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INTRODUCTION

Uranium mineralization is found in economic concentrations in the Eocene Galisteo Formation situated in the Hagan basin structural embayment of the Rio Grande trough (fig. 1). The Diamond Tail project under the control of the Metals Division of Union Carbide Corporation consists of about 13,000 acres of land holdings in T13N R6E, N.M.P.M., Sandoval County, New Mexico.

GEOLOGY

The Galisteo Formation is a continental fluvial and lacustrine sequence of sandstones, mudstones, conglomerates and some interbedded tuffs ranging in thickness from a feather edge to 4,000 ft (1,220 m) on the property (Gorham and Ingersoll, this guidebook). These sediments were deposited in a subsiding basin extending from west of the present Rio Grande trough to an area east of the present Estancia basin. The Hagan basin is a large embayment of the much larger depositional Galisteo basin and is connected structurally to the Rio Grande trough. Sources of sediment were principally from the Sangre de Cristo Mountains and other highlands to the north and east of the Gal isteo basin.

Modification of the Galisteo basin was caused by slow structural uplift along the present Sandia fault zone, causing a tilting of the Galisteo Formation to the east and north. The Espinaso Volcanics were deposited on a slight angular unconformity over a portion of the Hagan basin in latest Eocene to Oligocene time (Kelley and Northrop, 1975; Stearns, 1953). The Espinaso Volcanics are composed of water-laid breccia, conglomerate and tuff with zones of massive flows and explosive materials. The volcanic detritus is bluish, reddish and brownish-gray, ranging in composition from andesite to quartz latite (Stearns, 1953). Andesitic dikes and sills intrude the Galisteo Formation. Later deformation on the eastern margin of the Hagain basin occurred as the Ortiz Mountains were intruded. Still later, the Santa Fe Group was deposited over the area as alluvial fan deposits, river deposits, volcanic debris and lava flows.

The Galisteo Formation, as recognized today on the property, dips 19 to 26 degrees eastward on the west side of Hagan basin, and lessens to from 1 to 3 degrees in subcrop to the east. This decrease in dip is intensified locally as a major north-south structural trend is crossed.

URANIUM OCCURRENCES

Uranium mineralization is found within two distinct sandstone units of the Galisteo Formation on the Diamond Tail project (fig. 1). The lower sandstone member crops out on the west edge of the property, thinning to the south where it ultimately disappears. The upper sandstone member crops out about 2,500 ft (760 m) eastward and basinward, and continues into subcrop, thinning noticeably to the south. The sandstone units are principally quartzose with minor plagioclase feldspars. A few stringers of arkosic sandstone are found. Grain size ranges from fine to coarse with a dominance of fine to medium, subangular to subrounded particles. The sandstones generally are friable with local thin stringers of calcite-cemented sandstone. Uranium occurs interstitially as coatings on sand grains.

The ore minerals have been identified as uraninite and coffinite, found as dark minerals below the water table. Uranophane has been identified on outcrop in section 4 and from core in section 16 above the water table. Here, a uranium disequilibrium ratio of 1.4:1 (chemical analysis versus radiometric equivalents, respectively) is calculated for the uranophane-bearing zone. This indicates very recent mobility of uranium relative to its radioactive daughters. Lesser disequilibrium occurs in mineralization found beneath the water table. The uranium is not correlated positively with any particular grain size, nor necessarily with commonly abundant carbonaceous material. Pyrite generally is present where uranium occurs. Geochemical cell development with oxidized-reduced zoning is observed within the units. The uranium is deposited along cell boundaries in a modified roll-type form. Other elements identified are selenium, found near uranium minerals but trailing it in the cell formation, and molybdenum, which appears in the protore and marginal to the exterior of the geochemical cell.

The exploration model being pursued consists of three or more northeasterly trending zones or "channels" found closely related to major structural features evident across the property. The geochemical cell is overprinted on the lithologic and structural conditions, thus allowing uranium to collect in orebodies.

Exploration drilling has been confined principally to portions of the Galisteo Formation lying west of the Espinaso ridge in sections 16, 9 and 4 as shown by the mineralization outlines on Figure 1. This confinement was based strictly on drilling economics, although several holes have been drilled through the volcanics with encouraging results that support our exploration model.

Development drilling has been conducted on section 16 to aid in early evaluation of a very small portion of the project. An estimated 0.9 million pounds (4.1×10^5 kg) of uranium have been outlined on part of section 16, as shown on Figure 2. Average mining grade is 0.09 U_3O_5 at depths of from 10 to 400 ft (3 to 120 m).

A decline with two small stopes was driven to test underground mining conditions. The ground is competent and will allow underground mining with proper utilization of pillars and timber. Bulk samples were obtained for metallurgical testing while conducting the mining test.

We have been conducting additional exploration on other

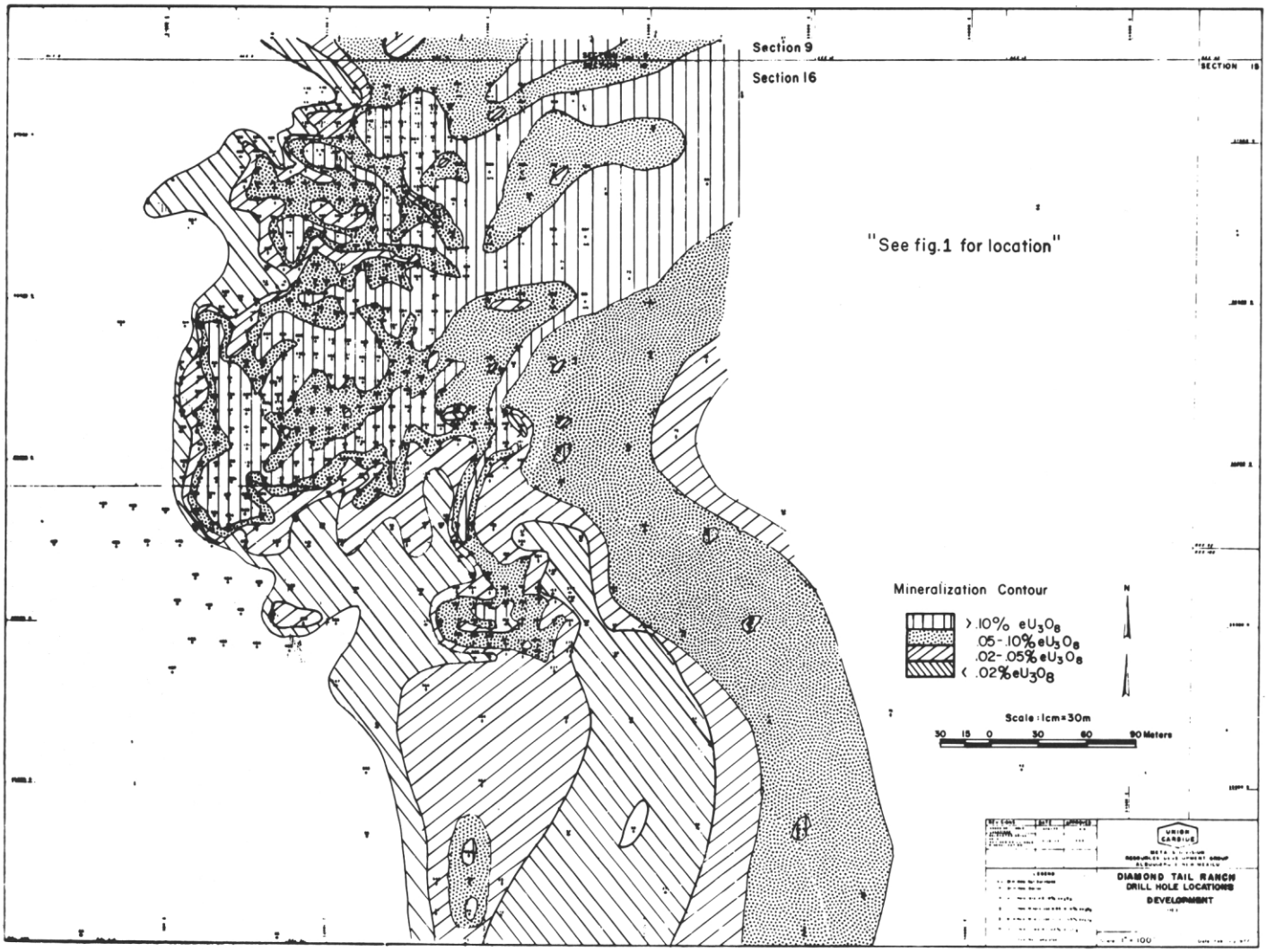

Figure 2. Contour map showing uranium mineralization in Galisteo Formation, Hagan basin. See Figure 1 for location.

parts of the property and now feel that additional uranium ore can be found at several points on the property. As with most projects these days, inflation is causing re-evaluation of the economics of production at this time. Additional costs are being added to insure that we have an environmentally acceptable operation and can be good neighbors to the people presently living in this area.

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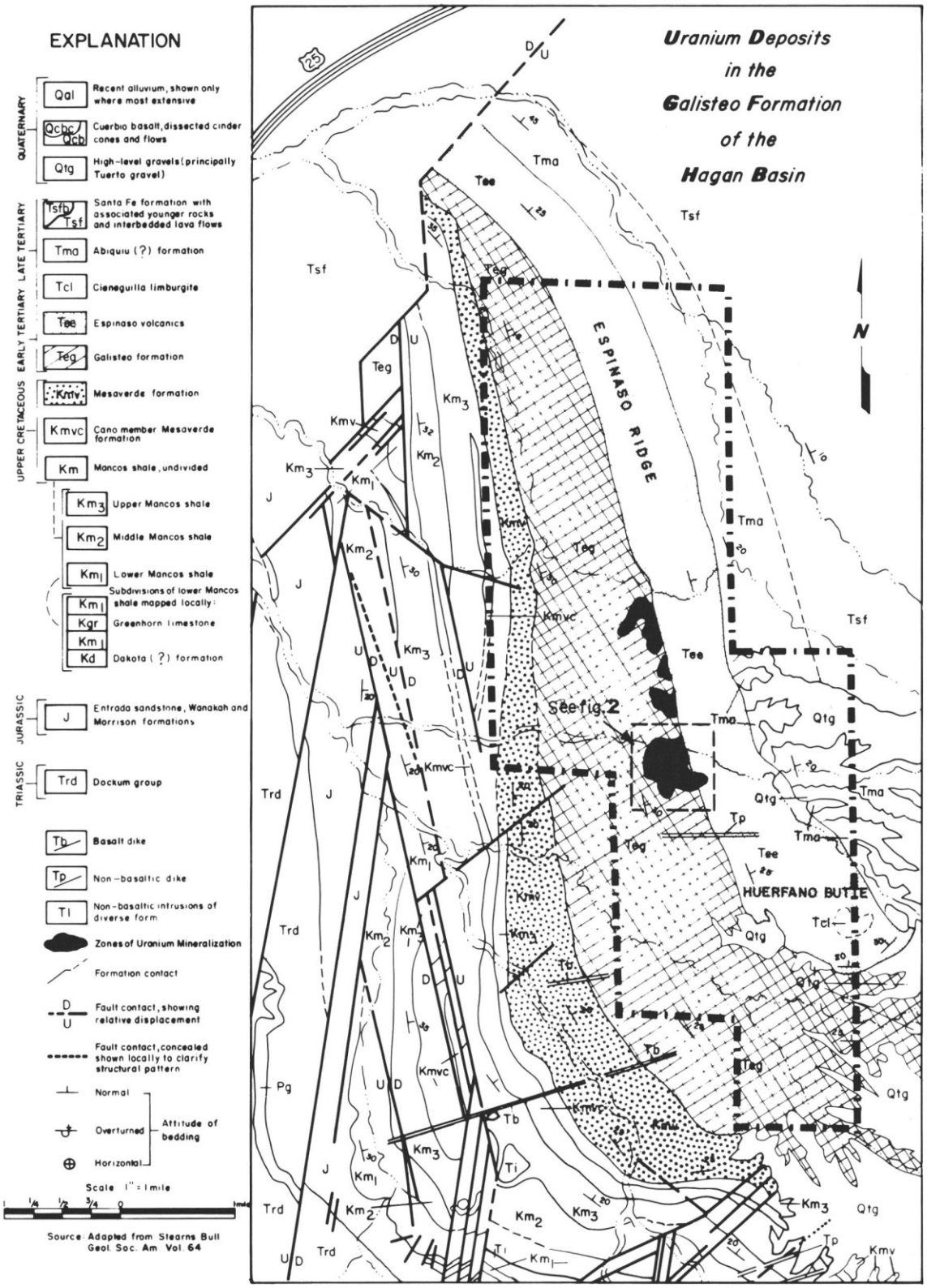

Figure 1. Map showing geology, property boundary and location of Figure 2.