ENVIRONMENTAL BUSINESS JOURNAL®
Strategic Information for a Changing Industry
Vol. XXXIII, Numbers 5/6, 2019 *REPRINT - **2019 Remediation & PFAS*** Environmental Business International Inc.

PFAS TESTING ACCOUNTING FOR MORE OF SGS WORK AS IT BUILDS ON ITS GLOBAL POSITION

***SGS** is the world's leading inspection, verification, testing and certification company. SGS employs over 97,000 people and operates a network of more than 2,600 offices and laboratories around the world. SGS provides state-of-the-art laboratory and monitoring facilities with experienced and knowledgeable consultants. Multiple SGS labs across the globe are accredited for PFAS including SGS EHS North America in Orlando, FL, the SGS Ultratrace lab in Wilmington, NC and SGS AXYS, a designated SGS Centre of Excellence, in Sidney, BC, Canada, providing significant testing capacity in North America. These SGS laboratories are both state and DoD certified to perform a wide variety of persistent organic pollutants (POPs) and contaminants of emerging concern (CECs) including PFAS and 1,4-Dioxane analysis.*

Bharat Chandramouli, Ph. D, Senior Scientist & Product Manager. Mr. Chandramouli has 20+ years of experience in the occurrence, fate and transport of persistent organic pollutants and contaminants of emerging concern. He is a published author on several peer-review articles and book chapters on atmospheric chemistry, PFAS measurement, PPCP occurrence and more.

Norm Farmer, PFAS Program Director. Mr. Farmer currently oversees the technical operations for SGS North America laboratories. Farmer is familiar with the various QC and reporting criteria for Navy, U.S. Army Corps of Engineers, and AFCEE. He is responsible for implementing the DoD QSM processes throughout SGS North America Inc.

Geoff Pellechia, National Sales Manager, PFAS and Ultratrace. Prior to Joining SGS, he held several national positions with Pace Analytical and Vista. Pellechia has specific expertise in emerging contaminants, developing analytical programs and client support to meet the needs of this everchanging market.

EBJ: What impact are PFAS and other emerging contaminants having in the environmental laboratory industry?

SGS: We entered the emerging contaminants (EC) markets very early through SGS AXYS, which specializes in Persistent Organic Pollutants (POPs) and ECs allowing us to develop expertise quickly in EC investigations. We have seen a significant growth in the EC market over the past few years. New promulgated methodologies are slow in the development and approval process. Worldwide development of new analytical techniques is underway, and non-target analysis is an emerging technique in PFAS research. In the United States, State agencies have needed to develop their own regulations in response to contamination events, while they await Federal regulations

EBJ: What sampling and analysis challenges are often faced with PFAS?

SGS: Sampling challenges arise because these analytes are present in many products and have unique chemical properties. Traditional sampling supplies and techniques have needed modification. The surfactant properties of PFAS, especially in foam-impacted samples, lead to high variability unless special precautions are taken in sampling and sample handling.

The single biggest analytical challenge for many end users and labs has been the lack of an official method for matrices other than drinking water. This lack of standardized methodology and rapid expansion in testing by laboratories, not always familiar with the unique challenges of PFAS analysis, has led to concerns around data quality and reproducibility.

EBJ: Have there been changes that provide more accurate results?

SGS: Liquid Chromatography with tandem mass spectrometry (LC-MS/MS) technology has improved significantly on sensitivity and ability to monitor more targets. The greater availability of isotopically-labeled standard and emphasis on isotope dilution has been the single greatest factor in improving performance.

EBJ: Industry has phased out the use of PFOS and PFOA in favor of shorter chain PFAS such as GenX chemicals and PFBS. What research has been done on this topic?

SGS: Toxicology work on shorter chain and ether-PFAS chemistry is ongoing. So far, the data indicates that many of these replacements may have shorter half-lives in humans and higher thresholds of harm. However, much more information is needed, and this is an area of significant ongoing research interest.

EBJ: What percentage of your company's total revenue is generated by PFAS related projects? What about revenue generated by projects related to other emerging contaminants such as 1,4-Dioxane?

SGS: SGS AXYS, as a lab that provides a wide variety of analyses for contaminants of emerging concern, estimates that PFAS, analysis may contribute <15% of its revenue. PFAS is a large group of chemicals with many chemical precursors that may produce PFAS through degradation. Pharmaceuticals and Personal Care Products (PPCPs) and flame retardants have similar attention and complexity.

1,4-Dioxane is a single chemical and has a greater degree of study completed, as well as established analytical procedures. 1-4, Dioxane continues to be of concern with widespread occurrence.

For the SGS laboratory in Orlando, FL, it is estimated that PFAS analysis currently contributes to ~30% of revenue.

EBJ: What are the main sources and main threats that come along with 1,4-Dioxane contamination?

SGS: The main sources of 1,4-dioxane are chlorinated solvents, as 90% of use is as a stabilizer for chlorinated solvents. It can also be found in polyethylene terephthalate (PET) manufacturing. Main threats are human health exposure, as 1,4-dioxane is a probable human carcinogen.

EBJ: Are PFAS in leachate & groundwater from landfills different from those at WWTP or AFFF contaminated sites or other? What type of PFAS projects are most common among your clients?

SGS: With isotope dilution and proper application of best practices, leachate/groundwater can be analyzed using standardized approaches for all aqueous samples. Leachate, biosolids, and compost often have very challenging matrices and often require special handling.

SGS has a wide variety of clients including government, industry and private entities. The initial push in the early 2000s was from government pre-regulatory monitoring (fate and occurrence) and litigation support. More recently, AFFF sites, both military and civilian have become prominent. As more states begin to establish regulatory limits, we are seeing an increase in industrial, landfill, and treatment plant monitoring. Additionally, we have also seen an increase in residential testing. Product testing for PFAS content is a newer area.

EBJ: How do costs for PFAS laboratory analysis compare to the costs involved in other remediation projects?

SGS: The costs are relatively high as the technology is expensive and fairly new as levels of interest are generally in the single digit nanogram level. New methodologies

Selected Recent SGS Acquisitions in North America with Impact on SGS Environmental Testing Services

***SGS** as a leading inspection, verification, testing and certification company has continued an aggressive acquisition strategy for several years in most of its markets, including at least 10 companies acquired so far in 2019 as of the middle of August.*

July 2019: **Forensic Analytical Laboratories,** a leading provider of industrial hygiene, mold, bacteria, metals, particles, contamination control and asbestos & fibers testing on the US West Coast with locations in Hayward CA, Los Angeles and Las Vegas, employing 52 skilled experts, with revenues of $6.8 million in 2018.

April 2019: **Testing Engineering and Consulting Services** (Lawrenceville, GA), a leading independent testing, engineering and consulting services laboratory, focused on meeting the quality requirements of the construction industry. Founded in 2004 and privately owned, TEC Services employs 30 skilled people and generated 2018 revenues of $4.0 million.

October 2016: **AXYS Analytical Services Ltd.** (Sidney, British Columbia), the North American leader in ultra trace analysis of Persistent Organic Pollutants (POPs), Contaminants of Emerging Concerns (CECs) and the early development stages of the fast growing metabolomics business. AXYS holds multiple analysis and matrix accreditations with American (NELAC) and Canadian (CALA) national bodies and is ISO 17025 accredited, providing analytical testing services to research organizations, regulatory bodies, consultants and industry. Founded in 1974 and privately owned, at acquisition AXYS employed around 100 experts and was expected to generate 2016 revenues in excess of C$12 million.

January 2016: **Accutest Laboratories,** at the time the fifth largest full service environmental testing company in the United States. Accutest was a privately owned company founded in 1956 and is headquartered in Dayton, New Jersey with over 600 highly skilled employees, a significant client portfolio and a national network of laboratories and customer service centers in 14 states. The operations generated revenues of $65 million in 2015.

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are in process. New standards are being developed as new compounds are being looked for. Experts say there are over 5,000 individual PFAS related compounds. The industry is looking at the "tip of the iceberg", as the market evolves. This situation is still dynamic and evolving as targets of interest are expanding.

EBJ: What types of PFAS are getting the most attention and for what parties?

SGS: Impacts to drinking water by PFOS and PFOA, mostly from AFFF sites and sites adjacent to fluoropolymer manufacturing are getting the most attention. Additional targets are also being looked at.

EBJ: We have seen a number of states making their own contamination levels from 30 parts per trillion to 70 parts per trillion to 200 parts per trillion and more. We have to assume a national baseline standard will be established in the short term, and that States may then be able to adopt a lower standard? Is that the likely outcome?

SGS: We don't see states that have adopted a low CTL raising them, once the Federal government finally sets a limit. In many situations, states have always been able to specify more stringent environmental controls than the Federal government. On an ongoing basis, we expect to see more PFAS compounds with established MCLs, and in a broader range of matrices and situations. The general trend of PFAS allowable limits has been a lowering of the allowable levels as more study is conducted on PFAS compounds.

EBJ: What organizations are taking a stand or investing significant resources on research related to PFAS?

SGS: The Interstate Regulatory Commission (ITRC) has done good inter-agency work in coordinating the collection and dissemination of knowledge on PFAS best practices. Many NGOs have conducted studies to raise awareness of PFAS chemistries as it relates to environmental and human health issues.

EBJ: Some have observed that there is no smoking gun in the PFAS world that is pushing the regulatory agenda like Love Canal for Superfund or Exxon Valdez for Double hulled tankers. Do you agree or do you think this is yet to come?

SGS: It is challenging for the public to grasp and prioritize risks from the chronic, low-level exposure to PFAS and thousands of other contaminants of emerging concern. However, especially locally and regionally, pollution around contaminated PFAS sites has received a lot of attention, particularly when drinking water has been contaminated. PFAS-caused fish advisories are often a significant trigger for regulatory or legal action. □