PROJECT: “Factors responsible for limiting the degradation rate of Exxon Valdez oil in Prince William Sound beaches”.

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Progress report for the Period 09/01/07-08/31/08

The Temple University team conducted successfully two field studies in Prince William Sound in the summers of 2007 and 2008. In Summer 2007, two beaches on Eleanor Island were studied they are: EL056C and EL058B. In Summer 2008, four beaches were studied, two of them on Knight Island (KN109A and KN114A) and two on Smith Island (SM006B and SM006C). These last two were lotic beaches (i.e., subjected to waves). In the summer of 2007 sensors were embedded in the Eleanor Island beaches to measure the water level, water temperature, and salinity at a time interval of 20 minutes. These sensors were retrieved in the summer of 2008, and preliminary investigation revealed that their data are good. Additional sensors (14) were placed in the beaches, and they will be retrieved in the summer of 2009. These long-term data should explain the subsurface conditions during winter.

The field studies during summer consisted of establishing two transects on each beach: One oiled and one clean. Each transect would extend from the high tide line to the low tide line, and would have six locations (perpendicular to the shoreline, see Figures 1 and 2) where the water level is measured and samples taken for measuring the background nutrient concentration and other solutes. Afterwards, tracer studies were conducted on the beaches, and consisted of applying lithium nitrate onto the beach surface at the same time on both transects, and monitoring its movement within the beach. Lithium was used as the conservative tracer. The number of measurement locations was nine (instead of twelve) at beach KN114A, because it had a thin veneer, and constituted a challenge for excavation. The obtained data from that beach appear sufficient to characterize the hydraulics as inferred from the water level measurements and readings of the nitrate strips (the latter was used as surrogate for the measurements of lithium).

Currently, we have approximately 1500 samples from the four beaches of summer 2008. The lithium in these samples is being analyzed by Atomic Adsorption. The chlorine (indicative of seawater) will be analyzed using an electrode. And nutrients (samples taken prior to the tracer study on each beach) will be analyzed on an Auto Analyzer by various colorimetric techniques. Sediment samples were taken from the beaches at three depths at each measurement location, and they are being analyzed for grain size distribution and permeability.

The modeling of EL056C (Beach 1) is in its last steps, and it revealed that the magnitude of fresh groundwater flow moving seaward was the major hydraulic discrepancy between

the oiled transect and the clean transect. The flow was small in the oiled transect. The modeling of EL058B (Beach 2) has just started.

Figure 1: Photograph of the beach, where the pipe extruding from the beach indicate sampling wells. The oil was on the right transect.

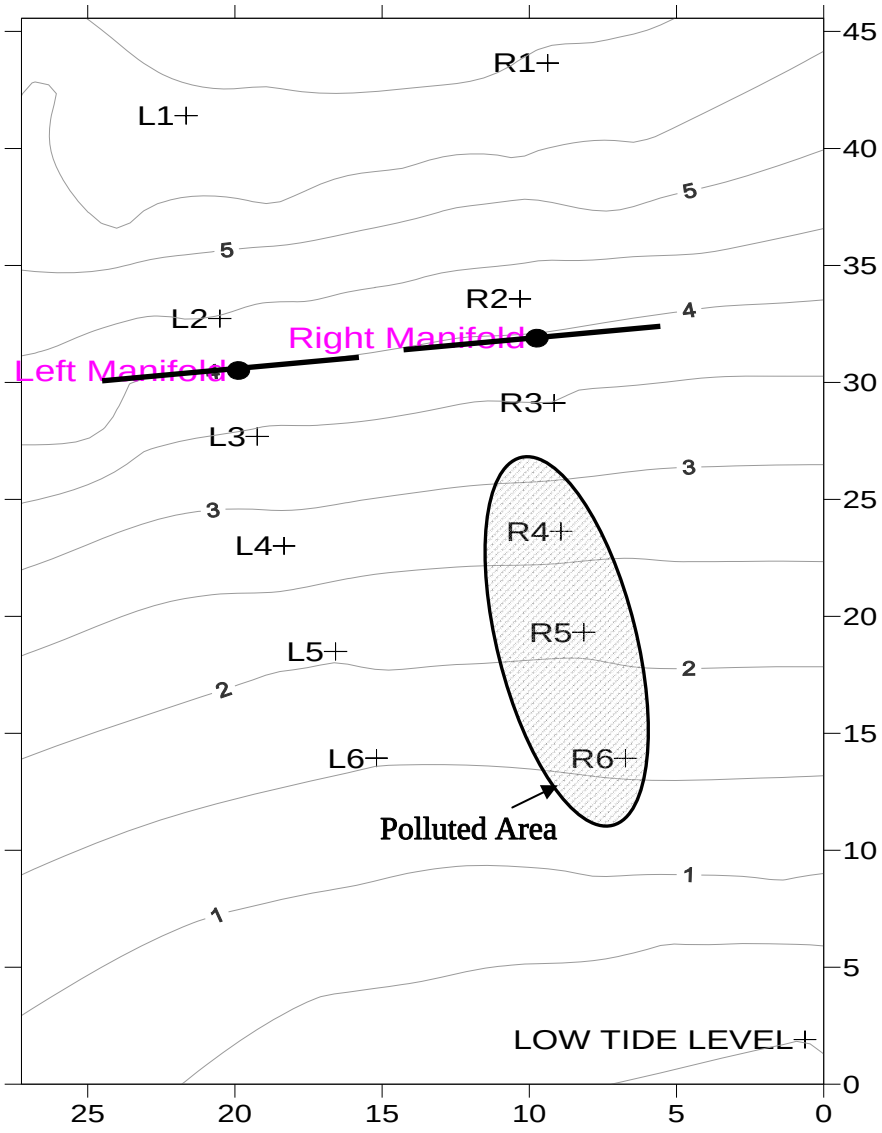

Figure 2: Topographic contours of the beaches, where the lowest low tide was assigned the elevation of 0.0. The left and right transect wells are labeled for example L4, R5, etc. The well numbering increases until six going seaward. All dimensions are in meter.