

PERMA FIX ENVIRONMENTAL SERVICES INC
Form 10-K
April 01, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10-K

**ANNUAL REPORT PURSUANT TO SECTION 13 OR 15 (d) OF THE SECURITIES EXCHANGE ACT
OF 1934**

For the fiscal year ended December 31, 2018

or

**TRANSITION REPORT PURSUANT TO SECTION 13 OR 15 (d) OF THE SECURITIES EXCHANGE
ACT OF 1934**

For the transition period from _____ to _____

Commission File No. 1-11596

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

(Exact name of registrant as specified in its charter)

Delaware

State or other jurisdiction

58-1954497

of incorporation or organization (IRS Employer
Identification Number)

8302 Dunwoody Place, #250, **30350**
Atlanta, GA
(Address of principal executive offices) (Zip Code)

(770) 587-9898

(Registrant's telephone number)

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Common Stock, \$.001 Par Value	NASDAQ Capital Markets

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes [] No [X]

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.

Yes [] No [X]

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes [X] No []

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit and post such files).

Yes [X] No []

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Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained to the best of the Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. [X]

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See definition of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer [] Accelerated Filer [] Non-accelerated Filer [] Smaller reporting company [X] Emerging growth company []

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial standards provided pursuant to Section 13(a) of the Exchange Act []

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Act).

Yes [] No [X]

The aggregate market value of the Registrant's voting and non-voting common equity held by nonaffiliates of the Registrant computed by reference to the closing sale price of such stock as reported by NASDAQ as of the last business day of the most recently completed second fiscal quarter (June 30, 2018), was approximately \$49,793,255. For the purposes of this calculation, all directors and executive officers of the Registrant (as indicated in Item 12) have been deemed to be affiliates. Such determination should not be deemed an admission that such directors and executive officers, are, in fact, affiliates of the Registrant. The Company's Common Stock is listed on the NASDAQ Capital Markets.

As of February 15, 2019, there were 11,961,537 shares of the registrant's Common Stock, \$.001 par value, outstanding.

Documents incorporated by reference: None

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

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PART I

ITEM 1. BUSINESS

Company Overview and Principal Products and Services

Perma-Fix Environmental Services, Inc. (the Company, which may be referred to as we, us, or our), a Delaware corporation incorporated in December, 1990, is an environmental and environmental technology know-how company.

We have grown through acquisitions and internal growth. Our goal is to continue to focus on the safe and efficient operation of our three waste treatment facilities and on-site activities, identify and pursue strategic acquisitions to expand our market base, and conduct research and development (“R&D”) of innovative technologies to solve complex waste management challenges providing increased value to our clients. The Company continues to focus on expansion into both commercial and international markets to supplement government spending in the USA, from which a significant portion of the Company’s revenue is derived. This includes new services, new customers and increased market share in our current markets.

Additionally, our goal is for our majority-owned subsidiary, Perma-Fix Medical S.A. and its wholly-owned subsidiary, Perma-Fix Medical Corporation (“PFM Corporation” – a Delaware corporation) (together known as “PF Medical” or our “Medical Segment”), to raise the necessary capital or to partner with others willing to finance its activities, to continue its R&D activities in order to pursue commercialization of its medical isotope production technology (see “Medical Segment” below for further information in connection with this segment).

Segment Information and Foreign and Domestic Operations and Sales

The Company has three reportable segments. In accordance with Financial Accounting Standards Board (“FASB”) ASC 280, “Segment Reporting”, we define an operating segment as:

a business activity from which we may earn revenue and incur expenses;
whose operating results are regularly reviewed by the chief operating decision maker (“CODM”) to make decisions about resources to be allocated and assess its performance; and
for which discrete financial information is available.

TREATMENT SEGMENT reporting includes:

nuclear, low-level radioactive, mixed (waste containing both hazardous and low-level radioactive waste), hazardous and non-hazardous waste treatment, processing and disposal services primarily through three uniquely licensed (Nuclear Regulatory Commission or state equivalent) and permitted (U.S. Environmental Protection Agency (“EPA”) -or state equivalent) treatment and storage facilities held by the following subsidiaries: Perma-Fix of Florida, Inc. (“PFF”), Diversified Scientific Services, Inc., (“DSSI”), and Perma-Fix Northwest Richland, Inc. (“PFNWR”). The presence of nuclear and low-level radioactive constituents within the waste streams processed by this segment creates different and unique operational, processing and permitting/licensing requirements; and R&D activities to identify, develop and implement innovative waste processing techniques for problematic waste streams.

The Company has completed the physical on-site closure and decommissioning activities at its East Tennessee Materials and Energy Corporation (“M&EC”) facility (within our Treatment Segment and in closure status) in accordance with M&EC’s license and permit requirements, with final closure of the facility subject to completion of final surveys and regulatory approvals. The Company continues to transition operational capabilities to our other Treatment Segment facilities, subject to customer requirements and regulatory approvals.

For 2018, the Treatment Segment accounted for \$36,271,000, or 73.2%, of total revenue, as compared to \$37,750,000, or 75.9%, of total revenue for 2017. Treatment Segment revenues for 2018 and 2017 included revenues of \$155,000 and \$6,312,000 for the M&EC subsidiary, which is in closure status as discussed above. See “– Dependence Upon a Single or Few Customers” for further details and a discussion as to our Segments’ contracts with domestic government clients or with others as a subcontractor to government clients.

SERVICES SEGMENT, which includes:

-Technical services, which include:

- o professional radiological measurement and site survey of large government and commercial installations using advanced methods, technology and engineering;
- o integrated Occupational Safety and Health services including industrial hygiene (“IH”) assessments; hazardous materials surveys, e.g., exposure monitoring; lead and asbestos management/abatement oversight; indoor air quality evaluations; health risk and exposure assessments; health & safety plan/program development, compliance auditing and training services; and Occupational Safety and Health Administration (“OSHA”) citation assistance;
- o global technical services providing consulting, engineering, project management, waste management, environmental, and decontamination and decommissioning field, technical, and management personnel and services to commercial and government customers; and
- o on-site waste management services to commercial and governmental customers.

-Nuclear services, which include:

- o technology-based services including engineering, decontamination and decommissioning (“D&D”), specialty services, logistics, transportation, processing and disposal;
- o remediation of nuclear licensed and federal facilities and the remediation cleanup of nuclear legacy sites. Such services capability includes: project investigation; radiological engineering; partial and total plant D&D; facility decontamination, dismantling, demolition, and planning; site restoration; logistics; transportation; and emergency response; and

A company owned equipment calibration and maintenance laboratory that services, maintains, calibrates, and -sources (i.e., rental) health physics, IH and customized nuclear, environmental, and occupational safety and health (“NEOSH”) instrumentation.

-A company owned gamma spectroscopy laboratory for the analysis of oil and gas industry solids and liquids.

For 2018, the Services Segment accounted for \$13,268,000, or 26.8%, of total revenue, as compared to \$12,019,000, or 24.1%, of total revenue for 2017. See “ – Dependence Upon a Single or Few Customers” for further details and a discussion as to our Segments’ contracts with domestic government clients or with others as a subcontractor to government clients.

MEDICAL SEGMENT reporting includes: R&D costs for the new medical isotope production technology from our majority-owned Polish subsidiary (of which we own approximately 60.5% at December 31, 2018), PF Medical. The Medical Segment has not generated any revenue as it remains in the R&D stage. R&D costs consist primarily of employee salaries and benefits, laboratory costs, third party fees, and other related costs associated with the development of new technology. As previously disclosed, our Medical Segment ceased a substantial portion of its

R&D activities for the new medical isotope production technology due to the need for substantial capital to fund such activities. We anticipate that our Medical Segment will not restart its full scale R&D activities until it obtains the necessary funding or partners with others willing to provide the necessary funding.

Our Treatment and Services Segments provide services to research institutions, commercial companies, public utilities, and governmental agencies (domestic and foreign), including the U.S. Department of Energy (“DOE”) and U.S. Department of Defense (“DOD”). The distribution channels for our services are through direct sales to customers or via intermediaries.

Our corporate office is located at 8302 Dunwoody Place, Suite 250, Atlanta, Georgia 30350.

Foreign Revenue

Our consolidated revenue for 2018 and 2017 included approximately \$98,000, or 0.2%, and \$84,000, or 0.2%, respectively, from United Kingdom customers (including revenues generated by our United Kingdom subsidiary, Perma-Fix UK Limited (“PF UK Limited”)).

Our consolidated revenue for 2018 and 2017 included approximately \$1,140,000, or 2.3%, and \$1,073,000, or 2.2%, respectively, from Canadian customers (including revenues generated by our Perma-Fix of Canada, Inc. (“PF Canada”) subsidiary).

Importance of Patents, Trademarks and Proprietary Technology

We do not believe we are dependent on any particular trademark in order to operate our business or any significant segment thereof. We have received registration to May 2022 and December 2020, for the service marks “Perma-Fix Environmental Services” and “Perma-Fix”, respectively. We also have registration to April 2024 and April 2032 for two service marks for PF Canada. In addition, we have received registration to January 2027 for a service mark for our Safety and Ecology Corporation” or “SEC”.

We are active in the R&D of technologies that allow us to address certain of our customers’ environmental needs. To date, we have fifteen active patents and the filing of several applications for which patents are pending. These fifteen active patents have remaining lives ranging from approximately one to seventeen years. These active patents include a U.S and two international patent for new technology for the production of radiological isotopes for certain types of medical applications; and which have been licensed to PFM Corporation. These patents are effective through November 2035.

Permits and Licenses

Waste management service companies are subject to extensive, evolving and increasingly stringent federal, state, and local environmental laws and regulations. Such federal, state and local environmental laws and regulations govern our activities regarding the treatment, storage, processing, disposal and transportation of hazardous, non-hazardous and radioactive wastes, and require us to obtain and maintain permits, licenses and/or approvals in order to conduct our waste activities. We are dependent on our permits and licenses discussed below in order to operate our businesses. Failure to obtain and maintain our permits or approvals would have a material adverse effect on us, our operations, and financial condition. The permits and licenses have terms ranging from one to ten years, and provided that we maintain a reasonable level of compliance, renew with minimal effort, and cost. We believe that these permit and license requirements represent a potential barrier to entry for possible competitors.

PFF, located in Gainesville, Florida, operates its hazardous, mixed and low-level radioactive waste activities under a Resource Conservation and Recovery Act (“RCRA”) Part B permit, Toxic Substances Control Act (“TSCA”) authorization, Restricted RX Drug Distributor-Destruction license, and a radioactive materials license issued by the State of Florida.

DSSI, located in Kingston, Tennessee, conducts mixed and low-level radioactive waste storage and treatment activities under RCRA Part B permits and a radioactive materials license issued by the State of Tennessee Department of Environment and Conservation. Co-regulated TSCA Polychlorinated Biphenyl (“PCB”) wastes are also managed for PCB destruction under EPA Approval.

PFNWR, located in Richland, Washington, operates a low-level radioactive waste processing facility as well as a mixed waste processing facility. Radioactive material processing is authorized under radioactive materials licenses issued by the State of Washington and mixed waste processing is additionally authorized under a RCRA Part B permit with TSCA authorization issued jointly by the State of Washington and the EPA.

As previously discussed, our M&EC facility, located in Oak Ridge, is in closure status, with final closure of the facility subject to completion of final surveys and regulatory approval. The Company had previously fully impaired the permit value at our M&EC subsidiary. The permits at M&EC will be terminated upon completion of requirements pursuant to M&EC’s closure plan.

The combination of a RCRA Part B hazardous waste permit, TSCA authorization, and a radioactive materials license, as held by our Treatment Segment are very difficult to obtain for a single facility and make these facilities unique.

We believe that the permitting and licensing requirements, and the cost to obtain such permits, are barriers to the entry of hazardous waste and radioactive and mixed waste activities as presently operated by our waste treatment subsidiaries. If the permit requirements for hazardous waste treatment, storage, and disposal (“TSD”) activities and/or the licensing requirements for the handling of low level radioactive matters are eliminated or if such licenses or permits were made less rigorous to obtain, we believe such would allow companies to enter into these markets and provide greater competition.

Backlog

The Treatment Segment of our Company maintains a backlog of stored waste, which represents waste that has not been processed. The backlog is principally a result of the timing and complexity of the waste being brought into the facilities and the selling price per container. At December 31, 2018, our Treatment Segment had a backlog of approximately \$11,104,000, as compared to approximately \$7,666,000 at December 31, 2017. Additionally, the time it takes to process waste from the time it arrives may increase due to the types and complexities of the waste we are currently receiving. We typically process our backlog during periods of low waste receipts, which historically has been in the first or fourth quarters.

Dependence Upon a Single or Few Customers

Our Treatment and Services Segments have significant relationships with the federal government, and continue to enter into contracts, directly as the prime contractor or indirectly for others as a subcontractor, with the federal government. The contracts that we are a party to with the federal government or with others as a subcontractor to the federal government generally provide that the government may terminate or renegotiate the contracts on 30 days notice, at the government’s election. Our inability to continue under existing contracts that we have with the federal government (directly or indirectly as a subcontractor) could have a material adverse effect on our operations and financial condition.

We performed services relating to waste generated by domestic government clients (includes U.S federal, state and local), either directly as a prime contractor or indirectly as a subcontractor to government entities, representing approximately \$34,811,000, or 70.3%, of our total revenue during 2018, as compared to \$37,019,000, or 74.4%, of our total revenue during 2017.

As our revenues are project/event based where the completion of one contract with a specific customer may be replaced by another contract with a different customer from year to year, we do not believe the loss of one specific customer from one year to the next will generally have a material adverse effect on our operations and financial condition.

Competitive Conditions

The Treatment Segment's largest competitor is EnergySolutions ("ES") which operates treatment facilities in Oak Ridge, TN and Erwin, TN and a disposal facility for low level radioactive waste in Clive, UT. Waste Control Specialists ("WCS"), which has licensed disposal capabilities for low level radioactive waste in Andrews, TX, is also a competitor in the treatment market with increasing market share. We now have two options for disposal of treated nuclear waste and thus mitigate prior risk of ES providing the only outlet for disposal. The Treatment Segment treats and disposes of DOE generated wastes largely at DOE owned sites. Smaller competitors are also present in the market place; however, we believe they do not present a significant challenge at this time. Our Treatment Segment currently solicits business primarily on a North America basis with both government and commercial clients; however, we continue to focus on emerging international markets for additional work.

Our Services Segment is engaged in highly competitive businesses in which a number of our government contracts and some of our commercial contracts are awarded through competitive bidding processes. The extent of such competition varies according to the industries and markets in which our customers operate as well as the geographic areas in which we operate. The degree and type of competition we face is also often influenced by the project specification being bid on and the different specialty skill sets of each bidder for which our Services Segment competes, especially projects subject to the governmental bid process. We also have the ability to prime federal government small business procurements (small business set asides). Based on past experience, we believe that large businesses are more willing to team with small businesses in order to be part of these often substantial procurements. There are a number of qualified small businesses in our market that will provide intense competition that may provide a challenge to our ability to maintain strong growth rates and acceptable profit margins. For international business there are additional competitors, many from within the country the work is to be performed, making winning work in foreign countries more challenging. If our Services Segment is unable to meet these competitive challenges, it could lose market share and experience an overall reduction in its profits.

Certain Environmental Expenditures and Potential Environmental Liabilities

Environmental Liabilities

We have three remediation projects, which are currently in progress at our Perma-Fix of Dayton, Inc. (“PFD”), Perma-Fix of Memphis, Inc. (“PFM”), and Perma-Fix South Georgia, Inc. (“PFSG”) subsidiaries, which are all included within our discontinued operations. These remediation projects principally entail the removal/remediation of contaminated soil and, in most cases, the remediation of surrounding ground water. These remediation activities are closely reviewed and monitored by the applicable state regulators.

At December 31, 2018, we had total accrued environmental remediation liabilities of \$887,000, of which \$50,000 are recorded as a current liability, an increase of \$16,000 from the December 31, 2017 balance of \$871,000. The net increase presents an increase of approximately \$50,000 made to the reserve at our PFD subsidiary due to reassessment of the remediation reserve and payments of approximately \$34,000 on remediation projects for our PFD and PFSG subsidiaries.

No insurance or third party recovery was taken into account in determining our cost estimates or reserves.

The nature of our business exposes us to significant cost to comply with governmental environmental laws, rules and regulations and risk of liability for damages. Such potential liability could involve, for example, claims for cleanup costs, personal injury or damage to the environment in cases where we are held responsible for the release of hazardous materials; claims of employees, customers or third parties for personal injury or property damage occurring in the course of our operations; and claims alleging negligence or professional errors or omissions in the planning or performance of our services. In addition, we could be deemed a responsible party for the costs of required cleanup of properties, which may be contaminated by hazardous substances generated or transported by us to a site we selected, including properties owned or leased by us. We could also be subject to fines and civil penalties in connection with violations of regulatory requirements.

Research and Development (“R&D”)

Innovation and technical know-how by our operations is very important to the success of our business. Our goal is to discover, develop and bring to market innovative ways to process waste that address unmet environmental needs. We conduct research internally, and also through collaborations with other third parties. The majority of our research activities are performed as we receive new and unique waste to treat. Our competitors also devote resources to R&D

and many such competitors have greater resources at their disposal than we do. As previously discussed, our Medical Segment has ceased a substantial portion of its R&D activities due to the need for substantial capital to fund such activities. We continue to explore ways to raise this capital. We anticipate that our Medical Segment will not restart its full scale R&D activities until it obtains the necessary funding or find a partner willing to fund its R&D activities. During 2018 and 2017, we incurred approximately \$1,370,000 and \$1,595,000, respectively, in R&D activities, of which approximately \$811,000 and \$1,141,000, respectively, were spent by our Medical Segment for the R&D of its medical isotope production technology.

Number of Employees

In our service-driven business, our employees are vital to our success. We believe we have good relationships with our employees. At December 31, 2018, we employed approximately 258 employees, of whom 249 are full-time employees and 9 are part-time/temporary employees.

Governmental Regulation

Environmental companies, such as us, and their customers are subject to extensive and evolving environmental laws and regulations by a number of federal, state and local environmental, safety and health agencies, the principal of which being the EPA. These laws and regulations largely contribute to the demand for our services. Although our customers remain responsible by law for their environmental problems, we must also comply with the requirements of those laws applicable to our services. We cannot predict the extent to which our operations may be affected by future enforcement policies as applied to existing laws or by the enactment of new environmental laws and regulations. Moreover, any predictions regarding possible liability are further complicated by the fact that under current environmental laws we could be jointly and severally liable for certain activities of third parties over whom we have little or no control. Although we believe that we are currently in substantial compliance with applicable laws and regulations, we could be subject to fines, penalties or other liabilities or could be adversely affected by existing or subsequently enacted laws or regulations. The principal environmental laws affecting our customers and us are briefly discussed below.

The Resource Conservation and Recovery Act of 1976, as amended (“RCRA”)

RCRA and its associated regulations establish a strict and comprehensive permitting and regulatory program applicable to companies, such as us, that treat, store or dispose of hazardous waste. The EPA has promulgated regulations under RCRA for new and existing treatment, storage and disposal facilities including incinerators, storage and treatment tanks, storage containers, storage and treatment surface impoundments, waste piles and landfills. Every facility that treats, stores or disposes of hazardous waste must obtain a RCRA permit or must obtain interim status from the EPA, or a state agency, which has been authorized by the EPA to administer its program, and must comply with certain operating, financial responsibility and closure requirements.

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (“CERCLA,” also referred to as the “Superfund Act”)

CERCLA governs the cleanup of sites at which hazardous substances are located or at which hazardous substances have been released or are threatened to be released into the environment. CERCLA authorizes the EPA to compel responsible parties to clean up sites and provides for punitive damages for noncompliance. CERCLA imposes joint and several liabilities for the costs of clean up and damages to natural resources.

Health and Safety Regulations

The operation of our environmental activities is subject to the requirements of the OSHA and comparable state laws. Regulations promulgated under OSHA by the Department of Labor require employers of persons in the transportation and environmental industries, including independent contractors, to implement hazard communications, work practices and personnel protection programs in order to protect employees from equipment safety hazards and exposure to hazardous chemicals.

Atomic Energy Act

The Atomic Energy Act of 1954 governs the safe handling and use of Source, Special Nuclear and Byproduct materials in the U.S. and its territories. This act authorized the Atomic Energy Commission (now the Nuclear Regulatory Commission “USNRC”) to enter into “Agreements with states to carry out those regulatory functions in those respective states except for Nuclear Power Plants and federal facilities like the VA hospitals and the DOE operations.” The State of Florida (with the USNRC oversight), Office of Radiation Control, regulates the permitting and radiological program of the PFF facility, and the State of Tennessee (with the USNRC oversight), Tennessee Department of Radiological Health, regulates permitting and the radiological program of the DSSI and M&EC facilities. The State of Washington (with the USNRC oversight) Department of Health, regulates permitting and the radiological operations of the PFNWR facility.

Other Laws

Our activities are subject to other federal environmental protection and similar laws, including, without limitation, the Clean Water Act, the Clean Air Act, the Hazardous Materials Transportation Act and the TSCA. Many states have also adopted laws for the protection of the environment which may affect us, including laws governing the generation, handling, transportation and disposition of hazardous substances and laws governing the investigation and cleanup of, and liability for, contaminated sites. Some of these state provisions are broader and more stringent than existing federal law and regulations. Our failure to conform our services to the requirements of any of these other applicable federal or state laws could subject us to substantial liabilities which could have a material adverse effect on us, our operations and financial condition. In addition to various federal, state and local environmental regulations, our hazardous waste transportation activities are regulated by the U.S. Department of Transportation, the Interstate Commerce Commission and transportation regulatory bodies in the states in which we operate. We cannot predict the extent to which we may be affected by any law or rule that may be enacted or enforced in the future, or any new or different interpretations of existing laws or rules.

ITEM 1A. RISK FACTORS

The following are certain risk factors that could affect our business, financial performance, and results of operations. These risk factors should be considered in connection with evaluating the forward-looking statements contained in this Form 10-K, as the forward-looking statements are based on current expectations, and actual results and conditions could differ materially from the current expectations. Investing in our securities involves a high degree of risk, and before making an investment decision, you should carefully consider these risk factors as well as other information we include or incorporate by reference in the other reports we file with the Securities and Exchange Commission (the “Commission”).

Risks Relating to our Operations

Failure to maintain our financial assurance coverage that we are required to have in order to operate our permitted treatment, storage and disposal facilities could have a material adverse effect on us.

We maintain finite risk insurance policies and bonding mechanisms which provide financial assurance to the applicable states for our permitted facilities in the event of unforeseen closure of those facilities. We are required to provide and to maintain financial assurance that guarantees to the state that in the event of closure, our permitted facilities will be closed in accordance with the regulations. In the event that we are unable to obtain or maintain our financial assurance coverage for any reason, this could materially impact our operations and our permits which we are required to have in order to operate our treatment, storage, and disposal facilities.

If we cannot maintain adequate insurance coverage, we will be unable to continue certain operations.

Our business exposes us to various risks, including claims for causing damage to property and injuries to persons that may involve allegations of negligence or professional errors or omissions in the performance of our services. Such claims could be substantial. We believe that our insurance coverage is presently adequate and similar to, or greater than, the coverage maintained by other companies in the industry of our size. If we are unable to obtain adequate or required insurance coverage in the future, or if our insurance is not available at affordable rates, we would violate our permit conditions and other requirements of the environmental laws, rules, and regulations under which we operate. Such violations would render us unable to continue certain of our operations. These events would have a material adverse effect on our financial condition.

The inability to maintain existing government contracts or win new government contracts over an extended period could have a material adverse effect on our operations and adversely affect our future revenues.

A material amount of our Treatment and Services Segments' revenues are generated through various government contracts or subcontracts involving specifically the U.S. government. Our revenues from governmental contracts and subcontracts relating to domestic governmental facilities within our segments were approximately \$34,811,000, or 70.3%, and \$37,019,000, or 74.4%, of our consolidated operating revenues for 2018 and 2017, respectively. Most of our government contracts or our subcontracts granted under government contracts are awarded through a regulated competitive bidding process. Some government contracts are awarded to multiple competitors, which increase overall competition and pricing pressure and may require us to make sustained post-award efforts to realize revenues under these government contracts. All contracts with, or subcontracts involving, the federal government are terminable, or subject to renegotiation, by the applicable governmental agency on 30 days notice, at the option of the governmental agency. If we fail to maintain or replace these relationships, or if a material contract is terminated or renegotiated in a manner that is materially adverse to us, our revenues and future operations could be materially adversely affected.

Our existing and future customers may reduce or halt their spending on hazardous waste and nuclear services with outside vendors, including us.

A variety of factors may cause our existing or future customers (including the federal government) to reduce or halt their spending on hazardous waste and nuclear services from outside vendors, including us. These factors include, but are not limited to:

- accidents, terrorism, natural disasters or other incidents occurring at nuclear facilities or involving shipments of nuclear materials;
- failure of the federal government to approve necessary budgets, or to reduce the amount of the budget necessary, to fund remediation of DOE and DOD sites;
- civic opposition to or changes in government policies regarding nuclear operations;
- a reduction in demand for nuclear generating capacity; or
- failure to perform under existing contracts, directly or indirectly, with the federal government.

These events could result in or cause the federal government to terminate or cancel its existing contracts involving us to treat, store or dispose of contaminated waste and/or to perform remediation projects, at one or more of the federal sites since all contracts with, or subcontracts involving, the federal government are terminable upon or subject to renegotiation at the option of the government on 30 days notice. These events also could adversely affect us to the extent that they result in the reduction or elimination of contractual requirements, lower demand for nuclear services, burdensome regulation, disruptions of shipments or production, increased operational costs or difficulties or increased liability for actual or threatened property damage or personal injury.

Economic downturns and/or reductions in government funding could have a material negative impact on our businesses.

Demand for our services has been, and we expect that demand will continue to be, subject to significant fluctuations due to a variety of factors beyond our control, including economic conditions, reductions in the budget for spending to remediate federal sites due to numerous reasons, including, without limitation, the substantial deficits that the federal government has and is continuing to incur. During economic downturns and large budget deficits that the federal government and many states are experiencing, the ability of private and government entities to spend on waste services, including nuclear services, may decline significantly. Our operations depend, in large part, upon governmental funding, particularly funding levels at the DOE. Significant reductions in the level of governmental funding (for example, the annual budget of the DOE) or specifically mandated levels for different programs that are important to our business could have a material adverse impact on our business, financial position, results of operations and cash flows.

The loss of one or a few customers could have an adverse effect on us.

One or a few governmental customers or governmental related customers have in the past, and may in the future, account for a significant portion of our revenue in any one year or over a period of several consecutive years. Because customers generally contract with us for specific projects, we may lose these significant customers from year to year as their projects with us are completed. Our inability to replace the business with other similar significant projects could have an adverse effect on our business and results of operations.

As a government contractor, we are subject to extensive government regulation, and our failure to comply with applicable regulations could subject us to penalties that may restrict our ability to conduct our business.

Our governmental contracts, which are primarily with the DOE or subcontracts relating to DOE sites, are a significant part of our business. Allowable costs under U.S. government contracts are subject to audit by the U.S. government. If these audits result in determinations that costs claimed as reimbursable are not allowed costs or were not allocated in accordance with applicable regulations, we could be required to reimburse the U.S. government for amounts previously received.

Governmental contracts or subcontracts involving governmental facilities are often subject to specific procurement regulations, contract provisions and a variety of other requirements relating to the formation, administration, performance and accounting of these contracts. Many of these contracts include express or implied certifications of compliance with applicable regulations and contractual provisions. If we fail to comply with any regulations, requirements or statutes, our existing governmental contracts or subcontracts involving governmental facilities could be terminated or we could be suspended from government contracting or subcontracting. If one or more of our governmental contracts or subcontracts are terminated for any reason, or if we are suspended or debarred from government work, we could suffer a significant reduction in expected revenues and profits. Furthermore, as a result of our governmental contracts or subcontracts involving governmental facilities, claims for civil or criminal fraud may be brought by the government or violations of these regulations, requirements or statutes.

We are a holding company and depend, in large part, on receiving funds from our subsidiaries to fund our indebtedness.

Because we are a holding company and operations are conducted through our subsidiaries, our ability to meet our obligations depends, in large part, on the operating performance and cash flows of our subsidiaries.

Loss of certain key personnel could have a material adverse effect on us.

Our success depends on the contributions of our key management, environmental and engineering personnel. Our future success depends on our ability to retain and expand our staff of qualified personnel, including environmental specialists and technicians, sales personnel, and engineers. Without qualified personnel, we may incur delays in rendering our services or be unable to render certain services. We cannot be certain that we will be successful in our efforts to attract and retain qualified personnel as their availability is limited due to the demand for hazardous waste management services and the highly competitive nature of the hazardous waste management industry. We do not maintain key person insurance on any of our employees, officers, or directors.

Changes in environmental regulations and enforcement policies could subject us to additional liability and adversely affect our ability to continue certain operations.

We cannot predict the extent to which our operations may be affected by future governmental enforcement policies as applied to existing laws, by changes to current environmental laws and regulations, or by the enactment of new environmental laws and regulations. Any predictions regarding possible liability under such laws are complicated further by current environmental laws which provide that we could be liable, jointly and severally, for certain activities of third parties over whom we have limited or no control.

Our Treatment Segment has limited end disposal sites to utilize to dispose of its waste which could significantly impact our results of operations.

Our Treatment Segment has limited options available for disposal of its nuclear waste. Currently, there are only two disposal sites, each site having different owners, for our low level radioactive waste we receive from non-governmental sites, allowing us to take advantage of the pricing competition between the two sites. If either of these disposal sites ceases to accept waste or closes for any reason or refuses to accept the waste of our Treatment Segment, for any reason, we would be limited to only the one remaining site to dispose of our nuclear waste. With only one end disposal site to dispose of our waste, we could be subject to significantly increased costs which could negatively impact our results of operations.

Our businesses subject us to substantial potential environmental liability.

Our business of rendering services in connection with management of waste, including certain types of hazardous waste, low-level radioactive waste, and mixed waste (waste containing both hazardous and low-level radioactive waste), subjects us to risks of liability for damages. Such liability could involve, without limitation:

claims for clean-up costs, personal injury or damage to the environment in cases in which we are held responsible for the release of hazardous or radioactive materials;

claims of employees, customers, or third parties for personal injury or property damage occurring in the course of our operations; and

claims alleging negligence or professional errors or omissions in the planning or performance of our services.

Our operations are subject to numerous environmental laws and regulations. We have in the past, and could in the future, be subject to substantial fines, penalties, and sanctions for violations of environmental laws and substantial expenditures as a responsible party for the cost of remediating any property which may be contaminated by hazardous substances generated by us and disposed at such property, or transported by us to a site selected by us, including properties we own or lease.

As our operations expand, we may be subject to increased litigation, which could have a negative impact on our future financial results.

Our operations are highly regulated and we are subject to numerous laws and regulations regarding procedures for waste treatment, storage, recycling, transportation, and disposal activities, all of which may provide the basis for litigation against us. In recent years, the waste treatment industry has experienced a significant increase in so-called “toxic-tort” litigation as those injured by contamination seek to recover for personal injuries or property damage. We believe that, as our operations and activities expand, there will be a similar increase in the potential for litigation alleging that we have violated environmental laws or regulations or are responsible for contamination or pollution caused by our normal operations, negligence or other misconduct, or for accidents, which occur in the course of our business activities. Such litigation, if significant and not adequately insured against, could adversely affect our financial condition and our ability to fund our operations. Protracted litigation would likely cause us to spend significant amounts of our time, effort, and money. This could prevent our management from focusing on our operations and expansion.

Our operations are subject to seasonal factors, which cause our revenues to fluctuate.

We have historically experienced reduced revenues and losses during the first and fourth quarters of our fiscal years due to a seasonal slowdown in operations from poor weather conditions, overall reduced activities during these periods resulting from holiday periods, and finalization of government budgets during the fourth quarter of each year. During our second and third fiscal quarters there has historically been an increase in revenues and operating profits. If we do not continue to have increased revenues and profitability during the second and third fiscal quarters, this could have a material adverse effect on our results of operations and liquidity.

If environmental regulation or enforcement is relaxed, the demand for our services will decrease.

The demand for our services is substantially dependent upon the public's concern with, and the continuation and proliferation of, the laws and regulations governing the treatment, storage, recycling, and disposal of hazardous, non-hazardous, and low-level radioactive waste. A decrease in the level of public concern, the repeal or modification of these laws, or any significant relaxation of regulations relating to the treatment, storage, recycling, and disposal of hazardous waste and low-level radioactive waste would significantly reduce the demand for our services and could have a material adverse effect on our operations and financial condition. We are not aware of any current federal or state government or agency efforts in which a moratorium or limitation has been, or will be, placed upon the creation of new hazardous or radioactive waste regulations that would have a material adverse effect on us; however, no assurance can be made that such a moratorium or limitation will not be implemented in the future.

We and our customers operate in a politically sensitive environment, and the public perception of nuclear power and radioactive materials can affect our customers and us.

We and our customers operate in a politically sensitive environment. Opposition by third parties to particular projects can limit the handling and disposal of radioactive materials. Adverse public reaction to developments in the disposal of radioactive materials, including any high profile incident involving the discharge of radioactive materials, could directly affect our customers and indirectly affect our business. Adverse public reaction also could lead to increased regulation or outright prohibition, limitations on the activities of our customers, more onerous operating requirements or other conditions that could have a material adverse impact on our customers' and our business.

We may be exposed to certain regulatory and financial risks related to climate change.

Climate change is receiving ever increasing attention from scientists and legislators alike. The debate is ongoing as to the extent to which our climate is changing, the potential causes of this change and its potential impacts. Some attribute global warming to increased levels of greenhouse gases, including carbon dioxide, which has led to significant legislative and regulatory efforts to limit greenhouse gas emissions.

Presently there are no federally mandated greenhouse gas reduction requirements in the United States. However, there are a number of legislative and regulatory proposals to address greenhouse gas emissions, which are in various phases of discussion or implementation. The outcome of federal and state actions to address global climate change could result in a variety of regulatory programs including potential new regulations. Any adoption by federal or state governments mandating a substantial reduction in greenhouse gas emissions could increase costs associated with our operations. Until the timing, scope and extent of any future regulation becomes known, we cannot predict the effect on our financial position, operating results and cash flows.

We may not be successful in winning new business mandates from our government and commercial customers or international customers.

We must be successful in winning mandates from our government, commercial customers and international customers to replace revenues from projects that we have completed or that are nearing completion and to increase our revenues. Our business and operating results can be adversely affected by the size and timing of a single material contract.

The elimination or any modification of the Price-Anderson Acts indemnification authority could have adverse consequences for our business.

The Atomic Energy Act of 1954, as amended, or the AEA, comprehensively regulates the manufacture, use, and storage of radioactive materials. The Price-Anderson Act (“PAA”) supports the nuclear services industry by offering broad indemnification to DOE contractors for liabilities arising out of nuclear incidents at DOE nuclear facilities. That indemnification protects DOE prime contractor, but also similar companies that work under contract or subcontract for a DOE prime contract or transporting radioactive material to or from a site. The indemnification authority of the DOE under the PAA was extended through 2025 by the Energy Policy Act of 2005.

Under certain conditions, the PAA’s indemnification provisions may not apply to our processing of radioactive waste at governmental facilities, and may not apply to liabilities that we might incur while performing services as a

contractor for the DOE and the nuclear energy industry. If an incident or evacuation is not covered under PAA indemnification, we could be held liable for damages, regardless of fault, which could have an adverse effect on our results of operations and financial condition. If such indemnification authority is not applicable in the future, our business could be adversely affected if the owners and operators of new facilities fail to retain our services in the absence of commercial adequate insurance and indemnification.

We are engaged in highly competitive businesses and typically must bid against other competitors to obtain major contracts.

We are engaged in highly competitive business in which most of our government contracts and some of our commercial contracts are awarded through competitive bidding processes. We compete with national and regional firms with nuclear and/or hazardous waste services practices, as well as small or local contractors. Some of our competitors have greater financial and other resources than we do, which can give them a competitive advantage. In addition, even if we are qualified to work on a new government contract, we might not be awarded the contract because of existing government policies designed to protect certain types of businesses and under-represented minority contractors. Although we believe we have the ability to certify and bid government contract as a small business, there are a number of qualified small businesses in our market that will provide intense competition. For international business, which we continue to focus on, there are additional competitors, many from within the country the work is to be performed, making winning work in foreign countries more challenging. Competition places downward pressure on our contract prices and profit margins. If we are unable to meet these competitive challenges, we could lose market share and experience an overall reduction in our profits.

Our failure to maintain our safety record could have an adverse effect on our business.

Our safety record is critical to our reputation. In addition, many of our government and commercial customers require that we maintain certain specified safety record guidelines to be eligible to bid for contracts with these customers. Furthermore, contract terms may provide for automatic termination in the event that our safety record fails to adhere to agreed-upon guidelines during performance of the contract. As a result, our failure to maintain our safety record could have a material adverse effect on our business, financial condition and results of operations.

We may be unable to utilize loss carryforwards in the future.

We have approximately \$21,277,000 and \$76,312,000 in net operating loss carryforwards for federal and state income tax purposes, respectively, which will expire in various amounts starting in 2021 if not used against future federal and state income tax liabilities, respectively. Our net loss carryforwards are subject to various limitations. Our ability to use the net loss carryforwards depends on whether we are able to generate sufficient income in the future years. Further, our net loss carryforwards have not been audited or approved by the Internal Revenue Service.

If any of our permits, other intangible assets, and tangible assets becomes impaired, we may be required to record significant charges to earnings.

Under accounting principles generally accepted in the United States (“U.S. GAAP”), we review our intangible and tangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Our permits are tested for impairment at least annually. Factors that may be considered a change in circumstances, indicating that the carrying value of our permit, other intangible assets, and tangible assets may not be recoverable, include a decline in stock price and market capitalization, reduced future cash flow estimates, and slower growth rates in our industry. We may be required, in the future, to record impairment charges in our financial statements, in which any impairment of our permit, other intangible assets, and tangible assets is determined. Such impairment charges could negatively impact our results of operations.

We bear the risk of cost overruns in fixed-price contracts. We may experience reduced profits or, in some cases, losses under these contracts if costs increase above our estimates.

Our revenues may be earned under contracts that are fixed-price in nature. Fixed-price contracts expose us to a number of risks not inherent in cost-reimbursable contracts. Under fixed price and guaranteed maximum-price contracts, contract prices are established in part on cost and scheduling estimates which are based on a number of

assumptions, including assumptions about future economic conditions, prices and availability of labor, equipment and materials, and other exigencies. If these estimates prove inaccurate, or if circumstances change such as unanticipated technical problems, difficulties in obtaining permits or approvals, changes in laws or labor conditions, weather delays, cost of raw materials or our suppliers' or subcontractors' inability to perform, cost overruns may occur and we could experience reduced profits or, in some cases, a loss for that project. Errors or ambiguities as to contract specifications can also lead to cost-overruns.

Adequate bonding is necessary for us to win certain types of new work and support facility closure requirements.

We are often required to provide performance bonds to customers under fixed-price contracts, primarily within our Services Segment. These surety instruments indemnify the customer if we fail to perform our obligations under the contract. If a bond is required for a particular project and we are unable to obtain it due to insufficient liquidity or other reasons, we may not be able to pursue that project. In addition, we provide bonds to support financial assurance in the event of facility closure pursuant to state requirements. We currently have a bonding facility but, the issuance of bonds under that facility is at the surety's sole discretion. Moreover, due to events that affect the insurance and bonding markets generally, bonding may be more difficult to obtain in the future or may only be available at significant additional cost. There can be no assurance that bonds will continue to be available to us on reasonable terms. Our inability to obtain adequate bonding and, as a result, to bid on new work could have a material adverse effect on our business, financial condition and results of operations.

Failure to maintain effective internal control over financial reporting or failure to remediate a material weakness in internal control over financial reporting could have a material adverse effect on our business, operating results, and stock price.

Maintaining effective internal control over financial reporting is necessary for us to produce reliable financial reports and is important in helping to prevent financial fraud. If we are unable to maintain adequate internal controls, our business and operating results could be harmed. We are required to satisfy the requirements of Section 404(a) of Sarbanes Oxley and the related rules of the Commission, which require, among other things, management to assess annually the effectiveness of our internal control over financial reporting. If we are unable to maintain adequate internal control over financial reporting or effectively remediate any material weakness identified in internal control over financial reporting, there is a reasonable possibility that a misstatement of our annual or interim financial statements will not be prevented or detected in a timely manner. If we cannot produce reliable financial reports, investors could lose confidence in our reported financial information, the market price of our common stock could decline significantly, and our business, financial condition, and reputation could be harmed.

Systems failures, interruptions or breaches of security and other cyber security risks could have an adverse effect on our financial condition and results of operations.

We are subject to certain operational risks to our information systems. Because of efforts on the part of computer hackers and cyberterrorists to breach data security of companies, we face risk associated with potential failures to adequately protect critical corporate, customer and employee data. As part of our business, we develop and retain confidential data about us and our customers, including the U.S. government. We also rely on the services of a variety of vendors to meet our data processing and communications needs.

Despite our implemented security measures and established policies, we cannot be certain that all of our systems are entirely free from vulnerability to attack or other technological difficulties or failures or failures on the part of our employees to follow our established security measures and policies. Information security risks have increased significantly. Our technologies, systems, and networks may become the target of cyber-attacks, computer viruses, malicious code, or information security breaches that could result in the unauthorized release, gathering, monitoring, misuse, loss or destruction of our or our customers' confidential, proprietary and other information and the disruption of our business operations. A security breach could adversely impact our customer relationships, reputation and operation and result in violations of applicable privacy and other laws, financial loss to us or to our customers or to our employees, and litigation exposure. While we maintain a system of internal controls and procedures, any breach, attack, or failure as discussed above could have a material adverse impact on our business, financial condition, and results of operations or liquidity.

There is also an increasing attention on the importance of cybersecurity relating to infrastructure. This creates the potential for future developments in regulations relating to cybersecurity that may adversely impact us, our customers

and how we offer our services to our customers.

Risks Relating to our Intellectual Property

If we cannot maintain our governmental permits or cannot obtain required permits, we may not be able to continue or expand our operations.

We are a nuclear services and waste management company. Our business is subject to extensive, evolving, and increasingly stringent federal, state, and local environmental laws and regulations. Such federal, state, and local environmental laws and regulations govern our activities regarding the treatment, storage, recycling, disposal, and transportation of hazardous and non-hazardous waste and low-level radioactive waste. We must obtain and maintain permits or licenses to conduct these activities in compliance with such laws and regulations. Failure to obtain and maintain the required permits or licenses would have a material adverse effect on our operations and financial condition. If any of our facilities are unable to maintain currently held permits or licenses or obtain any additional permits or licenses which may be required to conduct its operations, we may not be able to continue those operations at these facilities, which could have a material adverse effect on us.

We believe our proprietary technology is important to us.

We believe that it is important that we maintain our proprietary technologies. There can be no assurance that the steps taken by us to protect our proprietary technologies will be adequate to prevent misappropriation of these technologies by third parties. Misappropriation of our proprietary technology could have an adverse effect on our operations and financial condition. Changes to current environmental laws and regulations also could limit the use of our proprietary technology.

Risks Relating to our Financial Position and Need for Financing

Breach of any of the covenants in our credit facility could result in a default, triggering repayment of outstanding debt under the credit facility.

Our credit facility with our bank contains financial covenants. A breach of any of these covenants could result in a default under our credit facility triggering our lender to immediately require the repayment of all outstanding debt under our credit facility and terminate all commitments to extend further credit. Our fixed charge coverage ratio fell below the minimum quarterly requirement under our credit facility in the fourth quarter of 2018; however, we have obtained a waiver for this non-compliance from our lender. Additionally, our lender also has provided certain amendments to our fixed charge coverage ratio requirements for 2019 which will enable us to meet our quarterly fixed charge coverage ratio requirements. If we fail to meet any of our financial covenants going forward, including the minimum quarterly fixed charge coverage ratio requirement, and our lender does not further waive the non-compliance or further revise our covenant requirement so that we are in compliance, our lender could accelerate the payment of our borrowings under our credit facility. In such event, we may not have sufficient liquidity to repay our debt under our credit facility and other indebtedness.

Our debt and borrowing availability under our credit facility could adversely affect our operations.

At December 31, 2018, our aggregate consolidated debt was approximately \$3,302,000. Our Amended and Restated Revolving Credit, Term Loan and Security Agreement, dated October 31, 2011, as subsequently amended (“Revised Loan Agreement”) provides for a total credit facility commitment of approximately \$18,100,000, consisting of a \$12,000,000 revolving line of credit and a term loan of \$6,100,000. The maximum we can borrow under the revolving part of the credit facility is based on a percentage of the amount of our eligible receivables outstanding at any one time reduced by outstanding standby letters of credit and any borrowing reduction that our lender may impose from time to time. At December 31, 2018, we had borrowings under the revolving part of our credit facility of approximately \$639,000 and borrowing availability of up to an additional \$2,368,000. A lack of positive operating results could have material adverse consequences on our ability to operate our business. Our ability to make principal and interest

payments, to refinance indebtedness, and borrow under our credit facility will depend on both our and our subsidiaries' future operating performance and cash flow. Prevailing economic conditions, interest rate levels, and financial, competitive, business, and other factors affect us. Many of these factors are beyond our control.

Our indebtedness could limit our financial and operating activities, and adversely affect our ability to incur additional debt to fund future needs.

As a result of our indebtedness, we could, among other things, be:

- required to dedicate a substantial portion of our cash flow to the payment of principal and interest, thereby reducing the funds available for operations and future business opportunities;
- make it more difficult for us to satisfy our obligations;
- limit our ability to borrow additional money if needed for other purposes, including working capital, capital expenditures, debt service requirements, acquisitions and general corporate or other purposes, on satisfactory terms or at all;
- limit our ability to adjust to changing economic, business and competitive conditions;
- place us at a competitive disadvantage with competitors who may have less indebtedness or greater access to financing;
- make us more vulnerable to an increase in interest rates, a downturn in our operating performance or a decline in general economic conditions; and

make us more susceptible to changes in credit ratings, which could impact our ability to obtain financing in the future and increase the cost of such financing.

Any of the foregoing could adversely impact our operating results, financial condition, and liquidity. Our ability to continue our operations depends on our ability to generate profitable operations or complete equity or debt financings to increase our capital.

Risks Relating to our Common Stock

Issuance of substantial amounts of our Common Stock could depress our stock price.

Any sales of substantial amounts of our Common Stock in the public market could cause an adverse effect on the market price of our Common Stock and could impair our ability to raise capital through the sale of additional equity securities. The issuance of our Common Stock will result in the dilution in the percentage membership interest of our stockholders and the dilution in ownership value. At December 31, 2018, we had 11,936,573 shares of Common Stock outstanding.

In addition, at December 31, 2018, we had outstanding options to purchase 616,000 shares of our Common Stock at exercise prices ranging from \$2.79 to \$13.35 per share. Further, our preferred share rights plan, if triggered, could result in the issuance of a substantial amount of our Common Stock. The existence of this quantity of rights to purchase our Common Stock under the preferred share rights plan could result in a significant dilution in the percentage ownership interest of our stockholders and the dilution in ownership value. Future sales of the shares issuable could also depress the market price of our Common Stock.

We do not intend to pay dividends on our Common Stock in the foreseeable future.

Since our inception, we have not paid cash dividends on our Common Stock, and we do not anticipate paying any cash dividends in the foreseeable future. Our credit facility prohibits us from paying cash dividends on our Common Stock without prior approval from our lender.

The price of our Common Stock may fluctuate significantly, which may make it difficult for our stockholders to resell our Common Stock when a stockholder wants or at prices a stockholder finds attractive.

The price of our Common Stock on the NASDAQ Capital Markets constantly changes. We expect that the market price of our Common Stock will continue to fluctuate. This may make it difficult for our stockholders to resell the Common Stock when a stockholder wants or at prices a stockholder finds attractive.

Future issuance of our Common Stock could adversely affect the price of our Common Stock, our ability to raise funds in new stock offerings and could dilute the percentage ownership of our common stockholders.

Future sales of substantial amounts of our Common Stock or equity-related securities in the public market, or the perception that such sales or conversions could occur, could adversely affect prevailing trading prices of our Common Stock and could dilute the value of Common Stock held by our existing stockholders. No prediction can be made as to the effect, if any, that future sales of shares of our Common Stock or the availability of shares of our Common Stock for future sale will have on the trading price of our Common Stock. Such future sales or conversions could also significantly reduce the percentage ownership of our common stockholders.

Delaware law, certain of our charter provisions, our stock option plans, outstanding warrants and our Preferred Stock may inhibit a change of control under circumstances that could give you an opportunity to realize a premium over prevailing market prices.

We are a Delaware corporation governed, in part, by the provisions of Section 203 of the General Corporation Law of Delaware, an anti-takeover law. In general, Section 203 prohibits a Delaware public corporation from engaging in a “business combination” with an “interested stockholder” for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. As a result of Section 203, potential acquirers may be discouraged from attempting to effect acquisition transactions with us, thereby possibly depriving our security holders of certain opportunities to sell, or otherwise dispose of, such securities at above-market prices pursuant to such transactions. Further, certain of our option plans provide for the immediate acceleration of, and removal of restrictions from, options and other awards under such plans upon a “change of control” (as defined in the respective plans). Such provisions may also have the result of discouraging acquisition of us.

We have authorized and unissued 17,439,785 (which include shares issuable under outstanding options to purchase 616,000 shares of our Common Stock) shares of our Common Stock and 2,000,000 shares of our Preferred Stock as of December 31, 2018 (which includes 50,000 shares of our Preferred Stock reserved for issuance under our new preferred share rights plan discussed below). These unissued shares could be used by our management to make it more difficult for, and thereby discourage an attempt to acquire control of us.

Our Preferred Share Rights Plan may adversely affect our stockholders.

In May 2018, the Company adopted a new Preferred Share Purchase Rights Plan (“Rights Plan”) to replace a 2008 rights plan which expired on May 2, 2018 (“Expiring Rights Plan”). As part of the Rights Plan, the Company’s Board of Directors (“Board”) declared a dividend distribution of one Preferred Share Purchase Right (“Right”) on each outstanding share of the Company’s Common Stock to stockholders of record on May 12, 2018. The new Rights Plan is designed to assure that all of the Company’s shareholders receive fair and equal treatment in the event of any proposed takeover of the Company and to guard against partial tender abusive tactics to gain control of the Company.

In general, the Rights under the Rights Plan will be exercisable only if a person or group acquires beneficial ownership of 15% or more of the Company’s Common Stock or announces a tender or exchange offer, the consummation of which would result in ownership by a person or group of 15% or more of the Common Stock (with certain exceptions). Each Right under the Rights Plan (other than the Rights owned by such acquiring person or members of such group which are void) will entitle shareholders to buy one one-thousandth of a share of a new series of participating preferred stock at an exercise price of \$20.00. Each one one-thousandth of a share of such new preferred stock purchasable upon exercise of a Right has economic terms designed to approximate the value of one share of Common Stock. Shareholders who have beneficial ownership of 15% or more at the adoption of the new Rights Plan are grandfathered in, but may not acquire additional shares without triggering the new Rights Plan.

If the Company is acquired in a merger or other business combination transaction, each Right will entitle its holder (other than Rights owned by such acquiring person or members of such group which are void) to purchase, at the Right’s then current exercise price, a number of the acquiring company’s common shares having a market value at the time of twice the Right’s exercise price.

In addition, if a person or group (with certain exceptions) acquires 15% or more of the Company’s outstanding Common Stock, each Right will entitle its holder (other than the Rights owned by such acquiring person or members of such group which are void) to purchase, in lieu of preferred stock, at the Right’s then current exercise price, a number of shares of the Company’s Common Stock having a market value of twice the Right’s exercise price.

Following the acquisition by a person or group of beneficial ownership of 15% or more of the Company's outstanding Common Stock (with certain exceptions), and prior to an acquisition of 50% or more of the Company's Common Stock by such person or group, the Company's Board may, at its option, exchange the Rights (other than Rights owned by such acquiring person or members of such group) in whole or in part, for shares of the Company's Common Stock at an exchange ratio of one share of Common Stock (or one one-thousandth of a share of the new series of participating preferred stock) per Right.

Prior to the acquisition by a person or group of beneficial ownership of 15% or more of the Company's Common Stock (with certain exceptions), the Rights are redeemable for \$0.001 per Right at the option of the Board of Directors.

The Rights Plan is to terminate the earliest of (1) close of business on May 2, 2019, (2) the time at which the Rights are redeemed, (3) the time at which the Rights are exchange, or (4) closing of any merger or acquisition of the Company which has been approved by the Board of Directors prior to any person becoming such an acquiring person.

The Rights will cause substantial dilution to a person or group that attempts to acquire us on terms not approved by our Board. The Rights should not interfere with any merger or other business combination approved by our Board.

ITEM 1B. UNRESOLVED STAFF COMMENTS

Not Applicable.

ITEM 2. PROPERTIES

Our principal executive office is in Atlanta, Georgia. Our Business Center is located in Oak Ridge, Tennessee. Our Treatment Segment facilities are located in Gainesville, Florida; Kingston, Tennessee; and Richland, Washington. Our Services Segment maintains offices as noted below, which are all leased properties. We maintain properties in Valdosta, Georgia and Memphis, Tennessee, which are all non-operational and are included within our discontinued operations.

The properties where three of our facilities operate on (Kingston, Tennessee; Gainesville, Florida; and Richland, Washington) are held by our senior lender as collateral for our credit facility. The Company currently leases properties in the following locations:

Location	Square Footage	Expiration of Lease
Oak Ridge, TN (Business Center)	14,932	May 1, 2022
Oak Ridge, TN (SEC)	5,000	September 30, 2019
Blaydon On Tyne, England (PF UK Limited)	1,000	Monthly
New Brighton, PA (SEC)	3,558	June 30, 2022
Newport, KY (SEC)	1,566	Monthly
Friendly, WV (SEC)	320	Monthly
Pembroke, Ontario, Canada (SEC)	800	Monthly
Atlanta, GA (Corporate)	6,499	February 28, 2021

We believe that the above facilities currently provide adequate capacity for our operations and that additional facilities are readily available in the regions in which we operate, which could support and supplement our existing facilities.

Our M&EC facility (within our Treatment Segment), located in Oak Ridge, TN, is currently in closure status. The lease for the facility expired on March 31, 2019.

ITEM 3. LEGAL PROCEEDINGS

In the normal course of conducting our business, we may become involved in litigation or be subject to local, state and federal agency (government) proceedings. We are not a party to any litigation or governmental proceeding, which our management believes could result in any judgments or fines that would have a material adverse effect on our financial position, liquidity or results of future operations.

ITEM 4. MINE SAFETY DISCLOSURE

Not Applicable.

PART II**ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY AND RELATED STOCKHOLDER MATTERS**

Our Common Stock is traded on the NASDAQ Capital Markets ("NASDAQ") under the symbol "PESI." The following table sets forth the high and low market trade prices quoted for the Common Stock during the periods shown. The source of such quotations and information is the NASDAQ online trading history reports.

		2018		2017	
		Low	High	Low	High
Common Stock	1 st Quarter	\$3.29	\$4.26	\$2.85	\$4.00
	2 nd Quarter	4.10	5.15	2.95	3.85
	3 rd Quarter	4.05	5.00	3.25	4.30
	4 th Quarter	1.90	4.57	3.40	4.05

At February 15, 2019, there were approximately 191 stockholders of record of our Common Stock, including brokerage firms and/or clearing houses holding shares of our Common Stock for their clientele (with each brokerage house and/or clearing house being considered as one holder). However, we have been advised that the total number of beneficial stockholders at February 15, 2019 was approximately 2,045.

Since our inception, we have not paid any cash dividends on our Common Stock and have no dividend policy. Our Revised Loan Agreement prohibits us from paying any cash dividends on our Common Stock without prior approval from our lender. We do not anticipate paying cash dividends on our outstanding Common Stock in the foreseeable future.

There were no purchases made by us or on behalf of us or any of our affiliated members of shares of our Common Stock during 2018.

On May 30, 2018, the Company completed an exchange offer of the Series B Preferred Stock of its wholly-owned subsidiary, M&EC, resulting in the issuance of 134,994 unregistered shares of the Company's Common Stock in a private placement pursuant to an exemption from registration under the Securities Act of 1933, as amended (the "Act"). See Note 8 "Series B Preferred Stock" in Part II, Item 8, "Financial Statements and Supplementary Data" for the issuance of the 134,994 shares which is incorporated herein by reference.

In May 2018, we adopted a new preferred share rights plan (the “Rights Plan”), which is designed to protect us against certain creeping acquisitions, open market purchases, and certain mergers and other combinations with acquiring companies. The Rights Plan terminates at the earliest of (1) close of business on May 2, 2019, (2) the time at which the Rights are redeemed, (3) the time at which the Rights are exchange, or (4) closing of any merger or acquisition of the Company approved by the Board prior to any person becoming acquiring person.

See Item 1A. - Risk Factors – “Our Preferred Share Rights Plan may adversely affect our stockholders” as to further discussion relating to the terms of our new Rights Plan in addition to its termination date.

See Note 6 “Capital Stock, Stock Plans, Warrants, and Stock Based Compensation” in Part II, Item 8, “Financial Statements and Supplementary Data” and “Equity Compensation Plan” in Part III, Item 12, “Security Ownership of Certain Beneficial Owners and Management and Related Stockholders Matter” for securities authorized for issuance under equity compensation plans which are incorporated herein by reference.

ITEM 6. SELECTED FINANCIAL DATA

Not required under Regulation S-K for smaller reporting companies.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Certain statements contained within this "Management's Discussion and Analysis of Financial Condition and Results of Operations" ("MD&A") may be deemed "forward-looking statements" within the meaning of Section 27A of the Act, and Section 21E of the Securities Exchange Act of 1934, as amended (collectively, the "Private Securities Litigation Reform Act of 1995"). See "Special Note regarding Forward-Looking Statements" contained in this report.

Management's discussion and analysis is based, among other things, upon our audited consolidated financial statements and includes our accounts, the accounts of our wholly-owned subsidiaries and the accounts of our majority-owned Polish subsidiary, after elimination of all significant intercompany balances and transactions.

The following discussion and analysis should be read in conjunction with our consolidated financial statements and the notes thereto included in Item 8 of this report.

Review

Revenue decreased \$230,000, or 0.5%, to \$49,539,000 for the twelve months ended December 31, 2018 from \$49,769,000 for the corresponding period of 2017. Treatment Segment revenue decreased approximately \$1,479,000, or 3.9%, to \$36,271,000 from \$37,750,000. Our East Tennessee Materials and Energy Corporation ("M&EC") facility, which is currently in closure status, had revenues of approximately \$155,000 in 2018 as compared to \$6,312,000 in the corresponding period of 2017; however, revenues from our remaining Treatment Segment facilities increased by approximately \$4,678,000 as we continue to transition operational capabilities from our M&EC facility to our other Treatment Segment facilities, subject to customer requirements and regulatory approvals. Our Treatment Segment revenues were also negatively impacted by delays in waste shipments which were not received until late in the fourth quarter of 2018, which we believe should have a positive effect for us in the first half of 2019. Treatment Segment backlog increased approximately \$3,438,000, or 44.8%, to \$11,104,000 at December 31, 2018 from \$7,666,000 at December 31, 2017. Services Segment revenue increased approximately \$1,249,000, or 10.4%, to \$13,268,000 for the twelve months ended December 31, 2018 from \$12,019,000 for the corresponding period of 2017.

Total gross profit decreased \$159,000, or 1.8%, for the year ended December 31, 2018 as compared to the corresponding period of 2017. Our gross profit for the years ended December 31, 2018 and 2017 included an additional \$3,323,000 and \$1,400,000, respectively, in closure costs recorded in our Treatment Segment in connection with the closure of our M&EC facility. Total SG&A expenses decreased by \$360,000, or 3.2%, for the year ended 2018 as compared to the year ended 2017.

Net losses from continuing operations for the year ended December 31, 2018 and 2017 included tax benefits of \$1,235,000 and \$1,695,000, respectively, recorded resulting from the Tax Cuts and Jobs Act of 2017 (the “TCJA”) enacted into law on December 22, 2017 (see “Income Taxes” in this MD&A for a discussion of the tax benefits recorded). During the second quarter of 2018, we recorded a net gain of \$1,596,000 in connection with the exchange offer of our Common Stock for M&EC’s outstanding Series B Preferred Stock as discussed in this MD&A (see “M&EC Series B Preferred Stock”).

We had a working capital deficit of approximately \$6,753,000 at December 31, 2018, as compared to working capital deficit of \$2,268,000 at December 31, 2017 (see “Liquidity and Capital Resources –Operating Activities” within this Management’s Discussion and Analysis of Financial Condition and Results of Operations (“MD&A”) for a discussion as to our working capital deficit and improvement made to our working capital deficit subsequent to December 31, 2018 and further improvements we expect to our working capital deficit subsequent to the filing of this report).

Business Environment and Outlook

Our Treatment and Services Segments' business continues to be heavily dependent on services that we provide to governmental clients directly as the contractor or indirectly as a subcontractor. We believe demand for our services will continue to be subject to fluctuations due to a variety of factors beyond our control, including the current economic conditions and the manner in which the government will be required to spend funding to remediate federal sites. In addition, our governmental contracts and subcontracts relating to activities at governmental sites are generally subject to termination or renegotiation on 30 days notice at the government's option. Significant reductions in the level of governmental funding or specifically mandated levels for different programs that are important to our business could have a material adverse impact on our business, financial position, results of operations and cash flows. As previously disclosed, our Medical Segment (which has not generated any revenues to date) substantially reduced its research and development ("R&D") activities due to the need for capital to fund such activities. Our Medical Segment continues to seek various sources in order to raise this capital or partners willing to provide the funding for its R&D activities. We anticipate that our Medical Segment R&D activities will be limited until the necessary capital is obtained through its own credit facility or additional equity raise or obtaining partners willing to provide funding for its R&D activities. If the Medical Segment is unable to raise the necessary capital, the Medical Segment could be required to further reduce, delay or eliminate its R&D program.

We are continually reviewing operating costs and are committed to further reducing operating costs to bring them in line with revenue levels, when needed. We continue to focus on expansion into both commercial and international markets to increase revenues in our Treatment and Services Segments to offset the uncertainties of government spending in the United States of America. See "Liquidity and Capital Resources" below for further discussion of our liquidity.

Results of Operations

The reporting of financial results and pertinent discussions are tailored to our three reportable segments: The Treatment Segment ("Treatment"), the Services Segment ("Services"), and the Medical Segment ("Medical"). Our Medical Segment has not generated any revenue and all costs incurred are included within R&D:

Summary - Years Ended December 31, 2018 and 2017

Below are the results of continuing operations for years ended December 31, 2018 and 2017 (amounts in thousands):

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(Consolidated)	2018	%	2017	%
Net revenues	\$49,539	100.0	\$49,769	100.0
Cost of goods sold	41,078	82.9	41,149	82.7
Gross profit	8,461	17.1	8,620	17.3
Selling, general and administrative	10,741	21.7	11,101	22.3
Research and development	1,370	2.8	1,595	3.2
Gain on disposal of property and equipment	(46)	(.1)	(12)	—
Impairment loss on tangible assets	—	—	672	1.3
Loss from operations	(3,604)	(7.3)	(4,736)	(9.5)
Interest income	295	.6	140	.3
Interest expense	(251)	(.5)	(315)	(.6)
Interest expense – financing fees	(38)	(.1)	(35)	(.1)
Net gain on exchange offer of Series B Preferred Stock	1,596	3.2	—	—
Other	(8)	—	123	.2
Loss from continuing operations before taxes	(2,010)	(4.1)	(4,823)	(9.7)
Income tax benefit	(936)	(1.9)	(1,285)	(2.6)
Loss from continuing operations	\$(1,074)	(2.2)	\$(3,538)	(7.1)

Revenue

Consolidated revenues decreased \$230,000 for the year ended December 31, 2018 compared to the year ended December 31, 2017, as follows:

(In thousands)	2018	% Revenue	2017	% Revenue	Change	% Change
<u>Treatment</u>						
Government waste	\$23,701	47.8	\$27,925	56.1	\$(4,224)	(15.1)
Hazardous/non-hazardous ⁽¹⁾	5,656	11.4	4,855	9.8	801	16.5
Other nuclear waste	6,914	14.0	4,970	10.0	1,944	39.1
Total	36,271	73.2	37,750	75.9	(1,479)	(3.9)
<u>Services</u>						
Nuclear	10,424	21.1	9,186	18.4	1,238	13.5
Technical	2,844	5.7	2,833	5.7	11	0.4
Total	13,268	26.8	12,019	24.1	1,249	10.4
Total	\$49,539	100.0	\$49,769	100.0	\$(230)	(0.5)

¹⁾ Includes wastes generated by government clients of \$1,594,000 and \$31,000 for the twelve months ended December 31, 2018 and the corresponding period of 2017, respectively.

Treatment Segment revenue decreased \$1,479,000, or 3.9 %, for the year ended December 31, 2018 over the same period in 2017. The revenue decrease was primarily due to lower revenue generated from government clients due to lower volume and lower averaged price waste resulting from waste mix. Other nuclear waste increased by approximately \$1,944,000, or 39.1%, primarily due to higher waste volume and higher averaged price waste. Revenue for our M&EC subsidiary (in closure status) decreased approximately \$6,157,000 for the twelve months ended December 31, 2018 as compared to the corresponding period of 2017 (\$155,000 in the twelve months of 2018 as compared to \$6,312,000 in the twelve months of 2017); however, our remaining Treatment Segment facilities had a total increase in revenue of approximately \$4,678,000 in the twelve months of 2018, as compared to the corresponding period of 2017 as we continue to transition operational capabilities from our M&EC subsidiary to our other Treatment Segment facilities, subject to customer requirements and regulatory approvals. Services Segment revenue increased by \$1,249,000, or 10.4%, for year ended December 31, 2018 over the same period in 2017. Our Services Segment revenues are project based; as such, the scope, duration and completion of each project vary. As a result, our Services Segment revenues are subject to differences relating to timing and project value.

Cost of Goods Sold

Cost of goods sold decreased \$71,000 for the year ended December 31, 2018, as compared to the year ended December 31, 2017, as follows:

(In thousands)	2018	% Revenue	2017	% Revenue	Change
Treatment	\$29,074	80.2	\$29,834	79.0	\$ (760)
Services	12,004	90.5	11,315	94.1	689
Total	\$41,078	82.9	\$41,149	82.7	\$ (71)

Cost of goods sold for the Treatment Segment decreased by \$760,000, or approximately 2.5%. Treatment Segment costs of goods sold for the year ended December 31, 2018 and 2017 included additional closure costs recorded in the amount of approximately \$3,323,000 and \$1,400,000, respectively, for our M&EC facility due to changes in estimated future closure costs in connection with the closure of the facility. Excluding the closure costs in both periods, Treatment Segment costs decreased \$2,683,000, or 9.4%. Total Treatment Segment's variable costs decreased by approximately \$1,214,000 primarily in disposal, transportation and material and supplies costs. Treatment Segment overall fixed costs were lower by approximately \$1,469,000 resulting from the following: depreciation expense was lower by approximately \$2,281,000 as the tangible assets at our M&EC facility became fully depreciated by the end of the third quarter of 2017 resulting from the pending closure of the facility; regulatory costs were lower by approximately \$63,000; maintenance expense was higher by \$21,000; salaries/payroll related/healthcare expenses were higher by \$658,000; travel expenses were higher by \$91,000; and general expenses were higher by \$105,000 in various categories. Services Segment cost of goods sold increased \$689,000, or 6.1%, primarily due to the increase in revenue as discussed above. The increase in Services Segment's cost of goods sold was primarily due to higher salaries and payroll related expenses, travel, and outside services expenses totaling approximately \$1,311,000 and higher material and supplies cost of approximately \$176,000. This overall higher cost in Services Segment's cost of goods sold was offset by lower disposal/transportation costs totaling approximately \$585,000 with the remaining lower costs in general expenses in various categories and lower depreciation expenses totaling approximately \$213,000. Included within cost of goods sold is depreciation and amortization expense of \$1,378,000 and \$3,720,000 for the twelve months ended December 31, 2018, and 2017, respectively.

Gross Profit

Gross profit for the year ended December 31, 2018 was \$159,000 lower than 2017 as follows:

(In thousands)	2018	% Revenue	2017	% Revenue	Change
Treatment	\$7,197	19.8	\$7,916	21.0	\$ (719)
Services	1,264	9.5	704	5.9	560
Total	\$8,461	17.1	\$8,620	17.3	\$ (159)

Excluding the \$3,323,000 and \$1,400,000 in closure costs recorded in the twelve months ended December 31, 2018 and 2017, respectively, within Treatment Segment's costs of goods sold discussed above in connection with the closure of the M&EC facility, our Treatment Segment had a gross profit increase of \$1,204,000, or 12.9%, and gross margin increased to 29.0% from 24.7% primarily due to the reduction in our fixed costs (as discussed above in costs of goods sold) and revenue mix. In the Services Segment, the increases in gross profit of \$560,000, or 79.5%, and gross margin to 9.5% from 5.9% was primarily due to the increase in revenue as discussed above. Additionally, our overall Services Segment gross margin is impacted by our current projects which are competitively bid on and will therefore, have varying margin structures.

SG&A

SG&A expenses decreased \$360,000 for the year ended December 31, 2018 as compared to the corresponding period for 2017 as follows:

(In thousands)	2018	% Revenue	2017	% Revenue	Change
Administrative	\$4,947	—	\$4,788	—	\$ 159
Treatment	3,740	10.3	3,316	8.8	424
Services	2,054	15.5	2,997	24.9	(943)
Total	\$10,741	21.7	\$11,101	22.3	\$ (360)

The decrease in total SG&A was primarily due to lower SG&A costs in the Services Segment. The decrease in Services Segment SG&A of \$943,000 was primarily due to the following: outside services expenses were lower by approximately \$120,000 resulting from fewer consulting/legal/subcontract matters; bad debt expense was lower by approximately \$394,000 as we recorded an additional \$364,000 in bad debt expense during the fourth quarter of 2017 as certain accounts receivables were determined not to be collectible at December 31, 2017; general expenses were lower by approximately \$385,000 in various categories which included a reduction in rent expense resulting from the end of our lease term for our business center office in Knoxville, Tennessee (which was not renewed with the same

lessor) in the second quarter of 2018; and salaries and payroll related expense were lower by approximately \$44,000. The increase in Administrative SG&A was primarily due to the following: stock-based compensation expenses were higher by approximately \$68,000 resulting from options granted to our executive officers in July 2017 and options granted to certain of our employees in October 2017; salary/payroll related/healthcare costs were higher by approximately \$152,000; general expenses were lower by \$48,000 in various categories; and outside services expenses were lower by \$13,000 resulting from fewer consulting/business matters. Treatment SG&A expenses were higher primarily due to the following: general expenses were higher by approximately \$237,000 in various categories; travel expenses were higher by approximately \$48,000; outside services expenses were higher by \$88,000 resulting from more business/consulting matters; and bad debt expenses were higher by \$51,000. Included in SG&A expenses is depreciation and amortization expense of \$77,000 and \$83,000 for the twelve months ended December 31, 2018 and 2017, respectively.

R&D

R&D expenses decreased \$225,000 for the year ended December 31, 2018 as compared to the corresponding period of 2017 as follows:

(In thousands)	2018	2017	Change
Administrative	\$76	\$15	\$ 61
Treatment	483	439	44
Services	—	—	—
PF Medical	811	1,141	(330)
Total	\$1,370	\$1,595	\$ (225)

Research and development costs consist primarily of employee salaries and benefits, laboratory costs, third party fees, and other related costs associated with the development of new technologies and technological enhancement of new potential waste treatment processes. The decrease in R&D costs for 2018 as compared to 2017 was primarily due to reduced R&D performed by our PF Medical Segment as discussed above.

Interest Income

Interest income increased \$155,000 for the year ended December 31, 2018 as compared to the corresponding period of 2017 primarily due to higher interest earned on the finite risk sinking funds resulting from higher interest rates.

Interest Expense

The decrease in interest expense of approximately \$64,000 for the twelve months ended December 31, 2018 as compared to the corresponding period of 2017 was primarily due to lower interest expense from our declining term loan balance and lower average revolver loan balance outstanding.

Income Taxes

We had income tax benefits of \$936,000 and \$1,285,000 for continuing operations for the years ended December 31, 2018 and 2017, respectively. The Company's effective tax rates were approximately 46.6% and 26.6% for the twelve months ended December 31, 2018 and 2017, respectively. Our tax benefit for 2018 included a tax benefit of

approximately \$1,235,000 recorded in 2018 resulting from the release of a portion of the valuation allowance on deferred tax assets related to indefinite-lived net operating losses generated due to the closure of our M&EC facility. Our tax benefit for 2017 included a tax benefit of approximately \$1,695,000 recorded in the fourth quarter of 2017 resulting primarily from the required re-measurement of our deferred assets and liabilities and the reversal of valuation allowance and refunding of alternative minimum tax (“AMT”) credit carryforward. These tax benefits were recorded as a result of the TCJA enacted into law in December 22, 2017 (see “Critical Accounting Policies” in this section for a further discussion of the Tax Act and the tax benefits recorded).

Discontinued Operations

Our discontinued operations consist of all our subsidiaries included in our Industrial Segment which were divested in 2011 and prior, previously closed locations, and our Perma-Fix of South Georgia, Inc. (“PFSG”) facility which is undergoing final closure, subject to regulatory approval of necessary plans and permits.

Our discontinued operations had no revenue for the twelve months ended December 31, 2018 and 2017. We incurred net losses of \$667,000 and \$592,000 for our discontinued operations for the twelve months ended December 31, 2018 and 2017, respectively (net of taxes of \$0 for each period). Our net loss for the year ended December 31, 2018 included an increase of approximately \$50,000 in remediation reserve recorded in the second quarter of 2018 for our Perma-Fix of Dayton (“PFD”) subsidiary due to reassessment of the remediation reserve, with the remaining loss incurred primarily due to costs incurred in the administration and continued monitoring of our discontinued operations. The loss incurred for 2017 was primarily due to costs incurred in the administration and continued monitoring of our discontinued operations.

Liquidity and Capital Resources

Our cash flow requirements during 2018 were primarily financed by our operations and credit facility availability. We generated positive cash flow from our operations of approximately \$1,960,000, which included cash outlays of approximately \$5,400,000 in operating and closure spending for our M&EC facility, which is in closure status. Our cash flow requirements for the next twelve months will consist primarily of general working capital needs, scheduled principal payments on our debt obligations, remediation projects, planned capital expenditures, and remaining spending requirements in connection with the closure of our M&EC facility. We plan to fund these requirements from our operations, credit facility availability and proceeds of approximately \$2,500,000 from a loan that was consummated on April 1, 2019 (see “Financing Activities” below for further information of the agreement and note). Additionally, as a result of the M&EC facility closure, we expect to receive, by the end of the second quarter of 2019, a release of approximately \$5,000,000 of the \$15,971,000 restricted finite risk sinking funds held by American International Group (“AIG”) as collateral under the financial assurance policy dated June 2003 that we currently have with AIG. The release of this finite risk sinking fund is subject to approval from AIG and the appropriate regulators, and, when released, we expect will further enhance our liquidity and improve our working capital deficit. We continue to explore all sources of increasing revenue. We are continually reviewing operating costs and are committed to further reducing operating costs to bring them in line with revenue levels, when necessary. Although there are no assurances, we believe that our cash flows from operations, our available liquidity from our credit facility and loan proceeds of \$2,500,000 received from the loan described below should be sufficient to fund our operations for the next twelve months. Additionally, the finite risk sinking funds that we expect to receive as a result of the M&EC facility closure as discussed above will provide additional funding for our operations as needed and improve our working capital. As previously disclosed, our Medical Segment substantially reduced its R&D activities due to the need for capital to fund such activities. We continue to seek various sources of potential funding for our Medical Segment. We anticipate that our Medical Segment will not resume full R&D activities until it obtains the necessary funding through obtaining its own credit facility or additional equity raise or obtaining new partners willing to fund its R&D activities. If the Medical Segment is unable to raise the necessary capital, the Medical Segment could be required to further reduce, delay or eliminate its R&D program.

The following table reflects the cash flow activity for the year ended December 31, 2018 and the corresponding period of 2017:

(In thousands)	2018	2017
Cash provided by operating activities of continuing operations	\$2,578	\$1,089
Cash used in operating activities of discontinued operations	(618)	(647)
Cash used in investing activities of continuing operations	(1,385)	(409)
Cash provided by investing activities of discontinued operations	67	69
Cash used in financing activities of continuing operations	(580)	(5,022)
Effect of exchange rate changes on cash	(20)	9
Increase (decrease) in cash and finite risk sinking fund (restricted cash)	\$42	\$(4,911)

At December 31, 2018, we were in a net borrowing position (revolving credit) of approximately \$639,000. At December 31, 2018, we had cash on hand of approximately \$810,000, which reflects primarily account balances of our foreign subsidiaries totaling approximately \$806,000.

Operating Activities

Accounts receivable, net of allowances for doubtful accounts, totaled \$7,735,000 at December 31, 2018, a decrease of \$205,000 from the December 31, 2017 balance of \$7,940,000. The decrease was primarily due to timing of invoicing and timing of accounts receivable collection. We provide a variety of payment terms to our customers; therefore, our accounts receivable are impacted by these terms and the related timing of accounts receivable collections.

Accounts payable, totaled \$5,497,000 at December 31, 2018, an increase of \$1,960,000 from the December 31, 2017 balance of \$3,537,000. The increase in accounts payable was attributed to closure related expenses for our M&EC facility which are pending payment. Additionally, our accounts payable are impacted by the timing of payments as we are continually managing payment terms with our vendors to maximize our cash position throughout all segments.

Disposal/transportation accrual at December 31, 2018, totaled \$1,542,000, a decrease of \$529,000 over the December 31, 2017 balance of \$2,071,000. Our disposal accrual can vary based on revenue mix and the timing of waste shipments for final disposal. During 2018, we shipped more waste for disposal than 2017.

We had a working capital deficit of \$6,753,000 (which included working capital of our discontinued operations) at December 31, 2018 as compared to a working capital deficit of \$2,268,000 at December 31, 2017. The additional accrual of \$3,323,000 in closure costs we recorded in 2018 in connection with the closure of our M&EC facility negatively impacted our working capital. Additionally, our working capital was also negatively impacted by the increase of our unearned revenue. The loan proceeds of \$2,500,000 that we received from a loan agreement consummated on April 1, 2019 as discussed below has improved our working capital deficit. Additionally, we anticipate that cash flows to be generated from our operations and the release of the restricted finite sinking funds by AIG of \$5,000,000 which we anticipate to receive upon the closure of our M&EC facility as discussed above, will provide further improvement to our working capital deficit.

Investing Activities

During 2018, our purchases of capital equipment totaled approximately \$1,977,000, of which \$545,000 was financed, with the remaining funded from cash from operations and our credit facility. These expenditures were made primarily for our Treatment Segment. We have budgeted approximately \$1,500,000 for 2019 capital expenditures for our Treatment and Services Segments to maintain operations and regulatory compliance requirements and continued footprint expansion for one of our Treatment Segment facilities. Certain of these budgeted projects may either be delayed until later years or deferred altogether. We have traditionally incurred actual capital spending totals for a given year at less than the initial budgeted amount. We plan to fund our capital expenditures from cash from operations and/or financing. The initiation and timing of projects are also determined by financing alternatives or funds available for such capital projects.

Financing Activities

We entered into an Amended and Restated Revolving Credit, Term Loan and Security Agreement, dated October 31, 2011 (“Amended Loan Agreement”), with PNC National Association (“PNC”), acting as agent and lender. The Amended Loan Agreement, as subsequently amended (“Revised Loan Agreement”), provides us with the following credit facility

with a maturity date of March 24, 2021: (a) up to \$12,000,000 revolving credit (“revolving credit”) and (b) a term loan (“term loan”) of approximately \$6,100,000, which requires monthly installments of approximately \$101,600 (based on a seven-year amortization). The maximum that we can borrow under the revolving credit is based on a percentage of eligible receivables (as defined) at any one time reduced by outstanding standby letters of credit and borrowing reductions that our lender may impose from time to time.

Under the Revised Loan Agreement, we have the option of paying an annual rate of interest due on the revolving credit at prime (5.50% at December 31, 2018) plus 2% or London Inter Bank Offer Rate (“LIBOR”) plus 3% and the term loan at prime plus 2.5% or LIBOR plus 3.5%.

Pursuant to the Revised Loan Agreement, we may terminate the Revised Loan Agreement, upon 90 days’ prior written notice upon payment in full of our obligations under the Revised Loan Agreement. We agree to pay PNC 0.25% of the total financing if we pay off our obligations after March 23, 2018 but prior to or on March 23, 2019. No early termination fee shall apply if we pay off our obligations after March 23, 2019.

At December 31, 2018, the borrowing availability under our revolving credit was \$2,368,000, based on our eligible receivables and includes an indefinite reduction of borrowing availability of \$1,000,000 that our lender has imposed. Our borrowing availability under our revolving credit was also reduced by outstanding standby letters of credit totaling approximately \$2,648,000. Previously, our lender had imposed an indefinite reduction of borrowing availability of \$2,000,000; however, on July 26, 2018, we entered into an amendment to our Revised Loan Agreement with our lender which provided, among other things, for the release of \$1,000,000 of the \$2,000,000 reduction in borrowing availability by our lender. The release of this \$1,000,000 in borrowing availability reduction was used for working capital purposes.

On March 29, 2019, we entered into another amendment to our Revised Loan Agreement with our lender under the credit facility which provided the following:

waived our failure to meet the minimum quarterly fixed charge coverage ratio (“FCCR”) requirement for the fourth quarter of 2018 as discussed below;

waived the quarterly FCCR testing requirement for the first quarter of 2019;

revised the methodology to be used in calculating the FCCR in each of the second and third quarters of 2019 (with continued requirement to maintain a minimum 1.15:1 ratio in each of the quarters);

revised the minimum Tangible Adjusted Net Worth requirement (as defined in the Revised Loan Agreement) from \$26,000,000 to \$25,000,000;

eliminated the LIBOR interest payment option of paying annual rate of interest due on our term loan and revolving credit until we become compliant with our FCCR requirement again. As a result of this amendment, our payment of annual rate of interest due on our term loan will be at prime plus 2.5% and prime plus 2.0% for our revolving credit;

provided consent for the \$2,500,000 loan that we entered into with Robert Ferguson as discussed below. We are not allowed to make any principal prepayment on this loan until we receive the restricted finite risk sinking funds held as collateral by AIG under our financial assurance policy. We expect to receive this restricted funds resulting from the closure of our M&EC facility (see “Liquidity and Capital Resources” for a discussion of this expected receipt); and

revised the annual rate used to calculate the Facility Fee (as defined in the Revised Loan Agreement) (“unused revolving credit line fee”) from 0.250% to 0.375%.

Most of the other terms of the Revised Loan Agreement remain principally unchanged. In connection with this amendment, we paid our lender a fee of \$20,000.

Our credit facility with our lender contains certain financial covenants, along with customary representations and warranties. A breach of any of these financial covenants, unless waived by our lender, could result in a default under our credit facility allowing our lender to immediately require the repayment of all outstanding debt under our credit facility and terminate all commitments to extend further credit. The following table illustrates the most significant quarterly financial covenant requirements under our credit facility at December 31, 2018.

	Quarterly	1st	2nd	3rd	4th
(Dollars in thousands)	Requirement	Quarter	Quarter	Quarter	Quarter
Senior Credit Facility		Actual	Actual	Actual	Actual
Fixed charge coverage ratio	1.15:1	1.22:1	1.72:1	1.39:1	1.13:1
Minimum tangible adjusted net worth	\$ 26,000	\$27,038	\$28,364	\$28,686	\$26,133

We met our financial covenant requirements in 2018 with the exception of our minimum quarterly FCCR requirement for the fourth quarter of 2018; however, our lender waived this non-compliance as discussed above. As a result of the amendment discussed above which provides for further amendments to our quarterly FCCR requirements, we expect to meet our financial covenant requirements in the next twelve months; however, if we fail to meet any of our

financial covenant requirements and our lender does not further waive the non-compliance or revise our covenant so that we are in compliance, our lender could accelerate the repayment of borrowings under our credit facility. In the event that our lender accelerates the payment of our borrowings, we may not have sufficient liquidity to repay our debt under our credit facility and other indebtedness.

On April 1, 2019, we completed a lending transaction with Robert Ferguson (the “Lender”), whereby we borrowed from the Lender the sum of \$2,500,000 pursuant to the terms of a Loan and Security Purchase Agreement and promissory note (the “Loan”). The Lender is a shareholder of the Company. The Lender also currently serves as a consultant to the Company’s PFNWR subsidiary (see “Related Party Transactions – Robert Ferguson” for further information). The proceeds from the Loan will be used for general working capital purposes. The Loan is unsecured, with a term of two years with interest payable at a fixed interest rate of 4.00% per annum. The Loan provides for monthly payments of accrued interest only during the first year of the Loan, with the first interest payment due May 1, 2019 and monthly payments of approximately \$208,333 in principal plus accrued interest starting in the second year of the Loan. The Loan also provides for prepayment of principal payments over the term of the Loan without penalty. In connection with the above Loan, the Lender entered into a Subordination Agreement with our credit facility lender, whereby the Lender agreed to subordinate payment under the Loan, and agreed that the Loan will be junior in right of payment to the credit facility in the event of default or bankruptcy or other insolvency proceeding by us. As consideration for us receiving the Loan, we issued a Warrant to the Lender to purchase up to 60,000 shares of our Common Stock at an exercise price of \$3.51, which was the closing bid price for a share of our Common Stock on NASDAQ.com immediately preceding the execution of the Loan and Warrant. The Warrant is exercisable six months from April 1, 2019 and expires on April 1, 2024. As further consideration for the Loan, we also will issue 75,000 shares of our Common Stock, to the Lender. The 75,000 shares of Common Stock and 60,000 Common Stock purchase warrant will be and was issued in a private placement that was exempt from registration under the Securities Act of 1933, as amended (the “Securities Act”) and bear a restrictive legend against resale except in a transaction registered under the Securities Act or in a transaction exempt from registration thereunder.

Upon default, the Lender will have the right to elect to receive in full and complete satisfaction of our obligations under the Loan either: (a) the cash amount equal to the sum of the unpaid principal balance owing under the loan and all accrued and unpaid interest thereon (the “Payoff Amount”) or (b) upon meeting certain conditions, the number of whole shares of our Common Stock (the “Payoff Shares”) determined by dividing the Payoff Amount by the dollar amount equal to the closing bid price of our Common Stock on the date immediately prior to the date of default, as reported or quoted on the primary nationally recognized exchange or automated quotation system on which our Common Stock is listed; provided however, that the dollar amount of such closing bid price shall not be less than \$3.51, the closing bid price for our Common Stock as disclosed on NASDAQ.com immediately preceding the signing of this loan agreement.

If issued, the Payoff Shares will not be registered and the Lender will not be entitled to registration rights with respect to the Payoff Shares. The aggregate number of shares, warrant shares, and Payoff Shares that are or will be issued to the Lender pursuant to the Loan, together with the aggregate shares of our Common Stock and other voting securities owned by the Lender as of the date of issuance of the Payoff Shares, shall not exceed the number of shares of our Common Stock equal to 14.9% of the number of shares of our Common Stock issued and outstanding as of the date immediately prior to the default, less the number of shares of our Common Stock owned by the Lender immediately prior to the date of such default plus the number of shares of our Common Stock that may be acquired by the Lender under warrants and/or options outstanding immediately prior to the date of such default.

We are currently evaluating the accounting treatment of this transaction and the impact to our financial statements.

M&EC Series B Preferred Stock

The 1,284,730 shares of the non-voting Series B Preferred Stock (the “Series B Preferred Stock”) of our consolidated wholly-owned subsidiary, M&EC, were exchanged by us for our Common Stock in a private exchange offer exempt from registration (the “Exchange Offer”). Holders of shares of M&EC Series B Preferred Stock were entitled to receive, when, as and if declared by M&EC’s Board of Directors (“Board”) out of funds legally available for payment, cumulative dividends at the rate per annum of 5% per share on the liquidation preference of \$1.00 per share of Series B Preferred Stock. Dividends on the Series B Preferred Stock accrued without interest beginning one year from the date of original issuance (June 25, 2001), and was payable in cash, if, when, and as declared by M&EC Board, quarterly each year commencing on the first dividend due date following the expiration of one year from the date of original issuance. The Exchange Offer, to all 13 holders of the M&EC Series B Preferred Stock, was to exchange, in a private placement exempt from registration, for every share of Series B Preferred Stock tendered, (a) 0.1050805 shares of our newly issued common stock, par value \$.001 per share (“Common Stock”), and (b) cash in lieu of fractional shares of Common Stock that would otherwise be issuable to the tendering holder of Series B Preferred Stock, in an amount equal to such fractional share of Common Stock multiplied by the closing price per share of the Common Stock on the last trading day immediately preceding the expiration date of the Exchange Offer. The Exchange Offer for all 1,284,730 shares of Series B Preferred Stock outstanding and had an expiration date of May 30, 2018. We own 100% of the voting capital stock of M&EC. On May 30, 2018, the Exchange Offer was consummated resulting in the issuance of an aggregate 134,994 shares of our Common Stock in exchange for the

1,284,730 shares of Series B Preferred Stock and the payment of an aggregate of approximately \$29.00 in cash in lieu of the fractional shares of our Common Stock that would otherwise have been issuable to the tendering holders of the Series B Preferred Stock. The fair value of the 134,994 unregistered shares of our Common Stock issued was determined to be approximately \$648,000 which was based on the closing price of our Common Stock on May 30, 2018 of \$4.80 per share. Upon the consummation of the Exchange Offer, the previous holders of the M&EC Series B Preferred Stock forfeited all rights of a holder of Series B Preferred Shares, including the right to receive quarterly cash dividends, and the rights to the cumulative accrued and unpaid dividends with M&EC Series B Preferred Stock in the amount of approximately \$1,022,000 at May 30, 2018. The M&EC Board never declared dividends on the Series B Preferred Stock and our credit facility prohibits the payment of cash dividends without the lender's consent. After the Exchange Offer, the 1,284,730 shares of the Series B Preferred Stock acquired by us were contributed by us to M&EC and the Series B Preferred Stock is no longer outstanding. We recorded a gain of approximately \$1,596,000 in the second quarter of 2018, which was net of approximately \$63,000 in legal expenses incurred for the completion of the transaction.

The shares of our Common Stock issued in exchange for shares of M&EC's Series B Preferred Stock were issued pursuant to an exemption from registration under the Securities Act, and, as a result, were considered restricted securities when issued.

Off Balance Sheet Arrangements

We have a number of routine non-cancelable operating leases, primarily related to office space rental, office equipment rental and equipment rental for contract projects and operations at December 31, 2018, which total approximately \$1,392,000, payable as follows: \$575,000 in 2019; \$406,000 in 2020; \$308,000 in 2021; with the remaining \$103,000 in 2022.

From time to time, we are required to post standby letters of credit and various bonds to support contractual obligations to customers and other obligations, including facility closures. At December 31, 2018, the total amount of standby letters of credit outstanding totaled approximately \$2,648,000 and the total amount of bonds outstanding totaled approximately \$11,284,000. We also provide closure and post-closure requirements through a financial assurance policy for certain of our Treatment Segment facilities through AIG. At December 31, 2018, the closure and post-closure requirements for these facilities were approximately \$29,977,000.

Critical Accounting Policies

In preparing the consolidated financial statements in conformity with accounting principles generally accepted in the United States of America ("US GAAP"), management makes estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements, as well as, the reported amounts of revenues and expenses during the reporting period. We believe the following critical accounting policies affect the more significant estimates used in preparation of the consolidated financial statements:

Revenue Recognition Estimates. In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09, "Revenue from Contracts with Customers" followed by a series of related accounting standard updates (collectively referred to as "Topic 606"). Topic 606 provides a single, comprehensive revenue recognition model for all contracts with customers. Under the new standard, a five-step process is utilized in order to determine revenue recognition, depicting the transfer of goods or services to a customer at an amount that reflects the consideration it expects to receive in exchange for those goods or services. We adopted Topic 606 effective January 1, 2018. The adoption of Topic 606 did not result in significant changes to our revenues within our segments. Under Topic 606, a performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account. A contract transaction price is allocated to each distinct performance

obligation and recognized as revenues as the performance obligation is satisfied.

Treatment Segment Revenues:

Contracts in our Treatment Segment have a single performance obligation as the promise to receive, treat and dispose of waste is not separately identifiable in the contract and, therefore, not distinct. Performance obligations are generally satisfied over time using the input method. Under the input method, the Company uses a measure of progress divided into major phases which include receipt (generally ranging from 9.0% to 33%), treatment/processing and shipment/final disposal. As major processing phases are completed and the costs are incurred, the proportional percentage of revenue is recognized. Transaction price for Treatment Segment contracts are determined by the stated fixed rate per unit price as stipulated in the contract.

Services Segment Revenues:

Revenues for our Services Segment are generated from time and materials, cost reimbursement or fixed price arrangements:

Our primary obligation to customers in time and materials contracts relate to the provision of services to the customer at the direction of the customer. This provision of services at the request of the customer is the performance obligation, which is satisfied over time. Revenue earned from time and materials contracts is determined using the input method and is based on contractually defined billing rates applied to services performed and materials delivered.

Our primary performance obligation to customers in cost reimbursement contracts is to complete certain tasks and work streams. Each specified work stream or task within the contract is considered to be a separate performance obligation. The transaction price is calculated using an estimated cost to complete the various scope items to achieve the performance obligation as stipulated in the contract. An estimate is prepared for each individual scope item in the contract and the transaction price is allocated on a time and materials basis as services are provided. Revenue from cost reimbursement contracts is recognized over time using the input method based on costs incurred, plus a proportionate amount of fee earned.

Under fixed price contracts, the objective of the project is not attained unless all scope items within the contract are completed and all of the services promised within fixed fee contracts constitute a single performance obligation. Transaction price is estimated based upon the estimated cost to complete the overall project. Revenue from fixed price contracts is recognized over time using the output or input method. For the output method, revenue is recognized based on milestone attained on the project. For the input method, revenue is recognized based on costs incurred on the project relative to the total estimated costs of the project.

Allowance for Doubtful Accounts. The carrying amount of accounts receivable is reduced by an allowance for doubtful accounts, which is a valuation allowance that reflects management's best estimate of the amounts that are uncollectible. We regularly review all accounts receivable balances that exceed 60 days from the invoice date and, based on an assessment of current credit worthiness, estimate the portion, if any, of the balances that are uncollectible. Specific accounts that are deemed to be uncollectible are reserved at 100% of their outstanding balance. The remaining balances aged over 60 days have a percentage applied by aging category (5% for balances 61-90 days, 20% for balances 91-120 days and 40% for balances over 120 days aged), based on a historical collections patterns, that allows us to calculate the total allowance required. This analysis excludes government related receivables due to our past successful experience in their collectability. Our allowance was approximately 0.2% of revenue for 2018 and 1.3% of accounts receivable at December 31, 2018. Additionally, this allowance was approximately 1.4% of revenue for 2017 and 8.3% of accounts receivable at December 31, 2017.

Intangible Assets. Intangible assets consist primarily of the recognized value of the permits required to operate our business. We continually monitor the propriety of the carrying amount of our permits to determine whether current events and circumstances warrant adjustments to the carrying value.

Indefinite-lived intangible assets are not amortized but are reviewed for impairment annually as of October 1, or when events or changes in the business environment indicate that the carrying value may be impaired. If the fair value of the asset is less than the carrying amount, we perform a quantitative test to determine the fair value. The impairment loss, if any, is measured as the excess of the carrying value of the asset over its fair value. Significant judgments are inherent in these analyses and include assumptions for, among other factors, forecasted revenue, gross margin, growth rate, operating income, timing of expected future cash flows, and the determination of appropriate long term discount rates.

Impairment testing of our permits related to our Treatment reporting unit as of October 1, 2018 and 2017 resulted in no impairment charges.

Intangible assets that have definite useful lives are amortized using the straight-line method over the estimated useful lives (with the exception of customer relationships which are amortized using an accelerated method) and are excluded from our annual intangible asset valuation review as of October 1. We have one definite-lived permit which was excluded from our annual impairment review as noted above. The net carrying value of this one definite-lived permit at December 31, 2018 and 2017 was approximately \$7,000 and \$62,000, respectively. Intangible assets with definite useful lives are also tested for impairment whenever events or changes in circumstances indicate that the asset's carrying value may not be recoverable.

Accrued Closure Costs and Asset Retirement Obligations (“ARO”). Accrued closure costs represent our estimated environmental liability to clean up our facilities as required by our permits, in the event of closure. ASC 410, “Asset Retirement and Environmental Obligations” requires that the discounted fair value of a liability for an ARO be recognized in the period in which it is incurred with the associated ARO capitalized as part of the carrying cost of the asset. The recognition of an ARO requires that management make numerous estimates, assumptions and judgments regarding such factors as estimated probabilities, timing of settlements, material and service costs, current technology, laws and regulations, and credit adjusted risk-free rate to be used. This estimate is inflated, using an inflation rate, to the expected time at which the closure will occur, and then discounted back, using a credit adjusted risk free rate, to the present value. ARO’s are included within buildings as part of property and equipment and are depreciated over the estimated useful life of the property. In periods subsequent to initial measurement of the ARO, we must recognize period-to-period changes in the liability resulting from the passage of time and revisions to either the timing or the amount of the original estimate of undiscounted cash flow. Increases in the ARO liability due to passage of time impact net income as accretion expense and are included in cost of goods sold in the Consolidated Statements of Operations. Changes in the estimated future cash flows costs underlying the obligations (resulting from changes or expansion at the facilities) require adjustment to the ARO liability calculated and are capitalized and charged as depreciation expense, in accordance with our depreciation policy.

Accrued Environmental Liabilities. We have three remediation projects in progress (all within discontinued operations). The current and long-term accrual amounts for the projects are our best estimates based on proposed or approved processes for clean-up. The circumstances that could affect the outcome range from new technologies that are being developed every day to reduce our overall costs, to increased contamination levels that could arise as we complete remediation which could increase our costs, neither of which we anticipate at this time. In addition, significant changes in regulations could adversely or favorably affect our costs to remediate existing sites or potential future sites, which cannot be reasonably quantified (See “Environmental Contingencies” below for further information of these liabilities).

Disposal/Transportation Costs. We accrue for waste disposal based upon a physical count of the waste at each facility at the end of each accounting period. Current market prices for transportation and disposal costs are applied to the end of period waste inventories to calculate the disposal accrual. Costs are calculated using current costs for disposal, but economic trends could materially affect our actual costs for disposal. As there are limited disposal sites available to us, a change in the number of available sites or an increase or decrease in demand for the existing disposal areas could significantly affect the actual disposal costs either positively or negatively.

Stock-Based Compensation. We account for stock-based compensation in accordance with ASC 718, “Compensation – Stock Compensation.” ASC 718 requires all stock-based payments to employees, including grant of options, to be recognized in the income statement based on their fair values. We account for stock-based compensation issued to consultants in accordance with the provisions of ASC 505-50, “Equity-Based Payments to Non-Employees.” We use the Black-Scholes option-pricing model to determine the fair-value of stock-based awards which requires subjective assumptions. Assumptions used to estimate the fair value of stock-based awards include the exercise price of the award, the expected term, the expected volatility of our stock over the stock-based award’s expected term, the risk-free interest rate over the award’s expected term, and the expected annual dividend yield. We account for forfeitures when they occur.

Income Taxes. The provision for income tax is determined in accordance with ASC 740, "Income Taxes." We are required to estimate our income taxes in each of the jurisdictions in which we operate. We record this amount as a provision or benefit for taxes. This process involves estimating our actual current tax exposure, including assessing the risks associated with tax audits, and assessing temporary differences resulting from different treatment of items for tax and accounting purposes. These differences result in deferred tax assets and liabilities. We assess the likelihood that our deferred tax assets will be recovered from future taxable income and, to the extent that we believe recovery is not likely, we establish a valuation allowance.

On December 22, 2017, the TCJA was signed into law making significant changes to the Internal Revenue Code. Changes include, but are not limited to, a federal corporate tax rate decrease from 35% to 21% for tax years beginning after December 31, 2017, the transition of U.S international taxation from a worldwide tax system to a territorial system, the elimination of AMT for corporations and a one-time transition tax on the mandatory deemed repatriation of foreign earnings.

As of December 31, 2018, we have completed our accounting for the tax effects of the enactment of the TCJA under the guidance of Staff Accounting Bulletin No. 118 (“SAB 118”) (issued December 22, 2017), which provides registrants an one-year measurement period to report the impact of the TCJA.

Specific to the enactment of the TCJA, we recognized a tax benefit of \$1,695,000 in the fourth quarter of 2017 which consisted of \$916,000 related to the re-measurement of deferred tax assets and liabilities, based on the rates at which they are expected to reverse in the future and \$779,000 related to the reversal of valuation allowance and refunding of AMT credit carryforwards.

An additional provision of the TJCA was to provide an indefinite carryforward period for net operating losses (“NOLs”) generated starting in 2018. Also, the law limits the utilization of these NOLs to 80% of taxable income in the year in which the NOL is utilized. We have been carrying on our balance sheet a deferred tax liability related to indefinite-lived intangible assets. A common accounting interpretation of the Tax Act provisions is that deferred tax assets related to indefinite-lived NOLs may now be used to offset indefinite-lived deferred tax liabilities, up to 80% of the amount of the liability. During 2018, we forecasted a substantial tax loss for the full year due to the closure of the M&EC facility. As a result, we released a portion of the valuation allowance against deferred tax assets equal to 80% of the deferred tax liability related to indefinite-lived intangible assets and recorded a tax benefit in the amount of approximately \$1,235,000 in accordance to the provisions of the TCJA.

The global intangible low-taxed income (“GILTI”) provisions under the TCJA require us to include in our U.S. income tax return foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary’s tangible assets. We have elected to account for GILTI tax in the period in which it is incurred, and therefore have not provided any deferred tax impacts of GILTI in our consolidated financial statements for the years ended December 31, 2017 and 2018. As our foreign subsidiaries are all in loss positions for 2018, there is no GILTI inclusion for the current year.

The base-erosion and anti-abuse tax provisions (“BEAT”) in the TCJA eliminates the deduction of certain base-erosion payments made to related foreign corporations, and imposes a minimum tax if greater than regular tax. We do not expect we will be subject to this tax due to the immaterial amounts of outbound U.S. payments and therefore have not included any tax impacts of BEAT in our consolidated financial statements for the years ended December 31, 2017 and 2018.

The TCJA imposes a one-time transition tax on previously untaxed earnings and profits of foreign subsidiaries. As of December 31, 2018, we have current and accumulated deficits in earnings and profits for all of our foreign subsidiaries. As such, we do not expect any exposure to the one-time transition tax.

As of December 31, 2018, we had net deferred tax assets of approximately \$10,479,000 (which excludes a deferred tax liability relating to goodwill and indefinite lived intangible assets) which were primarily related to federal and state net NOL carryforwards, impairment charges, and closure costs. As of December 31, 2018, we concluded that it was more likely than not that \$10,479,000 of our deferred income tax assets would not be realized, and as such, a full valuation allowance was applied against those deferred income tax assets. Our net operating losses are subject to audit by the Internal Revenue Services, and, as a result, the amounts could be reduced.

As of December 31, 2018, we have approximately \$21,277,000 and \$76,312,000 in NOL carryforwards for federal and state income tax purposes, respectively, which will expire in various amounts starting in 2021 if not used against future federal and state income tax liabilities, respectively. Our net loss carryforwards are subject to various limitations. Our ability to use the net loss carryforwards depends on whether we are able to generate sufficient income in the future years.

Known Trends and Uncertainties

Economic Conditions. Our business continues to be heavily dependent on services that we provide to governmental clients (including the U.S. Department of Energy (“DOE”) and U.S. Department of Defense (“DOD”)) directly as the prime contractor or indirectly for others as a subcontractor. We believe demand for our services will continue to be subject to fluctuations due to a variety of factors beyond our control, including the current economic conditions, the large budget deficit that the government is facing, and the manner in which the government will be required to spend funding to remediate federal sites. In addition, our governmental contracts and subcontracts relating to activities at governmental sites are generally subject to termination or renegotiation on 30 days notice at the government’s option. Significant reductions in the level of governmental funding or specifically mandated levels for different programs that are important to our business could have a material adverse impact on our business, financial position, results of operations and cash flows.

Significant Customers. Our Treatment and Services Segments have significant relationships with the federal government, and continue to enter into contracts, directly as the prime contractor or indirectly for others as a subcontractor, with the federal government. The contracts that we are a party to with the federal government or with others as a subcontractor to the federal government generally provide that the government may terminate or renegotiate the contracts on 30 days notice, at the government’s election. Our inability to continue under existing contracts that we have with the federal government (directly or indirectly as a subcontractor) could have a material adverse effect on our operations and financial condition.

We performed services relating to waste generated by domestic government clients (includes U.S federal, state and local), either directly as a prime contractor or indirectly as a subcontractor to government entities, representing approximately \$34,811,000 or 70.3% of our total revenue during 2018, as compared to \$37,019,000 or 74.4% of our total revenue during 2017.

As our revenues are project/event based where the completion of one contract with a specific customer may be replaced by another contract with a different customer from year to year, we do not believe the loss of one specific customer from one year to the next will generally have a material adverse effect on our operations and financial condition.

Contract Awards. During the latter part of March 2019, we were awarded several contracts within our Services Segment which includes remediation work for DOE locations throughout the United States. Additionally, our Services Segment has received a notice of contract award with a value of approximately \$9,000,000, which includes remediation work in Canada with an expected effective date of April 1, 2019. The contract for the Canadian remediation project has not yet been executed by the parties, and we expect that this contract will be finalized during the early part of the second quarter of 2019. The total contract value of these awards is expected to be approximately \$17,000,000 through 2019.

Environmental Contingencies

We are engaged in the waste management services segment of the pollution control industry. As a participant in the on-site treatment, storage and disposal market and the off-site treatment and services market, we are subject to rigorous federal, state and local regulations. These regulations mandate strict compliance and therefore are a cost and concern to us. Because of their integral role in providing quality environmental services, we make every reasonable attempt to maintain complete compliance with these regulations; however, even with a diligent commitment, we, along with many of our competitors, may be required to pay fines for violations or investigate and potentially remediate our waste management facilities.

We routinely use third party disposal companies, who ultimately destroy or secure landfill residual materials generated at our facilities or at a client's site. In the past, numerous third party disposal sites have improperly managed waste and consequently require remedial action; consequently, any party utilizing these sites may be liable for some or all of the remedial costs. Despite our aggressive compliance and auditing procedures for disposal of wastes, we could further be notified, in the future, that we are a potentially responsible party ("PRP") at a remedial action site, which could have a material adverse effect.

We have three remediation projects, which are currently in progress at our PFD, Perma-Fix of Memphis, Inc. ("PFM" – closed location), and PFSG (in closure status) subsidiaries. We divested PFD in 2008; however, the environmental liability of PFD was retained by us upon the divestiture of PFD. These remediation projects principally entail the removal/remediation of contaminated soil and, in most cases, the remediation of surrounding ground water. The remediation activities are closely reviewed and monitored by the applicable state regulators. While no assurances can be made that we will be able to do so, we expect to fund the expenses to remediate these sites from funds generated internally.

At December 31, 2018, we had total accrued environmental remediation liabilities of \$887,000, of which \$50,000 are recorded as a current liability, an increase of \$16,000 from the December 31, 2017 balance of \$871,000. The net increase presents an increase of approximately \$50,000 made to the reserve at our PFD subsidiary due to reassessment of the remediation reserve and payments of approximately \$34,000 on remediation projects for our PFD and PFSG subsidiaries.

Related Party Transactions

David Centofanti

David Centofanti serves as our Vice President of Information Systems. For such position, he received annual compensation of \$173,000 and \$168,000 for 2018 and 2017, respectively. David Centofanti is the son of Dr. Louis Centofanti, our Executive Vice President (“EVP”) of Strategic Initiatives and a Board of Director (“Board”) member. Dr. Louis Centofanti previously held the position of President and Chief Executive Office (“CEO”) until September 8, 2017. We believe the compensation received by David Centofanti for his technical expertise which he provides to us is competitive and comparable to compensation we would have to pay to an unaffiliated third party with the same technical expertise.

Robert Ferguson

Robert Ferguson serves as an advisor to our Board and was also a member of the Supervisory Board of PF Medical (until May 11, 2018), a majority-owned Polish subsidiary of the Company. Robert Ferguson previously served as a Board member of the Company from June 2007 to February 2010 and again from August 2011 to September 2012. Robert Ferguson is also a consultant for us in connection with our Test Bed Initiative (“TBI”) at our Perma-Fix Northwest Richland, Inc. (“PFNWR”) facility. As an advisor to our Board, Robert Ferguson is paid \$4,000 monthly plus reasonable expenses. For such services, Robert Ferguson received compensation of approximately \$50,000 and \$51,000 for the year ended December 31, 2018 and 2017, respectively. For Robert Ferguson’s consulting work in connection with our TBI, on July 27, 2017 (“grant date”), we granted Robert Ferguson a non-qualified stock option from our 2017 Stock Option Plan for the purchase of up to 100,000 shares of the Company’s Common Stock at an exercise price of \$3.65 a share, which was the fair market value of our Common Stock on the date of grant (“Ferguson Stock Option”). The vesting of the Ferguson Stock Option is subject to the achievement of the following milestones (“waste” as noted below is defined as liquid LAW (“low activity waste”) and/or liquid TRU (“transuranic waste”)):

Upon treatment and disposal of three gallons of waste at the PFNWR facility by January 27, 2018, 10,000 shares of the Ferguson Stock Option shall become exercisable;

Upon treatment and disposal of 2,000 gallons of waste at the PFNWR facility by January 27, 2019, 30,000 shares of the Ferguson Stock Option shall become exercisable; and

Upon treatment and disposal of 50,000 gallons of waste at the PFNWR facility and assistance, on terms satisfactory to the Company, in preparing certain justifications of cost and pricing data for the waste and obtaining a long-term commercial contract relating to the treatment, storage and disposal of waste by January 27, 2021, 60,000 shares of the Ferguson Stock Option shall become exercisable.

The term of the Ferguson Stock Option is seven (7) years from the grant date. Each of the milestones is exclusive of each other; therefore, achievement of any of the milestones above by Robert Ferguson by the designated date will provide Robert Ferguson the right to exercise the number of options in accordance with the milestone attained. The 10,000 options as noted above became vested by Robert Ferguson on December 19, 2017. The fair value of the 10,000 options was determined to be approximately \$20,000. On May 1, 2018, Robert Ferguson exercised the 10,000 options for the purchase of 10,000 shares of our Common Stock, resulting in total proceeds paid to us of approximately \$36,500.

On January 17, 2019, the Ferguson Stock Option was amended whereby the vesting date of the Ferguson Stock Option for the second milestone as discussed above was amended from “by January 27, 2019” to “by March 31, 2020.” All other terms of the Ferguson Stock Option remain unchanged.

On April 1, 2019, we executed a loan and securities purchase agreement and promissory note with Robert Ferguson for a \$2,500,000 loan (see “Liquidity and Capital Resources - Financing Activities” of this MD&A for further information of the loan agreement).

Employment Agreements

We entered into employment agreements with each of Mark Duff (President and CEO), Ben Naccarato (Chief Financial Officer (“CFO”)), and Dr. Louis Centofanti, (EVP of Strategic Initiatives), with each employment dated September 8, 2017. Each of the employment agreements is effective for three years from September 8, 2017 (the “Initial Term”) unless earlier terminated by us or by the executive officer. At the end of the Initial Term of each employment agreement, each employment agreement will automatically be extended for one additional year, unless at least six months prior to the expiration of the Initial Term, we or the executive officer provides written notice not to extend the terms of the employment agreement. Each employment agreement provides for annual base salaries, performance bonuses (as provided in the Management Incentive Plan (“MIP”) as approved by our Board, and other benefits commonly found in such agreements. In addition, each employment agreement provides that in the event the executive officer terminates his employment for “good reason” (as defined in the agreements) or is terminated by us without cause (including the executive officer terminating his employment for “good reason” or is terminated by us without cause within 24 months after a Change in Control (as defined in the agreement)), we will pay the executive officer the following: (a) a sum equal to any unpaid base salary; (b) accrued unused vacation time and any employee benefits accrued as of termination but not yet been paid (“Accrued Amounts”); (c) two years of full base salary; (d) performance compensation under the MIP earned with respect to the fiscal year immediately preceding the date of termination; and (e) an additional year of performance compensation as provided under the MIP earned, if not already paid, with respect to the fiscal year immediately preceding the date of termination. If the executive terminates his employment for a reason other than for good reason, we will pay to the executive the amount equal to the Accrued Amounts plus any performance compensation payable pursuant to the MIP.

If there is a Change in Control (as defined in the agreements), all outstanding stock options to purchase our Common Stock held by the executive officer will immediately become exercisable in full commencing on the date of termination through the original term of the options. In the event of the death of an executive officer, all outstanding stock options to purchase our Common Stock held by the executive officer will immediately become exercisable in full commencing on the date of death, with such options exercisable for the lesser of the original option term or twelve months from the date of the executive officer’s death. In the event of an executive officer terminating his employment for “good reason” or is terminated by us without cause, all outstanding stock options to purchase our Common Stock held by the executive officer will immediately become exercisable in full commencing on the date of termination, with such options exercisable for the lesser of the original option term or within 60 days from the date of the executive’s date of termination.

We had previously entered into an employment agreement with each of Dr. Louis Centofanti and Ben Naccarato on July 10, 2014 which both employment agreements were to expire on July 10, 2018, as amended (the “July 10, 2014 Employment Agreements”). We also had previously entered into an employment agreement dated January 19, 2017 (which was effective June 11, 2016) with Mark Duff which is due to expire on June 11, 2019 (the “January 19, 2017 Employment Agreement”). The July 10, 2014 Employment Agreements and the January 19, 2017 Employment Agreement were terminated effective September 8, 2017.

MIPs

On January 18, 2018, our Board and the Compensation and Stock Option Committee (the “Compensation Committee”) approved individual MIP for each Mark Duff, CEO and President, Ben Naccarato, CFO, and Dr. Louis Centofanti, EVP of Strategic Initiatives. The MIPs are effective January 1, 2018 and applicable for year ended December 31, 2018. Each MIP provides guidelines for the calculation of annual cash incentive based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive’s 2018 annual base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 100% (\$13,350 to \$267,000) of the base salary for the CEO and President; 5% to 100% (\$11,475 to \$229,494) of the base salary for the CFO; and 5% to 100% (\$11,170 to \$223,400) of the base salary for the EVP of Strategic Initiatives. Pursuant to the MIPs, the Compensation Committee has the right to modify, change or terminate the MIPs at any time and for any reason. No performance compensation was earned or payable under each of the 2018 MIPs as discussed above.

On January 17, 2019, our Board and the Compensation Committee approved individual MIP for the CEO, CFO, and EVP of Strategic Initiatives. Each MIP is effective January 1, 2019 and applicable for the year ended December 31, 2019. Each MIP provides guidelines for the calculation of annual cash incentive based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive's annual 2019 base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 150% of the 2019 base salary for the CEO (\$14,350 to \$430,500), 5% to 100% of the 2019 base salary for the CFO (\$11,762 to \$235,231), and 5% to 100% of the 2019 base salary for the EVP of Strategic Initiatives (\$11,449 to \$228,985).

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Not required under Regulation S-K for smaller reporting companies.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

Forward-looking Statements

Certain statements contained within this report may be deemed "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (collectively, the "Private Securities Litigation Reform Act of 1995"). All statements in this report other than a statement of historical fact are forward-looking statements that are subject to known and unknown risks, uncertainties and other factors, which could cause actual results and performance of the Company to differ materially from such statements. The words "believe," "expect," "anticipate," "intend," "will," and similar expressions identify forward-looking statements. Forward-looking statements contained herein relate to, among other things,

- demand for our services;
- continue to focus on expansion into both commercial and international markets to increase revenues;
- closure of M&EC facility;
- improvement to working capital;
- reductions in the level of government funding in future years;
- R&D activity of our Medical Segment;
- reducing operating costs;
- expect to meet our financial covenant requirements in the next twelve months;
- cash flow requirements;
- government funding for our services;
- may not have liquidity to repay debt if our lender accelerates payment of our borrowings;

our cash flows from operations, our available liquidity from our credit facility, loan proceeds of \$2,500,000, and finite sinking funds that we expect to receive are sufficient to service our operations;
release of restricted finite risk sinking funds;
manner in which the government will be required to spend funding to remediate federal sites;
audit by the Internal Revenue Services of our net operating losses;

funding operations;
fund capital expenditures from cash from operations and/or financing;
fund remediation expenditures for sites from funds generated internally;
compliance with environmental regulations;
future environmental policies affecting operations;
potential effect of being a PRP;
subject to fines and civil penalties in connection with violations of regulatory requirements;
large business are more willing to team with small businesses;
permit and license requirements represent a potential barrier to entry for possible competitors;
process backlog during periods of low waste receipts, which historically has been in the first and fourth quarters;
potential sites for violations of environmental laws and remediation of our facilities;
delay in waste shipment should have positive effect for us in first half of 2019;
continuation of contracts with federal government;
loss of contracts;
necessary capital for Medical Segment;
disposal of our waste;
exposure to one-time transition tax; and
contract awards and estimated value of these contracts.

While the Company believes the expectations reflected in such forward-looking statements are reasonable, it can give no assurance such expectations will prove to be correct. There are a variety of factors, which could cause future outcomes to differ materially from those described in this report, including, but not limited to:

general economic conditions;
material reduction in revenues;
ability to meet PNC covenant requirements;
inability to collect in a timely manner a material amount of receivables;
increased competitive pressures;
inability to maintain and obtain required permits and approvals to conduct operations;
public not accepting our new technology;
inability to develop new and existing technologies in the conduct of operations;
inability to maintain and obtain closure and operating insurance requirements;
inability to retain or renew certain required permits;
discovery of additional contamination or expanded contamination at any of the sites or facilities leased or owned by us or our subsidiaries which would result in a material increase in remediation expenditures;
delays at our third party disposal site can extend collection of our receivables greater than twelve months;
refusal of third party disposal sites to accept our waste;
changes in federal, state and local laws and regulations, especially environmental laws and regulations, or in interpretation of such;
requirements to obtain permits for TSD activities or licensing requirements to handle low level radioactive materials are limited or lessened;
potential increases in equipment, maintenance, operating or labor costs;
management retention and development;
financial valuation of intangible assets is substantially more/less than expected;
the requirement to use internally generated funds for purposes not presently anticipated;

inability to continue to be profitable on an annualized basis;
inability of the Company to maintain the listing of its Common Stock on the NASDAQ;
terminations of contracts with federal agencies or subcontracts involving federal agencies, or reduction in amount of waste delivered to the Company under the contracts or subcontracts;
renegotiation of contracts involving the federal government;
federal government's inability or failure to provide necessary funding to remediate contaminated federal sites;
disposal expense accrual could prove to be inadequate in the event the waste requires re-treatment;
inability to raise capital on commercially reasonable terms;
inability to increase profitable revenue;
lender refuses to waive non-compliance or revise our covenant so that we are in compliance; and
risk factors contained in Item 1A of this report.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Financial Statement Schedules

In accordance with the rules of Regulation S-X, schedules are not submitted because they are not applicable to or required by the Company.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders

Perma-Fix Environmental Services, Inc.

We have audited the accompanying consolidated balance sheets of Perma-Fix Environmental Services, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive loss, stockholders’ equity, and cash flows for each of the two years in the period ended December 31, 2018, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2018, in conformity with accounting principles generally accepted in the United States of America.

Basis for opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (“PCAOB”) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company’s internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2014.

Atlanta, Georgia

April 1, 2019

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PERMA-FIX ENVIRONMENTAL SERVICES, INC.**CONSOLIDATED BALANCE SHEETS***As of December 31,*

(Amounts in Thousands, Except for Share and Per Share Amounts)	2018	2017
ASSETS		
Current assets:		
Cash	\$810	\$1,063
Accounts receivable, net of allowance for doubtful accounts of \$105 and \$720, respectively	7,735	7,940
Unbilled receivables - current	3,105	4,547
Inventories	449	393
Prepaid and other assets	2,552	3,281
Current assets related to discontinued operations	107	89
Total current assets	14,758	17,313
Property and equipment:		
Buildings and land	19,782	23,806
Equipment	19,157	33,182
Vehicles	369	393
Leasehold improvements	23	11,549
Office furniture and equipment	1,551	1,670
Construction-in-progress	1,389	653
Total property and equipment	42,271	71,253
Less accumulated depreciation	(26,532)	(56,383)
Net property and equipment	15,739	14,870
Property and equipment related to discontinued operations	81	81
Intangibles and other long term assets:		
Permits	8,443	8,419
Other intangible assets - net	1,278	1,487
Unbilled receivables - non-current	—	184
Finite risk sinking fund (restricted cash)	15,971	15,676
Other assets	1,054	1,313
Other assets related to discontinued operations	118	195
Total assets	\$57,442	\$59,538

The accompanying notes are an integral part of these consolidated financial statements.

PERMA-FIX ENVIRONMENTAL SERVICES, INC.**CONSOLIDATED BALANCE SHEETS, CONTINUED***As of December 31,*

(Amounts in Thousands, Except for Share and per Share Amounts)	2018	2017
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$5,497	\$3,537
Accrued expenses	5,014	4,782
Disposal/transportation accrual	1,542	2,071
Deferred revenue	6,595	4,311
Accrued closure costs - current	1,142	2,791
Current portion of long-term debt	1,184	1,184
Current portion of capital lease obligations	181	—
Current liabilities related to discontinued operations	356	905
Total current liabilities	21,511	19,581
Accrued closure costs	5,608	5,604
Other long-term liabilities	255	1,191
Deferred tax liabilities	586	1,694
Long-term debt, less current portion	2,118	2,663
Long-term capital lease obligations, less current portion	268	—
Long-term liabilities related to discontinued operations	963	359
Total long-term liabilities	9,798	11,511
Total liabilities	31,309	31,092
Commitments and Contingencies (Note 15)		
Series B Preferred Stock of subsidiary, \$0 par value; 1,467,396 shares authorized; 0 and 1,284,730 shares issued, respectively; 0 and 1,284,730 shares outstanding, respectively; liquidation value of \$1.00 per share plus accrued and unpaid dividends of \$0 and \$995, respectively (Note 8)	—	1,285
Stockholders' Equity:		
Preferred Stock, \$.001 par value; 2,000,000 shares authorized, no shares issued and outstanding	—	—
Common Stock, \$.001 par value; 30,000,000 shares authorized; 11,944,215 and 11,738,623 shares issued, respectively; 11,936,573 and 11,730,981 shares outstanding, respectively	12	12
Additional paid-in capital	107,548	106,417
Accumulated deficit	(79,630)	(77,893)
Accumulated other comprehensive loss	(214)	(112)

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Less Common Stock in treasury, at cost; 7,642 shares	(88)	(88)
Total Perma-Fix Environmental Services, Inc. stockholders' equity	27,628	28,336
Non-controlling interest	(1,495)	(1,175)
Total stockholders' equity	26,133	27,161
Total liabilities and stockholders' equity	\$57,442	\$59,538

The accompanying notes are an integral part of these consolidated financial statements.

PERMA-FIX ENVIRONMENTAL SERVICES, INC.**CONSOLIDATED STATEMENTS OF OPERATIONS***For the years ended December 31,*

(Amounts in Thousands, Except for Per Share Amounts)	2018	2017
Net revenues	\$49,539	\$49,769
Cost of goods sold	41,078	41,149
Gross profit	8,461	8,620
Selling, general and administrative expenses	10,741	11,101
Research and development	1,370	1,595
Gain on disposal of property and equipment	(46)	(12)
Impairment loss on tangible assets	—	672
Loss from operations	(3,604)	(4,736)
Other income (expense):		
Interest income	295	140
Interest expense	(251)	(315)
Interest expense-financing fees	(38)	(35)
Other	(8)	123
Net gain on exchange offer of Series B Preferred Stock of subsidiary (Note 8)	1,596	—
Loss from continuing operations before taxes	(2,010)	(4,823)
Income tax benefit	(936)	(1,285)
Loss from continuing operations, net of taxes	(1,074)	(3,538)
Loss from discontinued operations, net of taxes of \$0	(667)	(592)
Net loss	(1,741)	(4,130)
Net loss attributable to non-controlling interest	(320)	(450)
Net loss attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$(1,421)	\$(3,680)
Net loss per common share attributable to Perma-Fix Environmental Services, Inc. stockholders - basic and diluted:		
Continuing operations	\$(.06)	\$(.26)
Discontinued operations	(.06)	(.05)
Net loss per common share	\$(.12)	\$(.31)
Number of common shares used in computing net loss per share:		
Basic	11,855	11,706
Diluted	11,855	11,706

The accompanying notes are an integral part of these consolidated financial statements.

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

For the years ended December 31,

(Amounts in Thousands)	2018	2017
Net loss	\$(1,741)	\$(4,130)
Other comprehensive (loss) income:		
Foreign currency translation adjustments	(102)	50
Total other comprehensive (loss) income	(102)	50
Comprehensive loss	(1,843)	(4,080)
Comprehensive loss attributable to non-controlling interest	(320)	(450)
Comprehensive loss attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$(1,523)	\$(3,630)

The accompanying notes are an integral part of these consolidated financial statements.

PERMA-FIX ENVIRONMENTAL SERVICES, INC

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

For the years ended December 31,

(Amounts in Thousands, Except for Share Amounts)

	Common Stock	Additional Paid-In Capital	Common Stock Held In Treasury	Accumulated Other Comprehensive Loss	Non-controlling Interest in Subsidiary	Accumulated Deficit	Total Stockholders' Equity	
	Shares	Amount						
Balance at December 31, 2016	11,677,025	\$ 11	\$ 106,048	\$ (88)	\$ (162)	\$ (725)	\$ (74,213)	\$ 30,871
Net loss	—	\$ —	\$ —	\$ —	\$ —	\$ (450)	\$ (3,680)	\$ (4,130)
Foreign currency translation	—	—	—	50	—	—	—	50
Issuance of Common Stock for services	61,598	1	225	—	—	—	—	226
Stock-Based Compensation	—	—	144	—	—	—	—	144
Balance at December 31, 2017	11,738,623	\$ 12	\$ 106,417	\$ (88)	\$ (112)	\$ (1,175)	\$ (77,893)	\$ 27,161
Adoption of accounting standards updates (Note 2)	—	—	—	—	—	—	(316)	(316)
Net loss	—	—	—	—	—	(320)	(1,421)	(1,741)
Foreign currency translation adjustment	—	—	—	(102)	—	—	—	(102)
Issuance of Common Stock upon exercise of options	10,000	—	36	—	—	—	—	36
Issuance of Common Stock from exchange offer of Series B Preferred Stock of subsidiary (Note 8)	134,994	—	648	—	—	—	—	648
Issuance of Common Stock for services	60,598	—	249	—	—	—	—	249
Stock-Based Compensation	—	—	198	—	—	—	—	198
	11,944,215	\$ 12	\$ 107,548	\$ (88)	\$ (214)	\$ (1,495)	\$ (79,630)	\$ 26,133

**Balance at December
31, 2018**

The accompanying notes are an integral part of these consolidated financial statements.

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PERMA-FIX ENVIRONMENTAL SERVICES, INC.**CONSOLIDATED STATEMENTS OF CASH FLOWS***For the years ended December 31,*

(Amounts in Thousands)	2018	2017
Cash flows from operating activities:		
Net loss	\$(1,741)	\$(4,130)
Less: loss on discontinued operations, net of taxes of \$0 (Note 9)	(667)	(592)
Loss from continuing operations	(1,074)	(3,538)
Adjustments to reconcile net loss from continuing operations to cash provided by operating activities:		
Depreciation and amortization	1,455	3,803
Amortization of debt issuance costs	35	36
Deferred tax benefit	(1,108)	(668)
Provision for bad debt reserves	66	462
Gain on disposal of property and equipment	(46)	(12)
Gain on exchange offer of Series B Preferred Stock of subsidiary (Note 8)	(1,659)	
Impairment loss on tangible assets		672
Issuance of common stock for services	249	225
Stock-based compensation	198	144
Changes in operating assets and liabilities of continuing operations:		
Accounts receivable	139	515
Unbilled receivables	1,626	(1,589)
Prepaid expenses, inventories and other assets	1,932	(54)
Accounts payable, accrued expenses and unearned revenue	765	1,093
Cash provided by continuing operations	2,578	1,089
Cash used in discontinued operations	(618)	(647)
Cash provided by operating activities	1,960	442
Cash flows from investing activities:		
Purchases of property and equipment	(1,432)	(439)
Proceeds from sale of property and equipment	47	30
Cash used in investing activities of continuing operations	(1,385)	(409)
Cash provided by investing activities of discontinued operations	67	69
Cash used in investing activities	(1,318)	(340)
Cash flows from financing activities:		
Borrowing on revolving credit	54,714	45,163
Repayments of revolving credit borrowings	(54,075)	(48,966)
Principal repayments of long term debt	(1,219)	(1,219)
Principal payment on capital leases	(36)	
Proceeds from issuance of common stock upon exercise of options	36	
Cash used in financing activities of continuing operations	(580)	(5,022)

Effect of exchange rate changes on cash	(20)	9
Increase (decrease) in cash and finite risk sinking fund (restricted cash) (Note 2)	42		(4,911)
Cash and finite risk sinking fund (restricted cash) at beginning of period (Note 2)	16,739		21,650
Cash and finite risk sinking fund (restricted cash) at end of period (Note 2)	\$16,781		\$16,739
Supplemental disclosure:			
Interest paid	\$248		\$318
Income taxes paid	160		58
Non-cash investing and financing activities:			
Equipment purchase subject to capital lease	545		196
Common stock issued in exchange offer of Series B Preferred Stock of subsidiary (Note 8)	648		

The accompanying notes are an integral part of these consolidated financial statements.

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

Notes to Consolidated Financial Statements

December 31, 2018 and 2017

NOTE 1

DESCRIPTION OF BUSINESS AND BASIS OF PRESENTATION

Perma-Fix Environmental Services, Inc. (the Company, which may be referred to as we, us, or our), an environmental and technology know-how company, is a Delaware corporation, engaged through its subsidiaries, in three reportable segments:

TREATMENT SEGMENT, which includes:

- nuclear, low-level radioactive, mixed waste (containing both hazardous and low-level radioactive constituents),
- hazardous and non-hazardous waste treatment, processing and disposal services primarily through three uniquely licensed and permitted treatment and storage facilities; and
- R&D activities to identify, develop and implement innovative waste processing techniques for problematic waste streams.

SERVICES SEGMENT, which includes:

- Technical services, which include:

- professional radiological measurement and site survey of large government and commercial installations using advanced methods, technology and engineering;
- integrated Occupational Safety and Health services including IH assessments; hazardous materials surveys, e.g., exposure monitoring; lead and asbestos management/abatement oversight; indoor air quality evaluations; health risk and exposure assessments; health & safety plan/program development, compliance auditing and training services; and OSHA citation assistance;
- global technical services providing consulting, engineering, project management, waste management, environmental, and decontamination and decommissioning field, technical, and management personnel and services to commercial and government customers; and
- on-site waste management services to commercial and governmental customers.

-Nuclear services, which include:

technology-based services including engineering, decontamination and decommissioning (“D&D”), specialty services and construction, logistics, transportation, processing and disposal; remediation of nuclear licensed and federal facilities and the remediation cleanup of nuclear legacy sites. Such services capability includes: project investigation; radiological engineering; partial and total plant D&D; facility decontamination, dismantling, demolition, and planning; site restoration; logistics; transportation; and emergency response; and

- A company owned equipment calibration and maintenance laboratory that services, maintains, calibrates, and sources (i.e., rental) health physics, IH and customized NIOSH instrumentation.

-A company owned gamma spectroscopy laboratory for the analysis of oil and gas industry solids and liquids.

MEDICAL SEGMENT, which includes: R&D of the Company’s medical isotope production technology by our majority-owned Polish subsidiary, Perma-Fix Medical S.A. and its wholly-owned subsidiary Perma-Fix Medical Corporation (“PFM Corporation”) (together known as “PF Medical” or the Medical Segment). The Company’s Medical Segment has not generated any revenue as it remains in the R&D stage and has substantially reduced its R&D activities due to the need for capital to fund these activities. All costs incurred by the Medical Segment are reflected within R&D in the accompanying consolidated financial statements (see “Financial Position and Liquidity” below for further discussion of Medical Segment’s significant curtailment of its R&D activities).

The Company's continuing operations consist of Diversified Scientific Services, Inc. ("DSSI"), Perma-Fix of Florida, Inc. ("PFF"), Perma-Fix of Northwest Richland, Inc. ("PFNWR"), East Tennessee Materials & Energy Corporation ("M&EC") (see "Note 4 – M&EC Facility" regarding the closure of this facility), Safety & Ecology Corporation ("SEC"), Perma-Fix Environmental Services UK Limited ("PF UK Limited"), Perma-Fix of Canada, Inc. ("PF Canada"), and PF Medical.

The Company's discontinued operations (see Note 9) consist of all our subsidiaries included in our Industrial Segment which were divested in 2011 and prior, previously closed locations, and our Perma-Fix of South Georgia, Inc. ("PFSG") facility which is non-operational and is in closure status.

Financial Position and Liquidity

The Company's cash flow requirements during 2018 were primarily financed by our operations and credit facility availability. We generated positive cash flow from our operations of approximately \$1,960,000, which included cash outlays of approximately \$5,400,000 for operating and closure spending for our M&EC facility, which is in closure status.

The Company's cash flow requirements for 2019 and into the first quarter of 2020 will consist primarily of general working capital needs, scheduled principal payments on our debt obligations, remediation projects, planned capital expenditures and remaining closure spending requirements in connection with the closure of our M&EC facility (see "Note 4 – M&EC Facility" for further discussion of the M&EC facility closure) which we plan to fund from operations, credit facility availability, and proceeds of approximately \$2,500,000 that the Company received pursuant to the terms of a loan and securities purchase agreement and promissory note that the Company consummated on April 1, 2019 (see "Note 19 – Subsequent Event" for further information of this loan). Additionally, as a result of the M&EC facility closure, the Company expects to receive, by the end of the second quarter of 2019, a release of approximately \$5,000,000 of the \$15,971,000 restricted finite risk sinking funds held by American International Group ("AIG") as collateral under the financial assurance policy dated June 2003 that we currently have with AIG. The release of this finite risk sinking fund is subject to approval from AIG and the appropriate regulators and when released, will further enhance our liquidity and working capital deficit (see "Note 15 – Commitment and Contingencies – Insurance" for further information of this policy with AIG). The Company continues to explore all sources of increasing revenue. The Company is continually reviewing operating costs and is committed to further reducing operating costs to bring them in line with revenue levels, when necessary.

As previously disclosed, the Company's Medical Segment reduced its R&D activities substantially due to the need for capital to fund such activities. Our Medical Segment continues to seek various sources in order to raise this funding or partners willing to provide the funding for its R&D activities. The Company anticipates that the Medical Segment will not resume full R&D activities until the necessary capital is obtained through its own credit facility or additional equity raise or obtains partners willing to provide funding for its R&D activities. If the Medical Segment is unable to

raise the necessary capital, the Medical Segment could be required to further reduce, delay or eliminate its R&D program.

NOTE 2

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Principles of Consolidation

Our consolidated financial statements include our accounts, those of our wholly-owned subsidiaries, and our majority-owned Polish subsidiary, PF Medical, after elimination of all significant intercompany accounts and transactions.

Use of Estimates

The Company prepares financial statements in conformity with accounting standards generally accepted in the United States of America ("US GAAP"), which may require estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements, as well as, the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. See Notes 9, 13, 14 and 15 for estimates of discontinued operations and environmental liabilities, closure costs, income taxes and contingencies for details on significant estimates.

Cash and Finite Risk Sinking Fund (Restricted Cash)

At December 31, 2018, the Company had cash on hand of approximately \$810,000, which reflects primarily account balances of our foreign subsidiaries totaling approximately \$806,000. At December 31, 2017, the Company had cash on hand of approximately \$1,063,000, which included account balances for our foreign subsidiaries totaling approximately \$305,000. At December 31, 2018 and 2017, the Company has finite risk sinking funds of approximately \$15,971,000 and \$15,676,000, respectively, which represents cash held as collateral under the Company's financial assurance policy (see "Note 15 – Commitment and Contingencies – Insurance" for a discussion of this fund).

Accounts Receivable

Accounts receivable are customer obligations due under normal trade terms requiring payment within 30 or 60 days from the invoice date based on the customer type (government, broker, or commercial). The carrying amount of accounts receivable is reduced by an allowance for doubtful accounts, which is a valuation allowance that reflects management's best estimate of the amounts that will not be collected. The Company regularly reviews all accounts receivable balances that exceed 60 days from the invoice date and based on an assessment of current credit worthiness, estimates the portion, if any, of the balance that will not be collected. This analysis excludes government related receivables due to our past successful experience in their collectability. Specific accounts that are deemed to be uncollectible are reserved at 100% of their outstanding balance. The remaining balances aged over 60 days have a percentage applied by aging category, based on historical experience that allows us to calculate the total allowance required. Once the Company has exhausted all options in the collection of a delinquent accounts receivable balance, which includes collection letters, demands for payment, collection agencies and attorneys, the account is deemed uncollectible and subsequently written off. The write off process involves approvals from senior management based on required approval thresholds.

The following table sets forth the activity in the allowance for doubtful accounts for the years ended December 31, 2018 and 2017 (in thousands):

	Year Ended December 31,	
	2018	2017
Allowance for doubtful accounts - beginning of year	\$720	\$272
Provision for bad debt reserve	66	462
Write-off	(681)	(14)
Allowance for doubtful accounts - end of year	\$105	\$720

Unbilled Receivables

Unbilled receivables are generated by differences between invoicing timing and our proportional performance based methodology used for revenue recognition purposes. As major processing and contract completion phases are completed and the costs are incurred, the Company recognizes the corresponding percentage of revenue. Within our Treatment Segment, the facilities experience delays in processing invoices due to the complexity of the documentation that is required for invoicing, as well as the difference between completion of revenue recognition milestones and agreed upon invoicing terms, which results in unbilled receivables. The timing differences occur for several reasons: partially from delays in the final processing of all wastes associated with certain work orders and partially from delays for analytical testing that is required after the facilities have processed waste but prior to our release of waste for disposal. The tasks relating to these delays usually take several months to complete. Based on historical data used in reviewing the timing of these delays, the Company determined that certain issues, including, but not limited to, delays at our third party disposal site, can extend collection of some of these receivables greater than twelve months. However, our historical experience suggests that a significant portion of unbilled receivables are ultimately collectible with minimal concession on our part. The Company, therefore, segregates the unbilled receivables between current and long-term.

Unbilled receivables within our Services Segment can result from: (1) revenue recognized by our Earned Value Management program (a program which integrates project scope, schedule, and cost to provide an objective measure of project progress) but invoice milestones have not yet been met and/or (2) contract claims and pending change orders, including Requests for Equitable Adjustments (“REAs”) when work has been performed and collection of revenue is reasonably assured.

Inventories

Inventories consist of treatment chemicals, saleable used oils, and certain supplies. Additionally, the Company has replacement parts in inventory, which are deemed critical to the operating equipment and may also have extended lead times should the part fail and need to be replaced. Inventories are valued at the lower of cost or market with cost determined by the first-in, first-out method.

Property and Equipment

Property and equipment expenditures are capitalized and depreciated using the straight-line method over the estimated useful lives of the assets for financial statement purposes, while accelerated depreciation methods are principally used for income tax purposes. Generally, asset lives range from ten to forty years for buildings (including improvements and asset retirement costs) and three to seven years for office furniture and equipment, vehicles, and decontamination and processing equipment. Leasehold improvements are capitalized and amortized over the lesser of the term of the lease or the life of the asset. Maintenance and repairs are charged directly to expense as incurred. The cost and accumulated depreciation of assets sold or retired are removed from the respective accounts, and any gain or loss from sale or retirement is recognized in the accompanying Consolidated Statements of Operations. Renewals and improvements, which extend the useful lives of the assets, are capitalized.

Certain property and equipment expenditures are financed through the use of capital leases. Amortization of capitalized leased assets is computed using the straight-line method over the estimated useful lives of the assets. Total property and equipment at December 31, 2018 financed through capital leases was approximately \$517,000 less accumulated depreciation of \$8,000 resulting in net fixed assets under capital leases of \$509,000. The Company had no capital leases in 2017.

Long-lived assets, such as property, plant and equipment, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset. Assets to be disposed of are separately presented in the balance sheet and reported at the lower of the carrying amount or fair value less costs to sell, and are no longer depreciated.

Our depreciation expense totaled approximately \$1,105,000 and \$3,429,000 in 2018 and 2017, respectively.

Capitalized Interest

The Company's policy is to capitalize interest cost incurred on debt during the construction of projects for its use. A reconciliation of our total interest cost to "Interest Expense" as reported on our Consolidated Statements of Operations for 2018 and 2017 is as follows:

(Amounts in Thousands)	2018	2017
Interest cost capitalized	\$70	\$6
Interest cost charged to income	251	315
Total interest	\$321	\$321

Intangible Assets

Intangible assets consist primarily of the recognized value of the permits required to operate our business.

Indefinite-lived intangible assets are not amortized but are reviewed for impairment annually as of October 1, or when events or changes in the business environment indicate that the carrying value may be impaired. If the fair value of the asset is less than the carrying amount, a quantitative test is performed to determine the fair value. The impairment loss, if any, is measured as the excess of the carrying value of the asset over its fair value. Significant judgments are inherent in these analyses and include assumptions for, among other factors, forecasted revenue, gross margin, growth rate, operating income, timing of expected future cash flows, and the determination of appropriate long term discount rates. Impairment testing of our permits related to our Treatment reporting unit as of October 1, 2018 and 2017 resulted in no impairment charges.

Intangible assets that have definite useful lives are amortized using the straight-line method over the estimated useful lives (with the exception of customer relationships which are amortized using an accelerated method) and are excluded from our annual intangible asset valuation review as of October 1. The Company has one definite-lived permit which was excluded from our annual impairment review as noted above. Definite-lived intangible assets are also tested for impairment whenever events or changes in circumstances suggest impairment might exist.

R&D

Operational innovation and technical know-how is very important to the success of our business. Our goal is to discover, develop, and bring to market innovative ways to process waste that address unmet environmental needs and to develop new company service offerings. The Company conducts research internally and also through collaborations with other third parties. R&D costs consist primarily of employee salaries and benefits, laboratory costs, third party fees, and other related costs associated with the development and enhancement of new potential waste treatment processes and new technology and are charged to expense when incurred in accordance with ASC Topic 730, "Research and Development." The Company's R&D expenses included approximately \$811,000 and \$1,141,000 for the years ended December 31, 2018 and 2017, respectively, incurred by our Medical Segment in the R&D of its medical isotope production technology.

Accrued Closure Costs and Asset Retirement Obligations ("ARO")

Accrued closure costs represent our estimated environmental liability to clean up our facilities, as required by our permits, in the event of closure. ASC 410, "Asset Retirement and Environmental Obligations" requires that the discounted fair value of a liability for an ARO be recognized in the period in which it is incurred with the associated ARO capitalized as part of the carrying cost of the asset. The recognition of an ARO requires that management make numerous estimates, assumptions and judgments regarding such factors as estimated probabilities, timing of settlements, material and service costs, current technology, laws and regulations, and credit adjusted risk-free rate to be used. This estimate is inflated, using an inflation rate, to the expected time at which the closure will occur, and then discounted back, using a credit adjusted risk free rate, to the present value. ARO's are included within buildings as part of property and equipment and are depreciated over the estimated useful life of the property. In periods subsequent to initial measurement of the ARO, the Company must recognize period-to-period changes in the liability resulting from the passage of time and revisions to either the timing or the amount of the original estimate of undiscounted cash flows. Increases in the ARO liability due to passage of time impact net income as accretion expense, which is included in cost of goods sold. Changes in costs resulting from changes or expansion at the facilities require adjustment to the ARO liability and are capitalized and charged as depreciation expense, in accordance with the Company's depreciation policy.

Income Taxes

Income taxes are accounted for in accordance with ASC 740, "Income Taxes." Under ASC 740, the provision for income taxes is comprised of taxes that are currently payable and deferred taxes that relate to the temporary differences between financial reporting carrying values and tax bases of assets and liabilities. Deferred tax assets and liabilities are measured using enacted income tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. Any effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date.

ASC 740 requires that deferred income tax assets be reduced by a valuation allowance if it is more likely than not that some portion or all of the deferred income tax assets will not be realized. The Company regularly assesses the likelihood that the deferred tax asset will be recovered from future taxable income. The Company considers projected future taxable income and ongoing tax planning strategies, then records a valuation allowance to reduce the carrying value of the net deferred income taxes to an amount that is more likely than not to be realized.

ASC 740 sets out a consistent framework for preparers to use to determine the appropriate recognition and measurement of uncertain tax positions. ASC 740 uses a two-step approach wherein a tax benefit is recognized if a position is more-likely-than-not to be sustained. The amount of the benefit is then measured to be the highest tax benefit which is greater than 50% likely to be realized. ASC 740 also sets out disclosure requirements to enhance transparency of an entity's tax reserves. The Company recognizes accrued interest and income tax penalties related to unrecognized tax benefits as a component of income tax expense.

The Company reassesses the validity of our conclusions regarding uncertain income tax positions on a quarterly basis to determine if facts or circumstances have arisen that might cause us to change our judgment regarding the likelihood of a tax position's sustainability under audit.

Foreign Currency

The Company's foreign subsidiaries include PF UK Limited, PF Canada and PF Medical. Assets and liabilities are translated to U.S. dollars at the exchange rate in effect at the balance sheet date and revenue and expenses at the average exchange rate for the period. Foreign currency translation adjustments for these subsidiaries are accumulated as a separate component of accumulated other comprehensive income (loss) in stockholders' equity. Gains and losses resulting from foreign currency transactions are recognized in the Consolidated Statements of Operations.

Concentration Risk

The Company performed services relating to waste generated by domestic government clients (includes U.S federal, state and local), either directly as a prime contractor or indirectly as a subcontractor to government entities, representing approximately \$34,811,000, or 70.3%, of our total revenue during 2018, as compared to \$37,019,000, or 74.4%, of our total revenue during 2017.

As our revenues are project/event based where the completion of one contract with a specific customer may be replaced by another contract with a different customer from year to year, the Company does not believe the loss of one specific customer from one year to the next will generally have a material adverse effect on our operations and financial condition.

Financial instruments that potentially subject the Company to significant concentrations of credit risk consist principally of cash and accounts receivable. The Company maintains cash with high quality financial institutions, which may exceed Federal Deposit Insurance Corporation ("FDIC") insured amounts from time to time. Concentration

of credit risk with respect to accounts receivable is limited due to the Company's large number of customers and their dispersion throughout the United States as well as with the significant amount of work that we perform for the federal government.

The Company had two government related customers whose net outstanding receivable balance represented 13.0% and 10.1% of the Company's total consolidated net accounts receivable at December 31, 2018. The Company had two government related customers whose net outstanding receivable balance represented 17.9% and 16.8% of the Company's total consolidated net accounts receivable at December 31, 2017.

Revenue Recognition and Related Policies

In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09, "Revenue from Contracts with Customers" followed by a series of related accounting standard updates (collectively referred to as "Topic 606") which superseded nearly all existing revenue recognition guidance. Under the new standard, a five-step process is utilized in order to determine revenue recognition, depicting the transfer of goods or services to a customer at an amount that reflects the consideration it expects to receive in exchange for those goods or services. We adopted Topic 606 effective January 1, 2018 (see "Recently Adopted Accounting Standards" below for further discussion of Topic 606 and the impact to the Company's financial statements). Under Topic 606, a performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account. A contract transaction price is allocated to each distinct performance obligation and recognized as revenues as the performance obligation is satisfied.

Treatment Segment Revenues:

Contracts in our Treatment Segment have a single performance obligation as the promise to receive, treat and dispose of waste is not separately identifiable in the contract and, therefore, not distinct. Performance obligations are generally satisfied over time using the input method. Under the input method, the Company uses a measure of progress divided into major phases which include receipt (generally ranging from 9.0% to 33%), treatment/processing and shipment/final disposal. As major processing phases are completed and the costs are incurred, the proportional percentage of revenue is recognized. Transaction price for Treatment Segment contracts are determined by the stated fixed rate per unit price as stipulated in the contract.

Services Segment Revenues:

Revenues for our Services Segment are generated from time and materials, cost reimbursement or fixed price arrangements:

Our primary obligation to customers in time and materials contracts relate to the provision of services to the customer at the direction of the customer. This provision of services at the request of the customer is the performance obligation, which is satisfied over time. Revenue earned from time and materials contracts is determined using the input method and is based on contractually defined billing rates applied to services performed and materials delivered.

Our primary performance obligation to customers in cost reimbursement contracts is to complete certain tasks and work streams. Each specified work stream or task within the contract is considered to be a separate performance obligation. The transaction price is calculated using an estimated cost to complete the various scope items to achieve the performance obligation as stipulated in the contract. An estimate is prepared for each individual scope item in the contract and the transaction price is allocated on a time and materials basis as services are provided. Revenue from cost reimbursement contracts is recognized over time using the input method based on costs incurred, plus a proportionate amount of fee earned.

Under fixed price contracts, the objective of the project is not attained unless all scope items within the contract are completed and all of the services promised within fixed fee contracts constitute a single performance obligation. Transaction price is estimated based upon the estimated cost to complete the overall project. Revenue from fixed price contracts is recognized over time using the output or input method. For the output method, revenue is recognized based on milestone attained on the project. For the input method, revenue is recognized based on costs incurred on the project relative to the total estimated costs of the project.

The majority of our revenue is derived from short term contracts with an original expected length of one year or less. Also, the nature of our contracts does not give rise to variable consideration.

Significant Payment Terms

Invoicing is based on schedules established in customer contracts. Payment terms vary by customers but are generally established at 30 days from invoicing.

Incremental Costs to Obtain a Contract

Costs incurred to obtain contracts with our customers are immaterial and as a result, the Company expenses (within selling, general and administration expenses (“SG&A”)) incremental costs incurred in obtaining contracts with our customer as incurred.

Remaining Performance Obligations

The Company applies the practical expedient in paragraph 606-10-50-14 and does not disclose information about remaining performance obligations that have original expected durations of one year or less.

The Company applies the transition practical expedient in paragraph 606-10-65-1(f)(3) and does not disclose the amount of the transaction price allocated to the remaining performance obligations or an explanation of when the Company expects to recognize that amount as revenue for periods prior to the adoption of Topic 606.

Stock-Based Compensation

The Company accounts for stock-based compensation in accordance with ASC 718, “Compensation – Stock Compensation.” ASC 718 requires all stock-based payments to employees, including grant of options, to be recognized in the Statement of Operations based on their fair values. The Company accounts for stock-based compensation issued to consultants in accordance with the provisions of ASC 505-50, “Equity-Based Payments to Non-Employees (see “Recently Issued Accounting Standards – Not Yet Adopted – ASU No 2018-07, Compensation – Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting” which the Company will adopt effective January 1, 2019. The Company uses the Black-Scholes option-pricing model to determine the fair-value of stock-based awards which requires subjective assumptions. Assumptions used to estimate the fair value of stock-based awards include the exercise price of the award, the expected term, the expected volatility of our stock over the stock-based award’s expected term, the risk-free interest rate over the award’s expected term, and the expected annual dividend yield. The Company accounts for forfeitures when they occur.

Comprehensive Income (Loss)

The components of comprehensive income (loss) are net income (loss) and the effects of foreign currency translation adjustments.

Income (Loss) Per Share

Basic income (loss) per share is calculated based on the weighted-average number of outstanding common shares during the applicable period. Diluted income (loss) per share is based on the weighted-average number of outstanding common shares plus the weighted-average number of potential outstanding common shares. In periods where they are anti-dilutive, such amounts are excluded from the calculations of dilutive earnings per share. Income (loss) per share is computed separately for each period presented.

Fair Value of Financial Instruments

Certain assets and liabilities are required to be recorded at fair value on a recurring basis, while other assets and liabilities are recorded at fair value on a nonrecurring basis. Fair value is determined based on the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants. The three-tier value hierarchy, which prioritizes the inputs used in the valuation methodologies, is:

Level 1—Valuations based on quoted prices for identical assets and liabilities in active markets.

Level 2—Valuations based on observable inputs other than quoted prices included in Level 1, such as quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets and liabilities in markets that are not active, or other inputs that are observable or can be corroborated by observable market data.

Level 3—Valuations based on unobservable inputs reflecting the Company's own assumptions, consistent with reasonably available assumptions made by other market participants.

Financial instruments include cash (Level 1), accounts receivable, accounts payable, and debt obligations (Level 3). Credit is extended to customers based on an evaluation of a customer's financial condition and, generally, collateral is not required. At December 31, 2018 and December 31, 2017, the fair value of the Company's financial instruments approximated their carrying values. The fair value of the Company's revolving credit and term loan approximate its carrying value due to the variable interest rate.

Recently Adopted Accounting Standards

The Company adopted Topic 606 effective January 1, 2018. Topic 606 provides a single, comprehensive revenue recognition model for all contracts with customers and also requires additional disclosure surrounding the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments and assets recognized from costs incurred to obtain or fulfill a contract. The Company adopted Topic 606 under the modified retrospective approach to all contracts as of the date of adoption. The Company recognized the cumulative effect of initially adopting Topic 606 as an increase of approximately \$316,000 to the opening balance of accumulated deficit at January 1, 2018. The adoption of Topic 606 did not result in significant changes to our revenues within our Treatment and Services Segments. The cumulative impact to the opening balance of accumulated deficit at January 1, 2018 was primarily driven by changes to the timing of revenue recognition in certain immaterial waste streams within our Treatment Segment. See "Revenue Recognition and Related Policies" above in this Note and "Note 3 – Revenue" for additional disclosures related to our revenues under the new standard. The comparative previous period information continues to be reported under the accounting standards in effect for that period. We expect the impact of the adoption of Topic 606 to be immaterial to our consolidated financial statements on an on-going basis.

The cumulative effect of the changes made to our January 1, 2018 unaudited Consolidated Balance Sheet for the adoption of Topic 606 was as follows (in thousands):

	Balance at December 31, 2017	Adjustment Due to Topic 606	Opening balance at January 1, 2018
LIABILITIES AND STOCKHOLDERS' EQUITY			
Current liabilities:			
Disposal/transportation accrual	\$ 2,071	\$ (456)	\$ 1,615
Deferred revenue	4,311	772	5,083
Stockholders' Equity:			
Accumulated deficit	\$(77,893)	\$ (316)	\$(78,209)

In accordance with Topic 606 requirements, the disclosure of the impact of adoption of Topic 606 on our Consolidated Balance Sheets, Consolidated Statement of Operations, and Consolidated Statement of Comprehensive Loss was as follows (in thousands):

Consolidated Balance Sheet	December 31, 2018		
	As Reported	Balances Before Adoption of Topic 606	Effect of Change Higher/(Lower)
LIABILITIES AND STOCKHOLDERS' EQUITY			
Current liabilities:			
Disposal/transportation accrual	\$1,542	\$1,882	\$ (340)
Deferred revenue	6,595	6,007	588
Stockholders' Equity:			
Accumulated deficit	\$(79,630)	\$(79,795)	\$ 165

Consolidated Statement of Operations	For the year ended December 31, 2018
	Balances Before

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	As Reported	Adoption of Topic 606	Effect of Change Higher/(Lower)
Revenues	\$49,539	\$49,355	\$ 184
Cost of goods sold	41,078	41,059	19
Loss from continuing operations, net of taxes	(1,074)	(1,239)	165
Net loss attributable to Perma-Fix Services, Inc. common stockholders	(1,421)	(1,586)	165
Net loss attributable to Perma-Fix Environmental Services, Inc. common stockholders - basic and diluted:			
Continuing operations	\$(.06)	\$(.07)	\$.01
Net loss per common shares	\$(.12)	\$(.13)	\$.01

Consolidated Statement of Comprehensive Loss	For the year ended Decmeber 31, 2018		
	As Reported	Balances Before Adoption of Topic 606	Effect of Change Higher/(Lower)
Net loss	\$(1,741)	\$ (1,906)	\$ 165
Comprehensive loss attributable to Perma-Fix Environmental Services, Inc. stockholders	(1,523)	(1,688)	165

In August 2016, the FASB issued ASU 2016-15, “Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments (a consensus of the Emerging Issues Task Force),” which aims to eliminate diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230, Statement of Cash Flows, and other Topics. Subsequently, in November 2016, the FASB issued ASU 2016-18, “Statement of Cash Flows (Topic 230), Restricted Cash, a consensus of the FASB Emerging Issues Task Force,” which clarifies the guidance on the cash flow classification and presentation of changes in restricted cash or restricted cash equivalents. Although ASU 2016-18 does not provide a definition of restricted cash or restricted cash equivalents, it states that amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flow. ASU 2016-15 and ASU 2016-18 are effective for annual reporting periods, and interim periods therein, beginning after December 15, 2017. The Company retrospectively adopted these ASUs effectively January 1, 2018 and has included finite risk sinking funds (included in other long term assets of the Company’s Consolidated Balance Sheets) of \$15,971,000 and \$15,676,000 at December 31, 2018 and 2017, respectively, as well as previously reported cash, when reconciling the beginning-of-period and end-of-period cash and restricted cash on the accompanying Company’s Consolidated Statements of Cash Flows. The Company’s finite risk sinking funds represent cash held as collateral under the Company’s financial assurance policy (see “Note 14 – Commitment and Contingencies – Insurance” for a discussion of the Company’s finite risk sinking funds). The adoption of these ASUs by the Company effective January 1, 2018 did not have a material impact on the Company’s financial position and results of operations.

In October 2016, the FASB issued ASU 2016-16, “Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory,” which eliminates the existing exception in U.S. GAAP prohibiting the recognition of the income tax consequences for intra-entity asset transfers. Under ASU 2016-16, entities are required to recognize the income tax consequences of intra-entity asset transfers other than inventory when the transfer occurs. ASU 2016-16 is effective on a modified retrospective basis for fiscal years, and for interim periods within those fiscal years, beginning after December 15, 2017, with early adoption permitted. The adoption of ASU 2016-16 by the Company effective January 1, 2018 did not have a material impact on the Company’s financial position, results of operations, or cash flows.

In January 2017, the FASB issued ASU No. 2017-01, “Business Combinations (Topic 805) – Clarifying the Definition of a Business.” ASU 2017-01 clarifies the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or

businesses. The definition of a business affects many areas of accounting including acquisition, disposals, goodwill and consolidation. This standard is effective for fiscal years beginning after December 15, 2017, including interim periods within that reporting period. The adoption of ASU 2017-01 by the Company effective January 1, 2018 did not have a material impact on the Company's financial position, results of operations, or cash flows.

In May 2017, the FASB issued ASU 2017-09, "Compensation – Stock Compensation (Topic 718): Scope of Modification Accounting." This ASU provides guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in Topic 718. ASU 2017-09 is effective for fiscal years beginning after December 15, 2017 and interim periods within those fiscal years, and early adoption is permitted, including in an interim period. ASU 2017-09 is to be applied on a prospective basis to an award modified on or after the adoption date. The adoption of ASU 2017-01 by the Company effective January 1, 2018 did not have a material impact on the Company's financial position, results of operations, or cash flows.

Recently Issued Accounting Standards – Not Yet Adopted

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842).” ASU 2016-02 requires lessees to recognize a lease liability and a right-of-use (“ROU”) asset for all leases, including operating leases, with a term greater than twelve months in their balance sheets. ASU 2016-02 is effective for annual and interim periods in fiscal years beginning after December 15, 2018, with early adoption permitted. In July 2018, the FASB issued ASU 2018-11, “Targeted Improvements,” which provided entities with an additional (and optional) transition method, allowing an entity to apply the new lease standard at the adoption date and to recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. The Company will adopt ASC Topic 842 on January 1, 2019 using the modified retrospective transition method allowed under ASU 2018-11. The Company will elect the package of practical expedients permitted under ASU 2018-11 which among other things, allows an entity to carry forward its historical lease classifications. Based on our current assessment, which is subject to change, the Company estimates it will recognize both ROU assets and related liabilities on its Consolidated Balance Sheets in the range of \$2,500,000 to \$2,700,000, upon adoption. The Company continues to evaluate implementation of key systems functionality and internal control processes in order to comply with ASC Topic 842. The Company does not expect the adoption of this standard to have a material impact in its Consolidated Statements of Operations and Cash Flows. The Company will expand its consolidated financial statement disclosure upon adoption of this standard.

In February 2018, FASB issued ASU 2018-02, “Income Statement—Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income.” This ASU allows for the reclassification of certain income tax effects related to the new Tax Cuts and Jobs Act legislation between “Accumulated other comprehensive income” and “Retained earnings.” This ASU relates to the requirement that adjustments to deferred tax liabilities and assets related to a change in tax laws or rates be included in “Income from continuing operations”, even in situations where the related items were originally recognized in “Other comprehensive income” (rather than in “Income from continuing operations”). ASU 2018-02 is effective for all entities for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years, with early adoption permitted. Adoption of this ASU is to be applied either in the period of adoption or retrospectively to each period in which the effect of the change in the tax laws or rates were recognized. This ASU is effective January 1, 2019 for the Company. The Company does not expect that the adoption of ASU 2018-09 will have a material impact on the Company’s financial statements.

In June 2018, the FASB issued ASU No. 2018-07, “Compensation — Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting,” which expands the scope of Topic 718 to include all share-based payment transactions for acquiring goods and services from nonemployees. ASU 2018-07 specifies that Topic 718 applies to all share-based payment transactions in which the grantor acquires goods and services to be used or consumed in its own operations by issuing share-based payment awards. ASU 2018-07 also clarifies that Topic 718 does not apply to share-based payments used to effectively provide (1) financing to the issuer or (2) awards granted in conjunction with selling goods or services to customers as part of a contract accounted for under ASC 606. ASU 2018-07 is effective for annual reporting periods, and interim periods within those years, beginning after December 15, 2018, with early adoption permitted. This ASU is effective January 1, 2019 for the Company. The Company does not expect that the adoption of ASU 2018-09 will have a material impact on the Company’s financial statements.

In August 2018, the FASB issued ASU 2018-13, “Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement.” ASU 2018-13 improves the disclosure requirements on fair value measurements. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. Early adoption is permitted for any removed or modified disclosures. The Company is currently assessing the impact that this standard will have on its financial statements.

NOTE 3**REVENUE****Disaggregation of Revenue**

In general, the Company's business segmentation is aligned according to the nature and economic characteristics of our services and provides meaningful disaggregation of each business segment's results of operations. The following tables present further disaggregation of our revenues by different categories for our Services and Treatment Segments:

Revenue by Contract Type

(In thousands)	Twelve Months Ended			Twelve Months Ended		
	December 31, 2018			December 31, 2017		
	Treatment	Services	Total	Treatment	Services	Total
Fixed price	\$36,271	\$1,575	\$37,846	\$37,750	\$714	\$38,464
Time and materials		11,693	11,693		11,305	11,305
Total	\$36,271	\$13,268	\$49,539	\$37,750	\$12,019	\$49,769

Revenue by generator

(In thousands)	Twelve Months Ended			Twelve Months Ended		
	December 31, 2018			December 31, 2017		
	Treatment	Services	Total	Treatment	Services	Total
Domestic government	\$25,181	\$9,630	\$34,811	\$27,956	\$9,063	\$37,019
Domestic commercial	10,970	2,521	13,491	9,794	1,800	11,594
Foreign government	114	1,019	1,133		1,073	1,073
Foreign commercial	6	98	104		83	83
Total	\$36,271	\$13,268	\$49,539	\$37,750	\$12,019	\$49,769

Contract Balances

The timing of revenue recognition, billings, and cash collections results in accounts receivable and unbilled receivables (contract assets). The Company's contract liabilities consist of deferred revenues which represents advance payment from customers in advance of the completion of our performance obligation.

The following table represents changes in our contract assets and contract liabilities balances:

(In thousands)	December 31, 2018	January 1, 2018	Year-to-date Change (\$)	Year-to-date Change (%)
Contract assets				
Account receivables, net of allowance	\$ 7,735	\$ 7,940	\$ (205)	(2.6)%
Unbilled receivables - current	3,105	4,547	(1,442)	(31.7)%
Unbilled receivables - non-current		184	(184)	(100.0)%
Contract liabilities				
Deferred revenue	\$ 6,595	\$ 5,083	\$ 1,512	29.7 %

During the twelve months ended December 31, 2018 and 2017, the Company recognized revenue of \$8,071,000 and \$5,105,000, respectively, which was included in the deferred revenue balance at the beginning of the year. Revenue recognized in each period related to performance obligations satisfied within the respective period.

NOTE 4

M&EC FACILITY

The Company has completed the physical on-site closure and decommissioning activities at its M&EC facility (in closure status) in accordance with M&EC's license and permit requirements, with final closure of the facility subject to completion of final surveys and regulatory approvals. The Company continues to transition operational capabilities to our other Treatment Segment facilities, subject to customer requirements and regulatory approvals. The closure of the Company's M&EC facility was approved during the second quarter of 2016.

During the third quarter of 2017, the Company recorded a \$672,000 in impairment loss on tangible assets resulting from an updated financial valuation of M&EC's remaining long-lived tangible assets (inclusive of ARO costs) in accordance with ASC 360, "Property, Plant, and Equipment." Additionally, during the third and fourth quarters of 2017, the Company recorded an additional \$550,000 and \$850,000, respectively, in closure costs and current closure costs liabilities due to changes in future estimated closure costs.

During the second, third and fourth quarters of 2018, the Company recorded an additional \$1,215,000, \$1,093,000, and \$1,015,000, respectively, in closure costs and current closure liabilities due to changes in estimated future closure costs resulting from additional decommissioning clean-up scope. Given the nature of the closure requirements, additional clean up responsibilities were identified in locations of the building not previously accessible.

During the years ended December 31, 2018 and 2017, M&EC's revenues were approximately \$155,000 and \$6,312,000, respectively.

NOTE 5

PERMIT AND OTHER INTANGIBLE ASSETS

The following table summarizes changes in the carrying amount of permits. No permit exists at our Services and Medical Segments.

Permit (amount in thousands)	Treatment
Balance as of December 31, 2016	\$ 8,474

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PCB permit amortized ⁽¹⁾	(55)
Balance as of December 31, 2017	8,419
PCB permit amortized ⁽¹⁾	(55)
Permit in progress	79
Balance as of December 31, 2018	\$ 8,443

⁽¹⁾ Amortization for the one definite-lived permit capitalized in 2009. This permit is being amortized over a ten year period in accordance with its estimated useful life. See net carrying value of this permit at December 31, 2018 and 2017 in the table below.

The following table summarizes information relating to the Company's definite-lived intangible assets:

Intangibles (amount in thousands)	Useful Lives (Years)	December 31, 2018			December 31, 2017		
		Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Patent	1-17	\$728	\$ (336)	\$ 392	\$657	\$ (306)	\$ 351
Software	3	410	(403)	7	410	(398)	12
Customer relationships	10	3,370	(2,491)	879	3,370	(2,246)	1,124
Permit	10	545	(538)	7	545	(483)	62
Total		\$5,053	\$ (3,768)	\$ 1,285	\$4,982	\$ (3,433)	\$ 1,549

The intangible assets are amortized on a straight-line basis over their useful lives with the exception of customer relationships which are being amortized using an accelerated method.

The following table summarizes the expected amortization over the next five years for our definite-lived intangible assets:

Year	Amount (In thousands)
2019	\$ 255
2020	219
2021	198
2022	172
2023	132

Amortization expense recorded for definite-lived intangible assets was approximately \$350,000 and \$374,000, for the years ended December 31, 2018 and 2017, respectively.

NOTE 6

CAPITAL STOCK, STOCK PLANS, WARRANTS, AND STOCK BASED COMPENSATION

Stock Option Plans

The Company adopted the 2003 Outside Directors Stock Plan (the “2003 Plan”), which was approved by our stockholders at the Company’s July 29, 2003 Annual Meeting of Stockholders. Options granted under the 2003 Plan generally have a vesting period of six months from the date of grant and a term of 10 years, with an exercise price equal to the closing trade price on the date prior to grant date. The 2003 Plan also provides for the issuance to each outside director a number of shares of the Company’s Common Stock in lieu of 65% or 100% (based on option elected by each director) of the fee payable to the eligible director for services rendered as a member of the Board. The number of shares issued is determined at 75% of the market value as defined in the plan (the Company recognizes 100% of the market value of the shares issued). The 2003 Plan, as amended, also provides for the grant of an option to purchase up to 6,000 shares of our Common Stock for each outside director upon initial election to the Board, and the grant of an option to purchase 2,400 shares of our Common Stock upon each re-election. At the July 27, 2017 Annual Meeting of Stockholders (“2017 Annual Meeting”), the Company’s stockholders approved an amendment to the 2003 Plan which authorized the issuance of an additional 300,000 shares of the Company’s Common Stock under the plan. After the approval of the amendment, the number of shares of the Company’s Common Stock authorized under the 2003 Plan was 1,100,000. At December 31, 2018, the 2003 Plan had available for issuance 329,417 shares.

On April 28, 2010, the Company adopted the 2010 Stock Option Plan (“2010 Plan”), which was approved by our stockholders at the Company’s September 29, 2010 Annual Meeting of Stockholders. The 2010 Plan authorized an aggregate grant of 200,000 Non-Qualified Stock Options (“NQSOs”) and Incentive Stock Options (“ISOs”) to officers and employees of the Company for the purchase of up to 200,000 shares of the Company’s Common Stock. The term of each stock option granted is to be fixed by the Compensation Committee, but no stock option is exercisable more than ten years after the grant date, or in the case of an incentive stock option granted to a 10% stockholder, five years after the grant date. As discussed below, as the result of the approval of the 2017 Stock Option Plan (“2017 Plan”) at the Company’s 2017 Annual Meeting, no further options remain available for issuance under the 2010 Plan immediately upon the approval of the 2017 Plan; however, the 2010 Plan remains in full force and effect with respect to the outstanding options issued and unexercised at the date of the approval of the 2017 Plan. At December 31, 2018, the 2010 Plan had an option for the purchase of up to 10,000 shares of our Common Stock with expiration date of July 10, 2020 and an option for the purchase of up to 50,000 shares of our Common Stock with expiration date of May 15, 2022.

The Company adopted the 2017 Plan, which was approved by the Company’s stockholders at the Company’s 2017 Annual Meeting. The 2017 Plan authorizes the grant of options to officers and employees of the Company, including any employee who is also a member of the Board, as well as to consultants of the Company. The 2017 Plan authorizes an aggregate grant of 540,000 NQSOs and ISOs, which includes a rollover of 140,000 shares that remained available for issuance under the 2010 Plan as discussed above. Consultants of the Company can only be granted NQSOs. The term of each stock option granted under the 2017 Plan shall be fixed by the Compensation Committee, but no stock options will be exercisable more than ten years after the grant date, or in the case of an ISO granted to a 10% stockholder, five years after the grant date. The exercise price of any ISO granted under the 2017 Plan to an individual who is not a 10% stockholder at the time of the grant shall not be less than the fair market value of the shares at the time of the grant, and the exercise price of any incentive stock option granted to a 10% stockholder shall not be less than 110% of the fair market value at the time of grant. The exercise price of any NQSOs granted under the plan shall not be less than the fair market value of the shares at the time of grant. At December 31, 2018, the 2017 Plan had available for issuance 130,000 shares.

Stock Options to Employees and Outside Director

On January 18, 2018, the Company granted 6,000 NQSOs from the Company's 2003 Plan to a new director elected by the Company's Board to fill a vacancy on the Board. The options granted were for a contractual term of ten years with a vesting period of six months. The exercise price of the options was \$4.05 per share, which was equal to our closing stock price the day preceding the grant date, pursuant to the 2003 Plan.

On July 26, 2018, the Company granted an aggregate of 12,000 NQSOs from the Company's 2003 Plan to five of the six re-elected directors at the Company's July 26, 2018 Annual Meeting of Stockholders. Dr. Louis F. Centofanti (a Board member) was not eligible to receive options under the 2003 Plan as an employee of the Company, pursuant to the 2003 Plan. The NQSOs granted were for a contractual term of ten years with a vesting period of six months. The exercise price of the NQSO was \$4.30 per share, which was equal to our closing stock price the day preceding the grant date, pursuant to the 2003 Plan.

On January 13, 2017, the Company granted 6,000 NQSOs from the Company's 2003 Plan to a new director elected by the Company's Board to fill the vacancy left by a Board member who retired from the Board in October 2016. The options granted were for a contractual term of ten years with a vesting period of six months. The exercise price of the NQSO was \$3.79 per share, which was equal to our closing stock price the day preceding the grant date, pursuant to the 2003 Plan.

On July 27, 2017, the Company granted 12,000 NQSOs from the Company's 2003 Plan to five of the six re-elected directors at the 2017 Annual Meeting. Dr. Louis F. Centofanti, who is a member of the Board, was not eligible to receive options under the 2003 Plan as an employee of the Company, pursuant to the 2003 Plan. The NQSOs granted to the five directors were for a contractual term of ten years with a vesting period of six months. The exercise price of the NQSO was \$3.55 per share, which was equal to our closing stock price the day preceding the grant date, pursuant to the 2003 Plan.

On October 19, 2017, the Company granted an aggregate of 110,000 ISOs from the 2017 Plan to certain employees. The ISOs granted were for a contractual term of six years with one-fifth vesting annually over a five year period. The exercise price of the ISO was \$3.60 per share, which was equal to the fair market value of the Company's common stock on the date of grant.

On July 27, 2017, the Company granted an aggregate 200,000 ISOs from the 2017 Plan (following the approval of the 2017 Plan as discussed above) to the three named executive officers of the Company. The ISOs granted has a contractual term of six years with one-fifth vesting annually over a five year period. The exercise price of the ISO was \$3.65 per share, which was equal to the fair market value of the Company's Common Stock on the date of grant.

No employees or directors exercised options during 2018 and 2017.

The Company estimates the fair value of stock options using the Black-Scholes valuation model. Assumptions used to estimate the fair value of stock options granted include the exercise price of the award, the expected term, the expected volatility of the Company's stock over the option's expected term, the risk-free interest rate over the option's expected term, and the expected annual dividend yield. The fair value of the options granted during 2018 and 2017 and the related assumptions used in the Black-Scholes option model used to value the options granted were as follows:

	Employee Stock Option Granted			
	October 19, 2017		July 27, 2017	
Weighted-average fair value per share	\$1.75		1.88	
Risk -free interest rate ⁽¹⁾	1.98	%	1.98	%
Expected volatility of stock ⁽²⁾	54.64	%	53.15	%
Dividend yield	None		None	
Expected option life ⁽³⁾	5.0 years		6.0 years	

	Outside Director Stock Options Granted			
	January 18, 2018	July 26, 2018	January 13, 2017	July 27, 2017
Weighted-average fair value per share	\$ 2.55	3.02	\$ 2.63	\$ 2.48
Risk -free interest rate ⁽¹⁾	2.62	% 2.98	% 2.40	% 2.32 %
Expected volatility of stock ⁽²⁾	57.29	% 55.34	% 56.32	% 57.21 %
Dividend yield	None	None	None	None
Expected option life ⁽³⁾	10.0 years	10.0 years	10.0 years	10.0 years

⁽¹⁾ The risk-free interest rate is based on the U.S. Treasury yield in effect at the grant date over the expected term of the option.

⁽²⁾ The expected volatility is based on historical volatility from our traded Common Stock over the expected term of the option.

⁽³⁾ The expected option life is based on historical exercises and post-vesting data.

The following table summarizes stock-based compensation recognized for fiscal years 2018 and 2017.

	Year Ended	
	2018	2017
Employee Stock Options	\$ 147,000	\$ 78,000
Director Stock Options	51,000	46,000
Total	\$ 198,000	\$ 124,000

At December 31, 2018, the Company has approximately \$432,000 of total unrecognized compensation cost related to unvested employee and director options, of which \$131,000 is expected to be recognized in 2019, \$114,000 in 2020, \$114,000 in 2021, with the remaining \$73,000 in 2022.

Stock Options to Consultant

Robert Ferguson is a consultant to the Board and a consultant to the Company in connection with the Company's Test Bed Initiative ("TBI") at its PFNWR facility (see "Note 16 – Related Party Transactions" for further discussion). For Robert Ferguson's consulting work with the Board, he has been receiving monthly compensation of \$4,000. For Robert Ferguson's consulting work in connection with the Company's TBI, on July 27, 2017 ("grant date"), the Company granted Robert Ferguson a stock option from the Company's 2017 Plan for the purchase of up to 100,000 shares of the Company's Common Stock at an exercise price of \$3.65 a share, which was the fair market value of the Company's Common Stock on the date of grant ("Ferguson Stock Option"). The vesting of the Ferguson Stock Option is subject to the achievement of the following milestones ("waste" as noted below is defined as liquid LAW ("low activity waste") and/or liquid TRU ("transuranic waste")):

Upon treatment and disposal of three gallons of waste at the PFNWR facility by January 27, 2018, 10,000 shares of the Ferguson Stock Option shall become exercisable;

Upon treatment and disposal of 2,000 gallons of waste at the PFNWR facility by January 27, 2019, 30,000 shares of the Ferguson Stock Option shall become exercisable; and

Upon treatment and disposal of 50,000 gallons of waste at the PFNWR facility and assistance, on terms satisfactory to the Company, in preparing certain justifications of cost and pricing data for the waste and obtaining a long-term commercial contract relating to the treatment, storage and disposal of waste by January 27, 2021, 60,000 shares of the Ferguson Stock Option shall become exercisable.

The term of the Ferguson Stock Option is seven (7) years from the grant date. Each of the milestones is exclusive of each other; therefore, achievement of any of the milestones above by Robert Ferguson by the designated date will provide Robert Ferguson the right to exercise the number of options in accordance with the milestone attained (See “Note 18- Subsequent Events” for a discussion of an amendment whereby the second milestone date has been extended to March 31, 2020 from January 27, 2019).

In December 2017, the Company recorded approximately \$20,000 in consulting expenses (included in SG&A) and additional paid-in capital in connection with this transaction which amount was estimated to be the fair value of the 10,000 options on the performance completion date of December 19, 2017 under the first milestone. The fair value of the 10,000 options was estimated using the Black-Scholes valuation model with the following assumptions: 52.65% volatility, risk free interest rate of 2.30%, and an expected life of approximately 6.6 years and no dividends. On May 1, 2018, Robert Ferguson exercised the 10,000 options for the purchase of 10,000 shares of the Company’s Common Stock, resulting in total proceeds paid to the Company of approximately \$36,500.

The Company has not recorded expenses for the remaining 90,000 Ferguson Stock Option since achievement of the performance obligation under each of the two remaining milestones is uncertain at December 31, 2018.

Summary of Stock Option Plans

The summary of the Company’s total plans as of December 31, 2018 and 2017, and changes during the period then ended are presented as follows:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value ⁽²⁾
Options outstanding January 1, 2018	624,800	\$ 4.42		
Granted	18,000	4.22		
Exercised	(10,000)	3.65		
Forfeited/expired	(16,800)	11.70		
Options outstanding end of period ⁽¹⁾	616,000	\$4.23	4.7	\$
Options exercisable at December 31, 2018 ⁽¹⁾	249,333	\$5.04	4.4	\$
Options exercisable and expected to be vested at December 31, 2018	616,000	\$4.23	4.7	\$

Shares

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		Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value ⁽²⁾
Options outstanding January 1, 2017	247,200	\$ 6.69		
Granted	428,000	3.64		
Exercised				
Forfeited/expired	(50,400)	8.95		
Options outstanding end of period ⁽¹⁾	624,800	4.42	5.5	\$ 19,780
Options exercisable at December 31, 2017 ⁽¹⁾	179,467	6.30	4.6	\$13,080
Options vested and expected to be vested at December 31, 2017	624,800	\$ 4.42	5.5	\$19,780

⁽¹⁾Options with exercise prices ranging from \$2.79 to \$13.35

⁽²⁾The intrinsic value of a stock option is the amount by which the market value of the underlying stock exceeds the exercise price of the option.

The summary of the Company's nonvested options as of December 31, 2018 and changes during the period then ended are presented as follows:

	Shares	Weighted Average Grant-Date Fair Value
Non-vested options January 1, 2018	445,333	\$ 1.89
Granted	18,000	1.89
Vested	(96,666)	1.99
Forfeited		
Non-vested options at December 31, 2018	366,667	\$ 1.91

Common Stock Issued for Services

The Company issued a total of 60,598 and 61,598 shares of our Common Stock in 2018 and 2017, respectively, under our 2003 Plan to our outside directors as compensation for serving on our Board. As a member of the Board, each director elects to receive either 65% or 100% of the director's fee in shares of our Common Stock. The number of shares received is calculated based on 75% of the fair market value of our Common Stock determined on the business day immediately preceding the date that the quarterly fee is due. The balance of each director's fee, if any, is payable in cash. The Company recorded approximately \$249,000 and \$234,000 in compensation expense (included in SG&A) for the twelve months ended December 31, 2018 and 2017, respectively, for the portion of director fees earned in the Company's Common Stock.

Shares Reserved

At December 31, 2018, the Company has reserved approximately 616,000 shares of our Common Stock for future issuance under all of the option arrangements.

NOTE 7**LOSS PER SHARE**

The following table reconciles the loss and average share amounts used to compute both basic and diluted loss per share:

(Amounts in Thousands, Except for Per Share Amounts)	Years Ended December 31,	
	2018	2017
Net loss attributable to Perma-Fix Environmental Services, Inc., common stockholders:		
Loss from continuing operations, net of taxes	\$(1,074)	\$(3,538)
Net loss attributable to non-controlling interest	(320)	(450)
Loss from continuing operations attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$(754)	\$(3,088)
Loss from discontinuing operations attributable to Perma-Fix Environmental Services, Inc. common stockholders	(667)	(592)
Net Loss attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$(1,421)	\$(3,680)
Basic loss per share attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$ (.12)	\$ (.31)
Diluted loss per share attributable to Perma-Fix Environmental Services, Inc. common stockholders	\$ (.12)	\$ (.31)
Weighted average shares outstanding:		
Basic weighted average shares outstanding	11,855	11,706
Add: dilutive effect of stock options		
Add: dilutive effect of warrants		
Diluted weighted average shares outstanding	11,855	11,706
Potential shares excluded from above weighted average share calculations due to their anti-dilutive effect include:		
Stock options	107	595

NOTE 8**SERIES B PREFERRED STOCK**

The 1,284,730 shares of the Series B Preferred Stock (the "Series B Preferred Stock") of the Company's wholly-owned consolidated subsidiary, M&EC, were non-voting and non-convertible, had a \$1.00 liquidation preference per share

and were redeemable at the option and sole discretion of M&EC at any time, and from time to time, from and after one year from the date of issuance (June 25, 2001) of the Series B Preferred Stock for the purchase price of \$1.00 per share. Holders of shares of M&EC Series B Preferred Stock were entitled to receive, when, as and if declared by M&EC's Board out of funds legally available for payment, cumulative dividends at the rate per annum of 5% per share on the liquidation preference of \$1.00 per share of Series B Preferred Stock. Dividends on the Series B Preferred Stock accrued without interest beginning one year from the date of original issuance (June 25, 2001), and was payable in cash, if, when, and as declared by M&EC Board, quarterly each year commencing on the first dividend due date following the expiration of one year from the date of original issuance. On April 24, 2018, the Company announced a private exchange offer ("Exchange Offer"), to all 13 holders of the M&EC Series B Preferred Stock, to exchange in a private placement exempt from registration, for every share of Series B Preferred Stock tendered, (a) 0.1050805 shares of newly issued Common Stock of the Company, par value \$.001 per share ("Common Stock"), and (b) cash in lieu of fractional shares of Common Stock that would otherwise be issuable to the tendering holder of Series B Preferred Stock, in an amount equal to such fractional share of Common Stock multiplied by the closing price per share of the Common Stock on the last trading day immediately preceding the expiration date of the Exchange Offer. The Exchange Offer was made on an all-or-none basis, for all 1,284,730 shares of Series B Preferred Stock outstanding and had an expiration date of May 30, 2018. The Company owns 100% of the voting capital stock of M&EC. On May 30, 2018, the Exchange Offer was consummated, resulting in the issuance of an aggregate 134,994 unregistered shares of the Company's Common Stock in exchange for the 1,284,730 shares of Series B Preferred Stock and the payment of an aggregate of approximately \$29.00 in cash in lieu of the fractional shares of the Company's Common Stock that would otherwise have been issuable to the tendering holders of the Series B Preferred Stock. The fair value of the 134,994 shares of the Company's Common Stock issued was determined to be approximately \$648,000 which was based on the closing price of the Company's Common Stock on May 30, 2018 of \$4.80 per share. Upon the consummation of the Exchange Offer, the previous holders of the M&EC Series B Preferred Stock forfeited all rights of a holder of Series B Preferred Shares, including the right to receive quarterly cash dividends, and the rights to the cumulative accrued and unpaid dividends with M&EC Series B Preferred Stock in the amount of approximately \$1,022,000 at May 30, 2018. The M&EC Board never declared dividends on the Series B Preferred Stock and our credit facility prohibits the payment of cash dividends without the lender's consent. After the Exchange Offer, the 1,284,730 shares of the Series B Preferred Stock acquired by the Company were contributed by the Company to M&EC and the Series B Preferred Stock was no longer outstanding. The Company recorded a gain of approximately \$1,596,000 during the second quarter of 2018, which was net of approximately \$63,000 in legal costs incurred for the completion of the transaction.

The shares of Company Common Stock issued in exchange for shares of M&EC's Series B Preferred Stock were issued pursuant to an exemption from registration under the Securities Act of 1933, as amended (the "Securities Act"), and, as a result, were considered restricted securities when issued.

NOTE 9

DISCONTINUED OPERATIONS

The Company's discontinued operations consist of all our subsidiaries included in our Industrial Segment: (1) subsidiaries divested in 2011 and prior, (2) two previously closed locations, and (3) our Perma-Fix of PFSG facility, which is currently in the process of undergoing closure, subject to regulatory approval of necessary plans and permits.

The Company incurred losses from discontinued operations of \$667,000 and \$592,000 for the years ended December 31, 2018 and 2017 (net of taxes of \$0 for each period), respectively. The loss for the year ended 2018 included an increase of approximately \$50,000 in remediation reserve for our Perma-Fix of Dayton ("PFD") subsidiary due to reassessment of the remediation reserve. The remaining loss for each of the periods noted above were primarily due to costs incurred in the administration and continued monitoring of our discontinued operations.

The following table presents the major class of assets of discontinued operations at December 31, 2018 and 2017. No assets and liabilities were held for sale at December 31, 2018 and 2017.

(Amounts in Thousands)	December 31, 2018	December 31, 2017
Current assets		
Other assets	\$ 107	\$ 89
Total current assets	107	89
Long-term assets		
Property, plant and equipment, net ⁽¹⁾	81	81
Other assets	118	195
Total long-term assets	199	276
Total assets	\$ 306	\$ 365
Current liabilities		
Accounts payable	\$ 10	\$ 8
Accrued expenses and other liabilities	296	265
Environmental liabilities	50	632
Total current liabilities	356	905
Long-term liabilities		
Closure liabilities	126	120

Environmental liabilities	837	239
Total long-term liabilities	963	359
Total liabilities	\$ 1,319	\$ 1,264

(1) net of accumulated depreciation of \$10,000 for each period presented.

The Company's discontinued operations include a note receivable in the original amount of approximately \$375,000 recorded in May 2016 resulting from the sale of property at our Perma-Fix of Michigan, Inc. ("PFMI") subsidiary. This note requires 60 equal monthly installment payments by the buyer of approximately \$7,250 (which includes interest). At December 31, 2018, the outstanding amount on this note receivable totaled approximately \$202,000, of which approximately \$84,000 is included in "Current assets related to discontinued operations" and approximately \$118,000 is included in "Other assets related to discontinued operations" in the accompanying Consolidated Balance Sheets.

Environmental Liabilities

The Company has three remediation projects, which are currently in progress at our PFD, Perma-Fix of Memphis, Inc. ("PFM" – closed location), and PFSG (in closure status) subsidiaries. The Company divested PFD in 2008; however, the environmental liability of PFD was retained by the Company upon the divestiture of PFD. These remediation projects principally entail the removal/remediation of contaminated soil and, in most cases, the remediation of surrounding ground water. The remediation activities are closely reviewed and monitored by the applicable state regulators.

At December 31, 2018, we had total accrued environmental remediation liabilities of \$887,000, of which \$50,000 are recorded as a current liability, an increase of \$16,000 from the December 31, 2017 balance of \$871,000. The net increase presents an increase of approximately \$50,000 made to the reserve at our PFD subsidiary due to reassessment of the remediation reserve and payments of approximately \$34,000 on remediation projects for our PFD and PFSG subsidiaries.

The current and long-term accrued environmental liability at December 31, 2018 is summarized as follows (in thousands).

	Current Accrual	Long-term Accrual	Total
PFD	\$ 50	\$ 60	\$110
PFM	—	15	15
PFSG	—	762	762
Total liability	\$ 50	\$ 837	\$887

NOTE 10

LONG-TERM DEBT

Long-term debt consists of the following at December 31, 2018 and December 31, 2017:

(Amounts in Thousands)	December 31, 2018	December 31, 2017
Revolving Credit facility dated October 31, 2011, as amended, borrowings based upon eligible accounts receivable, subject to monthly borrowing base calculation, balance due March 24, 2021. Effective interest rate for 2018 and 2017 was 5.8% and 4.1%, respectively. (1) (2)	\$ 639	\$ —
Term Loan dated October 31, 2011, as amended, payable in equal monthly installments of principal of \$102, balance due on March 24, 2021. Effective interest rate for 2018 and 2017 was 5.5% and 4.6%, respectively. (1) (2)	2,663 (3)	3,847 (3)
Total debt	3,302	3,847
Less current portion of long-term debt	1,184	1,184
Long-term debt	\$ 2,118	\$ 2,663

(1) Our revolving credit facility is collateralized by our accounts receivable and our term loan is collateralized by our property, plant, and equipment.

(2) See below “Revolving Credit and Term Loan Agreement” for monthly payment interest options.

(3) Net of debt issuance costs of (\$80,000) and (\$115,000) at December 31, 2018 and December 31, 2017, respectively.

Revolving Credit and Term Loan Agreement

The Company entered into an Amended and Restated Revolving Credit, Term Loan and Security Agreement, dated October 31, 2011 (“Amended Loan Agreement”), with PNC National Association (“PNC”), acting as agent and lender. The Amended Loan Agreement has been amended from time to time since the execution of the Amended Loan Agreement. The Amended Loan Agreement, as subsequently amended (“Revised Loan Agreement”), provides the Company with the following credit facility with a maturity date of March 24, 2021: (a) up to \$12,000,000 revolving credit (“revolving credit”) and (b) a term loan (“term loan”) of approximately \$6,100,000, which requires monthly installments of approximately \$101,600 (based on a seven-year amortization). The maximum that we can borrow under the revolving credit is based on a percentage of eligible receivables (as defined) at any one time reduced by outstanding standby letters of credit and borrowing reductions that our lender may impose from time to time.

Under the Revised Loan Agreement, we have the option of paying an annual rate of interest due on the revolving credit at prime (5.50% at December 31, 2018) plus 2% or London Inter Bank Offer Rate (“LIBOR”) plus 3% and the term loan at prime plus 2.5% or LIBOR plus 3.5%.

Pursuant to the Revised Loan Agreement, the Company may terminate the Revised Loan Agreement, upon 90 days’ prior written notice upon payment in full of its obligations under the Revised Loan Agreement. The Company agreed to pay PNC 1.0% of the total financing had the Company paid off its obligations on or before March 23, 2017, .50% of the total financing had the Company paid off its obligations after March 23, 2017 but prior to or on March 23, 2018, and .25% of the total financing if the Company pays off its obligations after March 23, 2018 but prior to or on March 23, 2019. No early termination fee shall apply if the Company pays off its obligations after March 23, 2019.

At December 31, 2018, the borrowing availability under our revolving credit was approximately \$2,368,000, based on our eligible receivables and includes an indefinite reduction of borrowing availability of \$1,000,000 that the Company’s lender has imposed. The Company’s borrowing availability under our revolving credit was also reduced by outstanding standby letters of credit totaling approximately \$2,648,000. Previously, the Company’s lender had imposed an indefinite reduction of borrowing availability of \$2,000,000; however, on July 26, 2018, the Company entered into an amendment to our Revised Loan Agreement with our lender which provided, among other things, for the release of \$1,000,000 of the \$2,000,000 reduction in borrowing availability by our lender. The release of this \$1,000,000 in borrowing availability reduction is to be used by the Company for working capital purposes. Most of the other terms of the Revised Loan Agreement remain principally unchanged.

The Company’s credit facility with PNC contains certain financial covenants, along with customary representations and warranties. A breach of any of these financial covenants, unless waived by PNC, could result in a default under our credit facility allowing our lender to immediately require the repayment of all outstanding debt under our credit facility and terminate all commitments to extend further credit. Our Revised Loan Agreement prohibits us from paying cash dividends on our Common Stock without prior approval from our lender. The Company met all of its

financial covenant requirements in 2018 with the exception of its quarterly minimum fixed charge coverage ratio requirement for the fourth quarter of 2018. In March 2019, the Company entered into another amendment to its Revised Loan Agreement which provided a waiver for this non-compliance in addition to further amendments to our fixed charge coverage ratio requirements (see “Note 19 – Subsequent Events - Revolving Credit and Term Loan Agreement” for a discussion of this amendment). As a result of this amendment, the Company expects to meet its financial covenant requirements in 2019 and into the first quarter of 2020.

The following table details the amount of the maturities of long-term debt maturing in future years at December 31, 2018 (excludes debt issuance costs of \$80,000).

Year ending December 31:	
(In thousands)	
2019	1,219
2020	1,219
2021	944
Total	\$3,382

NOTE 11

CAPITAL LEASES

The following table details the amount of the maturities of capital leases maturing in future years at December 31, 2018 (in thousands):

Year ending December 31:	Capital
	Leases
2019	\$ 181
2020	226
2021	42
Total	449 (1)

(1)Interest at rate ranging from 5.8% to 11.9%

The Company had no capital leases in 2017.

NOTE 12

ACCRUED EXPENSES

Accrued expenses include the following (in thousands) at December 31:

	2018	2017
Salaries and employee benefits	\$3,228	\$2,988
Accrued sales, property and other tax	404	402
Interest payable	7	3
Insurance payable	710	630
Other	665	759
Total accrued expenses	\$5,014	\$4,782

Each of our executives has an individual Management Incentive Plan (“MIP”) for fiscal years 2018 and 2017 which provides for the potential payment of performance compensation (see “Note 17 – Related Party Transactions – MIPs” for further discussion of the MIPs). No performance compensation payments were earned under any of the MIPs for 2018 and 2017.

NOTE 13**ACCRUED CLOSURE COSTS AND ARO**

Accrued closure costs represent our estimated environmental liability to clean up our fixed-based regulated facilities as required by our permits, in the event of closure. Changes to reported closure liabilities (current and long-term) for the years ended December 31, 2018 and 2017, were as follows:

Amounts in thousands	
Balance as of December 31, 2016	\$7,315
Accretion expense	460
Spending	(2,037)
Adjustment to closure liability	2,657
Balance as of December 31, 2017	8,395
Accretion expense	325
Spending	(5,293)
Adjustment to closure liability	3,323
Balance as of December 31, 2018	\$6,750

The Company recorded an additional \$3,323,000 and \$1,400,000 in closure liabilities in 2018 and 2017, respectively, due to changes in estimated future closure costs for our M&EC subsidiary which is in closure status (see “Note 4 – M&EC Facility” for further information of these additional closure liabilities recorded). The Company also recorded an additional \$1,257,000 in closure liabilities in 2017 for its DSSI subsidiary due to changes in estimated future closure costs.

In 2018 and 2017, the Company had spending of approximately \$4,991,000 and \$1,872,000, respectively, in closure related activities for the M&EC subsidiary. In 2018 and 2017, the Company had spending of approximately \$302,000 and \$165,000, respectively, in closure related activities for the PFNWR subsidiary in connection with the closure of certain processing equipment/enclosure.

At December 31, 2018 and 2017, M&EC’s closure liabilities totaled approximately \$1,142,000 and \$2,791,000, respectively, with the entire amount classified as current.

The reported closure asset or ARO, is reported as a component of “Net Property and equipment” in the Consolidated Balance Sheets at December 31, 2018 and 2017 with the following activity for the years ended December 31, 2018 and 2017:

Amounts in thousands	
Balance as of December 31, 2016	\$4,148
Amortization of closure and post-closure asset	(1,071)
Impairment of closure and post-closure asset	(413)
Adjustment to closure and post-closure asset	1,257
Balance as of December 31, 2017	3,921
Amortization of closure and post-closure asset	(191)
Balance as of December 31, 2018	\$3,730

The impairment of ARO for 2017 resulted from the impairment of M&EC's remaining tangible assets recorded in 2017 (See "Note 4 – M&EC Facility"). The adjustment made to ARO for 2017 was due to the increase in closure liabilities recorded for the DSSI subsidiary as discussed above.

NOTE 14**INCOME TAXES**

The components of current and deferred federal and state income tax (benefit) expense for continuing operations for the years ended December 31, consisted of the following (in thousands):

	2018	2017
Federal income tax benefit - current	\$	\$(780)
Federal income tax benefit - deferred	(1,171)	(778)
State income tax expense - current	173	163
State income tax expense - deferred	62	110
Total income tax benefit	\$(936)	\$(1,285)

An overall reconciliation between the expected tax benefit using the federal statutory rate of 21% and 34% for the years ended 2018 and 2017, respectively, and the benefit for income taxes from continuing operations as reported in the accompanying Consolidated Statement of Operations is provided below (in thousands).

	2018	2017
Tax benefit at statutory rate	\$(392)	\$(1,640)
State tax benefit, net of federal benefit	(178)	(295)
Change in deferred tax rates	(78)	1,711
Impact of Tax Act		(1,695)
Permanent items	(388)	104
Difference in foreign rate	13	170
Change in deferred tax liabilities	114	881
Other	(99)	(135)
Decrease in valuation allowance	72	(386)
Income tax benefit	\$(936)	\$(1,285)

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 (the "TCJA") was signed into law making significant changes to the Internal Revenue Code. Changes include, but are not limited to, a federal corporate tax rate decrease from 35% to 21% for tax years beginning after December 31, 2017, the transition of U.S international taxation from a worldwide tax system to a territorial system, the elimination of AMT for corporations and a one-time transition tax on the mandatory deemed repatriation of foreign earnings.

As of December 31, 2018, the Company has completed its accounting for the tax effects of the enactment of the TCJA under the guidance of Staff Accounting Bulletin No. 118 (“SAB 118”) (issued December 22, 2017), which provides registrants a one-year measurement period to report the impact of the TCJA.

Specific to the enactment of the TCJA, the Company recognized a tax benefit of \$1,695,000 in the fourth quarter of 2017 which consisted of \$916,000 related to the re-measurement of deferred tax assets and liabilities, based on the rates at which they are expected to reverse in the future and \$779,000 related to the reversal of valuation allowance and refunding of AMT credit carryforwards.

An additional provision of the TCJA was to provide an indefinite carryforward period for net operating losses (“NOLs”) generated starting in 2018. Also, the law limits the utilization of these NOLs to 80% of taxable income in the year in which the NOL is utilized. The Company has been carrying on its balance sheet a deferred tax liability related to indefinite-lived intangible assets. A common accounting interpretation of the new TCJA provisions is that deferred tax assets related to indefinite-lived NOLs may now be used to offset indefinite-lived deferred tax liabilities, up to 80% of the amount of the liability. During 2018, the Company forecasted a substantial tax loss for the full year due to the closure of the M&EC facility. As a result, the Company released a portion of the valuation allowance against deferred tax assets equal to 80% of the deferred tax liability related to indefinite-lived intangible assets and recorded a tax benefit in the amount of approximately \$1,235,000 in accordance to the provisions of the TCJA.

The global intangible low-taxed income (“GILTI”) provisions under the TCJA require the Company to include in its U.S. income tax return foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary’s tangible assets. The Company has elected to account for GILTI tax in the period in which it is incurred, and therefore has not provided any deferred tax impacts of GILTI in its consolidated financial statements for the years ended December 31, 2017 and 2018. As the foreign subsidiaries are all in loss positions for 2018, there is no GILTI inclusion for the current year.

The base-erosion and anti-abuse tax provisions (“BEAT”) in the TCJA eliminates the deduction of certain base-erosion payments made to related foreign corporations, and imposes a minimum tax if greater than regular tax. The Company does not expect it will be subject to this tax due to the immaterial amounts of outbound U.S. payments and therefore has not included any tax impacts of BEAT in its consolidated financial statements for the years ended December 31, 2017 and 2018.

The TCJA imposes a one-time transition tax on previously untaxed earnings and profits of foreign subsidiaries. As of December 31, 2018, the Company has current and accumulated deficits in earnings and profits for all of its foreign subsidiaries. As such, the Company does not expect any exposure to the one-time transition tax.

The Company had temporary differences and net operating loss carry forwards from both our continuing and discontinued operations, which gave rise to deferred tax assets and liabilities at December 31, 2018 and 2017 as follows (in thousands):

	2018	2017
Deferred tax assets:		
Net operating losses	\$9,540	\$5,992
Environmental and closure reserves	2,124	2,158
Depreciation and amortization	—	907
Other	1,263	1,252
Deferred tax liabilities:		
Depreciation and amortization	(2,418)	—
Goodwill and indefinite lived intangible assets	(586)	(1,694)
Prepaid expenses	(30)	(50)
	9,893	8,565
Valuation allowance	(10,479)	(10,259)
Net deferred income tax liabilities	(586)	(1,694)

In 2018 and 2017, the Company concluded that it was more likely than not that \$10,479,000 and \$10,259,000 of our deferred income tax assets would not be realized, and as such, a full valuation allowance was applied against those deferred income tax assets.

The Company has estimated net operating loss carryforwards (“NOLs”) for federal and state income tax purposes of approximately \$21,277,000 and \$76,312,000, respectively, as of December 31, 2018. The estimated consolidated federal and state NOLs include approximately \$2,629,000 and \$3,797,000, respectively, of our majority-owned subsidiary, PF Medical, which is not part of our consolidated group for tax purposes. These net operating losses can be carried forward and applied against future taxable income, if any, and expire in various amounts starting in 2021. However, as a result of various stock offerings and certain acquisitions, which in the aggregate constitute a change in control, the use of these NOLs will be limited under the provisions of Section 382 of the Internal Revenue Code of

1986, as amended. Additionally, NOLs may be further limited under the provisions of Treasury Regulation 1.1502-21 regarding Separate Return Limitation Years.

The tax years 2016 through 2018 remain open to examination by taxing authorities in the jurisdictions in which the Company operates.

No uncertain tax positions were identified by the Company for the years currently open under statute of limitations, including 2018 and 2017.

The Company had no federal income tax payable for the years ended December 31, 2018 and 2017.

NOTE 15

COMMITMENTS AND CONTINGENCIES

Hazardous Waste

In connection with our waste management services, we process both hazardous and non-hazardous waste, which we transport to our own, or other, facilities for destruction or disposal. As a result of disposing of hazardous substances, in the event any cleanup is required at the disposal site, we could be a potentially responsible party for the costs of the cleanup notwithstanding any absence of fault on our part.

Legal Matters

In the normal course of conducting our business, we are involved in various litigation. We are not a party to any litigation or governmental proceeding which our management believes could result in any judgments or fines against us that would have a material adverse effect on our financial position, liquidity or results of future operations.

Insurance

The Company has a 25-year finite risk insurance policy entered into in June 2003 (“2003 Closure Policy”) with AIG, which provides financial assurance to the applicable states for our permitted facilities in the event of unforeseen closure. The 2003 Closure Policy, as amended, provides for a maximum allowable coverage of \$39,000,000 and has available capacity to allow for annual inflation and other performance and surety bond requirements. At December 31, 2018, our financial assurance coverage amount under this 2003 Closure Policy totaled approximately \$29,977,000. The Company has recorded \$15,971,000 and \$15,676,000 in sinking fund related to this policy in other long term assets on the accompanying Consolidated Balance Sheets at December 31, 2018 and 2017, respectively, which includes interest earned of \$1,500,000 and \$1,205,000 on the sinking fund as of December 31, 2018 and 2017, respectively. Interest income for the years ended 2018 and 2017 was approximately \$295,000 and \$130,000, respectively. If the Company so elects, AIG is obligated to pay the Company an amount equal to 100% of the sinking fund account balance in return for complete release of liability from both us and any applicable regulatory agency using this policy as an instrument to comply with financial assurance requirements.

The Company also had a finite risk insurance policy dated August 2007 for our PFNWR facility with AIG (“PFNWR policy”) which provided financial assurance to the State of Washington in the event of closure of the PFNWR facility. In April 2017, the Company received final releases from state and federal regulators for the PFNWR policy which enabled the Company to cancel the PFNWR policy resulting in the release of approximately \$5,951,000 (which had been recorded in other long term assets on the Company’s Consolidated Balance Sheets) on May 1, 2017 in finite sinking funds previously held by AIG as collateral for the PFNWR policy. The Company used the released finite sinking funds to pay off our revolving credit with the remaining funds used for general working capital needs. The Company acquired new bonds in the required amount of approximately \$7,000,000 (“new bonds”) to replace the PFNWR policy in providing financial assurance for the PFNWR facility. Upon receipt of the \$5,951,000 in finite sinking funds from AIG, the Company and its lender executed a standby letter of credit in the amount of \$2,500,000 as collateral for the new bonds for the PFNWR facility.

Letter of Credits and Bonding Requirements

From time to time, the Company is required to post standby letters of credit and various bonds to support contractual obligations to customers and other obligations, including facility closures. At December 31, 2018, the total amount of standby letters of credit outstanding totaled approximately \$2,648,000 and the total amount of bonds outstanding totaled approximately \$11,284,000.

Operating Leases

The Company leases certain facilities and equipment under non-cancelable operating leases. The following table lists future minimum rental payments at December 31, 2018 under these (in thousands):

Year ending December 31:	
2019	575
2020	406
2021	308
2022	103
Total	\$ 1,392

Total rent expense under these leases was \$766,000 and \$754,000 for the years ended 2018 and 2017, respectively.

NOTE 16**PROFIT SHARING PLAN**

The Company adopted a 401(k) Plan in 1992, which is intended to comply with Section 401 of the Internal Revenue Code and the provisions of the Employee Retirement Income Security Act of 1974. All full-time employees who have attained the age of 18 are eligible to participate in the 401(k) Plan. Eligibility is immediate upon employment but enrollment is only allowed during four quarterly open periods of January 1, April 1, July 1, and October 1. Participating employees may make annual pretax contributions to their accounts up to 100% of their compensation, up to a maximum amount as limited by law. The Company, at its discretion, may make matching contributions of 25% based on the employee's elective contributions. Company contributions vest over a period of five years. In 2018 and 2017, the Company contributed approximately \$338,000 and \$326,000 in 401(k) matching funds, respectively.

NOTE 17**RELATED PARTY TRANSACTIONS**

David Centofanti

David Centofanti serves as our Vice President of Information Systems. For such position, he received annual compensation of \$173,000 and \$168,000 for 2018 and 2017, respectively. David Centofanti is the son of our EVP of Strategic Initiatives and a Board member, Dr. Louis Centofanti. Dr. Louis Centofanti previously held the position of President and CEO until September 8, 2017.

Robert Ferguson

Robert Ferguson serves as an advisor to our Board and was also a member of the Supervisory Board of PF Medical (until May 11, 2018), our majority-owned Polish subsidiary of the Company. Robert Ferguson previously served as our Board member from June 2007 to February 2010 and again from August 2011 to September 2012. As an advisor to our Board, Robert Ferguson is paid \$4,000 monthly plus reasonable expenses. For such services, Robert Ferguson received compensation of approximately \$50,000 and \$51,000 for the years 2018 and 2017, respectively. Robert Ferguson is also a consultant to the Company in connection with our TBI at our PFNWR facility (see “Note 6 – Capital Stock, Stock Plan, Warrants, and Stock Based Compensation” for a discussion of the options granted to Robert Ferguson in connection with the TBI initiatives).

Employment Agreements

The Company entered into employment agreements with each of Mark Duff (President and CEO effective September 8, 2017, who previously held the position of EVP and COO), Ben Naccarato (CFO), and Dr. Louis Centofanti, (EVP of Strategic Initiatives, who retired from the position of President and CEO effective September 8, 2017) with each employment agreement dated September 8, 2017. Each of the employment agreements is effective for three years from September 8, 2017 (the “Initial Term”) unless earlier terminated by us or by the executive officer. At the end of the Initial Term of each employment agreement, each employment agreement will automatically be extended for one additional year, unless at least six months prior to the expiration of the Initial Term, the Company or the executive officer provides written notice not to extend the terms of the employment agreement. Each employment agreement provides for annual base salaries, performance bonuses as provided in the MIP as approved by our Board, and other benefits commonly found in such agreements. In addition, each employment agreement provides that in the event the executive officer terminates his employment for “good reason” (as defined in the agreements) or is terminated by the Company without cause (including the executive officer terminating his employment for “good reason” or is terminated by us without cause within 24 months after a Change in Control (as defined in the agreement)), the Company will pay the executive officer the following: (a) a sum equal to any unpaid base salary; (b) accrued unused vacation time and any employee benefits accrued as of termination but not yet been paid (“Accrued Amounts”); (c) two years of full base salary; (d) performance compensation under the MIP earned with respect to the fiscal year immediately preceding the date of termination; and (e) an additional year of performance compensation as provided under the MIP earned, if not already paid, with respect to the fiscal year immediately preceding the date of termination. If the executive terminates his employment for a reason other than for good reason, the Company will pay to the executive the amount equal to the Accrued Amounts plus any performance compensation payable pursuant to the MIP.

If there is a Change in Control (as defined in the agreements), all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of termination through the original term of the options. In the event of the death of an executive officer, all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of death, with such options exercisable for the lesser of the original option term or twelve months from the date of the executive officer’s death. In the event of an executive officer terminating his employment for “good reason” or is terminated by us without cause, all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of termination, with such options exercisable for the lesser of the original option term or within 60 days from the date of the executive’s date of termination.

The Company had previously entered into an employment agreement with each of Dr. Louis Centofanti and Ben Naccarato on July 10, 2014 which both employment agreements were due to expire on July 10, 2018, as amended (the “July 10, 2014 Employment Agreements”). The Company also had previously entered into an employment agreement dated January 19, 2017 (which was effective June 11, 2016) with Mark Duff which is due to expire on June 11, 2019 (the “January 19, 2017 Employment Agreement”). The July 10, 2014 Employment Agreements and the January 19, 2017 Employment Agreement were terminated effective September 8, 2017.

MIPs

On January 18, 2018, our Board and the Compensation Committee approved individual MIP for each Mark Duff, CEO and President, Ben Naccarato, CFO, and Dr. Louis Centofanti, EVP of Strategic Initiatives. The MIPs are effective January 1, 2018 and applicable for year ended December 31, 2018. Each MIP provides guidelines for the calculation of annual cash incentive based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive's 2018 annual base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 100% (\$13,350 to \$267,000) of the base salary for the CEO and President; 5% to 100% (\$11,475 to \$229,494) of the base salary for the CFO; and 5% to 100% (\$11,170 to \$223,400) of the base salary for the EVP of Strategic Initiatives. Pursuant to the MIPs, the Compensation Committee has the right to modify, change or terminate the MIPs at any time and for any reason. No performance compensation was earned or payable under each of the 2018 MIPs as discussed above.

NOTE 18

SEGMENT REPORTING

In accordance with ASC 280, "Segment Reporting", we define an operating segment as a business activity:

from which we may earn revenue and incur expenses;

whose operating results are regularly reviewed by the chief operating decision maker ("CODM") to make decisions about resources to be allocated to the segment and assess its performance; and

for which discrete financial information is available.

We currently have three reporting segments, which include Treatment and Services Segments, which are based on a service offering approach; and Medical, whose primary purpose at this time is the R&D of a new medical isotope production technology. The Medical Segment has not generated any revenues and all costs incurred are reflected within R&D in the accompanying Consolidated Statements of Operations. As previously disclosed, the Medical Segment ceased a substantial portion of its R&D activities for the medical isotope production technology due to the need for substantial capital to fund such activities. Additionally, the Company is reviewing further strategic options for the Medical Segment. The Company does not anticipate that the Medical Segment will restart such activities until it obtains such funding. Our reporting segments exclude our corporate headquarter and our discontinued operations (see “Note 9 – Discontinued Operations”) which do not generate revenues.

The table below shows certain financial information of our reporting segments as of and for the years ended December 31, 2018 and 2017 (in thousands).

Segment Reporting as of and for the year ended December 31, 2018

	Treatment	Services	Medical	Segments Total	Corporate (²)	Consolidated Total
Revenue from external customers	\$ 36,271	\$ 13,268	—	\$ 49,539 (³)	\$ —	\$ 49,539
Intercompany revenues	509	70	—	579	—	—
Gross profit	7,197	1,264	—	8,461	—	8,461
Research and development	483	—	811	1,294	76	1,370
Interest income	—	—	—	—	295	295
Interest expense	(22)	(2)	—	(24)	(227)	(251)
Interest expense-financing fees	—	—	—	—	(38)	(38)
Depreciation and amortization	943	465	—	1,408	47	1,455
Segment income (loss) before income taxes	4,550 (⁶)	(756)	(811)	2,983	(4,993)	(2,010)
Income tax (benefit) expense	(943)(⁷)	—	—	(943)	7	(936)
Segment income (loss)	5,493	(756)	(811)	3,926	(5,000)	(1,074)
Segment assets(¹)	32,800	5,188	25	38,013	19,429 (⁴)	57,442
Expenditures for segment assets	1,311	117	—	1,428	4	1,432
Total debt	—	—	—	—	3,302 (⁵)	3,302

Segment Reporting as of and for the year ended December 31, 2017

	Treatment	Services	Medical	Segments Total	Corporate (²)	Consolidated Total
Revenue from external customers	\$ 37,750	\$ 12,019	—	\$ 49,769 (³)	\$ —	\$ 49,769
Intercompany revenues	362	31	—	393	—	—

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Gross profit	7,916	704	—	8,620	—	8,620
Research and development	439	—	1,141	1,580	15	1,595
Interest income	—	—	—	—	140	140
Interest expense	(35)	(5)	—	(40)	(275)	(315)
Interest expense-financing fees	—	—	—	—	(35)	(35)
Depreciation and amortization	3,228	536	—	3,764	39	3,803
Segment income (loss) before income taxes	3,577 ⁽⁸⁾	(2,286)	(1,141)	150	(4,973)	(4,823)
Income tax (benefit) expense	(1,290) ⁽⁷⁾	—	—	(1,290)	5	(1,285)
Segment income (loss)	4,867	(2,286)	(1,141)	1,440	(4,978)	(3,538)
Segment assets ⁽¹⁾	32,724	6,324	548	39,596	19,942 ⁽⁴⁾	59,538
Expenditures for segment assets	396	43	—	439	—	439
Total debt	—	—	—	—	3,847 ⁽⁵⁾	3,847

(1) Segment assets have been adjusted for intercompany accounts to reflect actual assets for each segment.

(2) Amounts reflect the activity for corporate headquarters not included in the segment information.

The Company performed services relating to waste generated by the domestic government clients (includes U.S federal, state and local), either directly as a prime contractor or indirectly for others as a subcontractor to government entities, representing approximately \$34,811,000 or 70.3% of total revenue for 2018 and \$37,019,000 or 74.4% of total revenue for 2017. The following reflects such revenue generated by our two segments:

	2018	2017
Treatment	\$25,181,000	\$27,956,000
Services	9,630,000	9,063,000
Total	\$34,811,000	\$37,019,000

⁽⁴⁾ Amount includes assets from our discontinued operations of \$306,000 and \$365,000 at December 31, 2018 and 2017, respectively.

⁽⁵⁾ Net of debt issuance costs of (\$80,000) and (\$115,000) for 2018 and 2017, respectively (see “Note 10 – “Long-Term Debt” for additional information).

⁽⁶⁾ Amount includes a net gain of \$1,596,000 recorded resulting from the exchange offer of the Series B Preferred Stock of the Company’s M&EC subsidiary (see “Note 8 – Series B Preferred Stock”)

For the year ended December 31, 2018 and 2017, amount includes a tax benefit recorded in the amount of ⁽⁷⁾approximately \$1,235,000 and \$1,695,000, respectively, resulting from the TCJA enacted on December 22, 2017 (see “Note 14 – Income Taxes” for further information of this tax benefit).

⁽⁸⁾ Amount includes tangible asset impairment loss of \$672,000 recorded in connection with the closure of M&EC (see “Note 4 – M&EC Facility”).

NOTE 19

SUBSEQUENT EVENTS

MIPs

On January 17, 2019, the Company’s Compensation Committee and the Board approved individual MIP for the CEO, CFO, and EVP of Strategic Initiatives. Each MIP is effective January 1, 2019 and applicable for the year ended December 31, 2019. Each MIP provides guidelines for the calculation of annual cash incentive based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive’s annual 2019 base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 150% of the 2019 base salary for the CEO (\$14,350 to \$430,500), 5% to 100% of the 2019 base salary for the CFO (\$11,762 to \$235,231), and 5% to 100% of the 2019 base salary for the EVP of Strategic Initiatives

(\$11,449 to \$228,985).

Grant of Options

On January 17, 2019 the Company's Compensation Committee and the Board approved the grant of 105,000 ISOs from the 2017 Stock Option Plan to certain employees, which included our named executive officers as follows: 25,000 ISOs to our CEO, Mark Duff; 15,000 ISOs to our CFO, Ben Naccarato; and 15,000 ISOs to our EVP of Strategic Initiatives, Dr. Louis Centofanti. The ISOs granted were for a contractual term of six years with one-fifth vesting annually over a five year period. The exercise price of the ISO was \$3.15 per share, which was equal to the fair market value of the Company's Common Stock on the date of grant.

Stock Option to Consultant

As discussed in "Note 6 – Capital Stock, Stock Plans, Warrants, and Stock Based Compensation – Stock Options to Consultant", the Company granted a NQSO to Robert Ferguson for the purchase of up to 100,000 shares of the Company's Common Stock ("Ferguson Stock Option") in connection with his work as a consultant to the Company's TBI. The vesting of the Ferguson Stock Option is subject to the achievement of three separate milestones by certain date. On January 17, 2019, the Company's Compensation Committee and Board approved an amendment to the Ferguson Stock Option whereby the vesting date for the second milestone was amended from "by January 27, 2019" to "by March 31, 2020." All other terms of the Ferguson Stock Option remain unchanged.

Loan and Securities Purchase Agreement, Promissory Note and Subordination Agreement

On April 1, 2019, the Company completed a lending transaction with Robert Ferguson (the “Lender”), whereby the Company borrowed from the Lender the sum of \$2,500,000 pursuant to the terms of a Loan and Security Purchase Agreement and promissory note (the “Loan”). The Lender is a shareholder of the Company. The Lender also currently serves as a consultant to the Company’s PFNWR subsidiary (see Note 17 - Related Party Transactions – Robert Ferguson” for further information). The proceeds from the Loan will be used for general working capital purposes. The Loan is unsecured, with a term of two years with interest payable at a fixed interest rate of 4.00% per annum. The Loan provides for monthly payments of accrued interest only during the first year of the Loan, with the first interest payment due May 1, 2019 and monthly payments of approximately \$208,333 in principal plus accrued interest starting in the second year of the Loan. The Loan also allows for prepayment of principal payments over the term of the Loan without penalty. In connection with the above Loan, the Lender entered into a Subordination Agreement with our credit facility lender, whereby the Lender agreed to subordinate payment under the Loan, and agreed that the Loan will be junior in right of payment to the credit facility in the event of default or bankruptcy or other insolvency proceeding by us. As consideration for us receiving the Loan, the Company issued a Warrant to the Lender to purchase up to 60,000 shares of our Common Stock at an exercise price of \$3.51, which was the closing bid price for a share of our Common Stock on NASDAQ.com immediately preceding the execution of the Loan and Warrant. The Warrant is exercisable six months from April 1, 2019 and expires on April 1, 2024. As further consideration for the Loan, the Company also will issue an aggregate 75,000 shares of our Common Stock to the Lender. The 75,000 shares of Common Stock and 60,000 Common Stock purchase warrant will be and was issued in a private placement that was exempt from registration under the Securities Act and bear a restrictive legend against resale except in a transaction registered under the Securities Act or in a transaction exempt from registration thereunder.

Upon default, the Lender will have the right to elect to receive in full and complete satisfaction of the Company’s obligations under the Loan either: (a) the cash amount equal to the sum of the unpaid principal balance owing under the loan and all accrued and unpaid interest thereon (the “Payoff Amount”) or (b) upon meeting certain conditions, the number of whole shares of the Company’s Common Stock (the “Payoff Shares”) determined by dividing the Payoff Amount by the dollar amount equal to the closing bid price of our Common Stock on the date immediately prior to the date of default, as reported or quoted on the primary nationally recognized exchange or automated quotation system on which our Common Stock is listed; provided however, that the dollar amount of such closing bid price shall not be less than \$3.51, the closing bid price for our Common Stock as disclosed on NASDAQ.com immediately preceding the signing of this loan agreement.

If issued, the Payoff Shares will not be registered and the Lender will not be entitled to registration rights with respect to the Payoff Shares. The aggregate number of shares, warrant shares, and Payoff Shares that are or will be issued to the Lender pursuant to the Loan, together with the aggregate shares of the Company’s Common Stock and other voting securities owned by the Lender as of the date of issuance of the Payoff Shares, shall not exceed the number of shares of the Company’s Common Stock equal to 14.9% of the number of shares of the Company’s Common Stock issued and outstanding as of the date immediately prior to the default, less the number of shares of the Company’s Common Stock owned by the Lender immediately prior to the date of such default plus the number of shares of our Common Stock that may be acquired by the Lender under warrants and/or options outstanding immediately prior to the date of such default.

The Company is currently evaluating the accounting treatment of this transaction and the impact to our financial statements.

Revolving Credit and Term Loan Agreement

On March 29, 2019, the Company entered into an amendment to its Revised Loan Agreement with its lender under the credit facility which provided the following:

waived the Company's failure to meet the minimum quarterly fixed charge coverage ratio ("FCCR") requirement for the fourth quarter of 2018;

waived the quarterly FCCR testing requirement for the first quarter of 2019;

revised the methodology to be used in calculating the FCCR in each of the second and third quarters of 2019 (with continued requirement to maintain a minimum 1.15:1 ratio in each of the quarters);

revised the minimum Tangible Adjusted Net Worth requirement (as defined in the Revised Loan Agreement) from \$26,000,000 to \$25,000,000;

eliminated the LIBOR interest payment option of paying annual rate of interest due on our term loan and revolving credit until the Company becomes compliant with its FCCR requirement again. As a result of this amendment, the Company's payment of annual rate of interest due on our term loan will be at prime plus 2.5% and prime plus 2.0% for our revolving credit;

provided consent for the \$2,500,000 loan that the Company entered into with Robert Ferguson as discussed above.

The Company is not allowed to make any principal prepayment on this loan until it receives the restricted finite risk sinking funds held as collateral by AIG under our financial assurance policy. The Company expects to receive this restricted funds resulting from the closure of our M&EC facility (see "Note 1 – Description of Business and Basis of Presentation - Financial Position and Liquidity" for a discussion of this expected receipt); and

revised the annual rate used to calculate the Facility Fee (as defined in the Revised Loan Agreement) (unused revolving credit line fee) from 0.250% to 0.375%.

Most of the other terms of the Revised Loan Agreement remain principally unchanged. In connection with this amendment, the Company paid its lender a fee of \$20,000 (see "Note 10 – Long Term Debt – Revolving Credit and Term Loan Agreement" for a discussion of the Revised Loan Agreement prior to this amendment).

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of disclosure controls and procedures.

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our periodic reports filed with the Securities and Exchange Commission (the “Commission”) is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the Commission and that such information is accumulated and communicated to our management, including the Chief Executive Officer (“CEO”) (Principal Executive Officer), and Chief Financial Officer (“CFO”) (Principal Financial Officer), as appropriate to allow timely decisions regarding the required disclosure. In designing and assessing our disclosure controls and procedures, our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their stated control objectives and are subject to certain limitations, including the exercise of judgment by individuals, the difficulty in identifying unlikely future events, and the difficulty in eliminating misconduct completely. Our management, with the participation of our CEO and CFO, evaluated the effectiveness of our disclosure controls and procedures pursuant to Rule 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934, as amended. Based upon this assessment, our CEO and CFO have concluded that our disclosure controls and procedures were effective as of December 31, 2018.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) of the Securities Exchange Act of 1934. Internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements or fraudulent acts. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. A control system, no matter how well designed, can provide only reasonable assurance with respect to financial statement preparation and presentation.

Internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the Company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit the preparation of the consolidated financial statements in accordance with generally accepted accounting principles in the United States of America, and that receipts and expenditures of the Company are being made only in accordance with appropriate authorizations of management and directors of the Company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on the consolidated financial statements.

Management, with the participation of our CEO and CFO, conducted an assessment of the effectiveness of internal control over financial reporting as of December 31, 2018 based on the framework in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). Based on this assessment, management, with the participation of our CEO and CFO, concluded that the Company’s internal control over financial reporting was effective as of December 31, 2018.

This Form 10-K does not include an attestation report of the Company’s independent registered public accounting firm regarding internal control over financial reporting. Since the Company is not a large accelerated filer or an accelerated filer, management’s report was not subject to attestation by the Company’s independent registered public accounting firm pursuant to the rules of the Commission that permit the Company to provide only management’s report in this Form 10-K.

Changes in Internal Control over Financial Reporting

There was no other change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the fiscal quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal controls over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

DIRECTORS

The following table sets forth, as of the date of this Report, information concerning our Board of Directors (“Board”):

NAME	AGE	POSITION
Dr. Louis F. Centofanti	75	Director; EVP of Strategic Initiatives; President of PF Medical
Mr. S. Robert Cochran	65	Director
Honorable Joe R. Reeder	71	Director
Mr. Larry M. Shelton	65	Chairman of the Board
Mr. Zach P. Wamp	61	Director
Mr. Mark A. Zwecker	68	Director

Each director is elected to serve until the next annual meeting of stockholders.

Director Information

Our directors and executive officers, their ages, the positions with us held by each of them, the periods during which they have served in such positions and a summary of their recent business experience is set forth below. Each of the biographies of the current directors listed below also contains information regarding such person's service as a director, business experience, director positions with other public companies held currently or at any time during the past five years, and the experience, qualifications, attributes and skills that our Board considered in nominating or appointing each of them to serve as one of our directors.

Dr. Louis F. Centofanti

Dr. Centofanti, the founder of the Company and a director of the Company since its inception in 1991, currently holds the position of EVP of Strategic Initiatives. Effective January 26, 2018, Dr. Centofanti was appointed to the position of President of PF Medical and was no longer a member of the Supervisory Board of PF Medical (a position he had held since June 2, 2015). From March 1996 to September 8, 2017 and from February 1991 to September 1995, Dr. Centofanti held the position of President and CEO of the Company. Dr. Centofanti served as Chairman of the Board from the Company's inception in February 1991 until December 16, 2014. In January 2015, Dr. Centofanti was appointed by the U.S. Secretary of Commerce Penny Prizker to serve on the U.S. Department of Commerce's Civil Nuclear Trade Advisory Committee (CINTAC). The CINTAC is composed of industry representatives from the civil nuclear industry and meets periodically throughout the year to discuss the critical trade issues facing the U.S. civil nuclear sector. From 1985 until joining the Company, Dr. Centofanti served as Senior Vice President ("SVP") of USPCI, Inc., a large publicly-held hazardous waste management company, where he was responsible for managing the treatment, reclamation and technical groups within USPCI. In 1981, he and Mark Zwecker founded PPM, Inc. (later sold to USPCI), a hazardous waste management company specializing in treating PCB-contaminated oil. From 1978 to 1981, Dr. Centofanti served as Regional Administrator of the U.S. Department of Energy for the southeastern region of the United States. Dr. Centofanti has a Ph.D. and a M.S. in Chemistry from the University of Michigan, and a B.S. in Chemistry from Youngstown State University.

As founder of Perma-Fix and PPM, Inc., and as a senior executive at USPCI, Dr. Centofanti combines extensive business experience in the waste management industry with a drive for innovative technology which is critical for a waste management company. In addition, his service in the government sector provides a solid foundation for the continuing growth of the Company, particularly within the Company's Nuclear business. Dr. Centofanti's comprehensive understanding of the Company's operations and his extensive knowledge of its history, coupled with his drive for innovation and excellence, positions Dr. Centofanti to optimize our role in this competitive, evolving market, and led the Board to conclude that he should serve as a director.

Mr. S. Robert Cochran

Mr. Cochran, a director since January 2017, has served as President and CEO of CTG, LLC, a company that provides strategic business development support, as well as acquisitions and business/management restructuring activity support, since November 2015. Since November 1, 2018, Mr. Cochran has served as interim President of Westinghouse Government Services through a consulting arrangement with CTG, LLC, in addition to providing previous consulting services to Westinghouse Government Services through CTG, LLC. Since April 2012, Mr. Cochran has been a director of Longenecker & Associates, Inc., a privately held consulting firm that provides highly specialized, fast-response technical-management support to nuclear and environmental industries. From March 2012 to November 2015, Mr. Cochran served as President and Officer Director of CB&I Federal Services, LLC (a subsidiary of Chicago Bridge & Iron Company, NYSE: CBI), which provides mission-critical services primarily to the U.S. federal government. From 2006 to 2011, Mr. Cochran served as President of B&W Technical Service Group, Inc., an operating group of The Babcock & Wilcox Company (NYSE: BW), which provides support to government

and commercial clients, including management and operation of complex high-consequence nuclear facilities, nuclear material processing and manufacturing, classified component manufacturing, engineering, procurement and construction of major capital projects, nuclear safeguards and security, environmental cleanup and remediation, and nuclear-facility deactivation. From 2007 to 2011, Mr. Cochran served as Chairman of the Board of Pantex LLC and B&W Y-12, where he had direct responsibility for the performance and operations associated with nuclear weapons production enterprise. Before joining The Babcock & Wilcox Company, Mr. Cochran worked for more than 20 years in operations and development within the engineering, construction, facilities management and operations, environmental technology, and remediation industries. This experience includes serving as President and CEO of MAGma LLC, a privately-held company that provided management and operational restructuring, strategic development, and acquisition/divestiture services to the public utility, engineering and construction, and Department of Energy business sectors. Additionally, as its SVP, Mr. Cochran led Tyco Infrastructure's development and delivery of services, opening new markets and service areas valued at more than \$1 billion. Mr. Cochran received an executive M.B.A. from the University of Richmond's Robins School of Business and a B.S. from James Madison University.

Mr. Cochran has had an extensive career in solving and overseeing solutions to complex issues involving both domestic and international concerns. In addition, his government related services provide solid experience for the continuing growth of the Company's Treatment and Services Segments. His extensive knowledge and problem-solving experience enhances the Board's ability to address significant challenges in the nuclear market, and led the Board to conclude that he should serve as a director.

Honorable Joe R. Reeder

Mr. Reeder, a director since 2003, served as Shareholder-in-Charge of the Mid-Atlantic Region (1999-2008) for Greenberg Traurig LLP, the nation's largest U.S.-based law firm, with 38 offices and approximately 2,100 attorneys worldwide. As a principal shareholder in the law firm, Mr. Reeder's clientele includes celebrities, sovereign nations, international corporations, and law firms. As the 14th Undersecretary of the U.S. Army (1993-97), Mr. Reeder also served three years as Chairman of the Panama Canal Commission's Board, overseeing a multibillion-dollar infrastructure program. For the past 18 years, he has served on the Canal's International Advisory Board. He has served on the boards of the National Defense Industry Association, chairing NDIA's Ethics Committee, the Armed Services YMCA, and many other private companies and charitable organizations. After successive 4-year appointments by Virginia Governors Mark Warner and Tim Kaine, Mr. Reeder served seven years as Chairman of two Commonwealth of Virginia military boards, and ten years on the National USO Board. Mr. Reeder was appointed by Governor Terry McAuliffe to the Virginia Military Institute's Board of Visitors (2014), and reappointed in 2018 by new Governor Ralph Northam. Mr. Reeder is also a television commentator on legal and national security issues. Among other corporate positions, he has been a director since September 2005 for ELBIT Systems of America, LLC, a subsidiary of Elbit Systems Ltd. (NASDAQ: ESLT), that provides product and system solutions focusing on defense, homeland security, and commercial aviation. Mr. Reeder served on the Washington First Bank Board from 2004 to 2017, and, since January 2018, has served on the Board of Sandy Spring Bancorp, Inc. (NASDAQ: SASR), and, since April 2018, its Audit Committee.

In May 2018 Mr. Reeder was appointed to the Advisory Council Bid Protest Committee to the United States Court of Federal Claims.

A West Point graduate who served in the 82nd Airborne Division after Ranger School, Mr. Reeder earned his J.D. from the University of Texas, and L.L.M. from Georgetown University.

Mr. Reeder's career has focused on solving and overseeing solutions to complex domestic and international issues. His problem-solving experience has enhanced the Board's ability to address major challenges in the nuclear market, as well as day-to-day corporate challenges. These factors led the Board to conclude that he should serve as a director.

Mr. Larry M. Shelton

Mr. Shelton, a director since July 2006, has also held the position of Chairman of the Board of the Company since December 16, 2014. Mr. Shelton served as the Chief Financial Officer (“CFO”) of S K Hart Management, LLC, a private investment management company from 1999 until August 31, 2018, when he resigned from his duties as CFO to pursue personal interests. Mr. Shelton remains an employee of and provides advisory services to S K Hart Management, LLC. Mr. Shelton served as President of Pony Express Land Development, Inc. (an affiliate of SK Hart Management, LLC), a privately-held land development company, from January 2013 to until August 2017 and has served on its board since December 2005. In March 2012, he was appointed Director and CFO of S K Hart Ranches (PTY) Ltd, a private South African Company involved in agriculture. Mr. Shelton served as a member of the Supervisory Board of PF Medical from April 2014 to December 2016. Mr. Shelton has over 19 years of experience as an executive financial officer for several waste management companies, including as CFO of Envirocare of Utah, Inc. (now Energy Solutions (1995–1999)) and CFO of USPCI, Inc. (1982–1987), a NYSE- listed company. Since July 1989, Mr. Shelton has served on the Board of Subsurface Technologies, Inc., a privately-held company specializing in providing environmentally sound innovative solutions for water well rehabilitation and development. Mr. Shelton has a B.A. in accounting from the University of Oklahoma.

With his years of accounting experience as CFO for various companies, including a number of waste management companies, Mr. Shelton combines extensive industry knowledge and understanding of accounting principles, financial reporting requirements, evaluating and overseeing financial reporting processes and business matters. These factors led the Board to conclude that he should serve as a director.

Mr. Zach P. Wamp

Mr. Wamp, a director since January 2018, is currently the President of Zach Wamp Consulting, a position he has held since 2011. As the President and owner of Zach Wamp Consulting, he has served some of the most prominent companies from Silicon Valley to Wall Street as a business development consultant and advisor. From September 2013 to November 2017, Mr. Wamp chaired the Board of Directors for Chicago Bridge and Iron Federal Services, LLC (a subsidiary of Chicago Bridge & Iron Company, NYSE: CBI, which provides critical services primarily to the U.S. government). From January 1995 to January 2011, Mr. Wamp served as a member of the U.S. House of Representatives from Tennessee's 3^d district. His district included the Oak Ridge National Laboratory, with strong science and research missions from energy to homeland security. Among his many accomplishments, which included various leadership roles in the advancement of education and science, Mr. Wamp was instrumental in the formation and success of the Tennessee Valley Technology Corridor, which created thousands of jobs for Tennesseans in the areas of high-tech research, development, and manufacturing. During his career in the political arena, Mr. Wamp served on several prominent subcommittees during his 14 years on the House Appropriations Committee, including serving as a "ranking member" of the Subcommittee on Military Construction and Veterans Affairs and Related Agencies. Mr. Wamp has been a regular panelist on numerous media outlets and has been featured in a number of national publications effectively articulating sound social and economic policy. Mr. Wamp's business career has also included work in the real estate sector for a number of years as a licensed industrial-commercial real estate broker where he was named Chattanooga's Small Business Person of the Year. He is a founding partner in Learning Blade, the nation's premiere STEM education platform, which is now operating at some level in 28 states.

Mr. Wamp has an extensive career in solving and overseeing solutions to complex issues involving domestic concerns. In addition, his wide-ranging career, particularly with respect to his government-related work, provides solid experience for the continuing growth of the Company's Treatment and Services Segments. His extensive knowledge and problem-solving experience enhances the Board's ability to address significant challenges in the nuclear market, and led the Board to conclude that he should serve as a director.

Mr. Mark A. Zwecker

Mark Zwecker, a director since the Company's inception in January 1991, currently serves as the CFO and a Board member for JCI US Inc., a telecommunications company and wholly-owned subsidiary of Japan Communications, Inc. (Tokyo Stock Exchange (Securities Code: 9424)), which provides cellular service for M2M (machine to machine) applications. From 2006 to 2013, Mr. Zwecker served as Director of Finance for Communications Security and

Compliance Technologies, Inc., a wholly-owned subsidiary of JCI US Inc. that develops security software products for the mobile workforce. From 1997 to 2006, Mr. Zwecker served as President of ACI Technology, LLC, an IT services provider, and from 1986 to 1998, he served as Vice President of Finance and Administration for American Combustion, Inc., a combustion technology solutions provider. In 1983, with Dr. Centofanti, Mr. Zwecker co-founded a start-up, PPM, Inc., a hazardous waste management company. He remained with PPM, Inc. until its acquisition in 1985 by USPCI. Mr. Zwecker has a B.S. in Industrial and Systems Engineering from the Georgia Institute of Technology and an M.B.A. from Harvard University.

As a director since our inception, Mr. Zwecker's understanding of our business provides valuable insight to the Board. With years of experience in operations and finance for various companies, including a number of waste management companies, Mr. Zwecker combines extensive knowledge of accounting principles, financial reporting rules and regulations, the ability to evaluate financial results, and understanding of financial reporting processes. He has an extensive background in operating complex organizations. Mr. Zwecker's experience and background position him well to serve as a member of our Board. These factors led the Board to conclude that he should serve as a director.

BOARD LEADERSHIP STRUCTURE

We currently separate the roles of Chairman of the Board and CEO. The Board believes that this leadership structure promotes balance between the Board's independent authority to oversee our business, and the CEO and his management team, who manage the business on a day-to-day basis.

The Company does not have a written policy with respect to the separation of the positions of Chairman of the Board and CEO. The Company believes it is important to retain its flexibility to allocate the responsibilities of the offices of the Chairman and CEO in any way that is in the best interests of the Company at a given point in time; therefore, the Company's leadership structure may change in the future as circumstances may dictate.

Mr. Mark Zwecker, a current member of our Board, continues to serve as the Independent Lead Director, a position he has held since February 2010. The Lead Director's role includes:

convening and chairing meetings of the non-employee directors as necessary from time to time and Board meetings in the absence of the Chairman of the Board;
acting as liaison between directors, committee chairs and management;
serving as information sources for directors and management; and
carrying out responsibilities as the Board may delegate from time to time.

AUDIT COMMITTEE

We have a separately designated standing Audit Committee of our Board established in accordance with Section 3(a)(58)(A) of the Exchange Act. The members of the Audit Committee are Mark A. Zwecker (Chairperson), S. Robert Cochran, and Larry M. Shelton, who replaced Dr. Gary G. Kugler as a member of the Audit Committee, effective April 19, 2018. Dr. Kugler elected to retire as a director and did not stand for re-election at the Company's 2018 Annual Meeting of Stockholder's held on July 26, 2018.

Our Board has determined that each of our Audit Committee members is and was independent within the meaning of the rules of the NASDAQ and is an "audit committee financial expert" as defined by Item 407(d)(5)(ii) of Regulation S-K of the Securities Exchange Act of 1934, as amended (the "Exchange Act").

The Audit Committee has also discussed with Grant Thornton, LLP, the Company's independent registered accounting firm, the matters required to be discussed by Public Company Accounting Oversight Board ("PCAOB") Auditing Standard No. 16 (Communications with Audit Committee).

BOARD OF DIRECTOR INDEPENDENCE

The Board has determined that each director, other than Dr. Centofanti, is "independent" within the meaning of the applicable NASDAQ rules. Dr. Centofanti is not deemed to be an "independent director" because of his employment as a senior executive of the Company.

COMPENSATION AND STOCK OPTION COMMITTEE

The Compensation and Stock Option Committee ("Compensation Committee") reviews and recommends to the Board the compensation and benefits of all of the Company's officers and reviews general policy matters relating to compensation and benefits of the Company's employees. The Compensation Committee also administers the Company's stock option plans. The Compensation Committee has the sole authority to retain and terminate a compensation consultant, as well as to approve the consultant's fees and other terms of engagement. It also has the authority to obtain advice and assistance from internal or external legal, accounting or other advisors. No compensation consultant was employed during 2018. Members of the Compensation Committee are Larry M. Shelton (Chairperson), Joe R. Reeder, and Mark A. Zwecker, who replaced Dr. Gary G. Kugler as a member of the Compensation Committee, effective April 19, 2018. Effective April 19, 2018, Larry M. Shelton became the Chairperson of the Compensation Committee, which position was previously held by Dr. Gary G. Kugler. None of the members of the Compensation Committee has been an officer or employee of the Company or has had any relationship with the Company requiring disclosure under applicable Securities and Exchange Commission regulations.

CORPORATE GOVERNANCE AND NOMINATING COMMITTEE

We have a separately-designated standing Corporate Governance and Nominating Committee (“Nominating Committee”). Members of the Nominating Committee are Joe R. Reeder (Chairperson), S. Robert Cochran, and Zach P. Wamp, who replaced Dr. Gary G. Kugler as a member effective April 19, 2018. All members of the Nominating Committee are and were “independent” as that term is defined by current NASDAQ listing standards.

The Nominating Committee recommends to the Board candidates to fill vacancies on the Board and the nominees for election as the directors at each annual meeting of stockholders. In making such recommendation, the Nominating Committee takes into account information provided to them from the candidate, as well as the Nominating Committee’s own knowledge and information obtained through inquiries to third parties to the extent the Nominating Committee deems appropriate. The Company’s Amended and Restated Bylaws, as amended (the “Bylaws”), sets forth certain minimum director qualifications to qualify for nomination for elections as a Director. To qualify for nomination or election as a director, an individual must:

- be an individual at least 21 years of age who is not under legal disability;
- have the ability to be present, in person, at all regular and special meetings of the Board;
- not serve on the boards of more than three other publicly held companies;
- satisfy the director qualification requirements of all environmental and nuclear commissions, boards or similar regulatory or law enforcement authorities to which the Corporation is subject so as not to cause the Corporation to fail to satisfy any of the licensing requirements imposed by any such authority;
- not be affiliated with, employed by or a representative of, or have or acquire a material personal involvement with, or material financial interest in, any “Business Competitor” (as defined);
- not have been convicted of a felony or of any misdemeanor involving moral turpitude; and
- have been nominated for election to the Board in accordance with the terms of the Bylaws.

In addition to the minimum director qualifications mentioned above, each candidate’s qualifications are also reviewed to include:

- standards of integrity, personal ethics and value, commitment, and independence of thought and judgment;
- ability to represent the interests of the Company’s stockholders;
- ability to dedicate sufficient time, energy and attention to fulfill the requirements of the position; and
- diversity of skills and experience with respect to accounting and finance, management and leadership, business acumen, vision and strategy, charitable causes, business operations, and industry knowledge.

The Nominating Committee does not assign specific weight to any particular criteria and no particular criterion is necessarily applicable to all prospective nominees. The Nominating Committee does not have a formal policy for the consideration of diversity in identifying nominees for directors; however, the Company believes that the backgrounds

and qualifications of the directors, considered as a group, should provide a significant composite mix of experience, knowledge, and abilities that will allow the Board to fulfill its responsibilities.

Stockholder Nominees

There have been no changes to the stockholder nomination process since the Company's last proxy statement. The procedure for stockholder nominees to the Board is set out below.

The Nominating Committee will consider properly submitted stockholder nominations for candidates for membership on the Board from stockholders who meet each of the requirements set forth in the Bylaws, including, but not limited to, the requirements that any such stockholder own at least 1% of the Company's shares of the Common Stock entitled to vote at the meeting on such election, has held such shares continuously for at least one full year, and continuously holds such shares through and including the time of the annual or special meeting. Nominations of persons for election to the Board may be made at any Annual Meeting of Stockholders, or at any Special Meeting of Stockholders called for the purpose of electing directors. Any stockholder nomination ("Proposed Nominee") must comply with the requirements of the Bylaws and the Proposed Nominee must meet the minimum qualification requirements as discussed above. For a nomination to be made by a stockholder, such stockholder must provide advance written notice to the Nominating Committee, delivered to the Company's principal executive office address (i) in the case of an Annual Meeting of Stockholders, no later than the 90th day nor earlier than the 120th day prior to the anniversary date of the immediately preceding Annual Meeting of Stockholders; and (ii) in the case of a Special Meeting of Stockholders called for the purpose of electing directors, not later than the 10th day following the day on which public disclosure of the date of the Special Meeting of Stockholders was made.

The Nominating Committee will evaluate the qualification of the Proposed Nominee and the Proposed Nominee's disclosure and compliance requirements in accordance with the Company's Bylaws. If the Board, upon the recommendation of the Nominating Committee, determines that a nomination was not made in accordance with the Bylaws, the Chairman of the Meeting shall declare the nomination defective and it will be disregarded.

RESEARCH AND DEVELOPMENT COMMITTEE

Until April 19, 2018, we had a separately-designated standing Research and Development Committee (the "R&D Committee"). The R&D Committee outlined the structures and functions of the Company's research and development strategies, the acquisition and protection of the Company's intellectual property rights and assets, and provided its perspective on such matter to the Board. Members of the R&D Committee included Dr. Louis Centofanti and Dr. Gary G. Kugler. Effective April 19, 2018, the R&D Committee was dissolved. Upon the dissolution of the R&D Committee, all R&D activities are managed and reviewed by senior management and oversight of these activities is conducted by the Board as deemed necessary. The R&D Committee did not have a charter.

STRATEGIC ADVISORY COMMITTEE

We have a separately-designated Strategic Advisory Committee (the "Strategic Committee"). The primary functions of the Strategic Committee are to investigate and evaluate strategic alternatives available to the Company and to work with management on long-range strategic planning and identifying potential new business opportunities. The members of the Strategic Advisory Committee are S. Robert Cochran (Chairperson), Joe R. Reeder, Mark A. Zwecker, and Larry M. Shelton. The Strategic Advisory Committee does not have a charter.

EXECUTIVE OFFICERS OF THE REGISTRANT

The following table sets forth, as of the date hereof, information concerning our executive officers:

NAME	AGE	POSITION
Mr. Mark Duff	56	President and CEO
Mr. Ben Naccarato	56	CFO, Vice President, and Secretary; CFO of PF Medical
Dr. Louis Centofanti	75	EVP of Strategic Initiatives; President of PF Medical

Mr. Mark Duff

Mr. Mark Duff was appointed President and CEO by the Company's Board on September 8, 2017, succeeding Dr. Louis Centofanti. In September 2016, Mr. Duff was named as the Chief Operating Officer ("COO") of the Company and continued to serve as EVP of the Company, a position he had held since joining the Company in June 2016. Duff has over 30 years of management and technical experience in the U.S Department of Energy ("DOE") and U.S. Department of Defense ("DOD") environmental and construction markets as a corporate officer, senior project manager, co-founder of a consulting firm, and federal employee. For the immediate five years prior to joining the Company in June 2016, Mr. Duff was responsible for the successful completion of over 70 performance-based projects at the Paducah Gaseous Diffusion Plant ("PGDP") in Paducah, KY. At the PGDP, he served as the Project Manager for the Paducah Remediation Contract, which was a five-year project with a total value of \$458 million. Prior to the PGDP project, Mr. Duff was a senior manager supporting Babcock and Wilcox ("B&W"), leading several programs that included building teams to solve complex technical problems. These programs included implementation of the American Recovery and Reinvestment Act ("ARRA") at the DOE Y-12 facility with a \$245 million budget for new cleanup projects completed over a two-year period. During this period, Mr. Duff served as project manager leading a team of senior experts in support of Toshiba Corporation in Tokyo, Japan to integrate United States technology in the recovery of the Fukushima Daiichi Nuclear Reactor disaster. Prior to joining B&W, Mr. Duff served as the president of Safety and Ecology Corporation ("SEC"). As President of SEC, he helped grow the company from \$50 million to \$80 million in annual revenues with significant growth in infrastructure, marketing, and client diversification. Mr. Duff has an MBA from the University of Phoenix and received his B.S. from the University of Alabama.

Mr. Ben Naccarato

Mr. Naccarato has served as the Company's CFO since February 26, 2009. Mr. Naccarato joined the Company in September 2004 and served as Vice President, Finance of the Company's Industrial Segment until May 2006, when he was named Vice President, Corporate Controller/Treasurer. Since July 2015 and December 2015, Mr. Naccarato has served as the CFO of PF Medical and a member of the Management Board of PF Medical, respectively. PF Medical is the Company's majority-owned Polish subsidiary involved in the research and development of a new medical isotope production technology. Mr. Naccarato has over 30 years of experience in senior financial positions in the waste management and used oil industries. From December 2002 to September 2004, Mr. Naccarato was the CFO of a privately held company in the fuel distribution and used waste oil industry. Mr. Naccarato is a graduate of University of Toronto with a Bachelor of Commerce and Finance Degree and is a Chartered Professional Accountant, Certified Management Accountant (CPA, CMA).

Dr. Louis Centofanti

See "Director – Dr. Louis F. Centofanti" in this section for information on Dr. Centofanti.

Certain Relationships

There are no family relationships between any of the directors or executive officers.

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act, and the regulations promulgated thereunder require our executive officers and directors and beneficial owners of more than 10% of our Common Stock to file reports of ownership and changes of ownership of our Common Stock with the Securities and Exchange Commission, and to furnish us with copies of all such reports. Based solely on a review of the copies of such reports furnished to us and written information provided to us, we believe that during 2018 none of our executive officers, directors, or beneficial owners of more than 10% of our Common Stock failed to timely file reports under Section 16(a).

Capital Bank–Grawe Gruppe AG ("Capital Bank") has advised us that it is a banking institution regulated by the banking regulations of Austria, which holds shares of our Common Stock as agent on behalf of numerous investors. Capital

Bank has represented that all of its investors are accredited investors under Rule 501 of Regulation D promulgated under the Act. In addition, Capital Bank has advised us that none of its investors, individually or as a group, beneficially own more than 4.9% of our Common Stock as calculated in accordance with Rule 13d-3 of the Exchange Act. Capital Bank has further informed us that its clients (and not Capital Bank) maintain full voting and dispositive power over such shares. Consequently, Capital Bank has advised us that it believes it is not the beneficial owner, as such term is defined in Rule 13d-3 of the Exchange Act, of the shares of our Common Stock registered in the name of Capital Bank because it has neither voting nor investment power, as such terms are defined in Rule 13d-3, over such shares. Capital Bank has informed us that it does not believe that it is required to file, and has not filed, (a) reports under Section 16(a) of the Exchange Act or (b) either Schedule 13D or Schedule 13G in connection with the shares of our Common Stock registered in the name of Capital Bank.

If the representations of, or information provided by Capital Bank, are incorrect or Capital Bank was historically acting on behalf of its investors as a group, rather than on behalf of each investor independent of other investors, then Capital Bank and/or the investor group would have become a beneficial owner of more than 10% of our Common Stock on February 9, 1996, as a result of the acquisition of 1,100 shares of our Preferred Stock that were convertible into a maximum of 256,560 shares of our Common Stock. If either Capital Bank or a group of Capital Bank's investors became a beneficial owner of more than 10% of our Common Stock on February 9, 1996, or at any time thereafter, and thereby required to file reports under Section 16(a) of the Exchange Act, then Capital Bank has failed to file a Form 3 or any Forms 4 or 5 since February 9, 1996. (See "Item 12 - Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matter – Security Ownership of Certain Beneficial Owners" for a discussion of Capital Bank's current record ownership of our securities).

Code of Ethics

Our Code of Ethics applies to all our executive officers and is available on our website at www.perma-fix.com. If any amendments are made to the Code of Ethics or any grants of waivers are made to any provision of the Code of Ethics to any of our executive officers, we will promptly disclose the amendment or waiver and nature of such amendment or waiver on our website at the same web address.

ITEM 11. EXECUTIVE COMPENSATION

Summary Compensation

The following table summarizes the total compensation paid or earned by each of the named executive officers ("NEOs") for the fiscal years ended December 31, 2018 and 2017.

Name and Principal Position	Year	Salary (\$)	Bonus (\$)	Option Awards (\$) ⁽⁴⁾	Non-Equity Incentive Plan Compensation (\$) ⁽⁵⁾	All other Compensation (\$) ⁽⁶⁾	Total Compensation (\$)
Mark Duff ⁽¹⁾ President and CEO	2018	275,125	—	—	—	29,555	304,680
	2017	267,000	—	188,118	—	32,362	487,480
Ben Naccarato Vice President and CFO	2018	229,494	—	—	—	40,732	270,226
	2017	226,552 ⁽²⁾	—	94,059	—	36,706	357,317
Dr. Louis Centofanti ⁽¹⁾	2018	223,400	—	—	—	32,177	255,577

EVP of Strategic Initiatives	2017	262,959 ⁽³⁾	—	94,059	—	30,464	387,482
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On September 8, 2017, Mr. Duff was named as President and CEO, succeeding Dr. Louis Centofanti, who retired from the position of President and CEO and was named to the position of EVP of Strategic Initiatives. Since joining⁽¹⁾ the Company (effective June 11, 2016), Mr. Duff earned an annual salary of \$267,000. On April 19, 2018, the Compensation Committee and the Board approved Mr. Duff’s annual to \$280,000 from \$267,000.

Effective April, 20, 2017, the Compensation Committee and the Board approved Mr. Naccarato’s annual salary to⁽²⁾ \$229,494 from \$220,667.

As EVP of Strategic Initiatives, Dr. Centofanti’s annual salary was amended to \$223,400 from \$279,248 effective⁽³⁾ September 8, 2017.

Reflects the aggregate grant date fair value of awards computed in accordance with ASC 718, “Compensation – Stock⁽⁴⁾ Compensation.” Assumptions used in the calculation of this amount are included in “Note 6 – Capital Stock, Stock Plans, Warrants and Stock Based Compensation” to “Notes to Consolidated Financial Statement.”

Represents performance compensation earned under the Company’s MIP with respect to each NEO. The MIP for⁽⁵⁾ each NEO is described under the heading “2018 MIPs.” No compensation was earned by any NEO under his respective MIP for 2018 and 2017.

The amount shown includes a monthly automobile allowance of \$750, insurance premiums (health, disability and⁽⁶⁾ life) paid by the Company on behalf of the executive, and 401(k) matching contributions.

Name	Insurance			Total
	Premium	Auto Allowance	401(k) match	
Mark Duff	\$ 14,430	\$ 9,000	\$ 6,125	\$ 29,555
Ben Naccarato	\$ 27,109	\$ 9,000	\$ 4,623	\$ 40,732
Dr. Louis Centofanti	\$ 18,687	\$ 9,000	\$ 4,490	\$ 32,177

Outstanding Equity Awards at Fiscal Year-End

The following table sets forth unexercised options held by the NEOs as of the fiscal year-end.

Outstanding Equity Awards at December 31, 2018

Name	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) ⁽¹⁾ Unexercisable	Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price (\$)	Option Expiration Date
Dr. Louis Centofanti	10,000	40,000	⁽²⁾ —	3.65	7/27/2023
Ben Naccarato	10,000	40,000	⁽²⁾ —	3.65	7/27/2023
Mark Duff	20,000 33,333	80,000 ⁽³⁾ 16,667	⁽²⁾ — ⁽³⁾ —	3.65 3.97	7/27/2023 5/15/2022

Pursuant to the NEO's employment agreements with the Company, each dated September 9, 2017, in the event of a change in control, death of the executive officer, the executive officer terminates his employment for "good reason" or ⁽¹⁾the executive officer is terminated by the Company without cause, each outstanding option and award shall immediately become exercisable in full (see "Employment Agreements" below for further discussion of the exercisability terms of the option under these events) .

⁽²⁾ Incentive stock option granted on July 27, 2017 under the Company's 2017 Stock Option Plan. The option has a contractual term of six years with one-fifth yearly vesting over a five-year period.

⁽³⁾ Incentive stock option granted on May 15, 2016 under the Company's 2010 Stock Option Plan. The option has a contractual term of six years with one-third yearly vesting over a three-year period.

None of the Company's NEOs exercised options during 2018.

Employment Agreements

Each of Messrs. Duff, Centofanti and Naccarato have entered into employment agreements with the Company (each, an "Employment Agreement" and collectively, the "Employment Agreements"), effective September 8, 2017, with annual base salaries of \$267,000, \$223,400, and \$229,494, respectively. Each annual base salary is subject to adjustment as determined by the Compensation Committee. In addition, each of these executive officers is entitled to participate in the Company's broad-based benefits plans and to certain performance compensation payable under separate MIPs as approved by the Company's Compensation Committee and Board. The Company's Compensation Committee and the Board approved individual 2018 MIPs on January 18, 2018 (which were effective January 1, 2018 and applicable for year 2018) for each of Mark Duff, Dr. Louis Centofanti, and Ben Naccarato (see discussion of the 2018 MIPs below under "2018 MIPs"). No compensation was earned under each of the 2018 MIPs.

Each of the Employment Agreements is effective for three years from September 8, 2017 (the "Initial Term") unless earlier terminated by the Company or by the executive officer. At the end of the Initial Term of each Employment Agreement, each Employment Agreement will automatically be extended for one additional year, unless at least six months prior to the expiration of the Initial Term, the Company or the executive officer provides written notice not to extend the terms of the Employment Agreement.

Pursuant to the Employment Agreements, if the executive officer's employment is terminated due to death/disability or for cause (as defined in the agreements), the Company will pay to the executive officer or to his estate an amount equal to the sum of any unpaid base salary, accrued unused vacation time through the date of termination, any benefits due to the executive officer under any employee benefit plan (the "Accrued Amounts") and any performance compensation payable pursuant to the MIP.

If the executive officer terminates his employment for "good reason" (as defined in the agreements) or is terminated by the Company without cause (including any such termination for "good reason" or without cause within 24 months after a Change in Control (as defined in the agreement)), the Company will pay the executive officer the Accrued Amounts, two years of full base salary, performance compensation (under the MIP) earned with respect to the fiscal year immediately preceding the date of termination, and an additional year of performance compensation (under the MIP) earned, if not already paid, with respect to the fiscal year immediately preceding the date of termination. If the executive terminates his employment for a reason other than for good reason, the Company will pay to the executive an amount equal to the Accrued Amounts plus any performance compensation payable pursuant to the MIP.

If there is a Change in Control (as defined in the agreements), all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of termination through the original term of the options. In the event of the death of an executive officer, all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of death, with such options exercisable for the lesser of the original option term or twelve months from the date of the executive officer's death. In the event an executive officer terminates his employment for "good reason" or is terminated by the Company without cause, all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full commencing on the date of termination, with such options exercisable for the lesser of the original option term or within 60 days from the date of the executive's date of termination. Severance benefits payable with respect to a termination (other than Accrued Amounts) shall not be payable until the termination constitutes a "separation from service" (as defined under Treasury Regulation Section 1.409A-1(h)).

Potential Payments

The following table sets forth the potential (estimated) payments and benefits to which our NEOs - Mark Duff, Ben Naccarato, and Dr. Centofanti - would be entitled upon termination of employment or following a Change in Control of the Company, as specified under each of their respective agreements with the Company, assuming each circumstance described below occurred on December 31, 2018, the last day of our fiscal year.

Name and Principal Position	Disability Potential Payment/Benefit or For Cause	Death	By Executive for Good Reason or by Company Without Cause	Change in Control of the Company
Mark Duff President and CEO				
Salary	\$	\$	\$560,000	(1) \$560,000 (1)
Performance compensation	\$	(2) \$	(2) \$	(2) \$ (2)
Stock Options	\$	(3) \$	(4) \$	(4) \$ (4)
Ben Naccarato CFO				
Salary	\$	\$	\$458,988	(1) \$458,988 (1)
Performance compensation	\$	(2) \$	(2) \$	(2) \$ (2)
Stock Options	\$	(3) \$	(4) \$	(4) \$ (4)
Dr. Louis Centofanti EVP of Strategic Initiatives				
Salary	\$	\$	\$446,800	(1) \$446,800 (1)
Performance compensation	\$	(2) \$	(2) \$	(2) \$ (2)
Stock Options	\$	(3) \$	(4) \$	(4) \$ (4)

(1) Represents two times the base salary of executive at December 31, 2018.

(2) No amount was earned and payable under the 2018 MIP (see "2018 MIPs" below).

(3) Benefit is zero since the number of stock options vested was out-of-the money at December 31, 2018 (as reported on the NASDAQ).

(4) All outstanding options become vested immediately upon circumstances noted; however, benefit is zero since the number of stock options that was outstanding was out-of-the money at December 31, 2018.

2018 Executive Compensation Components

For the fiscal year ended December 31, 2018, the principal components of compensation for executive officers were:

base salary;
performance-based incentive compensation;
long term incentive compensation;
retirement and other benefits; and
perquisites.

Based on the amounts set forth in the Summary Compensation table, during 2018, salary accounted for approximately 87.7% of the total compensation of our NEOs, while equity option awards, MIP compensation, and other compensation accounted for approximately 12.3% of the total compensation of the NEOs.

Base Salary

The NEOs, other officers, and other employees of the Company receive a base salary during the fiscal year. Base salary ranges for executive officers are determined for each executive based on his or her position and responsibility by using market data and comparisons to the Peer Group.

During its review of base salaries for executives, the Compensation Committee primarily considers:

market data and Peer Group comparisons;

internal review of the executive's compensation, both individually and relative to other officers; and

individual performance of the executive.

Salary levels are typically considered annually as part of the performance review process as well as upon a promotion or other change in job responsibility. Merit-based salary increases for executives are based on the Compensation Committee's assessment of the individual's performance. The base salary and potential annual base salary adjustments for the NEOs are set forth in their respective employment agreements. On January 17, 2019, the Compensation Committee and the Board approved a base salary increase of 2.5% for each named NEO, which became effective January 1, 2019.

Performance-Based Incentive Compensation

The Compensation Committee has the latitude to design cash and equity-based incentive compensation programs to promote high performance and achievement of our corporate objectives by directors and the NEOs, encourage the growth of stockholder value and enable employees to participate in our long-term growth and profitability. The Compensation Committee may grant stock options and/or performance bonuses. In granting these awards, the Compensation Committee may establish any conditions or restrictions it deems appropriate. In addition, the CEO has discretionary authority to grant stock options to certain high-performing executives or officers, subject to the approval of the Compensation Committee. The exercise price for each stock options granted is at or above the market price of our Common Stock on the date of grant. Stock options may be awarded to newly hired or promoted executives at the discretion of the Compensation Committee. Grants of stock options to eligible newly hired executive officers are generally made at the next regularly scheduled Compensation Committee meeting following the hire date.

2018 MIPs

On January 18, 2018, the Board and the Compensation Committee approved individual MIPs for our CEO, CFO and EVP of Strategic Initiatives. The MIPs are effective January 1, 2018 and applicable for fiscal 2018. Each MIP provides guidelines for the calculation of annual cash incentive-based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive's 2018 annual base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 100% of the base salary for the CEO (\$13,350 to \$267,000), 5% to 100% of the base salary for the CFO (\$11,475 to \$229,494) and 5% to 100% of the base salary for the EVP of Strategic Initiatives (\$11,170 to \$223,400).

Performance compensation is paid on or about 90 days after year-end, or sooner, based on finalization of our audited financial statements for 2018. The Compensation Committee retains the right to modify, change or terminate each MIP and may adjust the various target amounts described below, at any time and for any reason.

The total performance compensation paid to the CEO, CFO and EVP of Strategic Initiatives as a group is not to exceed 50% of the Company's pre-tax net income (exclusive of PF Medical) prior to the calculation of performance compensation.

No cash performance incentive based compensation was earned by any of the NEOs under his respective 2018 MIP.

The following describes the principal terms of each 2018 MIP as approved on January 18, 2018:

CEO MIP:

2018 CEO performance compensation was based upon meeting corporate revenue, EBITDA (earnings before interest, taxes, depreciation and amortization), health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2018 from our continuing operations (excluding PF Medical). The Compensation Committee believes performance compensation payable under each of the 2018 MIPs as discussed herein and below should be based on achievement of an EBITDA target, which excludes certain non-cash items, as this target provides a better indicator of operating performance. However, EBITDA has certain limitations as it does not reflect all items of income or cash flows that affect the Company's financial performance under accounting principles generally accepted in the United States of America ("GAAP"). At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation was payable at 5% to 50% of the 2018 base salary. For this compensation, 60% was based on EBITDA goal, 10% on revenue goal, 15% on the number of health and safety claim incidents that occurred during fiscal 2018, and the remaining 15% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occurred during fiscal 2018. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation was payable at 65% to 100% of the CEO's 2018 base salary. For this compensation, the amount payable was based on the four objectives noted above, with the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components was based on our Board-approved revenue target and EBITDA target. The 2018 target performance incentive compensation for our CEO was as follows:

Annualized Base Pay:	\$267,000
Performance Incentive Compensation Target (at 100% of Plan):	\$133,500
Total Annual Target Compensation (at 100% of Plan):	\$400,500

Perma-Fix Environmental Services, Inc.
2018 Management Incentive Plan
CEO MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,334	\$ 6,674	\$ 13,350	\$ 19,071	\$ 26,700	\$32,421
EBITDA (2)	-	8,010	40,050	80,100	114,429	160,200	194,529
Health & Safety (3) (5)	-	2,003	10,013	20,025	20,025	20,025	20,025
Permit & License Violations (4) (5)	-	2,003	10,013	20,025	20,025	20,025	20,025
	\$-	\$ 13,350	\$ 66,750	\$ 133,500	\$ 173,550	\$ 226,950	\$267,000

1) Revenue was defined as the total consolidated third-party top line revenue from continuing operations (excluding PF Medical) as publicly reported in the Company's 2018 financial statements. The percentage achieved was determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which was \$63,398,000. The Board reserved the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

2) EBITDA was defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved was determined by comparing the actual EBITDA to the Board-approved EBITDA target for 2018, which was \$7,682,000. The Board reserved the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

3) The health and safety incentive target was based upon the actual number of Worker's Compensation Lost Time Accidents, as provided by the Company's Worker's Compensation carrier. The Corporate Controller submitted a report on a quarterly basis documenting and confirming the number of Worker's Compensation Lost Time Accidents, supported by the Worker's Compensation Loss Report provided by the company's carrier or broker. Such claims were identified on the loss report as "indemnity claims." The following number of Worker's Compensation Lost Time Accidents and corresponding Performance Target Thresholds was established for the annual incentive compensation plan calculation for 2018.

Work Comp. Performance

Claim Number	Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150%

4) Permits or license incentive was earned/determined according to the scale set forth below: An “official notice of non-compliance” was defined as an official communication during 2018 from a local, state, or federal regulatory authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which resulted in a facility’s implementation of corrective action(s).

Permit and Performance

License Violations	Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150%

5) No performance incentive compensation was payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target was achieved.

CFO MIP:

2018 CFO performance compensation was based upon meeting corporate revenue, EBITDA, health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2018 from our continuing operations (excluding PF Medical). At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation was payable at 5% to 50% of the 2018 base salary. For this compensation, 60% was based on EBITDA goal, 10% on revenue goal, 15% on the number of health and safety claim incidents that occurred during fiscal 2018, and the remaining 15% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occurred during fiscal 2018. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation was payable at 65% to 100% of the CFO’s 2018 base salary. For this compensation, the amount payable was based on the four objectives noted above, with the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components was based on our Board-approved revenue target and EBITDA target. The 2018 target performance incentive compensation for our CFO was as follows:

Annualized Base Pay:	\$229,494
Performance Incentive Compensation Target (at 100% of Plan):	\$114,747
Total Annual Target Compensation (at 100% of Plan):	\$344,241

Perma-Fix Environmental Services, Inc.
2018 Management Incentive Plan
CFO MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,146	\$ 5,736	\$ 11,475	\$ 16,392	\$ 22,949	\$ 27,867
EBITDA (2)	-	6,885	34,424	68,848	98,355	137,696	167,203
Health & Safety (3) (5)	-	1,722	8,607	17,212	17,212	17,212	17,212
Permit & License Violations (4) (5)	-	1,722	8,607	17,212	17,212	17,212	17,212
	\$-	\$ 11,475	\$ 57,374	\$ 114,747	\$ 149,171	\$ 195,069	\$ 229,494

Revenue was defined as the total consolidated third-party top line revenue from continuing operations (excluding Medical) as publicly reported in the Company's 2018 financial statements. The percentage achieved was determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which was \$63,398,000. The Board reserved the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

EBITDA was defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved was determined by comparing the actual EBITDA to the Board-approved EBITDA target for 2018, which was \$7,682,000. The Board reserved the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

The health and safety incentive target was based upon the actual number of Worker's Compensation Lost Time Accidents, as provided by the Company's Worker's Compensation carrier. The Corporate Controller submitted a report on a quarterly basis documenting and confirming the number of Worker's Compensation Lost Time Accidents, supported by the Worker's Compensation Loss Report provided by the company's carrier or broker. Such claims were identified on the loss report as "indemnity claims." The following number of Worker's Compensation Lost Time Accidents and corresponding Performance Target Thresholds was established for the annual incentive compensation plan calculation for 2018.

Work Comp. Claim Number	Performance Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150%

Permits or license incentive was earned/determined according to the scale set forth below: An “official notice of non-compliance” was defined as an official communication during 2018 from a local, state, or federal regulatory authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which resulted in a facility’s implementation of corrective action(s).

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Permit and License Violations	Performance Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150%

5) No performance incentive compensation was payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target was achieved.

EVP of Strategic Initiatives MIP:

2018 EVP of Strategic Initiatives performance compensation was based upon meeting corporate revenue, EBITDA, health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2018 from our continuing operations (excluding PF Medical). At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation was payable at 5% to 50% of the 2018 base salary. For this compensation, 60% was based on EBITDA goal, 10% on revenue goal, 15% on the number of health and safety claim incidents that occurred during fiscal 2018, and the remaining 15% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occurred during fiscal 2018. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation was payable at 65% to 100% of the EVP of Strategic Initiative's 2018 base salary. For this compensation, the amount payable was based on the four objectives noted above, with the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components was based on our Board-approved revenue target and EBITDA target. The 2018 target performance incentive compensation for our EVP of Strategic Initiatives was as follows:

Annualized Base Pay:	\$223,400
Performance Incentive Compensation Target (at 100% of Plan):	\$111,700
Total Annual Target Compensation (at 100% of Plan):	\$335,100

Perma-Fix Environmental Services, Inc.
 2018 Management Incentive Plan
 EVP OF STRATEGIC INITIATIVES MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,116	\$ 5,584	\$ 11,170	\$ 15,957	\$ 22,340	\$ 27,127

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EBITDA (2)	-	6,702	33,510	67,020	95,743	134,040	162,763
Health & Safety (3) (5)	-	1,676	8,378	16,755	16,755	16,755	16,755
Permit & License Violations (4) (5)	-	1,676	8,378	16,755	16,755	16,755	16,755
	\$-	\$ 11,170	\$ 55,850	\$ 111,700	\$ 145,210	\$ 189,890	\$ 223,400

Revenue was defined as the total consolidated third-party top line revenue from continuing operations (excluding Medical) as publicly reported in the Company's 2018 financial statements. The percentage achieved was determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which was \$63,398,000. The Board reserved the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

EBITDA was defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved was determined by comparing the actual EBITDA to the 2) Board-approved EBITDA target for 2018, which was \$7,682,000. The Board reserved the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

The health and safety incentive target was based upon the actual number of Worker’s Compensation Lost Time Accidents, as provided by the Company’s Worker’s Compensation carrier. The Corporate Controller submitted a report on a quarterly basis documenting and confirming the number of Worker’s Compensation Lost Time 3) Accidents, supported by the Worker’s Compensation Loss Report provided by the company’s carrier or broker. Such claims were identified on the loss report as “indemnity claims.” The following number of Worker’s Compensation Lost Time Accidents and corresponding Performance Target Thresholds was established for the annual incentive compensation plan calculation for 2018.

Work Comp. Claim Number	Performance Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150+

Permits or license incentive was earned/determined according to the scale set forth below: An “official notice of non-compliance” was defined as an official communication during 2018 from a local, state, or federal regulatory 4) authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which resulted in a facility’s implementation of corrective action(s).

Permit and License Violations	Performance Target Payable Under Column
6	60%-74%
5	75%-89%
4	90%-110%
3	111%-129%
2	130%-150%
1	>150%

5) No performance incentive compensation was payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target was achieved.

2018 MIP Targets

As discussed above, 2018 MIPs approved by the Board and the Compensation Committee for the CEO, CFO and EVP of Strategic Initiatives provided for the award of cash compensation based on achievement of performance targets which included revenue and EBITDA targets as approved by our Board. The 2018 MIP revenue target of \$63,398,000 and EBITDA target of \$7,682,000 were set by the Compensation Committee taking into account the Board-approved budget for 2018 as well as the committee's expectations for performance that in its estimation would warrant payment of incentive cash compensation. In formulating the revenue target of \$63,398,000, the Board considered 2017 results, current economic conditions, and forecasts for 2018 government (U.S DOE) spending. The Compensation Committee believed the performance targets were likely to be achieved, but not assured.

2019 MIPs

On January 17, 2019, the Board and the Compensation Committee approved individual MIP for our CEO, CFO and EVP of Strategic Initiatives. The MIPs are effective January 1, 2019 and applicable for fiscal 2019. Each MIP provides guidelines for the calculation of annual cash incentive-based compensation, subject to Compensation Committee oversight and modification. Each MIP awards cash compensation based on achievement of performance thresholds, with the amount of such compensation established as a percentage of the executive's 2019 annual base salary on the approval date of the MIP. The potential target performance compensation ranges from 5% to 150% of the base salary for the CEO (\$14,350 to \$430,500), 5% to 100% of the base salary for the CFO (\$11,762 to \$235,231) and 5% to 100% of the base salary for the EVP of Strategic Initiatives (\$11,449 to \$228,985).

Performance compensation is paid on or about 90 days after year-end, or sooner, based on finalization of our audited financial statements for 2019. The Compensation Committee retains the right to modify, change or terminate each MIP and may adjust the various target amounts described below, at any time and for any reason.

The total performance compensation paid to the CEO, CFO and EVP of Strategic Initiatives as a group is not to exceed 50% of the Company's pre-tax net income (exclusive of PF Medical) prior to the calculation of performance compensation.

The following describes the principal terms of each 2019 MIP as approved on January 17, 2019:

CEO MIP:

2019 CEO performance compensation is based upon meeting corporate revenue, EBITDA, health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2019 from our continuing operations (excluding PF Medical). The Compensation Committee believes performance compensation payable under each of the 2019 MIPs as discussed herein and below should be based on achievement of an EBITDA target, which excludes certain non-cash items, as this target provides a better indicator of operating performance. However, EBITDA has certain limitations as it does not reflect all items of income or cash flows that affect the Company's financial performance under GAAP. At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation is payable at 5% to 50% of the 2019 base salary. For this compensation, 60% is based on EBITDA goal, 10% on revenue goal, 15% on the number of health and safety claim incidents that occur during fiscal 2019, and the remaining 15% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occur during the fiscal 2019. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation is payable at 75% to 150% of the CEO's 2019 base salary. For this compensation, the amount payable is based on the four objectives noted above, with

the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components is based on our Board-approved revenue target and EBITDA target. The 2019 target performance incentive compensation for our CEO is as follows:

Annualized Base Pay:	\$287,000
Performance Incentive Compensation Target (at 100% of Plan):	\$143,500
Total Annual Target Compensation (at 100% of Plan):	\$430,500

Perma-Fix Environmental Services, Inc.
2019 Management Incentive Plan
CEO MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,435	\$ 7,175	\$ 14,350	\$ 24,600	\$ 34,850	\$ 55,350
EBITDA (2)	-	8,609	43,049	86,100	147,600	209,100	332,100
Health & Safety (3) (5)	-	2,153	10,763	21,525	21,525	21,525	21,525
Permit & License Violations (4) (5)	-	2,153	10,763	21,525	21,525	21,525	21,525
	\$-	\$ 14,350	\$ 71,750	\$ 143,500	\$ 215,250	\$ 287,000	\$ 430,500

Revenue is defined as the total consolidated third-party top line revenue from continuing operations (excluding PF Medical) as publicly reported in the Company's 2019 financial statements. The percentage achieved is determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which is \$63,124,000. The Board reserves the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

EBITDA is defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved is determined by comparing the actual EBITDA to the Board-approved EBITDA target for 2019, which is \$6,777,000. The Board reserves the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

The health and safety incentive target is based upon the actual number of Worker's Compensation Lost Time Accidents, as provided by the Company's Worker's Compensation carrier. The Corporate Controller will submit a report on a quarterly basis documenting and confirming the number of Worker's Compensation Lost Time Accidents, supported by the Worker's Compensation Loss Report provided by the company's carrier or broker. Such claims will be identified on the loss report as "indemnity claims." The following number of Worker's Compensation Lost Time Accidents and corresponding Performance Target Thresholds has been established for the annual incentive compensation plan calculation for 2019.

Work Comp. Claim Number	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150%

Permits or license incentive is earned/determined according to the scale set forth below: An “official notice of non-compliance” is defined as an official communication during 2019 from a local, state, or federal regulatory authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which result in a facility’s implementation of corrective action(s).

Permit and License Violations	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150%

5) No performance incentive compensation will be payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target is achieved.

CFO MIP:

2019 CFO performance compensation is based upon meeting corporate revenue, EBITDA, health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2019 from our continuing operations (excluding PF Medical). At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation is payable at 5% to 50% of the 2019 base salary. For this compensation, 75% is based on EBITDA goal, 10% on revenue goal, 7.5% on the number of health and safety claim incidents that occur during fiscal 2019, and the remaining 7.5% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occur during fiscal 2019. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation is payable at 65% to 100% of the CFO's 2019 base salary. For this compensation, the amount payable is based on the four objectives noted above, with the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components is based on our Board-approved revenue target and EBITDA target. The 2019 target performance incentive compensation for our CFO is as follows:

Annualized Base Pay:	\$235,231
Performance Incentive Compensation Target (at 100% of Plan):	\$117,616
Total Annual Target Compensation (at 100% of Plan):	\$352,847

Perma-Fix Environmental Services, Inc.
2019 Management Incentive Plan
CFO MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,175	\$ 5,881	\$ 11,762	\$ 19,323	\$ 26,043	\$31,084
EBITDA (2)	-	8,821	44,105	88,212	115,935	156,261	186,505

Health & Safety (3) (5)	-	883	4,411	8,821	8,821	8,821	8,821
Permit & License Violations (4) (5)	-	883	4,411	8,821	8,821	8,821	8,821
	\$-	\$ 11,762	\$ 58,808	\$ 117,616	\$ 152,900	\$ 199,946	\$ 235,231

Revenue is defined as the total consolidated third-party top line revenue from continuing operations (excluding Medical) as publicly reported in the Company's 2019 financial statements. The percentage achieved is determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which is \$63,124,000. The Board reserves the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

EBITDA is defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved is determined by comparing the actual EBITDA to the

- 2) Board-approved EBITDA target for 2019, which is \$6,777,000. The Board reserves the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

The health and safety incentive target is based upon the actual number of Worker's Compensation Lost Time Accidents, as provided by the Company's Worker's Compensation carrier. The Corporate Controller will submit a report on a quarterly basis documenting and confirming the number of Worker's Compensation Lost Time

- 3) Accidents, supported by the Worker's Compensation Loss Report provided by the company's carrier or broker. Such claims will be identified on the loss report as "indemnity claims." The following number of Worker's Compensation Lost Time Accidents and corresponding Performance Target Thresholds has been established for the annual incentive compensation plan calculation for 2019.

Work Comp. Claim Number	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150%

Permits or license incentive is earned/determined according to the scale set forth below: An "official notice of

- 4) non-compliance" is defined as an official communication during 2019 from a local, state, or federal regulatory authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which result in a facility's implementation of corrective action(s).

Permit and License Violations	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150%

- 5) No performance incentive compensation will be payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target is achieved.

EVP of Strategic Initiatives MIP:

2019 EVP of Strategic Initiatives performance compensation is based upon meeting corporate revenue, EBITDA, health and safety, and environmental compliance (permit and license violations) objectives during fiscal 2019 from our continuing operations (excluding PF Medical). At achievement of 60% to 110% of each of the revenue and EBITDA targets, the potential performance compensation is payable at 5% to 50% of the 2019 base salary. For this compensation, 75% is based on EBITDA goal, 10% on revenue goal, 7.5% on the number of health and safety claim incidents that occur during fiscal 2019, and the remaining 7.5% on the number of notices alleging environmental, health or safety violations under our permits or licenses that occur during fiscal 2019. Upon achievement of 111% to 150%+ of each of the revenue and EBITDA targets, the potential performance compensation is payable at 65% to 100% of the EVP of Strategic Initiative's 2019 base salary. For this compensation, the amount payable is based on the four objectives noted above, with the payment of such performance compensation being weighted more heavily toward the EBITDA objective. Each of the revenue and EBITDA components is based on our Board-approved revenue target and EBITDA target. The 2019 target performance incentive compensation for our EVP of Strategic Initiatives is as follows:

Annualized Base Pay:	\$228,985
Performance Incentive Compensation Target (at 100% of Plan):	\$114,493
Total Annual Target Compensation (at 100% of Plan):	\$343,478

Perma-Fix Environmental Services, Inc.
 2019 Management Incentive Plan
 EVP OF STRATEGIC INITIATIVES MIP MATRIX

	Performance Target Achieved						
	<60%	60%-74%	75%-89%	90%-110%	111%-129%	130%-150%	>150%
Revenue (1) (5)	\$-	\$ 1,145	\$ 5,725	\$ 11,449	\$ 18,809	\$ 25,352	\$ 30,259
EBITDA (2)	-	8,586	42,935	85,870	112,857	152,111	181,552
Health & Safety (3) (5)	-	859	4,293	8,587	8,587	8,587	8,587
Permit & License Violations (4) (5)	-	859	4,293	8,587	8,587	8,587	8,587
	\$-	\$ 11,449	\$ 57,246	\$ 114,493	\$ 148,841	\$ 194,637	\$ 228,985

Revenue is defined as the total consolidated third-party top line revenue from continuing operations (excluding Medical) as publicly reported in the Company's 2019 financial statements. The percentage achieved is determined by comparing the actual consolidated revenue from continuing operations to the Board-approved revenue target from continuing operations, which is \$63,124,000. The Board reserves the right to modify or change the revenue targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

EBITDA is defined as earnings before interest, taxes, depreciation, and amortization from continuing operations (excluding PF Medical). The percentage achieved is determined by comparing the actual EBITDA to the
2) Board-approved EBITDA target for 2019, which is \$6,777,000. The Board reserves the right to modify or change the EBITDA targets as defined herein in the event of the sale or disposition of any of the assets of the Company or in the event of an acquisition.

The health and safety incentive target is based upon the actual number of Worker's Compensation Lost Time Accidents, as provided by the Company's Worker's Compensation carrier. The Corporate Controller will submit a report on a quarterly basis documenting and confirming the number of Worker's Compensation Lost Time
3) Accidents, supported by the Worker's Compensation Loss Report provided by the company's carrier or broker. Such claims will be identified on the loss report as "indemnity claims." The following number of Worker's Compensation Lost Time Accidents and corresponding Performance Target Thresholds is established for the annual incentive compensation plan calculation for 2019.

Work Comp. Claim Number	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150+

4) Permits or license incentive is earned/determined according to the scale set forth below: An “official notice of non-compliance” is defined as an official communication during 2019 from a local, state, or federal regulatory authority alleging one or more violations of an otherwise applicable Environmental, Health or Safety requirement or permit provision, which result in a facility’s implementation of corrective action(s).

Permit and License Violations	Performance Target Payable Under Column
4	60%-74%
3	75%-89%
2	90%-110%
1	111%-129%
1	130%-150%
1	>150%

5) No performance incentive compensation will be payable for achieving the health and safety, permit and license violation, and revenue targets unless a minimum of 60% of the EBITDA target is achieved.

2019 MIP Targets

As discussed above, 2019 MIPs approved by the Board and the Compensation Committee for the CEO, CFO and EVP of Strategic Initiatives provide for the award of cash compensation based on achievement of performance targets which included revenue and EBITDA targets as approved by our Board. The 2019 MIP revenue target of \$63,124,000 and EBITDA target of \$6,777,000 were set by the Compensation Committee taking into account the Board-approved budget for 2019 as well as the committee’s expectations for performance that in its estimation would warrant payment of incentive cash compensation. In formulating the revenue target of \$63,124,000, the Board considered 2018 results, current economic conditions, and forecasts for 2019 government (U.S DOE) spending. The Compensation Committee believes the performance targets are likely to be achieved, but not assured.

Long-Term Incentive Compensation

Employee Stock Option Plans

The 2010 Stock Option Plan and the 2017 Stock Option Plan (together, the “Option Plans”) encourage participants to focus on long-term performance and provides an opportunity for executive officers and certain designated key employees to increase their stake in the Company. Stock options succeed by delivering value to executives only when the value of our stock increases. The Option Plans authorize the grant of Non-Qualified Stock Options (“NQSOs”) and Incentive Stock Options (“ISOs”) for the purchase of our Common Stock.

The Option Plans assist the Company to:

- enhance the link between the creation of stockholder value and long-term executive incentive compensation;
- provide an opportunity for increased equity ownership by executives; and
- maintain competitive levels of total compensation;

Stock option award levels are determined based on market data, vary among participants based on their positions with us and are granted generally at the Compensation Committee's regularly scheduled July or August meeting. Newly hired or promoted executive officers who are eligible to receive options are generally awarded such options at the next regularly scheduled Compensation Committee meeting following their hire or promotion date.

Options are awarded with an exercise price equal to or not less than the closing price of the Company's Common Stock on the date of the grant as reported on the NASDAQ. In certain limited circumstances, the Compensation Committee may grant options to an executive at an exercise price in excess of the closing price of the Company's Common Stock on the grant date.

The Company's NEOs have outstanding options from the 2017 Stock Option Plan which were granted on July 27, 2017 as follows: 100,000 ISOs to Mr. Mark Duff; 50,000 ISOs to Dr. Louis Centofanti; and 50,000 ISOs to Mr. Ben Naccarato. The ISOs granted were for a contractual term of six years with one-fifth yearly vesting over a five year period. The exercise price of each ISO was \$3.65 per share, which was equal to the fair market value of the Company's Common Stock on the date of grant.

Additionally, Mr. Duff has outstanding 50,000 ISOs granted to him by the Company on May 15, 2016 from the 2010 Stock Option Plan. The ISOs granted were for a contractual term of six years with one-third vesting annually over a three-year period. The exercise price of each ISO was \$3.97 per share, which was equal to the fair market value of the Company's Common Stock on the date of grant.

On January 17, 2019 the Company's Compensation Committee and the Board approved the grant of ISOs from the 2017 Stock Option Plan to our NEOs as follows: 25,000 ISOs to Mark Duff; 15,000 ISOs to Ben Naccarato; and 15,000 ISOs to Dr. Louis Centofanti. The ISOs granted were for a contractual term of six years with one-fifth vesting annually over a five year period. The exercise price of the ISO was \$3.15 per share, which was equal to the fair market value of the Company's common stock on the date of grant.

In cases of termination of an executive officer's employment due to death, by the executive for "good reason", by the Company without cause, and due to a "change of control," all outstanding stock options to purchase common stock held by the executive officer will immediately become exercisable in full (see further discussion of the exercisability term of these options in each of these circumstances in "Item 11 – EXECUTIVE COMPENSATION – Employment Agreements"). Otherwise, vesting of option awards ceases upon termination of employment and exercise right of the vested option amount ceases upon three months from termination of employment except in the case of retirement (subject to a six-month limitation) and disability (subject to a one-year limitation).

Accounting for Stock-Based Compensation

We account for stock-based compensation in accordance with Accounting Standards Codification ("ASC") 718, "Compensation – Stock Compensation." ASC 718 establishes accounting standards for entity exchanges of equity instruments for goods or services. It also addresses transactions in which an entity incurs liabilities in exchange for goods or services that are based on the fair value of the entity's equity instruments or that may be settled by the issuance of those equity instruments. ASC 718 requires all stock-based payments to employees, including grants of employee stock options, to be recognized in the income statement based on their fair values. The Company uses the Black-Scholes option-pricing model to determine the fair-value of stock-based awards which requires subjective assumptions. Assumptions used to estimate the fair value of stock options granted include the exercise price of the award, the expected term, the expected volatility of the Company's stock over the option's expected term, the risk-free interest rate over the option's expected term, and the expected annual dividend yield. We recognize stock-based compensation expense using a straight-line amortization method over the requisite period, which is the vesting period of the stock option grant.

Retirement and Other Benefits

401(k) Plan

We adopted the Perma-Fix Environmental Services, Inc. 401(k) Plan (the “401(k) Plan”) in 1992, which is intended to comply with Section 401 of the Internal Revenue Code and the provisions of the Employee Retirement Income Security Act of 1974. All full-time employees who have attained the age of 18 are eligible to participate in the 401(k) Plan. Eligibility is immediate upon employment but enrollment is only allowed during four quarterly open periods of January 1, April 1, July 1, and October 1. Participating employees may make annual pretax contributions to their accounts up to 100% of their compensation, up to a maximum amount as limited by law. We, at our discretion, may make matching contributions based on the employee’s elective contributions. Company contributions vest over a period of five years. In 2018, the Company contributed approximately \$338,000 in 401(k) matching funds, of which approximately \$15,000 was for our NEOs (see the “Summary Compensation” table in this section for 401(k) matching fund contributions made for the NEOs for 2017). In 2017, the Company contributed approximately \$326,000 in 401(k) matching funds, of which approximately \$15,000 was for our NEOs.

Perquisites and Other Personal Benefits

The Company provides executive officers with limited perquisites and other personal benefits (health/disability/life insurance) that the Company and the Compensation Committee believe are reasonable and consistent with its overall compensation program to better enable the Company to attract and retain superior employees for key positions. The Compensation Committee periodically reviews the levels of perquisites and other personal benefits provided to executive officers. The executive officers are provided an auto allowance.

Consideration of Stockholder Say-On-Pay Advisory Vote.

At our Annual Meeting of Stockholders held on July 26, 2018, our stockholders voted, on a non-binding, advisory basis, on the compensation of our NEOs for 2017. A substantial majority (approximately 90%) of the total votes cast on our say-on-pay proposal at that meeting approved the compensation of our NEOs for 2017 on a non-binding, advisory basis. The Compensation Committee and the Board believes that this affirms our stockholders’ support of our approach to executive compensation. The Compensation Committee expects to continue to consider the results of future stockholder say-on-pay advisory votes when making future compensation decisions for our NEOs. We will hold an advisory vote on the compensation of our NEOs at our 2018 annual meeting of stockholders.

Compensation of Directors

Directors who are employees receive no additional compensation for serving on the Board or its committees. In 2018, we provided the following annual compensation to directors who are not employees:

options to purchase 2,400 shares of our Common Stock with each option having a 10-year term and being fully vested after six months from grant date;
a quarterly director fee of \$8,000;
an additional quarterly fee of \$5,500 and \$7,500 to the Chairman of our Audit Committee and Chairman of the Board (non-employee), respectively; and
a fee of \$1,000 for each board meeting attendance and a \$500 fee for meeting attendance via conference call.

Each director may elect to have either 65% or 100% of such fees payable in Common Stock under the 2003 Outside Directors Stock Plan ("2003 Outside Directors Plan"), with the balance payable in cash.

Dr. Louis Centofanti, a current member of the Board, is not eligible to receive compensation for his service as a director of the Company as he is an employee (named executive officer) of the Company (see "Summary Compensation" table in this section for Dr. Centofanti's annual salary as an employee of the Company).

The table below summarizes the director compensation expenses recognized by the Company for the director options and stock awards (resulting from fees earned) for the year ended December 31, 2018. The terms of the 2003 Outside Directors Plan are further described below under “2003 Outside Directors Plan.”

Director Compensation

Name	Fees Earned or Paid In Cash (\$) ⁽¹⁾	Stock Awards (\$) ⁽²⁾	Option Awards (\$) ⁽³⁾	Non-Equity Incentive Plan Compensation (\$)	Nonqualified Deferred Compensation Earnings (\$)	All Other Compensation (\$)	Total (\$)
S. Robert Cochran	—	48,002	22,548	—	—	—	70,550
Dr. Gary G. Kugler ⁽⁵⁾	7,091	17,558	—	—	—	—	24,649
Joe R. Reeder	—	47,336	7,248	—	—	—	54,584
Larry M. Shelton	23,100	57,203	7,248	—	—	—	87,551
Zach P. Wamp ⁽⁴⁾	11,721	29,021	7,248	—	—	—	47,990
Mark A. Zwecker	20,300	50,269	7,248	—	—	—	77,817

Under the 2003 Outside Directors Plan, each director elects to receive 65% or 100% of the director’s fees in shares of our Common Stock. The amounts set forth above represent the portion of the director’s fees paid in cash and exclude the value of the directors’ fee elected to be paid in Common Stock under the 2003 Outside Directors Plan, which values are included under “Stock Awards.”

The number of shares of Common Stock comprising stock awards granted under the 2003 Outside Directors Plan is calculated based on 75% of the closing market value of the Common Stock as reported on the NASDAQ on the business day immediately preceding the date that the quarterly fee is due. Such shares are fully vested on the date of grant. The value of the stock award is based on the market value of our Common Stock at each quarter end times the number of shares issuable under the award. The amount shown is the fair value of the Common Stock on the date of the award.

Options granted under the Company’s 2003 Outside Directors Plan resulting from re-election to the Board of Directors on July 26, 2018. Options are for a 10-year period with an exercise price of \$4.30 per share and are fully vested in six months from grant date. The value of the option award for each outside director is calculated based on the fair value of the option per share (\$3.02) on the date of grant times the number of options granted, which was 2,400 for each director, pursuant to ASC 718, “Compensation – Stock Compensation.” Option awards for Zach Wamp also included 6,000 options granted to him upon initial appointment to the Board on January 18, 2018. The options are for a 10-year period with an exercise price of \$4.05 per share and are fully vested six months from date of grant. The fair value of the 6,000 options was determined to be approximately \$15,300 based on fair value of \$2.55 per share. The following table reflects the aggregate number of outstanding non-qualified stock options held by the Company’s directors at December 31, 2018. As an employee of the Company or its subsidiaries, Dr. Centofanti is not eligible to participate in the 2003 Outside Directors Plan. Options reflected below for Dr. Centofanti were granted from the 2017 Option Plan as discussed previously:

Options

Name	Outstanding at December 31, 2018
S. Robert Cochran	10,800
Dr. Louis Centofanti	50,000
Joe R. Reeder	24,000
Larry M. Shelton	24,000
Zach P. Wamp	8,400
Mark A. Zwecker	24,000
Total	141,200

(4) Mr. Wamp was appointed by the Board to fill a vacancy on the Board effective January 18, 2018.

(5) Dr. Kugler elected not to stand for re-election at the Company's Annual Meeting of Stockholders held on July 26, 2018.

2003 Outside Directors Plan

We believe that it is important for our directors to have a personal interest in our success and growth and for their interests to be aligned with those of our stockholders; therefore, under our 2003 Outside Directors Stock Plan, as amended (“2003 Outside Directors Plan”), each outside director is granted a 10-year option to purchase up to 6,000 shares of Common Stock on the date such director is initially elected to the Board, and receives on each re-election date an option to purchase up to another 2,400 shares of our Common Stock, with the exercise price being the fair market value of the Common Stock preceding the option grant date. No option granted under the 2003 Outside Directors Plan is exercisable until after the expiration of six months from the date the option is granted and no option shall be exercisable after the expiration of ten years from the date the option is granted. At December 31, 2018, options to purchase 156,000 shares of Common Stock were outstanding under the 2003 Outside Directors Plan, of which 144,000 were vested at December 31, 2018.

As a member of the Board, each director may elect to receive either 65% or 100% of the director’s fee in shares of our Common Stock. The number of shares received by each director is calculated based on 75% of the fair market value of the Common Stock determined on the business day immediately preceding the date that the quarterly fee is due. The balance of each director’s fee, if any, is payable in cash. In 2018, the fees earned by our outside directors totaled approximately \$312,000. Reimbursements of expenses for attending meetings of the Board are paid in cash at the time of the applicable Board meeting. As a management director, Dr. Centofanti is not eligible to participate in the 2003 Outside Directors Plan.

As of December 31, 2018, we have issued 608,583 shares of our Common Stock in payment of director fees since the inception of the 2003 Outside Directors Plan.

In the event of a “change of control” (as defined in the 2003 Outside Directors Plan), each outstanding stock option and stock award shall immediately become exercisable in full notwithstanding the vesting or exercise provisions contained in the stock option agreement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Security Ownership of Certain Beneficial Owners

The table below sets forth information as to the shares of Common Stock beneficially owned as of February 15, 2019 by each person known by us to be the beneficial owners of more than 5% of any class of our voting securities.

Name of Beneficial Owner	Title Of Class	Amount and Nature of Ownership	Percent Of Class (1)
Heartland Advisors, Inc. (2)	Common	1,355,864	11.3%
TALANTA Investment Group, LLC (3)	Common	772,356	6.5%

(1) The number of shares and the percentage of outstanding Common Stock shown as beneficially owned by a person are based upon 11,961,537 shares of Common Stock outstanding on February 15, 2019, and the number of shares of Common Stock which such person has the right to acquire beneficial ownership of within 60 days. Beneficial ownership by our stockholders has been determined in accordance with the rules promulgated under Section 13(d) of the Exchange Act.

(2) This information is based on the Schedule 13F-HR of Heartland Advisors, Inc., an investment advisor, filed with the Securities and Exchange Commission on February 12, 2019, disclosing that at December 31, 2018, Heartland Advisors, Inc. had dispositive power over all shares shown above, but shared voting power over 1,236,512 of such shares and no voting power over 119,352 of the shares. The address of Heartland Advisors, Inc. is 789 North Water Street, Milwaukee, WI 53202.

(3) This information is based on the Schedule 13D of TALANTA Investment Group, LLC, a private investment firm, filed with the Securities and Exchange Commission on August 2, 2017, disclosing that as of July 25, 2017, (i) TALANTA Investment Group, LLC, (ii) TALANTA Fund, L.P, and (iii) Justyn R. Putnam (collectively, the "Reporting Persons"), had shared dispositive power and shared voting power over all shares shown in the table above. The address of the Reporting Persons is 401N. Tryon Street, 10th Floor, Charlotte, North Carolina 28202.

As of February 12, 2019, Capital Bank–Grawe Gruppe AG (“Capital Bank”), a banking institution regulated by the banking regulations of Austria, holds of record as a nominee for, and as an agent of, certain accredited investors, 1,859,499 shares of our Common Stock. None of Capital Bank’s investors beneficially own more than 4.9% of our Common Stock and to its best knowledge, as far as stocks held in accounts with Capital Bank, none of Capital Bank’s investors act together as a group or otherwise act in concert for the purpose of voting on matters subject to the vote of our stockholders or for purpose of disposition or investment of such stock. Additionally, Capital Bank’s investors maintain full voting and dispositive power over the Common Stock beneficially owned by such investors, and Capital Bank has neither voting nor investment power over such shares. Accordingly, Capital Bank believes that (i) it is not the beneficial owner, as such term is defined in Rule 13d-3 of the Exchange Act, of the shares of Common Stock registered in Capital Bank’s name because (a) Capital Bank holds the Common Stock as a nominee only, (b) Capital Bank has neither voting nor investment power over such shares, and (c) Capital Bank has not nominated or sought to nominate, and does not intend to nominate in the future, any person to serve as a member of our Board; and (ii) it is not required to file reports under Section 16(a) of the Exchange Act or to file either Schedule 13D or Schedule 13G in connection with the shares of our Common Stock registered in the name of Capital Bank.

Notwithstanding the previous paragraph, if Capital Bank’s representations to us described above are incorrect or if Capital Bank’s investors are acting as a group, then Capital Bank or a group of Capital Bank’s investors could be a beneficial owner of more than 5% of our voting securities. If Capital Bank was deemed the beneficial owner of such shares, the following table sets forth information as to the shares of voting securities that Capital Bank may be considered to beneficially own on February 15, 2019:

Name of Record Owner	Title Of Class	Amount and Nature of Ownership	Percent Of Class (*)
Capital Bank-Grawe Gruppe	Common	1,859,499 (+)	15.5%

(*) This calculation is based upon 11,961,537 shares of Common Stock outstanding on February 15, 2019, plus the number of shares of Common Stock which Capital Bank, as agent for certain accredited investors has the right to acquire within 60 days, which is none.

(+) This amount is the number of shares that Capital Bank has represented to us that it holds of record as nominee for, and as an agent of, certain of its accredited investors. As of the date of this report, Capital Bank has no warrants or options to acquire, as agent for certain investors, additional shares of our Common Stocks. Although Capital Bank is the record holder of the shares of Common Stock described in this note, Capital Bank has advised us that it does not believe it is a beneficial owner of the Common Stock or that it is required to file reports under Section 16(a) or Section 13(d) of the Exchange Act. Because Capital Bank (a) has advised us that it holds the Common Stock as a nominee only and that it does not exercise voting or investment power over the Common Stock held in its name and that no one investor of Capital Bank for which it holds our Common Stock holds more than 4.9% of our issued and

outstanding Common Stock and (b) has not nominated, and has not sought to nominate, and does not intend to nominate in the future, any person to serve as a member of our Board, we do not believe that Capital Bank is our affiliate. Capital Bank's address is Burgring 16, A-8010 Graz, Austria.

Security Ownership of Management

The following table sets forth information as to the shares of voting securities beneficially owned as of February 15, 2019, by each of our directors and NEOs and by all of our directors and NEOs as a group. Beneficial ownership has been determined in accordance with the rules promulgated under Section 13(d) of the Exchange Act. A person is deemed to be a beneficial owner of any voting securities for which that person has the right to acquire beneficial ownership within 60 days.

Name of Beneficial Owner ⁽²⁾	Amount and Nature of Beneficial Owner ⁽¹⁾	Percent of Class ⁽¹⁾
Dr. Louis F. Centofanti ⁽³⁾	233,325 ⁽³⁾	1.95 %
S. Robert Cochran ⁽⁴⁾	35,558 ⁽⁴⁾	*
Joe R. Reeder ⁽⁵⁾	174,075 ⁽⁵⁾	1.45 %
Larry M. Shelton ⁽⁶⁾	128,278 ⁽⁶⁾	1.07 %
Zack P. Wamp ⁽⁷⁾	16,664 ⁽⁷⁾	*
Mark A. Zwecker ⁽⁸⁾	194,223 ⁽⁸⁾	1.62 %
Ben Naccarato ⁽⁹⁾	12,000 ⁽⁹⁾	*
Mark Duff ⁽¹⁰⁾	63,384 ⁽¹⁰⁾	*
Directors and Executive Officers as a Group (8 persons)	857,507 ⁽¹¹⁾	7.07 %

*Indicates beneficial ownership of less than one percent (1%).

⁽¹⁾ See footnote (1) of the table under “Security Ownership of Certain Beneficial Owners.”

⁽²⁾ The business address of each person, for the purposes hereof, is c/o Perma-Fix Environmental Services, Inc., 8302 Dunwoody Place, Suite 250, Atlanta, Georgia 30350.

⁽³⁾ These shares include (i) 160,525 shares held of record by Dr. Centofanti, (ii) options to purchase 10,000 shares which are immediately exercisable, and (iii) 62,800 shares held by Dr. Centofanti’s wife. Dr. Centofanti has sole voting and investment power of these shares, except for the shares held by Dr. Centofanti’s wife, over which Dr. Centofanti shares voting and investment power. Dr. Centofanti also owns 700 shares of PF Medical’s Common Stock.

⁽⁴⁾ Mr. Cochran has sole voting and investment power over these shares which include: (i) 24,758 shares of Common Stock held of record by Mr. Cochran, and (ii) options to purchase 10,800 shares, which are immediately exercisable.

⁽⁵⁾ Mr. Reeder has sole voting and investment power over these shares which include: (i) 150,075 shares of Common Stock held of record by Mr. Reeder, and (ii) options to purchase 24,000 shares, which are immediately exercisable.

(6) Mr. Shelton has sole voting and investment power over these shares which include: (i) 104,278 shares of Common Stock held of record by Mr. Shelton, and (ii) options to purchase 24,000 shares, which are immediately exercisable. Mr. Shelton also owns 750 shares of PF Medical's Common Stock.

(7) Mr. Wamp has sole voting and investment power over these shares which include: (i) 8,264 shares of Common Stock held of record by Mr. Wamp, and (ii) options to purchase 8,400 shares, which are immediately exercisable.

(8) Mr. Zwecker has sole voting and investment power over these shares which include: (i) 170,223 shares of Common Stock held of record by Mr. Zwecker, and (ii) options to purchase 24,000 shares, which are immediately exercisable.

(9) Mr. Naccarato has sole voting and investment power over all these shares which include: (i) 2,000 shares of Common Stock held of record by Mr. Naccarato, and (ii) options to purchase 10,000 shares which are immediately exercisable. Mr. Naccarato also owns 100 shares of PF Medical's Common Stock.

(10) Mr. Duff has sole voting and investment power over all these shares which include: (i) 10,051 shares of Common Stock held of record by Mr. Duff, and (ii) options to purchase 53,333 shares, which are immediately exercisable.

(11) Amount includes 164,533 options, which are immediately exercisable.

Equity Compensation Plans

The following table sets forth information as of December 31, 2018, with respect to our equity compensation plans.

Plan Category	Equity Compensation Plan		
	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted average exercise price of outstanding warrants and rights	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
	(a)	(b)	(c)
Equity compensation plans approved by stockholders	616,000	\$ 4.23	459,417
Equity compensation plans not approved by stockholders	—	—	—
Total	616,000	\$ 4.23	459,417

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

We describe below transactions to which we were a party during our last two fiscal years or to which we currently propose to be a party in the future, and in which:

the amounts involved exceeded or will exceed the lesser of \$120,000 or one percent of the average of our total assets at year-end for the last two completed fiscal years; and
any of our directors, executive officers or beneficial owners of more than 5% of any class of our voting securities, or any member of the immediate family of the foregoing persons, had or will have a direct or indirect material interest.

Audit Committee Review

Our Audit Committee Charter provides for the review by the Audit Committee of any related party transactions, other than transactions involving an employment relationship with the Company, which are reviewed by the Compensation Committee. Although we do not have written policies for the review of related party transactions, the Audit Committee reviews transactions between the Company and its directors, executive officers, and their respective immediate family members. In reviewing a proposed transaction, the Audit Committee takes into account, among other factors it deems appropriate:

- (1) the extent of the related person's interest in the transaction;
- (2) whether the transaction is on terms generally available to an unaffiliated third-party under the same or similar circumstances;
- (3) the cost and benefit to the Company;
the impact or potential impact on a director's independence in the event the related party is a director, an
- (4) immediate family member of a director or an entity in which a director is a partner, stockholder or executive officer;
- (5) the availability of other sources for comparable products or services;
- (6) the terms of the transaction; and
- (7) the risks to the Company.

Related party transactions are reviewed by the Audit Committee prior to the consummation of the transaction. With respect to a related party transaction arising between Audit Committee meetings, the CFO may present it to the Audit Committee Chairperson, who will review and may approve the related party transaction subject to ratification by the Audit Committee at the next scheduled meeting. Our Audit Committee shall approve only those transactions that, in light of known circumstances, are not inconsistent with the Company's best interests.

Related Party Transactions

David Centofanti

David Centofanti serves as our Vice President of Information Systems. For such position, he received annual compensation of \$173,000 and \$168,000 for 2018 and 2017, respectively. David Centofanti is the son of Dr. Louis F. Centofanti, our EVP of Strategic Initiatives and a Board member. Dr. Louis Centofanti previously held the position of President and CEO until September 8, 2017.

Robert Ferguson

Robert Ferguson serves as an advisor to our Board and was also a member of the Supervisory Board of PF Medical (until May 11, 2018), a majority-owned Polish subsidiary of the Company. Robert Ferguson previously served as a Board member of the Company from June 2007 to February 2010 and again from August 2011 to September 2012. Robert Ferguson is also a consultant for us in connection with our Test Bed Initiative (“TBI”) at our Perma-Fix Northwest Richland, Inc. (“PFNWR”) facility. As an advisor to our Board, Robert Ferguson is paid \$4,000 monthly plus reasonable expenses. For such services, Robert Ferguson received compensation of approximately \$50,000 and \$51,000 for the year ended December 31, 2018 and 2017, respectively. For Robert Ferguson’s consulting work in connection with our TBI, on July 27, 2017 (“grant date”) we granted Robert Ferguson a stock option from our 2017 Stock Option Plan for the purchase of up to 100,000 shares of our Common Stock at an exercise price of \$3.65 a share, which was the fair market value of our common stock on the date of grant (“Ferguson Stock Option”). The vesting of the Ferguson Stock Option is subject to the achievement of the following milestones (“waste” as noted below is defined as liquid LAW (“low activity waste”) and/or liquid TRU (“transuranic waste”)):

Upon treatment and disposal of three gallons of waste at the PFNWR facility by January 27, 2018, 10,000 shares of the Ferguson Stock Option shall become exercisable;

Upon treatment and disposal of 2,000 gallons of waste at the PFNWR facility by January 27, 2019, 30,000 shares of the Ferguson Stock Option shall become exercisable; and

Upon treatment and disposal of 50,000 gallons of waste at the PFNWR facility and assistance, on terms satisfactory to the Company, in preparing certain justifications of cost and pricing data for the waste and obtaining a long-term commercial contract relating to the treatment, storage and disposal of waste by January 27, 2021, 60,000 shares of the Ferguson Stock Option shall become exercisable.

The term of the Ferguson Stock Option is seven (7) years from the grant date. Each of the milestones is exclusive of each other; therefore, achievement of any of the milestones above by Robert Ferguson by the designated date will

provide Robert Ferguson the right to exercise the number of options in accordance with the milestone attained. The 10,000 options as noted above became vested by Robert Ferguson on December 19, 2017. On May 1, 2018, Robert Ferguson exercised the 10,000 options for the purchase of 10,000 shares of our Common Stock, resulting in total proceeds paid to us of approximately \$36,500.

On January 17, 2019, the Ferguson Stock Option was amended whereby the vesting date of the Ferguson Stock Option for the second milestone as discussed above was amended from “by January 27, 2019” to “by March 31, 2020.” All other terms of the Ferguson Stock Option remain unchanged.

On April 1, 2019, we completed a lending transaction with Robert Ferguson (the “Lender”), whereby we borrowed from the Lender the sum of \$2,500,000 pursuant to the terms of a Loan and Security Purchase Agreement and promissory note (the “Loan”). The Lender is a shareholder of the Company and also currently serves as a consultant to our PFNWR subsidiary. The proceeds from the Loan will be used for general working capital purposes. The Loan is unsecured, with a term of two years with interest payable at a fixed interest rate of 4.00% per annum. The Loan provides for monthly payments of accrued interest only during the first year of the Loan, with the first interest payment due May 1, 2019 and monthly payments of approximately \$208,333 in principal plus accrued interest starting in the second year of the Loan. The Loan also allows for prepayment of principal payments over the term of the Loan without penalty. In connection with the above Loan, the Lender entered into a Subordination Agreement with our credit facility lender, whereby the Lender agreed to subordinate payment under the Loan, and agreed that the Loan will be junior in right of payment to the credit facility in the event of default or bankruptcy or other insolvency proceeding by us. As consideration for us receiving the Loan, we issued a Warrant to the Lender to purchase up to 60,000 shares of our Common Stock at an exercise price of \$3.51, which was the closing bid price for a share of our Common Stock on NASDAQ.com immediately preceding the execution of the Loan and Warrant. The Warrant is exercisable six months from April 1, 2019 and expires on April 1, 2024. As further consideration for the Loan, we also will issue an aggregate 75,000 shares of our Common Stock to the Lender. The 75,000 shares of Common Stock and 60,000 Common Stock purchase warrant will be and was issued in a private placement that was exempt from registration under the Securities Act and bear a restrictive legend against resale except in a transaction registered under the Securities Act or in a transaction exempt from registration thereunder.

Upon default, the Lender will have the right to elect to receive in full and complete satisfaction of our obligations under the Loan either: (a) the cash amount equal to the sum of the unpaid principal balance owing under the loan and all accrued and unpaid interest thereon (the “Payoff Amount”) or (b) upon meeting certain conditions, the number of whole shares of our Common Stock (the “Payoff Shares”) determined by dividing the Payoff Amount by the dollar amount equal to the closing bid price of our Common Stock on the date immediately prior to the date of default, as reported or quoted on the primary nationally recognized exchange or automated quotation system on which our Common Stock is listed; provided however, that the dollar amount of such closing bid price shall not be less than \$3.51, the closing bid price for our Common Stock as disclosed on NASDAQ.com immediately preceding the signing of this loan agreement.

If issued, the Payoff Shares will not be registered and the Lender will not be entitled to registration rights with respect to the Payoff Shares. The aggregate number of shares, warrant shares, and Payoff Shares that are or will be issued to the Lender pursuant to the Loan, together with the aggregate shares of our Common Stock and other voting securities owned by the Lender as of the date of issuance of the Payoff Shares, shall not exceed the number of shares of our Common Stock equal to 14.9% of the number of shares of our Common Stock issued and outstanding as of the date immediately prior to the default, less the number of shares of our Common Stock owned by the Lender immediately prior to the date of such default plus the number of shares of our Common Stock that may be acquired by the Lenders under warrants and/or options outstanding immediately prior to the date of such default.

Employment Agreements

We entered into employment agreements with each of our NEOs, Mark Duff (President and CEO), Ben Naccarato (CFO), and Dr. Louis Centofanti, (EVP of Strategic Initiatives), with each employment agreement dated September 8, 2017 (see “Item 11. Executive Compensation – Employment Agreements” for a discussion of these employment agreements).

Board Independence

Our Common Stock is listed on the Nasdaq Capital Market. Rule 5605 of the Nasdaq Marketplace Rules requires a majority of a listed company’s board of directors to be comprised of independent directors. In addition, the Nasdaq Marketplace Rules require that, subject to specified exceptions, each member of a listed company’s audit, compensation and nominating and corporate governance committees be independent under applicable provisions of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). Audit committee members must also satisfy independence criteria set forth in Rule 10A-3 under the Exchange Act, and compensation committee members must also satisfy the independence criteria set forth in Rule 10C-1 under the Exchange Act. Under Nasdaq Rule 5605(a)(2), a director will only qualify as an “independent director” if, in the opinion of our Board, that person does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director. In order to be considered independent for purposes of Rule 10A-3 under the Exchange Act, a member of an

audit committee of a listed company may not, other than in his or her capacity as a member of the audit committee, the board of directors, or any other board committee, accept, directly or indirectly, any consulting, advisory, or other compensatory fee from the listed company or any of its subsidiaries or otherwise be an affiliated person of the listed company or any of its subsidiaries. In order to be considered independent for purposes of Rule 10C-1, the board must consider, for each member of a compensation committee of a listed company, all factors specifically relevant to determining whether a director has a relationship to such company which is material to that director's ability to be independent from management in connection with the duties of a compensation committee member, including, but not limited to: the source of compensation of the director, including any consulting advisory or other compensatory fee paid by such company to the director; and whether the director is affiliated with the company or any of its subsidiaries or affiliates.

Our Board annually undertakes a review of the composition of our Board of Directors and its committees and the independence of each director. Based upon information requested from and provided by each director concerning his or her background, employment and affiliations, including family relationships, our Board of Directors has determined that each of S. Robert Cochran, Dr. Gary Kugler (a director until July 26, 2018), Joe R. Reeder, Larry M. Shelton, Zach P. Wamp and Mark A. Zwecker is/was an “independent director” as defined under the Nasdaq Marketplace Rules. Our Board of Directors has also determined that each member of our Audit Committee in 2018, consisting of Mark A. Zwecker (Chairperson), S. Robert Cochran, Dr. Gary G. Kugler (who was a member of the Audit Committee until April 19, 2018), and Larry M. Shelton (who became a member effective April 19, 2018), and each member of our Compensation and Stock Option Committee in 2018, consisting of Dr. Gary G. Kugler (who was the Chairperson and a member until April 19, 2018), Larry M. Shelton (who became the Chairperson effective April 19, 2018), Joe R. Reeder, and Mark A. Zwecker (who became a member effective April 19, 2018), satisfy/satisfied the independence standards for such committees established by the Securities and Exchange Commission and the Nasdaq Marketplace Rules, as applicable. In making such determination, our Board of Directors considered the relationships that each such non-employee director has with our Company and all other facts and circumstances our Board of Directors deemed relevant in determining independence, including the beneficial ownership of our capital stock by each non-employee director.

Our Board of Directors has determined that Dr. Centofanti is not deemed to be an “independent director” because of his employment as a senior executive of the Company.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The following table reflects the aggregate fees for the audit and other services provided by Grant Thornton LLP, the Company’s independent registered public accounting firm, for fiscal years 2018 and 2017:

Fee Type	2018	2017
Audit Fees ⁽¹⁾	\$535,000	454,000
Tax Fees ⁽²⁾	110,000	92,000
Total	\$645,000	546,000

⁽¹⁾ Audit fees consist of audit work performed in connection with the annual financial statements, the reviews of unaudited quarterly financial statements, and work generally only the independent registered accounting firm can reasonably provide, such as consents and review of regulatory documents filed with the Securities and Exchange Commission.

(2) Fees for income tax planning, filing, and consulting.

The Audit Committee of the Company's Board has considered whether Grant Thornton's provision of the services described above for the fiscal years 2018 and 2017 was compatible with maintaining its independence.

Engagement of the Independent Auditor

The Audit Committee approves in advance all engagements with the Company's independent accounting firm to perform audit or non-audit services for us. All services under the headings Audit Fees and Tax Fees were approved by the Audit Committee pursuant to paragraph (c)(7)(i)(C) of Rule 2-01 of Regulation S-X of the Exchange Act. The Audit Committee's pre-approval policy provides as follows:

The Audit Committee will review and pre-approve on an annual basis all audits, audit-related, tax and other services, along with acceptable cost levels, to be performed by the independent accounting firm and any member of the independent accounting firm's alliance network of firms, and may revise the pre-approved services during the period based on later determinations. Pre-approved services typically include: audits, quarterly reviews, regulatory filing requirements, consultation on new accounting and disclosure standards, employee benefit plan audits, reviews and reporting on management's internal controls and specified tax matters.

Any proposed service that is not pre-approved on the annual basis requires a specific pre-approval by the Audit Committee, including cost level approval.

The Audit Committee may delegate pre-approval authority to one or more of the Audit Committee members. The delegated member must report to the Audit Committee, at the next Audit Committee meeting, any pre-approval decisions made.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULE

The following documents are filed as a part of this report:

(a)(1) Consolidated Financial Statements

See Item 8 for the Index to Consolidated Financial Statements.

(a)(2) Financial Statement Schedule

Schedules are not required, are not applicable or the information is set forth in the consolidated financial statements or notes thereto.

(a)(3) Exhibits

The Exhibits listed in the Exhibit Index are filed or incorporated by reference as a part of this report.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Perma-Fix Environmental Services, Inc.

By */s/ Mark Duff* Date April 1, 2019
Mark Duff
Chief Executive Officer, President and
Principal Executive Officer

By */s/ Ben Naccarato* Date April 1, 2019
Ben Naccarato
Chief Financial Officer and
Principal Financial Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in capacities and on the dates indicated.

By */s/ Dr. Louis F. Centofanti* Date April 1, 2019
Dr. Louis F. Centofanti, Director

By */s/ S. Robert Cochran* Date April 1, 2019
S. Robert Cochran, Director

By */s/ Joe R. Reeder* Date April 1, 2019
Joe R. Reeder, Director

By */s/ Larry M. Shelton* Date April 1, 2019
Larry M. Shelton, Chairman of the Board

By */s/ Zach P. Wamp* Date April 1, 2019
Zach P. Wamp, Director

By */s/ Mark A. Zwecker* Date April 1, 2019
Mark A. Zwecker, Director

EXHIBIT INDEX

Exhibit No.	Description
3(i)	<u>Restated Certificate of Incorporation, as amended, of Perma-Fix Environmental Services, Inc.</u>
3(ii)	<u>Amended and Restated Bylaws, as amended effective July 28, 2016, of Perma-Fix Environmental Services, Inc., as incorporated by reference from Exhibit 3(ii) to the Company's 8-K filed on August 1, 2016.</u>
4.1	<u>Shareholder Rights Agreement dated and effective as of May 2, 2018 between Perma-Fix Environmental Services, Inc. as the Company and Continental Stock Transfer & Trust Company, as Rights Agent, as incorporated by reference from Exhibit 4.1 to the Company's Form 8-K filed on May 2, 2018.</u>
4.2	<u>Amended and Restated Revolving Credit, Term Loan and Security Agreement between Perma-Fix Environmental Services, Inc. and PNC Bank, National Association (as Lender and as Agent), dated October 31, 2011, as incorporated by reference from Exhibit 4.8 to the Company 2016 Form 10-K filed on March 24, 2017.</u>
4.3	<u>First Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement, dated November 7, 2012, between the Company and PNC Bank, National Association, as incorporated by reference from Exhibit 4.4 to the Company 2017 Form 10-K filed on March 16, 2018.</u>
4.4	<u>Second Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement and Waiver, dated May 9, 2013, between the Company and PNC Bank, National Association.</u>
4.5	<u>Third Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated August 2, 2013.</u>
4.6	<u>Third Amended, Restated and Substituted Revolving Credit Note between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated August 2, 2013.</u>
4.7	<u>Fourth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement and Waiver between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated April 14, 2014, as incorporated by reference from Exhibit 4.17 to the Company's 2013 Form 10-K filed on April 15, 2014.</u>
4.8	<u>Fifth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated July 25, 2014, as incorporated by reference from Exhibit 4.1 to the Company's 8-K filed on July 31, 2014.</u>
4.9	<u>Sixth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated July 28, 2014, as incorporated by reference from Exhibit 4.2 to the Company's 8-K filed on July 31, 2014.</u>
4.10	<u>Seventh Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated March 24, 2016, as incorporated by reference from Exhibit 4.17 to the Company's 2015 Form 10-K filed on March 24, 2016.</u>
4.11	<u>Eighth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated August 22, 2016, as incorporated by reference from Exhibit 4.9 to the Company's Form 10-Q for the quarter ended June 30, 2016 filed on August 22, 2016.</u>

- 4.12 Ninth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated November 17, 2016, as incorporated by reference from Exhibit 4.10 to the Company's Form 10-Q for the quarter ended September 30, 2016 filed on November 18, 2016.
- 4.13 Tenth Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated July 26, 2018, as incorporated by reference from Exhibit 4.1 to the Company's Form 8-K filed on July 30, 2018.
- 4.14 Eleventh Amendment to Amended and Restated Revolving Credit, Term Loan and Security Agreement and Waiver between PNC Bank, National Association and Perma-Fix Environmental Services, Inc., dated March 29, 2019
- 4.15 Loan and Securities Purchase Agreement, dated April 1, 2019 between Robert L. Ferguson and Perma-Fix Environmental Services, Inc.
- 4.16 Common Stock Purchase Warrant dated April 1, 2019 for Robert L. Ferguson.
- 10.1 2003 Outside Directors' Stock Plan of the Company, as incorporated by reference from Exhibit 10.2 to the Company's 2014 Form 10-K filed on March 31, 2015.
- 10.2 First Amendment to 2003 Outside Directors Stock Plan, as incorporated by reference from Exhibit 10.3 to the Company's 2014 Form 10-K filed on March 31, 2015.
- 10.3 Second Amendment to 2003 Outside Directors Stock Plan, as incorporated by reference from Exhibit 10.3 to the Company's 2017 Form 10-K filed on March 16, 2018.
- 10.4 Third Amendment to 2003 Outside Directors Stock Plan, as incorporated by reference from Exhibit 10.4 to the Company's 2017 Form 10-K filed on March 16, 2018.
- 10.5 Fourth Amendment to 2003 Outside Directors Stock Plan, as incorporated by reference from Exhibit A to the Company's Proxy Statement for its 2017 Annual Meeting of Stockholders filed on June 22, 2017.
- 10.6 2017 Stock Option Plan, as incorporated by reference from Exhibit B to the Company's Proxy Statement for its 2017 Annual Meeting of Stockholders filed on June 22, 2017.
- 10.7 Employment Agreement dated September 8, 2017 between Mark Duff, Chief Executive Officer, and Perma-Fix Environmental Services, Inc., which is incorporated by reference from Exhibit 99.1 to the Company's Form 8-K filed on September 12, 2017.
- 10.8 Employment Agreement dated September 8, 2017 between Dr. Louis Centofanti, Executive Vice President of Strategic Initiatives, and Perma-Fix Environmental Services, Inc., which is incorporated by reference from Exhibit 99.2 to the Company's Form 8-K filed on September 12, 2017.
- 10.9 Employment Agreement dated September 8, 2017 between Ben Naccarato, Chief Financial Officer, and Perma-Fix Environmental Services, Inc., which is incorporated by reference from Exhibit 99.3 to the Company's Form 8-K filed on September 12, 2017.
- 10.10 2018 Incentive Compensation Plan for Chief Executive Officer, effective January 1, 2018, as incorporated by reference from Exhibit 99.1 to the Company's Form 8-K filed on January 23, 2018.
- 10.11 2018 Incentive Compensation Plan for Chief Financial Officer, effective January 1, 2018, as incorporated by reference from Exhibit 99.2 to the Company's Form 8-K filed on January 23, 2018.
- 10.12 2018 Incentive Compensation Plan for Executive Vice President of Strategic Initiatives, effective January 1, 2018, as incorporated by reference from Exhibit 99.3 to the Company's Form 8-K filed on January 23, 2018.
- 10.13 2019 Incentive Compensation Plan for Chief Executive Officer, effective January 1, 2019, as incorporated by reference from Exhibit 99.1 to the Company's Form 8-K filed on January 23, 2019.
- 10.14 2019 Incentive Compensation Plan for Chief Financial Officer, effective January 1, 2019, as incorporated by reference from Exhibit 99.2 to the Company's Form 8-K filed on January 23, 2019.

- 10.15 2019 Incentive Compensation Plan for Executive Vice President of Strategic Initiatives, effective January 1, 2019, as incorporated by reference from Exhibit 99.3 to the Company's Form 8-K filed on January 23, 2019.
- 10.16 Incentive Stock Option Agreement dated July 27, 2017 between Perma-Fix Environmental Services, Inc., and Chief Executive Officer, as incorporated by reference from Exhibit 99.1 to the Company's Form 8-K filed on August 2, 2017.
- 10.17 Incentive Stock Option Agreement dated July 27, 2017 between Perma-Fix Environmental Services, Inc., and Executive Vice President/Chief Operating Officer, as incorporated by reference from Exhibit 99.2 to the Company's Form 8-K filed on August 2, 2017.
- 10.18 Incentive Stock Option Agreement dated July 27, 2017 between Perma-Fix Environmental Services, Inc., and Chief Financial Officer, as incorporated by reference from Exhibit 99.3 to the Company's Form 8-K filed on August 2, 2017.
- 10.19 Incentive Stock Option Agreement dated January 17, 2019 between Perma-Fix Environmental Services, Inc., and Chief Executive Officer, as incorporated by reference from Exhibit 99.4 to the Company's Form 8-K filed on January 23, 2019.
- 10.20 Incentive Stock Option Agreement dated January 17, 2019 between Perma-Fix Environmental Services, Inc., and Chief Financial Officer, as incorporated by reference from Exhibit 99.5 to the Company's Form 8-K filed on January 23, 2019.
- 10.21 Incentive Stock Option Agreement dated January 17, 2019 between Perma-Fix Environmental Services, Inc., and Executive Vice President of Strategic Initiatives, as incorporated by reference from Exhibit 99.6 to the Company's Form 8-K filed on January 23, 2019.
- 10.22 Stock Option Agreement dated July 27, 2017 between Perma-Fix Environmental Services, Inc., and Mr. Robert L. Ferguson, as incorporated by reference from Exhibit 10.6 to the Company's third quarter Form 10-Q filed on August 9, 2017.
- 10.23 First Amendment to Stock Option Agreement dated July 27, 2017 between Perma-Fix Environmental Services, Inc. Mr. Robert L. Ferguson.
- 21.1 List of Subsidiaries
- 23.1 Consent of Grant Thornton, LLP
- 31.1 Certification by Mark Duff, Chief Executive Officer and Principal Executive Officer of the Company pursuant to Rule 13a-14(a) and 15d-14(a).
- 31.2 Certification by Ben Naccarato, Chief Financial Officer and Principal Financial Officer of the Company pursuant to Rule 13a-14(a) and 15d-14(a).
- 32.1 Certification by Mark Duff, Chief Executive Officer and Principal Executive Officer of the Company furnished pursuant to 18 U.S.C. Section 1350.
- 32.2 Certification by Ben Naccarato, Chief Financial Officer and Principal Financial Officer of the Company furnished pursuant to 18 U.S.C. Section 1350.
- 101.INS XBRL Instance Document*
- 101.SCH XBRL Taxonomy Extension Schema Document*
- 101.CAL XBRL Taxonomy Extension Calculation Linkbase Document*
- 101.DEF XBRL Taxonomy Extension Definition Linkbase Document*
- 101.LAB XBRL Taxonomy Extension Labels Linkbase Document*
- 101.PRE XBRL Taxonomy Extension Presentation Linkbase Document*

*Pursuant to Rule 406T of Regulation S-T, the Interactive Data File in Exhibit 101 hereto are deemed not filed or part of a registration statement or prospectus for purposes of Section 11 or 12 of the Securities Act of 1933, as amended, are deemed not filed for purpose of Section 18 of the Securities Exchange Act of 1934, as amended, and otherwise are not subject to liability under those sections.

