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Summary

dTEC Systems L.L.C. is seeking a partner to license its EnvESI™ environmental water monitoring technology. The technology has a number of significant advantages over most of the currently used multi-parameter analytical systems and sensors including a large number of simultaneously measured pollutants, portability, real-time operation and relatively low cost. dTEC Systems has developed two working EnvESI™ verification prototypes. We estimate that as many as 5,650 EnvESI™ instruments may be sold within the initial three years after first offering at the unit cost of roughly $10,000. The identified potential investment risks include the need to clear up the existing IP on instrumentation subcomponents, the need to perform follow-on R&D work and field tests, and expected limited measurement sensitivity to some of the regulated pollutants.

EnvESI™ Technology

EnvESI™ is a technology that allows low cost real-time monitoring of chemical pollutants in environmental water samples and sample streams. EnvESI™ was developed by dTEC Systems L.L.C. and is an early-stage technology with up-to-date development cost of approximately $330,000 secured primarily through two Phase I awards and one Phase II SBIR award. This technology has a number of significant advantages when compared to the typical analytical multi-parameter instruments and sensors used for measuring common chemical pollutants in water samples including the following:

- the ability to generate test results almost instantaneously allowing for the real-time online water monitoring, reduces or eliminates sampling labor costs;
- EnvESI™ can be packaged into relatively low-cost ($10,000) portable instruments;
- the ability to simultaneously measure the concentrations of typical inorganic and some typical organic water contaminants with the same instrumentation, the ability to function as a screening tool for unexpected contaminants (water security applications);
- in most applications, no sample preparation and no consumables (such as test reagents) are required;
- EnvESI™ is based on an innovative merger of well-established, mature technologies and extends their individual application domains;
- EnvESI™ may become a dominant measurement technology in various industries due to its unique capabilities such as simultaneous and accurate nitrate/nitrite measurement which is highly beneficial in the wastewater treatment industry.

dTEC Systems L.L.C. has built two working EnvESI™ instrument prototypes for demonstration and technology evaluation. These prototypes were used to test a number of common chemical pollutants in the laboratory. EnvESI™ was shown to have detection levels below EPA set regulatory levels for drinking water contaminants for at least five of the studied pollutants (nitrate, nitrite, chloride, sulfate, and zinc). Many other pollutant were detected (arsenite, arsenate, phosphate, pentachlorophenol, lead, copper, bromide, fluoride, hypochlorite, ammonium, sodium, cadmium, chromium, and mercury), however additional work is needed to evaluate their corresponding detection levels and the accuracy of the measurements.

Projected US Markets

Stormwater Sites and CSOs

The projected stormwater market includes approximately 5,500 sites throughout the country which are required by US Environmental Protection Agency (EPA) to perform multi-parameter

testing. Approximately 2,000 of these sites are regulated by the original 260 permits issued by National Pollutant Discharge Elimination System (NPDES) Phase I program in 1990. Additional 3,500 regulated small municipal separate storm sewer systems (MS4s) were required to obtain a discharge permit by NPDES Phase II program in 1998. We estimate that EnvESI™ based instruments could initially penetrate a 10% share of the stormwater market selling up to 550 units in the first three years.

EPA NPDES program also issues permits to approximately 10,000 combined sewer overflow facilities (CSOs). Due to higher potential risk to the environment, real-time water monitoring at CSOs, higher portion of these facilities is expected to incorporate EnvESI™ monitors. We expect that operators of up to 15% of the CSOs will invest in purchasing of the total of 1,500 instruments in the first three years.

Wastewater Treatment Plants and SNdN Plants Control Systems

There are over 16,200 wastewater treatment plants in operation in the US. We expect that up to 5% of those facilities will be willing to install EnvESI™ shortly after introduction. The system would be used to optimize and monitor the treatment process and for constantly monitoring the quality of the effluent. Approximately 10% of all plants utilize simultaneous nitrification/denitrification treatment processes (SNdN). We expect that up to 80% of SNdN plants will be willing to purchase EnvESI™ for the purpose of monitoring and controlling SNdN reactors. Such high percentage is realistic because simultaneous nitrate/nitrite measurements will bring significant improvements in the process energy efficiency. The total estimated number of over 2,100 EnvESI™ units can be sold to wastewater industry in the first three years after the introduction.

Drinking Water Monitoring and Security

There are 160,000 public drinking water systems in the US. Approximately 3,900 of them (less than 3% by number yet serving over 80% of all customers) serve the populations of 10,000 and above. Only those large systems form the potential market for EnvESI™ water monitors with each system utilizing 1 to 5 instrument platforms. We expect that the technology will attract up to 15% of that market with sales of up to 1,500 units in the first three years.

Potential Risks

The important potential risks and identified difficulties include the following:

- clearing up the IP issues for some components used in EnvESI™ (might increase cost),
- EnvESI™ technology is insensitive to some of the contaminants (PAHs, for example),
- ionization source stability needs to be studied and addressed with a follow-on R&D (but provides opportunities to grow own IP).

Company Information

dTEC Systems L.L.C. was formed in 1999 by Thomas E. Coleman and James E. Bruya. Together Mr. Coleman and Dr. Bruya have 40 years of combined experience in environmental engineering and environmental chemistry. The primary focus of dTEC Systems is to develop detectors, sensors, instruments and systems for monitoring and control in water and wastewater treatment processes and other sample matrices relevant to environmental quality. Our objective is to transfer technologies from emerging disciplines in analytical chemistry and relevant engineering fields to develop innovative applications for addressing problems and opportunities that we have identified through our extensive previous work experience.