

STATE OF MISSOURI



DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: **102012-006**

Project Number: 2012-08-027
Installation Number: 097-0151

Parent Company: Changing World Technologies, Inc.
Parent Company Address: 460 Hempstead Ave, West Hempstead, NY 11552
Installation Name: Renewable Environmental Solutions LLC
Installation Address: 530 North Main Street, Carthage, MO 64836
Location Information: Jasper County, S34, T29N, R31W

Application for Authority to Construct was made for:
Expansion of the existing storage space of feedstock slurry an additional 100,000 gallons by installing 5 tanks with the capacity to hold 20,000 gallons each. Slurry is a mixture of DAF water and other food processing waste. Included in the expansion is Finish Product storage of 90,000 gallons by installing 3 tanks with the capacity of 30,000 gallons each. Finished product is classified as renewable diesel, carboxylic oil. All tanks will be vented to the existing thermal oxidizing system. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, Construction Permits Required.

- Standard Conditions (on reverse) are applicable to this permit.
- Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

OCT 10 2012

EFFECTIVE DATE

Kyra L Moore

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Department's Air Pollution Control Program of the anticipated date of startup of these air contaminant sources. The information must be made available within 30 days of actual startup. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located within 15 days after the actual startup of these air contaminant sources.

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant sources(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

Renewable Environmental Solutions LLC
Jasper County, S34, T29N, R31W

1. **Superseding Condition**
The conditions of this permit supersede all the special conditions in all construction permits previously issued by the *permitting authority*.
2. **Emergency Equipment Emission Limitation**
 - A. Renewable Environmental Solutions shall limit the total hours of operation of the emergency generator (EP-07) to less than 500 hours in any consecutive 12-month period.
 - B. Renewable Environmental Solutions shall keep a monthly sum of the most recent 12-months records that determine compliance with Special Condition Number 2.A. Attachment A - *Emergency Generator Operation Schedule*, or an equivalent form of the company's own design, is suitable for this purpose. The most recent 60 months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request.
3. **Hot Oil Heater Emission Limitation**
Natural gas is the only fuel that shall be burned in the Hot Oil Heater (EP-2).
4. **Odor Control and Corrective Action**
If a continuing situation of demonstrated nuisance odors exists in violation of *10 CSR 10-6.165 Restriction of Emission of Odors*, the Director may require Renewable Environmental Solutions to submit a corrective action plan within 30 days, adequate to timely and significantly mitigate the odors. Renewable Environmental Solutions shall implement any such plan immediately upon its approval by the Director. Failure to either submit or implement such a plan shall be a violation of the permit.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

5. **Raw Materials Storage and Transfer**
All solid and liquid raw materials awaiting processing must be stored under roof in a storage area. In the event of a process shut down, the solids raw materials shall not remain on-site for any more than 24 hours.
6. **Shut Down of Existing Equipment at Installation**
Renewable Environmental Solutions shall not operate EP-03, Second Stage Coking Heater, H-460, without first obtaining a construction permit.
7. **Control Device Emission Limitation**
 - A. Renewable Environmental Solutions LLC shall control emissions from the *Processes* listed using the *Control* equipment identified in the following table at all times:

Table 1: Controls Used on Processes

Processes	Control
1-ST Stage process, heat, reaction, separation, waste water evaporator (T350, V270, V265, V140 & R250r)	Thermal Oxidizer
	Wet Scrubbers
Mineral and land application	Wet Scrubbers
T-862 Water storage	Thermal Oxidizer
T-860 Water storage	Thermal Oxidizer
Receiving & RMT Hold storage	Wet Scrubber
Raw material storage, 100,000 gallon feed storage tank and the 50,000 gallon emergency feed storage tank (T-120A/B/C/D & T-027A/B/C)	Thermal Oxidizer
Finished product storage (700A/B/C & 710A/B, 430, T-700D/E/F)	Thermal Oxidizer
Rail Loading	Activated Carbon Canister
Truck Loading	Thermal Oxidizer

- B. Renewable Environmental Solutions, LLC shall operate and maintain all control equipment in accordance with the manufacturer's specifications.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- C. Renewable Environmental Solutions LLC shall maintain an operating and maintenance log for all control equipment which shall include the following:
 - 1) Incidents of malfunction, duration of event, probable cause, and corrective actions; and
 - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
 - 3) Refer to Attachment B, *Inspection/Maintenance/Repair/Malfunction Log*, as an example of the format the log could use.
 - D. Renewable Environmental Solutions, LLC shall follow regulation *10 CSR 10-6.050 Start-Up, Shutdown, and Malfunction Conditions* whenever *excess emissions* are created.
2. Record Keeping and Reporting Requirements
- A. Renewable Environmental Solutions LLC shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.
 - B. Renewable Environmental Solutions LLC shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than ten days after the end of the month during which any record required by this permit show an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW

Project Number: 2012-08-027
Installation ID Number: 097-0151
Permit Number:

Renewable Environmental Solutions LLC
530 North Main Street
Carthage, MO 64836

Complete: August 8, 2012

Parent Company:
Changing World Technologies, Inc.
460 Hempstead Ave
West Hempstead, NY 11552

Jasper County, S34, T29N, R31W

REVIEW SUMMARY

- Renewable Environmental Solutions LLC (RES) has applied for authority to expand the existing storage space of feedstock slurry an additional 100,000 gallons by installing 5 tanks with the capacity to hold 20,000 gallons each. The feedstock slurry tanks' dimensions are 32 feet tall with a diameter of 10.5 feet respectively. Slurry is a mixture of dissolved air flotation (DAF) water and other food processing waste. Included in the expansion is Finish Product storage of 90,000 gallons by installing 3 tanks with the capacity of 30,000 gallons each. The finished product tanks' dimensions are 36 feet tall with a diameter of 12 feet respectively. Finished product is classified as renewable diesel, carboxylic oil. All tanks will be vented to the existing thermal oxidizing system. Volatile organic liquid is not used.
- Even though this project is for the eight (8) tanks [five (5) feedstock and three (3) finished product] listed above, this construction permit consolidated and replaced all previous permitting authority activity for the purpose of clarifying the requirements.
- HAP emissions are not expected from the proposed equipment.
- None of the New Source Performance Standards (NSPS) apply to the installation.
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- A thermal oxidizer, wet scrubbers and an activated carbon canister are being used to control the odor emissions from the equipment in this permit.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels.

- This installation is located in Jasper County, an attainment area for all criteria pollutants.
- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation's major source level is 250 tons per year and fugitive emissions are not counted toward major source applicability.
- Ambient air quality modeling was not performed since potential emissions of the application are below de minimis levels.
- No Operating Permit is required for this installation.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

RES is an existing 200-ton per day TDP plant. A TDP plant converts solids and liquid food waste materials such as animal byproducts, greases, food processing plant dissolved air floatation residuals, etc. into combustible and renewable No. 2 fuel oil and organic fertilizers; The TDP process is a plug-flow, water intensive chemical reforming system.

Truckloads of solids and liquids, as well as railcar loads of liquids arrive daily at the facility. Smaller shipments of solids also arrive at times from area farms and businesses such as butcher scraps and farm mortalities.

The solids are sent to a receiving bin and the liquids are sent to storage tanks via pumps.

The solids are sent via augers and conveyors to solids grinders while the liquids that are received are sent via pumps to raw material tanks or in some instances are pre-heated and pre-screened via vibratory screeners before being directed to the raw material tanks. The ground solids are also directed and blended with the liquid raw material. From the raw material tanks, the blended solids and liquids are sent through a combination of high/low pressure vessels and tanks sequentially to de-polymerize the slurry. This de-polymerization process breaks down the long chain organic compounds into much smaller molecules that are ideal for producing liquid fuel. The process is done in the presence of water to form the desired products. This is the chemical reforming step of the TDP process. After the products are separated, they are sent to tanks or storage bins for shipment to customers.

Table 2: Relevant Project History

Project Number	Description
2002-05-308	082002-001: new installation, first construction permit
2004-04-052	No construction permit required letter for the replacement of a 50 hp NG fired boiler with a 200 hp boiler.
2005-05-003	No construction permit required letter for the replacement of a thermal oxidizer (EP-04) with a four MMBtu per hour thermal oxidizer (EP-12).
2006-03-064	082002-001A: removal an certain equipment, change of certain controls, change in special conditions.
2009-03-057	No construction permit required letter for the construction of rail load and unload equipment.
2009-06-027	082002-001B: switch of five storage tank controls to activated carbon canister.

PROJECT DESCRIPTION

RES has applied for authority to expand the existing storage space of feedstock slurry by an additional 100,000 gallons by installing five (5) tanks with the capacity to hold 20,000 gallons each. The tanks dimensions are 32 feet tall with a diameter of 10.5 feet. They will be vented to the existing thermal oxidizing system. Feedstock slurry is a mixture of DAF water and other food processing waste. Volatile organic liquid is not used. RES will also expand the existing storage space for finished product by an additional 90,000 gallons by installing 3 tanks with the capacity to hold 30,000 gallons each. The tanks dimensions are 36 feet tall with a diameter of 12 feet respectively. They will be vented to the existing the thermal oxidizing system. Finish product is classified as renewable diesel, carboxylic oil.

Although the emissions associated with this project are de minimis, in order to require the new equipment to be controlled for odor and federally enforceable, this project is being permitted. Since a permit is being required, the equipment reviewed under previous projects and still operating were restated here in order to give an accurate representation of the facility.

EMISSIONS/CONTROLS EVALUATION

This thermal oxidizer (EP-12) is rated at 5200 scfm and 4 MMBtu per hour. This unit will burn natural gas only and is designed to operate at temperatures greater than 1400°F with retention times greater than 1.93 seconds.

The calculated emission rates and insignificance levels are summarized in the following table.

Table 3: Thermal Oxidizer Emissions Summary (Pounds per Hour)

Pollutant	PM ₁₀	SO _x	NO _x	VOC	CO	HAPs
Potential Emissions of Application	0.03	0.00 ¹	0.38	0.02	0.32	0.00 ²
Exemption Level	1.00	2.75	2.75	2.75	6.88	0.50

The activated carbon canister contains BPL 4x10 activated carbon, to control odor emissions. The pollutants of concern are hydrogen sulfide (H₂S) and carbon monoxide (CO).

The maximum flow-rate of vapors from the oil tanks to the canister is 80 acfm. Using a concentration of 22 ppm of H₂S and the ideal gas law, the uncontrolled emissions are 0.024 tons per year (tpy). The oil tanks are sealed except for the oil inlet/outlet and vapor vent. The vapor vent is completely enclosed to the canister, therefore the capture efficiency is 100 percent. When the canister is new, the control efficiency will be high, likely 100 percent. With usage, the canister's control efficiency will drop. An average control efficiency of 80% was estimated. Applying the capture and control efficiencies of 100 and 80 percent, respectively, yields a potential to emit of 0.001 pounds per hour of H₂S. According to Electrocorp, a company that specializes in industrial odor controllers and air purifiers, one pound of activated carbon can absorb 20 to 50 percent of its own weight of H₂S. The weight of activated carbon is 180 pounds. Activated carbon has a service life dependent on the concentration of the pollutant being removed, flow-rate, humidity, and other factors. Using the mass flow-rate of H₂S, the lifespan of the canister is approximately 9,700 to 13,500 hours. RES shall replace the activated carbon canister before 10 CSR 10-3.090, Restriction of Emission of Odors, would be violated.

Using a concentration of 150 ppm of CO and the ideal gas law, the uncontrolled emissions are 0.133 tpy. According to Electrocorp, activated carbon is not satisfactorily used to remove CO under ordinary circumstances. Therefore, the capture efficiency is 100 percent, but the control efficiency is zero. The potential emissions of CO for the canister is 0.030 pounds per hour, which is less than the exemption level in 10 CSR 10-6.061, Construction Permit Exemptions (3)(A)3.A.

The following table provides an emissions summary for this project and the installation. Existing potential emissions were calculated. Existing actual emissions were taken from the installation's 2011 MoEIS (annual EIQ). Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). Because the emissions are required to be vented to the thermal oxidizer, no emissions increase is expected.

¹ Undetectable

² Undetectable

The emission factors and control efficiencies used in this analysis were obtained from the Environmental Protection Agency (EPA) document AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Section 1.3, *Fuel Oil Combustion* (September 1999), and Section 1.4, *Natural Gas Combustion* (July 1998), and those used in the annual emission reporting.

The installation conditioned potentials are based on the limit given to RES on the hours of operation for the emergency generator (EP07). In limiting the hours of operation (500 hours per year) of the emergency equipment, the installation's potential emissions will be at de minimis levels. The following table provides an emissions summary for this project.

Table 4: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2011 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM	25.0	2.6	0.7	-- ³	2.6
PM ₁₀	15.0	2.1	0.5	--	2.1
PM _{2.5}	10.0	0.5	0.2	--	0.5
SOx	40.0	1.2	0.0	--	1.2
NOx	40.0	28.3	3.2	--	28.3
VOC	40.0	2.0	0.2	--	2.0
CO	100.0	13.5	2.7	--	13.5
HAPs	10.0/25.0	N/A ⁴	N/A	--	N/A

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels.

APPLICABLE REQUIREMENTS

Renewable Environmental Solutions LLC shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110

³ The new tanks are required to be vented to the thermal oxidizer, and so no additional emissions are expected.

⁴ Not Applicable

- *Operating Permits*, 10 CSR 10-6.065
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-6.165
- *Start-Up, Shutdown, and Malfunction Conditions*, 10 CSR 10-6.050

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Randy Raymond
Environmental Engineer

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated August 8, 2012, received August 8, 2012, designating Changing World Technologies, Inc. as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.

APPENDIX A

Abbreviations and Acronyms

%	percent	m/s	meters per second
°F	degrees Fahrenheit	Mgal	1,000 gallons
acfm	actual cubic feet per minute	MW	megawatt
BACT	Best Available Control Technology	MHDR	maximum hourly design rate
BMPs	Best Management Practices	MMBtu	Million British thermal units
Btu	British thermal unit	MMCF	million cubic feet
CAM	Compliance Assurance Monitoring	MSDS	Material Safety Data Sheets
CAS	Chemical Abstracts Service	NAAQS ...	National Ambient Air Quality Standards
CEMS	Continuous Emission Monitor System	NESHAPs	
CFR	Code of Federal Regulations	National Emissions Standards for Hazardous Air Pollutants
CO	carbon monoxide	NO_x	nitrogen oxides
CO₂	carbon dioxide	NSPS	New Source Performance Standards
CO_{2e}	carbon dioxide equivalent	NSR	New Source Review
COMS	Continuous Opacity Monitoring System	PM	particulate matter
CSR	Code of State Regulations	PM_{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
dscf	dry standard cubic feet	PM₁₀	particulate matter less than 10 microns in aerodynamic diameter
EQ	Emission Inventory Questionnaire	ppm	parts per million
EP	Emission Point	PSD	Prevention of Significant Deterioration
EPA	Environmental Protection Agency	PTE	potential to emit
EU	Emission Unit	RACT	Reasonable Available Control Technology
fps	feet per second	RAL	Risk Assessment Level
ft	feet	SCC	Source Classification Code
GACT	Generally Available Control Technology	scfm	standard cubic feet per minute
GHG	Greenhouse Gas	SIC	Standard Industrial Classification
gpm	gallons per minute	SIP	State Implementation Plan
gr	grains	SMAL	Screening Model Action Levels
GWP	Global Warming Potential	SO_x	sulfur oxides
HAP	Hazardous Air Pollutant	SO₂	sulfur dioxide
hr	hour	tpy	tons per hour
hp	horsepower	tpy	tons per year
lb	pound	VMT	vehicle miles traveled
lbs/hr	pounds per hour	VOC	Volatile Organic Compound
MACT	Maximum Achievable Control Technology		
µg/m³	micrograms per cubic meter		

Mr. James Crum
General Manager
Renewable Environmental Solutions LLC
530 North Main Street
Carthage, MO 64836

RE: New Source Review Permit - Project Number: 2012-08-027

Dear Mr. Crum:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you have any questions regarding this permit, please do not hesitate to contact Randy E. Raymond, at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Susan Heckenkamp
New Source Review Unit Chief

SH:rrl

Enclosures

c: Southwest Regional Office
PAMS File: 2012-08-027

Permit Number: