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Geology of Shely Cauldron, Pinto Canyon Area, Presidio County, Texas

The Shely cauldron is in southwestern Presidio County, Texas, in an area known as Pinto Canyon. The Shely Volcanic Group is an Oligocene volcanic sequence of rhyolite and trachyte ash-flow tuffs, lava flows, and volcaniclastic sediments and agglomerates. It represents an intracauldron facies which filled a collapse zone after the initial cauldron-forming eruptions (upper Colmena Tuff, Buckshot Ignimbrite, and lower Chambers Tuff).

The Allen intrusive complex represents a series of discontinuous early rhyolite porphyry domes and dikes related to the resurgence of the central cauldron block (previously known as the Loma Plata anticline), and a late nonporphyritic rhyolite flow dome associated with the final emplacement of a discontinuous ring dike along the outer margins of the ring-fracture zone.

The occurrence of economic mineralization associated with late-stage hydrothermal mineralization within the Shely caldera is highly probable considering the silicic nature of the late-stage rhyolite intrusions (e.g., the uranium at Organ Pipe Hill; fluorite at the Bienevides Ranch; lead, zinc, and silver mineralization at the abandoned Loma Plata mine; and molybdenum mineralization at the French Ranch).

Recently a great deal of interest has been shown in the anomalous uranium values found at Organ Pipe Hill. Several shallow exploratory holes were drilled but failed to detect any uranium of economic interest.

Analysis of the uranium mineralization at Organ Pipe Hill (an early rhyolite porphyry intrusion of the Allen complex) suggests that the uranium was leached from younger Allen volcanic units and deposited along fractures developed subsequent to the intrusive emplacement. I believe that hydrothermal convection cells associated with the emplacement of an adjacent nonporphyritic rhyolite flow dome and associated ash-flow tuffs (an offshoot of the major late stage ring dike emplacement) was the major contributing factor in the uranium concentrations at Organ Pipe Hill. Additional trace-element and geochemical analysis is still in progress.

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Leonardian Radiolarians from Delaware Basin

A diverse assemblage of spumellarine radiolarians has been recovered from a sample of the Bone Springs Limestone (Leonardian) in the southern Guadalupe Mountains of west Texas. Other Permian radiolarian assemblages in North America include King's as yet undescribed assemblages from the Glass Mountains and assemblages from the Hegler and Lamar Limestone Members of the Bell Canyon Formation (Guadalupian). As no other certain Permian radiolarian assemblages are known worldwide, these west Texas faunas have much evolutionary and biostratigraphic significance. The Bone Springs fauna includes representatives of at least 15 genera, but taxonomic study is incomplete.

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Volcanogenic Uranium Deposits Associated with Mount Belknap Volcanics, Marysvale Volcanic Field, West-Central Utah

The Marysvale volcanic field consists of two contrasting assemblages of rocks, an older calc-alkalic assemblage erupted between 35 and 21 m.y. ago from coalescing volcanoes, and a younger bimodal basalt-rhyolite assemblage of heterogeneous lava flows and ash-flow tuffs erupted throughout later Cenozoic time. The Mount Belknap Volcanics, 21 to 16 m.y. old, are the largest accumulation of alkali rhyolite in the bimodal assemblage; they were erupted concurrently from two source areas about 21 km apart in and just east of the northern Tushar Mountains. Products from the two source areas intertongue complexly. The Mount Belknap magma was anomalously radioactive, and vitrophyres from several different localities average about 14 ppm U. Most of the known uranium deposits and occurrences in the Marysvale volcanic field are associated with the Mount Belknap Volcanics.

Uranium deposits associated closely with igneous centers are epitomized by the hydrothermal uranium-molybdenum-bearing veins in the Central mining area, 6 km north of Marysvale, in the eastern source area of the Mount Belknap Volcanics. The veins are localized in a small area of highly fractured ground believed to mark the surface expression above a hidden intrusive that potentially may host a porphyry-molybdenum deposit. Fluorine-rich hydrothermal fluids at 150°C and having low pH and f_{O_2} permeated the broken rocks. At the deepest levels exposed, the fluids and wall rocks interacted to form kaolinitic alteration products and to deposit uraninite, coffinite, jordisite, molybdenite, umhoite, fluorite, quartz, and pyrite in open fractures. The fluids were progressively oxidized at higher levels, and sooty pitchblende and fluorite were the predominant vein minerals deposited. In the highly oxidizing environment at the top of the system, uranium phosphate minerals were deposited by combining either primary or secondary uranium from the vein systems with phosphate derived by leaching apatite from the wall rocks. Some of these oxidized minerals may be of hypogene and some of supergene origin.

In contrast, the Mount Belknap caldera in the western source area was filled to overflowing with uranium-bearing ash-flow tuffs and lava flows. These rocks were widely altered by postcaldera steaming and hydrothermal activity. Much of the rock uranium was dissolved and incorporated into the hydrologic regime. Some of this mobilized uranium was redeposited in favorable environments within the caldera, but much seems to have been transported elsewhere. Some of the fugitive uranium may have been redeposited across redox fronts in sedimentary fills in adjacent basin-range valleys.

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Uranium in Volcanic and Volcaniclastic Rocks: Discussion of Examples from Canada, Australia, and Italy

Uranium deposits and prospects in volcanic and volcaniclastic rocks encompass a broad spectrum of genetic types, as illustrated by examples from Canada, Australia, and Italy. The hosts are commonly enriched in Zr, Ba, Sr, Rb, REE ± Th, and anomalous amounts of F are usually present. Additional metals such as Mo, Zn, and Cu may be present in economic concentrations in some of the occurrences, but there is no consistent U-base metal association. Associated comagmatic intrusives are locally enriched in Sn, W, Mo, U, and F ± Th. Mineralization is associated with both volcanic and volcaniclastic rocks surrounding subaerial volcanic complexes, and in some places with intercalcated epiclastics. Uranium