GEOLOGY AND SEISMICITY OF THE SALTON BASIN

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Sediment Intro.

The geology of the Salton Sea basin provides a foundation for understanding the ecosystem of the Salton Sea and for making decisions on remediation facilities. Bottom sediments are important as substrates and nutrient sources for many of the Sea's organisms. Although the geology of the basin is exceedingly complex, the geology of most relevance to understanding the ecosystem distills into the characteristics of sediment near and under the Sea. Sediment characteristics are controlled by bedrock sources, topographic characteristics of the land across which sediment is transported, and by its final depositional site (lake, stream, or alluvial fan). The bedrock geology of the area can be classified into five primary types, each of which erodes to form distinct sediment. For instance, schist and mudstone are very different rocks, but they each create clay-rich sediment such as that along the west side of the Sea. Evaluating the geology of the basin by using appropriately classified bedrock can therefore help in placing bottom sediments into a basin-wide context.

Geology is also an important factor for engineering design for remediation facilities from levees to pipelines. Part of the geologic complexity of the basin stems from its position on the San Andreas fault system, along which two of the Earth's major tectonic plates, the North American and Pacific plates, move past one another. In addition, several parallel major faults in and near the basin, such as the Elsinore and San Jacinto faults, take up part of the plate motion, and all are seismically active. Earthquakes cause ground rupture and ground deformation that may damage and destroy engineered facilities located near the fault line; over wider areas earthquakes cause strong shaking that can cause damage far from an earthquake's epicenter.

Plans for remediation facilities in the Salton Sea basin are developed as general plans that will be followed by more specific, detailed, plans. Planning for earthquake-caused ground rupture and strong shaking must likewise consider different scales, or resolutions, of information. Initial planning for the entire basin has used two information sources developed by California Division of Mines and Geology to make decisions on locations for facilities that will minimize hazards from earthquake-induced ground rupture: (1) existing information for state-mandated zones along active faults (Alquist-Priolo zones), and (2) regional maps of active faults. However, many poorly understood faults that lie in the basin do not have defined Alquist-Priolo zones, so initial design may require later improvement as fault information is developed.

After remediation options are determined and as detailed design work for facilities begins, detailed scales of geologic map information can provide the necessary framework for evaluating earthquake ground-rupture hazards and susceptibility to strong shaking. For example, in the San Gorgonio Pass area where detailed studies are underway by the U.S. Geological Survey, the two main splays of the San Andreas fault shown on regional maps and defined by the Alquist-Priolo zones are now known to comprise a set of compressional (thrust) faults that complicate an otherwise straightforward interpretation of the San Andreas zone. Detailed geologic study of remediation facility locations will provide information appropriate for more informed decisions relating to many hazards other than earthquakes, such as landsliding and floods.