C1 Persistence of Oil Spilled From the T/V *Exxon Valdez* on Beaches of Prince William Sound, Alaska, USA, After 12 Years

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This presentation will compare (1) results from a government study of the amount of oil on beaches in 2001 from the 1989 *Exxon Valdez* oil spill, (2) results from a covert audit of the study attempted by scientists supported by Exxon Corporation, and (3) results from a government audit prompted by allegations based on the Exxon supported audit.

The rapid disappearance of oil from the surface of beaches three years after the *Exxon Valdez* oil spill implied that remaining oil would quickly disperse. This presumed rapid dispersal has been cited in criticism of recent reports claiming long-term toxic impacts of the spill to fauna that forage or reproduce intertidally. This presumption was evaluated by conducting an extensive field study of *Exxon Valdez* oil remaining in Prince William Sound (PWS) in summer, 2001, based on a representative probability-based sampling design. At random, 91 beach segments were selected from 3 mutually-exclusive categories of oiled beaches surveyed during 1989-1993, and a total of 6,775 quadrats were excavated, each 0.25 m^2 and up to 0.5 m deep placed according to a stratified random sampling design among the selected beach segments, at tidal elevations that ranged from +1.8 m to +4.8 m. An additional 2,000 pits were excavated to delineate the size of oil patches discovered by random sampling. All pits were backfilled immediately after excavation and evaluation.

Exxon Valdez oil was found on 53 of the selected beaches, as surface oil in 226 quadrats and as subsurface oil in 347quadrats. We estimate the equivalent of 3.94 + 1.14 ha (+ SE) and 7.99 + 2.36 ha of beach remained oiled by surface and subsurface oil. The combined oiled area (correcting for overlap) was 11.4 + 2.25 ha, over twice the oiled area measured in 1993, indicating the area of oiling has probably changed little since then. Most of the surface oil was present as weathered asphalt pavements, soft surface oil residues or surface sheens. Subsurface oil was present as a fluid light oil residue in 62% of subsurface oiled quadrats, followed by fluid medium oiled residue (21%), oil film (11%) and fluid heavy-oil residues (6%). Subsurface oil was most prevalent in the midand lowerintertidal, in contrast with surface oil. The total volume of oil remaining in 2001 is estimated as about 65,000 L, or about 8% of the volume estimated remaining in 1992, indicating annual dispersion on the order of 22%. The remaining subsurface oil contains suites of polycyclic aromatic hydrocarbons (PAH) that are readily available biologically, and is most prevalent in beaches that were most heavily oiled initially. These beaches are most abundant in bays where evidence for long-term toxic effects of oil has been indicated.

Exxon-supported scientists attempted to audit this study covertly by evaluating beaches after they were assumed to have been sampled by the government study. The audit was conducted with only approximate knowledge of the locations of the sampled beaches, and no knowledge of when they were sampled. The audit was conducted during the final five weeks of the 17-week sampling period, and relied on enumeration of the number of sampling pits evident. Based on the Exxon scientist's inability to find evidence of excavated pits, it was concluded that the government study was not executed according to the study plan, but was instead highly biased. This conclusion disregards the possibilities that (1) the beaches sampled by the government may not have been accurately located for the audit, (2) the audit occurred weeks or months after the pits had been backfilled on most beaches, (3) the audit likely occurred before government sampling on some beaches, and (4) pits are naturally excavated by sea otters and other biota inhabiting the region.

These allegations prompted a government investigation of the conduct of the study, which found the Exxon allegations entirely without merit. The government audit relied on the extensive documentation produced by the study along with corroborative documents such as the log's of the support vessels, and statements from field personnel contracted by the government. Thorough cross-validation of these documents revealed no evidence that the study was no performed as claimed by the participating government scientists.

Exxon Valdez, Defamation, Scientific Fraud

 ** Presenting Author*