Enviro-Sampling Solutions

Executive Summary

Introduction: Per- and Polyfluoroalkyl substances, also known as PFAS, are dangerous compounds that have been used in many different things since the 1970's. Their uses include non-stick pans, waterproofing tools, and fire fighting foams. These compounds were made to last forever and they do. They have been found in water supplies, soil, and even the human body. It is estimated that 99.7% of the United States population has PFAS in their blood. PFAS have been linked to multiple health problems including cancer.

Company: EnviroSampling Technologies is currently partnered with Accurate Labs and Oklahoma State University. All of these companies are located in Stillwater, Oklahoma.

Opportunity: The remediation of PFAS in the environment will cost billions of dollars. There is little technology to aid in this remediation process, and it will have to be done all around the world. The US military is one of the biggest contaminators, due to the fire fighting foam they have used on their bases. Remediating bases alone will costthe Department of Defense billions of dollars. There are currently no passive sampling methods for soils and sediments. There are only active sampling methods, which are modified versions of EPA 547, a method developed for drinking water.

Solution: EnviroSampling Technologies has created a passive sampler that can be used in both soils and sediments. This is a more direct method that would prevent technicians from having to repeatedly go and collect samples from the field. It is also a more accurate sampler, since PFAS can move easily through the soil.

Market Potential: Environmental monitoring is still a fairly new industry and continues to grow every year. The value of the global environmental sampling market is expected to grow by 7.5% between 2015 and 2020 and will exceed a value of $20 billion. As PFAS awareness grows, so will remediation efforts that are going to cost governments and companies, like 3M and Dupont, who have used these compounds for decades, billions of dollars.

Business Model: EnviroSampling Technologies will use environmental and engineering consulting firms as indirect channels to the end users of our samplers. Firms like Geosyntec, Suez, Battele, and Antea Group have already expressed interest in our product and have key relationships in the environmental industry. Manufacturing of the samplers will be outsourced to an overseas manufacturer to save on inventory and production cost.

Sales Strategy: Most sales will be made by connections already established by our management team, with environmental consulting firms. Beyond those initial connections, the bulk of sales will be made by cold calls and emails.

Competition: Competition includes current sampling methods. Labs have made modifications for EPA method 547, which include new designs that allows for water to test soil grab samples for PFAS.

Management: The management team currently includes: Dr. Dave Lampert, Hannah Weilert, and Becca Perez.

Financial: Proforma Income Statement

		Year 1	Year 2	Year 3	Year 4	Year 5
Revenues:						
Product A		$0	$0	$2,000,000	$2,500,000	$3,000,000
Grants		$100,000	$599,027	$0	$0	$0
Freight/Shipping Revenue		$0	$0	$300,000	$375,000	$450,000
Total Revenues		$0	$0	$2,300,000	$2,875,000	$3,450,000
Cost of Good Sold		$0	$0	$800,000	$937,500	$1,035,000
Freight/Shipping Expenses		$0	$0	$200,000	$250,000	$300,000
Sales Commissions		$0	$0	$0	$0	$0
Gross Profit		$0	$0	$1,300,000	$1,687,500	$2,115,000
Gross Profit Margin		*0%*	*0%*	*57%*	*59%*	*61%*

Exit Strategy: We will seek acquisition from a large environmental consulting firm that offers complimentary services and products.

Introduction

What are PFAS?

The production of synthetic organic compounds, known as fluoroalkyl substances, used electrochemical fluorination (ECF) licensed by the company 3M in the 1940s. Perfluoroalkylated compounds consist of all the hydrogen and carbon bonds being replaced with fluorine and carbon. While polyfluoroalkylated compounds have bonds with fluorine and carbon, as well as, some hydrogen and carbon bonds. Both of these compounds are generally referred to as PFAS. This man made chemical is resistant to photolysis, hydrolysis, microbial degradation, and metabolism by higher organisms. PFAS is also hydrophobic and lipophilic, meaning that they attach themselves to lipids and fats, but they do not attach themselves to water. This makes PFAS useful repellents. The complex chemical properties and the presence of fluorine atoms in PFAS allows them to be used in many applications, such as in greases, lubricants, cosmetics, paints, polishes, firefighting foams and more. However, there is a growing concern for the stability of PFAS and its inability to breakdown in the environment. The first documented case of

the presence of the synthetic organic compound in human blood was in 1968. It was later detected in aquatic life in remote geographical locations, such as the Antarctic, Artic, and the North Pacific ocean. PFAS were found to be carcinogenic and a contributor to liver and immune system dysfunction. In 2002, the lead producing manufacturing company, 3M, phased out the production of PFAS. However, production has since moved to areas outside of the United States, and the usage of the products remain. In 2016, the U.S. Environmental Protection Agency set the concentration standard for PFAS in water to 70 parts per trillion (ppt), despite the risks associated at low levels. There are currently no standards for PFAS in soils and sediments. With the pressure currently being placed on governments across the world, we are expecting more standards in the near future. There is an increasing need to develop a device to identify the movement and concentration of PFAS in the environment to lower these human and environmental risks.

Why does this matter?

Have you used a non-stick pan? Have you used scotchgard? If you have, you have been exposed to PFAS. PFAS is a broad term that includes thousands of per- and poly-fluoroalkyl substances that have been developed by chemical companies like Dupont and 3M. The company 3M invented the first perflouriocated substance in 1949, and these chemicals have been used across a vast array of products. Consumers are not the only ones that use PFAS products. The biggest user of PFAS products have been the United States military. The military has used a fire fighting foam containing PFAS for training. They have not only used this foam all over the United States but all over the world. Recently, PFAS has been found to leach into ground-water all over the country. The most contaminated areas are the communities that are near where the chemicals were produced and that are near Air Force bases, where the fire fighting foams were used.

Not long after the production of PFAS chemicals began, 3M and DuPont began testing how safe the chemicals were. They discovered that the chemical caused testicular tumors in rats and every animal exposed to the compound had fatal results. In the 1970s they also stopped hiring women at the locations producing the chemicals because of multiple children being born with deformities. Despite this, they continued to produce the chemicals. In the 1990s a farmer in Parkersburg, West Virginia sued DuPont because he was downstream from the landfill they were using to dump the waste from producing Teflon materials. All of his cattle had died in a very short time period, and he lost his entire livelihood. Eventually the farmer settled for a undisclosed amount, and they continued to produce the chemicals. In 2001 after the farmer’s lawsuit was settled, a class action lawsuit was filed on behalf of the 70,000 residents affected by the nearby factory. In 2002, 3M phased out the use of one of the main PFAS compounds they had been using, and DuPont increased their production of it. The class action lawsuit against DuPont was

settled in 2005, and DuPont agreed to pay $235,000,000 to be used for medical monitoring of all the citizens in that geographical region.

The money from this settlement was used to create the C8 Science Panel, which conducted one of the largest comprehensive health studies in history. After 7 years, the study concluded that PFAS was directly connected to 6 diseases, including testicular and colon cancer. Beyond the diseases they connected to PFAS, PFAS was found in human blood and tissue. It is estimated that 99.6% of people in the United States alone have blood contaminated by PFAS. PFAS is not the only chemical or substance to make its way into human blood, so why is this different? The half life of PFAS has yet to be discovered, so it does not degrade. While most chemicals and substances eventually make their way out of our blood, PFAS attaches itself to the blood cells and stays forever. That means that the chemical will continue to build up in our bodies throughout our lives.

Despite the continued evidence of the dangers of PFAS, the EPA has been extremely slow to act. They just came up with the minimal livable standard for drinking water of 70 ppt in early 2019. The EPA is facing a lot of pressure to continue developing standards for the use, sale, and production of PFAS compounds. States, primarily in the north east, have been more proactive than the federal government. States like New Jersey and Michigan have already set their own livable standards, imposed fines, and begun lawsuits against 3M, DuPont, and more.

The PFAS contaminated drinking water is an immediate concern for government and private entities across the world. Further lawsuits against DuPont, 3M, and many more continue to be launched every month. There is so much unknown about PFAS like the ramifications of decades of use, who exactly is responsible, and who is going to pay for the testing and remediation of the contamination sites across the world.

Company

EnviroSampling Technologies is currently partnered with Accurate Labs and Oklahoma State University. All are located in Stillwater, Ok. We are also in search of another partner to begin field testing of our prototypes.

Opportunity

The testing and remediation of PFAS contaminated sites is going to cost billions, if not trillions, of dollars. There is efforts across the world being made to develop a strategy to clean up the areas that are contaminated the most. One of these areas are the military bases across the world. The United States military was one of the biggest users of PFAS

products. They have used fire fighting foams that contain the chemical for decades at military bases across the United States and the world. PFAS has been leaching into water supplies around these bases. There has already been significant testing at military sites and the areas surrounding them.

There is much unknown about PFAS chemicals. There has been strides in recent years to understand them, but there are thousands of these compounds, and they all act differently. Some PFAS stay in soil, some stay at the surface water, and some leach deep into ground-water. Despite the different behavior between different compounds, there is currently only one method of testing. EPA 547 was developed for testing PFAS in water. Every lab has their own modification for soils and sediments, which creates a lack of systematic research furthering the insufficient knowledge about PFAS because the results of different labs cannot be compared accurately.

Solution

EnviroSampling Solutions have developed an innovative passive sampling device to lower the detection limit and monitor PFAS in sediments and soils. There are currently no other passive soil samplers on the market. There is a large gap for soil and sediment sampling in the PFAS industry, due to the focus on water. Grab samples are unreliable because where you collect the sample it could have a totally different PFAS level than 20 feet away. PFAS have shown to be extremely mobile, and there are currently no monitoring methods of this.

The samplers will be inserted into the soil or sediments and then monitored over time. For example; 20 samplers will be inserted, and after 30 days 10 are removed and tested, and then after 60 days the remaining samplers will be removed and tested. This will give more comprehensive results than just grab sampling. This will also give remediation companies a more accurate quote on how much remediation will cost. Companies will know exactly how conservative or aggressive they need to be regarding clean up efforts. The samplers are about quarter sized, and they consist of three stainless steel washers with about 0.5 mm thickness bolted together in four places with two 30 mm microporous membranes made of polyethersulfone with a 0.45 micrometer pore size and 600 mg of Strata XAW resin. After the samplers are deposited into the ground, the PFAS will diffuse through the membrane and accumulate into the Strata XAW resin.

Difference between active sampling and passive sampling: Active sampling means a technician has to physically go to the test site and grab however many samples they need. There are many different methods of collecting the samples, but they usually consist of the sampler staying as sterile as possible and using a tool to collect some of the soil or sediments which is depicted in Figure 1.0. The sample is then sent to a lab and tested. With this method, PFAS concentration cannot be monitored over time, and these compounds are very mobile especially in soil. Passive sampling will be beneficial by showing the contaminant linear uptake over time until it reaches equilibrium. This helps to understand the PFAS movement rates and bioaccumulation risks. With our passive samplers, the technicians would go and place the samplers in the soil, and then collect the samplers over a set period of time. This is a more accurate way to test for PFAS, and it would save the company who owns the site money because they can be more conservative in their remediation efforts or prevent them from paying fines for remediating the site enough.

Figure 1.0

Value Proposition

The value of a standardized soil and sediment testing method for PFAS is incredibly large. Passive sampling of soil and sediments will not only help further research efforts, but give companies having to remediate a more clear idea of the amount of remediation efforts necessary.

The current average cost for soil grab sampling is $300 per a sample. Amount of samples taken can vary between 5-20 per an acre. Our samplers will be sold at $100 per sampler, leading to significant cost savings for our customer.

These samplers provide value to companies like DuPont, 3M, the Department of Defense, and many more that will have to remediate extremely large areas. Passive sampling is a more informative and comprehensive approach that will allow the testing site to be monitored over time. This will lead to more accurate results, so the companies know exactly how much remediation is necessary.

Market Potential

Environmental monitoring is still a fairly new industry and continues to grow every year. The value of the global environmental sampling market is expected to grow by 7.5% between 2015 and 2020, and will exceed a value of $20 billion. As PFAS awareness grows, so will remediation efforts that are going to cost governments and companies like 3M and Dupont, who have used these compounds for decades, billions of dollars.

The environmental remediation market is expected to grow to $122.8 Billion by 2022. Zion Market Research has published a report titled “Environmental Remediation Market by Environmental Medium (Soil and Groundwater) for Oil and Gas, Agriculture, Automotive, Industrial, Chemical Processing, Construction and Land Development and Other Applications: Global Industry Perspective, Comprehensive Analysis, and Forecast, 2016-2022” In 2016, the environmental remediation market was only $79.57 Billion and currently the market is estimated to be $98.79 Billion. The drivers for the continuously growing market are increasing the demand for environmental accountability for both private and public institutions. This pressure has led to stringent state and federal laws in the United States and across the developed world.

The cost of remediation is currently what is slowing growth of the industry the most. There is a lack in remediation technology leading to very expensive processes. Innovations like ours will continue to be made in the industry, in order to lower costs and increase effectiveness of testing and remediation processes.

Market Research

There was a preliminary commercialization report done by Foresight Science and Technology. The report found that municipalities are slow adopters when it comes to new technology, companies like 3M outsource to environmental and engineering consulting firms. The US military will possibly be the biggest customer for PFAS remediation.

Dr. Dave Lampert, Hannah Weilert, and Becca Perez participated and completed the National Science Foundation grant program, I-Corps. During I-Corps, 34 interviews were completed. During these interviews the I-Corps team spoke to the leading PFAS experts from environmental consulting firms and labs. These interviews were with individuals all over the United States and Australia. We also spoke with a United States Air Force personnel, that had been leading the effort of PFAS sampling on their base in Oklahoma City, Oklahoma and in Ft. Smith, Arkansas. Becca Perez and Hannah Weilert also attended a PFAS information conference in Philadelphia, Pennsylvania, where they heard experts speak over PFAS and the efforts currently being made. This included the lawyer that lead the DuPont class action lawsuits for both the farmer and community in West Virginia.

During this research, the overwhelming need for a more standardized and accurate soil and sediment sampling method for PFAS became clear. Almost all of those interviewed agreed that the current modifications to EPA-547 are not efficient and are hindering the research being done.

Throughout the I-Corps program, the team made strides to develop a valid business model. One thing that became abundantly clear was that environmental consulting firms have the greatest ability to begin using new testing methods. All of the interviewees agreed that they were the best channel to use because they had long standing relationships with the entities that will need the samplers. Consulting firms are also always looking for new innovations because they want to provide the best possible advice to their customers, and having accurate results is apart of that. Other markets identified through our research include: biosolids, oil and gas, smaller manufacturing companies, and more.

Business Model

Due to the uniform results from both the Foresight report, and the results from the I-Corps research, we believe that environmental engineering consulting firms are the best indirect channel to our end users. These firms like Geosyntec, Suez, Battele, Antea Group, and more have already expressed interest in our product and have key relationships in the environmental industry. More importantly, they have established contracts and relationships with entities like the United States Military and conglomerates, such as 3M and DuPont. Connections like these are invaluable when developing an innovation that could become a standard method of soil and sediment sampling. These consulting firms are our beachhead market, and where we will be most aggressive with our sales and marketing efforts.

The samplers manufacturing will be outsourced to an overseas manufacturer to save on inventory and production cost. Some of the sampler can be re-used but will require for the sampler to be taken apart and then reassembled.

The customer will purchase a set of samplers, one set comes with 20 individual samplers. They will proceed to place the samplers in the testing locations, then they will recollect them and send them to Accurate labs, or a lab that has our approval to test the samplers. The comprehensive results will be given to the customer by the lab they chose to use.

Sales and Marketing Approach

EnviroSampling Technologies is primarily a B2B business and will follow a bottom-up sales approach. We will follow up with those who have already expressed interest in our samplers. Then will continue to reach out to our beachhead market of environmental and engineering consulting firms. To further customer visibility, we will continue to attend trade shows and environmental conferences. Through these methods, and by hiring sales associates as needed, we believe that our sampler will quickly become the standard for testing PFAS in soils and sediments.

Marketing the PFAS samplers will not be complicated. There are very specific people we need to target, and the best way to do this is through attending the conferences they will be at and emailing or cold calling. We will need to continue to market ourselves as a innovative sampling solution because there will continue to be innovations made in this growing industry.

Competitor Analysis

There are currently no passive sampling methods for PFAS in soils and sediments. While companies have been able to do nothing in the past that is all changing now. 3M and DuPont have already paid millions in reparations for allowing contamination to come from their plants. Now, there are state governments beginning to sue smaller companies as well. The current sampling method is EPA-547 which was developed for water testing. Future competitors are more of a concern to EnviroSampling Technologies, the industry is lagging behind with innovations, and as the industry continues to grow, so will entrants. Existing labs are competitors because they are currently doing soil and sediment grab samples. We are confident that the customer will see the inherent value in using our samplers, instead of traditional grab samples. EnviroSampling Technologies will have the first to market advantage with passive samplers for PFAS. To continually hold this advantage we will establish ourselves as the most reliable and cost efficient company to use.

Intellectual Property rights are still being established. When completed, royalties will be paid to Oklahoma State University and Accurate Laboratories.

Risk and Contingencies

Risk 1: We are currently still in the research and development phase of our product launch. This phase has significant risk associated with not getting desired results or the samplers not being as accurate as previously thought. We will continue to be stringent in our research and continue to develop the product, according to the schedule currently in place.

Risk 2: Lack of government regulation. As mentioned previously, the United States government, primarily the EPA, has been slow to act on this growing problem of PFAS contamination. One risk is that they will continue to lag behind the rest of the world in developing some regulations. To address this, we have already reached out to state officials in states, like New Jersey, where the state government is already legislating for PFAS contamination. We will also focus our sales efforts in Europe and Australia, where they have been consistently focusing government funding on PFAS contamination sites.

Risk 3: Emerging competitors. As mentioned in the competitor analysis section, this industry is growing extremely fast. There will continue to be innovations made and therefore will increase our competition. Again, we will establish EnviroSampling Technologies as the industry standard.

Operations

The management team currently includes: Dr. Dave Lampert, Hannah Weilert, and Becca Perez. Hannah Weilert is the acting CEO, and she has a B.S in Entrepreneurship and a B.S in Business Management. Ms. Weilert has been actively involved in several startup activities and has been an active participant in the commercialization research and development of this project. Dr. Dave Lampert is the Chief R&D Officer. Dr. Lampert has a PhD in Civil and Environmental Engineering. Dr. Lampert has many connections across varying industries and has established himself as a leading researcher in the environmental engineering community. Dr. Lampert thought of the passive soil sampler and has spearhead the research and development of the samplers. Becca Perez is the acting COO. Ms. Perez has a B.S in Civil and Environmental engineering from Oklahoma State University. Ms. Perez has been active in both the research and development in the laboratory and the commercialization research that has been done.

Exit Strategy

EnviroSampling Technology will seek acquisition from a firm that provides complimentary solutions. These firms are the environmental and engineering consulting firms that we had previously targeted as our beachhead market.

Financial Information:

Proforma Income Statement

		Year 1	Year 2	Year 3	Year 4	Year 5
Revenues:						
Product A		$0	$0	$2,000,000	$2,500,000	$3,000,000
Grants		$100,000	$599,027	$0	$0	$0
Freight/Shipping Revenue		$0	$0	$300,000	$375,000	$450,000
Total Revenues		$0	$0	$2,300,000	$2,875,000	$3,450,000
Cost of Good Sold		$0	$0	$800,000	$937,500	$1,035,000
Freight/Shipping Expenses		$0	$0	$200,000	$250,000	$300,000
Sales Commissions		$0	$0	$0	$0	$0
Gross Profit		$0	$0	$1,300,000	$1,687,500	$2,115,000
Gross Profit Margin		*0%*	*0%*	*57%*	*59%*	*61%*
Operating (Overhead) Expenses:						
Salaries		$0	$88,500	$568,000	$593,000	$618,000
Employee Taxes & Benefits		$0	$24,780	$159,040	$166,040	$173,040
Marketing Expenses		$23,000	$58,000	$74,000	$79,000	$84,000
Advertising Expenses		$3,000	$17,971	$60,000	$75,000	$90,000
Sales Travel		$0	$9,000	$18,000	$27,000	$36,000
Product Development & Testing		$100,000	$500,000	$75,000	$75,000	$75,000
Product Certification Expenses		$12,000	$12,000	$12,000	$24,000	$24,000
Internet/Website Expenses		$35,000	$18,000	$20,000	$30,000	$30,000
Travel Expenses		$0	$0	$24,000	$24,000	$24,000
Telephone Expenses		$1,000	$5,990	$20,000	$25,000	$30,000
Office Rent		$0	$2,160	$41,520	$42,240	$42,960
Insurance Expenses		$3,500	$20,966	$70,000	$87,500	$105,000
Accounting		$6,000	$12,000	$30,000	$30,000	$35,000
Legal		$12,000	$25,000	$25,000	$25,000	$25,000
Total Operating Expenses		$195,500	$794,367	$1,196,560	$1,302,780	$1,392,000
EBITDA		($195,500)	($794,367)	$103,440	$384,720	$723,000
				4%	*13%*	*21%*
Depreciation		$0	$0	$30,000	$51,667	$75,000
Interest Expense		$0	$0	$0	$0	$0
Pre-Tax Income		($195,500)	($794,367)	$73,440	$333,053	$648,000
EBT Profit Margin		*0%*	*0%*	*3%*	*12%*	*19%*

Proforma Balance Sheet

	Beg.	Year 1	Year 2	Year 3	Year 4	Year 5
Cash	$0	$109,931	$131,226	$114,681	$263,246	$681,998
Accounts Receivables	$0	$0	$0	$191,667	$239,583	$287,500
Inventory	$0	$0	$0	$200,000	$234,375	$258,750
Total Current Assets	$0	$109,931	$131,226	$506,348	$737,205	$1,228,248
Equipment	$0	$0	$0	$125,000	$200,000	$275,000
Office Furniture & Computers	$0	$0	$0	$15,000	$35,000	$60,000
Accumulated Depreciation	$0	$0	$0	($30,000)	($81,667)	($156,667)
Net PP&E	$0	$0	$0	$110,000	$153,333	$178,333
Total Assets	$0	$109,931	$131,226	$616,348	$890,538	$1,406,581
Account Payable	$0	$5,431	$22,066	$99,904	$114,313	$124,917
Bank Credit Line	$0	$0	$0	$0	$0	$0
Total Current Liabilities	$0	$5,431	$22,066	$99,904	$114,313	$124,917
Long-term Debt	$0	$0	$0	$0	$0	$0
Total Liabilities	$0	$5,431	$22,066	$99,904	$114,313	$124,917
Equity	$0	$200,000	$400,000	$750,000	$750,000	$750,000
Grants		$100,000	$699,027	$699,027	$699,027	$699,027
Retained Earnings	$0	($195,500)	($989,867)	($916,427)	($583,374)	$64,626
Tax Distribution	$0	$0	$0	($16,157)	($89,429)	($231,989)
Total Equity	$0	$104,500	$109,160	$516,443	$776,225	$1,281,665
Total Liabilities & Equity	$0	$109,931	$131,226	$616,348	$890,538	$1,406,581
Check Balance	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

Cash Flow:

		Year 1	Year 2	Year 3	Year 4	Year 5
Net Income		($195,500)	($794,367)	$73,440	$333,053	$648,000
Plus: Depreciation		$0	$0	$30,000	$51,667	$75,000
Operating Cash Flow		($195,500)	($794,367)	$103,440	$384,720	$723,000
Working Capital Requirements:						
Change in Accounts Receivables		$0	$0	($191,667)	($47,917)	($47,917)
Change in Inventory		$0	$0	($200,000)	($34,375)	($24,375)
Change in Accounts Payable		$5,431	$16,635	$77,839	$14,409	$10,603
Change in Bank Credit Line		$0	$0	$0	$0	$0
Subtotal Working Capital Requirements		$5,431	$16,635	($313,828)	($67,883)	($61,688)
Investment Capital Requirements:						
Change in Equipment		$0	$0	($125,000)	($75,000)	($75,000)
Change in Furniture & Equipment		$0	$0	($15,000)	($20,000)	($25,000)
Subtotal Investment Capital Requirements		$0	$0	($140,000)	($95,000)	($100,000)
Funding Sources:						
Change in Long-term Debt		$0	$0	$0	$0	$0
Change in Equity		$200,000	$200,000	$350,000	$0	$0
Tax Distribution-Members		$0	$0	($16,157)	($73,272)	($142,560)
Grants		$100,000	$599,027			
Subtotal Funding Sources		$300,000	$799,027	$333,843	($73,272)	($142,560)
Total Cash Flow		$109,931	$21,295	($16,545)	$148,565	$418,752
Beginning Cash		$0	$109,931	$131,226	$114,681	$263,246
Ending Cash		$109,931	$131,226	$114,681	$263,246	$681,998