

MINERAL REPORT

**Mineral Potential Report  
Proposed Land Withdrawal  
Yuma County  
La Paz County**

LANDS INVOLVED

T. 2 N., R. 19 W. Portions of Sections 32 & 33  
T. 1 N., R. 19 W. Sections 5, 8, 17, 20, 21, 29, 32, and Those Portions of Sections 4, 9, 28,  
and 33 Westerly of U.S. Route 95  
T. 1 S., R. 19 W. Sections 5, 6, 7, 8, 17, 18, 19, 20, , 29, 30, 31, 32, Those Portions of  
Sections 4, 9, 16, 21, 28 and 33 Westerly of U.S. Route 95  
T. 2 S., R. 19 W. Section 5, 6, 7, 18, and Portions of Sections 4, 8, 17,19 and 30.  
Approximately 22,000 acres  
Yuma County & La Paz County, Arizona  
Gila and Salt River Meridian

Prepared By: O.C. Eke

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Geologist  
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August 24, 2021  
(Date)

Technical Approval:

Management Acknowledgement:

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(Date)



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# 1. Conclusions and Recommendations

## 1.1. Conclusions

Based on a review of existing literature, USGS geological map, and field observations of the proposed withdrawal area, the lands as described in this report, have:

- low potential for the occurrence of locatable minerals,
- low potential for the occurrence of salable minerals,
- moderate potential for the occurrence of leasable minerals.

No surface interference related to potential mineral development and proposed surface uses is anticipated.

## 1.2. Recommendations

The mineral potential of the subject lands should not be considered a limiting factor in processing or executing the proposed land withdrawal.

# 2. Introduction

## 2.1. Initiating Action/Purpose

The purpose of this report is to determine the mineral potential of lands proposed for withdrawal and reservation for military purposes pursuant to the Federal Land Policy and Management Act of 1976, as amended (FLPMA), and the Engle Act (43 U.S.C. §§ 155-158). The FLPMA, is the Bureau of Land Management's (BLM) "organic act" that establishes the agency's multiple-use and sustained yield mandate to serve present and future generations. All actions taken by the BLM, including withdrawals, rely on the authorities built into this law (43 U.S.C. §§1701-1785). The report analysis extends to all types of minerals: locatable, salable and leasable. Because these lands will be segregated from all forms of appropriation under the public land laws, including the United States general mining laws, it is standard BLM policy to evaluate the mineral potential of the proposed withdrawal. The mineral potential report will result in a recommendation as to whether the mineral potential of the proposed area should be considered a limiting factor in the processing or execution of the proposed land withdrawal.

The United States Department of the Army – Army Corps of Engineers on behalf of the United States Army Yuma Proving Ground (YPG), is requesting an indefinite withdrawal of approximately 22,000 acres of public lands, or until there is no longer a military need for the lands. According to the YPG, the proposed withdrawal is necessary for the following purposes:

1. To support national security objectives, provide for military testing, and ensure public safety within the context of Homeland Defense and the War on Terrorism. This proposed withdrawal will support the Army's needs to accommodate an increase in range capacity and safety buffer zones for high altitude precision air delivery systems. This land withdrawal is also critical to national security and includes, but is not limited to, the activities of Department of Defense (DoD) and Department of Homeland Security (DHS). This withdrawal must be approved to ensure that unique and enduring testing and training range capabilities are available in the future.
2. Specific purposes for which the lands are to be withdrawn and reserved are:

- a) As a Research Test and Development Range;
- b) Equipment and tactics development and testing;
- c) Other defense-related purposes consistent with the purposes specified in the current Public Land Order (PLO) 848.

This mineral report will address the mineral potential of the proposed withdrawal area. The report is based on a professional review of all available data as well as a field examination of the subject lands. This mineral report addresses all minerals that are known or inferred to exist at the time the report is written.

The conclusions of this report are limited to the action prompting the report and are not intended to be for any other purpose.

## 2.2. Land Status

The description for the actual withdrawal application will be finalized pending the results of the official survey.

(Surface and Subsurface)

Gila and Salt River Meridian, Arizona

T. 1 N., R. 19 W.,

- sec. 4, that part lying westerly of the westerly right-of-way of U.S. Route 95;
- secs. 5 and 8;
- sec. 9, that part lying westerly of the westerly right-of-way of U.S. Route 95;
- secs. 17 and 20;
- secs. 21 and 28, those portions lying westerly of the westerly right-of-way of U.S. Route 95;
- sec. 29;
- sec. 33, that part lying westerly of the westerly right-of-way of U.S. Route 95.

T. 2 N., R. 19 W.,

- sec. 33, S1/2SW1/4, and S1/2SE1/4, that part lying westerly of the westerly right-of-way of U.S. Route 95.

T. 1 S., R. 19 W.,

- secs. 4 thru 9 and secs. 16 thru 21;
- sec. 28, that part lying westerly of the westerly right-of-way of U.S. Route 95;
- secs. 29 thru 32;
- sec. 33, that part lying westerly of the westerly right-of-way of U.S. Route 95.

T. 2 S., R. 19 W.,

- sec. 4, that part lying westerly of the westerly right-of-way of U.S. Route 95;
- secs. 5 thru 7;
- sec. 8, that part lying westerly of the westerly right-of-way of U.S. Route 95, excepting NE1/4SW1/4NW1/4SE1/4, W1/2SE1/4NW1/4SE1/4, and NW1/4NE1/4SW1/4SE1/4;
- sec. 9, that part lying westerly of the westerly right-of-way of U.S. Route 95;
- sec. 17, that part lying westerly of the westerly right-of-way of U.S. Route 95, excepting S1/2SW1/4;
- sec. 18;
- sec. 19, lots 1 thru 4, NW1/4 NE1/4, and E1/2NW1/4;

sec. 30, lot 1.

The areas described aggregate approximately 21,200 acres, pending results of official survey

(Surface Only; Subsurface Excepted - Non-Federal Ownership)

Gila and Salt River Meridian, Arizona

T. 1 N., R. 19 W.,

sec. 32.

T. 2 N., R. 19 W.,

sec. 32, S1/2SW1/4, and S1/2SE1/4.

The areas described aggregate approximately 800 acres, pending results of official survey.

(Figure 1).

There are currently no salable minerals actions, no active unpatented lode mining claims, nor any mineral leases encumbering the subject lands.

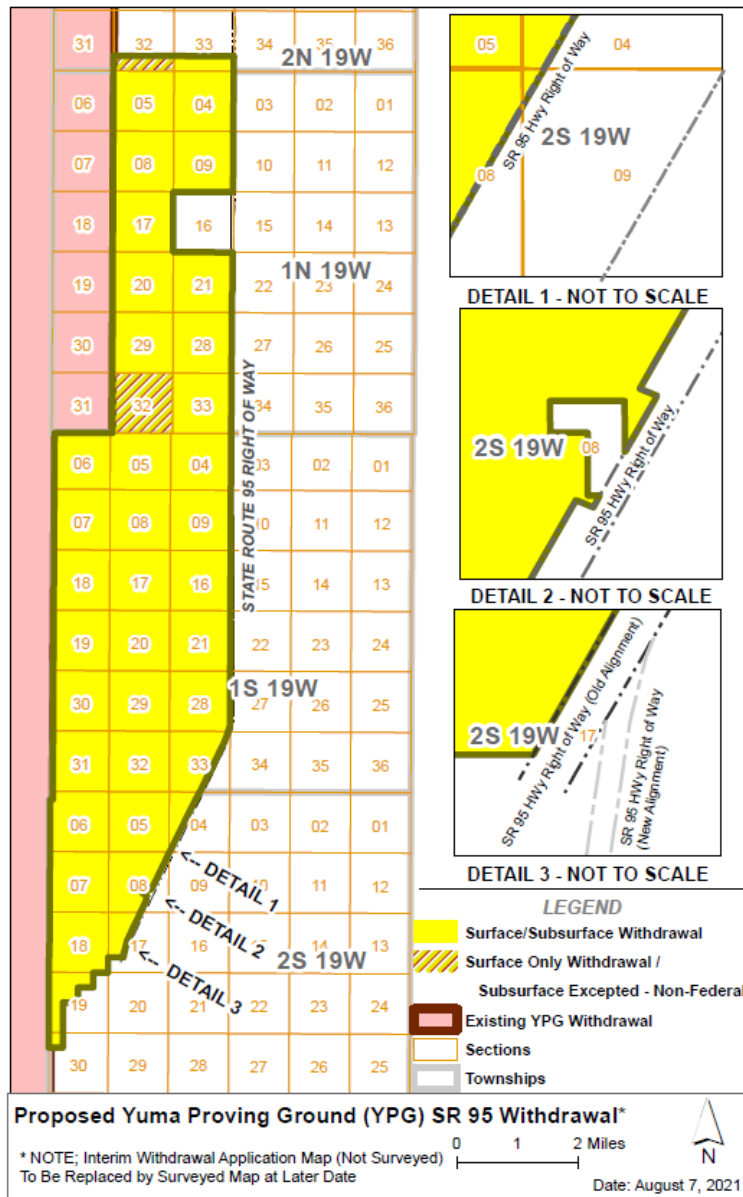


Figure 1- Location map showing proposed land withdrawal area.

### 2.3. Conflicts/Incumbrances If Any

There are no conflicts or incumbrances affecting the land. Currently, the land is under the jurisdiction of the BLM – Yuma Field Office (YFO).

## 3. Geology

### 3.1. Physiography

The subject land is in the Basin and Range Physiographic Province of southwest Arizona, which is characterized by a series of tilted fault blocks forming north-northwest trending mountains ranges separated by deep, alluvial basins (Menges and Pearthree, 1989; Spencer and Reynolds, 1989). These geomorphic expressions are the result of northeast-southwest directed extensional tectonism that occurred during the late Tertiary (Zoback et al., 1981; Wernicke, 1992). The proposed land consists of primarily Quaternary surficial deposits that comprises of material eroded from the hills located southeast and southwest of the proposed area of interest.

### 3.2. Regional Geology

The geologic age of the rock formations within the area are of the Cenozoic Era and comprise of the Quaternary Period and late stages of the Tertiary Period. Much of the YPG proposed withdrawal area enclosed in red (Figure 2), trending north, consist of the Qy, Q, and subsequently Qm geologic map units to the south. The southern part of the enclosed red area is of higher elevations. This is also characterized by the established presence of the Chocolate, Middle and Castle Dome Mountains (Figure 4) which are within the Tv geologic map unit. The primary likely source of deposits moving from south to north originate from Tv and Qm geologic rock formations.

- Q – (0-2 Ma) Unconsolidated to strongly consolidated alluvial and eolian deposits. This unit includes coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt and clay on alluvial plains and playas; and wind-blown sand deposits (Richard et al., 2000).
- Qy – (0-10 ka) Unconsolidated deposits associated with modern fluvial systems. This unit consists primarily of fine-grained, well-sorted sediment on alluvial plains, but also includes gravelly channel, terrace, and alluvial fan deposits on middle and upper piedmonts (Richard et al., 2000).
- Qm – (10-750 ka) Unconsolidated to weakly consolidated alluvial fan, terrace, and basin-floor deposits with moderate to strong soil development. Fan and terrace deposits are primarily poorly sorted, moderately bedded gravel and sand, and basin-floor deposits are primarily sand, silt, and clay (Richard et al., 2000).
- Tv – (11-38 Ma) Lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks. These compositionally variable volcanic rocks include basalt, andesite, dacite, and rhyolite. Thick felsic volcanic sequences form prominent cliffs and range fronts in the Black (Mohave County), Superstition, Kofa, Eagletail, Galiuro, and Chiricahua Mountains. This unit includes regionally extensive ash-flow tuffs, such as the Peach Springs tuff of northwestern Arizona and the Apache Leap tuff east of Phoenix. Most volcanic rocks are 20-30 Ma in southeastern Arizona and 15 to 25 Ma in central and western Arizona, but this unit includes some late Eocene rocks near the New Mexico border in east-central Arizona (Nealey and Sheridan, 1989; Richard et al, 2000; Spencer and Reynolds, 1989).



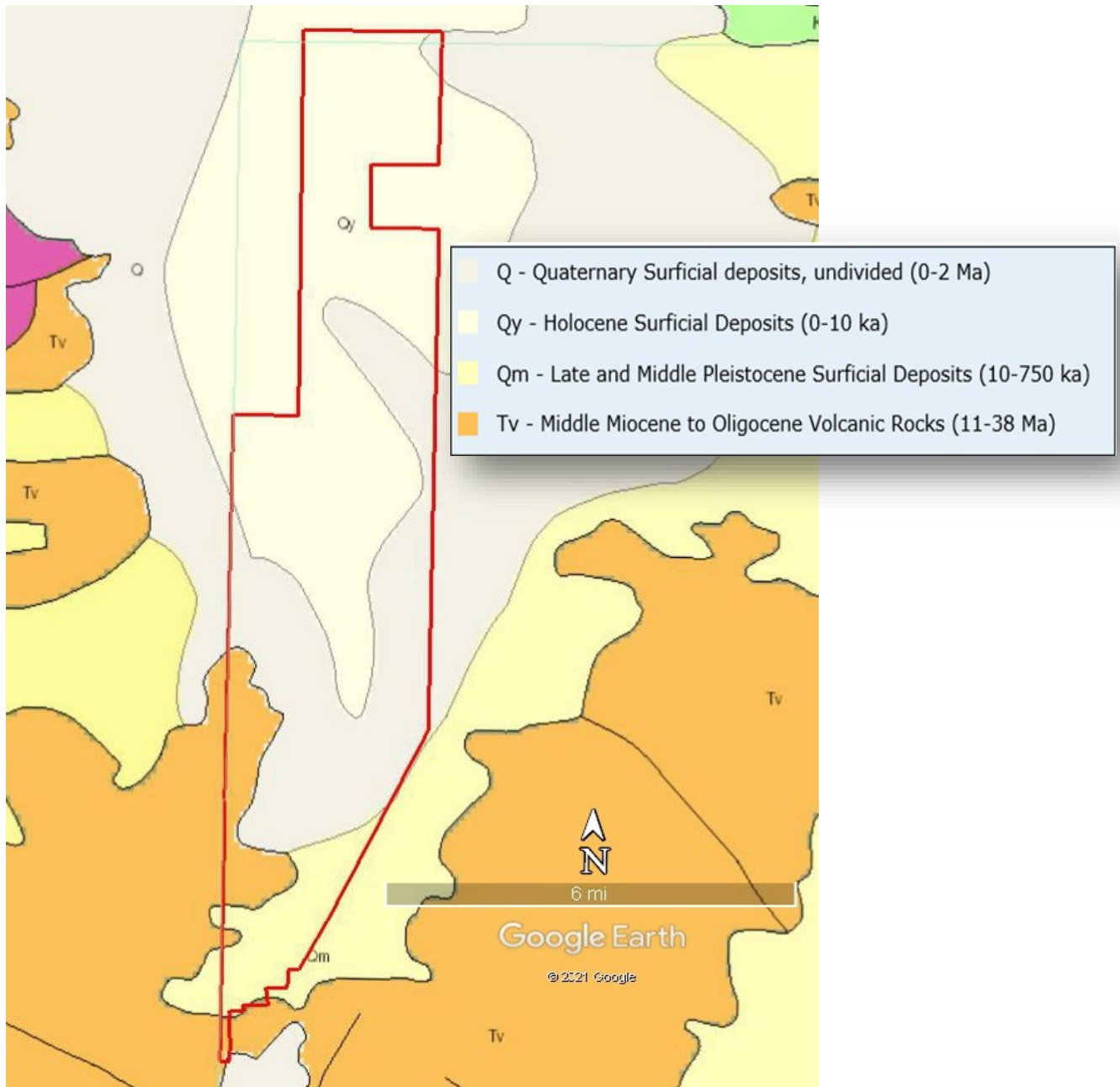


Figure 2- Regional geology map showing proposed area enclosed in red.

### 3.3. Local/Site Geology

Based on a Well Driller Report from the Arizona Department of Water Resources, a depth of up to 1240 feet was characterized. Clay, sand, and gravel was logged from surface to a depth of approximately 380 feet. This correlates with the presence of unconsolidated Holocene surficial deposits according to the geologic map in Figure 2. Cemented material to include volcanic clasts transitions to the Bouse Formation which was logged at a depth of 803 feet. Mineralization is likely present between depths of 1143 feet and 1195 feet due to the presence of rhyolite, purplish andesite, and porphyritic rhyolite in descending order. Water was also encountered between depths of 1135 feet to the bottom of 1240 feet.



Figure 3- Well logging Location that took place in 2010 is less than 200 feet from the redline.

## 4. Description of Energy and Mineral Resources

Locatable minerals include most metallic mineral deposits, as well as certain nonmetal and industrial minerals available for location and entry under the General Mining Law of 1872, as amended. Critical minerals are a select group of generally locatable minerals that are considered essential for use in defense, civilian, and industrial applications under the National Defense Stockpile Program. A list of critical minerals was developed by the USGS (Fortier and others, 2017) in response to Secretarial Order No. 3359. Leasable minerals are generally energy minerals such as coal, oil, and natural gas, as well as extensive bedded deposits, including potash and phosphates, and are available by the sale of leases. Salable minerals are common variety ‘mineral materials’ that are generally used in construction and landscaping and are sold to the public at a fair market value.

### 4.1. Leasable Minerals

A review of the available literature did not indicate the potential for leasable mineral deposits. There are no known leasable mineral deposits, oil/gas wells, or record of any leasable mineral operations within the proposed withdrawal area or immediate vicinity (Pierce and Wilt, 1970; Rauzi, 2001 & 2012).

### 4.2. Locatable Minerals – Known Prospects, Mineral Occurrences, and Mineralized Areas

Pursuant to Executive Order 13817 of December 20, 2017, “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals,” a review of published and unpublished literature and BLM records was conducted for strategic or critical minerals. There were no specific references to the existence of strategic or critical mineral occurrences or deposits in the vicinity of the proposed withdrawal area.

There are no prospect pits or claims within the proposed withdrawal area and it is not within or adjacent to a known metallic mineral district (Keith, et al., 1983) (Figure 4). No locatable mining or mineral production has occurred within the proposed withdrawal area or the nearby vicinity. Additionally, a review of the available literature and a field examination conducted on November 12, 2020, indicated no potential for locatable (metallic) mineral deposits on the subject land. A review of the available literature did not indicate the potential for locatable mineral deposits. There are no significant mineral occurrences or mineralized areas, and no known locatable mineral deposits within the proposed withdrawal area or local area.

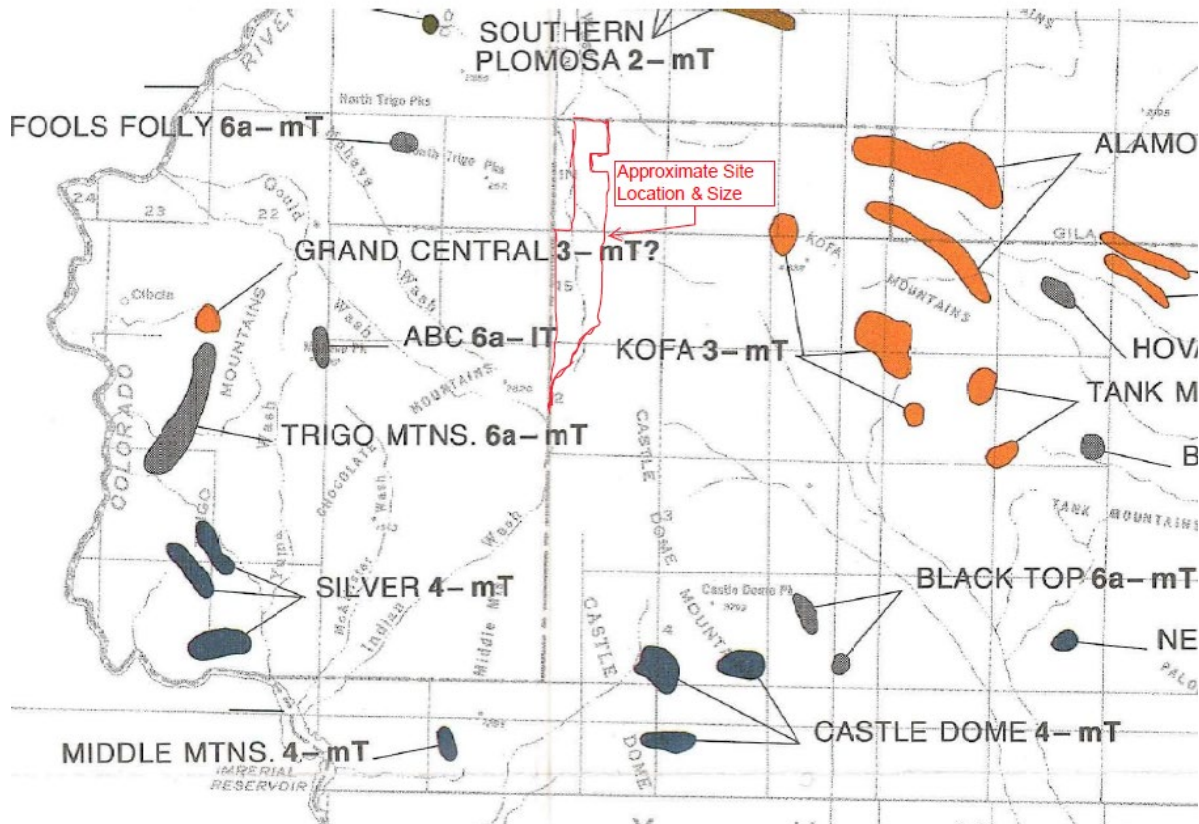


Figure 2- Metallic Mineral Districts of Arizona

### 4.3. Salable Minerals

A review of the available literature and a field examination conducted on November 12, 2020, indicated a low potential for salable mineral deposits within the proposed withdrawal area.

The proposed withdrawal area is located approximate 1.5 miles southwest from the nearest rock outcrop and operating aggregate pit, the Treasure Chest Granite Pit (Treasure Chest Pit) (Figure 5). The Treasure Chest Pit is currently operating under a BLM sales contract (AZA-38013) and producing crushed granite decorative rock. Based on geologic logs of the imaged well records from the Arizona Department of Water Resources for wells in the vicinity, the proposed withdrawal area is likely to be underlain by five to ten feet of sand, clay, and decomposed granite

or a combination thereof. This correlates with the units described in the surficial geology map of Apache Junction (Huckleberry, 1994). At depths of deeper than five to ten feet, there is likely either decomposed granite or basalt. There are no producing aggregate quarries within the proposed withdrawal area or the nearby vicinity, nor any evidence of past production.

There is low potential for salable mineral occurrence and the materials that exist within the proposed withdrawal area do not have any exceptional qualities that would make these materials better suited for aggregate development than any other materials found in the immediate vicinity. Additionally, the cost of stripping the deleterious surficial material would potentially render the deposit uneconomic.

#### 4.4. Mining Claims and Leases

A search of BLM records (United States Bureau of Land Management, 2021) found no mineral-related actions have occurred on or within the proposed withdrawal area. There are no active or pending mining claims on the proposed withdrawal area.

#### 4.5. Mineral Economics/ Development Potential

##### 4.5.1 Locatable Minerals

There are no active or pending mining claims on the proposed withdrawal area. Based on the lack of mineralization in or near the proposed withdrawal area, the lack of any record of commercial mining production, and the lack of any exploration in or near the proposed withdrawal area, the likelihood of an economically viable locatable minerals mining operation being developed there is negligible.

During the review of published and unpublished literature and BLM records relating to the subject lands there was no reference to strategic and critical mineral occurrences or deposits in the vicinity of the proposed withdrawal area.

##### 4.5.2 Salable Minerals

Although there is low potential for salable mineral occurrence, the materials that exist within the proposed withdrawal area do not have any exceptional qualities that would make these materials better suited for aggregate development than any other materials found in the immediate vicinity. Additionally, the cost of stripping the deleterious surficial material would potentially render the deposit uneconomic. The potential for salable minerals development is low.

## 5. Potential for the Occurrence of Mineral Resources

The mineral potential of the subject parcel was rated using the criteria in "Manual 3031 - Energy and Mineral Resource Assessment," published by the BLM in 1985. A summary of those criteria is presented in Table 1.

Development potential means whether or not an occurrence or potential occurrence is likely to be explored or developed within a specified timespan under specified geologic and non-geologic assumptions and conditions. Consistent with general BLM guidance on the applicability of Resource Management Plans over time, the development potential period for the purposes of this

review is over 20 years. Economic potential means whether or not an occurrence or potential occurrence is exploitable under current or foreseeable economic conditions.

*Table 1- Summary of the Mineral Potential Classification System*

### Level of Potential for Occurrence

Letter	Rating	Explanation
O	no potential	The geologic environment and lack of mineral occurrences do not indicate potential for mineral resources.
L	low potential	The geologic environment indicates low potential for mineral resources.
M	moderate potential	The geologic environment, reported mineral occurrences, or geochemical/geophysical anomaly indicates moderate potential for mineral resources.
H	high potential	The geologic environment, reported mineral occurrences and/or geochemical/geophysical anomaly, known mines/deposits indicate high potential for mineral resources. The known mines/deposits need not be contained within the classified lands, but must be within the same type of geologic environment.
ND	not determined	Lack of useful data. No determination possible.

### Level of Certainty

Letter	Rating	Explanation
A	least certain	Insufficient data. Rating for level of potential is uncertain.
B		Available data provides <b>indirect</b> evidence to support/refute the existence of mineral resources.
C		Available data provides <b>direct</b> evidence to support/refute the possible existence of mineral resources.
D	most certain	Available data provides <b>abundant direct and indirect evidence</b> to support/refute the possible existence of mineral resources.

#### 5.1. Coal

The subject lands are not prospectively valuable for coal (Peirce, et al., 1970; Haigler, et al., 1981).

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral potential classification for coal for the proposed withdrawal area is O/C.

## 5.2. Oil and Gas

The proposed withdrawal area is not known to be prospectively valuable for oil and gas (Arizona Oil and Gas Conservation Commission, 2012 & Rauzi, 2001).

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, mineral potential classification for oil and gas for the proposed withdrawal area is O/C.

## 5.3. Geothermal

The subject lands within the vicinity of Stone Cabin are well positioned for geothermal energy purposes (Gutmann, 1981). According to the Geothermal Resources of Arizona Map (1982), in Stone Cabin, a temperature log identified as YU-11 was made and had a depth of 310 m and a temperature reading of 44°C (Fig. 5). Additionally, YU-11 had a gradient higher than 50°C/km making it a potential geothermal energy source.

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral potential classification for geothermal for the proposed withdrawal area is M/C.

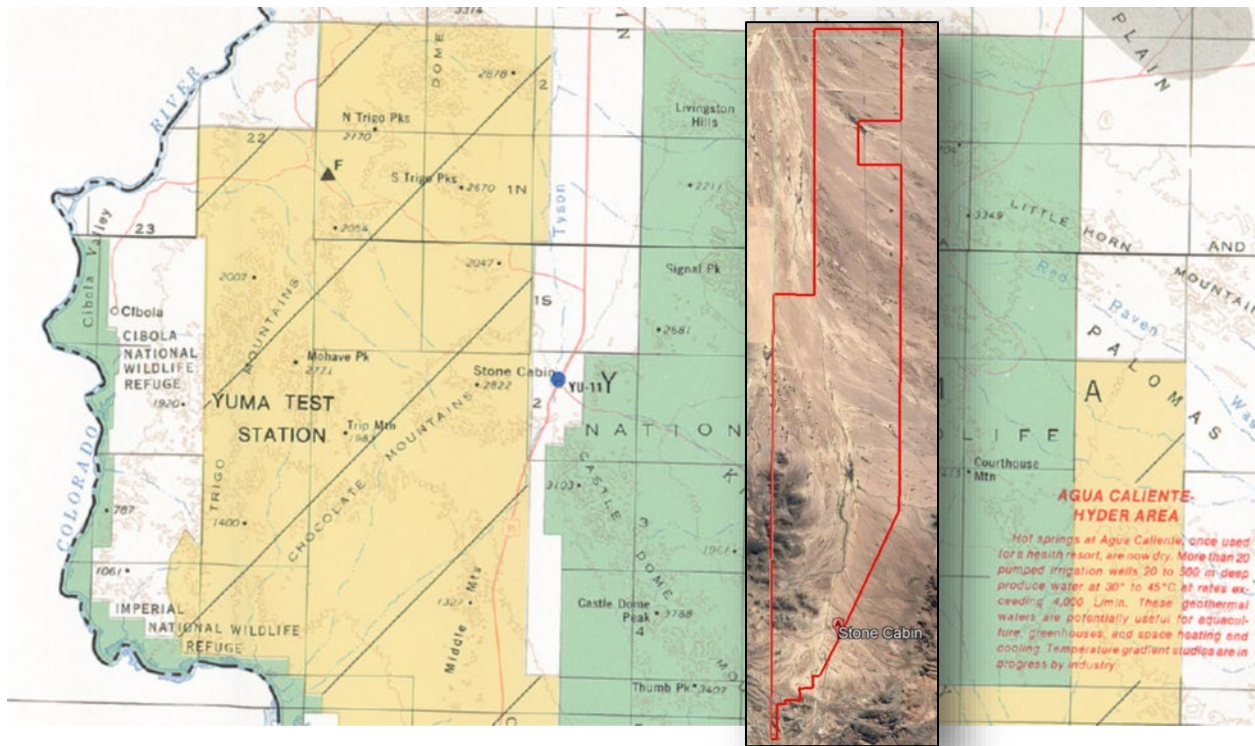


Figure 3- Blue dot shows where geothermal reading took place in Stone Cabin

## 5.4. Sodium and Potassium

The proposed withdrawal area is not prospectively valuable for sodium and potassium (Rauzi,

2002).

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral potential classification for sodium and potassium for the proposed withdrawal area is O/C.

### 5.5. Metallic Minerals

The proposed withdrawal area is not within or adjacent to a known metallic mineral district (Keith, et al., 1983). The Arizona Mineral Potential Map (ADMMR, 1984) shows the proposed area is adjacent to an area favorable for the discovery of metallic/nonmetallic mineral deposits by the Arizona Department of Mines and Mineral Resources through department file data, polling of the mineral exploration industry and compilation of exploration targets (Fig. 6).

Based on the lack of mineralization in the proposed withdrawal area and the lack of any record of commercial mining production in the proposed area, the likelihood of an economically viable locatable minerals mining operation being developed there is very low.

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral occurrence potential classification for metallic minerals for proposed withdrawal area is O/C.

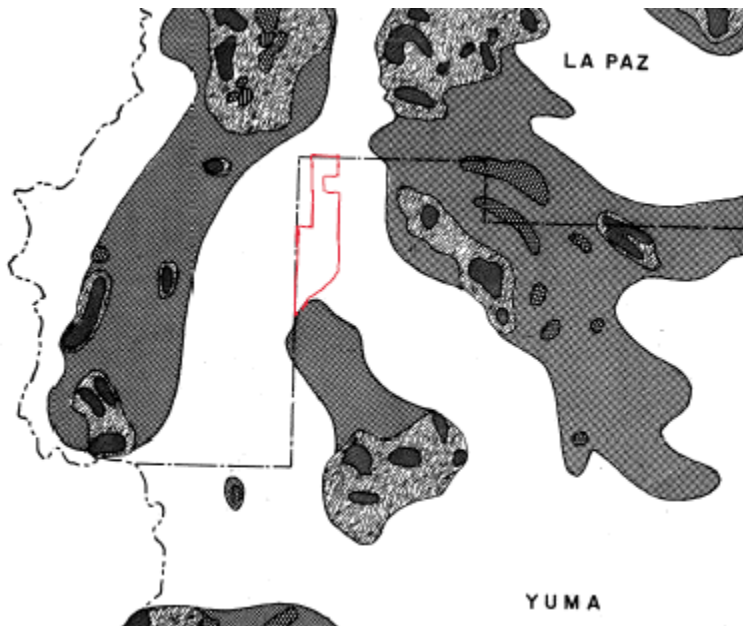


Figure 6- Arizona Department of Mines and Mineral Resources: Arizona Mineral Potential Map

### 5.6. Uranium and Thorium

The proposed withdrawal area does not contain known occurrences of uranium or thorium, but this does not rule out the possibility of it occurring within the Tertiary-Quaternary sediments of the southwestern half of Arizona (Pierce, et al., 1970; Keith, et. al., 1983). Since such deposits may be hidden by more recent sedimentation, any drilling or exploration in these basins should be carefully logged and checked for indications of uranium deposition (Pierce, et al., 1970).

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral potential classification for uranium or thorium for the proposed withdrawal area is L/A.

## 5.7. Nonmetallic Minerals

The proposed withdrawal area does not contain known occurrences of nonmetallic minerals (McCrary and O’Haire, 1965).

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, the mineral potential classification for nonmetallic minerals/industrial minerals for the proposed withdrawal area is O/C.

## 5.8. Common Variety Minerals

The proposed withdrawal area contains minor occurrences of hardrock aggregate and moderate occurrences of borrow (clay) aggregate. Due to the sheer size of the area, wide range inaccessibility – lack of routes and geologic impediments, it is difficult to pinpoint locations/pits with remarkable quality of salable materials. However, the existence of a nearby better developed source (Tyson Wash), and the proximity of the proposed area to the Yuma Proving Ground, likely show that the potential for commercial common variety mineral development is low.

Based upon criteria as set forth in the Bureau of Land Management Manual 3031, I have determined that the mineral occurrence potential classification for common variety minerals on the subject lands is L/B.

## 5.9. Surface Interference

Because there is low potential for the commercial development of salable minerals and a low potential for locatable minerals, the development of said minerals is unlikely in the foreseeable future. The Stone Cabin vicinity has a moderate potential for the development of a leasable mineral resource in geothermal energy, but its development will not be available anytime soon.

## 6. Field Examination

A field examination was conducted on July 19, 2021. The first point of visit was the Stone Cabin; the second point of visit was to climb a hill and get a panoramic view of the landscape and scope for other suitable routes which was to no avail. Third, attempts were made to move northwards through the proposed withdrawn area, but this effort was stymied due to lack of accessible routes. No evidence of recent mining activity was observed or noted except for evidence of recreational activity around the Stone Cabin area. All photos were taken by the Geologist, O.C. Eke.





*Photo 1 Location 33°15'58" N, 114°14'30" W; Trending SW. Showing the remnants of a structure made of huge stones which is likely Stone Cabin.*



*Photo 2 Location 33°15'59" N, 114°14'31" W; Trending West. Panoramic view of the landscape with the Chocolate Mountains in the background.*



*Photo 3 Location 33°15'59" N, 114°14'48" W; Trending North. A view of the landscape showing surficial deposits made up of sand, silt, and clay concurs with the geologic map data in Fig. 2.*



*Photo 4 Location 33°15'59" N, 114°14'48" W; Trending North. Close up of the soil type which ranged from silt to clay. The current potential pathway northwards could have been the destination of a former or ephemeral low energy stream.*

## 7. References

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