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## HYDROCARBON DEGRADERS IN THE PERMANENT ICE COVER OF LAKE FRYXELL, ANTARCTICA

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The 17January 2003 crash of the Bell 212 helicopter 79U on the Lake Frxyell ice cover resulted in a mixed hydrocarbon spill comprised of mostly diesel fuel. Preliminary assessment of the spill revealed a lack of understanding as to the fate of fuel in the dry valley lake system, which serves as a site of long-term ecological research. There was a clear need to assess the impact of the spill on the ecosystem. Towards this goal we conducted a series of experiments to determine the fate of hydrocarbons within the ice, and the influence of a large scale-spill on biological activity and microbial diversity.

Bulk JP8 jet fuel as well as fractions of this fuel, including naphthalene (aromatic) and nonane (C9 alkane), were respired by the *in situ* ice assemblage at 5˚C. The addition of nitrogen and phosphorous increased degradation of the hydrocarbons. These assays were conducted with samples collected prior to the crash demonstrating that the native Lake Fryxell ice assemblage is capable of degrading hydrocarbons.

Light fuels with a high vapor pressure, such as “mogas” and jet fuels, have previously been shown to volatilize from Antarctic soils, while heavier fractions such as engine oils are more viscous and persist in the environment. Based on our findings, bioremediation efforts should consider both volatilization and the role of added N and P on *in situ* hydrocarbon mineralization in permanently ice covered environments. Persistent fuel usage could be responsible for the presence of hydrocarbon-degraders in the ice-cover of Lake Fryxell; ice-covers of dry valley lakes with less exposure to fuels should be assessed for the presence of a hydrocarbon-degrading assemblage to determine if such species are truly native.