October 24, 2025

MEMORANDUM

Lisbon Valley Mining Company (LVMC) GTO Aquifer Exemption Request

PURPOSE

Lisbon Valley Mining Company (LVMC) operates a copper mine in San Juan County, Utah (Figure 1). LVMC seeks to extend current open pit and heap leach operations to include in situ recover (ISR) technology to extract copper from subsurface ore bodies. Because the ISR process would require injecting a sulfuric acid-based lixiviant solution into the Burro Canyon Aquifer (BCA), which is an underground source of drinking water (USDW), ann aquifer exemption (AE) for a portion of the BCA is required for the project to be approved. This memo provides a review of documents provided by LVMC to support the AE request as well as other associated data and documentation related to the hydrogeology of the GTO copper deposit, located in the Lower Lisbon Valley within in a graben (block of earth dropped down between two faults). The "GTO graben" is bounded by the Lisbon Valley Fault and secondary fault (Figures 2, 3). This review is focused on the geographic area in and around the GTO graben and builds on an initial review of previously available documentation.

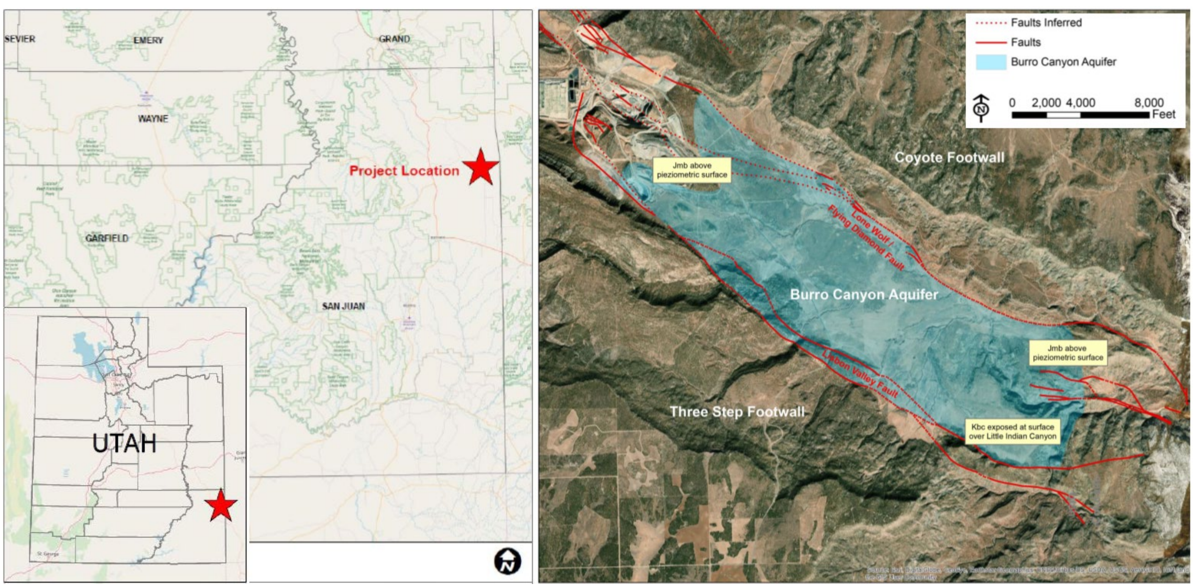


***Figure 1** General project location and LVMC-identified extent of the BCA. Modified from LVMC, 2020.*

REVIEW

Background

The GTO graben is located in the Lower Lisbon Valley, on the western flank of the NW-trending Lisbon Valley salt anticline. Copper deposits in the Burro Canyon and Dakota Formations in the GTO graben (Figure 2) resulted from migration of copper bearing hydrothermal fluids along the Lisbon Valley Fault (Utah Geological Survey, 2006) on the southwestern flank of the graben. This normal fault is referred to elsewhere as the Lisbon Valley or GTO Fault and herein will be referred to as the Lisbon Valley Fault, which forms the southwestern boundary of the GTO graben. A steeply dipping secondary fault bounds the northeastern edge of the GTO graben, which herein will be referred to as the secondary fault (Figure 3). The Lisbon Valley Fault offsets Cretaceous to Pennsylvanian-aged stratigraphy with displacements ranging from 50-3000’ (Krantz, 2019; Lingrey, 2023), whereas the offset along the secondary fault resulted in variable but generally smaller displacement than the Lisbon Valley Fault. Within the GTO graben, multiple additional high angle faults are inferred from LVMC borings and are referred to here as “within-graben” faults.

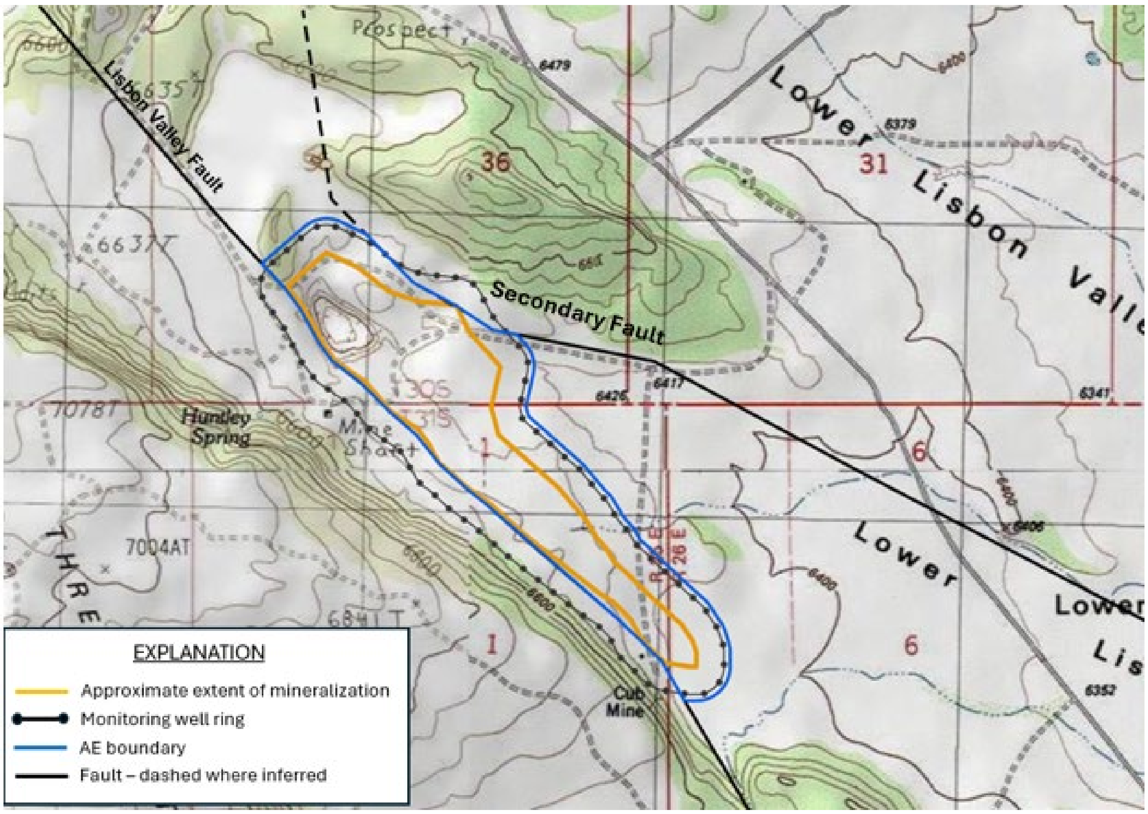


Figure 2. *GTO Mineralization and Aquifer Exemption Boundary The black fault lines represent where known faults intersect the top of the Burro Canyon Aquifer in the subsurface.*

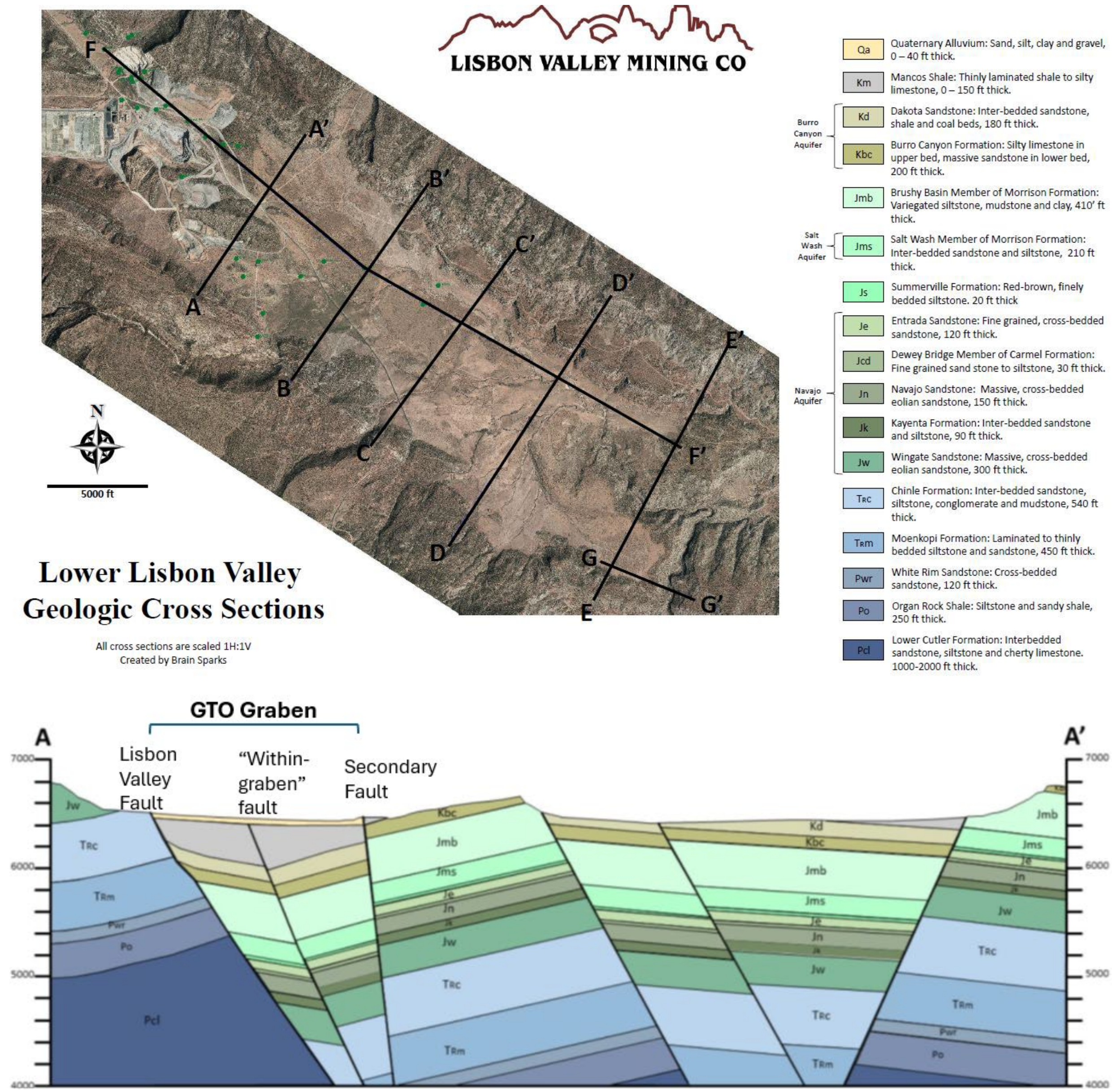


Figure 3. *Top: overview of the Lower Lisbon Valley, location of cross-sections, and stratigraphic column. "A-A' illustrates a relay fault system transmitted fault movement on the Lisbon Valley Fault to the SW, widening the Lower Lisbon Valley. The relay fault rotated a block in the center of the valley upward, exposing the Burro Canyon Aquifer at the surface. The relay structure has also down dropped the GTO graben." Modified from LVMC, 2020.*

Aquifers within the Lisbon Valley area identified in the literature (Avery, 1986; Gloyn et al., 1995) include the D, M, N, and P Aquifers (Figures 4, 7):

D Aquifer: Dakota and Burro Canyon Formations (referred by LVMC and in this document as Burro Canyon Aquifer or BCA). Within the Lower Lisbon Valley (LLV), LVMC indicates the BCA is perched on the Brushy Basin Member of the Morrison Formation and isolated from the regional groundwater system with little to no recharge. Within the LLV, LVMC notes the BCA to be compartmentalized and locally discontinuous due to faulting. Within the GTO area, the Burro Canyon Aquifer is limited to an area of about 206 acres and occurs in a synclinal fold on top of the Morrison Formation (Whetstone, 2018).

M Aquifer: Salt Wash Member of the Morrison Formation. LVMC has wells completed in or screened across the Morrison, identifies the presence of water-bearing fractures within the Morrison Formation, and notes that the Salt Wash Member may be water-bearing, but describes the BCA and Navajo Aquifers to be the major aquifers in the project area. LVMC references to the Morrison Formation generally are in terms of the Brushy Basin Member, a confining unit with low vertical permeabilities.

N Aquifer: Wingate Sandstone, Kayenta Formation, Navajo Sandstone, Carmel Formation and Entrada Sandstone. (referred by LVMC and in this document as Navajo Aquifer) Within LLV, LVMC describes compartmentalization of the Navajo Aquifer due to fault displacement resulting in a juxtaposition of the permeable Navajo Aquifer units against relatively impermeable units. LVMC indicates that these juxtapositions and fault gouge cause faults to act as barriers to flow.

P Aquifer: undifferentiated Cutler Formation. Only one well installed by LVMC was identified as being completed in the Cutler Formation. That well (MW97-8) was installed near Stage 1 and 2 heap leach pads in the footwall of the Lisbon Valley Fault, and that well is noted as having always been dry. No P Aquifer domestic wells were identified within the area of review.

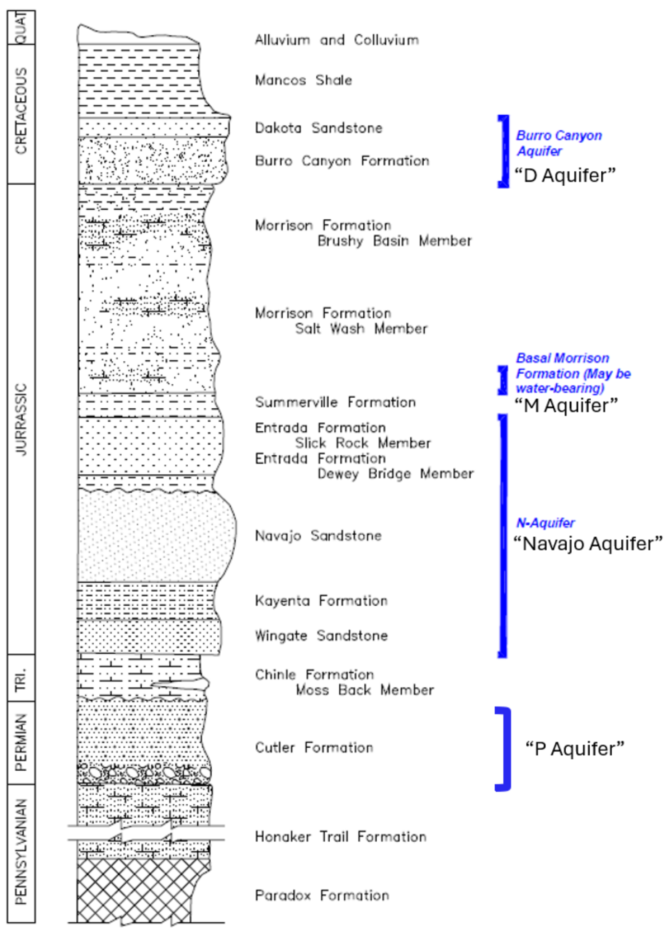


Figure 4. *Stratigraphic column showing stratigraphy and nomenclature of Burro Canyon/"D", Salt Wash/"M", Navajo/"N", and "P" Aquifers. Modified from Whetstone, 2006.*

LVMC indicated that the Lisbon Valley and secondary fault act as natural barriers to horizontal communication between the BCA and other aquifers or permeable units (e.g., Navajo Aquifer formations) juxtaposed against the BCA adjacent to these faults. To support their conceptualization, LVMC provided pump test data (Whetstone, 2006, 2018) and a fault gouge ratio and fault permeability study (Krantz, 2019). In addition to these studies, LVMC provided EPA with water level and water chemistry data. LVMC has indicated that confining units above and below the BCA would prevent vertical migration of fluids from resource recovery activities.

Citizens have raised concerns related to the potential for contamination of aquifers outside of the proposed AE boundaries, alleging specifically that groundwater monitoring data collected as required by LVMC's groundwater discharge permit issued by Utah's Department of Environmental Quality indicate that groundwater in the GTO area may already be impacted by existing activities, specifically from potential communication between aquifers. In response to these concerns, EPA has also reviewed LVMC's 2023 and 2024 annual groundwater monitoring reports (LVMC 2024, LVMC 2025).

Faults as horizontal flow barriers

Lisbon Valley Fault

Krantz (2019) conducted a study evaluating fault properties in the Lower Lisbon Valley area. The study focused on fault displacement and stratigraphic juxtaposition, fault shale gouge ratio (SGR) estimates, and fault zone permeability modeling of faults in the Lower Lisbon Valley, including locations on a major splay of the Lisbon Valley Fault at the southern end of the GTO deposit and further south (Figure 5). SGR values are estimates of the amount of clay expected in fault gouge as a function of the magnitude of displacement along the fault and clay in the faulted parent formations. For hydrocarbon bearing formations, SGR values above 0.2 are generally accepted by industry to indicate a hydrocarbon trap. Krantz used SGR estimates to model permeability values for the Lower Lisbon Valley faults.

Krantz (2019) concluded that in many locations, fault displacement results in the juxtaposition of permeable against non-permeable formations (e.g., Burro Canyon Formation against the Brushy Basin Member of the Morrison Formation), preventing the migration of fluids across the fault. In those areas where the Lisbon Valley Fault displacement results in juxtaposition of permeable formations (e.g., Burro Canyon Formation against Navajo Aquifer formations), Krantz concluded that the Lisbon Valley Fault would provide a barrier to flow as a result of predicted SGR and modeled permeability across the fault zone (SGR values ranged from 0.49-0.54, with corresponding permeabilities of 0.02-0.03 mD). In a related 2018-2019 study, X-Ray Diffraction (XRD) analysis of clay content of fault gouge samples collected from the GTO and Lisbon Valley Faults was conducted as part of a Bachelor of Science student study (Broaddus, 2018-2019). XRD-measured total clay percentages were 20-50% higher than values derived from estimated SGR, implying a higher likelihood of fault sealing capability (lower permeability due to higher clay content) on the Lisbon Valley Fault than estimated by the Krantz (2019) models.

References to sample locations provided in the Broaddus report suggest that the "GTO fault" samples were collected ~1 mile southeast of the GTO deposit, in the area of the Lucky Strike Prospect (Figure 6), but it is unclear exactly where any of the samples for the study were collected or whether the locations correlate with the locations used by Krantz (2019) as no map or sample coordinate information was provided in the Broaddus report. Broaddus refers to both a "GTO Fault" and a "Lisbon Valley Fault," without identifying these features on a map, and refers to sample collection methods ranging from "rapid succession" to "methodical", indicating there was potentially little-to-no consistency in sample collection methods. With these uncertainties it is difficult to evaluate the definitiveness of this study and, moreover, how samples of gouge collected at the surface correlate to conditions at depth.

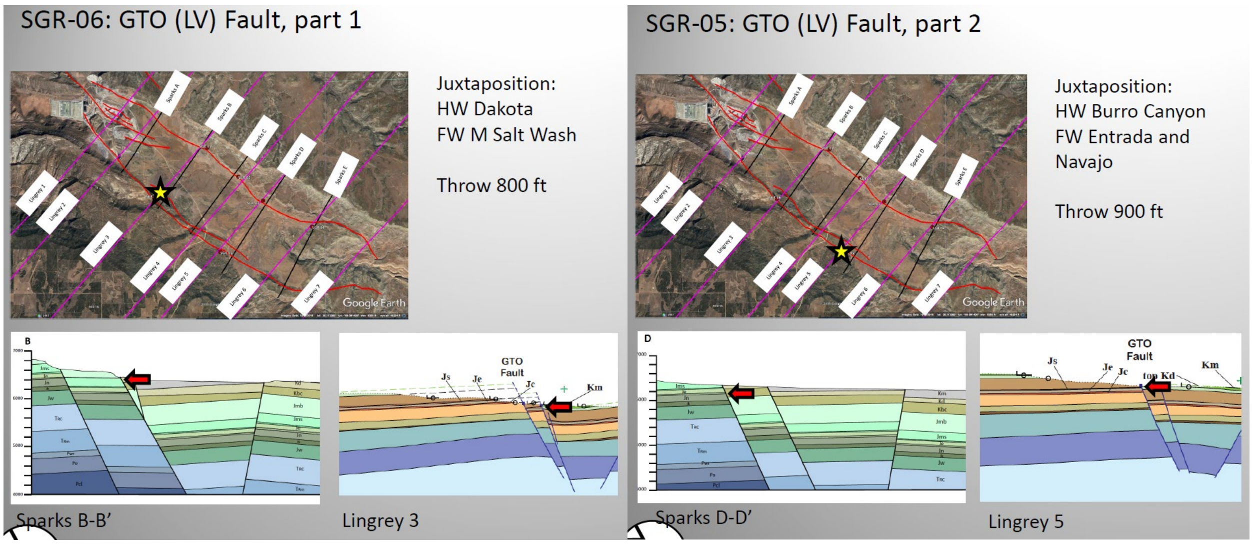


Figure 5*. Lisbon Valley Fault locations selected for SGR and permeability study (Krantz, 2019).*

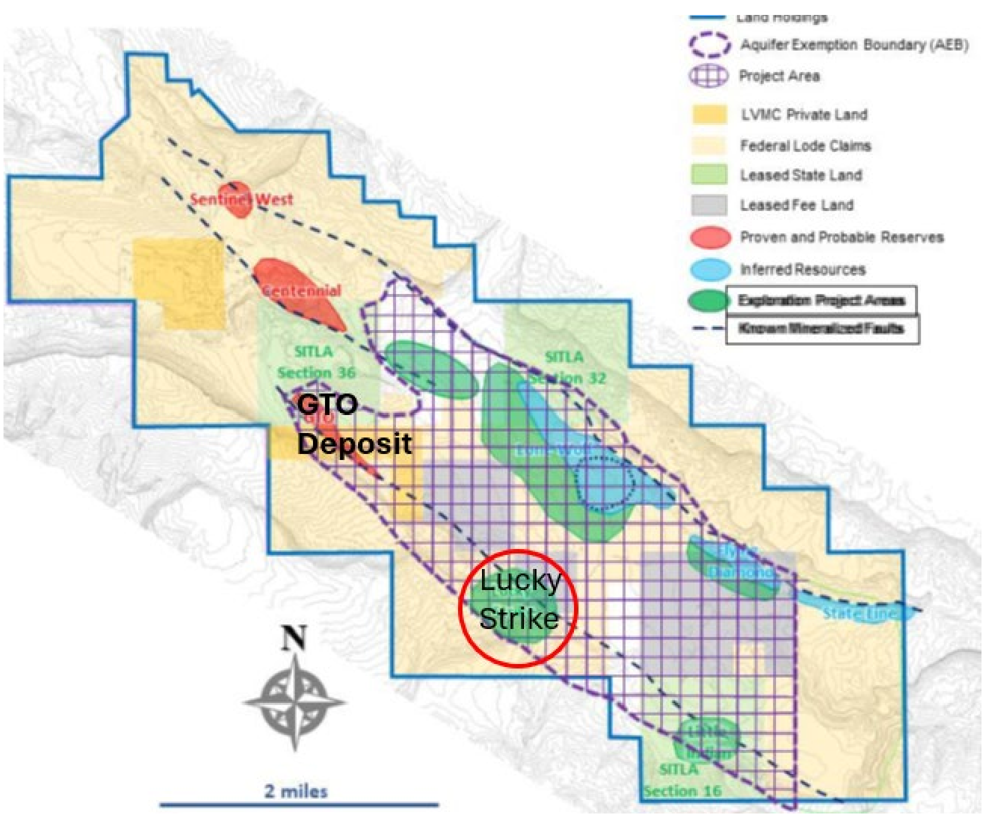


Figure 6. *Location of Lucky Strike Prospect relative to GTO deposit (LVMC, 2020).*

Regardless of the uncertainties, the SGR and permeability studies provide evidence that the Lisbon Valley Fault gouge is anticipated to have a high clay content and therefore is expected locally to act as a hydraulic seal, preventing horizontal migration of BCA fluids out of the GTO graben area southwest across the fault boundary. Although it is unclear how well the SGR-estimated permeability correlates to sealing behavior when water (rather than petroleum hydrocarbons) is the fluid, or whether any adjustments were considered by Krantz (2019) to account for differences in wettability, the demonstration of measured clay contents greater than SGR estimates provides some confidence that the Lisbon Valley Fault generally has sealing or low permeability properties that could prevent migration of fluid horizontally.

Published literature, however, cautions that "a poor correlation exists between clay content and fault rock permeability," (e.g., Fisher et al., 2018), and that significant changes in fault permeability can be seen with changes in water chemistry (brine content). It is unclear how ISR activities may affect aquifer chemistry in the BCA as a result of injection activities. LVMC (2020) discusses the results of a column study to evaluate fault and confining unit permeability conducted on two samples: Lisbon Valley fault gouge, and "Morrison Shale." LVMC indicated that lower permeability in the Morrison Formation and fault gouge is anticipated as a result of contact with the sulfuric acid lixiviant but does not discuss the resulting groundwater chemistry. LVMC does not describe whether they followed any established or validated column test method, how field samples were selected or collected, the source or composition of water (e.g., deionized water, formation water) fed into the columns, or quality assurance measures associated with this study. If this column test was conducted using distilled water, important aquifer-specific chemical reactions would not take place and the results would not be representative of the conditions that will be present in the aquifer. With the information available, it cannot be determined from these tests how aquifer chemistry may evolve as a result of ISR activities. The representativeness of the one fault gouge sample used in the column study is also unclear, particularly considering the anticipated lithological heterogeneity across the fault. For instance, Broaddus (2018-2019) described selecting at least one of his samples "because the vast differing lithology in gouge from the location only a few meters away." Broaddus describes that the samples were collected where "two zones were abutting the hanging wall of Burro Canyon Formation and the footwall again was the Morrison Formation." This within-fault heterogeneity raises concerns related to projecting estimated properties long distances along a single or multiple faults.

While the fault properties predicted by SGR suggest that the Lisbon Valley Fault provides a barrier to horizontal flow, pump test data collected by LVMC using well PW-5 (within the BCA in the hanging wall of the Lisbon Valley Fault) and the Woods mine borings (Chinle Formation in footwall of the Lisbon Valley Fault, Figure 7a) suggests that there may be exceptions (Whetstone, 2006). It should be noted that the available data regarding the relationship between PW-5 and the Woods mine is difficult to reconcile. For instance, Whetstone (2006) states despite that two of three borings into the Woods mine (Figure 7b) did not respond to drawdown in PW-5, drawdown observed in Wood #3 "may indicate that well PW-5 is hydraulically connected to the Wood Mine workings." Whetstone (2018) describes a 858-ft' deep "Wood Well" installed in October 2012 into the stope of the Woods Mine (Chinle Fm; see Whetstone, 2018 Table 8).

LVMC (2020) indicates this well "pumps groundwater from the Navajo Aquifer," and that the "Navajo Aquifer head is >200' higher than the BCA head at PW-5," (Figure 7a, 7c) and that "therefore an influent head gradient occurs across the Lisbon Valley Fault." LVMC (2020) states that a pumping and transducer test demonstrated that "pumpage from the Woods well does not appear to influence the pressure head at PW-5," and that "the Lisbon Valley Fault appears to behave as a hydraulic seal." Note that EPA was unable to locate information regarding the location of the three borings referenced in the 2006 report. Some of the available LVMC maps and cross-sections indicate that a fault block resulting from a splay of the Lisbon Valley Fault is located between PW-5 and the Lisbon Valley Fault in the area of the Woods mine, but this configuration was not described in relation to the pump test data.

The Chinle Formation is not expected to act as an aquifer in the area due to very low permeability where not faulted (Gloyn et al., 1995), but available information regarding potential communication between the Woods mine workings or Navajo Aquifer at the location of the Woods Mine in the footwall of the Lisbon Valley Fault and the BCA in the hanging wall suggests that inferred horizontal sealing of the Lisbon Valley Fault may not be continuous, or possibly that the Lisbon Valley Fault provides a vertical conduit for fluid migration. The evidence provided that the Lisbon Valley Fault acts as a continuous seal is inconclusive.

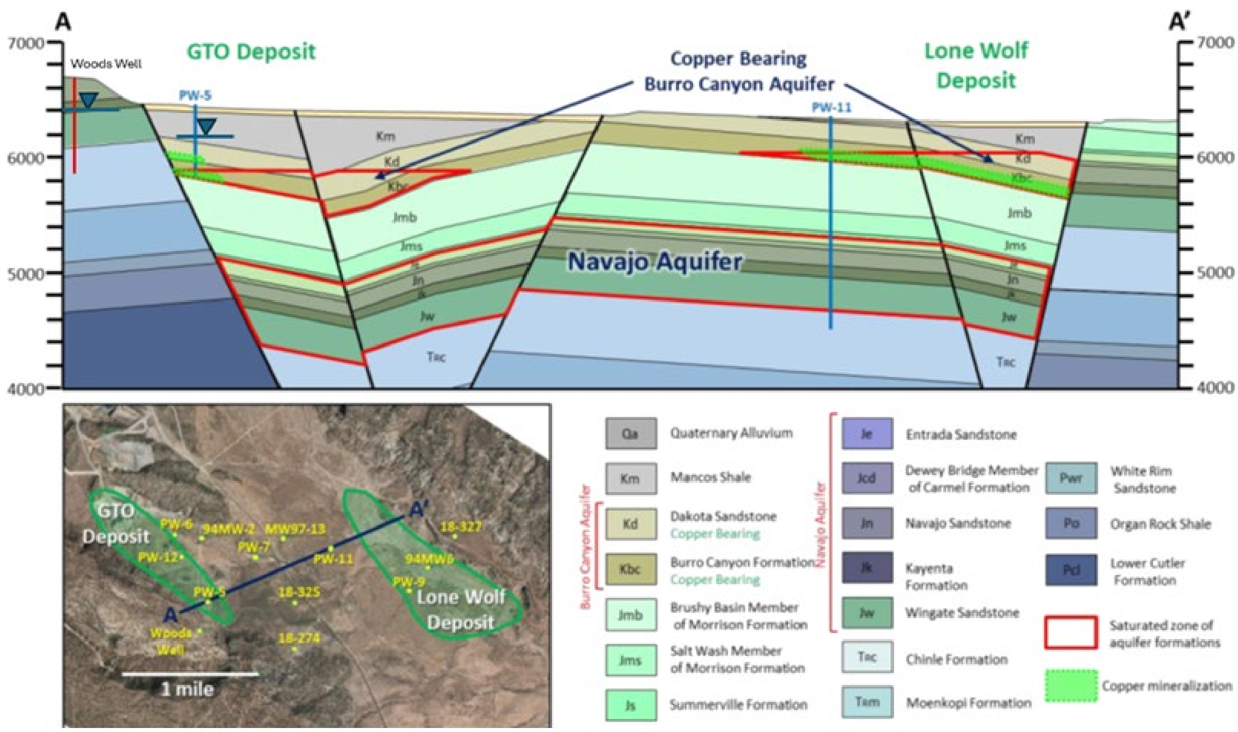
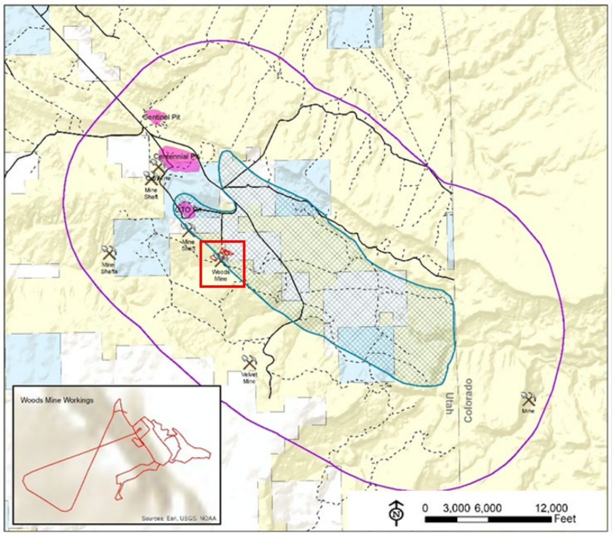


Figure 7a



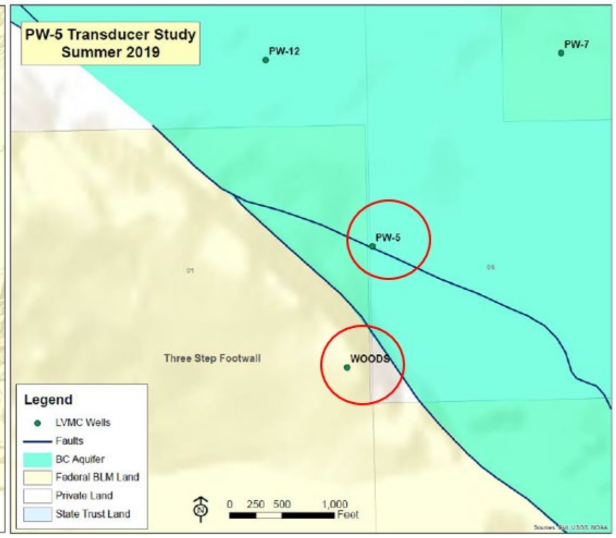


Figure 7b **Figure 7c**

Figure 7a. *Location of PW-5 and 2012 Woods Well. PW-5 is in the Burro Canyon Formation of the BCA, which is juxtaposed against the Triassic Chinle Formation at this location. The location of the Woods Well was projected onto the footwall of the Lisbon Valley fault, based on the known location of the well and cross-section line. Approximate water levels of the Navajo Aquifer (Woods Well) and BCA in PW-5 are indicated by blue horizontal lines with triangles. EPA added the approximate location of the Woods Well and water levels to the LVMC (2020) figure.* ***Figure 7b.*** *Position of PW-5 and Woods Mine workings. Red box on main figure is the approximate area of the inset detail of the Moods Mine workings. The location of the three borings referenced in the Whetstone 2006 document is not known.* ***Figure 7c.*** *Location of PW-5 completed into a Lisbon Valley Fault splay and the 2012 Woods Well located in the Lisbon Valley Fault footwall. Note the Lisbon Valley Fault splay shown in Figure 7c is not projected onto the cross-section in 6a. Modified from figures in LVMC, 2020.*

Secondary and within-graben faults

The secondary fault bounds the eastern edge of the GTO graben and has been identified as a barrier to horizontal flow out of the northern reaches of the GTO production area. Limited evidence has been provided concerning the anticipated fault seal behavior on the secondary fault. LVMC (2025) inferred an SGR of 0.45 and permeability of 0.04 mD on the secondary fault, assuming that the secondary fault shared similar properties to the Lone Wolf and Flying Diamond Faults on the northeastern flank of the Lower Lisbon Valley (from Krantz, 2019). Using these estimates, LVMC indicated that the secondary fault is likely to act as a barrier to flow, with SGR values >0.2.

Between the Lisbon Valley Fault and secondary fault there are several high-angle faults within the graben (Figure 8). LVMC has demonstrated that these "within-graben" faults do not act as hydraulic barriers or prevent horizontal communication within the BCA. For example, LVMC (2020) concluded that "pumpage from the BC aquifer at PW-12 [in the headwall of the GTO] influences the BC aquifer head at PW-5 [connected to the Lisbon Valley Fault]. The pressure influence is almost immediate, reflecting hydraulic connection." Although secondary faulting is not shown by LVMC (2020) between PW-12 and PW-5 (Figure 7c), cross-sections and subsequent mapping infers the presence of faults between these wells (Figure 8a), suggesting that the faults are not sealing. Pumping tests also demonstrated a hydraulic connection between PW-5 and PW-6 (Whetstone, 2006). Well 94MW2 (appears to sometimes be (mis)labeled as 97MW2) also responded to pumping tests conducted at PW-5 and PW-6. One or more faults have been mapped between most of these hydraulically connected well pairs (Figure 9). Whetstone (2006) indicates that secondary porosity due to "numerous faults encountered during drilling at PW-6, is the probable cause of high permeability of the Burro Canyon Aquifer in this area."

Pump test data from a pair of Navajo Aquifer wells (completed in the Wingate Sandstone) east of the GTO deposit near the secondary fault (PW-7 and MW97-13) indicate that cross-fault communication does not exist at depth in the Navajo Aquifer at this location. This lack of communication may be due in part to an inferred fault block separating these two wells (Figures 8a & 9), or to sealing of the secondary fault at depth. These results support the hypothesis that faults may act as seals locally. A cross-section through these wells would help understand the conditions at depth to determine how the inferred faults mapped on figures 8a and 9 may affect groundwater movement in this area. The secondary fault trace is mapped east of PW-7 before trending northwest around the northern end of the GTO. MW97-11 has been identified as a Navajo well south of the Centennial Pit and outside of the GTO. However, its location on the opposite side of the secondary fault allows an opportunity to consider communication in the Navajo in this northern area of the GTO. LVMC (2024) states that "There is a strong correlation between MW97-11 (south side of Centennial Pit), MW97-9 (north side of Centennial Pit), and MW97-13. (within the valley between PW-7 and PW-11). As these are all monitor wells and not pumped, this tight correlation and very gradual downward trend indicates that the cone of influence for PW-11 and PW-7 reaches these wells and is causing a slow dewatering of the area." LVMC notes a concern with PW-7 associated water level readings, but if this relationship is confirmed, it could indicate communication in the Navajo across the secondary fault, between these wells. The location of MW97-11, MW97-13, and PW-7 can be seen on Figure 10; the trace of the secondary fault is shown on Figure 8a.

Because of the similarities in stratigraphic offset and fault displacement, it can be anticipated that the secondary fault is more likely to share common properties with the within-graben faults than with the Lisbon Valley fault. Documented communication across within-graben faults within the BCA seems to indicate that these faults do not act as horizontal hydraulic barriers in the BCA. However, data from a single pair of Navajo Aquifer wells from one pump test suggests there is little to no communication in the Navajo Aquifer across the secondary fault east of the GTO deposit, but water level observations from Navajo Aquifer wells north of the secondary fault suggest the possibility of communication across the secondary fault to the north. Without additional information (e.g., more pump test data for wells on either side of the secondary fault), it is inconclusive whether the secondary fault would act as a hydraulic barrier to horizontal groundwater flow wherever permeable units are juxtaposed. The limited extent of the BCA in the eastern GTO area could reduce anticipated horizontal migration to the east, but data provided by LVMC indicate that at least one previously "dry" well to the east (PW-6) has recovered over 100' of water since 2017.

It is noteworthy that Noyes (2021) indicated that despite an apparent compartmentalization of BCA and Navajo Aquifer and the difficulty with identifying local flow paths within Lisbon Valley, "a strong correlation…between decreasing hydraulic head and increasing corrected radiocarbon age is observed, suggesting that a regional flow system exists," and that "evidence of this regional flow system continuing to flow to the southeast and out of the Lisbon Valley is supported by lower hydraulic head values from mining sites in Slick Rock, Colorado, approximately 46 km southeast."

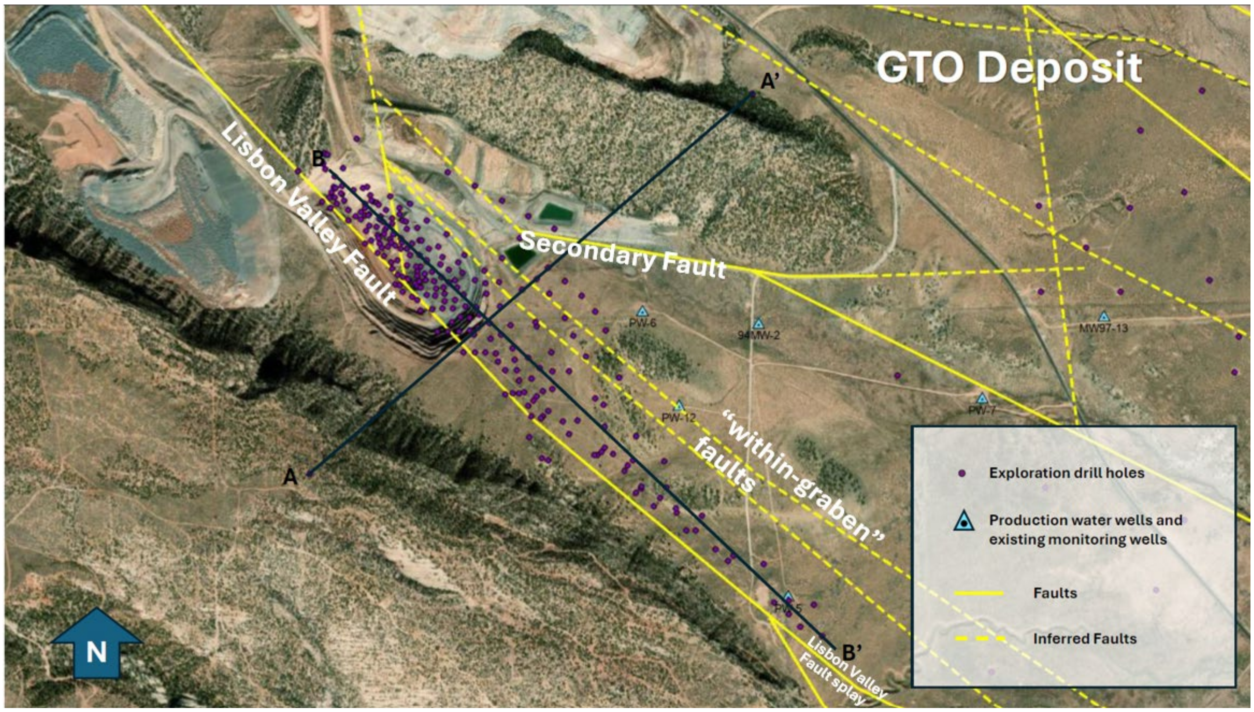


Figure 8a.

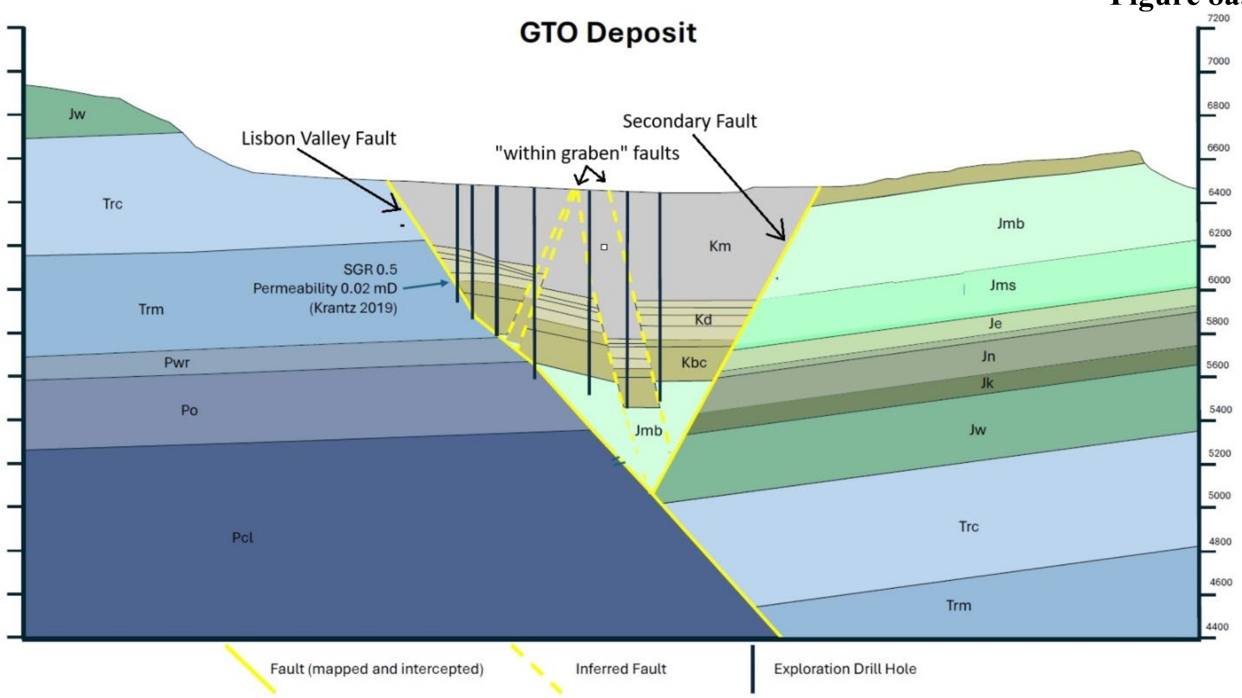


Figure 8b.

Figure 8a. *Location of mapped and inferred faults in the GTO area (yellow lines), exploration* *drill holes, and location of cross-section shown in Figure 8a (LVMC, 2025).* ***Figure 8b.*** *Cross-section prepared by LVMC demonstrating depths and locations of exploration drill holes used in fault location and depth within the GTO graben. LVMC, 2025.*

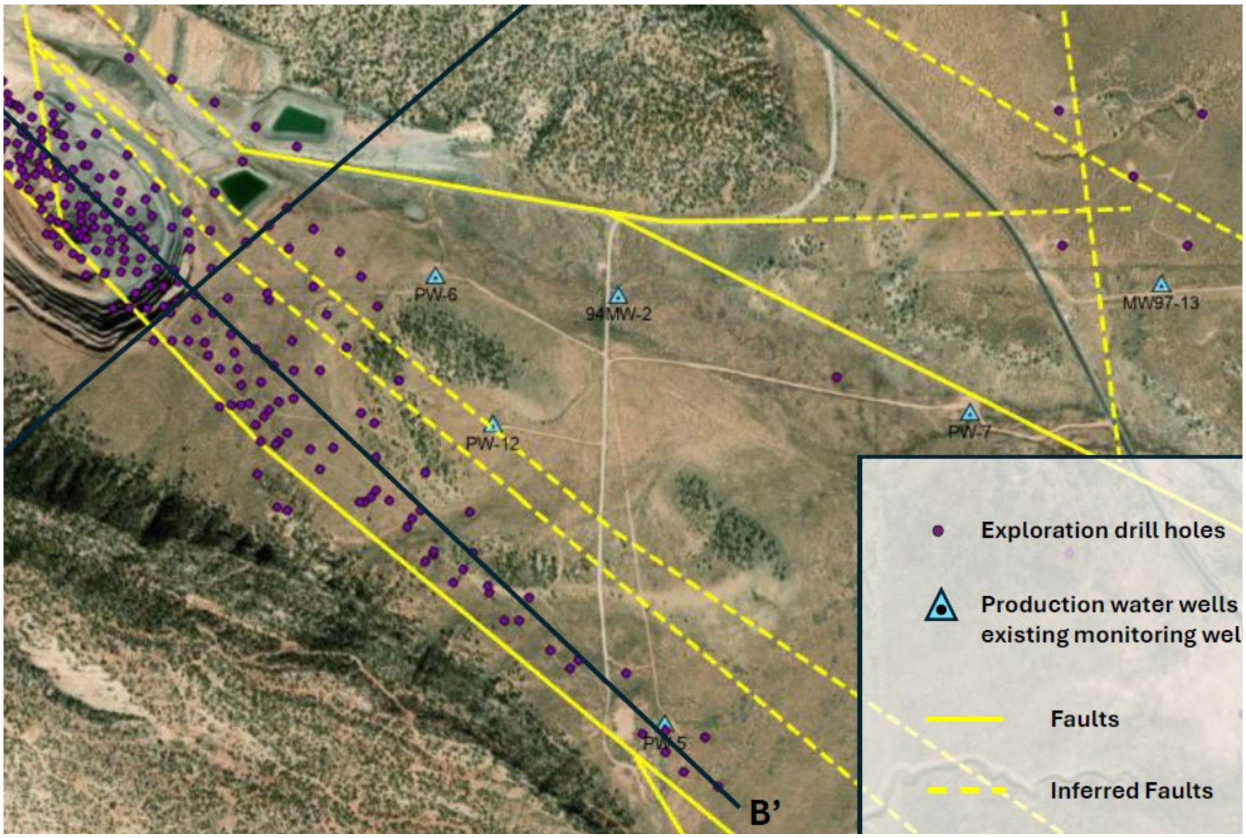


Figure 9. *Close-up of figure 8a, showing the location of wells in the GTO area with pump test data. BCA wells PW-5, PW-6, PW-12, and 94MW-2. Navajo Aquifer wells: PW-7 (possibly Navajo + Morrison), MW97-13. From LVMC, 2025*

<u>Vertical confining units</u>

The Mancos Shale (Km) overlying the Dakota Sandstone (Kd) and the Morrison Formation underlying the Burro Canyon Formation (Kbc) are described as the vertical confining units in the GTO graben. While the Salt Wash Member of the Morrison Formation (Jms) is identified as an aquifer, the Mancos Shale and Brushy Basin Member of the Morrison Formation (Jmb) are widely accepted as confining units where they are not fractured (Avery, 1986; Gloyn et al., 1995).

No wells completed in the Navajo Aquifer within or immediately adjacent to the GTO deposit were identified during this review; therefore, assessing the potential for vertical communication between the BCA and deeper aquifers within the GTO is difficult other than acknowledging that open faults and fractures could provide vertical conduits for groundwater, even through otherwise confining units. Whetstone (2018) indicates that "Water-bearing fractures occur extensively in the valley," and that the "Morrison Formation forms a leaky barrier to vertical downward flow," and Noyes (2019) indicated that in Lisbon Valley, "faults that are perpendicular to flow exhibit low permeability zones and act as barriers to flow, but "that faults that are parallel to flow act as conduits."

Outside of the GTO, Whetstone (2018) notes that "Well PW-2 is completed in [a water-bearing] fracture in the Morrison Formation, and has a geochemical signature distinct from the adjacent Burro Canyon Aquifer," but that "water quality in the N-aquifer is similar to water quality in fractures in the upper aquifer," suggesting that while the Navajo Aquifer may communicate locally with the Morrison Formation in this location, there does not appear to be direct communication with the BCA. However, Whetstone (2018) also noted that "although well PW-2 is completed in a fracture in the Morrison Formation, it is hydraulically connected with the Burro Canyon aquifer near the Sentinel Pit and was able to effectively dewater the pit during active mining." Although these observations were made outside of the GTO, the observations seem to contradict each other and create additional uncertainty related to the scope of potential communication between the BCA and the Navajo Aquifer via open fractures in the identified confining Morrison Formation.

In an evaluation of chemistry and isotope data from wells in the Lisbon Valley area, Noyes (2021) indicated that stable water isotope values for Navajo well LV-41-75 (at or near the Woods well) "fall in the middle of the range of values reported from the BCA." Noyes explains that this and other anomalous observations (e.g., "modern" recharge) from this well is related to its position on the footwall of the Lisbon Valley fault, in an unconfined portion of the Navajo Aquifer, rather than communication with the BCA. BCA well PW-5 was not included in the Noyes study.

Vertical communication between the BCA and Navajo Aquifer through ~500'of intact Brushy Basin Member of the Morrison Formation is unlikely, but vertical movement of fluids through open faults and fractures are possible in this geologically complex setting. Whereas Whetstone (2018) acknowledged that "fracture conduits…are known to exist at the site," and indicated that limited and localized vertical flow between the BCA and Navajo Aquifers occurs along faults and fractures, Noyes (2021) suggest that the geochemical data indicate communication "appears to be limited" in the wells used in his study. Two wells within the GTO graben (BCA well PW-12 and Navajo Aquifer well PW-7) were evaluated as part of the Noyes study (Figure 10).

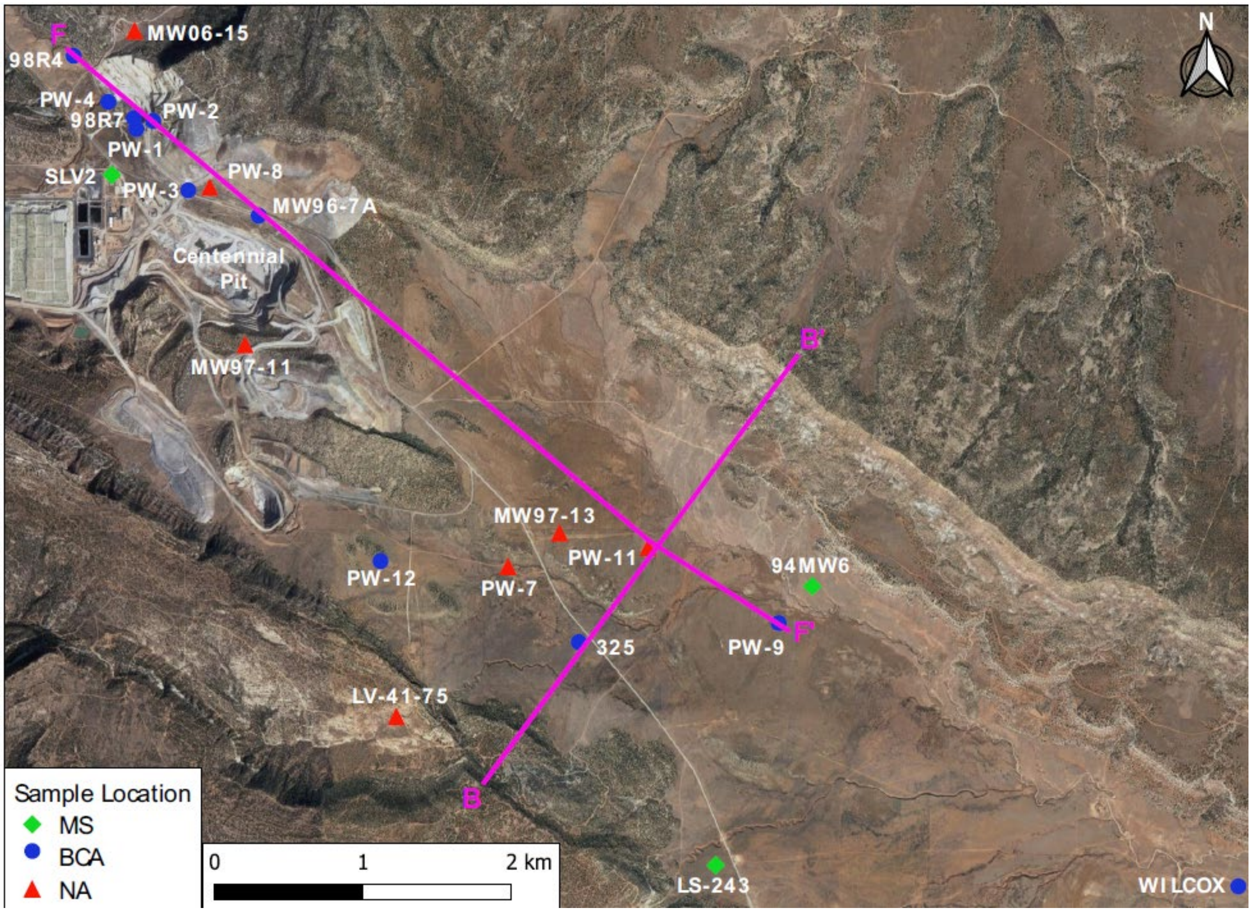


Figure 10. *Wells evaluated in Noyes (2021). Wells LV-41-75, 325, and PW-9 had "anomalous" results.*

Water chemistry

Citizens raised concerns related to changes in chemistry in wells in and near the GTO. Specifically, the concerns involved an evolution in major ion data in PW-5 (GTO area) and PW-9 (outside of the GTO) demonstrated by Stiff diagrams in LVMC (2024) that may reflect a hydraulic connection between the BCA and Navajo Aquifer (Figure 11), insufficient demonstration that a hydraulic barrier exists between the BCA and Navajo Aquifer (addressed above), and a notable upward trend of radionuclides in PW-7 and PW-12.

LVMC 2024 notes that GTO BCA well PW-5 "almost appears to be a mix of BC Aquifer and Coyote Wash Navajo Aquifer," and "require[s] further investigation." The Stiff diagrams do appear to demonstrate a slight evolution of water chemistry in PW-5 that could potentially reflect mixing of water that resembles that of the Navajo Aquifer. PW-5 is described as being completed into the Lisbon Valley Fault, and has demonstrated a potential communication with the Navajo Aquifer in the footwall of the Lisbon Valley Fault. It does not appear that LVMC conducted any additional investigation into the evolution of major ion chemistry of PW-5, and without additional information the source of this evolution cannot be determined at this time. LVMC (2020) indicated that "the company is continuing PW 5 study and analysis," related to transducer monitoring of PW-5, and LVMC (2024) stated that water chemistry of PW-5 "requires further evaluation." Updated evaluations related to PW-5 were not located during this review.

Although outside of the GTO, Stiff diagrams demonstrate a change in chemistry in BCA well PW-9 between 2014-2018 (Figure 11) that resembled chemistry from Navajo wells (LVMC 2024). Noyes (2021) indicated that "use of multiple tracers indicates that PW-9 may be receiving downward leakage from the overlying Mancos Shale" near 94MW6 and PW-9, outside of the GTO. LVMC (2024) indicated that this "requires further investigation," but no additional investigation materials associated with PW-9 were located during this review.

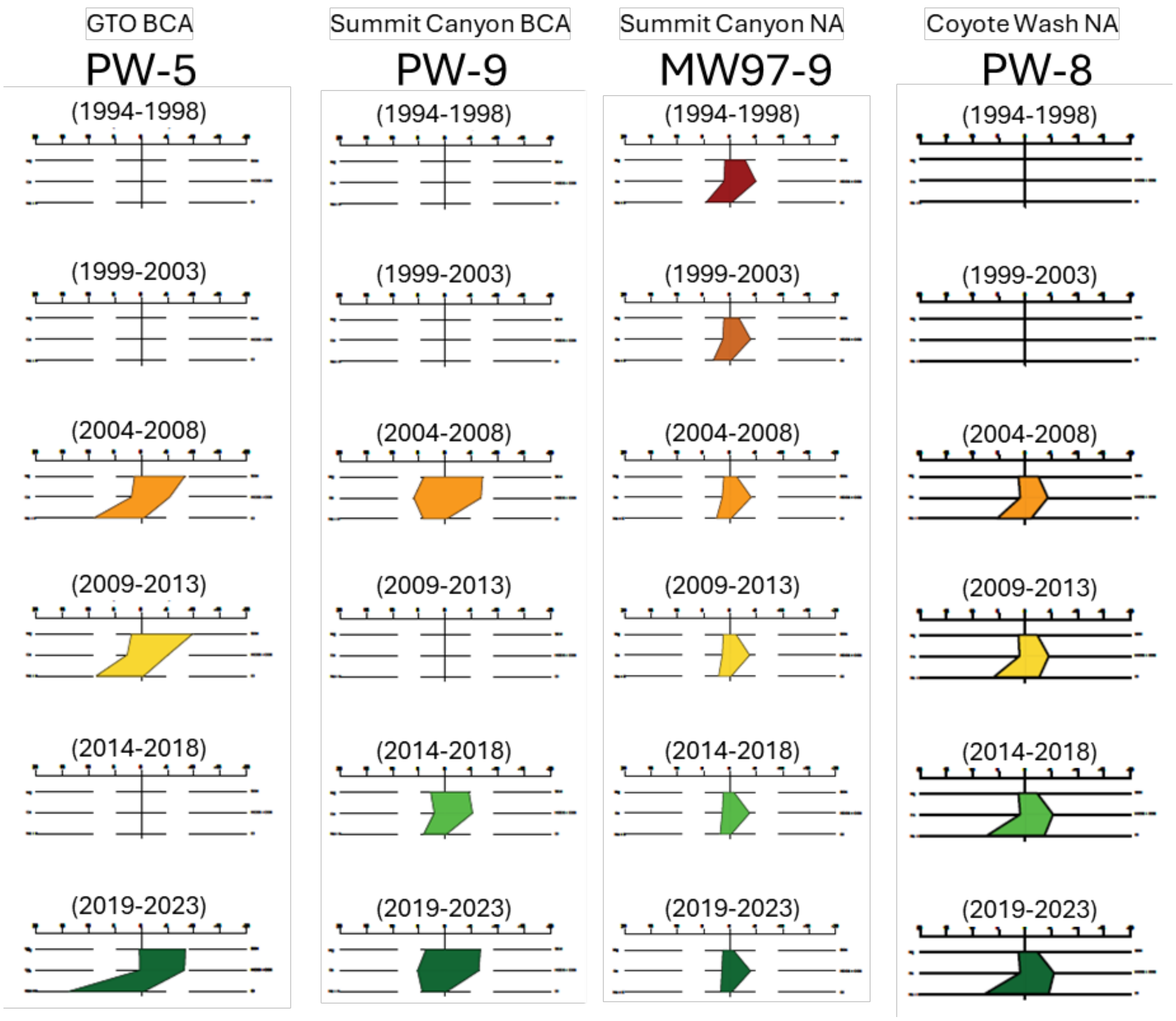


Figure 11. *Stiff diagrams showing evolution of major ion data in BCA well PW-5 and PW-9 compared to Navajo Aquifer well MW97-9 and PW-8. LVMC 2024.*

LVMC (2024) indicates that a noticeable rise in gross alpha and beta activity in Navajo Aquifer well PW-7 (east of the GTO deposit) coincides with re-initiation of pumping of this well in 2021, around the same time that increases of gross alpha and beta were also observed in GTO graben BCA well PW-12 (Figure 12). Increases in uranium, gross alpha, and gross beta in PW-7 appear to correlate with increasing water levels. It appears that increasing water levels (groundwater recovery) correlate with increases in uranium, gross alpha and gross beta. This could indicate that groundwater in this well recovers with input from a more radioactive source. PW-12 does not demonstrate the same correlation between water levels and radioactivity. LVMC proposed three potential options for the reason(s) for increases of gross alpha and gross beta activities in PW-7 and PW-12. One of the proposed hypotheses (lab or sampling change) was ruled out; LVMC indicates that the other two possibilities (trend related to pumping; trend related to mining) both require further study and that "the Company commits to studying the potential theories more thoroughly during the 2024 year." Additional study related to these exceedances were not found in the 2024 report (LVMC 2025) or elsewhere. With the information provided, the source of these increases cannot be determined.

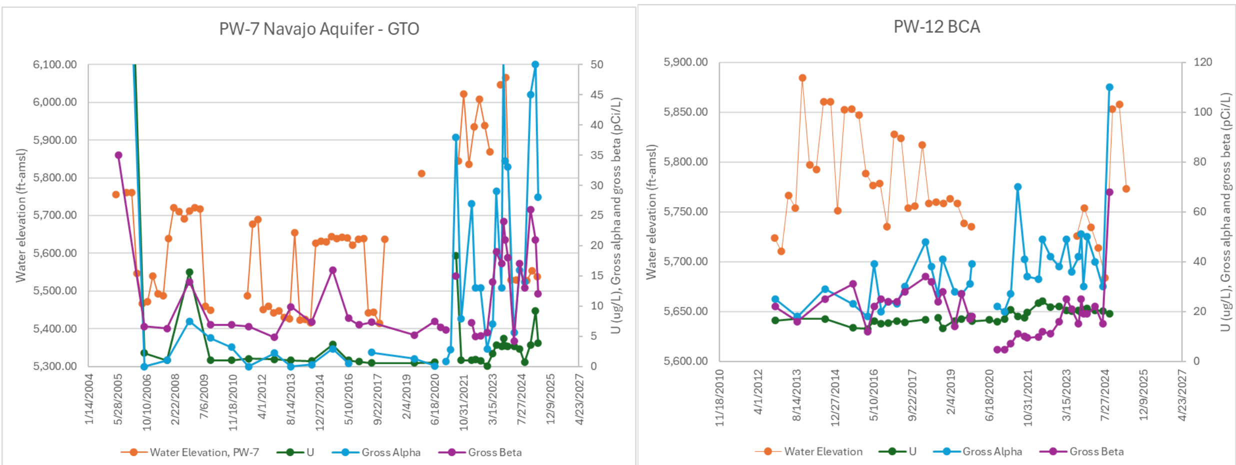


Figure 12. *Water elevations, uranium concentrations, and gross alpha and gross beta activities for PW-7 and PW-12.*

SUMMARY

<u>"Secondary" fault defining the northeastern boundary of the GTO</u>

Data from pump tests conducted on a single pair of wells (PW-7 and MW97-13) completed in the Navajo Aquifer on either side of the secondary fault (but outside of the GTO deposit) did not appear to demonstrate a hydraulic connection across the fault (Whetstone, 2006). However, pump tests and water level data from BCA wells across and within the mid-to-southern portion of the GTO graben indicate that even when separated by faults, wells completed in the BCA (PW-5, PW-6, PW-12, 94MW-2) are hydraulically connected (Whetstone, 2006; LVMC, 2020). Because of limited data near the secondary fault, and that no well data were available to review in the northernmost portion of the GTO, it is difficult to assess whether the secondary fault would act as a barrier to flow where it has been identified as a boundary. The evidence provided that the secondary fault acts as a continuous hydraulic barrier is inconclusive.

<u>Lisbon Valley Fault defining the southwestern boundary of the GTO</u>

Where low permeability formations are juxtaposed against opposite sides of the Lisbon Valley Fault, the likelihood of horizontal movement of groundwater across the fault is accepted to be low. Where permeable formations are juxtaposed against the fault, LVMC's GTO-area evaluations are based largely on SGR modeling of fault splays south of the mineralized zone and pump tests. SGR estimates suggest that the Lisbon Valley Fault is likely to act as a barrier to horizontal flow across the fault. However, pump tests evaluating potential communication between the Navajo Aquifer near the Woods Mine workings and PW-5 in the BCA provide inconsistent results. One of four borings or wells into the Navajo Aquifer near the Woods Mine in the footwall of the Lisbon Valley Fault demonstrated an apparent hydraulic connection with a Burro Canyon production well, PW-5, drilled through the footwall and completed in the Lisbon Valley Fault (Whetstone, 2006, 2018). Additionally, major ion data presented as a series of Stiff diagrams for BCA well PW-5 (and other wells in Lisbon Valley) demonstrate an evolution in groundwater chemistry that LVMC (2024) indicated "almost appears to be a mix of BC Aquifer and Coyote Wash [Navajo] Aquifer." While the Lisbon Valley fault may generally act as a barrier to horizontal flow, there are indications that there may be exceptions, or that it may act as a conduit for vertical flow. The evidence provided that the Lisbon Valley Fault acts as a continuous hydraulic barrier is inconclusive.

Vertical communication

The Mancos Shale overlying the Dakota Sandstone and the Morrison Formation underlying the Burro Canyon Formation are described as the vertical confining units in the GTO graben. While the Salt Wash Member of the Morrison Formation is identified as an aquifer, the Mancos Shale and Brushy Basin Member of the Morrison Formation are widely accepted as confining units where they are not fractured (Avery, 1986; Gloyn et al., 1995). Evolving major ion chemistry and radiological data observed in some wells could result from a range of sources; mixing of groundwater from different aquifers is one potential source. Vertical communication between the Burro Canyon Aquifer and Navajo Aquifer through ~500' of intact Brushy Basin Member is unlikely, but vertical movement of fluids through open faults and fractures is possible in this geologically complex setting.

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