PERMIT TO CONSTRUCT EVALUATION
REGENERATIVE THERMAL OXIDIZER

Applicant's Name	**HITCO COMPOSITES INC.**
Company I.D.	**800066**
Mailing Address	**1600 W. 135TH STREET, GARDENA, CA 90249**
Equipment Address	**SAME AS ABOVE**

EQUIPMENT DESCRIPTION

APPLICATION NO. 492308 (REPLACEMENT FOR P/N F18714, A/N 344770) (C211)

1) REGENERATIVE THERMAL OXIDIZER, TELLKAMP SYSTEMS INC.., MODEL NO. ROXIDIZER 25, 25,000 CFM, 12' – 6" W X 26' – 0" L X 11' –8" H, DUAL CHAMBER MULTI LAYERED CERAMIC MEDIA, WITH A 2,400,000 BTU/HR MAXON NATURAL GAS-FIRED BURNER, MODEL KINEDIZER LE, A 5 H.P. COMBUSTION BLOWER , AND A NATURAL GAS INJECTION SYSTEM UP TO 5,000,000 BTU/HR.

2) EXHAUST SYSTEM WITH A 100 H.P. FAN @ 25,000 CFM, VENTING:

   A. THIRTEEN VACUUM FURNACES (ELECTRICALLY HEATED)

   B. ONE FURNACE (NATURAL GAS-FIRED)

   C. ONE OVEN (ELECTRICALLY HEATED)

APPLICATION NO. 492309

TITLE V PERMIT REVISION/RECLAIM AMENDMENT

HISTORY

The above application from Hitco Carbon Composites Inc. was submitted to the District to install a new Regenerative Thermal Oxidizer (RTO) with a 2.4 mm BTU/HR natural gas-fired burner.

The applicant decided to install a new functionally identical but more efficient above described regenerative thermal oxidizer at this location to replace the old recuperative thermal oxidizer. As a result, Hitco Composites Inc. submitted the above permit application with the District as class I application to install the RTO.

A facility-wide VOC emission cap has not been established for this location. Most of the equipment has their own VOC emission limits. The applicant has not requested any VOC emission increases from the basic equipment to be vented to this RTO under this project. The new afterburner unit being a "Regenerative Thermal Oxidizer – RTO with a 2.4 mm BTU/HR" burner will use less thermal energy than direct flame thermal oxidizer with a 11.0 mm BTU/HR burner. Thus, there will be net reduction in the natural gas combustion emissions and emission offsets will not be not required under this project. The RTO will be equipped with a low-NOx burner that is designed to emit NOx concentration of <40 ppm @ 3% O_2. The applicant has requested a daily usage limit on the burner to limit the NOx emissions to be <1 lb/day for BACT compliance.

Currently a number of furnaces and ovens are vented to Smith Thermal Oxidizer with A/N 344770. All these furnaces and ovens are also vented to a Tellkamp Regenerative Thermal Oxidizer with A/N 344772, which is a back-up control device to Smith oxidizer. Once the above described RTO will be installed then it will be used as a main control device for these furnaces and ovens and the existing Tellkamp RTO with A/N 344772 will act as a back-up unit.

Hitco Carbon Composites Inc. is a large-sized aerospace component manufacturer and has a number of active permits from the District for autoclaves, furnaces, afterburner control devices, spray booths, I.C.Engines, storage tanks, ovens, presses, boilers, process tanks, dust collector, abrasive blasting systems and bag-houses under I.D. # 800066. Most of the permits are under their old I.D. # 5646.

The district database shows one notice to comply was issued to this facility to provide usage records in last two years. No other notices or complaints were on file in the last two years against. Also, the database shows one complaint against this facility for nuisance odors in the last two years. The company was operating "in compliance" during compliant inspection and on follow-up inspection for notice to comply.

Hitco Carbon Composites Inc. is a NOx RECLAIM and Title V facility. The Title V permit was renewed on 01/20/2008. This is the third permit revision of the renewed Title V permit under this project. The proposed permit revision is considered a "de minimis significant permit revision" to the renewed Title V permit, as described in the Regulation XXX evaluation.

This facility is not located within 1000 feet from any school and there will not be any emission increases exceeding Rule 212 thresholds from this project, hence, this application will not require a public notice.

PROCESS DESCRIPTION

Hitco Carbon Composites Inc. manufactures advanced composite materials and structures for defense, aerospace and industrial applications that require light weight, high strength and high heat/flame resistant properties. Some of the products manufactured on site are Delta and Titan rocket motor nozzle cones, Boeing C-17 tail cones, Boeing 767 flap track fairings, high strength composite beams for the Boeing 787 aircrafts, Atlas V rocket nose fairings, F-22 jet engine intake lips, carbon fiber/carbon composite (carbon/carbon) brake discs (for military air crafts, GT Series and Formula 1 cars), and multi-layered thermal and acoustic insulation materials (cloth, blanket, and panels).

The components are manufactured using prepreg (resin impregnated carbon fiber) sheets. Initially parts (materials) are pre-pregnated with carbon at a separate department which starts with the parts (materials) being cured in different furnaces at the facility. The cured parts (materials) are then transferred to other furnaces to go through the following processes:

1. **Carbonization**. The parts are placed in the furnaces at about 1000 to 1500^0 F and at 1 mmHg pressure for about 3 to 5 days.

2. **Pyrolysis**. The parts kept in the furnace at 4000^0 F under vacuum for about 2 hours.

3. **Carbon Vapor Infiltration**. After pyrolysis, the parts are cooled to approximately 1900^0 F, still under vacuum. The parts are then bathed in a gas mixture of about 100 standard liters per minute (slpm) of natural gas and 25 slpm of hydrogen. This process will allow carbon from natural gas to be compacted in to the parts. The cycle time is about 100 to 300 hours.

4. **Heat Treat**. The parts are then heat treated in the furnace at 4000^0 F, still under vacuum. The cycle time is about 18 hours.

5. The heat treated parts may have to go through another **carbon vapor infiltration process** again, depending on the product requirements.

The natural gas and hydrogen gas are not used for combustion but used as process raw materials to supply carbon atoms to strengthen the molecular structure of the composite material, so it can stand higher heat and friction. During the graphitization process the furnaces are sealed. The exhaust gases from the furnace consist of un-used methane and hydrogen, which are vented to air pollution control system (APC). This facility will always have one back-up APC system, so that production cycles are not to be disturbed.

The afterburner will mainly vent furnaces, which are generally operated in a closed loop systems, thus the VOC collection efficiency from this system is expected to be close to 100%. The RTO unit is designed to have at least 98% destruction efficiency. The applicant decided to take 95% overall control efficiency for the above described unit.

This regenerative thermal oxidizer is capable of processing 25,000 CFM contaminated air for VOC emission control from the furnaces and ovens. The equipment initially is heated to about 1500^0 to 1600^0 F by a burner, which supplies heat to the ceramic media. This media is located in two process zones. The process air gets heated above 1500^0 F in the heated combustion zone containing ceramic media. The incoming contaminated air gets natural gas injection of sufficient concentration to burn the pollutants and maintain the temperature of the ceramic media. The hot air goes to other process bed and transfers the heat to its ceramic media. The thermal energy recovery is 95% in the heat exchanger. The chambers are heated alternatively continuously at about every 2 minutes.

OPERATING HOURS

Average: 24 hr/day, 7 day/week, 52 weeks/year
Maximum: 24 hr/day, 7 day/week, 52 weeks/year

OXIDIZER DESIGN

Total maximum contaminated process flow rate:	25000 cfm
Design capacity of the control equipment:	30000 cfm
Inlet operating temperature	70^0 F
Outlet operating temperature from combustion chamber	1500^0 F
Heat exchanger efficiency:	95%
Heat Input Rating of the burner for initial heating of the media	2.4 mm BTU/HR
Heat required during the normal working load	nil
Volume of the combustion zone	1541 ft^3

Heat required to heat air from 70 ^{0}F to 1600 ^{0}F(worst case)

M = 25000 scfm x 0.075 lb/scf x 60 min/hr = 112500 lb/hr
Cp_{70} = 0.240 Btu/lb ^{o}F Cp_{1600} =0.275 Btu/lb ^{o}F

Cp_{avg} = 0.258 Btu/lb ^{o}F

$Q = MCp \Delta T$

= 112500 x 0.258 x (1600 - 70)
= 44.4 MM Btu/hr

After 95% heat recovery

Q= 44.4 x 0.05 = 2.22 MM Btu/hr

This being a RTO, no excess air is necessary during the oxidation of the VOC. The applicant will use the burner to start-up the RTO only. The natural gas injection will maintain the temperature in the combustion chamber. The RTO will have a burner rated at 2.4 x 10^6 Btu/hr for start-up, which is sufficient to fire-up the RTO. The permit condition will require a source test upon completion of the installation, which will prove the design capacity. A permit condition will also limit the use of the burner for start-up operation only.

Residence time calculation

Flow rate = 25000 cfm
Flow rate per minute = 25000 cfm / 60 sec/min = 417 cfs
Corrected volume = 417 cfs x 1960/ 530 = 1542 cfs (1500 ^{o}F to 70 ^{o}F)
Combustion zone volume = 1541 cubic feet
Residence time = 1541 / 1542 = 1.0 sec (greater than 0.3 sec recommended - OK)

Combustion emissions (RTO, A/N 492308):

This equipment will be equipped with a 2.4 mm BTU/HR burner with 40 ppm NOx emissions @ 3% O_2. The following table provides data on the emissions from the natural gas combustion.

A/N 492308 Tellkamp RTO @

	maximum	normal
hr/dy	8.4	2
dy/wk	7	7
wk/yr	52	52
load	100%	100%

max heat input 2.40E+06 (BTU/hr)

gross heating value 1050 (BTU/scf)

	Emission Factors	MAX (lb/hr)	AVE (lb/hr)	MAX (lb/dy)	30-DAY (lb/dy)	MAX (lb/yr)	MAX (ton/yr)
SO_2 (R1)	0.6	0.001	0.001	0.012	NA	4	0.002
SO_2 (R2)	0.6	0.001	0.001	0.012	0.012	4	0.002
NO_2 (R1)	51.92	0.119	0.119	0.997	NA	363	0.181
NO_2 (R2)	51.92	0.119	0.119	0.997	0.997	363	0.181
CO (R1)	158.02	0.361	0.361	3.034	NA	1,104	0.552
CO (R2)	158.05	0.361	0.361	3.035	3.035	1,105	0.552
N_2O (R1)	2.2	0.005	0.005	0.042	NA	15	0.008
N_20 (R2)	2.2	0.005	0.005	0.042	0.042	15	0.008
PM, PM_{10} (R1=R2)	7.5	0.017	0.017	0.144	0.144	52	0.026
CO_2(R1=R2)	0.000012	0.000	0.000	0.000	0.000	0	0.000
TOC(R1=R2)	7	0.016	0.016	0.134	0.134	49	0.024
ethyl benzene	0.0095	2.2E-05	2.2E-05	1.8E-04	NA	6.64E-2	3.32E-5
acetaldchyde	0.0043	9.8E-06	9.8E-06	8.3E-05	NA	3.01E-2	1.50E-5
acrolein	0.0027	6.2E-06	6.2E-06	5.2E-05	NA	1.89E-2	9.43E-6
benzene	0.008	1.8E-05	1.8E-05	1.5E-04	NA	5.59E-2	2.80E-5
formaldehyde	0.017	3.9E-05	3.9E-05	3.3E-04	NA	1.19E-1	5.94E-5
napthalene	0.0003	6.9E-07	6.9E-07	5.8E-06	NA	2.10E-3	1.05E-6
PAH's	0.0001	2.3E-07	2.3E-07	1.9E-06	NA	6.99E-4	3.49E-7
toluene	0.0366	8.4E-05	8.4E-05	7.0E-04	NA	2.56E-1	1.28E-4
xylenes	0.0272	6.2E-05	6.2E-05	5.2E-04	NA	1.90E-1	9.50E-5

NO_2 @ 3% excess O_2 ----->>> 40.00 (ppmv)

CO @ 3% excess O_2 ----->>> 200.00 (ppmv)

SO_2 @ 3% excess O_2 ----->>> 0.33 (ppmv)

PM @ 12% CO_2 ----->>> 5.5E-09 (grain/ft^3)

Ver. 1.3

Toxic Compound Emissions and Risk Assessment

A Tier 2 Risk Assessment was performed to determine the health risk from the toxic air contaminants emitted from the RTO due to combustion of natural gas. The assessment calculated a cancer risk of 0.388 in a million (3.88E-07) for the residential receptor and 0.123 in a million (1.23E-07) for a commercial receptor. The assessment also calculated both acute and chronic hazard index risks and all the risks were below 1. Thus, the Tier 2 risk assessment demonstrated compliance with the Rule 1401 requirements.

The applicant has accepted a usage limit of less than 504 minutes/day on the burner to limit the NOx emissions to be <1 lb/day for BACT compliance. A permit condition for this usage limit will be imposed for the BACT compliance.

There will be additional process NOx emissions from this operation. According to afterburner (RTO) manufacturer, there will be 2 ppm maximum NOx emissions from the oxidation of the contaminated air inflow. The NOx lbs/hr is calculated as follows.

Lbs/hr = PPM X MW X 60 X SCF / 379 X 10^6
= 2 X 46 X 60 X 25,000 / 379 X 1000000
= 0.364

In a day maximum 8.4 hrs will be for the start-up burner operation with 1 lb NOx emission. Hence, 24 – 8.4 = 15.6 hrs for the process NOx emissions @ 0.364 lb/hr.

Total NOx emission in a day = [0.364 x 15.6] + 1 =5.67 lbs/day.

RULES/REGULATION EVALUATION

¤ ***RULE 212, PUBLIC NOTIFICATION***
v ***SECTION 212(c)(1):***
This section requires a public notice for all new or modified permit units that may emit air contaminants located within 1,000 feet from the outer boundary of a school. This source is not located within 1,000 feet from the outer boundary of a school. Therefore, public notice will not be required by this section.

v ***SECTION 212(c)(2):***
This section requires a public notice for all new or modified facilities which have on-site emission increases exceeding any of the daily maximums as specified in subdivision (g). This equipment is proposed to replace an existing equipment with a net reduction in the combustion emissions (see Rule 1303 offset evaluation for emission summary). Thus, as shown in the following table, the emission increases from this project are below the daily maximum limits specified by Rule 212(g). Therefore, this application will not be subject to this section.

LB/DAY	CO	NOX	PM_{10}	ROG	Lead	SOX
MAX. LIMIT	220	40	30	30	3	60
INCREASES	0	0	0	0	0	0

v *SECTION 212(c)(3):*

The Tier 2 assessment indicated a cancer risk of 0.388 in a million for the residential receptor and 0.123 in a million for a commercial receptor due to toxic emissions from the natural gas combustion. Therefore, public notice will not be required by this section.

v *SECTION 212(g):*

This section requires a public notice for all new or modified sources which undergo construction or modifications resulting an emissions increase exceeding any of the daily maximum specified in the table below. As shown in the following table, the emission increases from this source are below the daily maximum limits specified by Rule 212(g). Therefore, public notice will not be required by this section.

LB/DAY	CO	NOX	PM_{10}	ROG	Lead	SOX
MAX. LIMIT	220	40	30	30	3	60
INCREASES	3	1	0	0	0	0

¤ ***RULES 401 & 402, VISIBLE EMISSIONS & NUISANCE***

With proper use of this equipment compliance with the provisions of these rules is expected. District database has no records of any visible emissions or nuisance complaints against this company from other similar equipment.

¤ ***RULES 404, 405 PARTICULATE MATTER CONCENTRATION& WEIGHT***

Compliance with these provisions is expected with proper operation of the equipment.

REGULATION XIII

Hitco Carbon Composites, Inc. is a NOx RECLAIM facility. Thus, compliance with Reg. XIII is still required for VOC, CO and PM10 emissions.

¤ ***RULE 1303(a), BEST AVAILABLE CONTROL TECHNOLOGY (BACT)***

The proposed regenerative thermal oxidizer with a 2.4 mm BTU/HR burner will be used to replace an existing direct-flame afterburner with 11.0 mm BTU/HR burner. The regenerative thermal oxidizer is expected to achieve a minimum VOC destruction efficiency of 95%. There is no BACT for CO emissions from the combustion of natural gas in oxidizers, and the VOC, SOx and PM_{10} emissions are below 1 lb/day. Therefore, compliance with BACT requirements is expected.

¤ ***RULE 1303(b)(1), MODELING***

Modeling is not required since PM10, and CO emissions are below the Table A-1 allowable emissions.

PM10 (lbs/hr)		CO (lbs/hr)	
Allowed	Actual	Allowed	Actual
1.9	0.017	17.1	0.36

¤ ***RULE 1303 (b)(2), EMISSION OFFSETS***

The proposed regenerative thermal oxidizer with a 2.4 mm BTU/HR burner will be used to replace an existing direct-fired afterburner with 11.0 mm BTU/HR burner. This will result in a net decrease in all criteria pollutant emissions as described in the Table below.

Criteria Pollutants	Emissions from A/N 344770 Existing APC being replaced	Emissions from A/N 492308 New APC being installed	Net emission change under this project
NOx	35	6	-29
CO	9	3	-6
VOC	2	0	-2
SOx	0	0	0
PM10	2	0	-2

⊙ ***RULE 1401, NEW SOURCE REVIEW OF CARCINOGENIC AIR CONTAMINANTS***

As discussed in this evaluation report, this equipment is expected to comply with the rule requirements. (MICR from the combustion of the natural gas is expected to be less than 1×10^{-6} and HIA &HIC to be below 1.)

⊙ ***RULE 2005, NEW SOURCE REVIEW FOR RECLAIM***

(c)(1)(A) Best Available Control Technology

The RTO burner will be used for start-up operation only to get the bed up to 1500^{0} F. Thus, NOx emissions are expected to be <1 lb/day with the usage of the burner for <504 minutes/day. A permit condition to automatically monitor and record the burner usage time will show compliance with this time limit.

(c)(1)(B) Modeling

Modeling is not required since NOx emissions of 0.119 lbs/hr are below the Table A allowable emissions of 0.31 lbs/hr..

(c)(2) Offsets
Hitco Carbon Composites Inc. holds sufficient RTCs to offset the NOx emission increase.

(g)(4)
A modeling analysis for plum visibility is not required since the net emission increase from the proposed project does not exceed 40 tons/year of NOx.

REGULATION XXX

This facility is in the RECLAIM program. The proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or hazardous air pollutants (HAPs), and a "minor permit revision" for RECLAIM pollutants to the RECLAIM/Title V permit for this facility.

Non-RECLAIM Pollutants or HAPs

Rule 3000(b)(6) defines a "de minimis significant permit revision" as any Title V permit revision where the cumulative emission increases of non-RECLAIM pollutants or HAPs from these permit revisions during the term of the permit are not greater than any of the following emission threshold levels:

Air Contaminant	Daily Maximum (lbs/day)
HAP	30
VOC	30
NOx*	40
PM_{10}	30
SOx*	60
CO	220

* Not applicable if this is a RECLAIM pollutant

To determine if a project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or HAPs, emission increases for non-RECLAIM pollutants or HAPs resulting from all permit revisions that are made after the issuance of the initial Title V permit shall be accumulated and compared to the above threshold levels. This proposed project is the 3rd permit revision to the renewed Title V permit issued to this facility on January 20, 2008. The following table summarizes the cumulative emission increases resulting from all permit revisions since the initial Title V permit was issued:

Revision	HAP	VOC	NOx*	PM_{10}	SOx	CO
1st Permit Revision: Add Device D203.	0	6	21*	4	0	22
2nd Permit Revision: Add Devices D205, D206, D208, 209 and D210.	0	2	0	0	0	0
3rd Permit Revision. Add Device C211	0	0	0	0	0	0
Cumulative Total	0	8	21*	4	0	22
Maximum Daily	30	30	40*	30	60	220

* RECLAIM pollutant, not subject to emission accumulation requirements

Since the cumulative emission increases resulting from all permit revisions are not greater than any of the emission threshold levels, this proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or HAPs.

RECLAIM Pollutants

Rule 3000(b)(12)(A)(v) defines a "minor permit revision" as any Title V permit revision that does not result in an emission increase of RECLAIM pollutants over the facility starting Allocation plus nontradeable Allocations, or higher Allocation amount which has previously undergone a significant permit revision process.

Since NOx is a RECLAIM pollutant for this facility, a separate analysis shall be made to determine if the proposed permit revision is considered a "minor permit revision" for RECLAIM pollutants. Section B of the Title V permit shows that this facility's NOx starting Allocation plus the non-tradable Allocation is 28,449 pounds. The proposed project is expected to result in an increase of 1 lbs/day (365 lbs/year) of NOx emissions from this permit revision, less than the starting Allocation plus the non-tradable Allocations of 28449 pounds. As a result, this proposed project is considered as a "minor permit revision" for RECLAIM pollutants.

RECOMMENDATION

The proposed project is expected to comply with all applicable District Rules and Regulations. Since the proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or hazardous air pollutants (HAPs), and a "minor permit revision" for RECLAIM pollutants, it is exempt from the public participation requirements under Rule 3006(b). A proposed permit incorporating this permit revision will be submitted to EPA for a 45-day review pursuant to Rule 3003(j). If EPA does not have any objections within the review period, a revised Title V/RECLAIM permit will be issued to this facility.