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# Developing a Reclamation Plan for the Abandoned ‘Telluride 18’ Uranium Mine (near Moab, UT)

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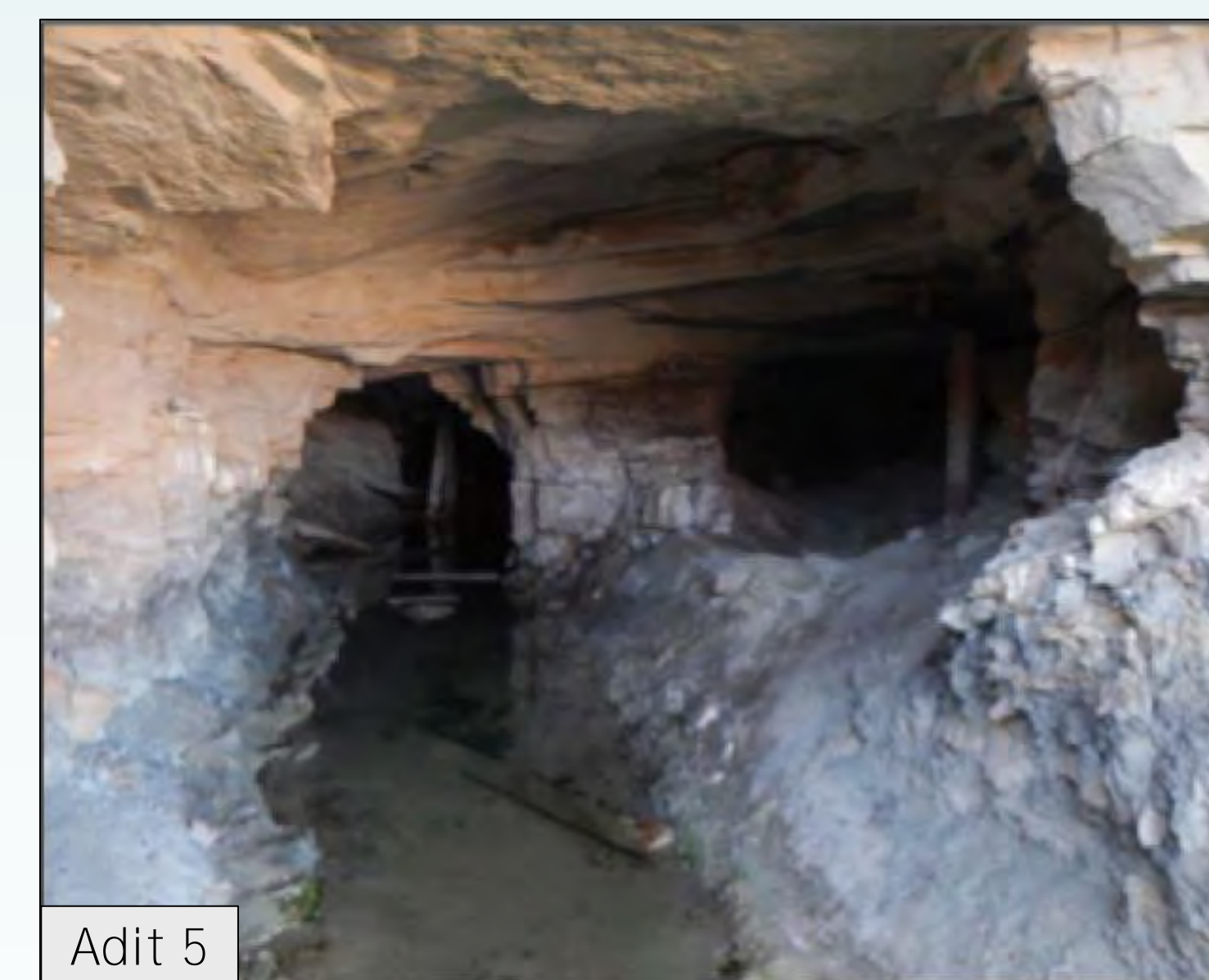
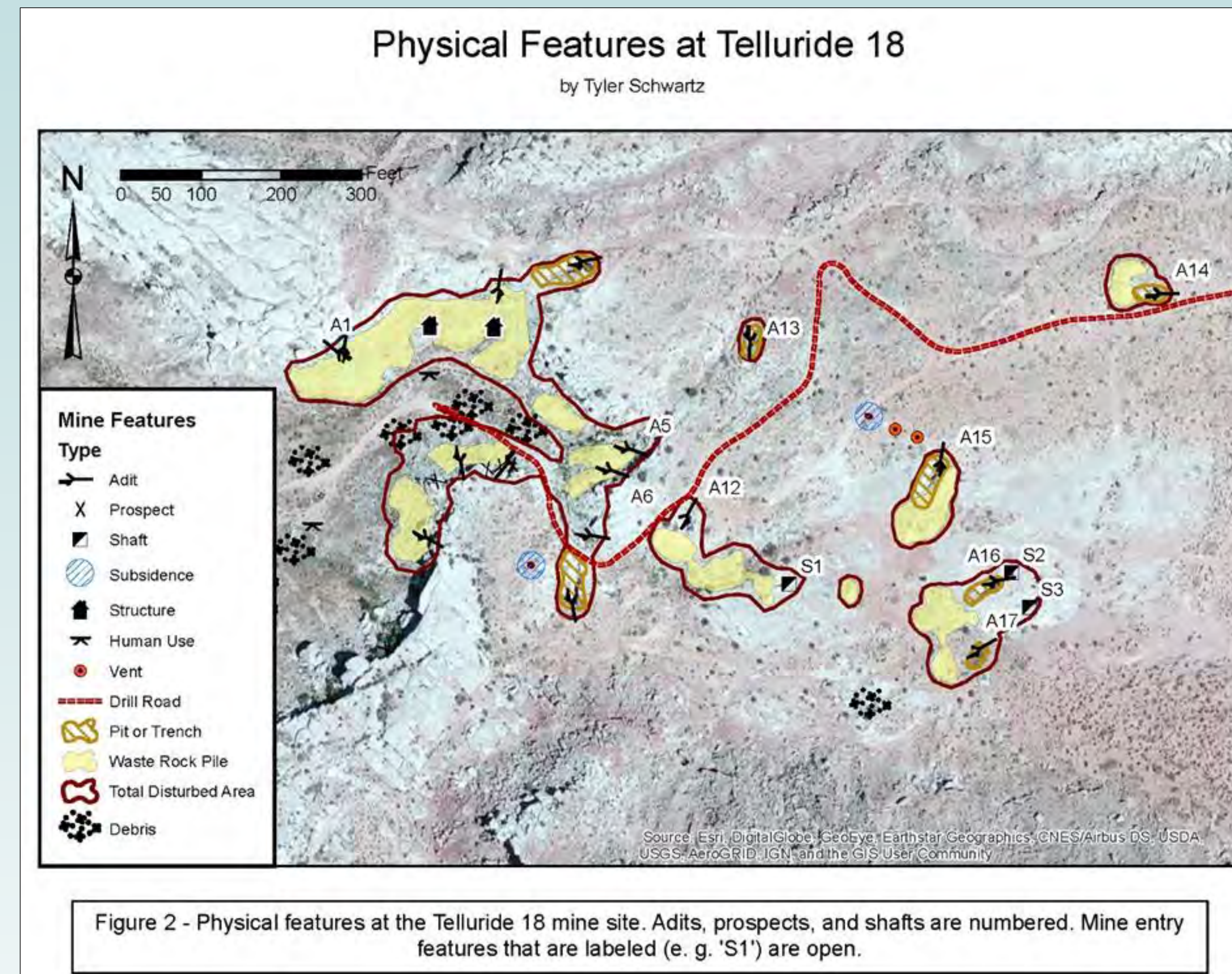
## Introduction

The Defense-Related Uranium Mines (DRUM) program under the United States Department of Energy’s (DOE) Office of Legacy Management (LM) assesses potential risks at uranium mines that sold ore to the federal government from 1946 until 1972. During the Cold War era, the predecessor to DOE—the Atomic Energy Commission (AEC)—funded exploration and mining activities for uranium across the United States, primarily in the West. At the conclusion of the AEC’s purchasing program, many uranium mines were left abandoned and in decay. Today, a number of these abandoned mines still pose threats to human health and the environment.

The office that the DRUM program operated from is located here, in Grand Junction, CO. Mr. Steve Renner, a part-time Professor of Environmental Science at Colorado Mesa University, is the DRUM Program Coordinator. Our capstone group contacted Mr. Renner and expressed interest in developing a comprehensive reclamation plan for one of the mines assessed under the program. The capstone group selected the abandoned ‘Telluride 18’ uranium mine with the goal of facilitating safe, dispersed recreation in the area and improving the soil stability, hydrologic function, and biotic integrity of the site. While the group was unable to conduct independent sampling activities due to COVID-19, soil and inventory data from the DRUM program’s assessment was used to guide proposed reclamation actions.

## Telluride 18 Mine Background

The Telluride 18 mine is located in the Yellowcat locality of southeastern Utah; the exact location of the mine is not disclosed for public safety concerns. The site was mined from 1949 until 1963, producing ~1580 tons of uranium ore that averaged 0.27%  $U_3O_8$ . Ore at the mine was extracted from the Salt Wash Member sandstone of the Morrison Formation of Late Jurassic age—likely from northeast-trending paleochannels containing fossilized detritus material. Today, the site is located on land under the jurisdiction of the Moab Field Office Bureau of Land Management (BLM).



## Inventory and Soil Sample Results

Inventory activities conducted at the Telluride 18 mine by DRUM program field personnel revealed: 12 open mine entry features (9 adits, 3 shafts), 10 waste rock piles, 7 trenches, 2 loadouts, and signs of recent human use (e.g., debris/trash piles, campfire rings).

- Ecological observations of each waste rock pile indicated low foliar cover (ranging from 5-10%) and dominant species consisting of *Atriplex confertifolia* (shadscale saltbush), *Gutierrezia sarothae* (broom snakeweed), and *Achnatherum hymenoides* (Indian rice grass).
- Composite soil sample analysis from each waste rock pile demonstrated elevated concentrations of metals compared to an undisturbed background area with similar soil and geologic characteristics to that of the Telluride 18 mine.
- Arsenic, in particular, exceeded BLM screening levels in waste rock piles 2, 3, 7, 9, & 10.
- Water sample analysis from adit 5 demonstrated moderate contamination of lead, aluminum, chromium, uranium, and vanadium.
- Radiological survey results indicated that the site emits—on average—20  $\mu R/hr$  above background. Under DRUM’s stringent recreational exposure scenario (14 days a year for 26 consecutive years), the site does not pose any radiological risk to human health and the environment.

## Proposed Reclamation Plan

The capstone group selected dispersed recreation as their post-reclamation land use. To successfully facilitate this land use, primary hazards must be addressed. These hazards and their proposed reclamation actions are listed below:

- Open mine entry features (shafts 1, 2, & 3, adits 1, 5, 6, 12-17) will be closed using either bulkheads, bat gates, or backfills dependent upon specific rock quality and projected cost
- Trench nearest 4x4 drill road at adit 11 (35 ft depth presents fall hazard) will be backfilled
- Arsenic contamination in waste rock piles 2, 3, 7, 9 & 10 will be mitigated through immobilization of material in an on-site disposal cell (low-cost) or via intense phytoremediation (high-cost) using arsenic-accumulators such as *Baccharis sarothroides* (desert broom)
- Steep slopes and high erosion potential of waste rock pile 1 will be mitigated with regrading and revegetation efforts

Note: backfills will use excess, uncontaminated waste rock material from the site.

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