A NATURAL SOURCE OF MERCURY, THALLIUM, ARSENIC, AND SILVER CONTAMINATION, CALIFORNIA CONTINENTAL BORDERLAND

HEIN, JAMES R., DOWLING, JENNIFER., and SCHUETZE, ANTHONY., U.S. Geological Survey, MS999, 345 Middlefield Rd., Menlo Park, CA, 94025, USA.

Blake Seamount is located along a San Clemente Basin fault about 72km off the southern California-northern Baja California coast. The seamount measures 80 km2 and is covered by a Fe-Mn oxyhydroxide pavement up to 12cm thick. Two types of layers comprise the Fe-Mn crusts: Type 1 layers are a mixture of vernadite, todorokite, and birnessite; relatively low Fe/Mn (0.3-0.4; 26-34 wt. % Mn); low mean Hg and As contents (1.3 ppm and 157 ppm, respectively); and high Tl (172 ppm, maximum 233 ppm). Type 2 layers are composed solely of vernadite and have high Fe/Mn (0.9-1.1; 18-20 wt. % Mn); relatively high Hg (mean 3.8 ppm, maximum 10 ppm) and As (mean 292 ppm, maximum 314 ppm); and low Tl (mean 71 ppm). Both layer types also have high Ag contents (4-6 ppm). The mineral assemblages, along with cobalt contents and REE patterns, indicate that types 1 and 2 layers formed by a combination of hydrogenetic and hydrothermal precipitation, but that type 1 layers have a greater hydrothermal component. The high As and Tl contents of Blake Seamount crusts are typical of hydrogenetic crusts that occur on Pacific seamounts, but in neither hydrogenetic or hydrothermal ocean basin crusts have such high Hg and Ag contents been documented. The unique composition of Blake Seamount Fe-Mn deposits is source dependent, being derived from continental crust and organic-matter-rich anoxic basin sediments that were leached by hydrothermal fluids circulating along basin-margin faults. Future work will determine the distribution of similar deposits throughout the borderland; and whether the high contents of toxic metals exposed at the seafloor are bio-accumulating in organisms that inhabit the seamount and surrounding area.