Office of Legacy Management Response to U.S. Nuclear Regulatory Commission's October 30, 2019, Comments and Request for Additional Information

RE: Comments and Request for Additional Information, Draft Groundwater Compliance Action Plan, Gunnison, Colorado, Processing Site
Docket No. WM-00061

This document provides the U.S. Department of Energy (DOE) Office of Legacy Management (LM) responses and proposed next steps in response to the U.S. Nuclear Regulatory Commission (NRC) comments and request for additional information (RAIs) dated October 30, 2019, pertaining to the *Draft Groundwater Compliance Action Plan for the Gunnison, Colorado, Processing Site* (DOE 2017), hereafter called the Draft 2017 GCAP. The "Introduction" (Section 1.0) and "LM'S Proposed Next Steps" (Section 2.0) include a summary of the key aspects of Draft 2017 GCAP and NRC comments. NRC's comments and LM's responses follow. For reference, NRC's October 30, 2019, comment letter is provided in Attachment 1.

1.0 Introduction

DOE submitted the Draft 2017 GCAP to NRC by letter dated May 1, 2017 (DOE 2017). The Draft 2017 GCAP was intended to replace the 2010 GCAP approved by NRC in 2015 (DOE 2010). The 2010 GCAP proposed a natural flushing compliance strategy with institutional controls (ICs) whereby the site was anticipated to naturally flush to a condition in which groundwater cleanup objectives would be met within a 100-year time frame. A reevaluation of the compliance strategy was presented in the 2015 verification monitoring report (DOE 2016), concluding that natural flushing within the groundwater IC boundary is unlikely to achieve cleanup objectives. Thus, the Draft 2017 GCAP was submitted to NRC proposing a revised compliance strategy of alternate concentration limits (ACLs) with the same ICs proposed as part of the 2010 GCAP. The new strategy proposed that ACLs be established for the full extent of the alluvial aquifer within the groundwater IC boundary. However, because historical uranium concentrations are higher within the former mill site boundary, for the purposes of applying ACLs, the alluvial aquifer was divided into two sectors. The strategy proposed that ACLs would be established for the former mill site, referred to as Sector 1 (a concentration of 1.43 milligrams per liter [mg/L] of uranium), and separate ACLs for the downgradient area within the IC boundary, referred to as Sector 2 (a concentration of 0.56 mg/L of uranium). Figure 2, which was provided by NRC in the RAIs, shows the proposed Sector 1 and Sector 2 boundaries that encompass the full extent of the IC boundary.

In review of the Draft 2017 GCAP, NRC provided 10 comments in which it explained that there was evidence suggesting natural flushing was working in areas of Sector 2 but was unlikely to meet the applicable uranium standard of 0.044 mg/L uranium in proposed Sector 1, which encompasses the area within the former mill site, and in an area outside of the Sector 1 boundary south of the former mill site extending to Tomichi Creek. Thus, NRC proposed a revised Sector 2 boundary, as shown in Figure 5 below which was provided by NRC in the RAIs, and associated point of exposure (POE) and point of compliance (POC) wells. NRC also requested additional evidence and analysis required to evaluate impacts on surface water and groundwater

from the proposed gravel pit expansion south of the former mill site, and evaluations of the areas directly west of the former mill site and south of Tomichi Creek, among other minor requests.

The following sections outline the proposed next steps and LM's responses to NRC's comments, bases, and suggested path forward.

2.0 LM's Proposed Next Steps

LM proposes an approach to address the comments and RAIs that includes conducting a series of analyses to revise the conceptual site model (CSM) and account for changes and updates outlined in the RAIs. The CSM will organize and communicate technical data about the site and support the selection of a defensible groundwater compliance strategy that adequately addresses risk and is protective of human health and the environment. This additional effort will include review and synthesis of meteorological data, surface water flow and elevation data, groundwater elevation data, and water chemistry data, along with review of site history, land and water use, nearby mine development and operation plans, and identification of potential receptors. The results from the initial data review will be used to select an approach to address the RAIs. LM plans to work with NRC to gain consensus on the approach. Once the approach is defined and the subsequent evaluations are complete, the GCAP will be revised with the updated CSM and a revised compliance strategy. Compliance strategies including no action, natural flushing, active remediation, ACLs, and associated ICs, and a combination of these will be considered. The compliance strategy and associated components NRC has proposed as an option in the October 30, 2019, assessment will be considered, but only after updating the CSM and conducting the additional evaluations as necessary. Upon completion of the evaluations LM will provide an updated revised GCAP for NRC review.

NRC guidance (NUREG-1724) will be used to inform the development of the GCAP (NRC 2000).

3.0 LM Responses to NRC Comments

NRC's comments, bases, and path forward and LM's responses and approach to the RAIs are outlined in Table 1. The figures included by NRC in the RAIs are also included below for reference.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 1 - Evaluate impacts of new gravel pit dewatering wells			
	DOE has proposed a uranium Alternate Concentration Level (ACL) of 1.43 mg/L[1] for all groundwater in the alluvial aquifer underlying the original Gunnison processing site boundary, renamed as Sector 1, in lieu of the original natural flushing remedy to the applicable uranium standard of 0.044 mg/L in Table 1 to Subpart A of Title 40 of the Code of Federal Regulations (CFR) Part 192 (DOE, 2017). NRC staff finds that the DOE has provided sufficient evidence that the current GCAP of natural flushing is unlikely to meet the applicable uranium standard of 0.044 mg/L uranium in proposed Sector 1. This finding is also supported by the current location of the uranium plume which exceeds the applicable uranium standard of 0.044 mg/L as shown below in Figure 1. However, NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL. In particular, DOE has not included an evaluation of changes in groundwater use, specifically the change in location for dewatering operations at the abutting gravel operations resulting from the recent approval of the Gunnison West Gravel Pit Expansion to the new location south of the proposed Sector 1 as shown in Figure 1. The application for this gravel expansion was submitted to Gunnison County in January 2017. It was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017).	The revised GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” by changing the groundwater remedy from the current natural flushing remedy to achieve the applicable maximum concentration in groundwater protection standards in Table 1 to Subpart A of 40 CFR 192 to an alternate concentration limit (ACL) strategy for uranium for Sector 1. To support an ACL, DOE has to address the relevant present and potential hazard factors in Part 192.02 c(3)(ii)(B)(1) and (2). NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL by not addressing the groundwater use or analyzing the groundwater quality impacts expected from the expansion of existing gravel pit operations to a new location south of Sector 1, as shown in Figure 1. The application for this gravel expansion was submitted to Gunnison County in January 2017. The application was titled the "Gunnison West Gravel Pit Expansion" and was submitted by Oldcastle SW Group Inc. dba United Companies as permit request LUC-17-00018. The application requested expansion of the sand and gravel operations for a new 7.5 acre gravel pit, up to 75 feet deep, directly west of the existing operational gravel pit as shown Figure 1. No other changes to the existing gravel processing operation were proposed. This permit was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017). The new Gunnison West Gravel Pit Expansion operation was approved with new dewatering wells. In past gravel pit operations, dewatering wells have operated at rates up to 4000 gpm. These wells represent a new groundwater use south of the Sector 1 proposed ACL site. NRC staff finds the use of any new dewatering wells must be evaluated under present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v). This evaluation is necessary to determine if and how the new gravel pit dewatering wells may impact the uranium plume and the uranium levels at the POE well MW0113 shown in Figure 1. In addition, the new dewatering wells are permitted to discharge to the “Valco Pond” gravel pit and may therefore impact the uranium levels in this gravel pond, which are measured at SW0780.	NRC staff requests that DOE analyze the potential impact of any new gravel pit dewatering wells for the approved Gunnison West Pit Expansion. Specifically, DOE should determine if and to what extent the use of these gravel pit dewatering wells may impact the existing uranium plume shown in Figure 1 and the future uranium levels at MW0113. DOE has proposed MW0113 to be the Sector 1 POE well that will be required to meet the proposed Sector 2 ACL of 0.56 mg/L. NRC staff also requests that DOE evaluate any impact on the uranium levels measured at SW0780 in the “Valco Pond” gravel pit which will receive the dewatering well discharge from the new expansion gravel pit operation. The evaluation of this groundwater use and potential surface water impact is needed to meet the requirements of the factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) for the proposed Sector 1 ACL.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
1	LM will conduct further evaluation of the impacts on surface water and groundwater from the newly permitted Gunnison West Pit Expansion.	LM concurs with the stated basis and acknowledges that an evaluation into the change in groundwater use and associated impacts on surface water and groundwater needs to be made.	LM acknowledges NRC’s proposed path forward for Comment 1 and agrees that the impacts on surface water and groundwater from the new permitted Gunnison West Pit Expansion need to be evaluated. However, before selecting a specific approach to analyze the impacts, the mine permit documents will be reviewed to understand the proposed operations (dewatering schedule) and final build out. The mine plans will also be reviewed to assess the plans for potential future build outs in areas that could influence the impacted groundwater at the Gunnison, Colorado, Processing Site. Historical mine operations will also be reviewed in context of how development might have influenced groundwater flow in the vicinity of the site. Additionally, meteorological, surface water, groundwater elevation, and water chemistry data will be evaluated to better understand potential impacts from gravel pit operations. Meteorological data will be used to evaluate potential groundwater recharge (infiltration) and discharge (evaporation) volumes, groundwater elevation data that will be used to evaluate flow direction variability and if historical influences can be noted. Historical and current water chemistry data will be used to assess if changes in water chemistry correspond to build out of the gravel pits. The review and analyses of historical and current data in context of the mine operations will be used to identify additional data gaps and to establish approaches to fill the data gaps and potential identify risks associated with the expansion. Findings from the evaluation of potential impacts on Valco Pond water quality will be considered risk factors, which will be incorporated into the selected groundwater compliance strategy. The impacts on Valco Pond from dewatering activities will be also be assessed. Similar to the case above, the approach to evaluate impacts from dewatering activities on Valco Pond will be selected following an initial comprehensive review of pertinent surface water data, groundwater data, and the associated mine plans.

[1] Note that in this document the use of lowercase “l” for liters in “mg/L”, as used originally in correspondence from NRC, has been changed to the standard uppercase “L” for clarity. This change was made globally throughout the document.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs (continued)

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 2 - NRC does not agree that the current GCAP of natural flushing is failing or will fail to meet the applicable uranium standard of 0.044 mg/L in the entire area of proposed Sector 2			
	NRC staff does not agree that the current GCAP of natural flushing is failing or will fail to meet the applicable uranium standard of 0.044 mg/L in the entire area of proposed Sector 2 shown in Figure 2 below. In contrast, NRC staff finds the current GCAP of natural flushing is meeting and will continue to meet the applicable uranium standards of 0.044 mg/L for almost the entire Sector 2 area, excluding the area just south of Sector 1. Therefore, NRC staff does not understand the basis for DOE to propose an ACL of 0.56 mg/L for uranium in the entirety of Sector 2 which covers 928 acres (1.45 square miles) with an aquifer thickness ranging from 70 - 130 feet thick. Assuming an average thickness of 100 feet, NRC concurrence on this proposed ACL would permanently affect over 92,800 acre feet of water and is not justified. The NRC staff are concerned with the future use restrictions to such a large area of groundwater.	The revised GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, by changing from the current natural flushing remedy to achieve the applicable uranium standard to an alternate concentration limit (ACL) strategy for uranium. Specifically, DOE has proposed a uranium ACL of 0.56 mg/L for all groundwater in the alluvial aquifer underlying 928 acres of Sector 2 in lieu of natural flushing to the uranium applicable uranium standard of 0.044 mg/L. The DOE may request ACLs for Title I sites with NRC concurrence as provided in 40 CFR 192.02(c)(3)(ii)(A) which states: "The Secretary may apply an alternate concentration limit if after considering remedial or corrective actions to achieve the levels specified in paragraphs (c) (3) (i) (A) and (B) if this section, he has determined that constituent will not pose substantial present of potential hazard to human health and the environment as long as the alternate concentration limit is not exceeded, and the Commission has concurred."[2]	NRC staff requests that DOE should withdraw the proposed ACL for all of Sector 2 and maintain the natural flushing remedy to maintain the groundwater protection standard of 0.044 mg/L uranium to meet the groundwater protection standard as specified in paragraphs 40 CFR Part 192.02(c) (3) (i) (A) and (B). If DOE chooses to withdraw the proposed ACL of 0.56 mg/L uranium for all of Sector 2, NRC staff requests that the DOE propose a revised Sector 2 with an ACL as described in Comment 3 below.

Response	LM Comment Response	LM Comment Basis Response	LM Approach to Comment
	LM acknowledges that NRC staff does not agree that natural flushing is failing for the entire proposed Sector 2. The basis for proposing the boundary for Sector 2 was to fully encompass the extent of contamination as outlined in the 2010 GCAP and that it would not restrict future domestic use because the groundwater use within the boundary is already restricted due to the IC described as the New Domestic Well Constraint Area for the Dos Rios area of the county. At the suggestion of NRC, LM will reevaluate the Sector 2 area to better discern the extent where compliance standards need to be applied.	LM acknowledges that NRC's assessment provides evidence that natural flushing may be successful in the downgradient monitoring wells. LM also acknowledges NRC's concern that the Sector 2 boundary encompasses areas where there are indications that natural flushing as a remedy may be successful and areas where no former mill operations groundwater contamination currently exists or is likely to ever exist. LM agrees that a revised Sector 2 boundary that includes natural flushing and ACLs may be an appropriate compliance strategy.	LM concurs with NRC's request to withdraw the proposed ACL for all of Sector 2 and maintain the natural flushing remedy. LM also agrees with NRC that ACLs are an appropriate compliance strategy; however, appropriate sector boundaries, POEs, and POCs need to be selected to ensure protection of human health and the environment. Thus, LM agrees to evaluate a revised Sector 2 boundary to support the final compliance strategy. In the absence of an analysis of the potential impacts from the gravel pit expansions (see NRC Comment 1) and not having evaluated data with regard to selecting a compliance strategy since 2017, LM proposes to conduct further review and analysis, to supplement prior analysis by LM and NRC, as a component of developing a revised compliance strategy. LM first proposes to evaluate the success of natural flushing with respect to the different areas and then conduct the appropriate analyses as suggested in the response to the path forward to Comment 1. LM's data analyses will include a review of data and the use of additional tools that expands on NRC's assessment provided above. Specifically, LM proposes to evaluate well concentration data and account for the influences of site history, land/water use, and impact of mine plans and operations on the groundwater concentrations to fully evaluate natural flushing. LM plans to use three-dimensional volumetric modeling software to synthesize and spatially and temporally integrate the concentration data and water-level elevation data. Conceptual and statistical trends of well concentration data and bulk plume metrics will help determine natural flushing progress. The initial review of natural flushing performance will be performed during the initial data review before data gaps are identified and final evaluations are conducted. Evidence stemming from the initial data evaluations and volumetric and spatial modeling will be used to confirm if ACLs will be necessary for the site and at least partially inform potential Sector 1 and Sector 2 boundary limits. The approach to define the application of ACLs, boundaries, and associated POE and POC wells is discussed in the response to Comments 3, 4, 5, and 6 below. DOE agrees with NRC findings and will provide evidence or basis for the ACL boundaries in compliance with 40 CFR 192. As part of this, LM will also evaluate the need for additional ICs as necessary.

[2] See Attachment 1 for the complete text.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs (continued)

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 3 - NRC proposes a revised Sector 2 area where an ACL would apply			
	NRC staff requests that DOE propose a revised Sector 2 from the southern boundary of Sector 1 down to Tomichi Creek to include MW0113, the entire gravel pit operation and newly approved Gunnison West gravel pit expansion. An example of such a revised Sector 2 is shown in Figure 5 below. NRC staff finds there is compelling evidence that the alluvial groundwater in this revised Sector 2 will not achieve the uranium applicable standard of 0.044 mg/L in 100 years by natural flushing and therefore a proposed ACL of 0.56 mg/L derived from MW0113 historical uranium values is appropriate.	NRC staff finds that the proposed ACL of 0.56 mg/L uranium would be reasonable over a revised Sector 2 area extending south from the boundary of Sector 1 to Tomichi Creek and NRC staff finds that in an appropriately revised Sector 2, the proposed ACL is justified for the following reasons: 1. The concentration of uranium in MW0113 has remained significantly above the applicable uranium standard as shown in Figure 3. 2. DOE has reported that there is a southern uranium plume located in this area as shown in Figure 1 with uranium levels that remain above the applicable uranium standard of 0.044 mg/L (DOE, 2019). 3. The size and behavior of the southern uranium plume in this revised Sector 2, including its probable exceedance of the applicable uranium standard of 0.044 mg/L over the 100-year natural flushing period, was predicted by the Site Observational Work Plan (SOWP) groundwater flow and uranium transport modeling (DOE, 2001). 4. The uranium levels in SW0780 over time at the "Valco Pond" gravel pit within this revised Sector 2 have been below the applicable uranium standard of 0.044 mg/L but are now increasing above it as shown in Figure 6 below. 5. The discharge of gravel pit dewatering water from the recently approved gravel pit expansion is likely to pull the uranium plume to the south from Sector 1 within this revised Sector 2. The discharge may increase the uranium levels in "Valco Pond" gravel pit.	NRC staff requests that DOE should reduce the Sector 2 area for the proposed ACL of 0.56 mg/L uranium to a revised Sector 2 area similar to the one shown in Figure 5 based on DOE's own assessment.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges NRC's Comment 3 and the NRC proposed revised Sector 2 boundary and will reevaluate the Sector 2 boundary.	LM acknowledges the basis NRC uses to select the revised Sector 2 boundary and does not disagree with any of NRC's statements. However, evidence and results from additional evaluations should be considered in selecting a revised Sector 2 boundary.	As discussed in response to the Comment 2 Path Forward, LM will conduct a comprehensive analysis and will consider additional data, results from the evaluations of past, present, and future mine operations, and associated risks before proposing the sector boundaries. Risks associated with plume expansion due to gravel pit dewatering operations and other groundwater use will be evaluated to support the basis for determination of the sector boundaries. It is anticipated that a range of scenarios representing actual and potential groundwater use conditions will be evaluated to assess the potential for exposure and corresponding risks.

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 4 - NRC proposes POC well for revised Sector 2			
	NRC staff requests that if DOE proposes the recommended revised Sector 2 for a proposed ACL of 0.56 mg/L, the POC well for revised Sector 2 should be MW0113. This well should also act as the POE for Sector 1	NRC staff agrees with the DOE analysis of the Upper Simultaneous Limit (USL) in MW0113 in the revised GCAP and that an ACL of 0.56 mg/L is appropriate for this well. The SOWP groundwater flow and uranium transport modeling and historical monitoring values show MW0113 will experience the highest uranium values in a revised Sector 2 region given its proximity to Sector 1 (DOE, 2001). It is therefore appropriate to select MW0113 as the POC well for the entire recommended revised Sector 2 proposed ACL.	DOE should identify MW0113 as the POC well for a revised Sector 2 with a proposed ACL of 0.56 mg/L. MW0113 will continue to act as the POE for Sector 1 proposed ACL of 1.43 mg/L uranium.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges NRC's Comment 4, which concurs with the proposed ACL of 0.56 mg/L for Sector 2 as presented in the revised GCAP and proposes POC well (MW0113) for Sector 2 and POE well (MW0113) for Sector 1. LM will determine the appropriateness of the proposed POE and POC wells, and appropriate POC and POE wells will be identified following completion of the upcoming evaluations.	LM concurs with NRC that the Upper Simultaneous Limit (USL) of 0.56 mg/L is an appropriate ACL and acknowledges the basis NRC uses to select well MW0113 as the POC for Sector 2. However, LM will need to confirm this location is a suitable POC location or if a POE location based on risk is more appropriate, since gravel pit operations will likely affect LM groundwater compliance in this area, which is an activity LM can't control but will be affected by.	LM acknowledges NRC's identification of MW0113 as the POC well and ACL of 0.56 mg/L for NRC's proposed revised Sector 2 boundary and understands NRC's proposed path forward. However, LM will select a POC well following the delineation of the Sector boundaries and evaluation of data and associated risks as discussed in response to Comments 1, 2, and 3 Path Forward.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs (continued)

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 5 - NRC proposes POE locations for revised Sector 2			
	NRC staff requests that if DOE proposes the recommended revised Sector 2 for a proposed ACL of 0.56 mg/L, the POE locations for a revised Sector 2 should be MW0125, MW0126, MW0127 and MW0062 and MW0063. NRC staff also requests that the surface water POEs for a revised Sector 2 be SW0780 on the "Valco Pond" gravel pit and SW0248 on Tomichi Creek.	The NRC staff requests these POE well and POE surface water monitoring locations shown on Figure 5 for the following reasons: 1. POE groundwater wells and surface water locations must be close to and outside of the boundary of the proposed ACL region because these are the locations where the potential receptor may be exposed. 2. POE groundwater wells and surface water locations should be located near the proposed ACL boundary to trigger corrective action if uranium levels are exceeded and to prevent any downgradient receptor from being impacted.[3]	NRC staff requests that DOE selects the groundwater well POE locations to be MW0125, MW0126, MW0127 and MW0062 and MW0063 and the surface water POEs to be SW0780 on the "Valco Pond" gravel pit and SW0248 on Tomichi Creek for an appropriately revised Sector 2.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges NRC's Comment 5, NRC's acceptance of the proposed ACL of 0.56 mg/L for Sector 2, and the NRC proposed POEs MW0125, MW0126, MW0127, MW0062, MW0063, SW0780 on the Valco Pond gravel pit, and SW0248 on Tomichi Creek for Sector 2.	LM acknowledges the basis NRC uses to select the POE wells for Sector 2. However, LM would like to confirm this recommendation using results from additional evaluations (as discussed in response to Comments 1, 2, and 3 Path Forward).	LM acknowledges the POEs for NRC's proposed revised Sector 2 boundary and understands NRC's proposed path forward. However, LM would like to select the POEs following the completion of additional evaluations (as discussed in response to Comments 1, 2, and 3 Path Forward). It is expected that POEs will be selected based on analysis of plume time series and volumetrics, as well as groundwater flow direction calculations. The use of an analytical model, updated groundwater model, or other appropriate tool may also support the selection of POEs.

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 6 - NRC proposes adding a POE well outside the IC boundary			
	NRC staff finds that there are no POE wells outside of the institutional control (IC) boundary directly south of the gravel pit operation in revised Sector 2 (Figure 5). A POE well is needed south of this IC boundary to monitor and ensure that unrestricted groundwater use will not pose a substantial present or potential hazard to human health and the environment.	The draft GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, by changing from a natural flushing strategy for contaminants of concern (COCs) to a proposed ACL for Sector 2. Approval of an ACL requires an assessment to determine that levels of contaminants will not pose a substantial present or potential hazard to human health and the environment. 40 CFR 192.02 (c)(3)(ii)(B)(1), specifies that an evaluation of potential hazards from proposed ACLs must consider several factors, including potential adverse effects on groundwater quality. This includes the proximity and withdrawal rates of groundwater users. NRC staff finds groundwater must be suitable for unrestricted use downgradient of a revised Sector 2 as there are no ICs beyond this boundary. DOE measured uranium concentrations in private domestic wells MW0080, MW0081, and MW0082 just south of the Sector 2 gravel pit boundary in the past. Some of the uranium measurements in these domestic wells were elevated relative to background, but below the applicable uranium standard of 0.044 mg/L. In 2005, DOE installed MW0067 shown on Figure 5 to verify elevated uranium concentrations measured in private domestic well MW0082 were representative. DOE monitored MW0067 for four years as shown in Figure 7 below. DOE has not provided any uranium measurements in MW 0067 since 2008. To concur on an ACL for the recommended revised Sector 2, NRC staff must have an analysis that demonstrates that domestic groundwater users south of the IC boundary for a revised Sector 2 will not be exposed to uranium levels above the applicable standard of 0.044 mg/L.	NRC staff requests that DOE provide an analysis to support the conclusion that uranium concentrations in the alluvial aquifer will not exceed the applicable uranium standard of 0.044 mg/L beyond the IC boundary south of the gravel pit operations in a revised Sector 2. This information should include updated modeling with recent site monitoring data as well as additional groundwater monitoring data beyond the IC Boundary to the south and west of the former processing site in Sector 1. NRC staff also requests that DOE add a POE well, such as MW0067, if it still exists or install a new POE well in this area to verify that the proposed ACL for Sector 2 is protective of private well users.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges NRC's Comment 6 that a POE well is needed to the south of the IC boundary and agrees that if it is determined there is potential that unrestricted groundwater use in that area may pose a substantial present or potential hazard to human health and the environment, then a POE well and/or an expanded IC boundary may be necessary.	LM agrees with NRC that an evaluation of potential hazards from proposed ACLs must consider several factors, including potential adverse effects on groundwater quality including the proximity and withdrawal rates of groundwater users. If the original Sector 2 boundary or revised Sector 2 boundary is used, the need for a POE well or IC boundary would need to be evaluated.	LM concurs with NRC and will provide analysis of the areas to the south and west of the former processing site in Sector 1. The approach to address these areas will be based on initial review of existing data, identification of data gaps, and consideration of potential risks to human health and the environment. If it is found there is limited data and inherent risks in either of these areas, appropriate investigations and evaluations will be conducted to confirm the risk and POEs after defining the ACL sector boundaries.

[3] See Attachment 1 for the complete text.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs (continued)

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 7 - Evaluate impact of the discharge from the "Valco Pond" gravel pit on the uranium levels in Tomichi Creek			
	NRC staff finds that DOE has not adequately addressed the impact of the discharge from the "Valco Pond" gravel pit on the uranium levels in Tomichi Creek from the change in groundwater use described in Comment 2. NRC staff has determined that the "Valco Pond" gravel pit has been and is currently permitted by Colorado Department of Public Health and Environment (CDPHE) to directly discharge to Tomichi Creek at the surface water discharge Outfall 001A as shown in Figure 2 under COPS Certification Number COG500010 (CDPHE, 2016). Specifically, DOE has not evaluated how this change in groundwater use from the approved new gravel pit expansion and associated dewatering wells which are permitted to discharge to the "Valco Pond" gravel pit may increase the uranium levels in Tomichi Creek which is designated as a water supply stream. As a water supply stream, Tomichi Creek must be shown to meet the applicable uranium standard of 0.044 mg/L for NRC concurrence on a Sector 2 proposed ACL.	The DOE must address the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) 192.02 c(3)(ii)(B)(2)(v), (vi) and (vii), which respectively address potential adverse effects on groundwater and surface water for a proposed ACL in a revised Sector 2. In particular, DOE has not included the change in groundwater use or addressed the effect of this groundwater use change resulting from the recent approval of the Gunnison West Gravel Pit Expansion to the new location south of the proposed Sector 1 as shown in Figure 1 on uranium levels in Tomichi Creek. The application for this gravel expansion was submitted to Gunnison County in January 2017. It was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017).	NRC staff requests that DOE provide an analysis that demonstrates that uranium levels in the "Valco Pond" gravel pit anticipated from the change in groundwater use from the approved gravel pit expansion and associated dewatering wells which are permitted to discharge to the "Valco Pond" and then directly to Tomichi Creek at COPS Outfall 001A are not likely to increase the uranium levels in Tomichi Creek above the applicable uranium standard of 0.044 mg/L.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges NRC's Comment 7 and agrees that the impacts on uranium levels in Tomichi Creek due to the change in groundwater use related to the gravel pit expansion need to be evaluated.	LM understands the basis for Comment 7 provided by NRC and agrees that the impacts on uranium levels in Tomichi Creek due to the change in groundwater use related to the gravel pit expansion need to be evaluated.	LM agrees that the impact on Tomichi Creek from the expanded gravel pit operations is important to evaluate. Like the approach outlined in the response to Comments 1 and 3–6, the final approach will be determined following the initial data review. The analysis will consider historical, current, and future predicted concentrations in Valco Pond, which will be addressed in response to Comment 1. Tomichi Creek flows and interactions with groundwater will also be considered when evaluating the potential impacts. Mixing calculations or numerical modeling may need to be used to assess the potential impacts. The current and anticipated concentration will be compared to appropriate standards.

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 8 - Colorado surface water quality uranium standards			
	DOE has incorrectly identified the State of Colorado surface water quality uranium standards for a water supply stream in the reference to Tomichi Creek on the bottom of page 9 in the draft GCAP (DOE, 2017).	In consultation with CDPHE, NRC staff has determined that the correct State of Colorado uranium surface water quality standards for a water supply stream in this portion of the Gunnison River Basin are found in Regulation No. 35 - "Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins." Section 35.5(3)(c) of this document states*: In no case shall uranium levels in waters assigned a water supply classification be increased by any cause attributable to municipal, industrial, or agricultural discharge so as to exceed 16.8 - 30 ug/L or naturally-occurring concentrations (as determined by the State of Colorado), whichever is greater.*	NRC staff requests that DOE correct the reference to the State of Colorado uranium surface water quality standards for Tomichi Creek on the bottom of page 9 of the draft GCAP (DOE, 2017).
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM agrees that the State of Colorado surface water quality uranium standard was misidentified in the draft GCAP (Draft 2017 GCAP). LM will acknowledge the State of Colorado surface water standard as a footnote to avoid confusion with UMTRCA compliance standards.	LM agrees with NRC's evaluation and findings.	LM will use the correct reference to the State of Colorado uranium surface water quality standards for Tomichi Creek.

Table 1. LM Responses to NRC Comments on the draft GCAP proposing ACLs (continued)

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 9 - Provide an updated list of all private or industrial wells			
	If DOE proposes a uranium ACL for a revised Sector 2 as recommended by NRC, DOE should provide an updated list of all private wells and or industrial wells and their current use in this revised Sector 2.	NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL in a revised Sector 2. In particular, DOE has not provided an updated list of private and industrial wells and their current use in a revised Sector 2.	DOE should provide an updated list of all existing private or industrial wells and their current use in a revised Sector 2.
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges that NRC is requesting an updated list of all private or industrial wells and their current use in the revised Sector 2.	LM acknowledges the need to address the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL in a revised Sector and that providing a list of groundwater users in a revised Sector 2 is necessary for compliance.	LM will provide an updated list and map of all existing wells in the revised Sector 2 and for any additional areas as necessary in the revised GCAP.

Comment	NRC Comment	NRC Comment Basis	NRC Path Forward
NRC RAI Comment 10 - Provide an updated environmental review or an amendment to the existing Site Environmental Assessment			
	DOE has not provided an updated environmental review of the proposed action for the draft GCAP (DOE, 2017) or an amendment to the Gunnison, Colorado, UMTRA Project Site Environmental Assessment (DOE, 2002). The NRC has determined that its action, specifically concurrence on DOE's revised GCAP, requires an appropriate review under the National Environmental Policy Act (NEPA). NRC must therefore conduct consultations including those satisfying Section 106 of the Nation Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA).	Although not specifically stated in the draft GCAP (DOE, 2017), it is NRC's understanding that DOE has determined that its action (i.e., revising the GCAP from natural flushing to ACLs) meets the criteria for an established categorical exclusion. On the other hand, NRC's action (i.e., concurrence on DOE's revised GCAP) does not meet the criteria for one of its categorical exclusions and thus NRC will be performing an appropriate environmental assessment resulting in an Environmental Assessment or an Environmental Impact Statement. In addition, NRC staff will be completing the requisite consultations including those satisfying Section 106 of the Nation Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA).	NRC staff requests that to minimize duplicative consultation efforts that DOE may have already performed, DOE should please provide any information on any consultations that DOE has performed for Section 106 of the NHPA or Section 7 of the ESA for the draft GCAP (DOE, 2017a). NRC staff also requests that DOE provide any relevant information from consultations with any other stakeholders including the National Park Service, Colorado Department of Public Health and Environment (CDPHE), and Gunnison County with respect to the draft GCAP (DOE, 2017).
Response	**LM Comment Response**	**LM Comment Basis Response**	**LM Approach to Comment**
	LM acknowledges the need to review the existing Gunnison, Colorado, UMTRA Project Site Environmental Assessment (EA) and determine the need for a potential amendment.	LM acknowledges the basis NRC provides for Comment 10.	LM has not yet updated the EA for the draft revised GCAP because the GCAP is still in draft form. The EA will be updated with the final GCAP, and future NEPA work will include all consultations as required so that NRC will not need to duplicate any work.

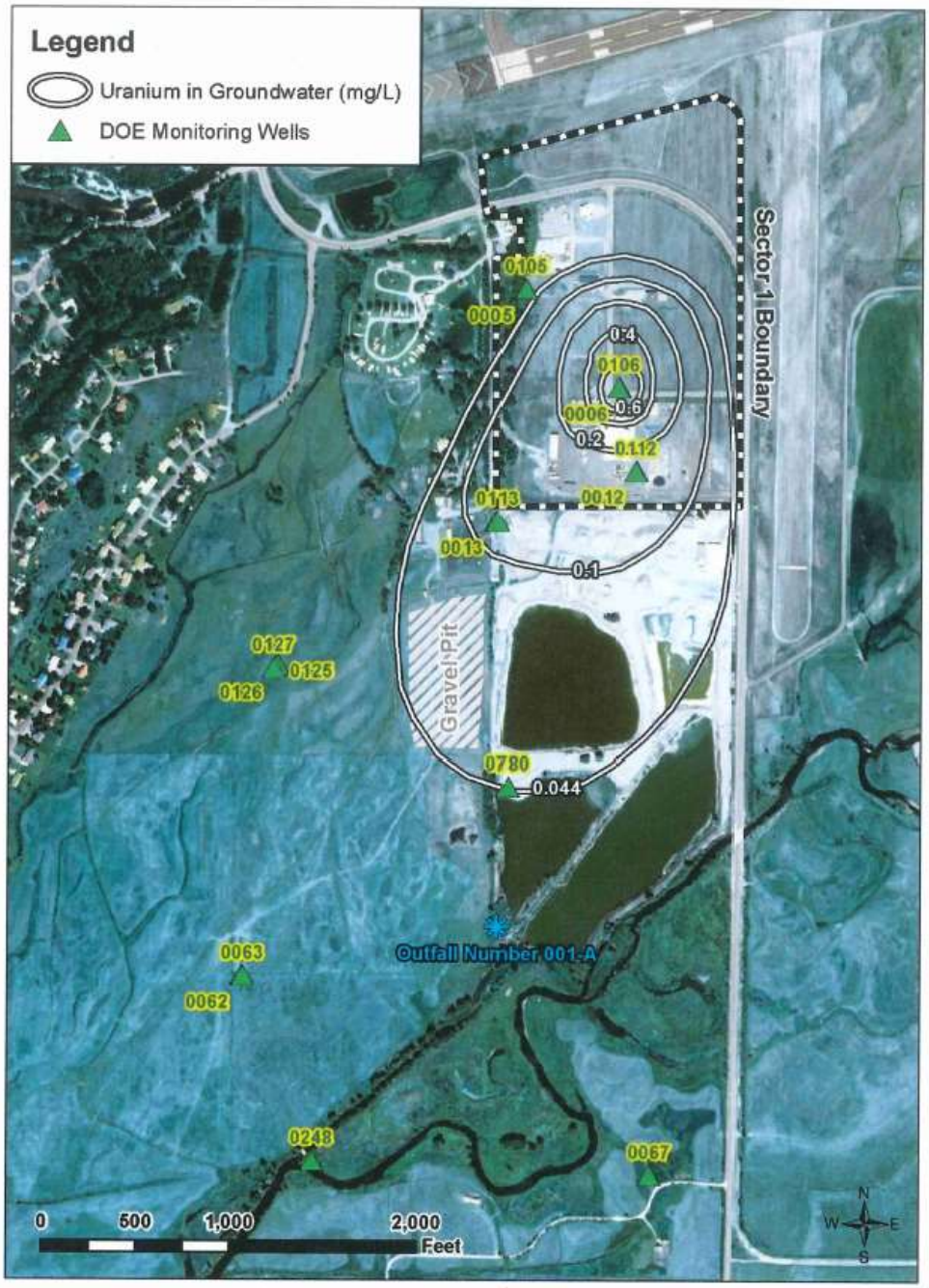

Figure 1. Uranium plume from Sector 1 and new gravel pit expansion (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

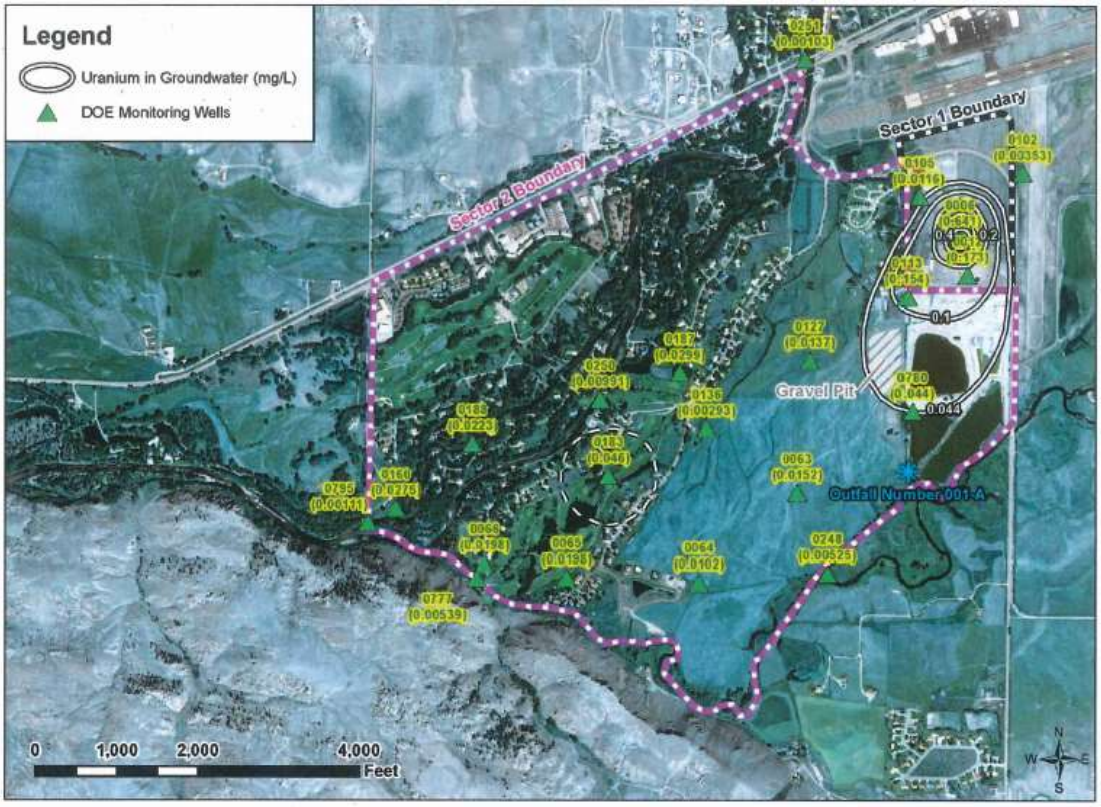

Figure 2. Uranium plume from Sector 1 and uranium in downgradient (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

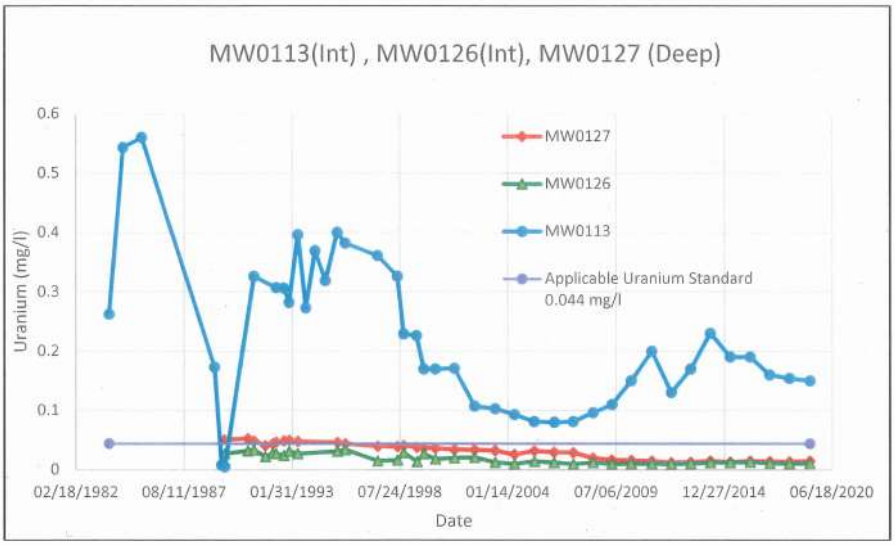

Figure 3. Uranium levels in MW0113, MW0126 and MW0127 vs. applicable uranium standard (0.044 mg/l)

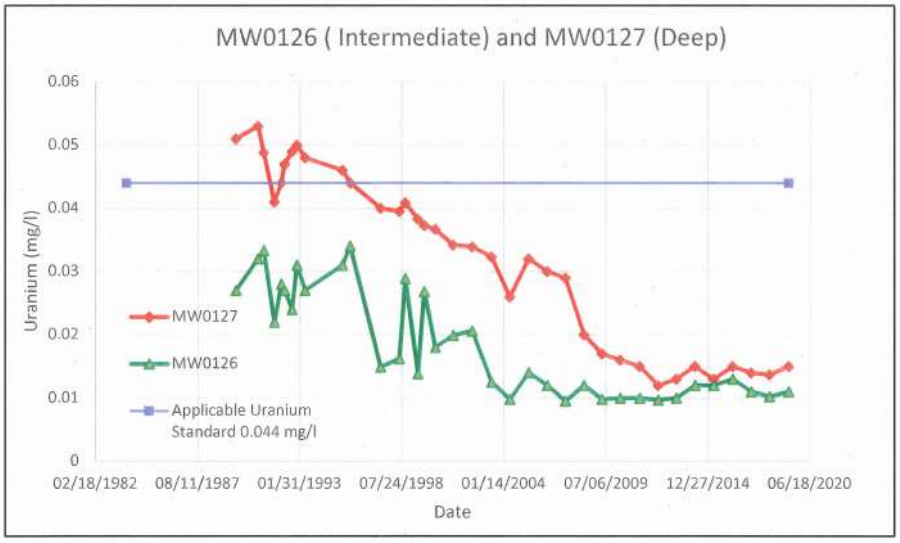

Figure 4. Uranium levels in MW0126 and MW0127 vs. applicable uranium standard (0.044 mg/l)

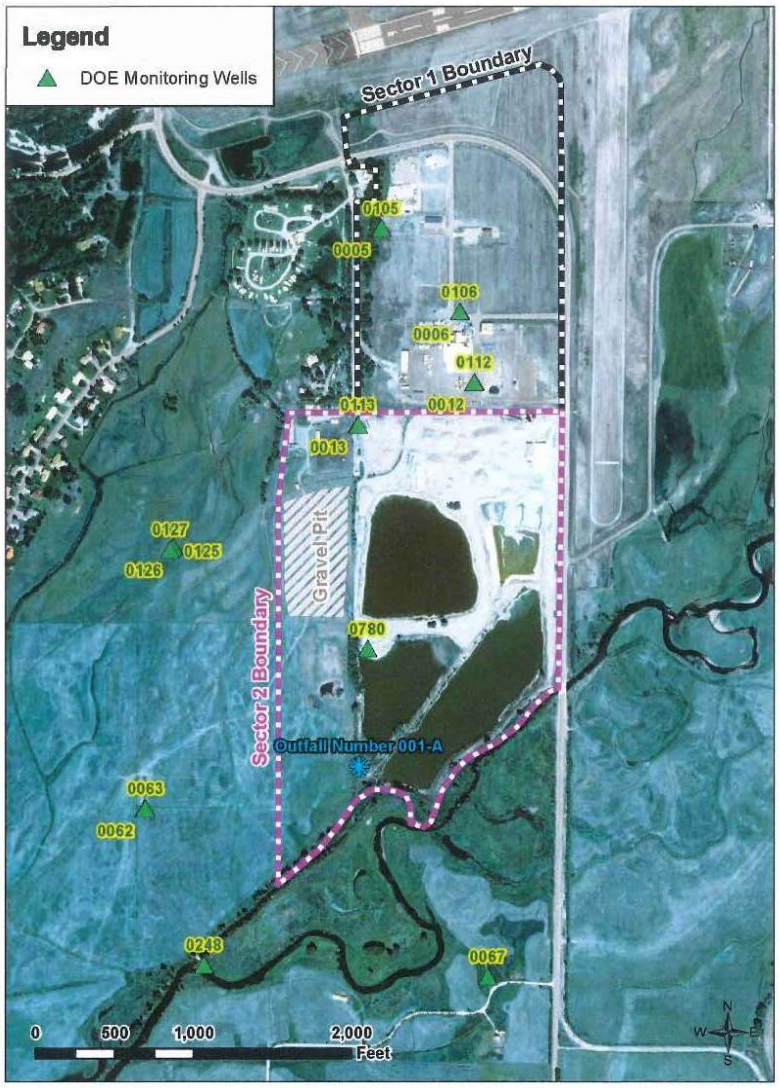

Figure 5. Example of revised Sector 2 (purple boundary) for proposed ACL (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

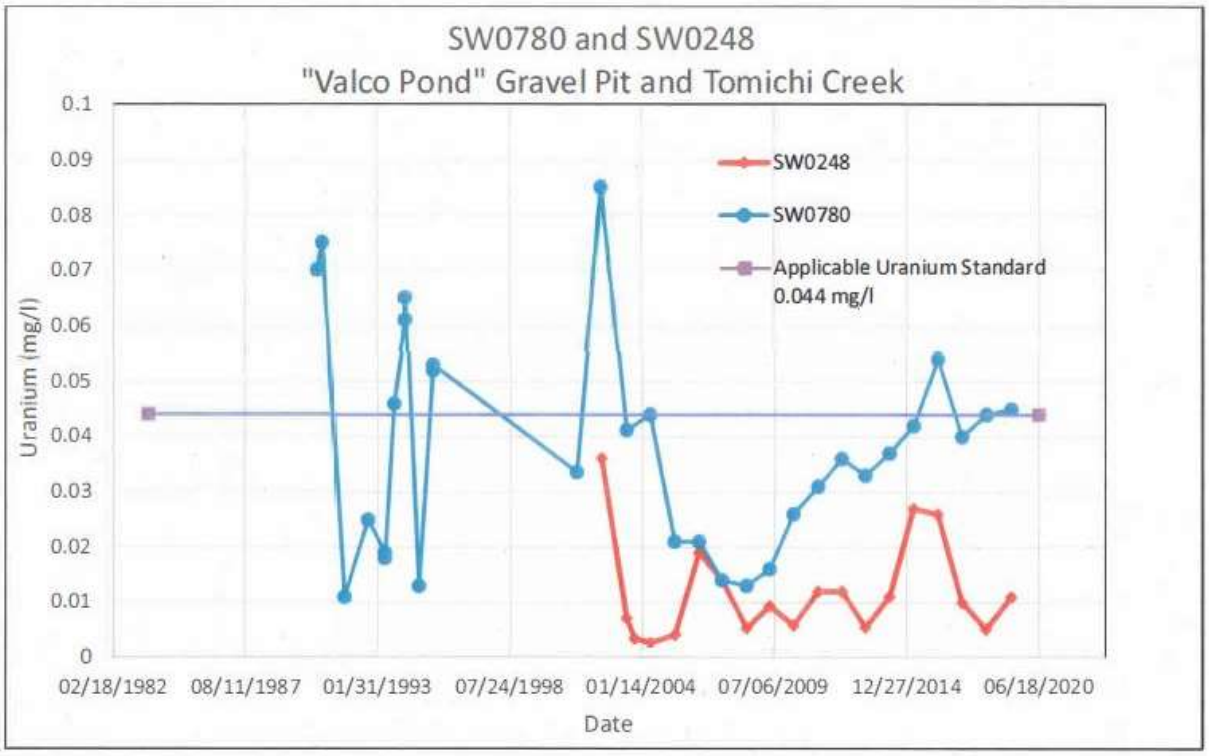

Figure 6. Uranium levels in SW0248 and SW0780 vs. applicable uranium standard (0.044 mg/l)

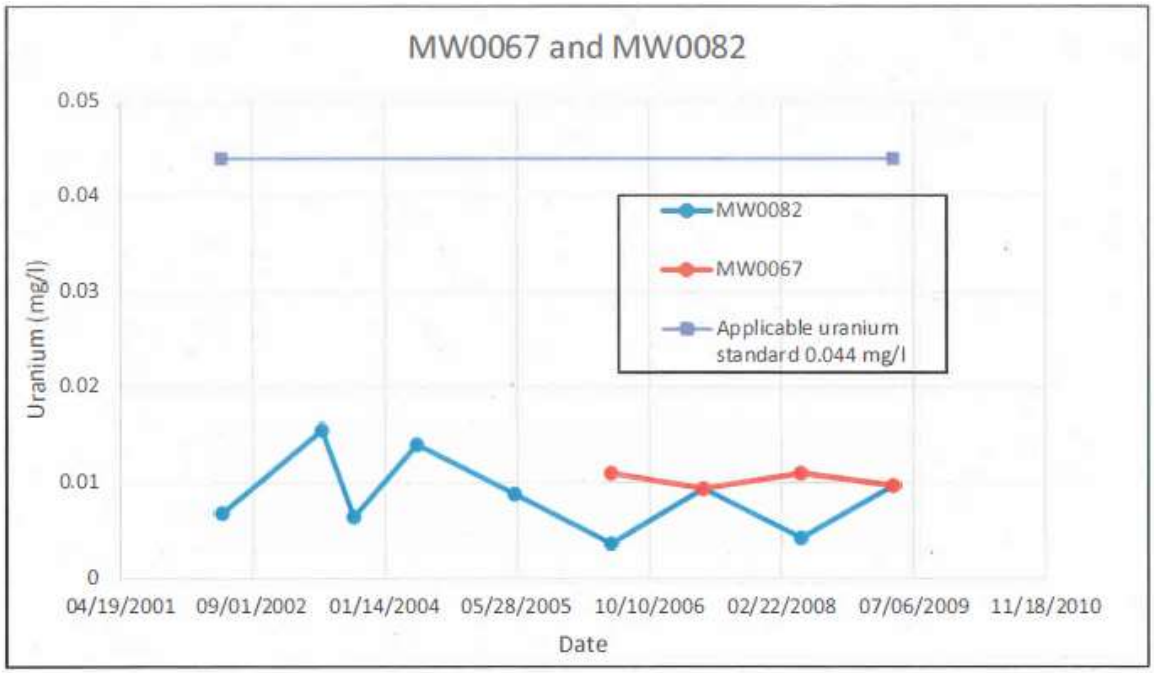

Figure 7. Uranium Trend in MW0067 and MW0082 vs. Applicable uranium standard (0.044 mg/l)

4.0 References

DOE (U.S. Department of Energy), 2010. *Final Groundwater Compliance Action Plan for the Gunnison, Colorado, Processing Site*, LMS/GUP/S06004, Office of Legacy Management, April.

DOE (U.S. Department of Energy), 2016. *2015 Verification Monitoring Report for the Gunnison, Colorado, Processing Site*, LMS/GUP/S13073, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2017. *Draft Groundwater Compliance Action Plan for the Gunnison, Colorado, Processing Site*, LMS/GUP/S06004, Office of Legacy Management, April.

NRC (U.S. Nuclear Regulatory Commission), 2000. *Standard Review Plan for the Review of DOE Plans for Achieving Regulatory Compliance at Sites with Contaminated Ground Water Under Title 1 of the Uranium Mill Tailings Control Act*, Draft Report for Comment, NUREG 1724, June.

Attachment 1

October 30, 2019, NRC Assessment

RE: Comments and Request for Additional Information, Draft Groundwater Compliance Action Plan, Gunnison, Colorado, Processing Site

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 30, 2019

Mr. Jalena Dayvault, Site Manager
U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: GUNNISON, COLORADO, PROCESSING SITE – REQUEST FOR ADDITIONAL INFORMATION RE: DRAFT GROUNDWATER COMPLIANCE ACTION PLAN

Ms. Dayvault:

By letter dated May 1, 2017, the U.S. Department of Energy (DOE) submitted the Draft Groundwater Compliance Action Plan (GCAP) for the Gunnison, Colorado, Processing Site, to the U.S. Nuclear Regulatory Commission (NRC) staff for review and comment.

The NRC staff has reviewed DOE's request and has determined that additional information and revisions are necessary for NRC to complete its review and concur on the revised GCAP. The comments and associated request for additional information are provided in the enclosure. We believe it would be of benefit to meet with you or hold a teleconference to discuss the comments and the requested information to ensure mutual understanding of the issues which must be addressed for NRC to concur on any proposed revisions to the GCAP.

In accordance with Title 10 of the *Code of Federal Regulations* Part 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of the ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this letter, please contact me, either by telephone at (301) 415-0708, or by e-mail at elise.striz@nrc.gov.

Sincerely,

Elise A. Striz

Elise A. Striz, Project Manager
Uranium Recovery and Materials
Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No.: WM-00061

Enclosure:
Comments and Request for Additional
Information

cc w/ enclosures: Distribution List

COMMENTS AND REQUEST FOR ADDITIONAL INFORMATION

DRAFT GROUNDWATER COMPLIANCE ACTION PLAN

GUNNISON, COLORADO, PROCESSING SITE

DOCKET NO. WM-00061

By letter dated May 1, 2017, the U.S. Department of Energy (DOE) submitted the Draft Groundwater Compliance Action Plan (GCAP) for the Gunnison, Colorado, Processing Site, to the U.S. Nuclear Regulatory Commission (NRC) staff for review and comment (DOE, 2017). Detailed below is the additional information needed by the NRC staff to complete its review of the GCAP. Unless otherwise noted, information provided in the comments is referencing the draft GCAP.

Comment 1: DOE has proposed a uranium Alternate Concentration Level (ACL) of 1.43 mg/l for all groundwater in the alluvial aquifer underlying the original Gunnison processing site boundary, renamed as Sector 1, in lieu of the original natural flushing remedy to the applicable uranium standard of 0.044 mg/l in Table 1 to Subpart A of Title 40 of the *Code of Federal Regulations* (CFR) Part 192 (DOE, 2017). NRC staff finds that the DOE has provided sufficient evidence that the current GCAP of natural flushing is unlikely to meet the applicable uranium standard of 0.044 mg/l uranium in proposed Sector 1. This finding is also supported by the current location of the uranium plume which exceeds the applicable uranium standard of 0.044 mg/l as shown below in Figure 1.

However, NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL. In particular, DOE has not included an evaluation of changes in groundwater use, specifically the change in location for dewatering operations at the abutting gravel operations resulting from the recent approval of the Gunnison West Gravel Pit Expansion to the new location south of the proposed Sector 1 as shown in Figure 1. The application for this gravel expansion was submitted to Gunnison County in January 2017. It was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017).

Enclosure

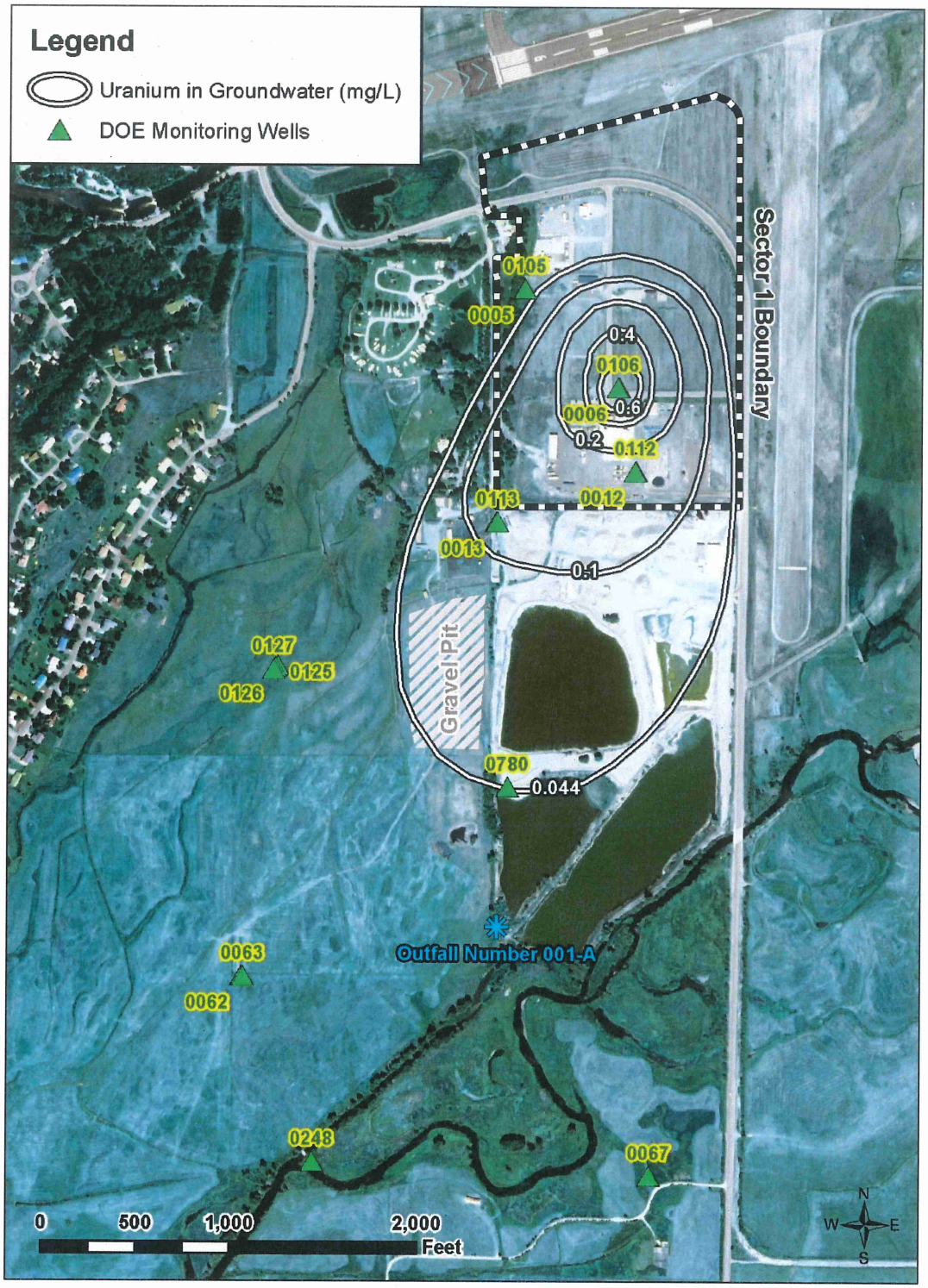

Figure 1. Uranium plume from Sector 1 and new gravel pit expansion (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

Basis: The revised GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, by changing the groundwater remedy from the current natural flushing remedy to achieve

the applicable maximum concentration in groundwater protection standards in Table 1 to Subpart A of 40 CFR 192 to an alternate concentration limit (ACL) strategy for uranium for Sector 1. To support an ACL, the DOE has to address the relevant present and potential hazard factors in Part 192.02 c(3)(ii)(B)(1) and (2).

NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL by not addressing the groundwater use or analyzing the groundwater quality impacts expected from the expansion of existing gravel pit operations to a new location south of Sector 1 as shown in Figure 1. The application for this gravel expansion was submitted to Gunnison County in January 2017. The application was titled the "Gunnison West Gravel Pit Expansion" and was submitted by Oldcastle SW Group, Inc. dba United Companies as permit request LUC-17-00018. The application requested expansion of the sand and gravel operations for a new 7.5 acre gravel pit, up to 75 feet deep, directly west of the existing operational gravel pit as shown Figure 1. No other changes to the existing gravel processing operation were proposed. This permit was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017).

The new Gunnison West Gravel Pit Expansion operation was approved with new dewatering wells. In past gravel pit operations, dewatering wells have operated at rates up to 4000 gpm. These wells represent a new groundwater use south of the Sector 1 proposed ACL site. NRC staff finds the use of any new dewatering wells must be evaluated under present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v). This evaluation is necessary to determine if and how the new gravel pit dewatering wells may impact the uranium plume and the uranium levels at the POE well MW0113 shown in Figure 1. In addition, the new dewatering wells are permitted to discharge to the "Valco Pond" gravel pit and may therefore impact the uranium levels in this gravel pond which are measured at SW0780.

Path Forward: NRC staff requests that DOE analyze the potential impact of any new gravel pit dewatering wells for the approved Gunnison West Pit Expansion. Specifically, DOE should determine if and to what extent the use of these gravel pit dewatering wells may impact the existing uranium plume shown in Figure 1 and the future uranium levels at MW0113. DOE has proposed MW0113 to be the Sector 1 POE well that will be required to meet the proposed Sector 2 ACL of 0.56 mg/l. NRC staff also requests that DOE evaluate any impact on the uranium levels measured at SW0780 in the "Valco Pond" gravel pit which will receive the dewatering well discharge from the new expansion gravel pit operation. The evaluation of this groundwater use and potential surface water impact is needed to meet the requirements of the factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) for the proposed Sector 1 ACL.

Comment 2: NRC staff does not agree that the current GCAP of natural flushing is failing or will fail to meet the applicable uranium standard of 0.044 mg/l in the entire area of proposed Sector 2 shown in Figure 2 below. In contrast, NRC staff finds the current GCAP of natural flushing is meeting and will continue to meet the applicable uranium standards of 0.044 mg/l for almost the entire Sector 2 area, excluding the area just south of Sector 1. Therefore, NRC staff does not understand the basis for DOE to propose an ACL of 0.56 mg/l for uranium in the entirety of Sector 2 which covers 928 acres (1.45 square miles) with an aquifer thickness ranging from 70 - 130 feet thick. Assuming an average thickness of 100 feet, NRC concurrence on this proposed ACL would permanently affect over 92,800 acre feet of water and is not justified. The NRC staff are concerned with the future use restrictions to such a large area of groundwater.

Basis: The revised GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, by changing from the current natural flushing remedy to achieve the applicable uranium standard to an alternate concentration limit (ACL) strategy for uranium. Specifically, DOE has proposed a uranium ACL of 0.56 mg/l for all groundwater in the alluvial aquifer underlying 928 acres of Sector 2 in lieu of natural flushing to the uranium applicable uranium standard of 0.044 mg/l.

The DOE may request ACLs for Title I sites with NRC concurrence as provided in 40 CFR 192.02(c)(3)(ii)(A) which states:

"The Secretary may apply an alternate concentration limit if after considering remedial or corrective actions to achieve the levels specified in paragraphs (c) (3) (i) (A) and (B) if this section, he has determined that constituent will not pose substantial present of potential hazard to human health and the environment as long as the alternate concentration limit is not exceeded, and the Commission has concurred."

This regulatory language makes clear that the intent is to reach either the background or applicable maximum concentration in the groundwater protection standards in Table 1 to Subpart A of 40 CFR 192. The regulation allows for DOE to propose an ACL only if the approved groundwater corrective action remedy, in this case natural flushing, has demonstrably shown that it will not meet the background level or the applicable maximum concentration in groundwater protection standards in Table 1 to Subpart A of 40 CFR 192 for the specific COC. The goal of the regulation to achieve background or groundwater protection standards in Table 1 to Subpart A of 40 CFR 192 before proposing an ACL is to preserve the aquifer water quality for all future use, unless strong compelling evidence exists that it cannot be done. This goal is typically known as ALARA, and though not specifically addressed in the 40 CFR 192.02(c)(3)(ii)(A) regulations, it is considered a goal of the groundwater remediation to meet the most protective standard possible.

NRC staff, however, finds that DOE has not provided compelling evidence that the natural flushing remedy is failing for the downgradient plume in the entire alluvial aquifer in Sector 2 and that the goal of achieving the applicable uranium standard of 0.044 mg/l should be abandoned in lieu of an ACL. In contrast, NRC staff finds the natural flushing remedy has been and continues to be successful in the majority of the alluvial aquifer in Sector 2, with no compelling evidence that all of the alluvial aquifer in Sector 2 will exceed the applicable uranium standard of 0.044 mg/l.

In Sector 2, the groundwater moves to the southwest from the original Gunnison Processing site at a yearly rate of approximately 690 to 1150 ft/year according to hydraulic conductivity and gradient values provided in the revised GCAP (DOE, 2017). As shown below in Figure 2, the uranium concentrations in the downgradient monitoring wells across Sector 2 are all below the applicable uranium standard of 0.044 mg/l with the exception of a slightly elevated uranium level at MW0183 of 0.046 mg/l.

DOE expressed agreement that uranium remains below the applicable uranium standard in Sector 2 with the following text in Section 2.4.1 "Distribution of Contamination" in the revised GCAP (DOE, 2017) which states:

Uranium is the groundwater COC at the Gunnison site, with historical concentrations measured over 2 mg/L beneath the former mill site. The highest uranium concentrations at the Gunnison site remain in the shallow groundwater under the former mill site (Figure 2). In the April 2015

sampling event, uranium concentrations exceed the UMTRCA MCL of 0.044 mg/L for groundwater in three monitoring wells on and adjacent to the former mill site and in one monitoring well (0183; deep) more than 4000 ft downgradient of the site boundary (Figure 2).

Concentrations of uranium that are less than the MCL but above background extend approximately 7000 ft downgradient of the former mill site in monitoring wells 0160 (intermediate) and 0161 (deep).

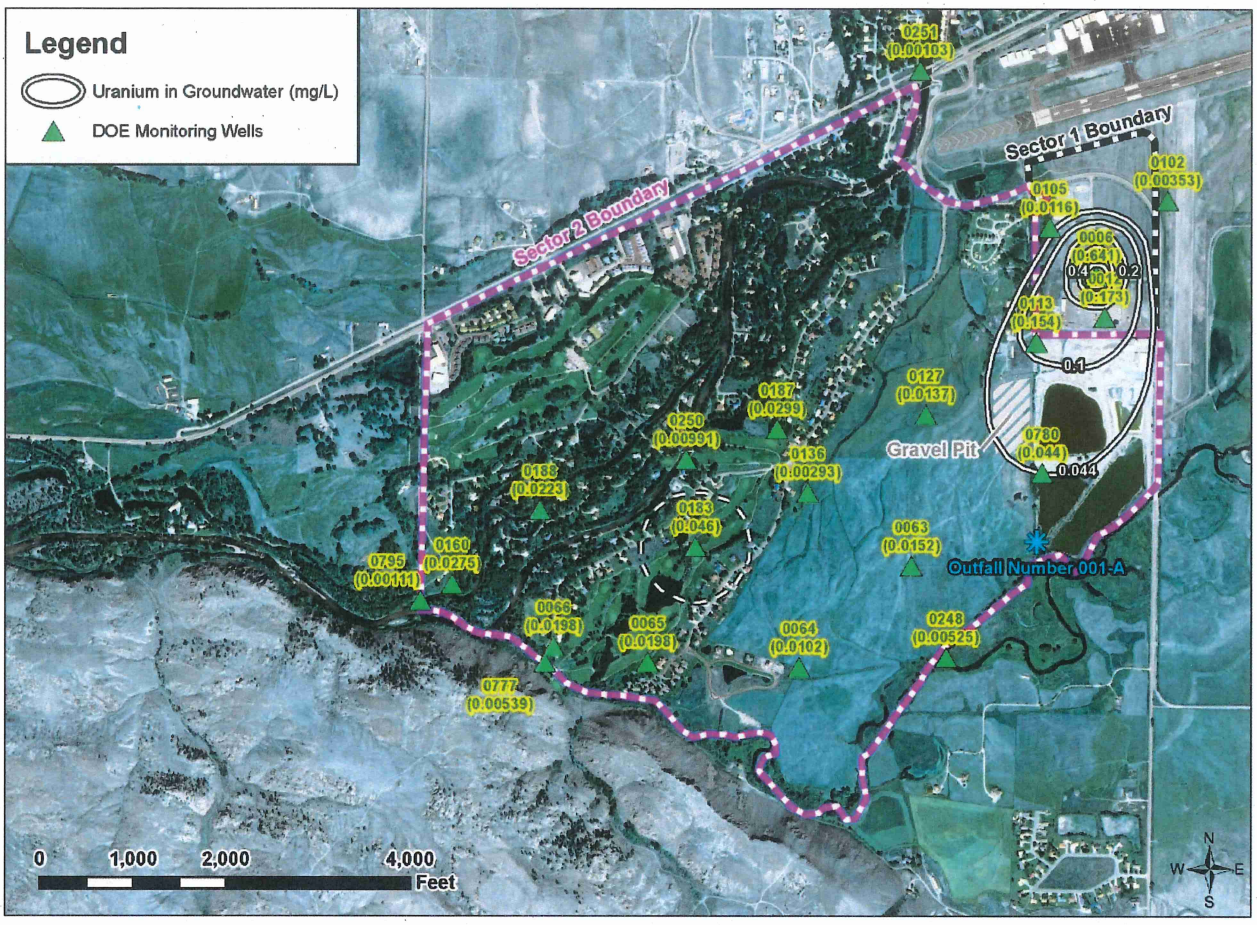

Figure 2. Uranium plume from Sector 1 and uranium in downgradient (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

In addition, NRC staff's evaluation of the monitoring well data presented by DOE in the draft revised GCAP (through 2016) and independent review of all the monitoring data for uranium in Sector 2 wells (through 2019) publicly available from the DOE GEMS site for the Gunnison, Colorado Processing Site (https://gems.lm.doe.gov/#site=GUP) shows the successful performance of natural flushing to achieve the applicable uranium standard of 0.044 mg/ in the downgradient wells in Sector 2:

1. All of the downgradient DOE monitoring wells in proposed Sector 2 located at least 100 feet from the Sector 1 boundary, with the exception of MW0183, have been historically and continue to be at or substantially below the applicable uranium standard of 0.044 mg/l as shown in Figure 11 of the revised GCAP (DOE, 2017) and Plots 2, 3, and 4 of the 2018 Annual Verification Monitoring Report (DOE, 2019).

2. None of the downgradient DOE monitoring wells in proposed Sector 2, located at least 100 feet from the Sector 1 boundary, show any trends which demonstrate that any well will exceed the applicable uranium standard of 0.044 mg/l in the future as shown in Figure 11 of the revised GCAP (DOE, 2017) and Plots 2, 3, and 4 of the 2018 Annual Verification Monitoring Report (DOE, 2019).
3. Of the downgradient monitoring wells in proposed Sector 2,located at least 100 feet from Sector 1 boundary, only one, MW0183, has exceeded the applicable uranium standard historically as shown in Figure 11 of the revised GCAP (DOE, 2017) and Plot 3 of the 2018 Annual Verification Monitoring Report (DOE, 2019).
4. NRC staff review of the most recent uranium data in MW0183 from 2017-2019 shows it has declined close to the applicable uranium standard and is at 0.046 mg/l. DOE reported that the uranium levels in MW0183 exhibit "no trend" in Table 4 of the 2015 Annual Verification Monitoring Report (DOE, 2016).
5. All of the five buffer zone domestic wells which are still being used for drinking water west of the Gunnison River have been and continue to be monitored by DOE. These domestic wells have historically been and continue to be substantially below the applicable uranium standard of 0.044 mg/l uranium as shown in Plot 9 of the 2018 Annual Verification Monitoring Report (DOE, 2019).
6. None of the five buffer zone domestic wells that are still being used for drinking water in proposed Sector 2 show any trends which demonstrate that any well will exceed the applicable uranium standard of 0.044 mg/l uranium as shown in Plot 9 of the 2018 Annual Verification Monitoring Report (DOE, 2019).
7. MW0160 and MW0161, the farthest downgradient monitoring wells, are located approximately 7000 feet away from the former processing site. These wells have been and continue to be below the 0.044 mg/l applicable uranium standard, demonstrate no current trend and are not expected to exceed the uranium standard as shown in Plot 4 of the 2018 Annual Verification Monitoring Report (DOE, 2019).

In its review, NRC staff found that DOE based the increasing trend in uranium and therefore failure of the natural flushing remedy in all of Sector 2 mostly on one well, MW0113, which lies immediately adjacent to the southwest corner of the original processing site as shown in Figure 1. DOE showed this upward trend as a deviation from the predicted natural flushing model in Figure 4 of the draft GCAP (DOE, 2017).

NRC staff's independent review of the monitoring well data for MW0113 is shown in Figure 3 below. The uranium levels in this well showed a significant decrease in uranium from 0.56 mg/l to 0.081 mg/l, from 1985 to 2007. The well then displayed a mild increasing trend up to 0.23 mg/l uranium from 2008 to 2014. However, from 2015 to 2019, the MW0113 data shows the upward trend in uranium has reversed and is now stable around 0.15 mg/l uranium as shown in Figure 3. In addition, the NRC staff's review of wells immediately downgradient of MW0113 showed this increase was not reflected in the downgradient wells, even though it was present for seven years. Specifically, MW0126 and MW0127, also shown on Figure 3, are the closest wells located 1039 feet directly downgradient of MW0113. These wells show significant decreasing trends with natural flushing in Figure 4 and have remained significantly below the 0.044 mg/l uranium standard since 1998. NRC staff review of these wells and of all other downgradient wells in Sector 2 indicate that the anomalous increase in MW0113 was naturally attenuated as predicted and did not impact downgradient wells.

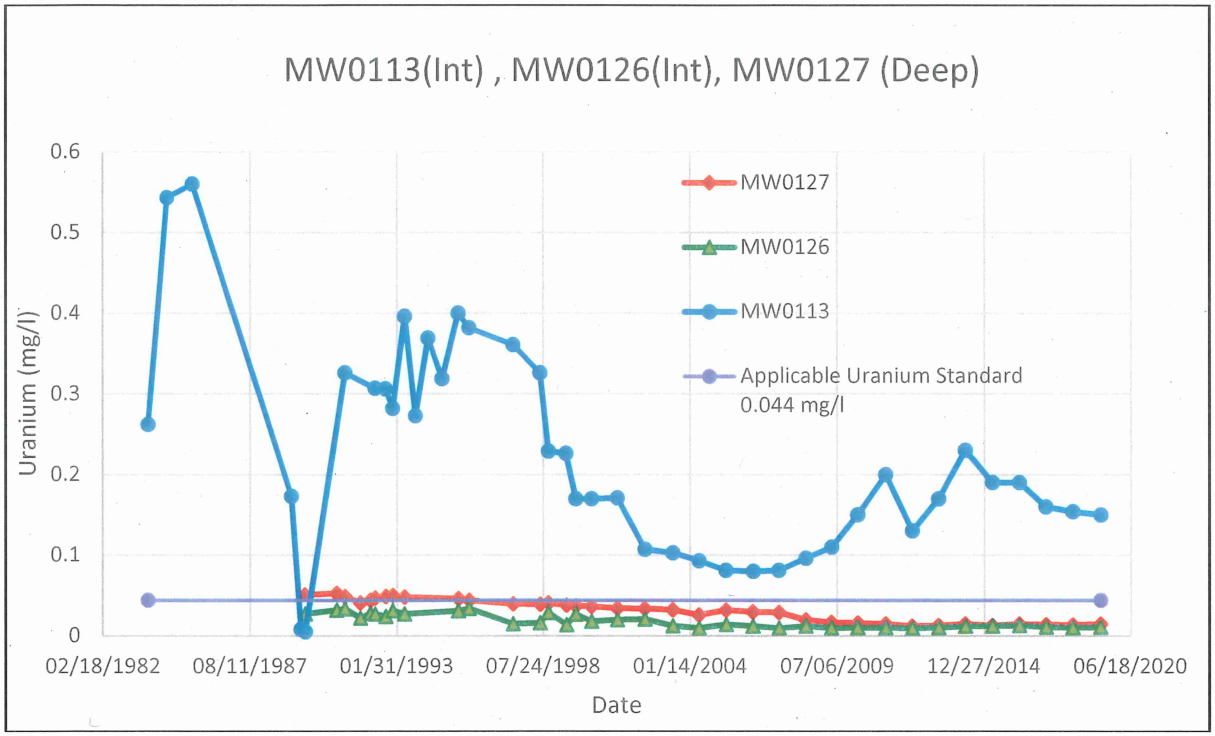

Figure 3. Uranium levels in MW0113, MW0126 and MW0127 vs. applicable uranium standard (0.044 mg/l)

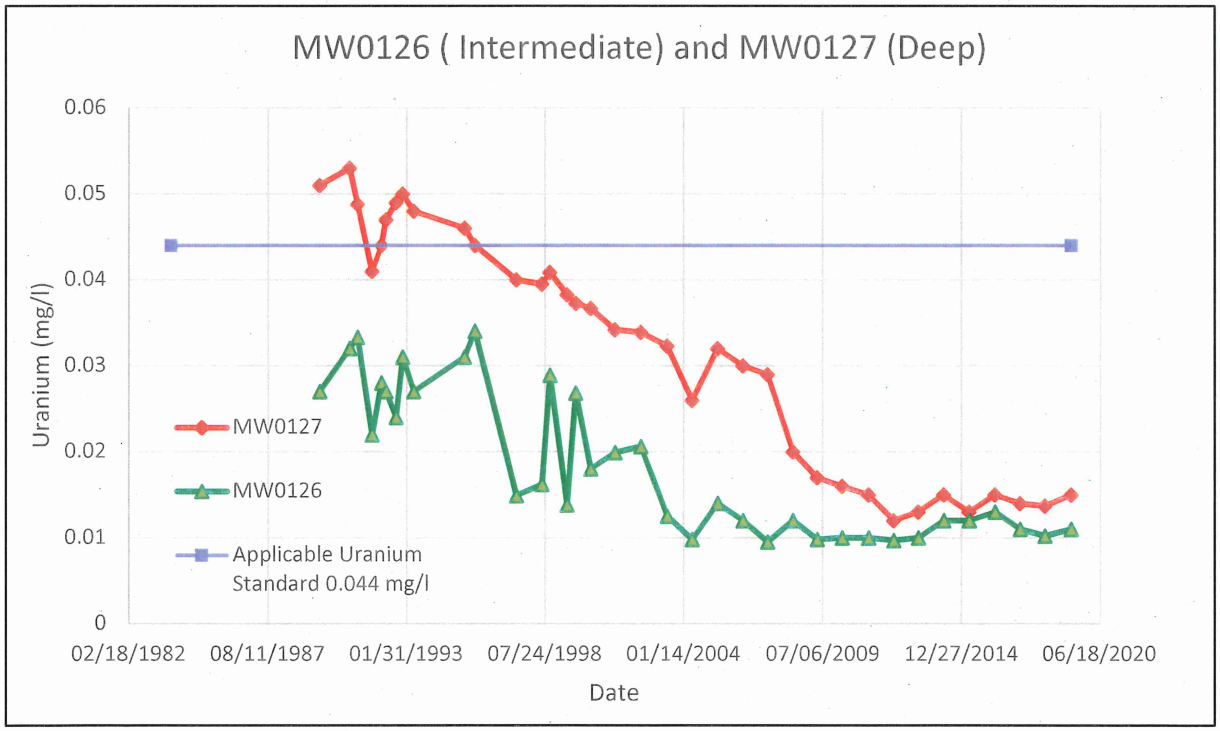

Figure 4. Uranium levels in MW0126 and MW0127 vs. applicable uranium standard (0.044 mg/l)

In addition to these findings, DOE, as quoted below in Appendix C4.5 of the draft GCAP (DOE, 2017), stated that the downgradient plume from the processing site is stable with only one downgradient well showing an exceedance of the appropriate uranium standard. Specifically, DOE agreed that the uranium on the Sector 1 processing site is persistent and elevated, but the downgradient uranium plume located in the proposed Sector 2 is stable or shrinking and remains below the "MCL" (applicable uranium standard) in all but one well:

C4.5 ALARA Demonstration

Because of the high uranium concentrations observed in onsite groundwater in the past and the residual uranium that remains in site soils, elevated levels of uranium are likely to persist for the foreseeable future. Most contamination is confined to the site, which is owned by the local government. The quitclaim deed for the site requires that the site remain in government ownership and that groundwater at this site is not used for any purpose. The plume appears to be stable or shrinking. Given current and likely site uses and the available supply of water, ALARA concentrations have been achieved in groundwater. Only one monitoring well downgradient of the immediate site vicinity has uranium concentrations above the MCL.

NRC staff believes this well is presumably MW0183 which is currently at 0.046 mg/l uranium, an exceedance of only 0.002 mg/l from the applicable uranium standard.

NRC staff finds that the only well in Sector 2 that had a brief increasing trend of concern was MW0113 located in the far northeastern border of Sector 2 on the southwestern corner of the original Gunnison processing site identified as Sector 1. NRC staff found the increasing trend in uranium in the MW0113 has reversed and is now declining. In addition, NRC staff finds this well is immediately adjacent to the original processing site and is therefore not representative of all the downgradient wells in Sector 2 which remain substantially below the applicable uranium standard of 0.044 mg/l. NRC staff finds this well is not representative of the entire Sector 2 downgradient water quality and is not impacting downgradient wells. It should therefore not be used as the main basis to propose an ACL for Sector 2.

Finally, DOE did not provide any additional revised groundwater modeling or other analysis in the revised GCAP that demonstrated that the applicable uranium standard will be exceeded downgradient in the alluvial aquifer or surface water to justify the proposed ACL of 0.56 mg/l uranium for the entire alluvial aquifer in proposed Sector 2.

NRC staff therefore concludes that the proposed ACL for Sector 2 is not justified and is not needed as the GCAP natural flushing remedy is successful for the downgradient plume. Approval of the proposed Sector 2 ACL would unnecessarily and permanently remove all of the groundwater in the alluvial aquifer from its potential future uses including as a domestic water source. It would also require that DOE provide new durable and enforceable institutional controls (IC) to permanently remove all currently installed wells from domestic use. The current institutional control of a New Domestic Well Constraint Special Area provided in Appendix B of the draft GCAP is not sufficient as it only prevents new domestic wells from being installed (DOE, 2017). If NRC were to concur on an ACL of 0.56 mg/l uranium, it would require a new IC that would also prevent currently installed wells being used for domestic water supply in the future or as they are now west of the Gunnison River. Obtaining a durable and enforceable institutional control preventing all domestic water use (e.g. quit claim deed or environmental covenant for each property) would be difficult and time consuming.

NRC staff concludes that the vast majority of downgradient monitoring wells in the proposed Sector 2 have and continue to demonstrate that the current natural flushing remedy to achieve and maintain the applicable uranium standard of 0.044 mg/l has been and will continue to be successful. NRC staff finds that the downgradient monitoring well data do not show any trends that will exceed the applicable uranium standard of 0.044 mg/l/ over the 100 year natural flushing time frame. Therefore, NRC cannot concur on the proposed ACL of 0.56 mg/l for the currently proposed Sector 2.

Path Forward: NRC staff requests that DOE should withdraw the proposed ACL for all of Sector 2 and maintain the natural flushing remedy to maintain the groundwater protection standard of 0.044 mg/l uranium to meet the groundwater protection standard as specified in paragraphs 40 CFR Part 192.02(c) (3) (i) (A) and (B).

If DOE chooses to withdraw the proposed ACL of 0.56 mg/l uranium for all of Sector 2, NRC staff requests that the DOE propose a revised Sector 2 with an ACL as described in Comment 3 below.

Comment 3: NRC staff requests that DOE propose a revised Sector 2 from the southern boundary of Sector 1 down to Tomichi Creek to include MW0113, the entire gravel pit operation and newly approved Gunnison West gravel pit expansion. An example of such a revised Sector 2 is shown in Figure 5 below. NRC staff finds there is compelling evidence that the alluvial groundwater in this revised Sector 2 will not achieve the uranium applicable standard of 0.044 mg/l in 100 years by natural flushing and therefore a proposed ACL of 0.56 mg/l derived from MW0113 historical uranium values is appropriate.

Basis: NRC staff finds that the proposed ACL of 0.56 mg/l uranium would be reasonable over a revised Sector 2 area extending south from the boundary of Sector 1 to Tomichi Creek and encompassing MW0113 and the new gravel pit operation to the west. An example of a revised Sector 2 area is shown in Figure 5 below.

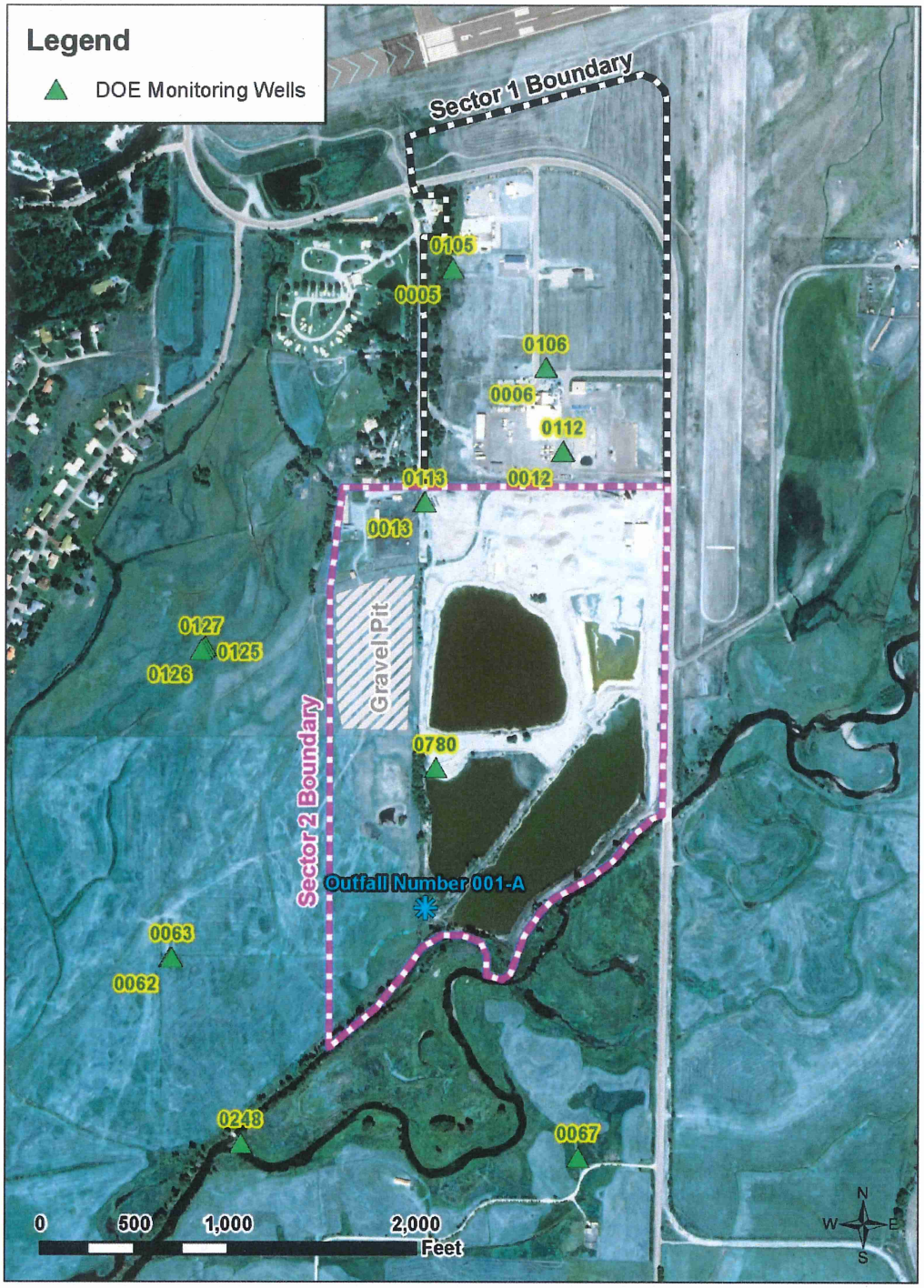

Figure 5. Example of revised Sector 2 (purple boundary) for proposed ACL (adapted from the 2018 Annual Verification Monitoring Report for the Gunnison Processing site Figure 2 (DOE, 2019))

NRC staff finds that in an appropriately revised Sector 2, the proposed ACL is justified for the following reasons:

1. The concentration of uranium in MW0113 has remained significantly above the applicable uranium standard as shown in Figure 3.

2. DOE has reported that there is a southern uranium plume located in this area as shown in Figure 1 with uranium levels that remain above the applicable uranium standard of 0.044 mg/l (DOE, 2019).
3. The size and behavior of the southern uranium plume in this revised Sector 2, including its probable exceedance of the applicable uranium standard of 0.044 mg/l over the 100 year natural flushing period, was predicted by the Site Observational Work Plan (SOWP) groundwater flow and uranium transport modeling (DOE, 2001).
4. The uranium levels in SW0780 over time at the "Valco Pond" gravel pit within this revised Sector 2 have been below the applicable uranium standard of 0.044 mg/l but are now increasing above it as shown in Figure 6 below.
5. The discharge of gravel pit dewatering water from the recently approved gravel pit expansion is likely to pull the uranium plume to the south from Sector 1 within this revised Sector 2. The discharge may increase the uranium levels in "Valco Pond" gravel pit.

Path Forward: NRC staff requests that DOE should reduce the Sector 2 area for the proposed ACL of 0.56 mg/l uranium to a revised Sector 2 area similar to the one shown in Figure 5 based on DOE's own assessment.

Comment 4: NRC staff requests that if DOE proposes the recommended revised Sector 2 for a proposed ACL of 0.56 mg/l, the POC well for revised Sector 2 should be MW0113. This well should also act as the POE for Sector 1.

Basis: NRC staff agrees with the DOE analysis of the Upper Simultaneous Limit (USL) in MW0113 in the revised GCAP and that an ACL of 0.56 mg/l is appropriate for this well. The SOWP groundwater flow and uranium transport modeling and historical monitoring values show MW0113 will experience the highest uranium values in a revised Sector 2 region given its proximity to Sector 1 (DOE, 2001). It is therefore appropriate to select MW0113 as the POC well for the entire recommended revised Sector 2 proposed ACL.

Path Forward: DOE should identify MW0113 as the POC well for a revised Sector 2 with a proposed ACL of 0.56 mg/l. MW0113 will continue to act as the POE for Sector 1 proposed ACL of 1.43 mg/l uranium.

Comment 5: NRC staff requests that if DOE proposes the recommended revised Sector 2 for a proposed ACL of 0.56 mg/l, the POE locations for a revised Sector 2 should be MW0125, MW0126, MW0127 and MW0062 and MW0063. NRC staff also requests that the surface water POEs for a revised Sector 2 be SW0780 on the "Valco Pond" gravel pit and SW0248 on Tomichi Creek.

Basis: The NRC staff requests these POE well and POE surface water monitoring locations shown on Figure 5 for the following reasons:

1. POE groundwater wells and surface water locations must be close to and outside of the boundary of the proposed ACL region because these are the locations where the potential receptor may be exposed.
2. POE groundwater wells and surface water locations should be located near the proposed ACL boundary to trigger corrective action if uranium levels are exceeded and to prevent any downgradient receptor from being impacted.
3. SW0780 is appropriate as a surface water POE for an appropriately revised Sector 2 ACL because the "Valco Pond" gravel pit is used for recreational fishing (DOE, 2002).

4. SW0780 is appropriate as a surface water POE because the "Valco Pond" gravel pit directly discharges to Tomichi Creek at the surface water discharge outfall (Outfall 001A in Figure 2) under CDPS Certification Number COG500010 (CDPHE, 2016).
5. SW0248 is appropriate as a surface water POE for an appropriately revised Sector 2 ACL because Tomichi Creek is designated as a water supply stream and must meet the applicable uranium standard of 0.044 mg/l.
6. SW0248 is appropriate as a surface water POE because it has been consistently below the applicable uranium standard of 0.044 mg/l as shown in Figure 6 below.
7. SW0248 is appropriate as a surface water POE as it is directly downstream of the CDPS surface water discharge outfall (Outfall 001A in Figure 2). This outfall allows direct discharge of uranium contaminated water from the "Valco Pond" gravel pit to Tomichi Creek (CDPHE, 2016).
8. MW0125, MW0126, and MW0127 are appropriate for POE wells for a revised Sector 2 as they are the closest wells located west and downgradient of the revised Sector 2 ACL region and have remained historically below the uranium MCLs. These wells are also in an area that may continue to exceed the applicable uranium standard past the 100 year natural flushing period as predicted by the DOE groundwater flow and uranium transport modeling in the SOWP (DOE, 2001).
9. MW0062 and00623 are appropriate as POE wells for a revised Sector 2 as they are the closest wells located southwest and downgradient of the revised Sector 2 and have remained historically below the applicable uranium standard. These wells are also in an area that may continue to exceed the applicable uranium standard past the 100 year natural flushing period based on the DOE groundwater flow and uranium transport modeling in the SOWP (DOE, 2001).
10. MW0062 and MW0063 are also appropriate as POE wells for Sector 2 as they are well positioned to detect any seepage of uranium from the "Valco Pond" gravel pit that might be missed by MW0126 and MW0127 based on predictions provided by the DOE groundwater flow and uranium transport modeling in the SOWP (DOE, 2001).
11. All of the recommended groundwater POE and surface water POE are located in areas closest to the revised Sector 2 boundary which will enable timely detection of an exceedance of the applicable uranium standard to trigger corrective action if needed.

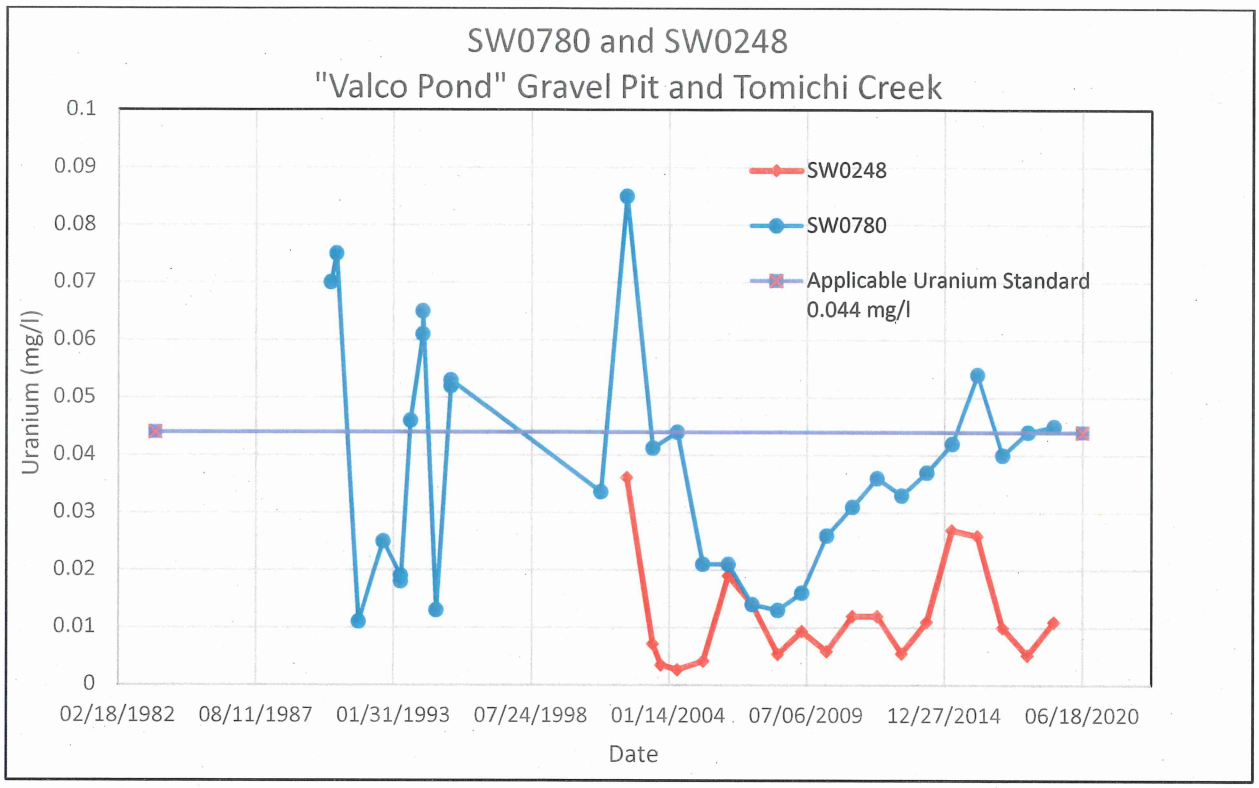

Figure 6. Uranium levels in SW0248 and SW0780 vs. applicable uranium standard (0.044 mg/l)

Path Forward: NRC staff requests that DOE selects the groundwater well POE locations to be MW0125, MW0126, MW0127 and MW0062 and MW0063 and the surface water POEs to be SW0780 on the 'Valco Pond" gravel pit and SW0248 on Tomichi Creek for an appropriately revised Sector 2.

Comment 6: NRC staff finds that there are no POE wells outside of the institutional control (IC) boundary directly south of the gravel pit operation in revised Sector 2 (Figure 5). A POE well is needed south of this IC boundary to monitor and ensure that unrestricted groundwater use will not pose a substantial present or potential hazard to human health and the environment.

Basis: The draft GCAP submitted by DOE proposes to meet the regulatory standards of 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, by changing from a natural flushing strategy for contaminants of concern (COCs) to a proposed ACL for Sector 2. Approval of an ACL requires an assessment to determine that levels of contaminants will not pose a substantial present or potential hazard to human health and the environment. 40 CFR 192.02 (c)(3)(ii)(B)(1), specifies that an evaluation of potential hazards from proposed ACLs must consider several factors, including potential adverse effects on groundwater quality. This includes the proximity and withdrawal rates of groundwater users.

NRC staff finds groundwater must be suitable for unrestricted use downgradient of a revised Sector 2 as there are no ICs beyond this boundary. DOE measured uranium concentrations in private domestic wells MW0080, MW0081, and MW0082 just south of the Sector 2 gravel pit boundary in the past. Some of the uranium measurements in these domestic wells were elevated relative to background, but below the applicable uranium standard of 0.044 mg/l. In 2005, DOE installed MW0067 shown on Figure 5 to verify elevated uranium concentrations measured in

private domestic well MW0082 were representative. DOE monitored MW0067 for four years as shown in Figure 7 below.

DOE has not provided any uranium measurements in MW 0067 since 2008. To concur on an ACL for the recommended revised Sector 2, NRC staff must have an analysis that demonstrates that domestic groundwater users south of the IC boundary for a revised Sector 2 will not be exposed to uranium levels above the applicable standard of 0.044 mg/l.

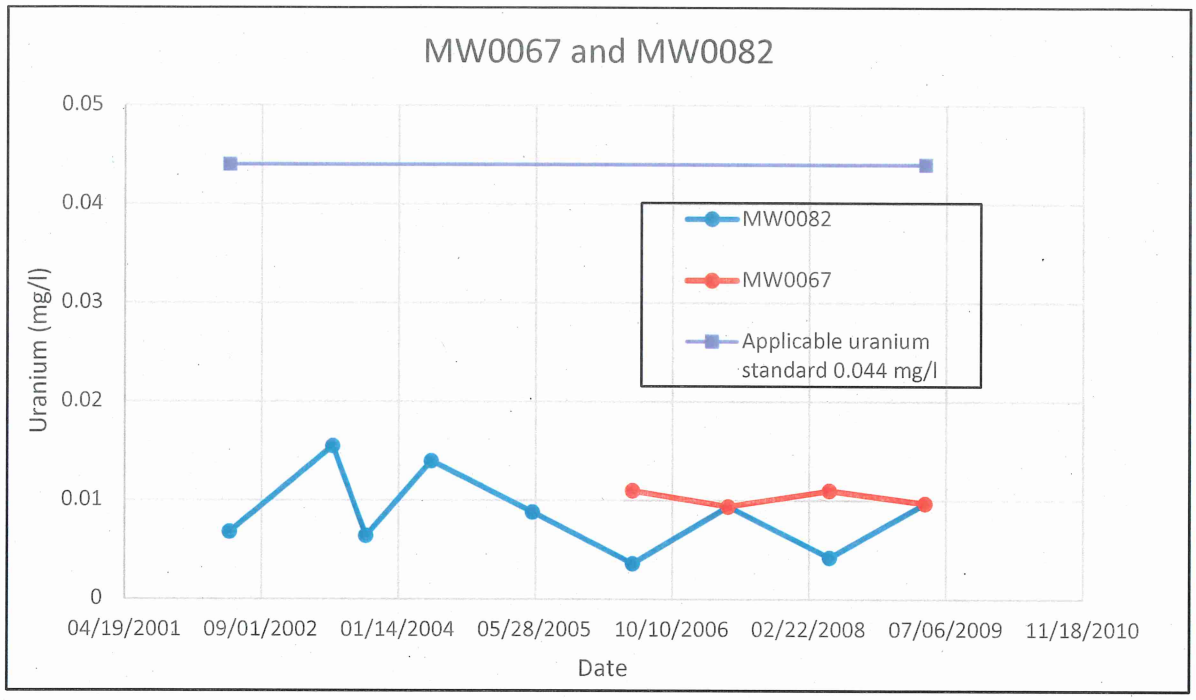

Figure 7. Uranium Trend in MW0067 and MW0082 vs. Applicable uranium standard (0.044 mg/l)

Path Forward: NRC staff requests that DOE provide an analysis to support the conclusion that uranium concentrations in the alluvial aquifer will not exceed the applicable uranium standard of 0.044 mg/l beyond the IC boundary south of the gravel pit operations in a revised Sector 2. This information should include updated modeling with recent site monitoring data as well as additional groundwater monitoring data beyond the IC Boundary to the south and west of the former processing site in Sector 1. NRC staff also requests that DOE add a POE well, such as MW0067, if it still exists or install a new POE well in this area to verify that the proposed ACL for Sector 2 is protective of private well users.

Comment 7: NRC staff finds that DOE has not adequately addressed the impact of the discharge from the "Valco Pond" gravel pit on the uranium levels in Tomichi Creek from the change in groundwater use described in Comment 2. NRC staff has determined that the "Valco Pond" gravel pit has been and is currently permitted by Colorado Department of Public Health and Environment (CDPHE) to directly discharge to Tomichi Creek at the surface water discharge Outfall 001A as shown in Figure 2 under CDPS Certification Number COG500010 (CDPHE, 2016). Specifically, DOE has not evaluated how this change in groundwater use from the approved new gravel pit expansion and associated dewatering wells which are permitted to discharge to the "Valco Pond" gravel pit may increase the uranium levels in Tomichi Creek which is designated as a water supply stream. As a water supply stream, Tomichi Creek must be

shown to meet the applicable uranium standard of 0.044 mg/l for NRC concurrence on a Sector 2 proposed ACL.

Basis: The DOE must address the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) 192.02 c(3)(ii)(B)(2)(v), (vi) and (vii), which respectively address potential adverse effects on groundwater and surface water for a proposed ACL in a revised Sector 2. In particular, DOE has not included the change in groundwater use or addressed the effect of this groundwater use change resulting from the recent approval of the Gunnison West Gravel Pit Expansion to the new location south of the proposed Sector 1 as shown in Figure 1 on uranium levels in Tomichi Creek. The application for this gravel expansion was submitted to Gunnison County in January 2017. It was approved by Gunnison County on July 26, 2017 (Certificate of Minor Approval, Certification No. 06 Series 2017).

Path Forward: NRC staff requests that DOE provide an analysis that demonstrates that uranium levels in the "Valco Pond" gravel pit anticipated from the change in groundwater use from the approved gravel pit expansion and associated dewatering wells which are permitted to discharge to the "Valco Pond" and then directly to Tomichi Creek at CDPS Outfall 001A are not likely to increase the uranium levels in Tomichi Creek above the applicable uranium standard of 0.044 mg/l.

Comment 8: DOE has incorrectly identified the State of Colorado surface water quality uranium standards for a water supply stream in the reference to Tomichi Creek on the bottom of page 9 in the draft GCAP (DOE, 2017).

Basis: In consultation with CDPHE, NRC staff has determined that the correct State of Colorado uranium surface water quality standards for a water supply stream in this portion of the Gunnison River Basin are found in Regulation No. 35 - "Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins." Section 35.5(3)(c) of this document states:

In no case shall uranium levels in waters assigned a water supply classification be increased by any cause attributable to municipal, industrial, or agricultural discharge so as to exceed 16.8 - 30 ug/l or naturally-occurring concentrations (as determined by the State of Colorado), whichever is greater.

Path Forward: NRC staff requests that DOE correct the reference to the State of Colorado uranium surface water quality standards for Tomichi Creek on the bottom of page 9 of the draft GCAP (DOE, 2017).

Comment 9: If DOE proposes a uranium ACL for a revised Sector 2 as recommended by NRC, DOE should provide an updated list of all private wells and or industrial wells and their current use in this revised Sector 2.

Basis: NRC staff finds that DOE has not adequately addressed the present and potential hazard factors in 40 CFR 192.02 c(3)(ii)(B)(1)(iv) and (v) required for a proposed ACL in a revised Sector 2. In particular, DOE has not provided an updated list of private and industrial wells and their current use in a revised Sector 2.

Path Forward: DOE should provide an updated list of all existing private or industrial wells and their current use in a revised Sector 2.

Comment 10: DOE has not provided an updated environmental review of the proposed action for the draft GCAP (DOE, 2017) or an amendment to the Gunnison, Colorado, UMTRA Project Site Environmental Assessment (DOE, 2002). The NRC has determined that its action, specifically concurrence on DOE's revised GCAP, requires an appropriate review under the National Environmental Policy Act (NEPA). NRC must therefore conduct consultations including those satisfying Section 106 of the Nation Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA).

Basis: Although not specifically stated in the draft GCAP (DOE, 2017), it is NRC's understanding that DOE has determined that its action (i.e., revising the GCAP from natural flushing to ACLs) meets the criteria for an established categorical exclusion. On the other hand, NRC's action (i.e., concurrence on DOE's revised GCAP) does not meet the criteria for one of its categorical exclusions and thus NRC will be performing an appropriate environmental assessment resulting in an Environmental Assessment or an Environmental Impact Statement. In addition, NRC staff will be completing the requisite consultations including those satisfying Section 106 of the Nation Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA).

Path Forward: NRC staff requests that to minimize duplicative consultation efforts that DOE may have already performed, DOE should please provide any information on any consultations that DOE has performed for Section 106 of the NHPA or Section 7 of the ESA for the draft GCAP (DOE, 2017a). NRC staff also requests that DOE provide any relevant information from consultations with any other stakeholders including the National Park Service, Colorado Department of Public Health and Environment (CDPHE), and Gunnison County with respect to the draft GCAP (DOE, 2017).

References

1. CDPHE, 2016, "Certificate to Discharge Under CDPS Permit COG500000, Discharges Associated with Sand and Gravel Mining and Processing," November 16, 2016.

2. DOE, 2001, "Final Site Observation Work Plan for the Gunnison, Colorado UMTRA Project Site (LMS/GUP/S06004), Office of Legacy Management, Grand Junction, CO, March 2001 (ADAMS Accession Nos. ML016172022 and ML061720024).

3. DOE, 2002, "Environmental Assessment of Ground Water Compliance at the Gunnison, Colorado UMTRA Project Site," DOE /EA-1399, July 2002 (ADAMS Accession No. ML061670211).

4. DOE, 2010, "Final Groundwater Compliance Action Plan for the Gunnison Colorado Processing Site (LMS/GUP/S06004)," Office of Legacy Management, Grand Junction, CO, April 2010 (ADAMS Accession No. ML101200599).

5. DOE, 2016, "2015 Annual Verification Monitoring Report ,Gunnison, Colorado, Processing Site, (LMS/GUP/S06004)" Office of Legacy Management, Grand Junction, CO, June 2016 (ADAMS Accession No. ML16168A045).

6. DOE, 2017, "Draft Groundwater Compliance Action Plan for the Gunnison, Colorado, Processing Site (LMS/GUP/S06004)," Office of Legacy Management, Grand Junction, CO, April 2017 (ADAMS Accession No. ML17124A592).

7. DOE, 2019, "2018 Annual Verification Monitoring Report, Gunnison, Colorado, Processing Site (LMS/GUP/S06004)," Office of Legacy Management, Grand Junction, CO, June 2019 (ADAMS Accession No. ML19025A086).