EXHIBIT 1: Proposed Research Project

A. A description of the nature of the research project being conducted.

a. For more than 20 years, the Texas Automated Buoy System (TABS) funded by the Texas General Land Office (TGLO) and operated and maintained by Texas A&M University has been in operation. During that time, the system has provided critical environmental observations and essential data for oil spill response and preparedness for the State of Texas. Real time data are available for response personnel at TGLO to determine ocean currents and meteorological conditions from 8 buoys funded through TGLO and an additional 2 buoys funded through a consortia of industry partners at the Flower Garden Banks National Marine Sanctuary. The TABS Network is a valuable resource to the State of Texas in mitigating the potential effects of oil spills off the coast of Texas. Other regions of the United States use High Frequency (HF) radars for measuring current and wave information and the Integrated Ocean Observing System (IOOS) has an integrated plan for the whole of the United States. Currently, there are no HF radars on the Texas shelf. The Geochemical and Environmental Research Group (GERG) has been funded to purchase a total of 8 HF radar systems to cover the shelf area of the State of Texas (4 have already been purchased).

   In addition to the HF radar, Autonomous Surface Vehicles (ASV) are becoming more widespread for supplementing ship, radar and fixed site buoy data. The State of Texas through the Texas General Land Office has acquired a wave powered surface vehicle called AutoNaut, which is equipped with an acoustic Doppler current profiler (ADCP), Fluorometer, CTD and MET sensors. The AutoNaut will transmit data back to shore in near real time via an Iridium satellite modem using RUDICS. The purpose of the research project is to integrate data collected from the AutoNaut with data from the existing buoy network at TABS sites and HF radars along the Texas coast. This is the first time that surface buoy, coastal radar, and ASV observations will be accomplished in the United States.

B. Show that the communication facilities requested are necessary for the research project involved.

a. Currently, GERG is in possession of 4 HF radars manufactured by CODAR (Coastal Ocean Dynamics Applications Radar) Ocean Sensors. The CODAR SeaSonde is a portable, land-based, High Frequency (HF) radar developed between 1973 and 1983 at NOAA's Wave Propagation Laboratory in Boulder, Colorado. It is a non-invasive system that can measure and map near-surface ocean currents in coastal waters in near real time. Moreover, by using the CODAR SeaSonde it is possible to measure waves heights and it provides an indirect estimate of local wind direction. The CODAR units are vital for the research project because they can produce comprehensive current maps up to 200 km off

the Texas coast. Using data from the TABS and AutoNaut for ground-truthing, the resulting maps from the HF radar network will be publically available with applications to search and rescue, monitoring water quality, and hazardous material remediation.

C. Show that the existing communication facilities are inadequate.

a. Currently, there are no existing HF radar capabilities along the Texas coast that produce surface current maps. When a high frequency signal reaches the ocean surface, a portion of the incident energy is scattered back towards the source and the receiver measures the reflected signal. This backscattering (or reflection) produces an energy spectrum at the receiver, even if the energy source is single-frequency, because of the shape and motion of the sea surface. Interpreting the spectral returns for various transmit frequencies is the key to extracting information about the ocean and, specifically, to measure surface currents. As a consequence of Bragg's Scattering Law, the strongest received return comes from ocean waves traveling directly toward or away from the radar source and whose physical wavelength is exactly one-half as long as the transmitted radar wave. The return signal is processed and its spectral analysis provides the sea-echo Doppler spectrum, where two dominant peaks at different frequencies can be recognized. Displacement of these peaks away from their known frequencies is called the "echo Doppler shift" and allows one to assess the radial velocity of a surface current. That is the scatter velocity along the line between the hit surface and the radar. In fact, the magnitude of this component of the velocity is proportional to the degree of signal-shift. Therefore, the CODAR unit measures the Doppler-induced frequency-shift (along with the distance from the radar to the sector and directional angle) to provide an estimate of the radial-component of wave-speed in the sector of sea surface of interest.