

**GEOLOGY AND PRODUCTION  
HISTORY OF THEALMA-SEEGAN  
URANIUM MINE  
NAVAJO COUNTY, ARIZONA**

by

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Arizona Geological Survey  
**Contributed Report 94-C**  
April 1994

**Arizona Geological Survey**  
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or reviewed for conformity with Arizona Geological Survey standards



# Geology and Production History of the Alma-Seegan Uranium Mine, Navajo County, Arizona

## INTRODUCTION

The Alma-Seegan Mine was one of several uranium deposits located by exploration drilling in the Oljeto syncline area of Monument Valley, Navajo County, Arizona. The mine, which contained orebodies on two separate claims, was the last uranium mine to commence production in the area. Since it was mined late (1965-66) in the U.S. Atomic Energy Commission's (AEC) ore-procurement program (1947-70), very little information was developed about this mine. U.S. Bureau of Mines (USBM) mine inspection reports in the Navajo Indian Reservation mines' files of the former U.S. Geological Survey Conservation Division (USGS) now stored in the U.S. Bureau of Land Management (BLM) archives in Phoenix, Arizona, provided additional information on activities at the mine. This report summarizes the available information from AEC and USBM documents, and is to correct the misspelling of Seegan found in Scarborough (1981).

## LOCATION AND LAND STATUS

The Alma-Seegan Mine was approximately 13 miles north of Kayenta, Arizona, and 3/4 miles west of the U.S. Highway 163 (Figure 1). On the Boot Mesa 7.5' quadrangle topographic map (U.S. Geological Survey, 1988), the mine site is labeled "Open Pit Mine" and is about 1 1/4 miles north of the southeast corner of the map (Lat. 33° 53.56', Long. 110° 15.45').

The mine was within the Navajo Indian Reservation. Mining permits and leases were issued by the Navajo Tribal Council and approved by the Bureau of Indian Affairs (BIA), U.S. Department of Interior. Mining permits could be obtained by individual Navajos only. Permit holders could assign the mining rights to another individual or a company; like the permits, these assignments had to be approved by the Tribal Council and the BIA. Leases could be issued directly by the BIA. Permits were issued for a 2-year period and could be renewed for an additional 2 years. Leases were issued for periods up to 10 years. No more than 960 acres of tribal land could be held by any one company or individual. Both the permittee and the tribe received royalties from ore production. Based on the mine value of the ore, the tribe received between 10% and 20% royalties and the permittee between 2% and 5% royalties.

In addition to mining permits, the tribe issued drilling and exploration permits. These permits were good for 120 days and were not renewable.

## GEOLOGICAL SETTING

The Alma-Seegan Mine ore deposit was one of several uranium-ore deposits that were located by "blind" drilling in the El Captain Flat area of Monument Valley. The Flat is a large, sand-dune-covered area on the eastern side of Oljeto syncline, which is between the Organ Rock anticline to the west and the crest of the Monument Uplift to the east. Underlying the dune sand in the mine area is the Upper Triassic Chinle Formation. Rocks of this formation dip approximately 5\_ to the west into the syncline (Witkind and Thaden, 1963).

The orebodies were formed in a channel deposit in the basal portion of the Shinarump Member of the Chinle Formation. The channel, scoured into the underlying Moenkopi Formation of Lower Triassic age, was filled with medium-to coarse-grained sandstone and conglomerate. Carbonaceous plant materials, including fossil logs, were abundant in the channel sediments. The channel, as determined by the examination of drill hole information, is about 200 feet wide with a depth of approximately 50 feet. In the vicinity of the orebodies the channel trends N40° W. Drill hole logs indicated the ore was at a depth of 150-200 feet, with an average thickness of 5 feet. The deposit was unoxidized because of a perched water table in the Shinarump. Water flowed into the mine workings at the approximate rate of 50 gallons per minute. Uraninite was the principal uranium mineral. Copper sulfides such as chalcocite, bornite and chalcopyrite were also present in the ore.

Geological studies of the channels in Monument Valley by Young and others (1964) indicate that the Alma-Seegan Mine deposit is located in a north- to northwest-trending channel that contains the Black Rock and Sally deposits to the south, and the Firelight 6 and Big Chief deposits to the north. This channel has been traced by drilling for approximately 6 miles before it merges with the Bootjack-Big Four channel at the Sunlight Mine (Young and others, 1964).

## EXPLORATION AND PRODUCTION HISTORY

During 1955, numerous Navajos acquired permits to hold land for mining on the sand-covered flats along El Capitan Wash, on the eastern flank of the Oljeto syncline. They applied for these permits in anticipation of exploration drilling that was to be done by companies looking for uranium deposits farther west, near the axis of the syncline. By early 1956, more than 25 square miles on the eastern flank of the Oljeto syncline had been acquired by mining permits.

On June 14, 1955, Alvin Bailey of Blanding, Utah was issued Navajo Tribal Mining Permit (MP) No. 303. This permit covered the Seegan 1 and 2 claims (Figure 2). On the same day, Jack Crank of Oljeto, Utah was issued MP-313 for the Alma 1 through 4 claims (Figure 2). Alma was Crank's wife name. Bailey was the permittee of the Black Rock mine (Figure 2). Sally was Bailey's wife name. The origin of the name Seegan is not known. The assignment of MP-313 to Noriscar Company of Las Angeles, California was approved on August 10, 1955 and the assignment of MP-303 to Noriscar was approved on September 16, 1955. The activities of Noriscar are not recorded, but the company cancelled its assignments on August 10, and September 16, 1966, after holding them for one year.

The area was then drilled by several companies, including the Texas Mining Company, Texas-Zinc Minerals Corporation, and others. Although this drilling did locate some ore, not enough was found to develop a mine. Most of the drilling was done as rows of fences, 200 feet apart with holes 100 to 200 feet apart on the fences. The fences were normal to the trend of a projected channel.

The drilling and mining permits all expired and properties were apparently abandoned by 1959. The Navajo Tribal Mining Department, at Window Rock, Arizona, reported to the AEC that as of March 1960 there were no valid mining permits in the area (written communication, 1960).

On April 1, 1962, the AEC's allocation program (market quotas) went into effect. Under this program, the AEC would purchase uranium concentrate (yellow cake) only from ore discovered before November 24, 1958, or equal to the amount of ore produced from July 1, 1956, through June 30, 1960 (Albrethsen and McGinley, 1982). The latter method was used to help small miners who did not block out large amount of ore prior to mining.

Since ore had been discovered on the property prior to November 24, 1958, the property was eligible for an allocation.

Alvin Bailey was issued MP-580 on November 1, 1962 covering 47.5 acres of the Seegan No. 2 claim. The next day, Jack Crank was issued MP 579 for the Alma No. 4 claim covering 134.6 acres. The assignment of both permits to the Fritz-Erickson Mining Company of Dove Creek, Colorado was approved December 6, 1962.

Prior to acquiring the assignment of the mining permits, Fritz-Erickson had drilled the area and developed additional ore. AEC records indicate that as of January 1963 a total of 158 holes with a total footage of 25,500 feet had been drilled on the property. This drilling had located ore-bodies containing approximately 8,000 tons of ore averaging 0.22%  $U_3O_8$ .

Fritz-Erickson did no mining and cancelled the assignment of the mining permits in February 1964. MP-580 and MP-579 were assigned to Grant L. Shumway of Blanding, Utah on March 3 and 4, 1964, respectively. These assignments were approved by the Navajo Tribe on March 10, 1964 and the BIA on April 22, 1964. Mr. Shumway applied to the AEC for an allocation in order to market the ore. Allocation No. 655 for an annual production of 6,152 pounds  $U_3O_8$  was issued on Shumway, based on ore reserves developed prior to November 24, 1958.

Using Fritz-Erickson as a contractor, Grant L. Shumway began sinking a decline to the orebodies in July 1964. The decline was near the claim line common to line between the Alma 4 and Seegan 2 permits (Figure 2). It was 900 feet long and had a minus 25 degree slope. Mine inspection reports indicate four men were employed underground during the sinking of the decline.

During 1965, Grant L. Shumway shipped 3,384.29 tons of ore that averaged 0.21%  $U_3O_8$  to the Atlas Minerals processing mill at Moab, Utah. All of the ore came from the Alma 4 permit (Table 1). Mining was by an open stope-random pillar method. Rubber-tired, diesel powered equipment was used underground. A Melroe Bobcat was used to load a 5-ton dump truck to bring ore to the surface.

Mining continued during the first half of 1966 with 2,366.08 tons averaging 0.16%  $U_3O_8$  produced from the Alma 4 and 1,018.90 tons mined from the Seegan 2 (Table 1). On July 12, 1966, prior to the mine being closed, the working had extended to the northwest 800 feet, from the base of the decline, into the Alma 4 permit, and 175 feet to the southeast on the Seegan 2 permit. Mine inspection reports indicated the four men were employed underground and two men on the surface during 1965-1966. Total production from the mine was 6,769.27 tons of ore, containing 25,540.90 pounds of  $U_3O_8$  and averaging 0.19%  $U_3O_8$  (Table 1). Since the production exceeded the annual AEC allocation, Atlas Minerals used the excess pounds from the property to fill other allocations at the Moab mill. All of the uranium concentrate produced from the Alma-Seegan ore was sold to the AEC.

A mine inspectors visit to the property in December 1966, noted that the portal had been blocked, but the trench leading to the portal was a V shaped cut 200 feet long and 15 feet deep, partly filled with sand. This would explain why the site was shown as an open pit mine on the topographic map (U.S. Geological Survey, 1988).

### **ACKNOWLEDGEMENT**

Paul J. Buff of the Phoenix District Office of the BLM allowed access to the old USGS files now stored by the BLM in Phoenix, Arizona. Stephen M. Richard of the Arizona Geological Survey reviewed and improved the manuscript.

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Table 1. Ore production from the Alma-Seegan Mine, Navajo County, Arizona

YEAR	CLAIM	TONS OF ORE	POUNDS $U_3O_8$	% $U_3O_8$
1965	Alma 4	3,384.29	14,259.48	0.21
1966	Alma 4	<u>2,366.08</u>	<u>7,760.49</u>	<u>0.16</u>
Subtotal	Alma 4	5,750.37	22,019.97	0.19
1966	Seegan 4	<u>1,018.90</u>	<u>3,520.93</u>	<u>0.17</u>
Mine Total		6,769.27	25,540.90	0.19

Source: Unpublished ore-production records, U.S. Atomic Energy Commission, Grand Junction, Colorado office.

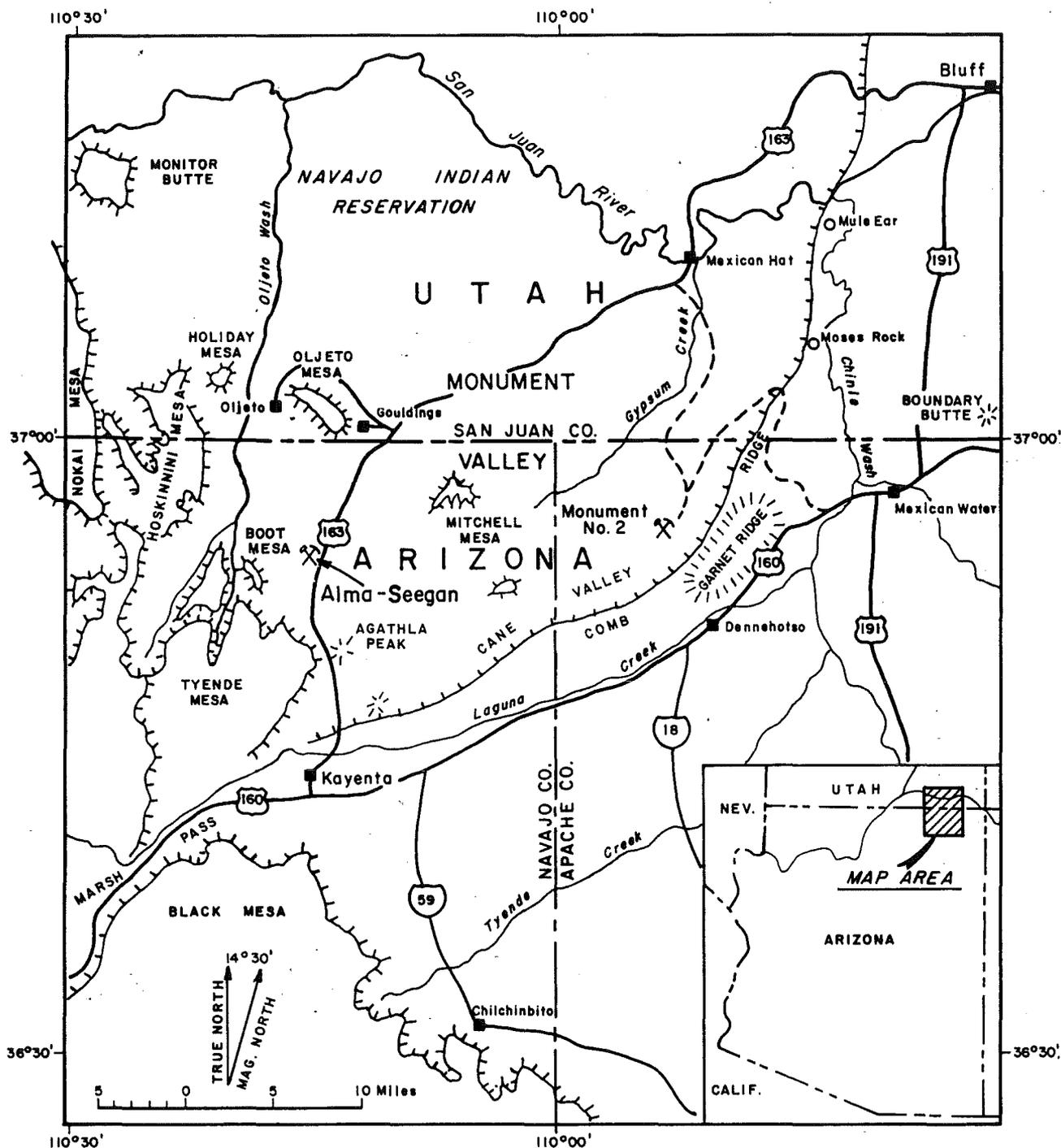


Figure 1. Index map of Monument Valley, Arizona - Utah, showing the location of the Alma-Seegan uranium mine

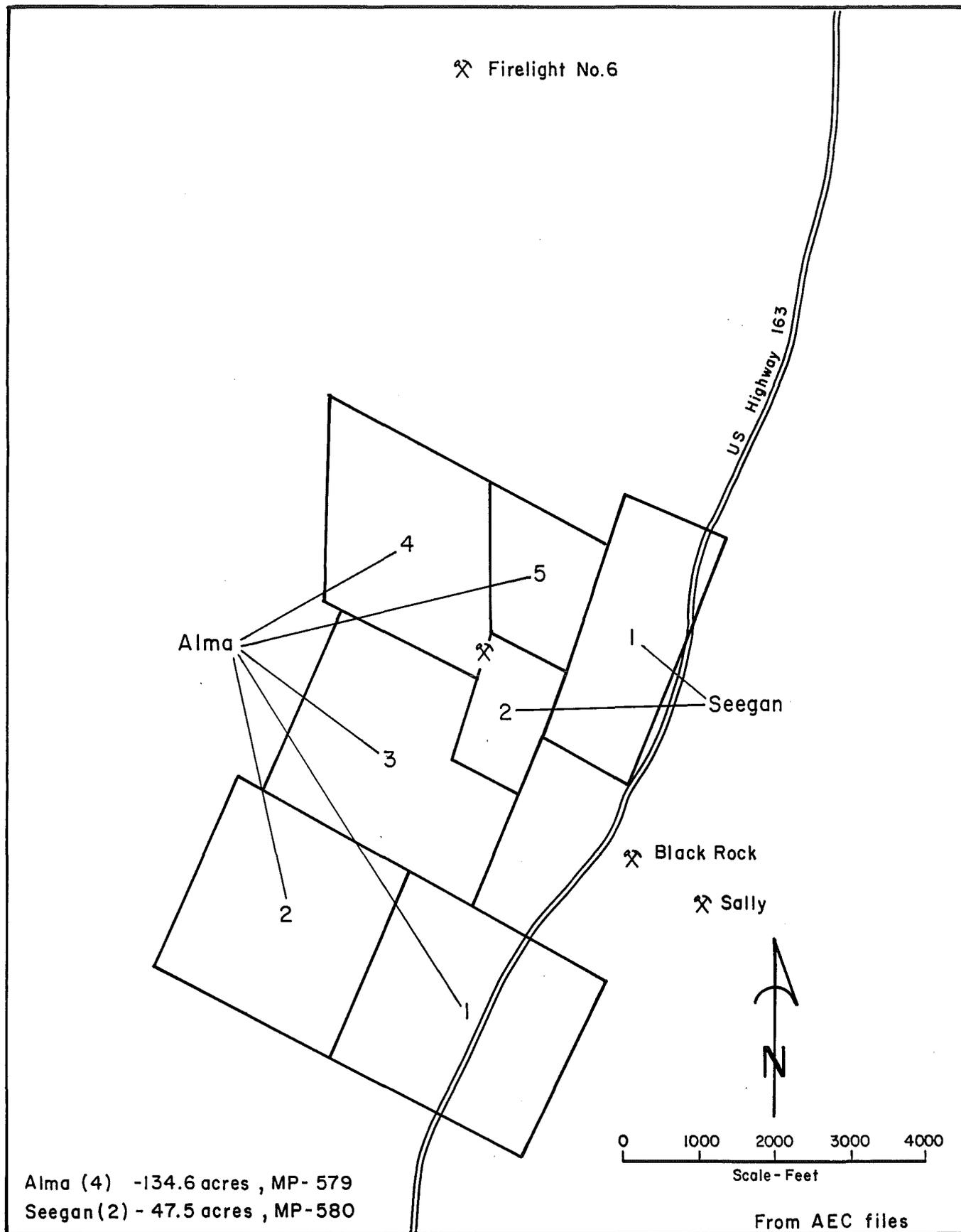


Figure 2. Index map showing the location of the Alma and Seegan claims, Navajo County, Arizona