Drake Water Technologies, Inc.

7492 Commerce Court, Suite B, Helena, MT USA 59602-9677 Telephone: (406) 449-2440

February 8, 2016

Ms. Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine:

Please find below our application to the North Dakota Oil and Gas Research Program for a proposed project entitled "***ThermFlo, a novel technology for complete on-site remediation of organically contaminated solids***" Our company, Drake Water Technologies, Inc., (DWT – Helena, MT) in cooperation with National Oilwell Varco (NOV – Houston, Denver, and Dickinson) and P&S Fabricators (P&S -Missoula, MT), has, through the experience and research of our CEO and President, Ron Drake, developed and improved upon a technology we have named ThermFlo. ThermFlo is a novel mobile, thermal process for on-site remediation of organically contaminated solids without production of toxic off-gas that is typical for current thermal treatment units. We are requesting funding to support the costs necessary for construction of a full-scale ThermFlo pilot unit to be demonstrated in North Dakota.

The ThermFlo pilot project was also approved on June 19, 2015, under House Bill 1390, as an oilfield special waste recycling facility. Mr. Dennis Fewless, ND DOH, visited our facilities on October 14, 2015, to view a ThermFlo run with North Dakota waste materials.

In a separate letter, we have a commitment from National Oilwell Varco (NOV), an international oilfield services company, to participate in the project by providing funding for capital equipment plus additional in-kind contributions including salaries for project administration, oversight, and operations, plus some funds for travel. We have also teamed with P&S Fabricators, Inc., out of Missoula, MT, for construction of the mobile, pilot ThermFlo unit. Their letter of support and commitment is attached. Also, enclosed is one original and one copy of the proposal along with a check for the $100 application fee.

If funded, DWT commits to the work described in the application, including but not limited to design, construction oversight, transport, deployment, shakedown and demonstration of the ThermFlo unit. DWT will be the project manager for this project. It is our sincere hope that the OGRC will view this project as beneficial to the North Dakota oil and gas industry. As a new technology, the ThermFlo process will have positive economic and environmental impacts for the State of North Dakota. Please do not hesitate to contact me with any questions or comments.

Sincerely yours,

Vivian Drake

Vivian Drake
Chief Operating Officer

Oil and Gas Research Program

North Dakota

Industrial Commission

Application

Project Title: ***ThermFlo, a novel technology for complete on-site remediation of organically contaminated solids***

Applicant: Drake Water Technologies, Inc., Helena, MT

Principal Investigator: Mr. Ron Drake, P.E.

Date of Application: February 8, 2016

Amount of Request: $329,000

Total Amount of Proposed Project: $671,095

Duration of Project: approximately 4 months

Point of Contact (POC): Vivian Drake, COO

POC Telephone: (406) 449-2440

POC E-Mail Address: vivian@drakewater.com

POC Address: 7492 Commerce Ct., Ste. A, Helena, MT 59602-9677

TABLE OF CONTENTS

Abstract	**3**
Project Description	**4**
Standards of Success	**9**
Background/Qualifications	**11**
Management	**13**
Timetable	**13**
Budget	**14**
Confidential Information	**15**
Patents/Rights to Technical Data	**15**

Transmittal and Commitment Letters

Affidavit of Tax Liability

Statement of status on Other Project Funding

ABSTRACT

Objective: Current methods for treatment or disposal of North Dakota's "special waste" (materials produced as a result of oil and gas exploration and production activities) include: 1) costly transport of the materials to special waste landfills, 2) interment on-site after mixing with drying agents and sorbents, 3) thermal treatment with fixed-base thermal desorbers, kilns, or incinerators, and 4) landfarming. ThermFlo, a novel thermal catalytic combustion technology, is an efficient and mobile "cradle-to-grave" process developed for complete remediation of these special wastes. Over the past year, Drake Water Technologies, Inc., (DWT), in collaboration with National Oilwell Varco (NOV), constructed and successfully operated a ThermFlo pilot unit, which was approved by the North Dakota Department of Health (ND DOH) as one of the pilot project facilities for oilfield special waste recycling facilities pursuant to House Bill 1390. Results of ThermFlo testing showed complete destruction of petroleum hydrocarbons from a variety of oilfield wastes including spent invert drilling residues (shaker,

centrifuge, and dryer), and 40-year old oilfield pit materials. In addition to producing clean solids that can be left onsite, salts in the waste materials partitioned to the quench portion of the process, which can be reused in brine mud makeup. ThermFlo technology will have a positive environmental and economic impact on oil and gas production in North Dakota by reducing handling, addition of purchased additives (fly ash, cement kiln dust, other sorbents), and transport of contaminated solids to approved landfills. In addition, the technology eliminates toxic off-gas streams produced by existing thermal processes, and reduces threats to groundwater and the ecosphere from on-site interment of poorly stabilized contaminated solids. The objective of this grant application is to fund construction of a ThermFlo mobile pilot unit for deployment to a drilling site in North Dakota in order to demonstrate its efficacy and cost effectiveness for on-site cleanup of hydrocarbon contaminated soils and solids, designated as special waste in North Dakota.

Expected Results: Construction, mobilization, deployment, and demonstration of a 4 to 6 ton/hr ThermFlo pilot unit at a site with oilfield petroleum contaminated wastes requiring treatment.

Duration: Construction of a ThermFlo unit will take approximately three months, with deployment and shakedown requiring two to three weeks. Schedule for deployment, startup, and process demonstration is contingent on acquisition of necessary permits from the North Dakota Department of Health and the North Dakota Industrial Commission but is expected to occur by Fall, 2016.

Total Project Cost: $671,095 with 51% contribution from private industry

Participants: Drake Water Technologies, Inc. (Helena, MT) in cooperation with P&S Fabricators, Inc., (P&S - Missoula, MT), and National Oilwell Varco (NOV – Houston, TX, Denver, CO and Dickinson, ND).

PROJECT DESCRIPTION

Objectives: Environmental controls, no matter how thorough, are not always sufficient to prevent hydrocarbons from entering the environment unchecked. Whether in an industrial refinery over decades of operation, or a single instance of a large spill, hydrocarbon contamination of soil and other

solids present very serious remediation challenges. The North Dakota Department of Health, Division of Waste Management, defines Special Waste as "*Most waste from crude oil and natural gas exploration and production such as drilling cuttings, water, spills, and similar waste that is not managed at a drill site or injection well but is shipped off-site is classified as "Special Waste". Most special waste is disposed or treated at permitted special or industrial waste facilities*". The objective of this project is to construct a mobile ThermFlo pilot unit for deployment to a site in North Dakota for demonstration of on-site cleanup of contaminated soils and solids, i.e. Special Waste. ThermFlo is a novel technology that will have a positive environmental and economic impact on oil and gas production in North Dakota by reducing truck transport of contaminated solids, including special wastes, eliminating the types of emissions that are generated by existing thermal treatment processes, reducing the footprint of landfills and landfarming of contaminated solids from oil and gas activities, and reducing threats to groundwater and ecosystems from on-site interment of wastes by eliminating "pitting" of special wastes at drilling sites. Current methods of adding fly ash (also considered a special waste), lime and other additives for stabilization not only increases the amount of material to be disposed of, but "...the most commonly used additive materials have a high pH, which can pose a problem if the stabilized wastes are subsequently land-applied or used as a soil supplement. Rain, surface water, and ground water all contain constituents that may increase or decrease the leaching rate (e.g., redox potential, pH, anions such as carbonate, sulfide and silicate, organic chelating agents, and adsorptive particulates),"[1] according to research by Argonne National Laboratories.

Methodology: ThermFlo is an efficient "cradle-to-grave" thermal process developed by Drake Water Technologies, Inc. (DWT), Helena, Montana, for complete remediation of soils or drill cuttings contaminated with organics that are not economically recoverable. ThermFlo was derived from technology developed by the US-DOE during the early 1980s for the US weapons demilitarization

[1] http://web.ead.anl.gov/dwm/techdesc/solid/index.cfm

program. The objective was to render "safe" soils and other materials that had been contaminated by very refractory chemical weapons and nerve agents. The technology was subsequently further developed and used to clean up hazardous waste sites contaminated with halogenated hydrocarbons such as dioxin, DDT, PCB, and pentachlorophenol. By the mid 1990s, the company operating the technology ran out of hazardous waste sites to clean up, and decommissioned their equipment. At that time, hydrocarbon discharges onto the landscape were largely unregulated and there was no market for thermal clean up technology. Times have changed.

Although the core ThermFlo technology is well proven and well demonstrated[2,3], integrated auxiliary systems to maximize energy recovery and improve technology efficiency will be developed and demonstrated. These systems include recuperation of hot off-gas to provide pre-heated combustion air and direct contact quenching and scrubbing of off-gas to ensure that acid gasses and thermally produced NOx and CO are not generated as in traditional thermal processes. ThermFlo facilitates solids remediation by catalytic combustion, permitting low energy treatment that can achieve extremely high organic destruction efficiencies. ThermFlo's low temperature catalytic combustion eliminates generation of thermal NOx and CO. Acid gasses such as SOx and HCl are sorbed in-situ and converted to benign mineral species, which eliminates their presence in emissions streams and off-gas. The ThermFlo process utilizes energy values from the organic contaminants to drive the process, which produces clean solids. Decontaminated solids are free from organics.

Over the past year, in cooperation with NOV and P&S, DWT constructed a ThermFlo pilot unit at DWT's shop facilities in Helena, MT. Several different types of organically contaminated wastes from North Dakota drilling operations, as well as 40-year old oilfield pit materials from eastern Montana, were treated in the ThermFlo pilot unit. The results of initial tests were very positive, with complete

[2] January 1992, U.S. Environmental Protection Agency, Office of Research and Development, "Technology Evaluation Report – Ogden Circulating Bed Combustor at the McColl Superfund Site".
[3] June 1987, Ogden Environmental Services, Inc., Technical Report prepared for the U.S.E.P.A., "BDAT Treatability Data for Soils, Sludges, and Debris from the Circulating Bed Combustor (CBC) Process".

destruction of the hydrocarbons in the solids, and a chloride residual of less than the ND DOH limit of 250 mg/l. It was also discovered in the course of our testing, the added bonus of partitioning salts to the quench water, which can be reused in drilling operations in the make-up of drilling muds. Also, the TENORM tested for in the pre- and post materials did not concentrate and was below the North Dakota Department of Health (ND DOH) limit of 5 pCi/g.

This means that clean solids may be left on site and quench water may be re-used in the makeup of drilling mud, eliminating the necessity for specialty packaging of waste materials, the use of flyash for stabilization, truck transport of the waste, and waste deposition in secure landfills.

Anticipated Results: Results of this project will be the **c**onstruction, shakedown testing, deployment, and demonstration of a mobile 4 to 6 t/hr ThermFlo pilot unit to treat hydrocarbon contaminated solids at an approved drilling site in North Dakota. Following successful demonstration, which will include analysis of pre- and post-treated materials, it is anticipated that the ThermFlo unit will be the basis for the commercialization of the technology in North Dakota.

Facilities: Drake Water Technologies, Inc. (DWT) has leased pilot plant facilities in Helena, MT, with design and CAD capabilities to provide the necessary fabrication drawings for construction. DWT is poised to begin final design upon notification of funding. P&S Fabricators, Inc., Missoula, MT, owns large facilities that house metal fabrication equipment of all sizes and types, with an experienced staff of metal workers and welders to complete construction of the ThermFlo unit. P&S fabricated the major equipment vessels for the ThermFlo pilot plant and are prepared to begin construction of the ThermFlo mobile pilot. As the ThermFlo unit will be mobile, it will be transported via truck to a designated site in North Dakota for deployment, setup, and operation at an approved facility site.

Resources: DWT, P&S, and NOV have the staff, equipment, and facilities to quickly and efficiently complete design, construction, deployment, shakedown and operation, through successful demonstration of a mobile ThermFlo pilot unit.

Techniques to Be Used, Their Availability and Capability: ThermFlo pilot tests on several samples of actual cuttings and pit wastes (shaker, centrifuge, and invert emulsion) from current Bakken drilling operations show that the ThermFlo process can derive necessary thermal energy from low temperature combustion (catalytic – no open flame) of the hydrocarbons in the contaminated solids. Electrical utilities are needed to drive an approximately 50-HP FD Blower plus supply low-power rotating equipment, instrumentation and controls (I&C), and lighting needs totaling <20 kW. The ThermFlo system will be modularized and skid mounted for rapid and simple deployment to spill or drilling sites. Similarly, repositioning or recovery of the ThermFlo system will be simple, rapid, and leave no permanent foot-print on the landscape.

Environmental and Economic Impacts while Project is Underway: ThermFlo is a modular, mobile unit, and can remediate hydrocarbon contaminated solids on site, saving both time and money in terms of transportation and backfill at spill sites while achieving environmental goals of treating organically contaminated solids, or special wastes. ThermFlo has a high throughput, allowing for rapid treatment and decommissioning. The process utilizes the fuel value in the contaminated soils, which eliminates or greatly reduces the need for supplemental fuels. If supplemental fuel is required, depending on the organic content of the special waste, ThermFlo can operate on a variety of low-grade feed stocks, including tank bottoms, slop oils, waste oils, rag layers, agricultural waste and refinery by-products. ThermFlo can successfully remediate soils contaminated with low volumes of hydrocarbons, a major benefit to North Dakota's environment through the pilot demonstration.

Ultimate Technological and Economic Impacts: ThermFlo will be the ultimate solution for the mitigation of organically contaminated wastes from oil and gas operations as well as remediation of contaminated soils that are all waste products from day-to-day operations in the oil and gas industry. The CAPEX and OPEX for a ThermFlo unit are much less than those of existing thermal processes. ThermFlo efficiently achieves complete destruction of the organics in the contaminated soil, without the

production of NOx, SOx, or CO which is commonplace with traditional thermal processes. Off-gas treatment is greatly simplified, no afterburners, bag-houses, or electrostatic precipitators are required. This presents a significant market opportunity as it will change the way wastes are currently being handled through reduction in transport traffic and economical on-site treatment and disposal.

Why the Project is Needed: The North Dakota Department of Health (DOH) currently lists 237 "Oilfield Environmental Incidents" that occurred in 2015. The majority of the "Incidents" have been organic spills, overtopped waste tanks, truck spills, and leaks from pipelines. Remediation is, for the most part, excavation of the contaminated solids and subsequent transport to a licensed special waste landfill. In 2012, 1.2 million tons of drill cuttings were disposed of in special waste landfills in the state [North Dakota].[4] The new regulations only allow for the disposal of drill cuttings and other special wastes at 12 permitted disposal facilities located within North Dakota[5]. This greatly increases transport and disposal costs for producers, who need cost effective alternatives to specialized and limited landfills. In February 2014, the DOH Division of Waste Management defined "Special Waste" and the requirement that it be disposed of in Permitted Special Waste Facilities.

STANDARDS OF SUCCESS

The initial deliverable of the ThermFlo project will be a mobile, full-scale pilot (4-6 t/hr) ThermFlo unit delivered and deployed at an approved site in western North Dakota. After initial shakedown and operation of the unit, pre- and post- treatment samples of the test materials will be sent to an approved, independent laboratory for analysis of organic destruction removal efficiencies, plus the chemical composition of sample leachates.. The results will be provided, in a final report, to the Oil and Gas Research Program. The final chemical analysis will determine the destruction efficiencies of the ThermFlo process as a measure of success. Given the proven success of the existing ThermFlo pilot unit, the outcome of field testing the full-scale ThermFlo pilot is expected to exceed performance

[4] http://oilpatchdispatch.areavoices.com/2014/03/03/companies-trying-to-tweak-methods-to-recycle-bakken-drill-cuttings/
[5] http://thebakken.com/articles/1165/delivering-new-oilfield-waste-strategies

requirements. It is anticipated that the technology will supplant other thermal processes for treatment of hydrocarbon wastes.

The value the ThermFlo process will provide to North Dakota is an on-site solution to organically contaminated solids and soils in a thermal process that generates a clean off-gas, requires no flaring or afterburning, and assures complete destruction of the organics in the solids as well as removal of salt from the residual solids. ThermFlo treatment will enable on-site beneficial use or ultimate disposal of drill cuttings while eliminating the potential liability of contaminants leaching into clean water supplies and native soils. The oil and gas industry, once convinced that the ThermFlo process is a cost-effective technology through this project, will change the way they currently dispose of organically contaminated wastes, which will provide them with significant cost savings and, at the same time, protect the public from exposure to wastes from spills, overtopping of tanks, pipeline leaks, as well as significantly reduce the amount of truck traffic and damage to North Dakota roads.

By reducing the environmental impact of the energy industry on North Dakota's landscape, ThermFlo will act as an energy-enabling technology, allowing producers to continue to grow production while maintaining responsible stewardship of the lands and roadways where they work. ThermFlo will significantly aid in the prevention of legacy wastes from the oil boom in the Bakken, ensuring that clean soils and clean water continue to be available to North Dakota residents for generations to come. Commercialization of the ThermFlo technology will also enhance the business of oilfield service companies such as NOV, increasing employment within the State while employing a clean environmental technology that treats extremely intractable oilfield wastes.

The benefits described above will help achieve many of OGRC's goals which include the promotion of environmentally sound development of North Dakota's oil and gas resources, encouraging the use of new and novel technologies that will have a positive economic and environmental impact in the development of oil and gas, which will improve the overall suitability of the oil and gas industry

through the development of new environmental practices that will help reduce the footprint and impact of oil and gas activities. The success of the ThermFlo project will be described in a comprehensive final report and presentation(s) that will be uploaded to the OGRC website.

BACKGROUND/QUALIFICIATIONS

In August, 2014, DWT completed construction, in cooperation with P&S Fabricators in Missoula, MT, of a full-scale CuttFlo unit that has since been transported for deployment at an oilfield services company in Canada. The CuttFlo process is more complex than the ThermFlo process, in that it recovers valuable organic product from heavily hydrocarbon laden materials such as drill cuttings, tank bottoms, slop oil, etc., as well as producing clean solids and water. ThermFlo is a thermal process designed for remediation of contaminated materials not having economically recoverable quantities of organics, for on-site unrestricted disposal, as well as being mobile and easily transportable. In July 2015, with funding from NOV, a ThermFlo pilot unit was commissioned at DWT facilities in Helena, MT. A run with 40-year old pit sludge from pits located in eastern Montana was performed on July 30, 2015, post-run analyses showed no evidence of organics in the treated solids. Laboratory analysis results of additional successful runs performed on August 27, 2015, September 1, 2015, October 1, 2015, and October 8, 2015 resulted in non-detects of petroleum hydrocarbons. An additional run was performed on October 14, 2015, during a visit from Dennis Fewless, North Dakota Department of Environmental Health (ND DOH) and NOV staff.

The *Bakken Oil Report, Spring 2014*, published an article about DWT (http://DrakeWater.com) beginning on page 150, http://issuu.com/delcomminc/docs/bakken_oil_report_-_spring_2014?e=5613582/5177006, that describes the company and its technology offerings, including the ThermFlo process.

Ron Drake, P.E. (Montana and Wyoming), is DWT's President and CEO and will be the project's principal investigator. Ron graduated in 1972 with a B.S. in Chemical Engineering from Montana State

University. He has worked for several architect engineers and industries since the inception of his career, including the predecessor of Ogden Environmental Services, where the original ThermFlo core technology was developed. In 1987, he formed Drake Engineering Incorporated, and in 2004, with investment from family and friends, formed DWT, with its flagship technology, IonFlo, for treatment of coal bed methane produced water. As an inventor, with 6 issued patents and 9 patents pending, Ron researches, develops, and demonstrates environmental solutions for difficult industrial applications, especially those in the oil and gas industry, which have been the major focus of both DWT this past decade. He is also holds a Governor's appointment as member of Montana's Board of Professional Engineers and Land Surveyors.

Vivian Drake is the Chief Operations Officer for DWT, having degrees in Civil Engineering, Hydrogeological Engineering, and Land Resources and Environmental Sciences. Vivian manages the day to day operations for DWT. She has expertise in groundwater flow, contamination & cleanup, water rights, and permitting. She will be the project's main coordinator, as well as being responsible for permitting with the appropriate regulatory agencies.

Mike Drake is DWT's Senior Staff Engineer. Mike is a graduate of Navy Nuclear Power School. He owned and operated a service business which required project and construction management and worked as a private consultant in development of new technologies.

Doug Hahn is DWT's Senior Staff Technician. Doug holds an A.S. in water quality technology and environmental health. Doug has over 12 years experience as a certified water and wastewater plant operator and is skilled in machine operation, welding, and construction.

P&S Fabricators, Inc. (http://psfab.com) is a Montana corporation that was originally formed in 1976 to provide metal fabrication for the wood products and mining industries. The facility sits on 3+ acres and has over 10,000 sq. ft. of floor space and includes a full machine shop as well as metal breaks, shears, plate and angle rolls. It is located at 9665 Summit Dr in Missoula, MT and began as a father/son

venture by Steve and Pat Haffner. P&S is currently 100% owned by Pat Haffner.

National Oilwell Varco http://NOV.com is an American multinational oilfield services corporation with offices in Houston, TX, Denver, CO, and Williston, ND. It is a leading worldwide provider of equipment and components used in oil and gas drilling and production operations, oilfield services, and supply chain integration services to the upstream oil and gas industry. NOV and DWT have collaboratively developed four technologies throughout 2015 that are directly applicable to oilfield waste treatment, reclamation, and remediation. NOV has clients and contacts throughout the oil and gas industry in North Dakota and will be instrumental in locating an appropriate site for the ThermFlo mobile pilot unit deployment, shake-down and demonstration.

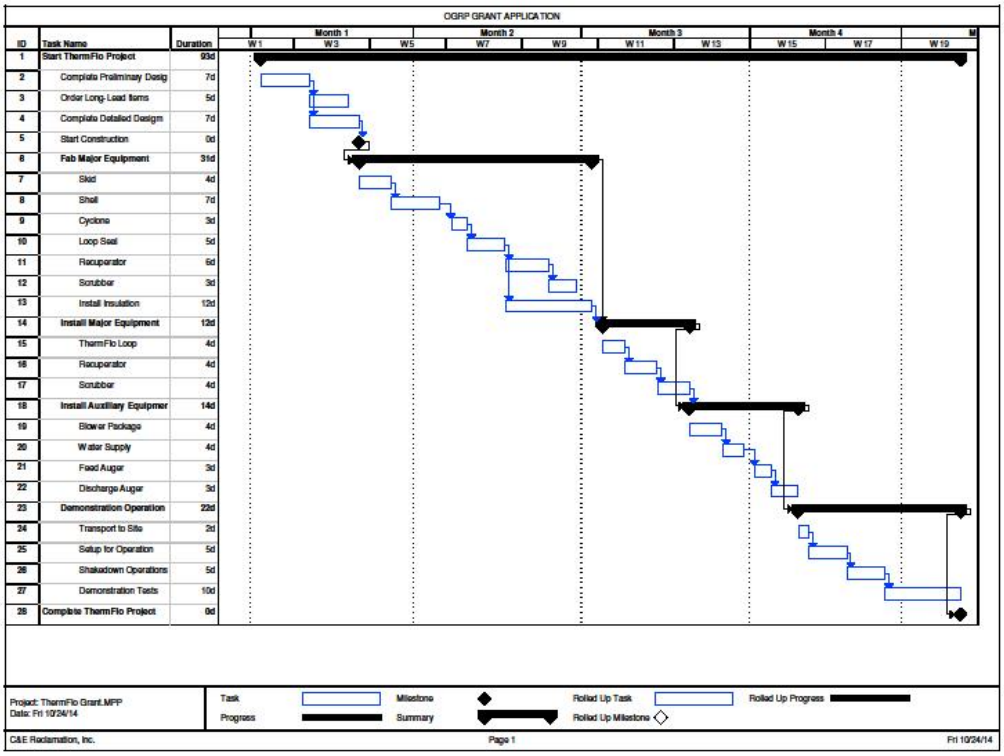
MANAGEMENT

DWT will provide ThermFlo designs to P&S Fabricators and provide construction oversight of the ThermFlo pilot unit. DWT, in cooperation with NOV, will arrange for the transport of the unit to the designated site in North Dakota and will provide staff for initial deployment, shake-down, and initial operation of the unit. NOV will provide staff for training and oversight of potential continued operation of the unit for other remediation sites, as well as certain pieces of equipment required as part of the ThermFlo construction. Evaluation will consist of sampling of hydrocarbon contaminated materials both pre- and post-treatment for analysis of destruction removal efficiencies, chloride partitioning, and TENORM concentrations. This information will be used to develop the financial models for economic analysis of both the process, as well as follow-on commercial development around the ThermFlo process in North Dakota.

TIMETABLE

From the time of potential funding, a full-scale ThermFlo pilot unit can be constructed within a three-month timeframe. Transport, deployment, shakedown, and initial operation will be accomplished

within a two to three week period.



BUDGET

Project Expense	NDIC's Share	Applicant's Share	P&S's Share	NOV's Share	Totals
Engineering & Project Admin.	$ 99,500	$ 28,000	$ 10,000	$ 45,000	$ 182,500
Payroll Benefits	$ 6,500	$ 1,820	$ 500	$ 2,275	$ 11,095
Travel	$ 6,000	$ 1,500		$ 5,000	$ 12,500
Subcontracts	$ 5,000				$ 5,000
M&S	$ 7,000				$ 7,000
Equipment	$ 205,000			$ 240,000	$ 445,000
Facilities G&A		$ 8,000			$ 8,000
TOTALS	**$ 329,000**	**$ 39,320**	**$ 10,500**	**$ 292,275**	**$ 671,095**
Percent	49.0%	5.9%	1.6%	43.6%	100.0%

Drake Water Technologies, Inc., (DWT), Helena, MT, in cooperation with P&S Fabricators, Inc. (P&S), Missoula, MT, and National Oilwell Varco (NOV), Denver, CO and Dickinson, ND, propose to cooperatively perform the design, construction, deployment, and operation of a full-scale ThermFlo pilot unit at an approved site in North Dakota to demonstrate the efficacy of ThermFlo technology. DWT

proposes to provide designs and drawings to P&S for construction of the unit at their facility in Missoula, as well as construction oversight. Once the unit is deployed, NOV will provide in-kind funding for staff to be trained to operate the unit at a site in North Dakota. NOV will also provide some of the equipment, such as pumps, grinders, tanks, etc., required for construction of the ThermFlo unit. DWT, P&S, and NOV all commit to providing in-kind salaries and payroll benefits as a significant portion of their contribution to the project. DWT also will provide a cash share in maintaining testing facilities and staff offices in Helena for the duration of the project.

The funding that is required from OGRP is primarily for purchase of the materials and equipment for construction of the ThermFlo pilot unit, including a small amount for salary support to the project. If the project is not fully funded, the project's objectives will most likely not be attainable as the majority of the funding from OGRP is for hard costs of the unit.

CONFIDENTIAL INFORMATION

There is no confidential information disclosed in this funding request.

PATENTS/RIGHTS TO TECHNICAL DATA

Proprietary designs of the ThermFlo unit will be closely held by DWT. If it is deemed necessary and desirable to apply for patent protection, DWT will make the application through its patent attorneys.

STATUS OF ONGOING PROJECTS (IF ANY)

DWT has not previously received any funding from OGRP.

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

☐	Application
☐	Transmittal Letter
☐	$100 Application Contribution
☐	Tax Liability Statement
☐	Letters of Support (If Applicable)
☐	Other Appendices (If Applicable)

When the package is completed, send an electronic version to Ms. Karlene Fine at kfine@nd.gov, and 2 hard copies by mail to:

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

For more information on the application process please visit:
http://www.nd.gov/ndic/ogrp/info/ogrcsubgrant-app.pdf

Questions can be addressed to Ms. Fine at 701-328-3722 or Brent Brannan at 701-425-1237.

Supporting Affidavit of Vivian Drake
Chief Operations Officer and Director of Drake Water Technologies, Inc.

COMES NOW, Vivian Drake, who after being first duly sworn upon her oath, deposes and says:

1. That she is an officer and director of Drake Water Technologies, Inc., responsible for substantial aspects of the operations and management of the Company.
2. That she has read and understands the requirements of the North Dakota Industrial Commission Oil and Gas Research Program (NDIC OGRP) application process regarding any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions, according to NDIC OGRP Policy 4.01, No. 11.
3. That she knows of her own personal knowledge and knowledge of the Company business records that Drake Water Technologies, Inc., has no outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

FURTHER AFFIANT SAYETH NAUGHT.

V. Drake

Vivian Drake
Chief Operations Officer
C&E Reclamation, Inc.

ThermFlo Pilot Plant Test Results

On June 4, 2015, Drake Water Technologies, Inc. (DWT) signed a Purchase Order with National Oilwell Varco (NOV) to construct a ThermFlo pilot plant that can treat 50 lbs/hr of organically contaminated solids. ThermFlo is an efficient and cost-effective mobile thermal process developed for complete remediation of soils or drill cuttings contaminated with organics which allows solids to remain on site, eliminating the need for transport and costly disposal at special waste landfills.

ThermFlo facilitates soil remediation by catalytic combustion, permitting low energy treatment that can achieve extremely high destruction efficiencies. ThermFlo is incredibly effective at destroying SOx and NOx in hydrocarbon streams, which helps to reduce or eliminate their presence in emissions streams and off-gas.

The original ThermFlo small pilot unit was commissioned at DWT's Helena facilities on July 2, 2015, with a successful run of NOV's shaker table cuttings on July 27, 2015. A second run with 40-year old pit sludge from pits located in eastern Montana was performed on July 30, 2015, with no evidence of organics in the treated solids. Laboratory analysis results of additional successful runs performed on August 27, 2015, September 1, 2015, October 1, 2015, and October 8, 2015 are compiled below. (Please note that Client #3 results are from a private lab and the Sodium results are reported in mg/kg.) An additional run was performed on October 14, 2015, during a visit from Dennis Fewless, North Dakota Department of Environmental Health (ND DOH) and NOV staff.

DATE	SAMPLE	TPH	Chloride	Sodium	pH	EC	TDS
		mg/kg	mg/L	mg/L		umhos/cm	mg/L
8/17/2015	Client #1 Raw	51,000	215	180	9.9	597	533
	Client #1 >10 Mesh	16	ND	34	9.8	235	181
	Client #1 <10 Mesh	ND	3	23	10	549	442
	Client #1 Quench	32	2,330	577	4.7	5,270	6,770
9/1/2015	Client #2 Raw	85,000	328	34	11	1,020	1,330
	Client #2 Treated	82	4	11	10.2	187	143
	Client #2 Quench	50	2,770	190	5.2	5,560	8,140
10/1/2015	Client #3 Centrifuge	110,000		880		354	
	Client #3 Cuttings	39,300		2,080		106	
	Client #3 Treated >10M	ND		2,730		92.7	
	Client #3 Treated <10M	ND		939		610	
	Client #3 Treated	ND		2,230		456	
	Client #3 Quench	ND		17,900		3,080	
10/8/2015	NOV Vortex Treated	ND	ND	18	10.2	125	59
	NOV Vortex Quench		1323		5.21	3,950	

Results from all runs show low to non-detect results for all treated materials. **All treated solids had total petroleum hydrocarbons of less than 100 mg/kg**, which is the ND DOH limit for on-site disposal. In addition, **the chloride results were below**

the ND DOH limit of 250 mg/L. A positive and unexpected result is that the chlorides in the raw materials tended to partition to the cooling tower quench water. This brine water can be used to make up drilling muds, evaporated, leaving a salt cake, which can be easily disposed at a landfill or sent to a salt water disposal.

Samples were submitted to Energy Laboratories in Casper, WY, for analysis of solids for TENORM species Radium 226 and 228, as well as Lead 210. The TENORM tested for in the pre- and post materials did not concentrate and was below the ND DOH limit of 5 pCi/g.

Below are photos of "before" and "after" treatment of various materials that have been treated in the ThermFlo pilot unit.

P&S Fabricators, Inc.
Delivery Address: 9665 Summit Drive • Missoula, MT 59808
Mailing Address: P.O. Box 749 • Frenchtown, MT 59834
Phone: (406) 728-6872 • FAX: (406) 549-4927
website: www.psfab.com

February 4, 2016

North Dakota Industrial Commission
ATTN: Oil and Gas Research Program
State Capitol – Fourteenth Floor
600 East Boulevard
Bismarck, North Dakota 58505

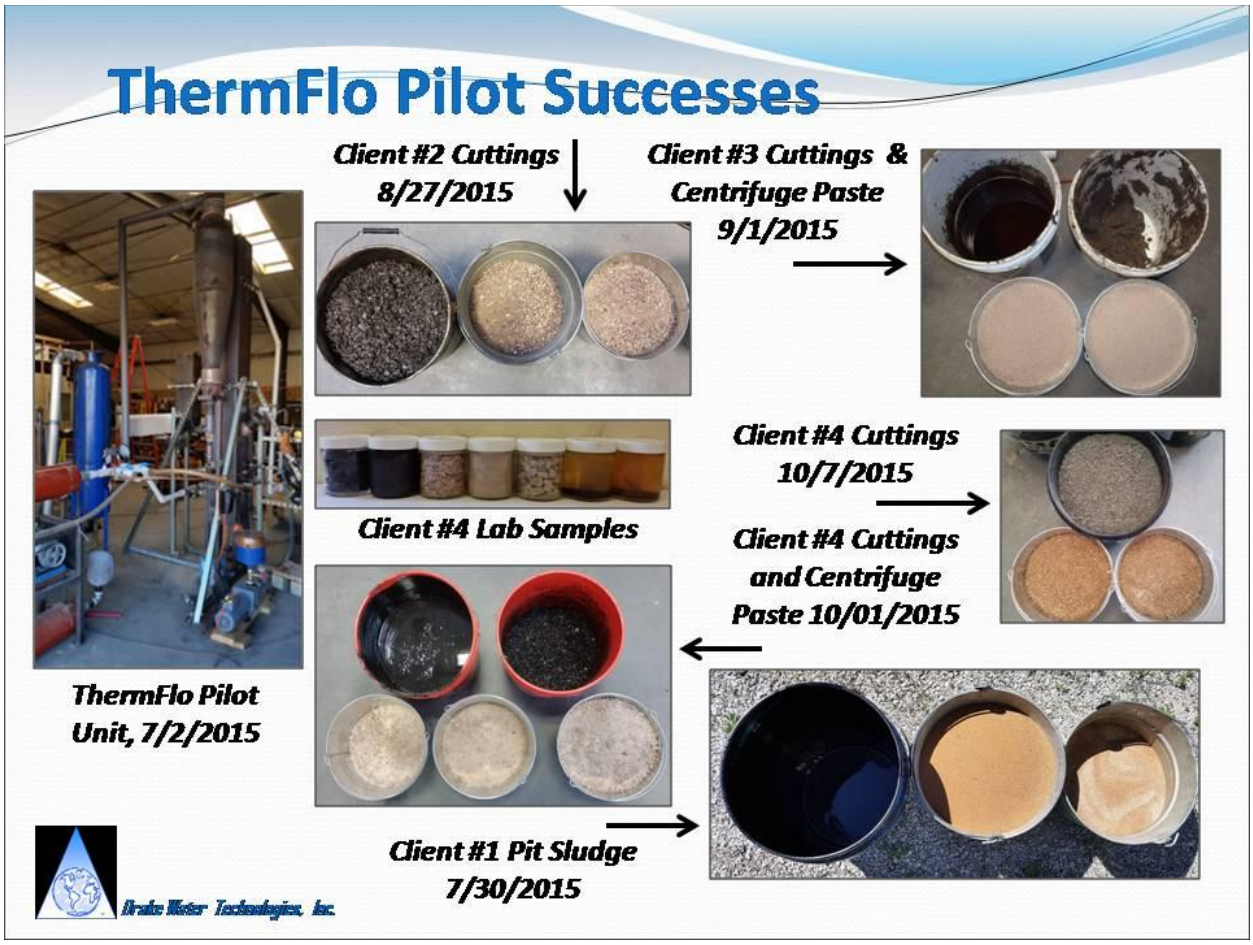
Attn: Ms Fine
Re: Letter of Support and Commitment

P&S Fabricators, Inc would like to acknowledge its support and commitment to the building of a prototype Thermo Flo unit for testing in the Bakken oil fields of North Dakota. P&S will contribute $10,500.00 of labor and shop usage, based on our original estimate, to assist in getting the Therm Flo unit operational.

Thank you for this opportunity.

Cordially;

Pat Haffner, President,
P&S Fabricator


ThermFlo Pilot Successes
Client #2 Cuttings
8/27/2015
Client #3 Cuttings &
Centrifuge Paste
9/1/2015
Client #4 Cuttings
10/7/2015
Client #4 Lab Samples
Client #4 Cuttings
and Centrifuge
Paste 10/01/2015
ThermFlo Pilot
Unit, 7/2/2015
Client #1 Pit Sludge
7/30/2015
Drake Water Technologies, Inc.

ThermFlo – an efficient "cradle-to-grave" process for complete remediation of organically contaminated solids, including cuttings and soils

- **Significant Cost Reduction compared to current thermal remediation methods or landfill disposal**
- **Total Petroleum Hydrocarbon (TPH) destruction of >100,000 mg/kg to non-detect levels**
- **Chlorides significantly reduced to levels (<250 mg/L in ND) that can be left on-site, salts partition to quench water that can be recycled on site, injected, or dried**
- **TENORM levels both before and after ThermFlo were less than the ND limit of 5 pCi/g and showed no concentration of radiological materials**
- **Omnivorous Consumption of Low-Value and Waste Fuels**
- **Generates Clean Off-Gas, no NOx, SOx, or CO**
- **No Secondary Wastes**
- **High-Throughput with Small Footprint and Can Be Mobilized**
- **Simple and Robust Construction**
- **Low CAPEX and OPEX**
- **Circulating Fluidized Bed Combustor exhibits destruction removal efficiencies of >99.9999%**
- **Low –Temperature (850 C) Catalytic Combustion of Contaminated Solids**
- **North Dakota DEH: "*Look forward to working with everyone listed above (e-mail) on the next phase of this project*"**

C & E Reclamation, Inc.

featuring ThermFlo technology!

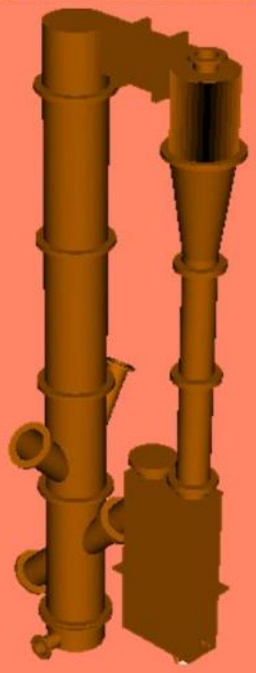
For more information about *ThermFlo* technology, please visit <http://cereclamation.com>

ThermFlo—Complete Thermal Solution for Reclamation of Drill Cuttings and Hydrocarbon Contaminated Materials

Tabletop ThermFlo Model

ThermFlo is an efficient and economic thermal process developed by C&E Reclamation, Inc. (C&E) for complete remediation of soils or drill cuttings contaminated with organics.

ThermFlo systems can be modularized and skid mounted for rapid and simple deployment to drilling or spill sites. Similarly, repositioning or recovery of ThermFlo systems is simple, rapid, and leaves no permanent foot-print on the landscape, while at the same time producing clean solids that can be returned to the landscape, eliminating long-term liabilities.



ThermFlo Isometric Full-Scale Mockup