STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Soil Preparation, Inc.
Penobscot County
Plymouth, Maine
A-1071-71-A-N (SM)

Departmental
Findings of Fact and Order
Air Emission License

After review of the air emissions license application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., §344 and §590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

Soil Preparation, Inc. (Soil Prep) submitted an air emission application to construct and operate a new biosolids drying, gasification and oxidation system located at 135 Valley Road Plymouth, Maine. The facility will process municipal sewer sludge through drying and gasification to produce a sustainable soil amendment product.

B. Emission Equipment

The following equipment is addressed in this air emission license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Maximum Design Capacity	Fuel Type, % sulfur	Pollution Control Equipment	Stack #
MaxWest Line (Gasifier and Oxidizing Process Heater)	30.9	48 tons/day of biosolids	Syngas derived from biosolids	SNCR * Dry Spray Absorber Fabric Filter	1

* Selective non-catalytic reduction for NOx control

Process Equipment

Emissions Unit ID	Equipment Type	Production Rate	Pollution Control Equipment
MaxWest Line	Biosolids Dryer	188 tons/day biosolids, 23% solids	Vented to Oxidizing Process Heater

C. Application Classification

A new source is considered a major source based on whether or not expected emissions exceed the "Significant Emission Levels" as defined in the Department's regulations. The emissions for the new source are determined by the maximum future license allowed emissions, as follows:

Pollutant	Max. Future License (TPY)	Sig. Level
PM	2.8	100
PM_{10}	2.8	100
SO_2	49.9	100
NO_x	32.0	100
CO	37.1	100
VOC	14.9	50
CO_2e	<100,000	100,000

The Department has determined Soil Prep is a minor source and the application has been processed through *Major and Minor Source Air Emission License Regulations*, 06-096 CMR 115 (as amended). Taking into account the proposed pollution control equipment, the facility is licensed below the major source thresholds and is considered a synthetic minor.

D. Regulatory Overview

Provided in this section is a summary of State and Federal air regulations that apply to the Soil Preparation, Inc. facility. Soil Prep has designed a facility and selected specific equipment that will achieve compliance with these State and Federal air regulations.

Maine Air Regulations

The proposed Project has been reviewed for potential applicability to the MEDEP Bureau of Air Quality regulations and the following are applicable:

06-096 CMR 101 Visible Emission Regulation

This rule establishes opacity limitations for emissions from several categories of air contaminant sources.

The gasifier and process heater are subject to Section (2)(B)(1)(f), which limits visible emissions from any fuel burning equipment not specifically listed in the Section to an opacity of 30 percent on a six (6) minute block average basis, except for no more than two (2) six (6) minute block averages in a 3-hour period.

06-096 CMR 103 Fuel Burning Equipment Particulate Emission Standard

This rule applies to all fuel burning equipment that has a rated heat input capacity of 3 MMBtu per hour or greater. The gasifier and process heater are considered a new source since an application for licensure is being submitted after December 22, 1982. Specifically, this unit will comply with Section 2(B)(4)(a), which establishes a PM limit of 0.30 lb/MMBtu for boilers designed to burn sludge with a heat input capacity less than 50 MMBtu/hr.

06-096 CMR 104 Incinerator Particulate Matter Standard

This rule establishes a limitation on the amount of particulate matter allowed to be emitted from each of several categories and sizes of incinerators and a limitation on the opacity of emissions from all incinerators. The proposed gasifier is not subject to this rule because the gasifier is not an incinerator. 06-096 CMR 100 defines incinerator to mean "any device, apparatus or equipment used for destroying, reducing or salvaging by fire or heat and material substance." The gasifier is converting sludge to a bulking agent which is an ingredient in a saleable product and the syngas that is produced is used to recover thermal energy which is used upstream in the system.

06-096 CMR 115 Major and Minor Source Air Emission License Regulations

This rule specifies who must obtain an air emission license, describes the information an applicant must submit for a license, and describes the standards and criteria that must be complied with during and following the air licensing process. For minor sources such as Soil Prep, 06-096 CMR 115 serves as a minor operating licensing program and a pre-construction license review program.

06-096 CMR 121 Emission Limits and Emission Testing of Resource Recovery Facilities

This rule establishes stack emission limitations, operating practices, compliance and performance testing, and reporting and recordkeeping requirements for all new, existing, and modified resource recovery facilities. The Soil Prep gasification process is not subject to this rule because it is not a resource recovery facility. A resource recovery facility is defined as "any building structure, or

installation where municipal wastes are incinerated to produce useable energy." The definitions in 40 CFR Part 60 Subparts Cb, Eb, and BBBB are incorporated by reference and municipal solid waste is defined in these Subparts to mean "household, commercial/retail, or institutional waste...Household, commercial/retail, and institutional waste does not include used oil; sewage sludge..." The sludge feeding into Soil Prep and the proposed gasifier do not meet the definition of municipal solid waste since it is comprised solely of sewage sludge. Further, the gasifier is not an incinerator as defined in 06-096 CMR 100 and the Department's Solid Waste Division made an advisory ruling dated October 1, 2010, that the proposed gasifier is also not an incinerator or waste-to-energy facility pursuant to 06-096 CMR 400.

06-096 CMR 137 Emission Statements

This rule establishes requirements for the reporting of pollutant emissions from stationary sources of air pollution. Soil Prep will be subject to the reporting requirements of this rule because it will be licensed to emit, into the ambient air, NOx and SO_2 in amounts greater than the reporting thresholds of 25 and 40 tons per year, respectively. Soil Prep will be required to submit annual criteria pollutant and greenhouse gas emission statements as well as triennial hazardous air pollutant emission statements.

Federal Air Regulations

New Source Performance Standards (NSPS)

This program is codified in 40 CFR Part 60 and is referred to as the NSPS program. There are numerous categories of emission sources for which a specific NSPS subpart applies. The paragraphs below present a description of the NSPS Subparts that are relevant to the Soil Prep facility and discuss the applicability of each.

Subpart Dc

Subpart Dc, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units applies to new, modified and reconstructed steam generating units with a maximum design heat input capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Subpart Dc defines steam generating unit as "*a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart.*" The gasifier does not employ the use of a heat transfer medium and is not a steam generating unit. The process heater at Soil Prep does not meet the definition of a process heater as described in Subpart Dc, but is used to heat hot oil, a heat transfer medium, and therefore meets the definition of a steam generating unit. Based on the definition of a steam generating unit, the process heater is subject to Subpart Dc. This is consistent

with a 1/04/2006 determination made by EPA Region 4 which found that wood gasification units were not steam generating units under Subpart Dc, but that the secondary combustion chamber was a steam generating unit and therefore subject to the rule.

There are no specific emission or operational limits that apply to steam generating units utilizing syngas that is a derivative of sewage sludge material. The process heater will be subject to the recordkeeping and reporting requirements of Subpart Dc including initial notifications pursuant to § 60.48c(a), and monthly recordkeeping of syngas combustion pursuant to § 60.48c(g)(2).

Subpart CCCC

Soil Prep may be subject to 40 C.F.R. Part 60, Subpart CCCC – New Source Performance Standards for Commercial/Industrial Solid Waste Incinerators (CISWI) constructed after November 30, 1999. This rule, proposed as final on March 21, 2011, has been in flux over the past year and was re-proposed on December 23, 2011 in 76 FR 80452 and on January 9, 2012 the U.S. District Court for the DC Circuit vacated the May 18, 2011 reconsideration notice. Due to the uncertainty surrounding this rule, Soil Prep submitted a regulatory analysis to EPA Region 1 for review on September 30, 2011 which addressed the applicability of the CISWI rule.

Specifically, Soil Prep found that the CISWI rule, as written at the time, was not applicable because the biosolids do not meet the 40 C.F.R. Part 241 definition of a "solid waste" since they are an ingredient that meets the legitimacy criteria described in § 241.3(d)(2). The 40 C.F.R. Part 60 Subpart CCCC definition of a CISWI unit hinges upon the incineration unit combusting a solid waste as defined by 40 C.F.R. Part 241. However, EPA has not provided formal comment and it may not provide comment until the CISWI rule is finalized. Once the CISWI rule is finalized, Soil Prep will again review this project's applicability to the rule and if air emission license modifications are required, the facility will address those at that time.

Subpart LLLL

Subpart LLLL, Standards of Performance for New Sewage Sludge Incineration (SSI) Units applies to units commencing construction after October 14, 2010 or modification after September 21, 2011. The MaxWest gasifier is not subject to this rule because it is not an SSI unit and it is not proposed to be located at a wastewater treatment plant designed to treat domestic sewage sludge. An SSI unit is defined to mean "an incineration unit combusting sewage sludge for the purpose of reducing the volume of the sewage sludge by removing combustible matter." The MaxWest gasifier is not an SSI unit because it is converting biosolids to a bulking agent which is an ingredient in a valuable product and the synthetic gas that is produced is used to recover thermal energy which is used

upstream in the system. The Department, through a letter dated October 1, 2010, made an advisory ruling stating that the proposed gasifier is not an incinerator or waste-to-energy facility. Further, the gasifier meets the exemption criteria in § 60.4780 for combustion units that incinerate sewage sludge and are not located at a wastewater treatment facility designed to treat domestic sewage sludge. The Soil Prep facility is designed to create a valuable soil amendment/fertilizer product by processing sewage sludge and is not a wastewater treatment facility designed to treat sewage sludge.

Subparts Ea, Eb, Cb, AAAA, BBBB

Subparts Ea, Eb, Cb, AAAA, and BBBB provide New Source Performance Standards for small and large, new and existing municipal waste combustion units. The MaxWest gasifier and process heater are not subject to these Subparts because they do not burn municipal waste as defined by the rules. Municipal solid waste is defined to mean "household, commercial/retail, or institutional waste...Household, commercial/retail, and institutional waste does not include used oil; sewage sludge..." The biosolids feeding the MaxWest gasifier do not meet the definition of municipal solid waste since it is comprised solely of sewage sludge.

National Emission Standards for Hazardous Air Pollutants

In the late 1970s, amendments to the CAA authorized EPA to require national standards for hazardous air pollutants (HAPs) at levels that would ensure the protection of the public health with an ample margin of safety and to prevent any significant and adverse environmental effects, which may reasonably be anticipated, on wildlife, aquatic life, or other natural resources. The passage of 1990 amendments renewed emphasis on controlling emissions of HAPS on the federal level but it changed the approach to regulating HAPs based on two types of emission standards: maximum achievable control technologies (MACTs) and generally available control technologies (GACTs). A list of 189 compounds was provided by the Congress to be controlled by EPA as HAPs. This program is codified in 40 CFR Part 63 and is referred to as the NESHAP program or as MACT Standards. There are numerous categories of emission sources for which a specific NESHAP subpart applies. The paragraphs below present a description of the NESHAP applicability of this emissions source.

Subpart JJJJJJ

Subpart JJJJJJ, *National Emissions Standards for Hazardous Air Pollutants for Industrial, Commercial and Institutional Boilers at Area Sources* applies to all new, reconstructed and existing boilers within three subcategories (coal, biomass and oil) located at an area source of hazardous air pollutants. The MaxWest gasifier and process heater are not subject to this rule because they are not

"boilers" as defined by the rule. The Soil Prep facility has the potential to emit less than 10 TPY of a single HAP and 25 TPY of all HAP combined and is an area source for HAP. Subpart JJJJJJ defines boiler to mean "an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam or hot water." The MaxWest gasifier and process heater do not meet the definition of a boiler. Although the process heater employs combustion through oxidation, the recovered thermal energy is used for heating the hot oil system, not water, so this unit does not meet the definition of a boiler. Because the gasifier and process heater are not boilers, they are not subject to Subpart JJJJJJ.

Subpart E

Subpart E, National Emission Standard for Mercury, applies to stationary sources which process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, and incinerate or dry wastewater treatment plant sludge. The MaxWest sludge dryer is not subject to this rule because it does not meet the definition of a sludge dryer as defined by the rule. Subpart E defines sludge dryer to mean "a device used to reduce the moisture content of sludge by heating to temperatures above 150°F directly with combustion gases." The MaxWest sludge dryer utilizes indirect heating of sludge with a heat transfer medium and therefore is not subject to this rule. The MaxWest gasifier and process heater are not subject to this rule because they are not incinerating sludge.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

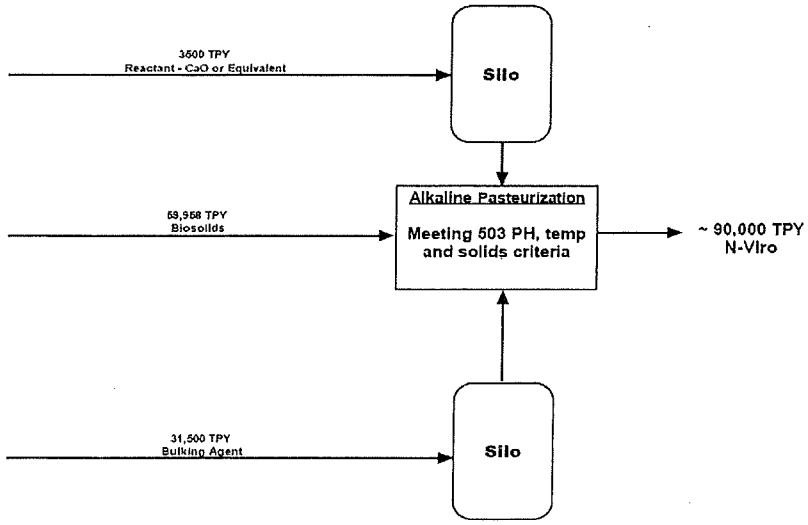
In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 CMR 100 (as amended). Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in *Definitions Regulation*, 06-096 CMR 100 (as amended). BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

Project Overview

Soil Prep is currently permitted by a Division of Solid Waste Management Utilization Program License to process approximately 60,000 wet tons per year (TPY) of municipal sewage sludge through alkaline pasteurization in order to generate approximately 90,000 TPY of soil amendment product. The current alkaline pasteurization process also requires approximately 3,500 TPY of lime and 31,500 TPY of bulking agent (e.g., biomass boiler ash) in order to meet pasteurization criteria for pH, solids, and temperature. Soil Prep receives sewage sludge from various municipalities in Maine, New Hampshire and Rhode Island and its bulking agents, primarily from New Hampshire.

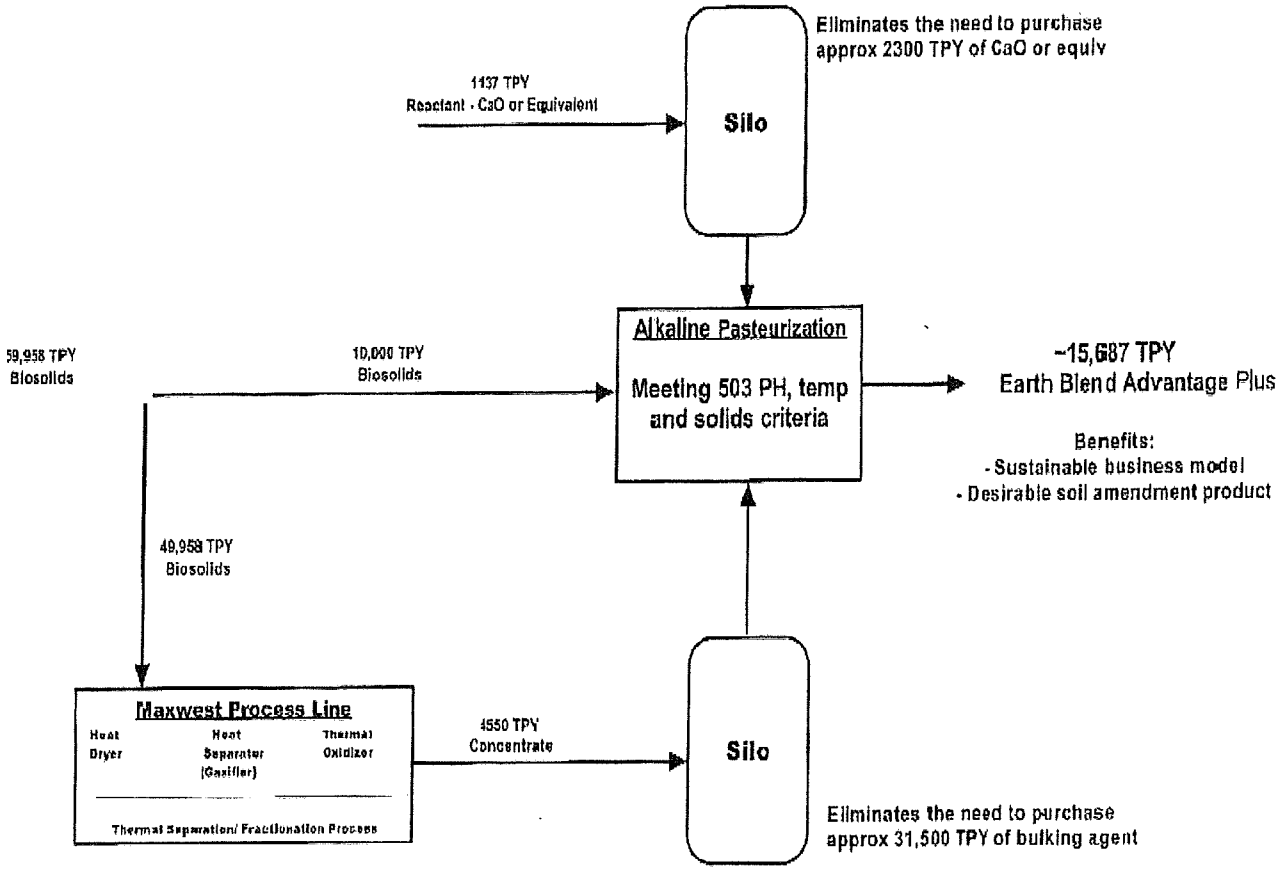
Existing Soil Prep Process Block Flow Diagram



Soil Prep is proposing to add a new MaxWest biosolids gasification processing line which will reduce the amount of lime and bulking agent used by the facility and will be used to create a new soil amendment product. Of the 60,000 TPY of biosolids Soil Prep is permitted to process, approximately 50,000 TPY will be diverted through the MaxWest line. The sludge as received will have a solids content of approximately 23%. In the MaxWest line, sludge will be preheated then dried to approximately 10% moisture prior to gasification and oxidation of the syngas in a 30.9 MMBtu/hr Process Heating Chamber. The gasifier will produce approximately 4,500 TPY of bulking agent and mixed with roughly 1,500 TPY of lime to be used for alkaline pasteurization of the remaining 10,000 TPY of feedstock biosolids to produce approximately 16,000 TPY of the final soil

amendment product. The 4,500 TPY of bulking agent produced by the MaxWest line is estimated to eliminate the need for the facility to purchase and have shipped 31,500 TPY in bulking agent and 2,300 TPY of lime while still allowing the facility to generate a valuable product. The net reduction in trucking is estimated to be over 250,000 truck miles per year, which will result in significant reductions in diesel oil and air emissions.

Below is a simplified diagram of Soil Prep's proposed process:



MaxWest Process Line Description

The MaxWest line will process approximately 50,000 TPY of dewatered sludge received by truck from municipal wastewater treatment plants. All sludge received for processing will be off-loaded onto an enclosed floor receiving area sized to facilitate all of the anticipated daily delivery volumes with provision for excess volume in the event of a facility upset. The sludge will be conveyed either directly from the transport vehicle or via front end loader or similar mechanical

device into a conveying hopper for transfer into two facility storage bins. As a means of odor control the bins will be fully enclosed and off-gases will be ducted to the process heater.

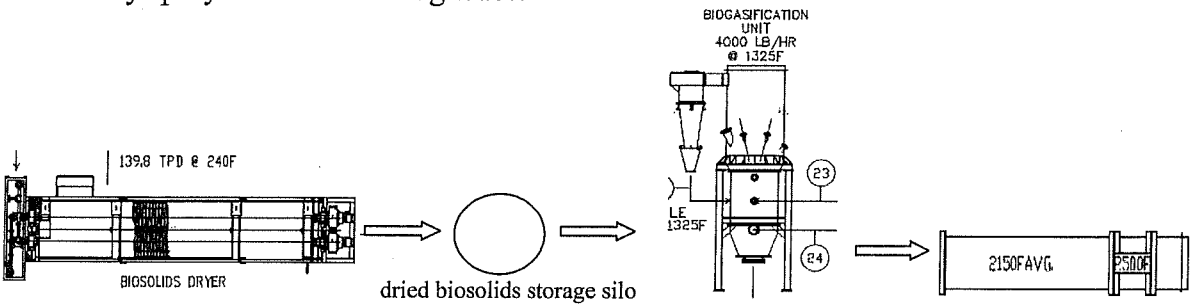
Sludge from the storage bins are preheated and then conveyed to a Therma-Flite indirect drying system with a maximum evaporative capacity of 12,000 lb/hr of water, consuming approximately 14 MMBtu/hr in the process. The dryer uses an enclosed heating chamber with twin conveyance screws for the drying process therein converting the dewatered sludge into a Class "A" biosolid. Heated thermal oil is circulated through the hollow flites of the twin screws as well as the outer shell of the drying chamber in order to indirectly transfer the energy/heat into the sludge required for drying. This is a time and temperature system that provides a 90% solids class "A" dried biosolids material that is then used in the gasifier. In the event of a facility upset the class "A" material can be diverted for direct land application uses or as a bulking agent in the Soil Prep Earthblend process. The gasifier feed system operates on a "turn of the screw" method for metering the fuel into the system. In addition, the entire feed system rests on load cells. The facility will conduct periodic testing to determine the feed loss rate/screw speed ratio and can set the screw speed to not operate beyond the speed that corresponds with the daily gasifier feed rate for the facility. The screw speed will be monitored continuously by Soil Prep's systems.

The 90% biosolids material delivered from the dryer to the gasifier will sustain the gasification process without the use of supplemental fuels or additives. The 30.9 MMBtu/hr design heat input bubbling fluidized bed gasifier will separate concentrated carbon based bulking agent from syngas that will be conveyed into a process heater for thermal oxidation. Sufficient air will be added to the process to maintain bed fluidization while maintaining gasification within the parameters of an oxygen starved environment thereby producing a consistent quantity of the desired bulking agent. Concentrated bulking agents will be separated from the syngas in a cyclone just downstream of the gasifier.

The balance of inert materials will be collected through an integral ash removal system mounted to the gasifier and transferred for storage and use in the alkaline stabilization process. The bulking agent will be removed from the gasifier using a discharge screw system designed to maintain an air seal between the fluidized bed and the discharge system. The bulking agent will be conveyed pneumatically from the intermediate storage hopper into the existing bulking agent silo that is part of the current system.

The following diagram illustrates the basic process flow diagram of the Maxwest Process which shows the general direction of emissions from each of the major components, including the dryer, biogasification unit, and the oxidizing process heater. Under normal operations the emissions from each of these units will exit

from the process heater through the heat exchangers and subsequently through the dry spray adsorber and baghouse.



B. MaxWest Process (Dryer, Biosolids Gasifier and Oxidizing Process Heater (BACT))

Biosolids Dryer

Prior to gasification, preheated biosolids are pumped to a 14 MMBtu/hr Therma-Flite indirect drying system that uses an enclosed heating chamber with twin conveyance screws for the drying of sludge. Thermal oil heated by a heat exchanger in the flue gas stream following the process heater is circulated through the hollow flites of the twin screws as well as the outer shell of the drying chamber in order to indirectly transfer the energy / heat into the sludge required for drying. No auxiliary fuel combustion is needed to operate this unit. Moist air from the biosolids dryer is vented through a venturi spray condenser which separates the condensables from the warm air. The condensate stream will be sent to the plant wastewater treatment facility and the warm air stream will be vented directly to the process heater. Under normal operations, there are no direct emissions expected from this unit, all emissions are vented to the downstream gasifier and process heater.

Biosolids Gasifier and Oxidizing Process Heater

In the MaxWest line, sludge will be preheated then dried to approximately 10% moisture prior to gasification. Soil Prep proposes to operate a biosolids gasifier that will process approximately 4,000 lbs of biosolids per hour and convert it to 940 lbs of ash per hour and 9,225 actual cubic feet per minute (acfm) of syngas at the anticipated gasification temperature of 1325°F. The ash will be used in Soil Prep's Earth Blend Advantage product. The syngas will be sent to a process heater for combustion with subsequent heat recovery.

The technologies listed in the table below are determined to be potentially available control technologies for emissions from the biosolids gasifier and process heater. The technologies are listed by order of effectiveness and described in greater detail in following subsections.

Potentially Available Control Technologies for Emissions from the Biosolids Gasifier and Oxidizing Process Heater

Pollutant	Control Technology
NO_x	1. Selective Catalytic Reduction 2. Selective Non-Catalytic Reduction
CO and VOCs	1. Good combustion practices
$PM/PM_{10}/PM_{2.5}/PM_{HAP}$	1. Fabric Filter 2. Dry Spray Absorber
SO_2	1. Wet scrubber (FGR) 2. Dry Spray Absorber

Control of Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is formed from sulfur in the biosolids during combustion. Pollution control options to reduce the emissions of sulfur dioxide (SO_2) can be achieved through either flue gas desulfurization by means of wet scrubbing whereby a caustic solution is used to remove sulfur from the flue gas, or dry spray absorption.

In a wet scrubber system, flue gas is ducted to a spray tower where an aqueous slurry of sorbent is injected into the flue gas. Soil Preparation, Inc. finds wet spray scrubbers to be a technically feasible control technology, however, the generation of a liquid waste stream presents an environmental hazard that can be avoided using other control approaches that achieve comparable levels of reduction.

In a dry spray absorber system, the exhaust gases are introduced into an absorbing tower (dryer) where the gases are contacted with a finely atomized alkaline slurry. Acid gases are absorbed by the slurry mixture and react to form solid salts which are removed by a downstream particulate control device, such as a baghouse or ESP. The heat of the flue gas is used to evaporate all the water droplets, leaving a non-saturated flue gas to exit the absorber tower. Dry spray absorbers are capable of achieving control efficiencies up to 50-60% for calcium based sorbents and up to 80% for sodium based sorbents.

As BACT, the Department finds the use of a dry spray absorber using a calcium based sorbent reduce SO2 emissions from the gasifier and oxidizing process heater. Soil Preparation, Inc. estimates that the dry spray absorber will achieve a

control efficiency of 70% followed by a baghouse with a capture and control efficiency of 99.9%. BACT will limit SO_2 emissions to 12.7 lb/hr.

Control of Particulate Matter (PM)

Particulate matter (PM) from biosolids combustion is formed from non-combustible material (ash) in the biosolids and from incomplete combustion. Metal PM_{HAP} emissions are influenced by the metal content of the biosolids. Since metals which are volatilized in the combustion zone condense in the exhaust gas stream, most metals (except mercury) are associated with fine particulate and are removed as the fine particulates are removed.

Add-on pollution control equipment for the control of PM, PM_{10} and $PM_{2.5}$ includes wet scrubbers, dry spray absorbers, fabric filters and electrostatic precipitators. A thorough review along with technical and economic feasibility studies of each of these technologies can be found in Soil Prep's May 2012 air license application. The technologies that were determined economically and technically feasible for particulate control were dry spray absorbers and a fabric filter.

In a dry spray absorber system, the exhaust gases are introduced into an absorbing tower (dryer) where the gases are contacted with a finely atomized alkaline slurry. Acid gases are absorbed by the slurry mixture and react to form solid salts which are removed by a downstream particulate control device, such as a fabric filter or ESP. The heat of the flue gas is used to evaporate all the water droplets, leaving a non-saturated flue gas to exit the absorber tower. Dry spray absorbers are capable of achieving control efficiencies up to 50-60% for calcium based sorbents and up to 80% for sodium based sorbents. While the control efficiencies are not as high as those offered by wet spray scrubbers, dry scrubbers have significantly lower capital and operating costs because they are simpler to operate, demand less water and waste disposal is less complex.

In a fabric filter, flue gas is passed through a tightly woven or felted fabric causing PM in the exhaust gas to be collected on the fabric by sieving and other mechanisms. Fabric filters may be in the form of sheets, cartridges or bags, with a number of the individual fabric filter units housed together in a group. Bags are the most common type of fabric filter. Fabric filters control all types of PM including PM_{HAP} such as most metals. Typical new equipment control efficiencies are between 95 to 99.9%.

As BACT, the Department finds the use of a dry spray absorber followed by a fabric filter to reduce PM and PM_{HAP} emissions from the gasifier and process heater. Soil Preparation, Inc. estimates that the dry spray absorber and baghouse will achieve a combined destruction efficiency of 99.9%. As part of BACT, Soil Prep will limit PM emissions to 0.1 lb/hr.

Control of Nitrogen Oxides (NO_x)

In the MaxWest gasification process, NOx emissions are primarily the result of oxidation of nitrogen in the biosolids which can vary greatly based on local and seasonal sewage characteristics and thermal NOx formation.

Potential control technologies for NO_x emissions from the gasification process include: 1) Selective Catalytic Reduction; 2) Selective Non-Catalytic Reduction and 3) Combustion Control Techniques (i.e., low excess air firing, burner modifications, water/steam injection, and flue gas recirculation).

The use of SCR immediately following the process heater in the MaxWest process is not technically feasible as exhaust gases leave this unit at a temperature of approximately 1800°F and would thermally degrade the catalyst causing permanent loss of active surface area. The SNCR process is similar to the SCR process in that it chemically reduces the NOx molecule into molecular nitrogen and water vapor. A nitrogen based reagent such as ammonia or urea is injected into the ductwork, downstream of the combustion unit. The reduction reaction with NOx is favored over other chemical reaction processes at temperatures ranging between 1600° F and 2100° F, therefore it is considered a selective chemical process. Certain applications are more suited for SNCR due to the combustion unit design. Units with furnace exit temperatures of 1550° F to 1950° F, residence times of greater than one second, and high levels of uncontrolled NOx are good candidates. NOx reduction levels range from 30-50% which is lower than the level of control offered by SCR.

As BACT, the Department finds the use of SNCR to reduce NOx emissions from the gasifier and process heater to be technically feasible and cost-effective. In addition, the gasifier and process heater will be operated and maintained to limit the formation of thermal NOx through the use of staged combustion. Soil Preparation, Inc. estimates that the SNCR will achieve a reduction efficiency of at least 60% which will limit NOx emissions to 7.3 lb/hr. Soil Preparation, Inc. will limit NH3 slip to 10 ppmvd.

Control of Carbon Monoxide (CO) and Volatile Organic Compounds (VOCs)

Carbon monoxide (CO) and volatile organic compound (VOC) emissions result from incomplete combustion of biosolids. To control VOC and CO emissions from the gasifier and process heater no auxiliary equipment is needed. Properly tuning, maintaining and operating the units will keep VOC and CO emissions at a minimum. Proper maintenance includes keeping the air/fuel ratio at the manufacturer's specified setting, and having the proper air and fuel pressures at the burners.

As BACT, the Department finds the use of good combustion practices to reduce CO and VOC emissions from the gasifier and process heater and emissions will be limited to 8.5 lb/hr and 3.4 lb/hr, respectively.

Greenhouse Gas Emissions

Greenhouse gas emissions need to be quantified from this source as it is now a regulated pollutant. EPA provided examples of biogenic CO_2 emissions that would be subject to the deferral from PSD and Part 70 permitting which included CO_2 from biological decomposition of waste and landfills, wastewater treatment or manure management processes, and CO_2 from combustion of biogas collected from biological decomposition of waste and landfills or wastewater treatment. The purpose of the deferral is to provide EPA with additional time to review the scientific basis for excluding CO_2 emissions from biogenic fuels from permitting programs.

Soil Prep provided the Department with an estimate of CO_2 emissions from the oxidizing process heater of approximately 5,320 pounds per hour. Annual emissions based on a total operating time of 8760 hours per year result in CO_2 emissions of 23,303 tons per year. Emissions of CH_4 and N_2O are not expected to contribute significantly to total CO_2e emissions. Based on this estimate greenhouse gas emissions from Soil Prep will remain below the major source threshold of 100,000 tons CO_2e per year. At these levels, pollution control equipment was found to be either economically or technically infeasible. The operation of the MaxWest system is considered part Soil Prep's greenhouse gas emissions control strategy.

BACT Summary

Soil Prep will use SNCR to reduce NOx emissions from the oxidizing process heater followed by a dry spray absorber and filter baghouse to reduce SO_2, PM, $PM_{2.5}$ and PM_{HAP} emissions. Soil Prep will optimize combustion in the gasifier and process heater to limit the formation of CO and VOC in the flue gas.

A summary of the proposed BACT limits is provided below:

BACT Limits

Pollutant	BACT Limit (lb/hr)
NOx	7.3
CO	8.5
PM, PM_{10}, $PM_{2.5}$	0.1
SO_2	12.7
VOC	3.4
NH_3	0.3

Opacity – Visible emissions from the Max West process stack shall not exceed an opacity of 10% on a six (6) minute block average basis, except for no more than one (1) six (6) minute block average in a 1-hour period.

Parametric Monitoring for Control Technologies

The following table outlines the parameter monitors for the control technologies selected as BACT (baghouse, oxidizing process heater, scrubber, SNCR) so that the facility may demonstrate ongoing compliance with BACT limits when it operates. Based on the design of the MaxWest process, the following continuous parameter monitors will be used to ensure the proper operation of each of the control devices described in the BACT analysis.

Control Device	Parameter Monitor
Oxidizing Process Heater	Chamber temperature
SNCR	Ammonia injection rate
Dry Spray Adsorber	Lime slurry feed rate
Baghouse	Differential pressure

Following startup of the facility and based on the results of initial stack testing, Soil Prep will define the thresholds corresponding to the required level of emissions control for each parameter. Compliance with the emission requirements for PM, NOx, and VOC shall be demonstrated by an initial performance test.

C. Fugitive Emissions

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed an opacity of 20%, except for no more than five (5) minutes in any 1-hour period. Compliance shall be determined by an aggregate of the individual fifteen (15)-second opacity observations which exceed 20% in any one (1) hour.

D. General Process Emissions

Visible emissions from any general process source shall not exceed an opacity of 20% on a six (6) minute block average basis, except for no more than one (1) six (6) minute block average in a 1-hour period.

E. Annual Emissions

Potential emissions from the gasifier and process heater depend heavily on the characteristics of the biosolids feedstock which is highly variable. Potential emissions for NOx, CO, SO2, PM and HAP were calculated using estimates supplied by MaxWest and the design engineering firm. These estimates were derived through a mass balance using data from a seven test composite average of an ultimate/proximate analysis conducted on sludge feedstock from locations in the Northeast. Assumptions were included based on experience with similar systems using best engineering judgment. Potential emissions for VOC were calculated using an AP-42 emission factor for sewage sludge incinerators of 1.7 lbs VOC per ton sludge incinerated. Annual uncontrolled emissions assume an annual operating schedule of 8760 hours per year and sludge processing capacity of 4,000 lbs per hour. Controlled emissions include the use of SNCR, dry spray absorption, and a fabric filter as described in the BACT analysis.

Soil Prep shall be restricted to the following annual emissions, calculated with the Max West process operating 8760 hrs/year, based on a 12 month rolling total:

Total Licensed Annual Emissions for the Facility
Tons/year
(used to calculate the annual license fee)

	PM	PM_{10}	SO_2	NO_x	CO	VOC
Max West Line (dryer, gasifier, and process heater)	**2.8**	**2.8**	**49.9**	**32.0**	**37.1**	**14.9**
Total TPY	**2.8**	**2.8**	**49.9**	**32.0**	**37.1**	**14.9**

Hazardous Air Pollutants (HAP)
Through this air emission license, Soil Prep's HAP emissions are limited/capped at 9.9 TPY for a single HAP and 14.9 TPY for all HAP combined.

Greenhouse Gases
Greenhouse gases are considered regulated pollutants as of January 2, 2011, through 'Tailoring' revisions made to EPA's *Approval and Promulgation of Implementation Plans,* 40 CFR Part 52, Subpart A, §52.21 Prevention of Significant Deterioration of Air Quality rule. Greenhouse gases, as defined in 06-096 CMR 100 (as amended), are the aggregate group of the following gases: Carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For licensing purposes, greenhouse gases (GHG) are calculated and reported as carbon dioxide equivalents (CO_2e).

Based on the facility's fuel use limit(s), the worst case emission factors from AP-42, IPCC (Intergovernmental Panel on Climate Change), and *Mandatory*

Greenhouse Gas Reporting, 40 CFR Part 98, and the global warming potentials contained in 40 CFR Part 98, Soil Prep is below the major source threshold of 100,000 tons of CO_2 e per year. Therefore, no additional licensing requirements are needed to address GHG emissions at this time.

III. AMBIENT AIR QUALITY ANALYSIS

According to 06-096 CMR 115, the level of air quality analyses required for a minor new source shall be determined on a case-by case basis. Based on the information available in the file, and the similarity to existing sources, Maine Ambient Air Quality Standards (MAAQS) will not be violated by this source.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-1071-71-A-N subject to the following conditions.

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

STANDARD CONDITIONS

(1) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions (38 M.R.S.A. §347-C).

(2) The licensee shall acquire a new or amended air emission license prior to commencing construction of a modification, unless specifically provided for in Chapter 115. [06-096 CMR 115]

(3) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [06-096 CMR 115]

(4) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request. [06-096 CMR 115]

(5) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to Title 38 M.R.S.A. §353. [06-096 CMR 115]

(6) The license does not convey any property rights of any sort, or any exclusive privilege. [06-096 CMR 115]

(7) The licensee shall maintain and operate all emission units and air pollution systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions. [06-096 CMR 115]

(8) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. The records shall be submitted to the Department upon written request. [06-096 CMR 115]

(9) The licensee shall comply with all terms and conditions of the air emission license. The filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for a renewal of a license or amendment shall not stay any condition of the license. [06-096 CMR 115]

(10) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license. [06-096 CMR 115]

(11) In accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department, the licensee shall:

A. perform stack testing to demonstrate compliance with the applicable emission standards under circumstances representative of the facility's normal process and operating conditions:
   1. within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions; or
   2. pursuant to any other requirement of this license to perform stack testing.

B. install or make provisions to install test ports that meet the criteria of 40 CFR Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and

C. submit a written report to the Department within thirty (30) days from date of test completion.

[06-096 CMR 115]

(12) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicate emissions in excess of the applicable standards, then:

A. within thirty (30) days following receipt of such test results, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department; and

B. the days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and

C. the licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions. [06-096 CMR 115]

(13) Notwithstanding any other provisions in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or Part 70 license requirement. [06-096 CMR 115]

(14) The licensee shall maintain records of malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emissions unit itself that would affect emission and that is not consistent with the terms and

conditions of the air emission license. The licensee shall notify the Department within two (2) days or the next state working day, whichever is later, of such occasions where such changes result in an increase of emissions. The licensee shall report all excess emissions in the units of the applicable emission limitation. [06-096 CMR 115]

(15) Upon written request from the Department, the licensee shall establish and maintain such records, make such reports, install, use and maintain such monitoring equipment, sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such a manner as the Department shall prescribe), and provide other information as the Department may reasonably require to determine the licensee's compliance status. [06-096 CMR 115]

SPECIFIC CONDITIONS

(16) **Gasifier and Process Heater**

A. The MaxWest gasifier and oxidizing process heater shall be limited to 30.9 MMBtu/hr and a maximum design capacity at 48 tons of biosolids per day measured by screw/auger speed. The facility shall conduct screw speed-feed loss calibrations once per year to determine the screw speed that corresponds with the daily max feed limit. [06-096 CMR 115, BACT]

B. Emissions from the gasifier and process heater shall not exceed the following [06-096 CMR 115, BACT]:

PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)	NH_3 (lb/hr)
0.1	0.1	12.7	7.3	8.5	3.4	0.3

C. Visible emissions from the stack for the gasifier and process heater shall not exceed 10% opacity on a six (6) minute block average, except for no more than two (2) six (6) minute block averages in a continuous 3-hour period. [06-096 CMR 101]

D. The stack for the biogas and process heater units shall be a minimum of 85 feet in height above ground level. [06-096 CMR 115, BACT]

E. Soil Prep shall keep records of the hours of operation of the biogas and process heater units on a monthly and 12 month rolling total basis. The units shall be maintained and operated according to the manufacturer's emission-

related instructions and records shall be kept of conducted maintenance. [06-096 CMR 115, BACT]

F. Soil Prep shall install and operate SNCR to reduce NOx emissions from the process heater followed by a dry spray absorber and filter baghouse to reduce SO_2, PM, $PM_{2.5}$ and PM_{HAP} emissions. [06-096 CMR 115, BACT]

G. Soil Prep shall perform an initial performance stack test to determine PM, NOx, SO_2, CO, and VOC emissions within 180 days after start-up. Compliance with the emission requirements for PM, NOx, and VOC shall be demonstrated by an initial performance test. [06-096 CMR 115, BACT]

H. Soil Prep shall demonstrate compliance with the SO_2 emission limits by conducting periodic (monthly) feedstock sulfur sampling and analysis and maintain these records. [06-096 CMR 115, BACT]

I. The following continuous parameter monitors shall be used to ensure the proper operation of each of the control devices:

Control Device	Parameter Monitor
Oxidizing Process Heater	Chamber temperature
SNCR	Ammonia injection rate
Dry Spray Adsorber	Lime slurry feed rate
Baghouse	Differential pressure

Following startup of the facility and based on the results of initial stack testing, Soil Prep will define the thresholds corresponding to the required level of emissions control for each parameter. Soil Prep shall maintain records of all maintenance, repair, and calibration activity for all parameter monitoring. [06-096 CMR 115, BACT]

J. The oxidizing process heater shall be subject to the recordkeeping and reporting requirements of Subpart Dc including initial notifications pursuant to § 60.48c(a), and monthly recordkeeping of syngas combustion pursuant to § 60.48c(g)(2).

K. NSPS, 40 CFR Part 60, Subpart CCCC

If Soil Prep is found applicable to 40 CFR Part 60 Subpart CCCC after changes to the rule or by EPA's case-by-case determination, then the facility shall meet all applicable requirements of 40 CFR Part 60, Subpart CCCC.

(17) **Startup, Shutdown, and Malfunction Recordkeeping**

- Within 180 days after initial start-up of the facility, Soil Prep shall submit a Start-up, Shut-down, Malfunction (SSM) and Alternative Operation plan. Proposed scenarios such as temporary alternative fuel sources, equipment bypass scenarios, and/or dump stacks must meet exempt or insignificant activity criteria.
- Soil Prep shall record each startup, shutdown, and malfunction event including start time, end time, duration, cause, and method utilized to minimize the duration of the event and/or to prevent a reoccurrence. [06-096 CMR115]

(18) **Fugitive Emissions**

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed an opacity of 20%, except for no more than five (5) minutes in any 1-hour period. Compliance shall be determined by an aggregate of the individual fifteen (15)-second opacity observations which exceed 20% in any one (1) hour. [06-096 CMR 101]

(19) **General Process Sources**

Visible emissions from any general process source shall not exceed an opacity of 20% on a six (6) minute block average basis, except for no more than one (1) six (6) minute block average in a 1-hour period. [06-096 CMR 101]

(20) **Parameter Monitors**

Each parameter monitor listed in Condition (16)(I) must record accurate and reliable data. If the parameter monitor is recording accurate and reliable data less than 98% of the source operating time within any quarter of the calendar year, the Department may initiate enforcement action and may include in that enforcement action any period of time that the parameter monitor was not recording accurate and reliable data during that quarter unless the licensee can demonstrate to the satisfaction of the Department that the failure of the system to record accurate and reliable data was due to the performance of established quality assurance and quality control procedures or unavoidable malfunctions. [06-096 CMR 115, BPT]

(21) **Annual Emission Statement**

In accordance with *Emission Statements*, 06-096 CMR 137 (as amended), the licensee shall annually report to the Department the information necessary to accurately update the State's emission inventory by means of either:

1) A computer program and accompanying instructions supplied by the Department; or

2) A written emission statement containing the information required in 06-096 CMR 137.

The emission statement must be submitted as specified by the date in 06-096 CMR 137.

(22) **Malfunction and Breakdown**

Soil Prep shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (38 M.R.S.A. §605).

DONE AND DATED IN AUGUSTA, MAINE THIS 29 DAY OF October , 2012.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Marc Allen Robert Cone for
PATRICIA W. AHO, COMMISSIONER

The term of this license shall be ten (10) years from the signature date above.

[Note: If a complete renewal application, as determined by the Department, is submitted prior to expiration, then pursuant to Title 5 MRSA §10002, all terms and conditions of the license shall remain in effect until the Department takes final action on the renewal of the license.]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: May 11, 2012
Date of application acceptance: May 18, 2012

Date filed with the Board of Environmental Protection:

Filed
OCT 29 2012
State of Maine
Board of Environmental Protection

This Order prepared by Edwin Cousins, Bureau of Air Quality