June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium Recovery Facility)	)	
	)	

NRC STAFF'S INITIAL TESTIMONY

Introduction

Q1: Please state your name, position, and employer, and briefly describe your role in reviewing Powertech's application for a license related to the Dewey-Burdock Project.

A1a: My name is Haimanot Yilma. I am Environmental Project Manager in the NRC's Office of Federal and State Materials and Environmental Management Programs. Ex. NRC-003 provides a statement of my professional qualifications. I served as the Project Manager for the Staff's environmental review of the Dewey-Burdock application. In this capacity I was responsible for overseeing the development of the Final Supplement Environmental Impact Statement for the Dewey-Burdock Project. I was also responsible for carrying out NHPA-related activities, such as consulting with interested American Indian tribes.

A1b: My name is Kellee Jamerson. I am an Environmental Scientist in the NRC's Office of Federal and State Materials and Environmental Management Programs. Ex. NRC-004 provides a statement of my professional qualifications. For the Dewey-Burdock

application, I served as the alternate Project Manager for the Staff's environmental review. Along with Ms. Yilma, I shared responsibility for overseeing the preparation of the Final Supplement Environmental Impact Statement.

A1c: My name is Thomas Lancaster. I am a Hydrogeologist with the Uranium Recovery Licensing Branch in the NRC's Office of Federal, State and Materials and Environmental Management programs. Ex. NRC-005 provides a statement of my professional qualifications. I was the Hydrogeologist and alternate Project Manager for the Staff's safety review of the Dewey-Burdock application. Although I did not contribute directly to the FSEIS, I reviewed the FSEIS to ensure consistency with the Staff's technical findings in its Safety Evaluation Report. I am therefore familiar with the FSEIS, particularly with the FSEIS sections addressing baseline groundwater quality, hydrogeology, and groundwater consumption.

A1d: My name is James Prikyl. I am a Senior Research Scientist in the Geosciences and Engineering Division of the Southwest Research Institute. Ex. NRC-006 provides a statement of my professional qualifications. For the Dewey-Burdock application, the Southwest Research Institute provided contract support to the NRC Staff in its preparation of the FSISE. I was lead reviewer on the Staff analyses of land use, noise, visual and scenic impacts, cost/benefit analysis, and cumulative impacts. I helped prepare FSEIS sections addressing geology and soils, water resources, socioeconomics, cultural and historic resources, and environmental monitoring measures.

A1fe: My name is Amy Hester. I am a Research Scientist in the Geosciences and Engineering Division of the Southwest Research Institute. Ex. NRC-006 provides a statement of my professional qualifications. I was directly involved in preparing the Dewey-Burdock FSEIS. I was the primary author of the ecology section in the FSEIS, and I contributed to the socioeconomics section of the FSEIS.

Q2: Are you familiar with the admitted contentions in this hearing, which were filed by the Consolidated Intervenors and the Oglala Sioux Tribe?

A2: Yes. We have reviewed the Consolidated Intervenors' and the Oglala Sioux Tribe's contentions challenging both the FSEIS and the Draft Supplemental Environmental Impact Statement (DSEIS) issued by the NRC Staff. We have also reviewed the contentions the Consolidated Intervenors and the Oglala Sioux Tribe filed with their hearing requests. In addition, we have reviewed all documents cited by the Consolidated Intervenors or the Oglala Sioux Tribe that pertain to the contentions on which we will be testifying.

Q3: What are the contentions on which you will be testifying?

A3a: (H. Yilma) I will be testifying on Contentions 1 (Cultural Resources), 6 (Mitigation Measures), 9 (Related Licensing Actions), and 14 (Wildlife).

A3b: (K. Jamerson) I will be testifying on Contentions 1 (Cultural Resources), 6 (Mitigation Measures), and 9 (Related Licensing Actions).

A3c: (T. Lancaster) I will be testifying on Contentions 2 (Baseline Groundwater Quality), 3 (Hydrogeology), and 4 (Groundwater Consumption).

A3d: (J. Prikryl) I will be testifying on Contentions 2 (Baseline Groundwater Quality), 3 (Hydrogeology), 4 (Groundwater Consumption), and 9 (Mitigation Measures).

A3e: (A. Hester) I will be testifying on Contention 14 (Wildlife).

Contention 1A: The Staff Evaluated Impacts to Historic Properties as Required under NEPA and the NHPA

Q1.1: In Contention 1A, the Intervenors argue that the Staff failed to comply with laws governing the protection of historic and cultural properties. Can you address this claim?

A1.1: (H. Yilma, K. Jamerson) The Intervenors argue that the Staff violated NEPA and the NHPA. Neither statute, however, provides absolute protection for historic or cultural properties. NEPA requires only that the Staff take a hard look at how the federal agency's proposed action—in this case, the Staff's issuance of a license to Powertech—may affect such resources. Under the NHPA, the Staff must make a reasonable and good faith attempt to identify properties eligible or potentially eligible for listing on the National Register of Historic Places (the National Register). NRC-047. The Staff must assess impacts to such properties and attempt to resolve those impacts by, for example, taking steps to avoid, minimize, or mitigate the impacts. In some cases, however, adverse impacts to eligible or potentially eligible properties cannot be avoided, and the NHPA does not necessarily require that the agency avoid such impacts.

Q1.2 What steps did the Staff take to identify historic or cultural properties that may be affected by the Dewey-Burdock Project?

A1.2: (H. Yilma; K. Jamerson) Numerous steps. Initially, we reviewed the Level III archeological survey of the Dewey-Burdock site that Powertech submitted with its application for an NRC license. Ex. APP-009; Ex. NRC-072; NRC-073. We also reviewed evaluative testing on 20 sites within the Dewey-Burdock boundary that Powertech performed in 2011. Ex. NRC-136-A; NRC- 136-B; NRC-136-C. We later arranged for field surveys of the Dewey-Burdock site, under which American Indian tribes with a historical presence in the Dewey-Burdock area could survey the site for properties of significance to each tribe. We then considered the results of these surveys in our NEPA and NHPA reviews In addition, in consultation with the South Dakota State Historic Preservation Office (SHPO) and other parties, we considered visual and auditory impacts to historic properties that may be affected by the Dewey-Burdock Project. The Staff considered the information from all these studies, as well

as comments provided by consulting parties and the general public, when assessing impacts to cultural resources under NEPA and NHPA.

Q1.3: Can you provide more specific information on these studies?

A1.3: (H. Yilma, K. Jamerson) Yes. We provide more information on these studies below.

Class III Archaeological Investigations: Powertech's contractor, the Archaeology Laboratory of Augustana College, conducted a Level III survey of 4,172 ha [10,311 ac] at the Dewey-Burdock site between April and August 2007. Augustana College surveyed an additional 526 ha [1,300 ac] between July and September 2008. Ex. NRC-072 at 1.2-4.18; NRC-073 at 5.53–5.106; Ex. APP-009. Augustana's field methodology followed South Dakota and federal standards for the management and protection of cultural resources. The South Dakota State Historic Preservation Office defines a Level III cultural resources survey as follows:

> Level III: 100 Percent Survey. Level III surveys require a visual inspection of the project APE. Survey transects must be no more than 30 meters (100 feet) apart. The report must explain survey methods and the rationale for their use, for instance, why the archaeologist did or did not conduct subsurface testing.

Ex. NRC-072 at 4.10-4.11.

Augustana College conducted pedestrian reconnaissance of the Dewey-Burdock area using parallel linear transects and maintaining distances of less than 30 m (98.43 ft) between field personnel. In certain instances, Augustana College adjusted its survey strategy in order to allow for more detailed examination of areas possessing a higher potential for archeological sites. Augustana College completed archeological site and historic structure forms for newly documented cultural resources, in accordance with established South Dakota guidelines. During its 2007 and 2008 field investigations, Augustana College performed evaluative testing at 43 sites. In 2011, Augustana College performed additional evaluative testing at 20 sites it had not evaluated during their earlier surveys. Ex. NRC-136-A; NRC-136-B; NRC-136-C.

Tribal Surveys: In April and May 2013, seven tribes participated in field surveys of the Dewey-Burdock site. Ex. NRC-018-B at 11; Ex. NRC-008-B at 3-87; Ex. NRC-008-B at F-1–F-2. The tribes conducted the field surveys using conventional transect survey methods, with individual team members following parallel transects across designated survey areas. Transect intervals between individual surveyors typically ranged from 20 to 100 m [66 to 328 ft], with surveyors sometimes following a zig-zag-like path along individual transects to improve overall coverage. Transect intervals were varied to accommodate work in areas with dense timber and in steep or deeply dissected terrain where it was either difficult or impossible to maintain visual contact between individual surveyors. Tribal participants following transect surveys alerted fellow team members when they identified a potential site, and all or part of the survey team would then gather to explore the immediate location of the site. The tribal participants recorded the locations of discoveries using GPS equipment capable of recording site locations with sub-meter accuracy. Participants took photographs of sites and recorded descriptive notes. Ex. NRC-008-B at F-2–F-4.

Visual Impact Assessment: In consultation with the South Dakota SHPO and other parties with whom it was consulting under the NHPA, the Staff assessed potential visual impacts on properties listed in or eligible for listing on the National Register. Ex. NRC-008-A at 3-91 through 3-93; Ex. NRC-008-A at 4-177 through 181; Ex. NRC-018-B at 4, 6. Specifically, the Staff considered whether the Dewey-Burdock Project could visually diminish the integrity of historic properties. Consistent with the NHPA's regulation at 36 C.F.R. § 800.5(a)(1), when considering visual effects the Staff took into account the location, design, setting, materials, workmanship, feeling, and association of each historic property. The Staff assessed visual impacts to historic properties situated within a 4.8 km [3-mi] radius of the tallest or most prominent building within each proposed processing facility in the Dewey and Burdock areas. FSEIS Section 3.9.2,

Figure 3.9-1. The Staff decided on a 4.8 km [3-mi] radius for assessing visual effects based on (i) consultation with the South Dakota SHPO, (ii) consultation with the U.S. Bureau of Land Management, and (iii) a previous visual assessment completed for the Dakota, Minnesota, and Eastern Railroad's Powder River Basin Expansion project. Ex. NRC-060. Because the Dewey-Burdock site is close to Wyoming, the Staff also consulted with the Wyoming SHPO on using a 4.8 km [3-mi] radius for its visual impacts assessment. The Wyoming SHPO agreed with the Staff's proposed approach for assessing visual impacts. Ex. NRC-026.

Auditory Impact Assessment: The Staff also considered whether auditory changes to the Dewey-Burdock Project area could affect historic properties located within 1000 feet (305 meters) from specific noise-generating activities at the site. None of the historic properties identified at the Dewey-Burdock site is less than 1800 feet (549 meters) from the nearest processing facility. Accordingly, the Staff concluded that auditory impacts to historic properties would be small. Ex. NRC-008-A at 4-181 through 4-182.

Q1.4: Describe the Staff's NEPA and NHPA analyses of the field survey results.

A1.4: (H. Yilma; K. Jamerson) The Staff evaluated the results of the archaeological and tribal surveys to identify historic properties at the Dewey-Burdock ISR Project site. Ex. NRC-008-A at Section 3.9.3 and Section 4.9. The Staff applied the criteria at 36 C.F.R. § 60.4(a)–(d) in making its recommendations for listing sites on the National Register. These criteria are: (A) association with significant events in history; (B) association with the lives of persons significant in the past; (C) embodiment of distinctive characteristics of type, period, or construction; and (D) sites or places that have yielded or are likely to yield important information. "National Register Evaluation Criteria, Advisory Council on Historic Preservation." Ex. NRC-027; Ex NRC-145.

Q1.5: Did the Staff seek other archeological, ethnographic, ethno-historical, or oral sources of information when identifying, evaluating, and assessing adverse impacts to historic properties?

A1.5: (H. Yilma; K. Jamerson) Yes. The Staff initiated its consultation efforts under Section 106 of the NHPA in March 2010, with a follow-up letter in September 2010. Ex. NRC-0021; NRC-00-22. In those letters, the Staff specifically asked the tribes to help identify properties of religious or cultural significance to them.

The Staff held several consultation meetings with interested tribes. Over February 14-15, 2012, the Staff held one such meeting in Rapid City, South Dakota. The purpose of the meeting was to identify the types of historic properties of significance to tribes that could potentially be affected by the Dewey-Burdock project. Tribal representatives made an oral presentation on identifying landforms expected in the Dewey-Burdock Project area that could be associated with tribal sites. In a closed portion of the meeting, the tribal representatives also presented an overview of tribal cosmology that described the types of sites, their importance to many tribes, and the interrelationships between the physical, religious, and cultural spheres. Although the tribal presentation did not include detailed information on the meaning of religious, ceremonial, and spiritual sites, the Staff nonetheless gained an understanding of the importance of tribal historic properties that might be found in the Dewey-Burdock area. Ex. NRC-044; Ex. NRC-045.

The Staff also inquired about the willingness of tribal elders to provide information on historic properties known to the tribes through oral histories. Ex. NRC-071. None of the consulting tribes, however, expressed interest in participating in the collection of oral histories.

In addition, the Staff researched anthropological and archeological literature when preparing the cultural resources section of the FSEIS. In particular, the Staff

examined the cultural history of the Great Plains Indian tribes, with a specific focus on the lifeways of tribes in the Black Hills region. Ex. NRC-008-A at 3-73 through 74; and 3-85 through 3-87.

In June 2012, Powertech's consultant, SRI Foundation, provided an ethnographic summary of academic information on American Indian cultural sites. The Staff considered this information in both its NEPA and NHPA reviews. In its ethnographic summary, SRI explained what sites may be of traditional or cultural significance to tribes. SRI also identified the landscape features associated with the traditional cultural practices and spiritual beliefs of Northern Plains tribes associated with southwestern South Dakota. Additionally, SRI identified resource areas that are sacred to the Northern Plains tribes. Ex. NRC-008-A at 3-85 through 3-87; NRC-144.

Q1.6: Does the National Historic Preservation Act, its regulations at 36 C.F.R. Part 800, or U.S. National Park Service guidance require that an agency use specific methodologies to identify historic properties eligible, or potentially eligible, for listing on the National Register of Historic Places?

A1.6: (H. Yilma; K. Jamerson) No. Under regulations published by the Advisory Council on Historic Preservation (ACHP), the agency charged with administering the NHPA, an agency may use any of several methods to identify properties. For example, the agency may use "background research, consultation, oral history interviews, sample field investigation, and field survey[s]." 36 C.F.R. § 800.4(b)(1). The ACHP's guidance also makes clear that an agency need not use any particular method to identify historic properties. Ex. APP-006. For the Dewey-Burdock Project, however, the Staff used *all* of the methods stated in § 800.4(b)(1), except for oral history interviews, which we were unable to obtain. The Staff conducted background research, consulted with numerous tribes, reviewed the results of Powertech's Class III

survey and evaluative testing, and considered the results of the field surveys conducted by the tribes in April and May 2013.

Q1.7: Can you provide more information on the field surveys conducted by consulting Indian tribes?

A1.7: (H. Yilma; K. Jamerson) In April and May 2013, seven consulting tribes participated in field surveys of the Dewey-Burdock site: the Northern Arapaho Tribe, Northern Cheyenne Tribe, Turtle Mountain Band of Chippewa Indians, Crow Creek Sioux Tribe, Cheyenne and Arapaho Tribes of Oklahoma, Crow Nation, and Santee Sioux Tribe. The Staff received detailed written reports with National Register eligibility recommendations from three of the tribes that participated in the field surveys (the Northern Arapaho Tribe, Northern Cheyenne Tribe, and Cheyenne and Arapaho Tribes of Oklahoma). The Crow Nation provided the Staff with field notes identifying sites of interest to its members. The survey reports prepared by the tribes, along with the maps recording the location of the properties identified during the tribal cultural surveys, are maintained by the NRC and at each of the respective tribal offices. Ex. NRC-018-B at 11; Ex. NRC-008-B at 3-87; Ex. NRC-008-B at F-1 through F-2.

Q1.8: The Intervenors argue that the tribal field surveys of the Dewey-Burdock site lacked a scientifically defensible methodology and, for that reason, were insufficient to identify historic properties. Is this correct?

A1.8: (H. Yilma; K. Jamerson) Certainly not. As the ACHP explains in its NHPA-implementing regulations, "[t]he agency official shall acknowledge that Indian tribes and Native Hawaiian organizations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to them." 36 C.F.R. § 800.4(c)(1). The Staff arranged for individual tribal surveys of the Dewey-Burdock site because this approach allowed each tribe to survey the site using a methodology appropriate to identifying properties significant to the tribe. During the

Staff's consultations under the NHPA, a number of tribes told us that only their members could identify sites of religious or ceremonial significance to them. Ex. NRC-064; NRC-066; NRC-067. For example, John Yellow Bird Steele, President of the Oglala Sioux Tribe, stated, "It is self-evident that each tribe will have expertise in recognizing its own sacred sites. The Oglala Sioux Tribe strongly objects to the use of persons without any expertise in Sioux TCP to identify Sioux TCP." Ex. NRC-064 at 2. Furthermore, the individual survey approach is one that other federal agencies have used to help identify historic properties of interest to tribes. Ex. NRC-071; NRC-060.

Q1.9: The Standing Rock Sioux Tribe argues that the entire Dewey-Burdock license area should have been surveyed, eliminating the need to develop a Programmatic Agreement for the Dewey-Burdock Project. Did tribal survey teams have access to the entire project area?

A1.9: (H. Yilma; K. Jamerson) Yes, they had access to the entire project area. As the Staff stated in an email to the Oglala Sioux Tribe:

> Any Tribe interested in examining areas of their choosing within the proposed Dewey-Burdock license area may do so during the period April 1 to May 1, 2013. Although Tribal representatives are encouraged to focus their efforts on those portions of the proposed license area that will actually be disturbed by the project, they may visit any place within the license boundary that they wish to examine within the allowable time.

Ex. NRC-068 at 2. In fact, the participating tribal survey teams surveyed approximately 95 percent of the entire project area within the Dewey-Burdock site boundary. Areas with open pit uranium mines and spoil piles from past mining activity were toured by vehicle, but tribal participants did not conduct pedestrian surveys of these areas due to the low potential for locating undisturbed sites. Ex NRC-008-B at F-2 through F-30.

Q1.10: Did the Standing Rock Sioux Tribe participate in the field surveys of the Dewey-Burdock site?

A1.10: (H. Yilma, K. Jamerson) They did not.

Q1.11: Did the Oglala Sioux Tribe participate in the field surveys?

A1.11: (H. Yilma, K. Jamerson) No. The Oglala Sioux Tribe initially accepted the Staff's invitation to participate in the tribal surveys. Exs. NRC-146; NRC-147. Several weeks before the survey began, however, they informed the Staff that they would be unable to survey the Dewey-Burdock site during the scheduled timeframe. Ex. NRC-148.

Q1.12: When and why did the Staff decide that a Programmatic Agreement should be developed for the Dewey-Burdock Project?

A1.12: (H. Yilma; K. Jamerson) Powertech has proposed a phased approach to developing wellfields at the Dewey-Burdock site. This approach is standard in the ISR industry. For this reason, the Staff worked with the consulting parties to prepare a Programmatic Agreement for the site. The Staff advised the consulting tribes that it would develop a Programmatic Agreement in consultation with them. Ex. NRC-055 at 2. The Staff explained that the use of a phased approach to comply with the NHPA is allowed by the ACHP's regulations at 36 CFR § 800.14(b)(b). At the same time, the Staff reiterated that it intended to continue consulting with the tribes as it developed the Programmatic Agreement.

The Programmatic Agreement for the Dewey-Burdock Project was executed on April 7, 2014 with the signature of John Fowler, Executive Director of the ACHP. Exs. NRC-018-A; NRC-018-B; NRC-018-C; NRC-018-D; NRC-018-E; NRC-018-F; NRC-018-G; NRC-018-H. As a result, the Staff will complete its NHPA-related obligations as set forth in the Programmatic Agreement. The Programmatic Agreement will protect not only those historic and cultural properties that may be affected during the initial phase of the Dewey-Burdock Project, but also properties potentially affected by future phases of the project.

Contention 1B: The Staff Consulted Extensively and in Good Faith with Interested Tribes

Q1.13: In Contention 1B, the Intervenors argue that the Staff failed to consult with all interested tribes as required by federal law. Did the Staff consult as required under the NHPA?

A1.13: (H. Yilma; K. Jamerson) Yes. The Staff consulted extensively, and in good faith, with interested tribes concerning historic resources at the Dewey-Burdock site. Ex. NRC-015 provides a chronology of our consultations under the NHPA. As reflected in this exhibit, since 2010 the Staff has consulted on all issues arising under the NHPA.

This is not merely the Staff's view. The ACHP, the agency charged with administering the NHPA, signed the Programmatic Agreement for the Dewey-Burdock Project because it found that the Staff had consulted as required under the NHPA. Ex. NRC-018-D. In a letter to the Standing Rock Sioux Tribe, the ACHP stated that "based on the background documentation, the issues addressed during consultation, and the processes established in the [Programmatic Agreement], the ACHP has concluded that the content and spirit of the Section 106 process has been met by the NRC." Ex. NRC-031. In addition, the South Dakota SHPO signed the Programmatic Agreement for the Dewey-Burdock Project, demonstrating that it found acceptable the Staff's consultation efforts under the NHPA. Ex. NRC-018-G.

Q1.14: Can you address the specific steps the Staff took when consulting under the NHPA?

A1.14: (H. Yilma, K. Jamerson) We summarize our extensive consultation efforts in the *Dewey-Burdock ISR Project Section 106/Tribal Outreach Efforts Timeline* (Ex. NRC-015). As reflected in this summary, we consulted with interested tribes between March 19, 2010, when we sent initial consultation letters to 17 tribes, and April 7, 2014, when we finalized the Programmatic Agreement for the Dewey-Burdock Project. We would

emphasize that this timeline does not include the entirety of the Staff's consultation efforts. In addition to the communications we identify in the timeline, we made numerous phone calls throughout our consultation with the tribes to discuss issues related to the NHPA. We also received numerous calls from tribal representatives seeking to discuss NHPA-related issues.

Q1.15: The Intervenors argue that the Staff failed to consult on a government-to-government basis with interested tribes. Can you address this argument?

A1.15: (H. Yilma, K. Jamerson) Throughout our NHPA consultations, we consulted with tribes on a government-to-government basis. We consulted only with individuals whom the tribes had designated as their representatives on issues arising under the NHPA. In most cases, that involved consulting with Tribal Historic Preservation Officers or other personnel designated by the tribes to address NHPA-related issues. As reflected in our consultation timeline (Ex. NRC-015), we did not seek to circumvent tribal leadership by consulting with individuals who were unauthorized by the tribes to speak on NHPA-related issues. We also routinely copied tribal leaders on significant correspondence related to our NHPA review. In addition, we attempted to meet with tribal leaders in person to discuss issues arising under the NHPA. We held a consultation meeting in Rapid City, South Dakota, for this very purpose. Ex. NRC-143.

Q1.16: Did you consult with interested tribes when developing the Programmatic Agreement for the Dewey-Burdock Project?

A1.16: (H. Yilma; K. Jamerson) Yes. By letter dated September 18, 2012 (Ex. NRC-055), the Staff agreed to develop a Programmatic Agreement in consultation with the Tribes. In a December 14, 2012 letter, we invited the tribes to provide information relevant to the development of the Programmatic Agreement. Ex. NRC-024. In August 2013, we provided the tribes a draft outline for the Programmatic Agreement in advance of a November 2013 webinar to discuss the Agreement. In all, we held four webinars while

preparing the Programmatic Agreement, and we provided the tribes a revised copy of the Programmatic Agreement before each webinar. Ex. NRC-149; Ex. NRC-150. We would note that many of the revisions to the Programmatic Agreement took into account concerns that tribal representatives raised during the webinars.

Q1.17: Which consulting parties participated in the drafting of the Programmatic Agreement?

A1.17: (H. Yilma; K. Jamerson) The following consulting parties participated in the drafting of the programmatic agreement: the ACHP, the South Dakota SHPO Project Review Officer; the Bureau of Land Management (BLM) Montana Office; the BLM South Dakota Field Office; the Environmental Protection Agency's Region 8 Office; the Oglala Sioux Tribe; the Northern Cheyenne Tribe; the Cheyenne River Sioux Tribe; the Cheyenne and Arapaho Tribe; the Standing Rock Sioux Tribe; Powertech, and Powertech's consultant. Appendix A of the Programmatic Agreement contains a table identifying the participants in each webinar. Ex. NRC-018-B at 24.

Q1.18: How did the NRC incorporate suggestions made by the consulting parties?

A1.18: (H. Yilma; K. Jamerson) Before each webinar, each consulting party had the opportunity to submit comments to the Staff. For example, both the Standing Rock Sioux Tribe and the Oglala Sioux Tribe submitted written comments on the draft Programmatic Agreement. Exs. NRC-029, NRC-030; NRC-067; NRC-142. In response to the comments from the Standing Rock Sioux Tribe, the Staff made changes in National Register eligibility recommendations for properties in the Dewey-Burdock area. Based on these comments, the Staff also revised Stipulation 1 in the Draft Programmatic Agreement to allow tribes to revisit unevaluated sites where tribal features were identified *before* ground-disturbing activities take place. Ex. NRC-018-A at Stipulation 1.

Q1.19: Can you summarize the Staff's consultation efforts under the NHPA?

A1.19: (H. Yilma, K. Jamerson) Between March 2010 and April 2014 we consulted extensively with the tribes on a government-to-government basis. Ex. NRC-015. Among our efforts, we arranged for field surveys of the Dewey-Burdock site so that each consulting tribe could identify properties of particular significance to its members. We consulted with the tribes through face-to-face meetings in South Dakota, teleconferences, webinars, emails, and phone calls to individual tribal representatives. We also consulted with the tribes on every stage of our development of the Programmatic Agreement for the Dewey-Burdock Project. We consulted with the tribes on a government-to-government basis, interacting only with authorized tribal representatives and informing tribal leaders of significant steps in our NHPA review. We made reasonable and good faith efforts to consult under the NHPA, as reflected by the decisions of the ACHP and the South Dakota SHPO to join in the Programmatic Agreement for the Dewey-Burdock Project.

Contention 2: The Staff Adequately Analyzed Baseline Groundwater Quality

Q2.1: In Contention 2, the Intervenors argue that the FSEIS fails to include information needed to determine baseline groundwater quality. Where in the FSEIS does the Staff address baseline groundwater quality?

A2.1: (J. Prikryl, T. Lancaster) The Staff addresses baseline groundwater quality in Sections 3.5.3.5 and 7.3.4 of the FSEIS. The Staff provides additional information on baseline groundwater quality, in response to public comments on the DSEIS, in FSEIS Section E5.21.4, “Aquifer Exemption and Baseline Water Quality.”

Q2.2: The Intervenors argue that the FSEIS inadequately defines baseline groundwater quality and fails to demonstrate that groundwater samples were collected and analyzed in a scientifically defensible manner. In support of its arguments, the

Intervenors refer to paragraphs 57–75, 82–84, and 92–95 in Dr. Moran's Supplemental Declaration. The Intervenors also refer to Dr. Moran's Second Supplemental Declaration, in which he repeats essentially these same claims. Are you familiar with Dr. Moran's arguments?

A2.2: (J. Prikryl, T. Lancaster) Yes, we have reviewed Dr. Moran's three declarations in this hearing, as well as the specific arguments in the declarations.

Q2.3: In paragraphs 57–60, and 69 of his Supplemental Declaration, Dr. Moran argues that the DSEIS fails to define preoperational baseline water quality. He states that, accordingly, there is no method for the public or the NRC to evaluate the success or failure of either fluid containment or aquifer restoration. Can you address these arguments?

A2.3: (J. Prikryl, T. Lancaster) We strongly disagree with Dr. Moran's claim that preoperational baseline water quality is not defined in the FSEIS. The Staff summarizes Powertech's initial baseline groundwater quality sampling results in FSEIS Section 3.5.3.5. The Staff shows the wells included in the initial groundwater quality sampling in FSEIS Figure 3.5-2 and lists these wells in FSEIS Table 3.5-4. All of these wells are within 2 km [1.25 mi] of proposed wellfields. As the Staff explains in FSEIS Section 3.5.3.5, Powertech collected the groundwater quality samples from the wells specified in Table 3.5-4 between either July 2007–June 2008 or March 2008–February 2009 on either a quarterly or monthly basis. Based on the information provided, Powertech's approach for defining preoperational baseline water quality meets Criterion 7 in 10 C.F.R. Part 40, Appendix A. Under Criterion 7, at least one full year prior to any major site construction, the applicant or licensee must conduct a preoperational monitoring program to provide complete baseline data on a milling site and its environs**.**

Powertech's approach for defining preoperational baseline water quality is also consistent with NRC Regulatory Guide 4.14 (Ex. NRC-074). Regulatory Guide 4.14 recommends that groundwater samples "be collected quarterly from each well within two kilometers of the tailings area that is or could be used for drinking water, water for livestock, or crop irrigation." The staff developed this guidance because conventional mill "tailings areas" have the potential to be a source of contamination to groundwater. The use of the two-kilometer guideline was validated in NUREG/CR-6705, "Historical Case Analysis of Uranium Plume Attenuation" (Ex. NRC-076). Furthermore, the radius of 2 km [1.2 mi] from an ISR wellfield has been shown to be sufficient based on historical and current monitoring data from NRC-licensed sites. There are no reported instances of contamination of any monitored private wells within or beyond 2 km of an ISR wellfield at any sites historically or currently licensed by the NRC (Ex. NRC-075).

Based on these factors, the baseline groundwater quality data presented in FSEIS Section 3.5.3.5 is adequate to assess how the Dewey-Burdock Project may affect groundwater quality. NEPA requires the Staff to consider the reasonably foreseeable impacts of the Dewey-Burdock Project, not impacts that are speculative. The data on baseline water quality that the Staff considered when preparing the FSEIS allowed the Staff to characterize the environment that may be affected by the Dewey-Burdock Project and assess the Project's reasonably foreseeable impacts.

We would further note that, before operations at Dewey-Burdock begin, the NRC staff will require Powertech to conduct additional groundwater quality sampling to ensure that adequate groundwater quality data is available to evaluate long-term impacts and the success or failure of fluid containment and aquifer restoration. In FSEIS Section 7.3.4, "Groundwater Monitoring (Project-Wide)," the Staff explains that "all domestic and stock wells within 2 km [1.2 mi] of the wellfields and all monitoring wells will be sampled quarterly over a 1-year period to establish baseline water quality

before operations begin." This requirement is memorialized in Condition 12.10 of Powertech's license (Ex. NRC-012). As the Staff explains in FSEIS Section 7.3.1.1, "Commission-Approved Background – Production Zone," Commission-approved background groundwater quality will be established in accordance with Criterion 5B(5) in 10 C.F.R. Part 40, Appendix A, before Powertech begins uranium production in a wellfield. This is done to characterize water quality in monitoring wells used to detect lixiviant excursions and to establish standards for aquifer restoration after uranium recovery is complete. The methods for assessing Commission-approved background concentrations are memorialized in Condition 11.3 of Powertech's license (Ex. NRC-012).

Q2.4: In paragraphs 57 and 60 of his Supplemental Declaration, Dr. Moran claims that preoperational baseline groundwater data is needed to evaluate the impacts of past uranium mining activities on water resources—for example, to explain which specific water sources are contaminated by past mining activities and which represent naturally-contaminated waters. Can you address this argument?

A2.4: (J. Prikryl, T. Lancaster) Preoperational baseline is a general description of the existing environmental conditions within and adjacent to the project area. As such, preoperational baseline groundwater quality consists of a definition or evaluation of existing groundwater quality conditions. The purpose of defining preoperational baseline water quality is not to evaluate the impacts of past uranium mining activities on water resources. Preoperational baseline groundwater conditions are established as part of a project-wide groundwater monitoring program so that corrective actions can be taken if adverse water quality conditions resulting from the proposed action are detected.

Under regulations issued by the Council on Environmental Quality, the agency responsible for implementing the procedural provisions of NEPA, the environmental impacts that result from past actions are assessed as "cumulative effects" as defined in 40 C.F.R. § 1508.7. The Staff evaluates past actions, including past uranium mining activities and their potential environmental impacts, in Chapter 5 of the FSEIS. In other words, the Staff considered the information mentioned by Dr. Moran, but appropriately discussed this information in the context of cumulative impacts, rather than in the context of preoperational water quality.

Q2.5: In paragraph 58 of his Supplemental Declaration, Dr. Moran claims that the DSEIS repeatedly attempts to convey the impression that the Dewey-Burdock groundwater quality is already degraded, rather than compile statistically-defensible data for both the ore zones and non-mineralized zones. Is this correct?

A2.5: (J. Prikryl, T. Lancaster) We assume that Dr. Moran is basing his claim on the discussion in DSEIS Section 3.5.3.5, where the Staff compares groundwater quality results to the maximum contaminant levels (MCLs) for primary drinking water standards provided in EPA regulations at 40 C.F.R. Part 141. Here, the Staff is simply noting that water quality must already be degraded to some extent for Powertech to use the portion of an aquifer for ISR operations. As the Staff explains in the last paragraph of FSEIS Section 3.5.3.5, before operations begin the portion of the aquifer(s) designated for uranium recovery must be exempted from the underground source of drinking water (USDW) designation, in accordance with the Safe Drinking Water Act and pursuant to 40 C.F.R. Part 146. Comparing the groundwater quality results with MCLs for drinking water standards, as the Staff does in FSEIS Section 3.5.3.5, is therefore logical to inform the public as to whether existing conditions are

such that the water might be used as a source of drinking water for public or private use.

Q2.6: In paragraph 61 of his Supplemental Declaration, Dr. Moran asserts that Table 3.5-4 of the DSEIS is misleading and does not represent baseline groundwater quality because: (1) the table and discussion fail to make clear that many of these sites are contaminated by past, unremediated uranium mining and processing; (2) the table leaves out most of the important baseline constituents a competent baseline evaluation would include; and (3) the table leaves out any values below the MCLs. Can you address these claims?

A2.6: (J. Prikryl, T. Lancaster) As stated previously, the baseline groundwater quality data presented in FSEIS Section 3.5.3.5 is adequate to assess the environmental impacts of the proposed action on groundwater resources at the Dewey-Burdock site. Dr. Moran's specific concerns with FSEIS Table 3.5-4 are addressed below:

(1) With regard to Table 3.5-4 not identifying sites contaminated by past, unremediated uranium mining and processing, we address this issue in answer A2.4 above. To summarize, preoperational baseline is a general description of the existing environmental conditions within and adjacent to the project area. The purpose of defining preoperational baseline water quality is not to evaluate the impacts of past uranium mining activities on water resources. Under CEQ regulations, the environmental impacts that result from past actions are assessed as "cumulative effects" under 40 C.F.R. § 1508.7. The Staff considers past actions, including past uranium mining activities, and their potential environmental impacts in the cumulative impact assessment for the Dewey-Burdock Project in Chapter 5 of the FSEIS.

(2) With regard to Dr. Moran's claim that Table 3.5-4 leaves out most of the important baseline constituents a competent baseline evaluation would include, Table 3.5-4 includes baseline data for arsenic, lead, uranium, Ra-226, and gross alpha.

These are important baseline constituents for assessing the environmental, health, and safety impacts of ISR operations. The Staff also discusses other constituents that are important for assessing the environmental, health, and safety impacts of ISR operations in FSEIS Section 3.5.3.5. These constituents include metals such as selenium, radionuclides such as Rn-222, chemical constituents such as sulfate and sodium, and chemical parameters such as pH and total dissolved solids. In conclusion, the purpose of Table 3.5-4 is not to comprehensively address all groundwater constituents. Rather, with Table 3.5-4 the Staff intended to present pertinent information on constituents that are most likely to impact environmental health and safety.

(3) With regard to the table leaving out values below the MCLs, as described in the title to Table 3.5-4, "Baseline Groundwater Samples with Values Exceeding the Maximum Contaminant Level . . .", the table is intended to illustrate only wells that have constituent values exceeding MCLs. The Staff did this so that the reader can easily understand which wells have or do not have constituents exceeding primary drinking water standards as provided by EPA regulations at 40 C.F.R. Part 141.

Q2.7: In paragraph 62 of his Supplemental Declaration, Dr. Moran argues that the DSEIS's and Powertech's groundwater baseline data should include, as a minimum, the chemical constituents listed in Table 2.7.3.1 of NUREG-1569 (Ex. NRC-013 at p. 2-25) and FSEIS Table 7.3-1. In paragraphs 62–65, Dr. Moran identifies specific chemical constituents and parameters that he believes should be included in baseline water quality sampling. In paragraph 63, Dr. Moran argues that the actual list of baseline constituents should be based on analyses of pregnant solutions resulting from leach testing of the Dewey-Burdock ores and lixiviants. Can you address these related claims?

A2.7: (J. Prikryl, T. Lancaster) As stated previously, FSEIS Section 3.5.3.5 presents a *summary* of baseline water quality conditions and includes selected constituents that NRC staff deemed important to environmental health and safety. In this section the Staff did not intend to present all the information Dr. Moran identifies.

At the same time, the baseline groundwater quality data presented in Powertech's application *does* include analyses of all the chemical constituents listed in Table 2.7.3.1 of NUREG-1569 and FSEIS Table 7.3-1. For example, see Appendix 3.4-C, "Groundwater Quality Data," of Powertech's Environmental Report (Ex. APP-040-Z) and Appendix 2.7-G, "Groundwater Quality Summary Tables," of Powertech's Technical Report RAI Responses (Ex. APP-016-M). In fact, in paragraph 64 of his Supplemental Declaration, Dr. Moran cites Appendix 3.4-C of Powertech's Environmental Report, stating "It should be noted that almost all of these constituents were included in the data in Appendix 3.4-C of the Powertech ER." To be clear, the Staff considered both Appendix 3.4-C and Appendix 2.7-G when preparing the FSEIS, and the Staff took into account the data in these appendices when assessing the environmental impacts of the Dewey-Burdock Project. The Staff thus complied with NEPA, and it did not need to summarize all of these data in FSEIS Section 3.5.3.5.

Regarding Dr. Moran's argument that the list of baseline constituents should be based on analyses of pregnant solutions resulting from leach testing of ores and lixiviants, no leach testing on Dewey-Burdock ores was conducted. However, Table 2.2-1 of the GEIS (Ex. NRC-010-A at p. 2-7) provides a list of NRC-accepted constituents and water quality parameters that are expected to increase in concentration as the result of ISR activities and that are of concern to water use of an aquifer. Because this issue was analyzed generically in the GEIS, the Staff did not need to review analyses of pregnant solutions resulting from leach testing in order to assess the reasonably foreseeable impacts of the Dewey-Burdock Project. The Staff

would further note that Powertech measured all of the constituents and parameters listed in Table 2.2-1 of the GEIS as part of its baseline groundwater quality measurements. See for example, Appendix 3.4-C, "Groundwater Quality Data," of Powertech's Environmental Report (Ex. APP-040-Z); and Appendix 2.7-G, "Groundwater Quality Summary Tables," of Powertech's Technical Report RAI Responses (Ex. APP-016-M).

Q2.8: In paragraphs 66, 67, and 68, Dr. Moran alleges specific deficiencies with the analytical methods used to collect and analyze groundwater quality samples. Can you address his claims?

A2.8: (J. Prikryl, T. Lancaster) In these paragraphs Dr. Moran recommends additional or alternative methods for collecting and analyzing groundwater samples that he states will improve data quality. Dr. Moran does not, however, provide supporting analyses of the existing water quality data to show how these recommended methods will improve water quality determinations.

The NRC Staff reviewed the groundwater sampling methods and groundwater quality analytical results presented in Powertech's application and supporting documents (see Section 6.1.8.1 of Powertech's Environmental Report (Ex. APP-040-C) and Appendix 2.7-H of Powertech's Technical Report RAI Responses (Exs. APP-016-N, APP-016-O, APP-016-P, and APP-016-Q)). Based on its review, the Staff found that the sampling methods used to collect groundwater were consistent with standard industry practice. For example, as documented in Section 6.1.8.1 of Powertech's Environmental Report, permanent pumps were installed in wells and three well volumes were purged before the well water was sampled. With regard to analysis of groundwater samples, chemical constituents and parameters in the sampled well water were analyzed using appropriate EPA or ASTM standard methods, as documented in Appendix 2.7-H of Powertech's TR RAI Responses.

The Staff also found that the sampling and analytical methods used to determine baseline groundwater quality were consistent with Section 2.7.3 of NUREG-1569 (Ex. NRC-013). Section 2.7.3 of NUREG-1569 provides guidance that is relevant to an ISR applicant's submittal of both its Technical Report and Environmental Report. In particular, Section 2.7.3 explains how an applicant can comply with 10 C.F.R. § 51.45(b), which requires that the applicant submit an Environmental Report that provides, among other information, "a description of the environment affected." Because Powertech's sampling and analytical methods were consistent with those described in Section 2.7.3, the Staff found that the quality of the baseline groundwater data presented in the FSEIS was adequate for use in assessing the Dewey-Burdock Project's environmental impacts on groundwater resources.

Q2.9: In paragraph 69 of his Supplemental Declaration, Dr. Moran claims that the DSEIS Section 7.3.4, "Groundwater Monitoring (Project-Wide)," makes clear that baseline water quality will actually be established *after* operations begin. Is this correct?

A2.9: (J. Prikryl, T. Lancaster) That is not what the Staff states in FSEIS Section 7.3.4. In this section, the Staff describes Powertech's project-wide groundwater monitoring program. As stated in the second sentence of the first paragraph in this section, "Consistent with Regulatory Guide 4.14 (NRC, 1980), all domestic and stock wells within 2 km [1.2 mi] of the wellfields and all monitoring wells will be sampled quarterly over a 1-year period to establish baseline water quality *before* operations begin." (Emphasis added.)

Q2.10: In paragraphs 70 and 71 of his Supplemental Declaration, Dr. Moran claims that Powertech's 2009 Application documents, carried forward in the DSEIS, include what it incorrectly calls "baseline." Can you address this claim?

A2.10: (J. Prikryl, T. Lancaster) To support his claim, Dr. Moran misinterprets what is presented in the application to construct arguments about inadequate baseline data resulting from missing historical TVA data and biased baseline data resulting from the exclusion of data on groundwater constituents reported as PQLs (Practical Quantitation Limit) or "less than detection limits." We address these arguments below.

First, citing information provided in Section 2.7 of Powertech's Technical Report (2009), Dr. Moran argues that the NRC must require Powertech to statistically summarize all historic water quality data and all recently collected water quality data to define preoperational baseline water quality. The Staff does not need this type of summary to assess baseline water quality, and the additional information to which Dr. Moran refers would actually bias the data set. The Staff would emphasize that Powertech provided an analysis of historical water quality data collected by TVA, and recent water quality data collected at and near the Dewey-Burdock site, only to demonstrate the consistency of groundwater quality over time (see Section 2.7.3.2.4 of Ex. APP-021-B). Powertech did not intend for the historical TVA presented in Section 2.7.3.2.4 of its Technical Report to be used to define baseline groundwater conditions at the Dewey-Burdock site. As the Staff explains in our answer A2.4 above, preoperational baseline is a general description of the *existing* environmental conditions within and adjacent to the project area. For that reason, preoperational baseline groundwater data should not include data on historical groundwater conditions, which might bias the data set.

Second, Dr. Moran states that the groundwater quality data results and statistics presented in Appendices 2.7-G, "Groundwater Quality Data," and 2.7-H, "Statistics for Groundwater Constituents at or above PQL by Constituent," of Powertech's Technical Report do not include "qualified values"; that is, data reported as "less than" some concentration. Dr. Moran argues that deleting the "less than" values severely biases

the data set, rendering it useless as a reliable source for evaluating baseline conditions. Dr. Moran also argues that baseline data should be segregated and reported by water-bearing unit.

In order to perform an independent, statistically valid analysis of groundwater quality, the Staff requested that Powertech report groundwater quality values for constituents below the minimum detection limit collected during its preoperational monitoring program as "less than" the PQL (see TR RAI 2.7-15 of Ex. APP-016-C at pp. 224–225). In response, Powertech provided a revised Appendix 2.7-G, "Groundwater Quality Summary Tables" (Ex. APP-016-M). In its revised appendix, concentrations reported as "non-detect" (or less than the minimum detection limit) by the laboratory are reported as "< RL," where RL is the laboratory detection limit. In cases where the laboratory reported a numerical value less than the RL, the numerical results are provided along with the value of the RL, with a footnote explaining the reporting convention. The summary tables in the revised Appendix 2.7-G (Ex. APP-016-M) present the minimum, maximum, and mean concentrations for each parameter at each sample location. Means were calculated using a value of one half of the RL when non-detect data occurred. In addition, the groundwater quality summary tables provided at the beginning of revised Appendix 2.7-G report the mean, standard deviation, minimum, and maximum values for each constituent in four water-bearing zones monitored for preoperational baseline water quality. The monitored zones are the alluvium, Fall River Formation, Chilson Member of the Lakota Formation, and Unkpapa Sandstone. In conclusion, Powertech provided all the information identified by Dr. Moran, and the Staff considered this information in its NEPA review of the Dewey-Burdock application.

Q2.11: In paragraph 72 of his Supplemental Declaration, Dr. Moran argues that baseline issues are confused by Powertech's Supplement to the Application (August

2009) which states on page 3-3, "A minimum of eight baseline water quality wells will be installed in the ore zone in the planned wellfield area." Can you address his claim?

A2.11: (J. Prikryl, T. Lancaster) The statement that Dr. Moran refers to is describing groundwater sampling that will be conducted prior to operations in individual wellfields to establish wellfield aquifer restoration goals and upper control limits for excursion monitoring (*i.e.*, Commission-approved background groundwater quality). In FSEIS Section 7.3.1, the Staff describes the wellfield groundwater monitoring program to be implemented at the project site. As the Staff explains, in accordance with Criterion 5B(5) in 10 CFR Part 40, Appendix A, Commission-approved background groundwater quality values must be established before beginning uranium production in a wellfield. This is done to characterize the water quality in monitoring wells that are used to detect any lixiviant excursions from the production zone. This is also done to establish standards for aquifer restoration after uranium recovery is complete. Dr. Moran fails to recognize that the groundwater sampling program conducted as part of the wellfield groundwater monitoring program, as described in FSEIS Section 7.3.1.1, is different from the preoperational baseline groundwater monitoring program described in FSEIS Section 3.5.3.5.

Q2.12: In paragraph 74, Dr. Moran argues that the DSEIS should contain baseline groundwater quality data from all known wells within at least 2 miles of the Dewey-Burdock boundary. Is he correct?

A2.12: (J. Prikryl, T. Lancaster) Dr. Moran fails to explain why, in order to assess the reasonably foreseeable impacts of the Dewey-Burdock Project, the Staff needed to obtain baseline groundwater quality data from all wells within 2 miles of the project boundary. As discussed in A2.3, the wells included in Powertech's baseline groundwater quality sampling are shown in FSEIS Figure 3.5-2 and listed in FSEIS

Table 3.5-4. All of these wells are within 2 km [1.25 mi] of proposed wellfields. Powertech's approach for defining preoperational baseline water quality is consistent with NRC Regulatory Guide 4.14 (Ex. NRC-074). NRC Regulatory Guide 4.14 recommends that groundwater samples "be collected quarterly from each well within two kilometers of the tailings area that is or could be used for drinking water, water for livestock, or crop irrigation." The staff developed this guidance because conventional mill "tailings areas" have the potential to be a source of contamination to groundwater. The use of the two-kilometer guideline was validated in NUREG/CR-6705, "Historical Case Analysis of Uranium Plume Attenuation" (Ex. NRC-076). This report examined radiological plume dispersion from mill tailings disposal areas at Uranium Mill Tailings Remedial Action (UMTRA) sites in the United States. The report concluded that the average radiological plume dispersion at UMTRA sites is less than 2 km [1.2 mi] for the 10-20 ppb uranium plume contour, which includes upgradient and downgradient dispersion. Moreover, NUREG/CR-6705 demonstrated that the dispersion of non-radiological contaminants mimics that of radiological contaminants, with a shorter dispersion range that occurs due to the production of relatively insoluble compounds.

The 2 km [1.2 mi] guideline applied to licensed ISR facilities assumes each wellfield is a "temporary source area" of groundwater contamination during production and restoration phases. The temporary nature of groundwater disturbance at an ISR wellfield does not represent the same threat to groundwater as the continuing source of contamination at a mill tailings disposal area. Specifically, during the extraction and restoration phases at an ISR wellfield, the wellfield makes use of a bleed to create and inward gradient that prevents the movement of contamination outside the wellfield. Furthermore, the radius of 2 km [1.2 mi] from an ISR wellfield has been shown to be sufficient based on historical and current monitoring data from NRC licensed sites. There are no reported instances of contamination of any monitored private wells within

or beyond 2 km of an ISR wellfield at any sites historically or currently licensed by the NRC (Ex. NRC-075). For this reason, and based on the other considerations discussed above, the 2 km [1.2 mi] radius provides adequate protection of water in wells for domestic uses and livestock watering. With regard to NEPA, use of this radius allows the Staff to assess the reasonably foreseeable impacts of the Dewey-Burdock Project on water quality.

Q2.13 In paragraph 75 of his Supplemental Declaration, Dr. Moran argues that the DSEIS confusingly and incorrectly uses the terms "background" and "baseline" as having the same meaning. As an example, he cites DSEIS Table 7.3-1 and the discussion on DSEIS pages 7-8 through 7-11. Can you address his statements?

A2.13: (J. Prikryl, T. Lancaster) NRC recognizes that there is a distinction between the terms "background" and "baseline." In the FSEIS, the Staff uses "baseline" consistently to describe the environmental conditions defined by preoperational monitoring and sampling programs. For example, as described in FSEIS Section 3.12.1, "Baseline Radiological Conditions," the results of Powertech's preoperational baseline radiological monitoring program provide data on radiological conditions that will be used to evaluate future impacts on facility operations or accidental or unplanned releases (Ex. NRC-008-A at p. 3-104). Likewise the results of Powertech's preoperational or baseline groundwater quality sampling program provide data on project-wide groundwater conditions that will be used to evaluate future impacts on facility operations or accidental or unplanned releases.

On the other hand, the Staff uses "background" consistently in the FSEIS to describe the establishment of Commission-approved background water quality prior to commencing operations in individual wellfields. For example, in FSEIS Section 7.3.1 the Staff describes the wellfield groundwater monitoring program Powertech will implement at the Dewey-Burdock site. In FSEIS Section 7.3.1, the Staff further

explains that, in accordance with Criterion 5B(5) in Appendix A, Commission-approved background groundwater quality values must be established before beginning uranium production in a wellfield. This is done to characterize the water quality in monitoring wells that are used to detect lixiviant excursions from the production zone. This is also done to establish standards for aquifer restoration after uranium recovery is complete.

To summarize, Dr. Moran fails to recognize that the groundwater sampling program Powertech will conduct as part of its wellfield groundwater monitoring program differs from the preoperational baseline groundwater sampling program described in FSEIS Section 3.5.3.5.

Q2.14: In paragraphs 82, 83, and 84 of his Supplemental Declaration, Dr. Moran claims that a baseline spring and seep survey is not presented in the DSEIS. Can you respond to this claim?

A2.14: (J. Prikryl, T. Lancaster) The Staff requested information from Powertech on groundwater discharging from springs and unplugged exploration test holes at the Dewey Burdock site (see Exh. APP-016-C at TR RAI 2.7-9, pp. 201–211 and TR RAI 2.7-10 at p. 211). In response, Powertech provided details of site investigations and color infrared (CIR) imagery analysis to locate and evaluate areas of groundwater discharge within and surrounding the Dewey-Burdock site. The Staff summarizes this information in FSEIS Section 3.5.1. CIR imagery identified two springs along the Dewey Fault near the town of Dewey and approximately 2 km [1.2 mi] northwest of the project boundary; however, no springs were identified within the project boundary (see p. 3-21 in FSEIS Section 3.5.1). As described in the response to TR RAI 2.7-9 (p. 202), the springs identified by CIR imagery were verified by Powertech personnel and sampled for water quality. Although spring water quality data can be interpreted as representative of local groundwater quality, the springs along the Dewey Fault were not included in preoperational baseline groundwater quality sampling. This is justified

because of their distance from the project boundary and their position with respect to the local and regional hydraulic gradient (*i.e.*, the springs are neither upgradient nor downgradient of proposed project activities and uranium ore bodies).

Q2.15: In paragraphs 92 and 93 of his Supplemental Declaration, Dr. Moran argues that there are serious flaws with the approach for project-wide groundwater monitoring as defined in FSEIS Section 7.3.4. The specific flaws he alleges are that: (1) samples collected after operations begin cannot be considered true baseline; (2) the list of constituents to be monitored, as presented in DSEIS Table 7.3-1, is inadequate; (3) NRC Regulatory Guide 4.14 is inappropriate because it refers to uranium mill tailings, not ISR operations, and deals only with radiological effluent; and (4) sampling of these wells during operations is proposed to be done once per year, which is inadequate to note changes in water quality. Can you address these various claims?

A2.15: (J. Prikryl, T. Lancaster) The Staff disagrees with each of Dr. Moran's claims, for the following reasons:

(1) Dr. Moran claims that, under FSEIS Section 7.3.4, quarterly sampling to establish baseline water quality will occur after operations begin. This is not the case. The second sentence of the first paragraph in Section 7.3.4 states the following: "Consistent with Regulatory Guide 4.14 (NRC, 1980), all domestic and stock wells within 2 km [1.2 mi] of the wellfields and all monitoring wells will be sampled quarterly over a 1-year period to establish baseline water quality *before* operations begin." (Emphasis added.)

(2) Contrary to Dr. Moran's claim, the list of constituents to be monitored is adequate. The list of constituents in FSEIS Table 7.3-1 includes those constituents listed in Table 2.7.3-1, "Typical Baseline Water Quality Indicators to be Determined During Preoperational Data Collection," of NUREG-1569 (Ex. NRC-013) and Table

2.2-1, “Typical Baseline Water Quality Parameters and Indicators,” of the GEIS (Ex. NRC-010-A). Therefore, the list of constituents in Table 7.3-1 is consistent with NRC-accepted constituents that are expected to increase in concentration as a result of ISR activities and that are of concern to the water use of an aquifer.

(3) The Staff acknowledges that the NRC developed Regulatory Guide 4.14 (Ex. NRC-074) for radiological effluent and environmental monitoring at uranium mills. NRC Regulatory Guide 4.14 recommends that groundwater samples “be collected quarterly from each well within two kilometers of the tailings area that is or could be used for drinking water, water for livestock, or crop irrigation.” The staff developed this guidance because conventional mill “tailings areas” have the potential to be a source of contamination to groundwater. The use of the two-kilometer guideline was validated in NUREG/CR-6705, “Historical Case Analysis of Uranium Plume Attenuation” (Ex. NRC-076). In this report the NRC examined radiological plume dispersion from mill tailings disposal areas at UMTRA sites in the United States. The NRC concluded that the average radiological plume dispersion at UMTRA sites is less than 2 km [1.2 mi] for the 10–20 ppb uranium plume contour, which includes upgradient and downgradient dispersion. Moreover, NUREG/CR-6705 demonstrated that the dispersion of non-radiological contaminants mimics that of radiological contaminants, with a shorter dispersion range that occurs due to the production of relatively insoluble compounds.

As stated above, the 2 km [1.2 mi] guideline applied to licensed ISR facilities assumes each wellfield is a “temporary source area” of groundwater contamination during production and restoration phases. The temporary nature of groundwater disturbance at an ISR wellfield does not represent the same threat to groundwater as the continuing source of contamination at a mill tailings disposal area. Specifically, during the extraction and restoration phases at an ISR wellfield, the wellfield makes

use of a bleed to create an inward gradient that prevents the movement of contamination outside the wellfield. Furthermore, the radius of 2 km [1.2 mi] from an ISR wellfield has been shown to be sufficient based on historical and current monitoring data from NRC licensed sites. There are no reported instances of contamination of any monitored private wells within or beyond 2 km of an ISR wellfield at any site historically or currently licensed by the NRC (Ex. NRC-075). For this reason, and based on other considerations discussed previously, the 2 km [1.2 mi] radius provides adequate protection of water in wells for domestic uses and livestock watering. From a NEPA standpoint, this distance is also sufficient to assess the reasonably foreseeable impacts of an ISR project.

(4) The Staff acknowledges that, as part of its project-wide groundwater monitoring program, Powertech proposes to collect annual groundwater samples. Although Dr. Moran argues that annual sampling is inadequate to note changes in water quality, he provides no support for his claim. In fact, any changes in groundwater quality are most likely to be detected in monitoring wells surrounding and within the active wellfields at the Dewey-Burdock site. As the Staff explains in FSEIS Section 7.3.1.2, "Excursion Monitoring," Powertech proposes to sample monitoring wells surrounding and within active wellfields at the Dewey-Burdock site at approximately 2-week intervals, with samples at least 10 days apart (Ex. APP-040-C). In brief, Powertech's proposed monitoring is sufficient to capture any reasonably foreseeable changes in water quality.

Q2.16: In paragraph 94 of his Supplemental Declaration, Dr. Moran argues that the DSEIS fails to show that Powertech ever performed a detailed inventory of all wells at least 2 miles outside the proposed Dewey-Burdock boundary. He argues that such an inventory is needed to evaluate present and future impacts as part of any acceptable EIS. Do you agree?

A2.16: (J. Prikryl, T. Lancaster) In FSEIS Section 4.5.2.1.1.2.2 (p. 4-60), the Staff presents a summary of all wells within 2 km [1.2 mi] of the Dewey-Burdock site. The Staff based this inventory on the historical records and field investigations presented in Powertech's Environmental Report and Technical Report RAI Responses (Exs. APP-040-A, APP-016-B). The Staff cites these documents in FSEIS Section 4.5.2.1.1.2.2. Powertech's Technical Report RAI Responses provide detailed information on the well inventory, including locations plotted on maps, well use, and aquifer that the well is screened. (See the response in TR RAI P&R-10 at pages 34-43). This inventory of wells within 2 km [1.2 mi] of the Dewey-Burdock site is adequate to evaluate present and future environmental impacts of the proposed project. As we explain in A2.3 and A2.12 above, using a 2 km distance is consistent with Regulatory Guide 4.14 (Ex. NRC-074), which the NRC developed in part to help it assess the environmental impacts of uranium mills. Also as explained above, the use of the 2 km distance has proven sufficient for these purposes, and it is in fact a conservative distance for assessing impacts related to ISR projects, as opposed to uranium mills.

Q2.17: In paragraph 95 of his Supplemental Declaration, Dr. Moran points out that on page 7-8 of the DSEIS the Staff states that selected wells completed within the mineralized zones will be used to evaluate "baseline" water quality, after which they will be converted to injection and production wells. He suggests this is an admission that the DSEIS contained inadequate information on baseline quality. Is he correct?

A2.17: (J. Prikryl, T. Lancaster) After the Staff issued the DSEIS, it recognized that the term "baseline" was used in Section 7.3.1.1 to describe groundwater sampling that would be conducted to establish Commission-approved background in wellfields before beginning wellfield operations. The Staff acknowledges that the term "baseline" should not have been used in this context; rather, the term "background" should have been

used. The Staff revised this language before issuing the FSEIS. In FSEIS Section 7.3.1.1 (p. 7-8), the Staff correctly states that a subset of wells in the production zone that will later serve as injection or production wells will be used to establish Commission-approved "background." The Staff would again emphasize that the wells used to establish Commission-approved background are not part of Powertech's preoperational baseline water quality sampling program. These wells are drilled after license issuance, but prior to developing and operating wellfields, to establish aquifer restoration goals and UCLs for excursion monitoring in individual wellfields.

Q2.18: In Contention 2, the Intervenors also refer to a 2009 report from Dr. Richard Abitz. Dr. Abitz's report addresses Powertech's application for the Centennial Project in Weld County, Colorado. Nonetheless, the Intervenors rely on certain statements in his report. Dr. Abitz first argues that Powertech's application lacks details on the methodology for acquiring baseline groundwater quality data. Where in the FSEIS for the Dewey-Burdock application does the Staff address the methodology for acquiring baseline groundwater quality?

A2.18: (J. Prikryl, T. Lancaster) The Staff describes the method for acquiring baseline groundwater quality in FSEIS Section 3.5.3.5. As the Staff explains, Powertech followed guidance in NUREG-1569 (Ex. NRC-013) to establish preoperational or baseline groundwater conditions at the Dewey-Burdock site. The information presented in Powertech's application (Ex. APP-040-C) is consistent with the acceptance criteria for establishing baseline groundwater quality in Section 2.7.3(4) of NUREG-1569. These acceptance criteria state in part:

- a reasonably comprehensive chemical and radiochemical analysis of water samples should be obtained within and at locations away from the mineralized zone(s) to determine preoperational baseline conditions

- baseline water quality should be determined for the mineralized and surrounding aquifers and should include water quality parameters that are expected to increase in concentration as a result of ISR activities and that are of concern to the water use of the aquifer (*i.e.,* drinking water, etc.)
- the list of constituents to be sampled for baseline concentrations should be identified
- at least four sets of samples, spaced sufficiently in time to indicate seasonal variability, should be collected and analyzed for each listed constituent

Based on the sampling locations, the number of samples collected, the aquifers sampled, and the parameters analyzed—as presented in Powertech's application documents (Ex. APP-040-C) and as summarized in FSEIS Section 3.5.3.5 of the FSEIS— Powertech has provided sufficient details regarding its methodology for acquiring baseline groundwater quality at the Dewey-Burdock site.

Q2.19: The Intervenors also cite Dr. Abitz's comments on Powertech's proposed site characterization plan and standard operating procedures for monitoring well installation and field measurement parameters for the Centennial Project. These comments were made on behalf of Coloradoans Against Resource Destruction and questioned Powertech's proposed methods for baseline groundwater characterization. Does the FSEIS respond to the concerns Dr. Abitz raises?

A2.19: (J. Prikryl, T. Lancaster) Yes. In the FSEIS the Staff responds to comments from the Oglala Sioux Tribe setting forth claims Dr. Abitz made regarding the credibility of scientific methods employed to establish baseline groundwater quality. The Staff's responses can be found in FSEIS Section E5.21.4, "Aquifer Exemption and Baseline Water Quality"—see specifically the response to comment 127-000010 on pages E-138 and E-139. As the Staff explains, Powertech appropriately developed and implemented a preoperational groundwater monitoring program in accordance with

Criterion 7 in Appendix A of 10 C.F.R. Part 40. Powertech also followed guidance in NUREG-1569 to establish baseline groundwater quality conditions at the Dewey-Burdock site. Powertech's sampling methods, number of samples collected, and constituents analyzed are sufficient to define preoperational baseline groundwater conditions at the Dewey-Burdock site.

In addition, as we explain in our answer A2.8 above, the NRC Staff reviewed the groundwater sampling methods and groundwater quality analytical results presented in Powertech's application and supporting documents (see Section 6.1.8.1 of Powertech's Environmental Report (Ex. APP-040-C) and Appendix 2.7-H of Powertech's Technical Report RAI Responses (Exs. APP-016-N, APP-016-O, APP-016-P, and APP-016-Q)). Based on its review, the Staff found that the sampling methods Powertech used to collect groundwater were consistent with standard industry practice. For example, as documented in Section 6.1.8.1 of its Environmental Report, Powertech installed permanent pumps in wells and purged three well volumes before sampling the well water. Powertech analyzed the chemical constituents and parameters in the sampled well water using appropriate EPA or ASTM standard methods, as documented in Appendix 2.7-H of Powertech's TR RAI Responses.

The Staff would emphasize that Dr. Abitz based his comments on his review of documents associated with site characterization plans and procedures for the Centennial Project in Weld County, Colorado. To our knowledge, Dr. Abitz has not reviewed or commented on Powertech's Dewey-Burdock application or the SEIS the Staff prepared for the Dewey-Burdock Project. In other words, Dr. Abitz's claims do not relate directly to the information that Powertech submitted in connection with the Dewey-Burdock application, nor to the Dewey-Burdock FSEIS.

Contention 3: The Staff Took a Hard Look at the Hydrogeology of the Aquifers in which Powertech Plans to Operate

Q3.1: In Contention 3, the Intervenors argue that the FSEIS fails to include an adequate hydrogeological analysis to assess potential impacts to groundwater. Where in the FSEIS does the Staff address the hydrogeologic characteristics of the Dewey-Burdock project area?

A3.1: (J. Prikryl, T. Lancaster) In Section 3.4 of the FSEIS (Ex. NRC-008-A), the Staff describes the geological setting of the project area. The Staff describes the geology and stratigraphy of the Black Hills of western South Dakota and northeastern Wyoming (Section 3.4.1.1), as well as the geology of the Dewey-Burdock site (Section 3.4.1.2). The Staff discusses breccia pipes and artificial penetrations (*i.e.*, exploration boreholes) in FSEIS Section 3.4.1.2. In addition, in FSEIS Section 3.4.3 the Staff discusses the seismology of the Dewey-Burdock area, including the locations of faults and earthquake epicenters.

In FSEIS Section 3.5, "Water Resources," the Staff describes the hydrological setting of the Dewey-Burdock area. The Staff discusses surface waters (Section 3.5.1), wetlands (Section 3.5.2), and groundwater (Section 3.5.3). With regard to groundwater, the Staff describes regional aquifer systems (Section 3.5.3.1), aquifer systems in the vicinity of the Dewey-Burdock site (Section 3.5.3.2), uranium-bearing aquifers (Section 3.5.3.3), and other surrounding aquifers for water supply (Section 3.5.3.4).

The Staff provides additional information on, and analysis of, hydrogeological characterization in responses to public comments in Appendix E of the FSEIS. The Staff responds to comments concerning hydrogeologic characteristics in Section E.5.19, "Geology and Soils," and Section E.5.21, "Groundwater Resources." In

Section E.5.19, the Staff responds specifically to comments on the characterization of producing and confining units, Black Hills geology, and Dewey-Burdock geology. In Section E.5.21, the Staff responds specifically to concerns about groundwater consumptive use, *in-situ* recovery, and groundwater contamination; drawdown; aquifer exemptions; pump testing and hydrogeologic test packages; hydrologic site characterization; aquifer recharge; impacts to surrounding aquifers and springs; and exploratory boreholes and confinement.

Q3.2: The Intervenors argue that the FSEIS fails to provide detailed, site-specific information on the hydrogeologic characteristics of the relevant Dewey-Burdock water-bearing and other bounding geologic units, including the mineralized zones. In support of their arguments, the Intervenors cite to paragraphs 33–36, 39–48, 49, 54–56, 82–84, and 85 in Dr. Moran's Supplemental Declaration. The Intervenors also refer to Dr. Moran's Second Supplemental Declaration, which contains substantially the same paragraphs. Are you familiar with Dr. Moran's positions?

A3.2: (J. Prikryl, T. Lancaster) Yes. We have reviewed Dr. Moran's three declarations in this hearing, as well as the documents to which he refers in his declarations.

Q3.3: In paragraph 33 of his Supplemental Declaration, Dr. Moran claims that the DSEIS failed to provide detailed, site-specific information on the hydrogeologic characteristics of relevant Dewey-Burdock water-bearing and other bounding geologic units. Can you address this claim?

A3.3: (J. Prikryl) The Staff addresses the hydrologic characteristics of regional aquifer systems, aquifer systems in the vicinity of the proposed Dewey-Burdock project site, and uranium-bearing aquifers at the project site in FSEIS Sections 3.5.3.1, 3.5.3.2, and 3.5.3.3, respectively. When discussing the hydrologic characterization of regional aquifer systems, the Staff provides information on aquifer thicknesses, effective

porosities, and transmissivities (FSEIS Section 3.5.3.1). The Staff also provides a hydrologic characterization of aquifer systems in the vicinity of the Dewey-Burdock site, including information on thicknesses, transmissivities, and storativities of uranium-bearing aquifers and the thicknesses and hydraulic conductivities of confining units (Section 3.5.3.2). The Staff provides hydrologic information on directional groundwater flow and the hydraulic gradient within aquifers in FSEIS Section 3.5.3.2. Finally, in Section 3.5.3.3, the Staff provides information related to confinement of uranium-bearing aquifers at Dewey-Burdock site. As the Staff explains in Section 4.5.2.1 of the SEIS, the information in the aforementioned FSEIS sections adequately describes the hydrogeologic characteristics of the Dewey-Burdock production zone aquifers and confining units. With this information, the Staff was able to assess how the Dewey-Burdock Project might foreseeably affect groundwater resources.

Q3.4: In paragraph 33 of his Supplemental Declaration, Dr. Moran also cites pages 2-17 and 7-11 of the DSEIS to argue that long-term, detailed aquifer testing will not be performed until after the NRC license is issued. He claims that the Staff therefore fails to provide an adequate hydrogeological analysis. Can you address his claim?

A3.4: (J. Prikryl, T. Lancaster) The pages to which Dr. Moran refers describe aquifer pump tests and delineation drilling that Powertech will be required to perform prior to operations in each wellfield. Dr. Moran attempts to link the collection and submission of data associated with wellfield hydrogeologic test packages, as described in Section 2.1.1.1.2.3.4 of the SEIS, with the project-wide hydrogeologic information provided in Sections 3.4 and 3.5 of the SEIS to claim that the hydrogeological information in the SEIS is inadequate. We would first note that the Staff has responded to comments from the Oglala Sioux Tribe concerning aquifer pump testing that will be conducted by Powertech after license issuance. The Staff addresses this issue in its response to

comments 116-000007, 127-000006, and 127-000007 in FSEIS Section E.5.21.5. In its response, the Staff explains why the information from this pump testing is not available at this time, nor is it needed to comply with NEPA

To further address this claim, consistent with NRC regulations, it is standard practice for operators of NRC-licensed ISR facilities to submit wellfield hydrogeologic data packages (as described in FSEIS Section 2.1.1.1.2.3.4) after license issuance but prior to operating the wellfield. The wellfield hydrogeologic data packages provide (i) detailed information on production and injection well patterns and locations of monitor wells; (ii) documentation of wellfield geology (*e.g*., geologic cross sections and isopach maps of production zone sand and overlying and underlying confining units); (iii) pumping test results for each wellfield; and (iv) water quality data for each wellfield. These data must be obtained to demonstrate that the production and injection wells are hydraulically connected to the perimeter production zone monitor wells and hydraulically isolated from nonproduction zone monitor wells in underlying and overlying aquifer units. These data are also used to establish Commission-approved background water quality and upper contaminant levels (UCLs) in individual wellfields for aquifer restoration and excursion monitoring. The submission of wellfield hydrogeologic data packages at ISR facilities is required by a site-specific condition in the NRC license for the facility. In Powertech's case, Condition 10.10 of its license (Ex. NRC-012) stipulates the information Powertech must submit to the NRC for review and evaluation prior to operating in specific Dewey-Burdock wellfields. Based on the current information and this license condition, the Staff is able to comply with NEPA by assessing the reasonably foreseeable effects of the Dewey-Burdock Project on groundwater resources.

Q3.5: In paragraph 34 of his Supplemental Declaration, Dr. Moran claims that the data presented in the DSEIS are inadequate to reliably portray and predict the

following: (1) the baseline detailed direction of groundwater flow in relevant water bearing units; (2) the extent of long-term hydraulic connections between the various geologic units, both within and outside the project area; (3) the horizontal/regional extent of water level declines (and impacts on pumping rates) outside the project boundaries; (4) the degree to which groundwater withdrawals may impact local surface waters; (5) Powertech's ability to contain the migration of contaminants; and (6) Powertech's ability to restore aquifer water quality to baseline/acceptable conditions. Can you address these claims?

A3.5: (J. Prikryl, T. Lancaster) Certainly. We address these claims below.

(1) Potentiometric surface maps are typically constructed to portray the direction of groundwater flow in aquifers. As described in FSEIS Section 3.5.3.2, potentiometric surfaces for the Fall River and Chilson aquifers, which are the relevant water-bearing units at the Dewey-Burdock site, indicate that groundwater flows from northeast to southwest. This statement is based on potentiometric surface maps presented in Powertech's Technical Report (Ex. APP-015-B at Figure 2.7-16 and Figure 2.7-17). These potentiometric surface maps are adequate to portray the direction of groundwater flow in relevant water-bearing units.

(2) As the Staff explains in FSEIS Sections 3.4.1.2 and 3.4.3, regionally there are collapse features, faults, and other features that may provide communication between aquifers, such as the Inyan Kara, Minnelusa, and Madison. In FSEIS Section 3.5.3.1, the Staff discusses hydraulic communication between the Inyan Kara and Minnelusa Aquifers through breccia pipes. In Section 3.5.3.1 the Staff also discusses potential hydraulic communication between the Minnelusa and Madison Aquifers due to the absence of confining layers. Furthermore, in response to public comments on cross-contamination between aquifers, the Staff addresses the extent of long-term hydraulic connections between geologic units at the Dewey-Burdock site. We are

referring to the responses to comments 045-000004, 065-000001, 093-000002, 124-000001, and 136-000018 in FSEIS Section E5.21.2, “Concerns about In-Situ Recovery and Groundwater Contamination.”

Historic exploration borings, abandoned mine pits, and breccia pipes are potential pathways for groundwater movement at the Dewey-Burdock site. The Staff reviewed each of these potential pathways. The Staff presents information on historic exploration borings in the “Artificial Penetrations” section of the FSEIS at page 3-20 of the FSEIS. As the Staff explains in this section, Powertech cannot confirm that all historic borings were properly plugged and abandoned. However, as the Staff documents in FSEIS Section 4.5.2.1.1.2.2 at page 4-64, Powertech has committed to plugging abandoned boreholes before beginning operations in specific wellfields.

The Staff discusses breccia pipes in the “Breccia Pipes” subsection in FSEIS Section 3.5.3.1, at page 3-19 of the FSEIS. As the Staff explains, according to USGS Professional Paper 763, breccia pipes do not occur at the Dewey-Burdock site (Ex. NRC-081)). The Staff also provides information on abandoned mine pits in the eastern and northeastern parts of the Dewey Burdock site in FSEIS Section 3.2.3.

The aforementioned information is sufficient to characterize the Dewey-Burdock hydrogeology and predict the extent of long-term hydraulic connections between geologic units, both within and outside the Dewey-Burdock area.

(3) In the FSEIS the Staff also estimates the extent of water level declines (drawdown) in production zone aquifers outside the project boundaries based on numerical groundwater model simulations. The Staff addresses this issue more fully in its response to Contention 4, which specifically concerns drawdown, but we will also address it briefly here. As the Staff explains in FSEIS Section 4.5.2.1.1.2.2, Powertech developed a numerical groundwater model using site-specific parameters, and calibrated to historical pumping test data, to determine the impacts of operations

on domestic and stock wells outside the project boundary (Ex. APP-025). Powertech provides specific information on water-level elevations and observed drawdowns in pumping and observation wells in Appendix 2.7-B, "2008 Pump Tests: Results and Analysis," of its Technical Report RAI Responses (Ex. APP-016-M). Based on its numerical groundwater model simulations, Powertech estimated that the maximum drawdown outside the project area resulting from projected ISR operations would be approximately 3.65 m [12 ft] in the Fall River Aquifer and 3.05 m [10 ft] in the Chilson Aquifer (Ex. APP-025). The Staff discusses these drawdown estimates in FSEIS Section 4.5.2.1.1.2.2. These estimates replace the previous estimates of drawdown discussed in DSEIS Section 4.5.2.1.1.2.2. The previous estimates of drawdown in the DSEIS were based solely on aquifer parameters obtained from historical pumping test analyses (Ex. APP-021-B) and are more uncertain than the revised drawdown estimates documented in the FSEIS. These revised data are sufficient to predict the extent of water-level declines (and impacts on pumping rates) outside the Dewey-Burdock boundary.

(4) The information on local surface water in the FSEIS is sufficient to characterize the environment and predict the degree to which groundwater withdrawals may impact local surface waters. For example, in Section 3.5.1 the Staff provides information on streams within and outside the Dewey-Burdock project area, including location, type (perennial or ephemeral), flow direction, water quality, and class of use. Moreover, in Sections 3.5.1 and 3.5.2 the Staff provides information on the locations and characteristics of other surface water bodies such as springs, wetlands, and abandoned open pit mines. This information is sufficient to predict the extent of water level declines (and impacts on pumping rates) outside the Dewey-Burdock boundary.

(5) In Appendix E of the FSEIS, the Staff responds to comments from the Oglala Sioux concerning Powertech's ability to contain the migration of contaminants (see response to comments 042-000011, 093-000002, and 127-000013 in Section E5.13.3, "Historic Operational Experience: Excursions, Spills, and Leaks"). The Staff recognizes that there are potential hydrogeologic conditions at the Dewey-Burdock site that may result in the migration of contaminants, such as leakage through the Fuson Shale or to the ground surface through improperly plugged exploratory boreholes (see FSEIS Section 3.5.3). We would note that in Appendix E the Staff also responds to comments from the Tribe concerning groundwater migration through improperly plugged exploratory boreholes. For example, see the Staff's response to comment 127-000011 in Section E5.21.10, "Exploratory Boreholes and Confinement." We would further note that the Staff discusses the potential migration of contaminants due to hydrogeological conditions at the Dewey-Burdock site in FSEIS Section 4.5.2.1.1.2.2 (specifically the subsection on "Excursions and Groundwater Quality" at pages 4-60 to 4-65).

In addition, Powertech is bound by license condition 10.7 (Ex. NRC-012), which states that Powertech must maintain a net inward hydraulic gradient at a wellfield, as measured from the surrounding perimeter monitoring well ring, starting when lixiviant is first injected into the production zone and continuing until initiation of the stabilization period. As Staff explains in FSEIS Section 4.5.2.1.1.2.2, Powertech plans to maintain an inward hydraulic gradient in production aquifers during ISR operations by maintaining a 0.5 to 3 percent production bleed rate. The inward hydraulic gradients will ensure that groundwater flows toward the production zone and that horizontal excursions will not occur. In sum, the hydrogeologic data the Staff presents in FSEIS Sections 3.5.3 and 4.5.2.1.1.2.2 is sufficient to characterize the environment and predict Powertech's ability to contain the migration of contaminants.

(6) In FSEIS Appendix E, the Staff also responds to the Tribe's comments concerning Powertech's ability to restore aquifer water quality to baseline or otherwise acceptable conditions (see the response to comment 127-000015 under Section E5.9.4, "Groundwater Restoration Criteria and Methods"). Based in part on this comment, the Staff added information on NRC-approved aquifer restorations at NRC-licensed ISR facilities to FSEIS Section 4.5.2.1.1.3. Overall, the information in the FSEIS is sufficient to describe the environment and predict Powertech's ability to restore aquifer water quality to baseline/acceptable conditions.

Q.3.6: In paragraph 35 of his Supplemental Declaration, Dr. Moran claims that the inadequate hydrogeological data in the DSEIS (as described in paragraph 34) means that any groundwater flow simulations based on these data are likely to provide highly imprecise and unreliable predictions. Can you address this claim?

A3.6: (J. Prikryl, T. Lancaster) As described in our answers to the claims made by Dr. Moran in paragraph 34, the hydrogeological data the Staff presents in FSEIS is sufficient to assess how the Dewey-Burdock Project might affect groundwater resources. Powertech's numerical flow simulations, which utilize the information the Staff describes in the FSEIS, are a reliable predictive tool for assessing these impacts. In other words, the Staff has sufficient information to characterize the environment potentially affected by the Dewey-Burdock Project and assess the reasonably foreseeable impacts of the Project.

Q3.7: In paragraph 36 of his Supplemental Declaration, Dr. Moran claims that in addition to inadequate hydrogeological data, the lack of reliable baseline water quality data renders the NRC staff predictions about impacts to water resources largely meaningless. Can you address this claim?

A3.7: (J. Prikryl, T. Lancaster) This paragraph involves claims related to water quality, not hydrogeological analysis. In other words, the claims relate to Contention 2, not Contention 3.

Q3.8: In paragraphs 39 through 46 and 49, Dr. Moran claims the DSEIS avoids discussing definitively the likely hydraulic interconnections between the various Dewey-Burdock water-bearing units. Dr. Moran further claims that it is unlikely the ISR process waters can be contained within the project boundaries given the following pathways that connect the project area with surrounding aquifers: (1) sedimentary formations, (2) geologic fractures, (3) exploration boreholes, (4) mine workings, and (5) other anthropogenic fractures and borings. Can you address these claims?

A3.8: (J. Prikryl, T. Lancaster) The Staff disagrees with these claims. The FSEIS discloses and discusses all likely hydraulic interconnections between various Dewey-Burdock water-bearing units.

The Staff describes the regional and site-specific geologic and hydrologic properties of sedimentary formations in FSEIS Sections 3.4.1 and 3.5.3. In FSEIS Section 3.4.1.2, the Staff discusses breccia pipes and artificial penetrations (*i.e.,* exploratory boreholes). As the Staff explains in this section, Powertech cannot confirm that all historic borings were properly plugged and abandoned. As the Staff documents in FSEIS Section 4.5.2.1.1.2.2 at page 4-64, however, Powertech has committed to plugging boreholes before beginning operations in specific wellfields. Regarding breccia pipes, based on a review of information in USGS Professional Paper 763 (Ex. NRC-081), breccia pipes do not occur at the Dewey-Burdock site.

In Section 3.4.3, the Staff discusses faults within and surrounding the Dewey-Burdock site. As the Staff explains in this section, the Dewey Fault is located approximately 1.6 km [1 mi] north of the project boundary. Long Mountain Structural

Zone, which is located 11 km [7 mi] southeast of the project area, contains several small, shallow faults in the Inyan Kara Group. No faults have been identified within the proposed project area (Ex. NRC-082). Cross sections representing both the Dewey and Burdock areas that depict the geologic strata, potentiometric surfaces, and ore locations indicate that no faults or major joints are present in the project area. These cross sections are depicted in Exhibits 2.7-1a through 2.7-1j of Ex. APP-016-G.

In Section 3.2.3 of the FSEIS, the Staff discusses abandoned mine workings, and plugged and abandoned oil and gas test wells, within and surrounding the Dewey-Burdock site. As the Staff explains, Powertech has committed to not conducting uranium recovery operations in the Fall River Formation in the area of the surface and underground mines (Ex. APP-050). However, Powertech is considering conducting ISR operations in the underlying Chilson Aquifer in the area of the surface and underground mines (Ex. APP-050).

In Section 4.5.2.1.1.2.2 of the FSEIS, the Staff discusses in detail the distinctive man-made and hydrogeological features of the Dewey-Burdock site that could contribute to excursions (*i.e.*, the migration of ISR process fluids away from wellfields). These features include historical exploratory boreholes and hydraulic communication (*i.e.*, leakage) between the Fall River and Chilson Aquifers through the intervening Fuson Shale.

Based on the aforementioned information presented in the FSEIS, geologic and man-made features such as breccia pipes, faults, fractures, old oil and gas test wells, and old mine workings are not expected to provide pathways connecting production zone aquifers to surrounding aquifers. One possible exception is improperly installed or abandoned exploratory boreholes. The Staff took these boreholes into account when assessing the environmental impacts of the Dewey-Burdock Project, as reflected in FSEIS Section 4.5.2.1.1.2.2 at page 4-64.

Q3.9: In paragraphs 40 through 42 of his Supplemental Declaration, Dr. Moran also alleges that the sandstones of the Fall River and Lakota Formations that host the Dewey-Burdock uranium deposits inter-finger with finer-grained silts and shales. Dr. Moran states that such sedimentary packages typically allow groundwaters to flow between the inter-fingering facies when coarser sediments are stressed by long-term pumping. According to Dr. Moran, ore-bearing sandstones in typical sedimentary packages associated with roll-front uranium deposits therefore do not routinely behave as hydraulically isolated bodies. Dr. Moran also states that hydraulic interconnections are verified by conducting long-term aquifer tests integrated with water quality sampling. Can you address these points?

A3.9: (J. Prikryl, T. Lancaster) In the FSEIS the Staff takes into account the interbedded and inter-fingering nature of sediments within the Fall River and Chilson Aquifers that host the uranium ores at the Dewey-Burdock site. The Staff also takes into account that groundwater may flow between the interbedded sediments when stressed by long-term pumping. For example, as the Staff documents in FSEIS Section 2.1.1.1.2.3.2, in some areas of the Dewey-Burdock site multiple orebodies are stacked vertically with the Fall River Formation or the Chilson Member of the Lakota Formation with no substantial confining layers between the orebodies. In these areas, the stacked orebodies will be treated as a single production zone. For example, perimeter production zone monitor wells in these areas will be screened across the full thickness of the stacked orebodies in order to detect any potential excursion of process-related fluids.

In FSEIS Section 3.5.3.2, the Staff describes the hydrogeologic characteristics of the Fuson Shale, which separates the Fall River aquifer from the underlying Chilson

aquifer. In this section the Staff also describes aquifer pumping tests that demonstrated a hydraulic connection between the Fall River and Chilson Aquifers.

Regarding Dr. Moran's suggestion that Powertech should conduct aquifer pump testing to verify hydraulic interconnections, consistent with NRC regulatory provisions, it is standard practice for operators of NRC-licensed ISR facilities to submit wellfield hydrogeologic data packages (as described in FSEIS Section 2.1.1.1.2.3.4) after license issuance but prior to operating the wellfield. The wellfield hydrogeologic data packages provide (i) detailed information on production and injection well patterns and the location of monitor wells; (ii) documentation of wellfield geology (*e.g*., geologic cross sections and isopach maps of production zone sand and overlying and underlying confining units); (iii) pumping test results for each wellfield; and (iv) water quality data for each wellfield. The purpose of these data is to demonstrate that the production and injection wells are hydraulically connected to the perimeter production zone monitor wells and hydraulically isolated from nonproduction zone monitor wells in underlying and overlying aquifer units. These data are also needed to establish Commission-approved background water quality and upper contaminant levels (UCLs) in individual wellfields for aquifer restoration and excursion monitoring. In Powertech's case, Condition 10.10 of its license (Ex. NRC-012) stipulates the information it must submit to the NRC for review and evaluation before operating in a wellfield.

Q3.10: In paragraph 44 of his Supplemental Declaration, Dr. Moran claims that, although the DSEIS states that detailed geologic mapping conducted by Powertech found no indication of breccia pipes (p. 3-32 of the DSEIS), the Staff does not explain whether Powertech conducted a detailed examination of all subsurface data for the presence of breccia pipes. Do you?

A3.10: (J. Prikryl, T. Lancaster) The Staff assumes that the "detailed examination of all the subsurface data" to which Dr. Moran refers is data from exploration drilling, such as

electric logs and structure maps developed on top of formations. The Staff acknowledges that the FSEIS does not specifically state that data from exploratory drilling was evaluated for the presence of breccia pipes. However, Powertech's Technical Report RAI Responses, to which the Staff refers in the FSEIS, does include an evaluation of exploratory drilling data. These data do not indicate the presence of breccia pipes at the Dewey-Burdock site (Ex. APP-016-B at TR RAI P&R-12, p. 48).

Q3.11: In paragraph 46 of his Supplemental Declaration, Dr. Moran further claims that the DSEIS does not consider that geologic materials with geologic/hydraulic characteristics similar to the Dewey-Burdock target formations frequently yield both water *and* oil and gas from geologic fractures. Dr. Moran bases his argument on the Florence oil field in Colorado, which has been producing oil from fractures in the Cretaceous Pierre Formation since 1862. Can you address this claim?

A3.11: (J. Prikryl, T. Lancaster) In FSEIS Section 3.2.3, the Staff discusses in detail the oil and gas test wells within and surrounding the Dewey-Burdock project area. All of these oil and gas test wells are dry holes. In addition, in FSEIS Section 5.1.1.3 the Staff provides additional information on oil and gas production surrounding the project site. Based on the water quality data presented in FSEIS Section 3.5.3.5, there is no evidence that domestic and stock wells completed in the Fall River and Lakota Aquifers within and surrounding the Dewey-Burdock site are contaminated with oil or gas migrating along fractures from deeper oil and gas reservoirs.

Q3.12: In paragraph 47, Dr. Moran states that the Pierre Formation exists in the Black Hills region and links stratigraphically above the Inyan Kara Aquifer. He states that it is therefore likely that several geologic units in the Dewey-Burdock area can transmit fluids via fracture pathways. Dr. Moran suggests that, as a result, future computer simulations of Dewey-Burdock groundwater flow and leach field

performance should be capable of modeling fracture flow characteristics. Can you address these statements?

A3.12: (J. Prikryl, T. Lancaster) In this paragraph Dr. Moran does not allege deficiencies in the FSEIS. He merely states that future computer simulations should include modeling of groundwater flow.

Q3.13: In paragraph 48, Dr. Moran states that aquifer testing already performed demonstrates leakage between the various formations bounding the ore zones. He states that it seems equally likely that longer-duration aquifer tests conducted at higher pumping rates would demonstrate even more clearly the leaky nature of site sediments. Can you address this statement?

A3.13: (J. Prikryl, T. Lancaster) Again, in this paragraph Dr. Moran does not allege specific deficiencies in the FSEIS. He merely states that longer-duration aquifer tests at higher pumping rates will provide additional data to evaluate the potential leaky nature of sediments. In FSEIS Section 3.5.3.2, the Staff discusses pumping tests conducted at the Dewey-Burdock site in 1979 and 2008, which suggested a direct connection between the Fall River and Chilson Aquifers through the Fuson Shale. The Staff took this information into account when assessing the environmental impacts of the Dewey-Burdock Project, as reflected in FSEIS Section 4.5.2.1.1.2.2 at page 4-64. Therefore, we do not need additional data in order to evaluate and assess the reasonably foreseeable impacts of the Project.

Q3.14: In paragraph 49 of his Supplemental Declaration, Dr. Moran claims that Powertech has not adequately defined baseline water levels and water quality within 2 miles of the Dewey-Burdock area and has not provided data on the use of aquifers in Fall River and Custer Counties. Can you address these claims?

A3.14: (J. Prikryl, T. Lancaster) These claims relate to water quality and use, not hydrogeological analysis. In other words, they involve claims that relate to Contentions 2 and 4, not Contention 3.

Q3.15: In paragraph 54, Dr. Moran argues that the DSEIS fails to clearly distinguish site surface waters, groundwaters (including springs and seeps), wetlands, and waters flowing from boreholes. He makes the following claims: (1) on page 3-23, the DSEIS discusses groundwaters in abandoned mine pits as though they are surface waters; (2) on page 3-23, the DSEIS states that there are no known natural springs within the proposed Dewey-Burdock Project area, which does not mean that a detailed attempt to locate and characterize such springs was ever conducted; and (3) on pages 3-27 and 3-28, the DSEIS confusingly describes water flowing from an old well as the source of a wetland, when it is obviously not a natural wetland. Can you address these arguments?

A3.15: (J. Prikryl, T. Lancaster) The description and characterization of water resources in the DSEIS/FSEIS is sufficient to assess the environmental impacts of the Dewey-Burdock project on water resources. We address Dr. Moran's specific arguments below:

(1) In describing waters in abandoned open pit mines, the Staff states the following in DSEIS/FSEIS Section 3.5.1:

> With the exception of Darrow Pit #2, the Darrow pits are usually dry but occasionally contain water that collects from runoff events (Powertech, 2011). The usual presence of water in Darrow Pit #2 suggests that the base of the pit may be below the potentiometric surface of the Fall River Formation. The Triangle Pit, which lies up dip of the proposed Burdock area wellfields, has permanent water storage at a depth greater than 30 m [100 ft]. The bottom of the Triangle Pit is below the potentiometric surface of the Fall River and is, therefore, hydraulically connected to the Fall River Formation.

This language makes clear that the bottom of the Triangle Pit and possibly the bottom of the Darrow Pit #2 are below the potentiometric surface of the Fall River Formation.

Therefore, standing water in the Triangle Pit is hydraulically connected to the Fall River Formation and standing water in the Darrow Pit #2 may be hydraulically connected to the Fall River Formation. The DSEIS/FSEIS in no way tries to hide this fact. As another example, in FSEIS Section 4.5.1.1.1.2 (p. 4-45) the Staff states that "standing water in the Triangle Pit in the Burdock area is hydraulically connected to the Fall River Formation."

(2) The Staff acknowledges that the DSEIS/FSEIS states that there are no known natural springs within the proposed Dewey-Burdock ISR Project area. This statement is based on information provided in Powertech's Technical Report RAI responses (Ex. APP-016-C) as cited in the DSEIS/FSEIS. The Staff specifically requested information on springs present within the Dewey-Burdock license area (see Ex. APP-016-C at TR RAI 2.7-10, p. 211). As discussed in the response to TR RAI 2.7-10, Powertech conducted extensive site investigations and color infrared (CIR) imagery analysis to evaluate groundwater discharge at the Dewey-Burdock site. In other words, to answer Dr. Moran's question, yes, there has been a detailed attempt to locate and characterize springs in the Dewey-Burdock area.

(3) With regard to Dr. Moran's argument about the DSEIS confusingly describing water flowing from an old well as the source of a wetland (p. 3-28 of the DSEIS), Dr. Moran apparently misreads what is stated in the DSEIS/FSEIS. FSEIS Section 3.5.2 (p. 3-28) states that wetlands were identified throughout the Beaver Creek drainage and near—not *from*—an old flowing well on Pass Creek.

Q3.16: In paragraphs 55 and 56 of his Supplemental Declaration, Dr. Moran argues that statements in the "Artificial Penetrations" section of the DSEIS imply that a careful study of the site using infrared photography has not been performed. Dr. Moran states that it is clear that a map of only a portion of the Dewey-Burdock site was available. To support his argument, Dr. Moran claims that the DSEIS

describes the presence of several water-filled mine pits (p. 3-23 of the DSEIS), yet they are not mentioned as being visible on the "infrared photography data of the Dewey-Burdock site." Can you address this argument?

A3.16: (J. Prikryl, T. Lancaster) The Staff specifically requested information on the potential for groundwater to discharge from unplugged exploration test holes (see Ex. APP-016-C at TR RAI 2.7-9, pp. 201-210). The Staff summarizes Powertech's response to this request in the "Artificial Penetrations" section of the DSEIS/FSEIS (Section 3.4.1.2). In this section the Staff includes the results of CIR imagery studies to identify where groundwater may be discharging to the surface. Powertech's response to the Staff's information request, as presented in Ex. APP-016-C at pages 201–210, also includes a discussion of CIR imagery obtained from the National Agriculture Image Program of the USDA Farm Services Agency for the Dewey-Burdock area and vicinity (see Ex. APP-016-C at Figure TR RAI 2.7-9-1). We note that the water-filled Triangle Pit in the northeastern part of the project site and old abandoned mine pits in the eastern part of the Dewey-Burdock site are clearly visible on Figure TR RAI 2.7-9-1. We also note that Figure TR RAI 2.7-9-2 provides a closer CIR view of the alkali flats area, which is one of the subjects discussed in the "Artificial Penetrations" section. In other words, to answer Dr. Moran's question, yes, the water-filled mine pits are visible on CIR imagery, and the Staff considered these mine pits when preparing the FSEIS.

Q3.17: In paragraphs 82, 83, and 84 of his Supplemental Declaration, Dr. Moran argues the DSEIS does not include a survey of springs and seeps. Can you address this argument?

A3.17: (J. Prikryl, T. Lancaster) As discussed previously, the Staff specifically requested, and Powertech thereafter provided, information on groundwater discharging from unplugged exploration test holes and springs at the Dewey-Burdock site (Ex. APP-016-C at TR RAI 2.7-9, pp. 201–210 and TR RAI 2.7-10 at p. 211). As Powertech

explains in its responses to TR RAI 2.7-9 and TR RAI 2.7-10, it performed extensive site investigations and color infrared (CIR) imagery analysis to evaluate groundwater discharge at the Dewey-Burdock site. The Staff summarizes information from Powertech's responses in Section 3.5.1 of the DSEIS and FSEIS. The site investigations and CIR imagery presented in the responses to TR RAI 2.7-9 and TR RAI 2.7-10 are adequate to identify where springs or groundwater discharges to the surface within and surrounding the Dewey-Burdock site.

Q3.18: In paragraph 85 of his Supplemental Declaration, Dr. Moran argues that the presence of high quality groundwater within the Dewey-Burdock project boundary has not been adequately defined. Is that correct?

A3.18: (J. Prikryl, T. Lancaster) This paragraph involves claims related to water quality, not hydrogeological analysis. In other words, they involve claims that relate to Contention 2, not Contention 3. The Staff addresses this issue in its testimony on Contention 2, and we respectfully refer the Board to that testimony.

Q3.19: In paragraph 6 of his Second Supplemental Declaration, Dr. Moran claims that almost all of the data and technical opinions in the FSEIS were taken directly from reports generated by Powertech and its consultants. As an example, Dr. Moran argues that the presence of geologic features, such as faults, breccia pipes, and collapse features, have been described in other historical documents (*e.g.,* Butz, et al., 1980), but the NRC chose not to address these scientific opinions in the SEIS. Can you address this claim?

A3.19: (J. Prikryl, T. Lancaster) This claim is unsupported. With regard to breccia pipes and collapse features, the Staff reviewed and evaluated information from a number of sources (*e.g.*, Exs. NRC-081, NRC-083, NRC-085, and NRC-086) to develop a discussion of these features in the "Breccia Pipes" section on p. 3-19 of the FSEIS. With regard to faults, the Staff reviewed the USGS Quaternary Fault and Fold

Database (Ex. NRC-139) to evaluate active faults with surface expression within and surrounding the Dewey-Burdock site (see Section 3.4.3 of the SEIS). We would further note that the information concerning breccia pipes and collapse features in Butz, et al. (1980) (Ex. NRC-084) to which Dr. Moran refers, was taken primarily from Gott, et al. (1974). The Staff used Gott, et al. (1974) as a source of information when discussing breccia pipes and collapse features in the FSEIS.

Q3.20: In paragraphs 9, 10, and 26 of his Second Supplemental Declaration, Dr. Moran argues that the FSEIS fails to provide an adequate hydrogeologic analysis because long-term aquifer testing will not be performed until after the NRC license is issued. Dr. Moran cites to FSEIS Section 2.1.1.1.2.3 to support his argument. Can you address this argument?

A3.20: (J. Prikryl, T. Lancaster) We note that this is the same argument Dr. Moran makes in paragraph 33 of his Supplemental Declaration, which challenged the DSEIS. As we explain in our testimony at A3.4, Dr. Moran attempts to link the collection and submission of data associated with wellfield hydrogeologic test packages for each wellfield, as described in FSEIS Section 2.1.1.1.2.3.4, with the project-wide hydrogeologic information provided in FSEIS Sections 3.4 and 3.5. These data sets are different, however, and the Staff does not need the hydrogeologic test packages in order to assess impacts under NEPA. The project-wide hydrogeologic information Powertech has provided is sufficient for those purposes.

Q3.21: In paragraphs 12 and 13 of his Second Supplemental Declaration, Dr. Moran claims that the Staff has disregarded the conclusions of numerous experts in stating the following: "Alluvial aquifers are separated from production zone and surrounding aquifers by thick aquitards (confining units) and, therefore, are not hydraulically connected to production zone and surrounding aquifers." (citing the FSEIS Executive Summary at p. xxxvi). Furthermore, Dr. Moran claims in

paragraph 14 that after reviewing relevant data, reports, and various combinations of satellite imagery, he concludes that the Dewey-Burdock water-bearing zones are hydrogeologically-interconnected, especially when subjected to long-term pumping. Can you address these claims?

A3.21: (J. Prikryl, T. Lancaster) Based on the information presented in FSEIS Section 3.5.3.2, the most reasonable conclusion is that alluvial aquifers are *not* in communication with production zone aquifers or surrounding aquifers. None of the publications to which Dr. Moran refers suggests that alluvial aquifers within and surrounding the Dewey-Burdock site are in hydraulic communication with the Inyan Kara Group Aquifers (*i.e.*, the Fall River or Chilson Aquifers). Moreover, Dr. Moran provides no other support for his conclusion that alluvial aquifers are hydrogeologically interconnected with production zone aquifers. Furthermore, neither Dr. Moran nor the Oglala Sioux Tribe has provided any satellite imagery as documentary support for their claim that alluvial aquifers are hydraulically interconnected with Inyan Kara Group Aquifers.

Q3.22.: In paragraphs 15 and 16 of his Second Supplemental Declaration, Dr. Moran claims that the statements on page 3-34 of the FSEIS about the leaky nature of Dewey-Burdock confining units are inconsistent with page 3-36 of the FSEIS, which states, "Based on results of the numerical modeling, the applicant concluded that vertical leakage through the Fuson Shale is caused by improperly installed wells or improperly abandoned boreholes." Can you address this claim?

A3.22: (J. Prikryl, T. Lancaster) There is no inconsistency between these statements. On page 3-36, NRC is merely documenting what Powertech has concluded based on its numerical modeling results.

Q3.23: In paragraph 17 of his Second Supplemental Declaration, Dr. Moran states that it is not unusual for inter-fingering sands and shales of sedimentary uranium deposits to be hydrogeologically interconnected when pumped over the long term. Can you address this statement?

A3.23: (J. Prikryl, T. Lancaster) The Staff recognizes the interbedded and inter-fingering nature of sediments within the Fall River and Lakota Formations that host the uranium ores at the Dewey-Burdock site. The Staff also understands that groundwater may flow between the interbedded sediments when stressed by long-term pumping. The Staff took these possibilities into account when preparing the FSEIS. For example, as documented in FSEIS Section 2.1.1.1.2.3.2, in some areas of the Dewey-Burdock site multiple orebodies are vertically stacked with the Fall River Formation or the Chilson Member of the Lakota Formation with no substantial confining layers between the orebodies. In these areas, the stacked orebodies will be treated as a single production zone. For example, perimeter production zone monitor wells in these areas will be screened across the full thickness of the stacked orebodies, in order to detect any potential excursion of process-related fluids.

Q3.24: In paragraph 19 of his Second Supplemental Declaration, Dr. Moran claims that, contrary to certain statements in the FSEIS, upward flowing waters in wells and boreholes can interconnect and mix between the various vertical water-bearing zones without showing any expression at the land surface. Dr. Moran cites Keene (1973) at page 24 to support his claim. Can you address this claim?

A3.24: (J. Prikryl, T. Lancaster) The Staff is unaware of any language in the FSEIS stating that upward-flowing waters in wells and boreholes cannot interconnect and mix between the various vertical water-bearing zones without showing any expression at the land surface. In fact, the Staff states the opposite in the FSEIS. For example, as the Staff explains in FSEIS Section 3.5.3.2 at pages 3-34 to 3-36, based on numerical

groundwater modeling results, Powertech concluded that hydraulic connection between the Fall River and Chilson Aquifers through the intervening Fuson Shale is caused by improperly installed wells or improperly abandoned boreholes.

As the Staff further explains in the FSEIS, in 1973 Keene reported that uncased and improperly abandoned boreholes were flowing in the artesian areas of the Dewey-Burdock Project area (Ex. NRC-138). He suggested that reported head loss at the time of his report may have been partially caused by these uncased bore and improperly abandoned boreholes (Keene, 1973). As discussed in the section on "Artificial Penetrations" on p. 3-20 of the SEIS, infrared aerial photography provided by Powertech identified only one location, the alkali flats area, that demonstrated the signature of leaking boreholes (see Ex. APP-016-C at TR RAI 2.7-9, pp. 201–210). No other leaky borehole locations were identified based on the infrared aerial photography (Ex. APP-016C at TR RAI 2.7-9).

Q3.25: In paragraph 20 of his Second Supplemental Declaration, Dr. Moran claims that the NRC apparently accepts Powertech's statements that no significant geologic structures are present at the Dewey-Burdock site. Dr. Moran states that this conclusion is contradicted by numerous published reports. Dr. Moran also claims that a review of several forms of Dewey-Burdock area satellite imagery by himself and senior remote-sensing experts at Front Range Natural Resources shows the Dewey-Burdock area is intersected by numerous faults and fractures, with evidence of circular geologic features at the land surface that are indicative of collapse structures. Can you address these claims?

A3.25: (J. Prikryl, T. Lancaster) These claims lack merit. With regard to breccia pipes and collapse features, The Staff reviewed information from a number of sources (e.g., Exs. NRC-081, NRC-083, NRC-085, and NRC-086) to develop a discussion of these features in the FSEIS (see the section on "Breccia Pipes" on p. 3-19 of the FSEIS).

With regard to faults, the Staff consulted the USGS Quaternary Fault and Fold Database (Ex. NRC-139) to evaluate active faults with surface expression within and surrounding the Dewey-Burdock site (see Section 3.4.3 of the SEIS). We further note that the information concerning breccia pipes and collapse features in Butz, et al. (1980) (Ex. NRC-084), which Dr. Moran cites, was taken primarily from Gott, et al. (1974) (Ex. NRC-081). As noted previously, the Staff used Gott, et al. (1974) as a source of information when discussing breccia pipes and collapse features in the SEIS. Thus, the Staff considered substantially the same information as that which Dr. Moran cites. Finally, neither Dr. Moran nor the Oglala Sioux Tribe has provided any satellite imagery as documentary support for their claim that the Dewey-Burdock site is intersected by numerous faults and fractures and shows circular geologic features indicative of collapse features at the land surface.

Q3.26: In paragraphs 21 to 25 of his Second Supplemental Declaration, Dr. Moran raises a number of issues. Can you summarize these issues and respond to Dr. Moran's claims?

A3.26: (J. Prikryl, T. Lancaster) In these paragraphs Dr. Moran cites Appendix 3.2-C, Plate 2 of Powertech's Large Scale Mine Permit Application. Dr. Moran claims that Powertech has misrepresented the data in USGS Professional Paper 763, Plate 4 (Ex. NRC-081) by neglecting to include several locations of breccia pipes within the outcrop areas of the Inyan Kara rocks that were originally described as being "topographic depressions" or "structures of possible solution origin." Dr. Moran argues that the USGS authors clearly mapped these areas within the Inyan Kara rocks near the Dewey-Burdock site as probable locations of solution features, such as breccia pipes. Dr. Moran claims that similar circular, topographic features can be seen on modern satellite imagery. He states that it is his opinion, and the opinion of senior remote-sensing experts at Front Range Natural Resources, that these features likely represent solution/collapse

structures. Furthermore, Dr. Moran claims that neither Powertech nor the NRC has presented any detailed interpretations of the Dewey-Burdock structural geology using high-quality satellite imagery. Dr. Moran states that, until such studies are performed, it is reasonable to assume the circular features are potential pathways for the upward migration of groundwater into the Inyan Kara sediments.

None of these claims has merit. With regard to Plate 2 in Appendix 3.2-C of Powertech's Large Scale Mine Permit Application, if the USGS authors considered areas described and mapped as being "topographic depressions" or "structures of possible solution origin" as being probable locations of solution features, such as breccia pipes, they would have clearly mapped these features as being "collapse features or breccia pipes." They did not. Furthermore, neither Dr. Moran nor the Oglala Sioux Tribe has provided satellite imagery as documentary support for their claim that the Dewey-Burdock site shows circular geologic features indicative of collapse features at the land surface.

We would further note that the Staff specifically requested information from Powertech on the location of breccia pipes in order to understand the potential impacts of operations on water resources (Ex. NRC-016-B at TR RAI P&R-12, pp. 45–58). As part of its response, Powertech provided color infrared (CIR) satellite imagery for an approximately 10-square-mile area, including the project area and surrounding vicinity (see response to TR RAI 2.7-9 in Ex. APP-016-C). The Staff examined this imagery to identify anomalies that suggested groundwater discharges at or near the surface, such as upward flow through breccia pipes, open boreholes, or natural springs.

Q3.27: In paragraphs 51 to 56 of his Second Supplemental Declaration, Dr. Moran argues that the hydrogeologic model developed for the site by Petrotek in 2012 does not consider the presence of faults, fractures, breccia pipes, open boreholes, and other site-specific hydrogeologic information. He claims the

Petrotek model is based on unreasonable assumptions and therefore cannot be relied upon as a predictive tool to assess environmental impacts. Can you address this argument?

A3.27: (J. Prikryl, T. Lancaster) As the Staff documented in its Safety Evaluation Report for the Dewey-Burdock Project, NRC technical staff conducted a detailed review of Powertech's groundwater model (Exs. NRC-134 and NRC-135). As the Staff explains in SER Section 2.4.3.6, Powertech prepared its groundwater model to study the current hydrogeologic conditions at the Dewey-Burdock site and assess the effects of ISR operations on the groundwater flow regime at and around the site. Powertech developed the model using the site-specific geologic and hydrologic information described in FSEIS Sections 3.4.1 and 3.5.3. Powertech first calibrated its model using a steady-state calibration that was accomplished by adjusting hydraulic conductivity, recharge, and hydraulic heads at the general head boundaries to synchronize actual well head measurements with modeled heads (Ex. APP-025). Powertech performed a transient calibration by simulating the two 2008 pumping tests at the Dewey-Burdock site and adjusting storativity values and hydraulic conductivity. Powertech completed its model development with a verification exercise and sensitivity analysis (Ex. APP-025).

The NRC staff reviewed the development and calibration of Powertech's groundwater model. The Staff concluded that the model was appropriately developed and sufficiently calibrated. (Exs. NRC-134 and NRC-135.) Therefore, the Staff found the model sufficient to use as a predictive tool.

One significant conclusion resulting from the groundwater model is that the Fuson Shale is not leaky through the rock matrix itself. Powertech drew this conclusion because the model could not duplicate observed drawdown in the Fall River Aquifer as the Chilson Aquifer was pumped. Consequently, as the Staff explains

in FSEIS Section 3.5.3.2, Powertech concluded that any leakage through the Fuson Shale is caused by improperly completed wells or improperly abandoned boreholes.

Contention 4: The Staff Fully Considered the Quantity of Groundwater to Be Used during the Dewey-Burdock Project

Q4.1: In Contention 4, the Tribe argues that the FSEIS does not adequately address the amount of water that is likely to be consumed during the Dewey-Burdock Project. Where in the FSEIS does the Staff address water consumption?

A4.1: (J. Prikryl, T. Lancaster) The Staff addresses water consumption in FSEIS Section 4.5.2, "Groundwater Impacts." The Staff provides additional information on water consumption, in response to public comments on the DSEIS, in FSEIS Section E5.21.1, "Concerns about Groundwater Consumptive Use."

Q4.2: The Tribe argues that the FSEIS provides imprecise and conflicting information on the amounts of water to be used during the Dewey-Burdock Project. In support of its arguments, the Tribe first cites to paragraphs 20 through 32 in Dr. Moran's Supplemental Declaration. Can you address the claims in these paragraphs?

A4.2: (J. Prikryl, T. Lancaster) Not all of the cited paragraphs allege deficiencies in the FSEIS. In particular, in paragraphs 20, 24, and 28, Dr. Moran appears to merely be citing information from Powertech's application or providing estimates based on that information.

Q4.3: What about the remaining paragraphs?

A4.3: (J. Prikryl, T. Lancaster) In paragraphs 21, 22, 27, 29, and 32, Dr. Moran argues that the FSEIS is inadequate because it does not include a water balance.

Q4.4: What is a water balance?

A4.4: (J. Prikryl, T. Lancaster) A water balance describes and quantifies the flow of water in and out of a system. In hydrology, the system in a water balance can be one of several hydrologic domains, such as a drainage basin (watershed) or aquifer. In a hydrologic system, water enters the hydrologic domain as precipitation and leaves via evaporation, streamflow, and withdrawals associated with human factors (*e.g.*, residential, industrial, and agricultural use). In mining operations, a water balance also accounts for how inflows and outflows of water associated with the mining process (*e.g.*, production, reinjection, and liquid waste flow rates) affects the natural hydrologic system. A water balance is an important component of mining projects and assists mine operators and regulators in determining whether sufficient water is available for proposed mining operations.

Q4.5: Does the Staff provide a water balance in the FSEIS?

A4.5: (J. Prikryl, T. Lancaster) Yes, the Staff provides a water balance for the Dewey-Burdock Project in Section 2.1.1.1.3.3 of the FSEIS (Ex. NRC-008-A at p. 2-34 to 2-35). The water balance is graphically illustrated in Figure 2.1-14 of the FSEIS (Ex. NRC-008-A at p. 2-36). In addition, the Staff reviewed and evaluated regional and local water balances conducted by the South Dakota Department of Environment and Natural Resources (SDDENR) as part of Powertech's water rights permit applications for the Inyan Kara and Madison aquifers (Exs. APP-027-A, APP-028, APP-048, and APP-049). The Staff discusses the findings of the SDDENR reports on the applicant's water rights permits in Sections 4.5.2.1 and E5.21.1 of the FSEIS (Ex. NRC-008-A at pp. 4-54 to 4-55). The mine process and regional and local water balances are summarized below.

The mine process water balance illustrated in Figure 2.1-14 of the FSEIS includes detailed information on production rates, aquifer bleed rates, reinjection rates, makeup water rates, and liquid waste disposal rates for the operations and aquifer

restoration phases of the project. The water balance is presented in terms of flow rates and is presented for each liquid waste disposal option that could be implemented in the Dewey and Burdock areas (i.e., Class V deep well injection and land application). The Staff discusses the operations and aquifer restoration flow rates presented in Figure 2.1-14 in more detail in FSEIS Sections 2.1.1.1.4.1, 4.5.2.1.1.2.2, 4.5.2.1.1.3, and 4.5.2.1.2.3.

The flow rates presented in Figure 2.1-14 are subsequently used to calculate the annual volumes of water that will be consumed from the Inyan Kara and Madison aquifers during the operations and aquifer restoration phases of the project (Powertech, 2012a,b). As described in Section 4.5.2.1 of the FSEIS, the water permit application for the Inyan Kara aquifer proposes to appropriate up to 33.8 ha-m [274.2 ac-ft] of water annually at a withdrawal rate of 558 Lpm [170 gpm] (Exs. APP-048 and APP-049). The water permit application for the Madison aquifer proposes to appropriate up to 109.6 ha-m [888.8 ac-ft] of water annually at a withdrawal rate of 2,085 Lpm [551 gpm] (Exs. APP-027-A and APP-028).

The regional and local water balances for the Inyan Kara and Madison aquifers conducted by the SDDENR include available information on annual recharge (e.g., precipitation, streamflow recharge, and groundwater inflow) and annual withdrawals (e.g., existing and future water rights permits appropriating water for municipal, residential, rural water system, and agricultural uses) (Exs. APP-028 and APP-048). Based on the water balances, SDDENR concluded that estimated annual withdrawals from the Inyan Kara and Madison aquifers are less than recharge and that there is reasonable probability that there is unappropriated water available to supply Powertech's proposed appropriations. As noted previously, the Staff discusses SDDENR's review of Powertech's water rights permit applications for the Inyan Kara and Madison aquifers in FSEIS Sections 4.5.2.1 and E5.21.1.

Q4.6: Is a water balance necessary?

A4.6: (J. Prikryl, T. Lancaster) With regard to ISR facilities, a water balance is necessary to predict whether sufficient water is available in an aquifer(s) for use by an ISR project. Typically, water balances are submitted to state permitting agencies (e.g., SDDENR in South Dakota) to support an agency's review of a water rights permit application. The agencies conduct these reviews to determine whether there is sufficient unappropriated water in an aquifer to supply the application's proposed appropriation (see previous answer). However, a water balance alone is not capable of predicting the impacts from consumptive groundwater use on surrounding water us (such as drawdown in nearby wells) resulting from ISR activities. Potential impacts on surrounding water users at ISR facilities from the consumptive use of groundwater are evaluated using numerical groundwater models (*e.g*., the models described in Exs. NRC-087 at pp. 4-26 to 4-27 and NRC-088 at pp. 4-30 to 4-32). These models utilize site-specific hydrologic, geologic, and meteorologic information, available pumping test data, proposed wellfield patterns, and proposed production/restoration flowrates and bleed rates to evaluate the response of aquifers to hydraulic stresses (e.g., changes in potentiometric surface and hydraulic gradient) imposed by operation of the ISR project. The Staff discusses the results of drawdown estimates in production zone aquifers at the Dewey-Burdock Project based on numerical modeling (i.e., Ex. APP-025) in Sections 4.5.2.1 and E.5.21.3 of the FSEIS.

Q4.7: In paragraph 23 of his Supplemental Declaration, Dr. Moran states that the DSEIS was "unclear which aquifer will be the source for long-term, operational phase water." Has the Staff addressed this issue, either in the DSEIS or the FSEIS?

A4.7: (J. Prikryl, T. Lancaster) Yes, in the FSEIS the Staff addresses and clarifies the source for long-term, operational phase water. The FEIS includes updated estimates of sustainable Inyan Kara aquifer pumping rates based on numerical modeling results (Ex. APP-025). The Staff discusses the results of the numerical groundwater simulations in Section 4.5.2.1.1.2.2 of the FSEIS (Ex. NRC-008-A at p. 4-62). The Staff also discusses these results in its comment responses in Sections E5.21.1 and E.5.21.9 of the FSEIS (Ex. NRC-008-B). As the Staff explains, the results of numerical groundwater simulations indicate that the Inyan Kara Aquifer can sustain net extraction rates of up to 363 Lpm [96 gpm] over the estimated 8-year operations phase. As the Staff further explains in Section 4.5.2.1.1.2.2 of the FSEIS (Ex. NRC-008-A at p. 4-62), Powertech estimates that sustainable pumping rates of 151 to 246 Lpm [40 to 65 gpm] will be needed to meet the operational needs of the proposed project (Exs. APP-050). Therefore, the Inyan Kara aquifer is expected to have adequate capacity and will serve as the long-term source of water during the operations phase of the project.

Q4.8: In paragraph 25 of his Supplemental Declaration, Dr. Moran claims that, while Powertech's application provides data on the volumes of groundwater required for the construction phase, it does not provide such information for other project phases. Does the DSEIS or FSEIS provide this information?

A4.8: (J. Prikryl, T. Lancaster) Yes, in the FSEIS the Staff provides estimates of the volume of groundwater required for other phases of the project. The FSEIS includes new information on projected consumptive water use—the estimated volumes of water that are expected to be withdrawn and not returned to the Inyan Kara and Madison aquifers—for the operations and aquifer restoration phases. The Staff discusses this new information in its responses to public comments in Section E5.21.1 of the FSEIS (Ex. NRC-008-B).

In June 2012, Powertech submitted water rights permit applications to use Inyan Kara aquifer and Madison aquifer water (Exs. APP-027-A and APP-049). As the Staff explains in Section 4.5.2.1 of the FSEIS, the water rights permit application for the Inyan Kara aquifer proposes to use up to 33.8 ha-m [274.2 ac-ft] of water annually, primarily for operations phase activities (Ex. APP-049). As the Staff further explains in SEIS Section 4.5.2.1 (Ex. NRC-008-A at p. 4-54 and 4-55), the water rights permit application for the Madison aquifer proposes to use up to 109.6 ha-m [888.8 ac-ft] of water annually, primarily for aquifer restoration phase activities (Ex. APP-027-A).

Q4.9: In paragraph 26 of his Supplemental Declaration, Dr. Moran argues that the DSEIS "fails to reveal reliable long-term water use data for all phases of the entire project." Has the Staff addressed this issue, either in the DSEIS or the FSEIS?

A4.9: (J. Prikryl, T. Lancaster) The FSEIS does reveal reliable long-term water use data for all phases of the project. As the Staff explains in FSEIS Section 4.5.2.1.1.1, Powertech estimates that groundwater consumption during the construction phase at the Dewey and Burdock areas will be 8.25×10^7 L and 1.16×10^8 L [21.8×10^6 gal and 30.6×10^6 gal], respectively (Ex. APP-050). As the Staff further explains in FSEIS Section 4.5.2.1.1.1, Powertech's consumptive use of groundwater during construction will be limited to dust control, cement mixing, pump tests, delineation drilling, and well drilling and completion. As illustrated in Figure 2.1-1 and discussed in Section 2.1.1.1.2.5 of the FSEIS, the construction phase is expected to take approximately two years.

The Staff also addresses groundwater consumption during the operations and restoration phases. As the Staff explains in FSEIS Sections 4.5.2.1.1.2.2 and 4.5.2.1.1.3, consumptive water use during ISR operations and aquifer restoration will be primarily due to production and aquifer restoration bleed and other small losses. As

noted in the answer to the previous question, the FSEIS includes new information on projected consumptive water use for the operations and aquifer restoration phases. The Staff discusses this new information in FSEIS Sections 4.5.2.1 and E5.21.1 (Exs. NRC-008-A and NRC-008-B). To summarize, Powertech used estimated production and aquifer restoration bleed rates based on the proposed mining process flow rates to estimate groundwater consumption during the operations and aquifer restoration phases of the project (Exs. APP-027-A, APP-049). As the Staff explains in FSEIS Section 4.5.2.1, Powertech estimated that up to 33.8 ha-m [274.2 ac-ft] of water annually will be withdrawn from the Inyan Kara aquifer, primarily for operations phase activities (Ex. APP-049). As the Staff further explains in FSEIS Section 4.5.2.1, Powertech estimated that up to 109.6 ha-m [888.8 ac-ft] of water annually will be withdrawn from the Madison aquifer, primarily for aquifer restoration phase activities (Ex. APP-027-A). As the Staff illustrates in FSEIS Figure 2.1-1 and discusses in FSEIS Sections 2.1.1.1.3.4 and 2.1.1.1.4.3, the operations and aquifer restoration phases are expected to last 8 and 9 years, respectively.

In addition, the Staff considered water consumption during the decommissioning phase of the Dewey-Burdock Project. As the Staff explains in FSEIS Section 4.5.2 (Ex. NRC-008-A at pp. 4-53 and 4-54), the Staff previously concluded in the GEIS that consumptive water use during the decommissioning phase will be less than during the operations and aquifer restoration phases (Ex. NRC-0010-A). In reaching this conclusion the Staff took into account the use of water for dust suppression, revegetation of landscapes, and reclamation of disturbed areas.

Q4.10: In paragraph 27 of his Supplemental Declaration, Dr. Moran again argues that the DSEIS fails to provide a water balance. He also argues, however, that the DSEIS does not address how much water will be recycled and reinjected as waste water in other formations. In addition, he argues that the DSEIS does not

address whether the recycled and reinjected water would be of lower quality than the baseline water in the area. Can you address these points?

A4.10: (J. Prikryl, T. Lancaster) As stated in A4.5 above, the Staff provides a water balance for Dewey-Burdock Project in FSEIS Section 2.1.1.1.3.3. The Staff also provides a graphic illustration of the water balance in FSEIS Figure 2.1-14. The water balance includes information on production rates, aquifer bleed rates, reinjection rates, makeup water rates, and liquid waste disposal rates for the operations and aquifer restoration phases of the project. The water balance is presented in terms of flow rates and is presented for each liquid waste disposal option that could be implemented in the Dewey and Burdock areas (*i.e.,* Class V deep well injection and land application).

With regard to how much water will be recycled and reinjected as wastewater in other formations, we will assume that Dr. Moran is referring to liquid waste injected in proposed Class V deep injection wells. As illustrated in Figure 2.1-14 and discussed in Sections 2.1.1.1.4.1.1, 4.14.1.1.2, and 4.14.1.1.3 of the FSEIS, the maximum production of liquid waste at any time, assuming concurrent uranium recovery operations and aquifer restoration activities, is 746 Lpm [197 gpm] for the deep Class V disposal well option. Assuming 24 hr, 365 day continuous operations, this flow rate equates to a maximum yearly volume of 39.3 ha-m [318.8 ac-ft] or 3.93×10^{-8} L [10.3×10^{-7} gal].

With regard to whether the recycled and reinjected water will be of lower quality than baseline water in the area, we will again assume that Dr. Moran is referring to the liquid waste injected in proposed Class V deep injection wells. As discussed in Sections 2.1.1.1.6.2 and 4.14.1.1.2 of the FSEIS, NRC will require (i) liquid waste to be treated prior to injection, and (ii) treatment systems to be approved, constructed, operated, and monitored to ensure the water meets the release standards in 10 CFR Part 20, Subparts D and K and Appendix B.

As the Staff explains in FSEIS Sections 2.1.1.1.6.2 and 4.14.1.1.2, Powertech proposes to treat liquid waste onsite to remove radium and uranium by radium settling and ion exchange. This will reduce radionuclide activities below the established NRC limits under 10 CFR Part 20, Appendix B, Table 2, Column 2 prior to injecting the material into a deep Class V disposal well. As the Staff further explains in FSEIS Section 2.1.1.1.6.2, Powertech will also have to meet applicable EPA requirements before it begins injecting any liquid waste in a deep Class V injection well.

The EPA is currently reviewing Powertech's Class V injection well permit application (see Table 1.6-1 of the FSEIS). When evaluating permit applications for Class V wells, EPA considers the characteristics of the operation, the material proposed to be injected, water quality in the receiving aquifer, and the surrounding environment. Based on these factors, EPA determines whether the proposed injection will endanger public health or the environment. An EPA permit, if granted, will also prohibit Powertech from injecting hazardous waste, as defined by the Resource Conservation and Recovery Act, into Class V wells.

Q4.11: In paragraph 30 of his Supplemental Declaration, Dr. Moran claims that Powertech's application—and by extension the DSEIS and FSEIS—does not compile baseline water level and pumping-rate data for the domestic and stock wells surrounding the Dewey-Burdock Project. Can you address his claims?

A4.11: (J. Prikryl, T. Lancaster) Powertech's Environmental Report includes an inventory of private wells within approximately 2 km of the proposed project (Exs. APP-040-A at Section 3.4.1.2 and APP-040-Y at Appendix 3.4-A). The inventory of wells includes water level elevations taken from well completion records (Ex. APP-040-Z at Appendix 3.4-B). Powertech's original application documents, however, did not include a compilation of water level data for domestic and stock wells surrounding the Dewey-Burdock project used to determine preoperational baseline groundwater quality. As a

result, the Staff requested additional information in this area (Ex. NRC-016-C). Subsequently, Powertech included revised summary tables presenting quarterly baseline groundwater sampling results for existing domestic and stock wells in Appendix 2.7G, "Groundwater Quality Summary Tables," of its RAI Responses (Ex. APP-016-C at TR RAI 2.7-15). The sampling results in the revised summary tables include water level measurements for the domestic and stock wells used in determining preoperational baseline groundwater quality.

With regard to Dr. Moran's claims concerning pumping rate data, Powertech's application documents do not provide a compilation of pumping rates for private wells within and surrounding the proposed project site. Many of these wells, however, are artesian or free-flowing wells (Ex. APP-040-A at Section 3.4.1.2). Based on measurements from artesian wells and estimates from other private wells within 2 km [1.2 mi] of the project site, Powertech provided estimates (as pumping rates) for the amount of water that is currently being withdrawn or consumed from aquifers beneath the project site (Ex. APP-040-A at Section 3.4.1.2). The Staff discusses this information in FSEIS Section 4.5.2.1.1.2.2.

Q4.12: In paragraph 31 of his Supplemental Declaration, Dr. Moran alleges that there is uncertainty over who will pay for the water Powertech uses during the Dewey-Burdock Project. Has the Staff considered this issue?

A4.12: (J. Prikryl, T. Lancaster) Dr. Moran alleges that Powertech will pay no cost for the water it uses during operations, while numerous other users do. The Staff assumes that Dr. Moran is referring to users (or customers) of water utilities (*e.g.*, municipal water systems or regional water districts) that supply water to nearby communities or developments. Users of municipal water systems or water districts are billed for the amount of water used. The City of Edgemont Public Water System is the closest water utility to the Dewey-Burdock site, and it draws water from the Madison Aquifer.

Within and surrounding the Dewey-Burdock project site, private landowners use water drawn from private wells for domestic and stock use. As the Staff explains in FSEIS Section 4.5.2.1.1.2.2, these private wells draw water primarily from the Inyan Kara and alluvial aquifers. Private landowners do not pay for the water drawn from their private wells. Lease agreements with private landowners in the project area have been executed that allow Powertech to remove and replace water supply wells as needed. Language in the lease agreements sets forth Powertech's responsibility to replace existing water wells or secure such other water so that the well owner's water quality and availability is not diminished. Details of the lease agreements are discussed in the supplement to Powertech's original application (Ex. NRC-141 at Section 5.1.1).

Q4.13: In Contention 4 the Tribe also cites to paragraphs 37 and 38 of Dr. Moran's Supplemental Declaration. In paragraph 37, Dr. Moran argues that the DSEIS lacks specific information on how the Dewey-Burdock Project may affect domestic and stock wells outside the project boundary. In paragraph 38, he claims that the Staff should have considered such impacts out to at least two miles from the Dewey-Burdock boundary. Has the Staff considered these issues?

A4.13: (J. Prikryl, T. Lancaster) The Staff evaluates impacts to domestic and stock wells outside the project boundary in FSEIS Section 4.5.2.1.1.2.2. As the Staff explains, in 2012 Powertech developed a numerical groundwater model using site-specific parameters, and calibrated to historical pumping test data, to determine the impacts of operations on domestic and stock wells outside the project boundary (Ex. APP-025). Based on the numerical groundwater model simulations, Powertech estimated that the maximum drawdown outside the project area resulting from projected ISR operations would be approximately 3.65 m [12 ft] in the Fall River aquifer and 3.05 m [10 ft] in the

Chilson aquifer (Petrotek, 2012). The Staff includes these refined drawdown estimates in FSEIS Section 4.5.2.1.1.2.2, and these estimates replace the previous estimates of drawdown discussed in DSEIS Section 4.5.2.1.1.2.2. The revised drawdown estimates documented in the FSEIS are more precise than the previous estimates discussed in the DSEIS, which were based solely on aquifer parameters obtained from historical pumping test analyses.

With regard to the distance from the Dewey-Burdock boundary for considering impacts, Dr. Moran claims that impacts should be considered out to at least two miles from the Dewey-Burdock boundary. Dr. Moran appears to base his claim on the previous estimates of drawdown described in DSEIS Section 4.5.2.1.1.2.2. However, based on the updated drawdown estimates from the 2012 numerical modeling simulations (Ex. APP-025), which are documented in FSEIS Section 4.5.2.1.1.2.2, Powertech's proposed 2 km [1.2 mi] distance for monitoring domestic and stock wells (Ex. APP-016-B) is appropriate. Using a 2 km [1.2 mi] distance is appropriate for NEPA purposes because, based on the updated drawdown estimates, it is speculative as to whether there will be drawdown impacts beyond this distance.

Q4.14: In Contention 4 the Tribe also cites paragraphs 50 and 51 of Dr. Moran's Supplemental Declaration. In paragraph 50, Dr. Moran notes that Powertech intends to store and use certain chemicals at its Dewey-Burdock facility. In paragraph 51, Dr. Moran claims that the release of these chemicals could contaminate local soils and waters. Could you address these statements?

A4.14: (J. Prikryl, T. Lancaster) These statements do not appear to be related to the subject of the contention, which is groundwater consumption. Nor do Dr. Moran's statements appear to allege any deficiency in the DSEIS or FSEIS. To the extent he is making such a claim, we do not understand the nature of the claim, and we are thus unable to respond to it.

Q4.15: In Contention 4 the Tribe also refers to paragraphs 86–91 and 101 of Dr. Moran's Supplemental Declaration. Can you address these paragraphs?

A4.15: (J. Prikryl, T. Lancaster) These paragraphs involve claims related to water quality, not water quantity. In other words, they include claims that relate to Contention 2, not Contention 4. We have reviewed each of these paragraphs, but we do not find any statements suggesting that either the DSEIS or FSEIS insufficiently considered the amount of water to be used during the Dewey-Burdock Project.

Q4.16: In its FSEIS-related contentions, the Tribe again claims that NEPA required the Staff to provide a more expansive "water balance" for the Dewey-Burdock Project. The Tribe claims that the water balance information in the FSEIS is inadequate, citing to Dr. Moran's Second Supplemental Declaration at paragraphs 31–33. In paragraph 31, Dr. Moran argues that the Staff needed to provide "measured data for all water inputs and outputs related to all mine operations and all sources of water that might influence these operations." Can you address this argument?

A4.16: (J. Prikryl, T. Lancaster) Powertech cannot provide measured data for all water inputs and outputs related the ISR mining process until the processing facility and wellfields are constructed and operated. At this time, the mine process water balance the Staff presents in FSEIS Section 2.1.1.1.3.3 and illustrates in FSEIS Figure 2.1-14 can only provide information on proposed production rates, bleed rates, reinjection rates, makeup water rates, and liquid waste disposal rates.

The Staff did, however, take into account the regional and local water balances analyzed by SDDENR as part of its review of Powertech's water rights permit applications for the Inyan Kara and Madison Aquifers. These water balances include existing data for water inputs and outputs (Exs. APP-028, APP-048). For example, the

water balances include available information on annual recharge (e.g., precipitation) and annual withdrawals (e.g., existing and future water rights permits appropriating water for municipal, residential, rural water system, and agricultural uses) (Exs. APP-028, APP-048). The Staff refers to this water balance information in FSEIS Section 4.5.2.1.

Q4.17: In paragraph 32 of his Second Supplemental Declaration, Dr. Moran again claims that the Staff failed to provide a proper water balance in the FSEIS, citing information he believes should have been included in the Staff's analysis. Is this additional information necessary?

A4.17: (J. Prikryl, T. Lancaster) As just discussed, the Staff reviewed and evaluated regional and local water balances conducted by the SDDENR as part of the applicant's water rights permit applications for the Inyan Kara and Madison aquifers (Exs. APP-028, APP-048). The water balances for the Inyan Kara and Madison aquifers conducted by the SDDENR include available information on water entering the system (*e.g.*, annual precipitation, streamflow recharge, and groundwater inflow) and water losses (*e.g.*, annual withdrawals based on existing and future water rights permits appropriating water for municipal, residential, rural water system, and agricultural uses; estimated bleed rates). Based on the water balances, SDDENR concluded that estimated annual withdrawals from the Inyan Kara and Madison aquifers are less than recharge and that there is reasonable probability that there is unappropriated water available to supply the applicant's proposed appropriations (*i.e.*, 274.2 ac-ft/yr from the Inyan Kara aquifer and 888.8 ac-ft/yr from the Madison aquifer) (Exs. APP-028, APP-048). The Staff summarizes the SDDENR's review of Powertech's water rights permit applications for the Inyan Kara and Madison Aquifers in FSEIS Sections 4.5.2.1 and E5.21.1.

Q4.18: In paragraph 33 of his Second Supplemental Declaration, Dr. Moran acknowledges that the NRC included flow rate figures in the FSEIS. He claims, however, that even with this information the FSEIS is deficient because the Staff does not provide information on flow *volumes*. Can you address his claims?

A4.18: (J. Prikryl, T. Lancaster) The Staff recognizes that the mine process water balance illustrated in FSEIS Figure 2.1-14 is presented in terms of flow rates rather than volumes. However, Dr. Moran fails to acknowledge that the flow rates presented in Figure 2.1-14 are used to calculate the annual volumes of water that will be withdrawn from the Inyan Kara and Madison Aquifers during the operations and aquifer restoration phases of the project (Exs. APP-027-A, APP-049). In other words, the Staff provides the underlying data needed to assess the reasonably foreseeable environmental impacts of the Dewey-Burdock Project.

The flow volume data to which Dr. Moran refers can be found in Powertech's water permit applications. As the Staff explains in FSEIS Section 4.5.2.1, Powertech's water permit application for the Inyan Kara Aquifer proposes to appropriate up to 33.8 ha-m [274.2 ac-ft] of water annually at a withdrawal rate of 558 Lpm [170 gpm] (Ex. APP-049). The water permit application for the Madison aquifer proposes to appropriate up to 109.6 ha-m [888.8 ac-ft] of water annually at a withdrawal rate of 2,085 Lpm [551 gpm] (Ex. APP-027-A). As the Staff further explains in FSEIS Section 4.5.2.1, based on its review of the water permit applications, which included regional and local water balances, SDDENR concluded that there is a reasonable probability unappropriated water will be available in the Inyan Kara and Madison aquifers to meet Powertech's proposed water appropriations (Exs. APP-028, APP-048).

Contention 6: The Staff Identified and Evaluated the Effectiveness of Mitigation Measures to the Extent Required under NEPA

Q6.1: In Contention 6, the Tribe argues that the FSEIS does not adequately describe or analyze mitigation measures. At the outset, can you explain what mitigation measures are?

A6.1: (H. Yilma, K. Jamerson, J. Prikryl) On page 6-1 of the FSEIS, we explain that mitigation measures "are those actions or processes that will be implemented to control and minimize potential adverse impacts from construction, operation, aquifer restoration, and decommissioning of the proposed Dewey-Burdock ISR Project." This sentence is consistent with the definition of "mitigation" in the Council on Environmental Quality's regulation at 40 C.F.R. § 1508.20.

Q6.2: Can you give an overview of how the Staff addresses mitigation measures in the FSEIS?

A6.2: (H. Yilma, K. Jamerson, J. Prikryl) In Chapter 6 of the FSEIS, we summarize mitigation measures identified by Powertech, as well as measures identified by the Staff itself. In Chapter 4, we explain how the proposed mitigation measures will be effective in avoiding or reducing environmental impacts. We also discuss mitigation measures in other chapters of the FSEIS. For example, in Chapter 2 we discuss alternatives to the proposed action. We also discuss mitigation measures that are typically used with those alternatives, such as reclamation of conventional mining sites. In Chapter 7 we discuss environmental monitoring measures, which are relevant to assessing the implementation of certain mitigation measures.

Q6.3: Turning to the substance of Contention 6, the Tribe argues that the discussion of mitigation measures in the FSEIS consists largely of a list of plans to be developed later, outside the NEPA context. Is this correct?

A6.3: (H. Yilma, K. Jamerson, J. Prikryl) No. The Tribe appears to be referring to Chapter 6 of the FSEIS, which lists mitigation measures identified by the Staff and by Powertech. Chapter 6, however, is only a summary of mitigation measures. We discuss mitigation measures in detail in other chapters, including Chapter 4, where we explain how these measures will avoid or reduce environmental impacts from the Dewey-Burdock Project.

Q6.4: The Tribe also argues that you fail to evaluate the effectiveness of mitigation measures. Is this accurate?

A6.4: (H. Yilma, K. Jamerson, J. Prikryl) No. An agency evaluates the effectiveness of mitigation measures by explaining how these measures will avoid or reduce in various environmental areas. We do this repeatedly throughout Chapter 4 of the FSEIS, which discusses impacts from Powertech's proposed action. We also discuss the effectiveness of mitigation measures in Chapter 2, which addresses alternatives to the proposed action.

Q6.5: Can you give examples of how you evaluate the effectiveness of mitigation measures?

A6.5: (H. Yilma, K. Jamerson, J. Prikryl) In accordance with 40 C.F.R. § 1502.14(f), in Chapter 4 of the FSEIS we discuss appropriate mitigation measures that are not already included in the proposed action or alternatives. We discuss mitigation measures for each resource area (*e.g.*, land, noise, water, geology) under each phase of the ISR process (the construction, operations, aquifer restoration, and decommissioning phases). We discuss these mitigation measures in sufficient detail so that their effectiveness can be determined and we can apply the measures in assessing whether the environmental impacts in a particular area will be Small, Moderate, or Large.

For example, under the land use resource area, we evaluated Powertech's commitments to reclaim and re-vegetate disturbed areas, limit construction of new access roads, and restrict vehicular traffic in wellfields to minimize impacts of surface disturbance. We also examined Powertech's plans to restrict and control access to the Dewey-Burdock site, such as for grazing or recreational uses, by installing temporary fencing to enclose processing facilities, storage ponds, and wellfields. As we explain, Powertech plans to sequentially restore and reclaim the wellfields to minimize potential impacts on grazing and recreational uses.

To summarize, we evaluated all the mitigation measures proposed by Powertech before assessing the environmental impacts of the Dewey-Burdock Project. As required by 40 C.F.R. §§ 1502.16(h) and 1505.2(c), we also identified additional reasonable measures that could be applied to lessen environmental impacts. We discuss these measures throughout Chapter 4 of the FSEIS, and we summarize these measures in Chapter 6 for ease of reference.

Q6.6: The Tribe also argues that your discussion of mitigation measures is inadequate because some of the measures you discuss are not in final form and will not be finalized until other agencies take certain actions. Did you take into account certain mitigation measures that are not yet in final form?

A6.6: (H. Yilma, K. Jamerson, J. Prikryl) Yes. In the SEIS, we consider Powertech's compliance with environmental quality standards and requirements imposed by other Federal, State, and local agencies that have regulatory authority for environmental protection. For example, we refer to standards governing stormwater discharge (FSEIS Section 4.5.1.1.1), wildlife protection (FSEIS Section 4.6.1.1.1.1.2), and air quality (FSEIS Section 4.7). We consider mitigation measures associated with permits Powertech has already obtained, and measures that may be included in permits Powertech has yet to obtain.

For example, in FSEIS Section 4.6.1.1.2 we explain that Powertech, in coordination with FWS, SDDENR, and SDGFP, will develop an avian monitoring and mitigation plan prior to construction activities. The state imposes regulatory requirements for surface water ponds and, accordingly, has special provisions for migratory bird and wildlife protection. Additionally, Powertech will have to adhere to ecological mitigative measures in its SDDENR large-scale mine permit—Powertech's permit application, Ex. NRC-137, addresses these measures—and its Groundwater Discharge Permit.

In the FSEIS we also refer to the Programmatic Agreement for the Dewey-Burdock Project. The Programmatic Agreement takes into account historic properties that may be affected by the Dewey-Burdock Project. For example, the Programmatic Agreement specifies measures to protect properties identified during ground-disturbing activities associated with the installation of electrical transmission lines. In sum, the Programmatic Agreement documents the measures that will be taken to avoid, minimize, or mitigate any adverse effects on historic properties.

Q6.7: Is this approach consistent with NEPA?

A6.7: (H. Yilma, K. Jamerson, J. Prikryl) Yes. NEPA does not require that all of the mitigation measures an agency specifies in an EIS be in final form.

Q6.8: The Tribe identifies several specific areas where it claims your analysis of mitigation measures is lacking. One area is groundwater restoration. The Tribe relies on the Supplemental Declaration of Dr. Moran. In paragraphs 93 and 94 of his Declaration, Dr. Moran argues that the monitoring measures discussed in the FSEIS are inadequate to detect changes in water quality and water levels. Is he correct?

A6.8: (H. Yilma, K. Jamerson, J. Prikryl) Dr. Moran's statements in these paragraphs concern monitoring measures associated with Powertech's operational groundwater

monitoring programs, as described in FSEIS Section 7.3, rather than Powertech's aquifer restoration monitoring program, which is described in FSEIS Section 2.1.1.1.4.2, "Restoration Monitoring and Stability." The Staff has responded to Dr. Moran's concerns about operational groundwater monitoring in A2.15 and A2.16 of our testimony on Contention 2. With regard to groundwater restoration, Powertech's aquifer restoration monitoring program, which we describe in FSEIS Section 2.1.1.1.4.2, will be adequate to detect changes in water quality and water levels. We summarize this program next.

Powertech's groundwater restoration monitoring program will include taking samples from monitoring wells, overlying aquifer wells, and underlying aquifer wells every 60 days during the restoration phase (Ex. APP-021-C). The samples will be analyzed to determine whether water quality has been restored consistent with requirements in 10 C.F.R. Part 40, Appendix A, Criterion 5B(5). Water levels in wells will be measured prior to sampling. Aquifer restoration will be complete when Powertech demonstrates that water quality conditions have been restored in accordance with the requirements of Appendix A, Criterion 5B(5).

Q6.9: The Tribe also cites paragraphs 102 and 103 of Dr. Moran's Supplemental Declaration. In these paragraphs Dr. Moran claims that the FSEIS fails to explain what specific criteria will be used to restore aquifers affected by the Dewey-Burdock Project. Is this true?

A6.9: (H. Yilma, K. Jamerson, J. Prikryl) Powertech is bound by license condition 10.6, which states that groundwater shall be restored to the numerical groundwater protection standards required by 10 C.F.R. Part 40, Appendix A, Criterion 5B(5). For aquifer restoration to be complete, Powertech must demonstrate that hazardous constituents in the water do not exceed either (i) Commission-approved background water quality; (ii) the MCLs provided in Criterion 5C; or (iii) an ACL NRC established in

accordance with Criterion 5B(6). The Staff discusses these standards in FSES Section 2.1.1.1.4.2, "Restoration Monitoring and Stabilization." In Appendix B of the FSEIS, the Staff discusses the process for reviewing and approving ACLs.

Q6.10: The Tribe next cites paragraphs 104 through 113 of Dr. Moran's Supplemental Declaration. In these paragraphs Dr. Moran claims that target restoration goals and UCL parameters and standards should all be selected by the NRC and presented in the EIS prior to license approval. Can you address his claims?

A6.10: (H. Yilma, K. Jamerson, J. Prikryl) In the FSEIS, the Staff clearly sets forth the standards that will be used to establish aquifer restoration goals and the UCLs selected for excursion monitoring at the Dewey-Burdock site. With regard to aquifer restoration goals, Powertech is bound by license condition 10.6, which states that groundwater shall be restored to the numerical groundwater protection standards required by 10 C.F.R. Part 40, Appendix A, Criterion 5B(5). These standards are either (i) Commission-approved background water quality; (ii) the MCLs provided in Criterion 5C; or (iii) an ACL NRC established in accordance with Criterion 5B(6). The Staff discusses these standards in FSEIS Section 2.1.1.1.4, "Aquifer Restoration Activities." In FSEIS Section 7.3.1.1, "Commission-Approved Background – Production Zone," the Staff describes the procedures for establishing Commission-approved background water quality at the Dewey-Burdock site. As the Staff explains, Powertech is bound by license condition 11.3, which states that prior to injecting lixiviant into each production wellfield Powertech must establish Commission-approved background groundwater quality data for the ore zone, overlying aquifers, underlying aquifers, alluvial aquifers (where present), and the perimeter monitoring areas.

With regard to UCLs for excursion monitoring, Powertech is bound by license condition 11.4, which stipulates the following:

> (1) prior to injection of lixiviant into each production wellfield, the licensee shall establish excursion parameters and their respective upper control limits (UCLs) in the designated overlying aquifers, underlying aquifer, and perimeter monitoring areas; (2) unless otherwise determined, the site-specific excursion parameters are chloride, conductivity, and total alkalinity; (3) the UCLs shall be established for each excursion control parameter and for each well based on the mean plus five standard deviations of the data collected for license conditions 11.3 (Establishment of Commission-Approved Background Water Quality); (4) the UCL for chloride can be set at the sum of the background mean concentration and either (a) five standard deviations or (b) 15 mg/L, whichever provides the higher limit; and (5) the licensee shall submit any revisions to its plan for establishing UCLs to the NRC staff for review and approval.

The Staff discusses the details of Powertech's excursion monitoring program, which are consistent with the stipulations in license condition 11.4, in FSEIS Section 7.3.1.2, "Excursion Monitoring." In FSEIS Section 7.3.1.2, the Staff explains why chloride, conductivity, and total alkalinity were selected as UCL indicators. As the Staff further discusses in Section 7.3.1.2, monitoring wells will be sampled at approximately 2-week intervals and water levels, and analytical data for the UCL parameters will be reported to NRC quarterly and retained onsite for NRC review.

Q6.11: In paragraphs 114 and 115 of his Supplemental Declaration, Dr. Moran claims that the Staff's discussion of mitigation measures consists solely of proposals to make plans in the future. Is this correct?

A6.11: (H. Yilma, K. Jamerson, J. Prikryl) No. There are numerous measures that we specify in the FSEIS that do not rely on future actions. Some examples are dust suppression methods and carpooling to lower air quality impacts, painting the central processing building to blend in with the setting of the area and minimize visual impacts, and , operating heavy equipment only within certain time to lower noise impacts. We discuss these specific measures in FSEIS Sections 4.7.1.1.1, 4.10.1.1.1, and 4.8.1.1.1, respectively.

Q6.12: Dr. Moran also argues that the Staff does not explain whether the measures it identifies have succeeded in the past. Can you address this?

A6.12: (H. Yilma, K. Jamerson, J. Prikryl) The Council on Environmental Quality's (CEQ) regulations at 40 C.F.R. §§ 1502.14(f), 1502.16(h), and 1505.29(c) do not require that measures have succeeded in the past in order for an agency to consider them as a means of mitigating impacts. To the contrary, these regulations encourage agency officials to identify and discuss *all* reasonable measures—even measures that are outside the jurisdiction of the lead or cooperating agency. Through these regulations, the CEQ explains that, because an EIS is the most comprehensive environmental document issued under NEPA, it provides an opportunity to discuss the full spectrum of appropriate mitigation measures. To this end, in the Dewey-Burdock FSEIS the Staff has discussed all reasonable measures that could reduce or avoid environmental impacts from the Dewey-Burdock Project.

Q6.13: In paragraph 115 of his Supplemental Declaration, Dr. Moran argues that groundwater restoration has failed at other ISR sites and that, as a result, the NRC should require post-operational monitoring at the Dewey-Burdock site until baseline conditions are attained. Can you respond to his arguments?

A6.13: (H. Yilma, K. Jamerson, J. Prikryl) In Section 6.1.3.3 of the SER, the Staff provides examples of existing ISR facilities at which restoration has been successful and approved by the relevant regulatory agencies. The restoration efforts at these projects involved methods similar to those proposed by Powertech for the Dewey-Burdock Project.

In any event, Dr. Moran appears to overlook that, under its license conditions, Powertech will be required to conduct significant post-operating monitoring of groundwater affected by the Dewey-Burdock Project. Under License Condition 10.4, the NRC requires Powertech to conduct sampling of all constituents of concern on a quarterly basis during restoration stability monitoring (Ex. NRC-012). The Staff describes Powertech's aquifer restoration stability monitoring program in FSEIS

Section 2.1.1.1.4.2. In addition, as stipulated in License Condition 10.6, Powertech must continue stability monitoring until the data show that the most recent four consecutive quarters indicate no statistically significant increasing trend for all constituents of concern that would lead to an exceedance of the respective standard in 10 C.F.R. Part 40, Appendix A, Criterion 5B(5). These standards are either Commission-approved background (CAB) water quality; water quality equivalent to the MCLs provided in the table in 10 C.F.R. Part 40, Appendix A, Criterion 5C; or an ACL established in accordance with Criterion 5B(6). The NRC's process for reviewing and approving ACLs is found in SEIS Appendix B.

Q6.14: Turning from groundwater to cultural resources, the Tribe argues that the FSEIS's discussion of mitigation measures is inadequate because, at the time the Staff issued the FSEIS, it had not finalized a Programmatic Agreement for the Dewey-Burdock Project. Have you considered mitigation measures for cultural resources in your NEPA review?

A6.14: (H. Yilma, K. Jamerson) The Staff has now finalized the Programmatic Agreement for the Dewey-Burdock Project. The Programmatic Agreement includes mitigation measures for cultural resources. The Staff took into account the Programmatic Agreement in its NEPA review, along with the mitigation measures specified in the Agreement. The Staff did not issue its Record of Decision for the Dewey-Burdock Project—its NEPA decision document—until after the Programmatic Agreement was finalized. Although the Tribe focuses on the FSEIS, the FSEIS did not mark the end of our NEPA review. Our NEPA review also took into account the mitigation measures for cultural resources that are specified in the Programmatic Agreement.

Q6.15: On page 23 of its FSEIS-related contentions, the Tribe appears to argue that the FSEIS is inadequate because, rather than spelling out specific mitigation measures, in some areas the Staff refers to license conditions that will require

Powertech to submit plans in the future. Is the Staff's approach consistent with NEPA?

A6.15: (H. Yilma, K. Jamerson, J. Prikryl) We address this claim above, in A6.7. As stated above, NEPA does not require that all of the mitigation measures an agency specifies in an EIS be in final form. Nor does the Commission, as reflected in *Hydro Resources,* CLI-06-29, 64 NRC at 427.

Q6.16: In addition to claiming that the Staff should not have relied on license conditions in these instances, the Tribe appears to argue that the license conditions imposed by the Staff are impermissibly vague. Is that so?

A6.16: (H. Yilma, K. Jamerson) No. Powertech's license conditions state specifically what actions Powertech must take in order to comply with the condition. Before finalizing the condition, the NRC staff held multiple public meetings with Powertech to ensure Powertech and interested members of the public understood what is required by each license condition.

Q6.17: Beginning at the bottom of page 24 on its FSEIS-related contentions, the Tribe argues that the FSEIS lacks sufficient detail on mitigation measures and simply requires Powertech to submit plans in the future. The Tribe cites three examples of the discussion in Appendix E of the FSEIS, where the Staff responds to public comments on the DSEIS. The Tribe's examples relate to air impacts, land disposal of waste, and wildlife protection. Can you address each of the Tribe's claims?

A6.17: (H. Yilma, K. Jamerson, J. Prikryl) With regard to air impacts, the Tribe misinterprets the comment response on page E-163 (response to Comment 049-000013) to argue that the Staff has not identified mitigation measures to address air quality impacts. The comment response on page E-163 concerns additional air modeling using updated emission inventories that are presented in the FSEIS, not mitigation

measures. The Staff provides information on mitigation measures that will be implemented to minimize air impacts in FSEIS Section 4.7.1 and summarizes these measures in Chapter 6 of the FSEIS. These mitigation measures include using new engines with lower emission factors, carpooling, spraying water on unpaved roads, and implementing dust control measures, such as speed limits. In addition, the Staff incorporated mitigation measures into calculations of emission inventories (see Section C2.1 of the FSEIS) and considered the effectiveness of mitigation based on these calculations when reaching its environmental impact conclusions for air quality.

With regard to land disposal of waste, in FSEIS Sections 3.13 and 4.14 the Staff provides detailed discussions of radioactive waste disposal. As the Staff explains, the disposal of treated wastewater by land application will require treatment to meet NRC release requirements for radionuclides in 10 C.F.R. Part 20, Appendix B, and SDDENR requirements imposed by a Groundwater Discharge Permit (GDP). Furthermore, as the Staff explains in FSEIS Section 4.5.1.1.2.1 (p. 4-47), runoff from precipitation events or snowmelt on land application areas will be conveyed to catchment areas constructed downgradient of land application areas and allowed to evaporate or infiltrate (Ex. APP-051).

Regarding the Staff's discussion of land disposal of waste on page E-56 of the FSEIS, the Tribe misrepresents the comment response presented on page E-56 (response to Comment 116-000028) to argue that the FSEIS relies on SDDENR permitting processes to defer analysis of impacts. We would note that the Staff addressed a comment from the Oglala Sioux Tribe raising this same argument in FSEIS Section E5.31, "Mitigation Measures" (see response to comment 127-000024 on p. E-242). As discussed in the Staff's comment, relying upon state and federal permitting processes to require appropriate mitigation measures to lessen impacts is appropriate in a NEPA analysis. By license condition, the Staff requires an operator of

an ISR facility to obtain all necessary permits and approvals from the appropriate regulatory authorities before operating its facility (see License Condition 12.1 in Ex. NRC-012). Mitigation measures may also be imposed by other agencies through permits the ISR operator must obtain.

Regarding wildlife protection, in FSEIS Sections 3.6 and 4.6 the Staff provides detailed information on this issue. As the Staff explains, Powertech has committed to (i) minimize disturbance of surface areas and vegetation, where possible; (ii) minimize construction of new access and secondary roads so more than one drill site can be accessed through a single road; and (iii) construct new roads, power lines, and pipelines in the same corridor to the extent possible to reduce overall disturbance and minimize new disturbance. Additionally, as the Staff explains on page 4-87 of the FSEIS, all lands disturbed by Dewey-Burdock Project activities will be concurrently re-vegetated, which will restore any habitat loss. As the Staff further explains, Powertech, in coordination with FWS, SDDENR, and SDGFP, will develop an avian monitoring and mitigation plan prior to construction activities. The Staff explains that South Dakota imposes regulatory requirements for surface water ponds and accordingly has special provisions for migratory birds and wildlife protection.

Finally, we would note that the CEQ's regulations at 40 C.F.R. §§ 1502.16(h) and 1505.2(c) encourage agencies to consider an applicant's compliance with environmental quality requirements imposed by other Federal, State, and local agencies with responsibility for environmental protection. Consistent with these regulations—and as just described above—in the FSEIS the Staff took into account land-use regulations, wildlife protection, and water pollution limitations that fall outside the NRC's jurisdiction.

Q6.18: Finally, the Tribe argues that ISR projects have a poor record of groundwater restoration, and that no ISR operator has successfully restored the groundwater

used to conduct ISR activities. Did you take the Tribe's claims into account in analyzing mitigation measures for the Dewey-Burdock Project?

A6.18: (H. Yilma, K. Jamerson, J. Prikryl) Yes. In the FSEIS the Staff responds to comments on the DSEIS from the Oglala Sioux Tribe and other commenters concerning aquifer restorations at NRC-licensed ISR facilities. The Staff addresses these comments in Section E5.9.4 (see the response to comments 022-000001, 047-000009, 053-000003, 065-000002; 093-000002, 093-000004, 122-000001, 127-000015, 134-000002, and 136-000002 on page E-61). Based on these comments, the Staff added information to Section 4.5.2.1.1.3, "Aquifer Restoration Impacts" (page 4-67), regarding the success of NRC-approved aquifer restorations at NRC-licensed IRS facilities.

As the Staff explains in FSEIS Sections 4.5.2.1.1.3 and E5.9.4, the NRC examined available groundwater restoration data from three NRC-licensed ISR facilities: COGEMA's Irigary/Christensen Ranch facility, PRI's Smith Ranch/Highland Uranium Project facility, and Crow Butte Resources Crow Butte facility (Exs. NRC-008-A and 008-B). The Staff has approved 11 wellfield restorations at the 3 sites. The restoration data show that preoperational concentrations are attainable for many parameters (50 to 70 percent of the 35 parameters commonly monitored) but are not attainable for other constituents; in particular, the major and trace cations with solubilities most susceptible to the oxidation state of the aquifer water (i.e., iron, manganese, arsenic, selenium, uranium, vanadium, and radium-226). However, for the approved restorations, the groundwater in the exempted aquifer met all regulatory standards for the state or EPA Underground Injection Control program and met the quality designated for its class of use prior to ISR operations. The impacts to groundwater have been shown to decrease over time due to natural attenuation processes, and the groundwater has been shown to meet drinking water standards at

the perimeter of the exempted aquifer. Therefore, the impacts to the exempted aquifer for each of the approved restorations do not pose a threat to human health or the environment.

Contention 9: The Staff Independently Reviewed Impacts from Powertech's Related Licensing Actions and Analyzed those Impacts in the FSEIS

Q 9.1: In Contention 9, the Tribe refers to a number of other permitting actions and argues that the Staff failed to analyze these actions to the extent required under NEPA. Did the Staff consider other permitting actions in the FSEIS?

A 9.1: (H. Yilma, K. Jamerson) The Tribe refers to Powertech's applications for Class III and Class V permits from the U.S. Environmental Protection Agency (EPA), for a National Pollutant Discharge Elimination System (NPDES) permit from EPA, and for EPA permits associated with Subpart W controls. The Tribe also refers to permits required by the South Dakota Department of Game, Fish, and Parks. The Staff did, in fact, consider the environmental impacts of these other actions in the FSEIS. The FSEIS incorporates by reference these actions, the potential environmental impacts associated with these actions, and certain mitigation measures that will be implemented to minimize those impacts.

Consistent with NEPA and the CEQ regulations at 40 C.F.R. § 1502.21, agencies can incorporate by reference analyses and information from concurrent environmental reviews into their own NEPA document. In this case, for example, the Staff identified and evaluated the impacts of Class V wells on its own, taking into account EPA regulations. This approach is consistent with 40 C.F.R. § 1502.21. The Staff assessed the environmental impacts of Powertech disposing of waste through a Class

V permit, and it also considered the impacts of Powertech disposing of waste through alternative methods. We discuss these alternative methods in more detail below.

Q 9.2: Let's turn to the specific actions identified by the Tribe. The Tribe argues that in the FSEIS the Staff failed to independently analyze impacts associated with Powertech's application with EPA for a Class III injection well permit. Did you consider impacts associated with a Class III permit?

A 9.2: (H. Yilma, K. Jamerson) Yes. The Staff considered impacts of Class III injection wells and associated impacts to water resources and other environmental resources throughout the FSEIS. In Chapter 2 of the FSEIS, we describe the use of Class III wells for production, injection, and monitoring activities. The Staff recognizes that Powertech must obtain Class III underground injection control (UIC) permits from EPA prior to starting operations. As we explain in the FSEIS, in 2011 the South Dakota legislature suspended its rules regulating UIC Class III wells. As a result, EPA now regulates underground injection wells to protect underground sources of drinking water in accordance with 40 C.F.R. Parts 144–147. The EPA implements its UIC program pursuant to the Safe Drinking Water Act.

As the Staff explains, Powertech applied for a UIC Class III permit in 2008 and revised its UIC Class III permit application in 2012. Ex. NRC-008-A at Table 1.6-1; Ex. APP-042-A EPA has not yet acted upon Powertech's permit application. As the Staff further explains, Powertech may not start operations at the Dewey-Burdock ISR facility without the EPA's approval of its UIC Class III injection well application. The Staff describes this process in FSEIS Section 2.1.1.1.2.3.1.

In the FSEIS the Staff also evaluates the construction, development, and testing of production, injection, and monitoring wells in accordance with EPA regulations under 40 C.F.R. Part 146. For example, as described in FSEIS Section 2.1.1.1.2.3.5, the EPA's UIC regulations at 40 C.F.R. § 146.33 require quarterly reporting of the

results of mechanical integrity tests to the EPA. In addition, mechanical integrity test results must be maintained onsite and will be available for EPA and NRC inspection. License Condition 10.5 requires the mechanical testing of injection and production wells, to ensure compliance with EPA and NRC regulatory requirements. In addition to the material presented in Chapter 2 of the FSEIS, the Staff discusses Class III permitting requirements in Chapter 4 of the FSEIS, at pages 4-32–4-33, 4-56, and 4-71.

Q 9.3: The Tribe also claims the Staff did not independently analyze impacts associated with a Class V permit. Did you do so?

A 9.3: (H. Yilma, K. Jamerson) Yes. In Chapter 4 of the FSEIS we evaluate the impacts of disposal via Class V injection wells for each resource area during each of the four-lifecycle phases of ISR uranium extraction. For example, on page 4-69 of the FSEIS the Staff states: "EPA will evaluate the suitability of the proposed deep well injection wells and will only allow deep well injection if the waste fluids can be suitably isolated in a deep aquifer. Consequently, NRC staff determine that the potential environmental impact from the Class V injection well disposal option on targeted deep aquifers below the production zone aquifers will be SMALL." The Staff assessed specific impacts from disposal via Class V injection wells at pages 4-100 through 4-102 of the FSEIS.

Q 9.4: What about the impacts of Powertech's application for an NPDES permit?

A 9.4: (H. Yilma, K. Jamerson) In addition to obtaining an NRC source material license, Powertech must obtain permits and approvals from other federal and state agencies before it begins ISR operations at the Dewey-Burdock site. As we explain in Chapter 4 of the SEIS, Powertech must obtain construction and industrial stormwater NPDES permits in accordance with regulations issued by the South Dakota Department of Energy and Natural Resources. The NPDES permit requirements control the amount of pollutants discharged into surface water, including streams, wetlands, and lakes.

As we state in the FSEIS, Powertech has not yet submitted an application for an NPDES permit to South Dakota Department of Energy and Natural Resources. Under the Administrative Rules of South Dakota (ARSD) at 74:52, an application for an NPDES permit should be submitted to the South Dakota Department of Energy and Natural Resources at least 180 days before the date of any surface water discharge.

Q 9.5: The Tribe also claims you did not analyze impacts related to EPA permits under the Safe Drinking Water Act and Subpart W of the EPA's regulations. Did you do so?

A 9.5: (H. Yilma, K. Jamerson) Yes, the Staff analyzed impacts related to EPA permits under the Safe Drinking Water Act and Subpart W. As we explain in the FSEIS, to use the Class V injection well option Powertech must construct surface impoundments or ponds for storage and settling of radium as part of the treatment and injection of wastewater into deep disposal wells. The NRC staff acknowledges the requirements of 40 C.F.R. Part 61, Subpart W associated with the use of ponds as part of wastewater disposal systems. In FSEIS Sections 2.1.1.1.2.4.1 and 2.1.1.1.2.4.2, we evaluate Powertech's plan for siting and designing these retention ponds. As we explain, NRC Regulatory Guide 3.11 (Ex. NRC-0094) states that the siting and design of retention ponds at ISR facilities should consider the EPA national emission regulations under 40 CFR Part 61, Subpart W. In order to comply with 40 C.F.R. Part 61, Subpart W, Powertech may need EPA approval of its impoundments before beginning operations in any wellfield.

As we further explain in the FSEIS, the EPA's regulations at 40 C.F.R. Part 61, Subpart W control radon emissions and apply to all uranium recovery facilities. This is part of the EPA's oversight of uranium byproduct material and tailings. The Staff recognizes that the enforcement of EPA regulations related to Subpart W is outside the NRC's regulatory authority. Therefore, the Staff included a general condition in

Powertech's license, License Condition 12.1, which prohibits Powertech from commencing operations until it obtains all necessary permits, licenses, and approvals from the appropriate regulatory authorities. In addition, before beginning operations, Powertech must submit a copy of its Class V injection well permit to the NRC.

Q 9.6: The Tribe's overarching claim in Contention 9 is that, while in the FSEIS you mention each of these other permitting processes, you do not fully review the environmental impacts related to Powertech obtaining the other permits. Rather, you rely on the other agencies to analyze the baseline conditions, potential impacts, and proposed mitigation measures associated with Powertech's proposals. Is this correct?

A 9.6: (H. Yilma, K. Jamerson) No. A guidance document published by the Council on Environmental Quality (CEQ), *Improving the Process for Preparing Efficient and Timely Environmental Reviews under NEPA* (Ex. NRC-132), encourages federal agencies to integrate their draft EISs with environmental impact analyses prepared by other agencies, and with related surveys and studies required by other statutes. The Staff followed the integrative approach recommended by the CEQ and, as a result, in the FSEIS we refer to the reviews being conducted by the EPA and the South Dakota Department of Energy and Natural Resources.

As stated above, in the FSEIS the Staff considers Powertech's ability to comply with environmental quality standards imposed by other federal, state, and local agencies with regulatory authority for environmental protection. The Staff specifically evaluates regulations governing stormwater discharge (FSEIS Section 4.5.1.1.1), wildlife protection (FSEIS Section 4.6.1.1.1.1.2), and air quality (FSEIS Section 4.7). We also consider mitigation measures associated with permits Powertech has already obtained, and measures that may be included in permits Powertech has yet to obtain.

For example, at page 4-45 of the FSEIS we explain that Powertech must obtain construction and industrial stormwater NPDES permits in accordance with regulations issued by the South Dakota Department of Energy and Natural Resources. The NPDES permit requirements control the amount of pollutants discharged to surface water bodies, such as streams, wetlands, and lakes. As part of the NPDES permit, Powertech will have to implement a stormwater pollution management plan. This plan will require that Powertech detain and treat stormwater runoff to ensure that the runoff does not contaminate surface waters and wetlands. In addition, Powertech has committed to implementing mitigation measures to control erosion and sedimentation in its stormwater pollution management plan. Because the NPDES permit has not yet been submitted to the South Dakota Department of Energy and Natural Resources, however, the Staff was unable to describe the specific details of the NPDES permit application in the FSEIS. Nonetheless, because Powertech agrees to comply with all NPDES permit requirements for discharge into surface waters, the Staff was able to conclude that the environmental impacts associated with stormwater runoff will be small.

Q 9.7: On pages 27–28 of its FSEIS-related contentions, the Tribe cites a number of FSEIS sections where it claims that, rather than conducting required analysis, you simply refer to the future permitting actions of other agencies. Can you address these claims?

A 9.7: (H. Yilma, K. Jamerson) It appears that the Tribe is focusing on isolated sentences in the FSEIS and overlooking relevant language from other sections. As we explain below, we fully considered the environmental impacts associated with each of the licensing actions the Tribe identifies.

Class V Injection wells – As we explain in FSEIS Section 2.1.1.2, South Dakota prohibits the use of Class I disposal wells. ARSD 74:55:02:02. South Dakota Codified

Law 34A-2 sets the goal of preventing the pollution of state waters. South Dakota regulations at ARSD 74:55:02:03 provide the framework for safely using Class V disposal wells. Liquid waste containing hazardous or radioactive constituents may not be injected into Class V disposal wells under any circumstances. At pages 2-21 through 2-29 of the FSEIS, we discuss the Resource Conservation and Recovery Act regulations in 40 C.F.R. § 261.3 that prohibit the injection of any material defined as hazardous waste under an EPA UIC Class V permit. As we explain on pages 2-51 and 4-66 of the FSEIS, the NRC will also require the liquid waste to be treated and monitored to verify it meets NRC release standards in 10 CFR Part 20, Subparts D and K and Appendix B, Table 2, Column 2.

As the Staff further explains in the FSEIS, the Class V deep well injection permit requirements that are imposed by other agencies, and also the mitigation measures to which Powertech has committed, are means by which environmental impacts will be reduced. For example, Powertech has committed to construct the Dewey-Burdock central plant and satellite facility on concrete slabs surrounded by protective berms or curbs to contain and control accidental spills. This will reduce the likelihood of surface water contamination. Powertech's commitment to implement these mitigation measures allows the NRC staff to conclude, at pages 4-45 and 4-46 of the FSEIS, that the environmental impacts to surface waters from use of the Class V injection well disposal option at the Dewey-Burdock Project will be small.

Additionally, in the FSEIS we explain that the Class V injection well option requires the construction of surface impoundments or ponds for storage to allow radium to settle out before wastewater is injected into deep disposal wells. The Staff refers to the requirements of 40 C.F.R. Part 61, Subpart W associated with the use of ponds as part of wastewater disposal systems. In FSEIS Sections 2.1.1.1.2.4.1 and 2.1.1.1.2.4.2, we discuss Powertech's plan for siting and designing retention ponds.

Class III injection wells – In the FSEIS the Staff also independently evaluates how Class III injection wells may affect water and other environmental resources. In Chapter 2 of the FSEIS, we discuss Powertech's plan to use Class III wells for its production, injection, and monitoring activities. We also discuss the need for Powertech to obtain Class III permits from the EPA because the South Dakota Legislature suspended South Dakota's UIC Class III rules in 2011. As a result, EPA will be overseeing UIC Class III permitting in South Dakota. As we explain, EPA's UIC Program is found in 40 C.F.R. Parts 144–147. These regulations implement the Safe Drinking Water Act and regulate underground injection practices to protect underground sources of drinking water.

As we further explain, Powertech submitted a UIC Class III permit application to the EPA in 2008 and a revised UIC Class III permit application to the EPA in 2012. Ex.NRC-008-A at Table 1.6-1. As we state in FSEIS Section 2.1.1.1.2.3.1, before Powertech can begin ISR operations at the Dewey-Burdock Project, the EPA must review and approve Powertech's UIC Class III permit application. This ensures that the Dewey-Burdock Project meets the requirements of the UIC Program under the Safe Drinking Water Act.

Subpart W – In the FSEIS the Staff takes into account the EPA's regulations at 40 C.F.R. Part 61, Subpart W. Subpart W address radon emissions at uranium recovery facilities that produce, store, or process uranium byproduct material or tailings. Although the enforcement of EPA regulations is outside the NRC's authority, Powertech's license includes a general condition, License Condition 12.1, that prohibits ISR operations until Powertech obtains all necessary permits, licenses, and approvals from the appropriate regulatory authorities. This type of license condition has historically been an effective mechanism for ensuring an NRC licensee complies

with the applicable rules of other agencies, and the Staff expects it to provide the same assurances for the Dewey-Burdock ISR facility.

In the FSEIS at 4-45, the Staff also explains that Powertech must obtain construction and industrial stormwater NPDES permits in accordance with regulations issued by the South Dakota Department of Energy and Natural Resources. The NPDES permit requirements restrict the amount of pollutants discharged to surface water bodies, such as streams, wetlands, and lakes. In order to obtain an NPDES permit, Powertech must implement a stormwater pollution management plan, in accordance with requirements of the South Dakota Department of Energy and Natural Resources. As the Staff explains at page 4-45 of the FSEIS, Powertech must impound and treat stormwater runoff at the Dewey-Burdock facility to ensure that runoff does not contaminate surface waters and wetlands. In addition, Powertech's stormwater pollution management plan must implement erosion and sedimentation controls.

Because Powertech has not yet submitted its NPDES permit application to the South Dakota Department of Energy and Natural Resources, the NRC staff was unable to describe the specifics of the NPDES permit application in the FSEIS. Because Powertech agrees to comply with all NPDES permit requirements for discharge into surface waters, however, the Staff reasonably concluded that the environmental impacts from stormwater runoff will be small. The Staff would emphasize that we did not defer assessing the environmental impacts from stormwater runoff, as the Tribe suggests. Rather, we assessed these impacts based on the reasonably foreseeable conditions in Powertech's NPDES permit, should it obtain one.

Q 9.8: On page 29 of its FSEIS-related contentions, the Tribe argues that the Staff improperly relies on Powertech's intent to dispose of waste in a Class V well. The Tribe argues that Powertech's proposal would require a Class I permit, which is prohibited in South Dakota. Can you address this claim?

A 9.8: (H. Yilma, K. Jamerson) The Staff took into account the Tribe's argument, which it submitted as a comment on the DSEIS, when preparing the FSEIS. As the Staff explains at pages 7-24 and E-231 of the FSEIS, we recognize that Class I wells are prohibited in South Dakota by ARSD 74:55:02.02. As we explain, however, Powertech is seeking a permit not for a Class I well, but for a Class V well. Class V wells are allowed in South Dakota, subject to South Dakota Codified Law 34A-2 and the extensive regulations at ARSD 74:55:01 and ARSD 74:55:02. Class V wells are also subject to the requirements at 40 C.F.R. Part 146 Subpart B, "Criteria and Standards Applicable to Class I Wells." If the EPA issues Powertech a Class V permit, the Subpart B standards will be included in that permit.

Q9.9: The Tribe argues that Powertech will not, however, be able to obtain a Class V injection permit. Did you consider that argument?

A9.9: (H. Yilma, K. Jamerson) Yes. Because Powertech proposes to use Class V deep injection wells for disposal, under any EPA permit it will have to treat injectate to remove radioactive constituents so that the injectate meets the radioactive waste standards at 10 C.F.R. Part 20, Subparts D and K and Appendix B, Table 2. The Staff addresses this issue on page 4-66 of the FSEIS.

Under EPA regulations, if the total dissolved solids concentration in a proposed injection zone is below 10,000 mg/L [10,000 ppm], the injection zone is classified as an underground source of drinking water. If Powertech proposes to inject liquid that has a total dissolved solids concentration greater than 10,000 mg/L, it will need to obtain an aquifer exemption from the EPA that allows disposal of treated wastewater into an underground drinking water source. Alternatively, Powertech could choose to inject only treated wastewater that meets drinking water standards or contaminant-specific background concentrations for constituents listed in the Safe Drinking Water Act. We discuss these possibilities at pages 4-66, 7-24, and E-231 of the FSEIS.

Q 9.10: Assuming that Powertech cannot obtain a permit allowing for underground disposal, how would they dispose of waste? Did you consider the impacts from this alternative disposal scenario?

A 9.10: (H. Yilma, K. Jamerson) Yes, in the FSEIS the Staff considers the impacts of alternatives to deep well disposal. If Powertech cannot obtain an EPA permit for underground disposal, it plans to use land application to dispose of properly treated wastewater. Under the land application method, Powertech would spray treated water on fields for crop irrigation. The Staff analyzes the land application option in detail throughout the FSEIS (*e.g.,* Sections 4.2.1.2, 4.3.1.2, 4.4.1.2). In Section 2.1.1.1.2.4.2, the Staff describes Powertech's proposed plans to use the land application option.

As we explain at page 2-22 of the FSEIS, the South Dakota Department of Energy and Natural Resources regulates the land application of treated wastewater. Powertech must therefore obtain approval of its groundwater discharge plan in order to use this method.

As we further explain at page 2-25 of the FSEIS, to dispose of liquid waste through land application, Powertech would need to treat the waste so that it meets the standards in 10 C.F.R. Part 20, Subparts D and K and Appendix B, Table 2, Column 2. To accomplish this, Powertech would collect wastewater and treat it in lined settling ponds. Furthermore, as we explain in FSEIS Section 7.5, Powertech would need to develop an operational monitoring plan in connection with its proposal for land application. The monitoring program would need to meet the requirements of ARSD 74:54:02:06(9).

In Chapter 4 of the FSEIS, we discuss the environmental impacts related to Powertech's use of a land application option. We discuss the impacts of the land application option in each resource area. We also recommend mitigation measures,

including monitoring plans, to lessen environmental impacts associated with the land application option. We discuss these measures in FSEIS Chapters 6 and 7. In addition, in Chapter 5 we describe cumulative impacts related to the land application option.

Finally, in addition to evaluating the land application option, in FSEIS Section 2.1.1.2 we analyze other waste disposal methods. As we explain, these other methods are not viable options for liquid waste disposal at the Dewey-Burdock site. For the Dewey-Burdock Project, the use of evaporation ponds—which can be effective in some environments—would prove ineffective due to the short period of high temperatures, long period of sub-freezing temperatures, and strong winds in southwest South Dakota. Surface water discharge is likewise an unacceptable option, because NDPES permit requirements do not allow process wastewater discharges into the waters of South Dakota.

Q9.11: Do you have any concluding remarks?

A9.11: (H. Yilma, K. Jamerson) As we have explained, in the FSEIS the Staff analyzed the environmental impacts related to other permits Powertech is seeking for the Dewey-Burdock Project. We did not defer to the analyses of other agencies; rather, we analyzed the impacts ourselves, taking into account the regulations of other agencies and the reasonably foreseeable conditions that might be included in any permits issued by those other agencies.

Contention 14A: The Staff Consulted as Required under the Endangered Species Act

Q14.1: In Contention 14A the Tribe states that the Staff did not consult with the U.S. Fish and Wildlife Service (FWS) on threatened and endangered species and critical habitat. The Tribe claims that, as a result, the FSEIS does not comply

with NEPA and the Endangered Species Act (ESA). Did the NRC staff consult with the FWS in this area?

A14.1: (A. Hester, H. Yilma) Yes. On March 15, 2010, the Staff initially consulted with the FWS and requested information on whether federally listed species protected under the ESA may be affected by the Dewey-Burdock facility, which is in Fall River and Custer Counties, South Dakota. Ex. NRC-097. The South Dakota Field Office of the FWS advised the Staff that the whooping crane (*Grus americana*) and black footed ferret (*Mustela nigripes*) are federally listed endangered species that could be present within Custer County. Ex. NRC-129. In that letter, the FWS specifically advised the Staff that the whooping crane and black-footed ferret have not been identified within the Dewey-Burdock project boundaries. The FWS reported that the black-footed ferret has been identified at Wind Cave National Park and may occur within Custer County, but is not expected in Fall River County. The whooping crane is expected to be present within Custer County *only* during migration. The FWS reported that no threatened or endangered species or critical habitat is known to be present within the project boundary. Ex. NRC-129.

The FWS provided specific information on the migratory patterns and habitat of whooping cranes in its Environmental Comments on the Dewey-Burdock project.

> Whooping cranes migrate through South Dakota on their way to northern breeding grounds and southern wintering areas. They occupy numerous habitats such as cropland and pastures; wet meadows; shallow marshes; shallow portions of rivers, lakes, reservoirs, and stock ponds; and both freshwater and alkaline basins for feeding and loafing. Overnight roosting sites frequently require shallow water in which they stand and rest. Additionally, should mining activities occur during spring or fall migration, the potential for disturbances to whooping cranes exists. Disturbance (flushing the birds) stresses them at critical times of the year. We recommend that you remain vigilant for these birds. Little can be done to reduce disturbance besides ceasing activities at sites where the birds have been observed. The birds normally do not stay in anyone area for long during migration. Any whooping crane sightings should be reported to this office.

The FWS's Environmental Comments can be found at Ex. NRC-129.

Q14.2: Did the Staff find that there would be no adverse effects to federally listed threatened or endangered species or critical habitat at the Dewey-Burdock site?

A14.2: (A. Hester, H. Yilma) Yes. On August 27, 2010, the Staff advised the FWS that the Dewey-Burdock project was expected to have *no adverse effects* on threatened or endangered species or critical habitat. The Staff also advised the FWS that it would be publishing its determination in the Dewey-Burdock DSEIS. Ex. NRC-130, Ex. NRC-131 at 4, DSEIS (Exs. NRC-009-A and NRC-009-B) at 1-13, FSEIS (Exs. NRC-008-A and NRC-008-B) at A-157. Letters and emails between the NRC and the FWS from March 2010 to September 2013 document the FWS's consultation on the Dewey-Burdock Section 7 review.

The Staff would note that the ESA does not require formal consultation with, or formal concurrence from, the FWS when a federal agency determines that a proposed project will have no effect on endangered or threatened species or critical habitat. 10 C.F.R. Part 402, Subpart B; Ex. NRC-014. Confirming the Staff's determination, the FWS wrote that "no formal or informal Section 7 consultation is required based upon your determination and we have no records of any federally listed species in the area of the project." Ex. NRC-00131 at 1; FSEIS at A-157.

The FWS also provided comments on the DSEIS, but it did not raise concerns regarding federally listed threatened or endangered species or critical habitat. Ex. NRC-096. The Staff later provided the FWS with the Staff's FSEIS assessment stating that it did not expect adverse effects to federally-listed threatened or endangered species or critical habitat. Ex. NRC-131 at 2; FSEIS at 1-14, A-157. The Staff provided its assessment to the FWS on September 9, 2013, over four months before it issued the FSEIS.

Q14.3: At page 52 of its DSEIS-related contentions, the Tribe suggested that a biological opinion and Section 7 consultation were required under ESA regulations at 50 C.F.R. Part 402. Did the Staff need to obtain a biological opinion or assessment?

A14.3: (A. Hester, H. Yilma) No. The Staff found that neither protected species nor critical habitats are likely to be present at the Dewey-Burdock project. In the absence of adverse effects to threatened or endangered species, the Staff found that neither a biological assessment nor further Section 7 consultation under the ESA was warranted. Furthermore, the FWS confirmed "that no formal or informal Section 7 consultation is required," when the Staff asked whether a biological opinion was necessary. Ex. NRC-131 at 1-2; FSEIS Section 1.7.1.

Q 14.4: The Tribe argues at page 55 of its DSEIS-related contentions that the whooping crane, black-footed ferret and Greater sage-grouse may be harmed because the NRC has not documented "any attempt to seek USFWS concurrence or consultation regarding these species." Did the Staff coordinate with FWS regarding these species and their habitats?

A 14.4 (A. Hester, H. Yilma) Yes. The Greater sage-grouse is a candidate species that has been nominated for listing. Ex. NRC-113; FSEIS at 3-45, 3-57. Candidate species have no legal protection under the ESA. Ex. NRC-129; FSEIS at 1-15. The ESA did not require that the Staff consult with the FWS regarding the Greater sage-grouse and its habitat. Nor did the ESA require that we consider impacts, and measures to mitigate impacts, to the Greater sage-grouse. Nonetheless, as we explain in answer A14.8 below, we assessed impacts to the Greater sage-grouse as part of our NEPA analysis.

Regarding the black-footed ferret, the Staff consulted with the FWS and considered the Environmental Comments provided by the FWS on the Dewey-Burdock

licensing action. Ex. NRC-129. The FWS advised us in writing that "we have no records of any federally listed species in the area of the project." Ex. NRC-131 at 1; FSEIS at A-157. The FWS stated that the black-footed ferret may occur within Custer County, but is currently only found in Wind Cave National Park. The FWS added that the black-footed ferret is not expected to be present at the Dewey-Burdock site. Ex. NRC-129; Ex. NRC-129; FSEIS at 3-55, 3-61, 4-96.

Regarding the whooping crane (*Grus americana*), the Staff likewise consulted with the FWS and considered FWS's Environmental Comments. Ex. NRC-129. The Staff determined that the whooping crane occupies numerous habitats for feeding and loafing, including cropland and pastures; wet meadows; shallow marshes; shallow portions of rivers, lakes, reservoirs, and stock ponds; and both freshwater and alkaline basins. Ex. NRC-129. The Staff reviewed information stating that the crane is expected to be present in the eastern portion of Custer County during its migration between northern breeding grounds and southern wintering areas. As reported by the FWS, however, the whooping crane has not been reported within the Dewey-Burdock boundary. Ex. NRC-129; Ex. NRC-131. The FWS further indicated that the whooping crane does not remain in any area for an extended period during migration. The NRC staff therefore determined that it is unlikely migrating whooping cranes stop regularly at or near the Dewey-Burdock site during their seasonal migrations. FSEIS at 4-95.

Contention 14B: The Staff Evaluated Impacts to the Greater Sage-Grouse, Whooping Crane, and Black-Footed Ferret as Required under NEPA

Q14.5: The Tribe claims that the Staff failed to consider how the Dewey-Burdock Project may affect the black-footed ferret, the whooping crane, and the Greater sage-grouse? Did you consider impacts to these species?

A14.25: (A. Hester, H. Yilma) Yes. When evaluating impacts to these species we considered information and recommendations provided by the FWS, the BLM, and the SDGFP. As documented throughout the FSEIS, the Staff reviewed professional publications from the FWS, the BLM, the and South Dakota Game, Fish, and Parks. The Staff also consulted the FWS directly and obtained additional information on these species.

Q14.6: Could you provide more information on how you considered impacts to the black-footed ferret?

A14.6: (A. Hester, H. Yilma) As we explain in the FSEIS, the black-footed ferret depends on prairie dogs for food and all essential aspects of its habitat. The black-footed ferret depends especially on prairie dog burrows, where the ferret spends most of its life. Ex. NRC-110; FSEIS at 3-48, 3-61, 3-62. The Dewey-Burdock site contains potentially suitable habitat for the black-footed ferret. Ex. NRC-104; Ex. NRC-105; Ex. NRC-106; FSEIS at 3-48, 3-61. In fact, one black-tailed prairie dog (*Cynomys ludovicianus*) colony is located in the northwestern corner of the Dewey-Burdock site, and two additional colonies are present within 1.6 km [1 mi] southwest of the proposed site boundary. FSEIS at 3-61, 3-62, 4-96.

While black-footed ferret habitat exists at the Dewey-Burdock site because a prairie dog colony is present, no ferrets have been found at the site, according to the FWS and the U.S. Bureau of Land Management (BLM). The BLM concluded that closely spaced prairie dog colonies on the order of several thousand acres are needed to support and sustain a breeding population of black-footed ferrets. Ex. NRC-104; Ex. NRC-105 at 2-4; Ex. NRC-128 at 24; FSEIS at 3-61 and 4-96. The prairie dog colony on the Dewey-Burdock site is most likely too small to support and sustain a breeding population of black-footed ferrets. FSEIS Section 3.6.3 at 3-61 and 4.6.1.1.1.1.4 at 4-96.

In terms of impacts to the black-footed ferret, we address this issue in FSEIS Sections 1.7.1; 1.7.3.7, 3.6.1.2.3, 3.6.3; 3.8; 4.6.1.1.1.1.4 and 4.6.1.2, and 4.6.1.3. As we explain in these sections, the Staff found that the Dewey-Burdock Project will not adversely affect either current or future populations of the black-footed ferret.

Q14.7: What about impacts to the whooping crane?

A14.7: (A. Hester, H. Yilma) As we explain above, whooping cranes are not expected to be present in the Dewey-Burdock area, and may only pass through the area during their seasonal migrations. Nonetheless, the Staff evaluated FWS information on overnight roosting behaviors of the whooping crane. We also considered additional reports on whooping crane behavior and habitat. With this information, in the FSEIS the Staff evaluated measures to reduce impacts to this species. Ex. NRC-098; Ex. NRC-112. The Staff also took into account the input of the FWS, which stated that facility operations during the spring or fall migration could potentially disturb whooping cranes. The FWS recommend that the NRC be vigilant for the presence of whooping cranes in the project area so that, if necessary, steps could be taken to reduce stresses to the cranes at critical times of the year. Ex. NRC-129.

In the FSEIS, the Staff discusses the migratory patterns of whooping cranes. FSEIS at 3-58 and 4-95. As the Staff explains, whooping cranes tend to stop migration to rest late in the day. Whooping cranes may be used on a regular basis, or in unpredictable locations that may not be used again. Ex. NRC-098. After considering all relevant information, the Staff concluded that it is unlikely migrating whooping cranes would stop at the Dewey-Burdock site on a regular basis. FSEIS at 4-95. The Staff therefore concluded that no adverse effects to whooping cranes are expected.

Q14.8: And what about the Greater sage-grouse?

A14.8: (A. Hester, H. Yilma) The Staff analyzed multiple sources of information when assessing sage-grouse habitat, biology, behavior, and recommended conservation measures. Ex. NRC-113, NRC-114, NRC-122; FSEIS at 3-50, 3-62, 4-92. The Staff considered the habitat in the Dewey-Burdock area, which is similar to habitat the FWS evaluated at nearby Buffalo Gap National Grassland. FSEIS Section 3.6.3 at 3-57, FSEIS Section 4.6.1.1.1.1.2 at 4-87. The Staff concluded that it is unlikely the Dewey-Burdock site provides the optimum canopy coverage of sagebrush habitat needed to support breeding and wintering populations of the sage-grouse. Ex. NRC-114; FSEIS at 4-87, and 5-37. Nonetheless, the Staff incorporated the most recent BLM-recommended seasonal wildlife stipulations for Greater sage-grouse in the FSEIS at page 4-89. In addition, The Northeast Wyoming Sage-Grouse Conservation Plan recommends the same measures suggested by the Staff for mitigating impacts to the sage-grouse at FSEIS 6-14 (e.g., burying power lines).

Q14.9 Under what circumstances would the Staff further review the potential impacts to the black-footed ferret, whooping crane, or Greater sage-grouse?

A14.9: (A. Hester, H. Yilma) If Powertech changes its project plans or operating criteria, or if significant new information becomes available, the Staff would inform the FWS. In that case, both the NRC and the FWS could reconsider their prior determinations. Ex. NRC-129. For example, if Powertech seeks a license amendment, under NEPA or the ESA the Staff may need to further consider impacts to the black-footed ferret, the whooping crane, and the Greater sage-grouse.

June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium Recovery Facility)	)	
	)	

AFFIDAVIT OF HAIMANOT YILMA

I declare under penalty of perjury that my statements in prefiled Exhibits NRC-001 (NRC Staff's Initial Testimony) and NRC-003 (Statement of Professional Qualifications for Haimanot Yilma) are true and correct to the best of my knowledge and belief.

Haimanot Yilma

Executed in Rockville, Maryland

June 20, 2014

June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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(Dewey-Burdock In Situ Uranium Recovery Facility)	)	
	)	

AFFIDAVIT OF KELLEE L. JAMERSON

I declare under penalty of perjury that my statements in prefiled Exhibits NRC-001 (NRC Staff's Initial Testimony) and NRC-004 (Statement of Professional Qualifications for Kellee L. Jamerson) are true and correct to the best of my knowledge and belief.

Kellee L. Jamerson

Executed in Rockville, Maryland

June 20, 2014

June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium Recovery Facility)	)	
	)	

AFFIDAVIT OF THOMAS LANCASTER

I declare under penalty of perjury that my statements in prefiled Exhibits NRC-001 (NRC Staff's Initial Testimony) and NRC-005 (Statement of Professional Qualifications for Thomas Lancaster) are true and correct to the best of my knowledge and belief.

Thomas Lancaster

Executed in Rockville, Maryland

June 20, 2014

June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
POWERTECH (USA) INC.,	)	Docket No. 40-9075-MLA
	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium Recovery Facility)	)	

AFFIDAVIT OF JAMES PRIKRYL

I declare under penalty of perjury that my statements in prefiled Exhibits NRC-001 (NRC Staff's Initial Testimony) and NRC-006 (Statement of Professional Qualifications for James Prikryl) are true and correct to the best of my knowledge and belief.

James Prikryl

San Antonio, Texas
June 20, 2014

June 20, 2014

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
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	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium Recovery Facility)	)	
	)	

AFFIDAVIT OF AMY HESTER

I declare under penalty of perjury that my statements in prefiled Exhibits NRC-001 (NRC Staff's Initial Testimony) and NRC-007 (Statement of Professional Qualifications for Amy Hester) are true and correct to the best of my knowledge and belief.

Amy Hester

Amy Hester

Executed in San Antonio, Texas
June 20, 2014