

## Air Permit Review

Permit Issue Date: **XX, 2008**

**Region:** Mooresville Regional Office  
**County:** Rowan  
**NC Facility ID:** 8000055  
**Inspector's Name:** Carlotta Adams  
**Date of Last Inspection:** 11/13/2007  
**Compliance Code:** W/In Violation W/regard To Proc Compliance

<b>Facility Data</b>			<b>Permit Applicability (this application only)</b>
<p><b>Applicant (Facility's Name):</b> National Starch Cedar Springs</p> <p><b>Facility Address:</b> National Starch Cedar Springs 485 Cedar Springs Road Salisbury, NC 28147</p> <p><b>SIC:</b> 2869 / Industrial Organic Chemicals,nec <b>NAICS:</b> 325188 / All Other Basic Inorganic Chemical Manufacturing</p> <p><b>Facility Classification: Before:</b> Title V <b>After:</b> Title V <b>Fee Classification: Before:</b> Title V <b>After:</b> Title V <b>Fee Classification: Before:</b> Title V <b>After:</b> Title V</p>			<p><b>SIP:</b> <b>NSPS:</b> <b>NESHAP:</b> <b>PSD:</b> <b>NSR Avoidance:</b> VOC - 2Q .0317 <b>NC Toxics:</b> 2Q .0711 <b>112(r):</b> <b>Other:</b></p>
<b>Contact Data</b>			<b>Application Data</b>
<b>Facility Contact</b>	<b>Authorized Contact</b>	<b>Technical Contact</b>	<p><b>Application Number:</b> 8000055.08C <b>Date Received:</b> 01/17/2008 <b>Application Type:</b> Modification <b>Application Schedule:</b> TV-Significant <b>Existing Permit Data</b> <b>Existing Permit Number:</b> 05279/T46 <b>Existing Permit Issue Date:</b> 03/28/2008 <b>Existing Permit Expiration Date:</b> 11/30/2008</p>
<p>David Simons Safety and Environmental Affairs (704) 642-6233 485 Cedar Springs Road Salisbury NC, 28147</p>	<p>Richard Steinert Site Manager (704) 633-1731 485 Cedar Springs Road Salisbury NC, 28147</p>	<p>David Simons Safety and Environmental Affairs (704) 642-6233 485 Cedar Springs Road Salisbury NC, 28147</p>	
<b>Review Engineer:</b> Jenny Kelvington, P.E.		<b>Comments / Recommendations:</b>	
<b>Review Engineer's Signature:</b> _____		<b>Issue</b> 05279/T47	
<b>Date:</b> _____		<b>Permit Issue Date:</b>	
		<b>Permit Expiration Date:</b> 11/30/2008	

### 1. Purpose of Application:

On January 17, 2008, the North Carolina Division of Air Quality (NC DAQ) received Air Quality Permit Application No. 8000055.08C for a significant modification to National Starch's existing air permit. The application seek the following changes:

- The connecting of the following Area 8 – PSA sources to the existing regenerative thermal oxidizer (ID No. CD-TO1) venting to halogen scrubber (ID No. CD-TO1S), for VOC destruction:
  - 2-ethylhexyl acrylate storage tank (ID No. CP123);
  - vinyl acetate storage tank (ID No. ST31);
  - isopropanol storage tank (ID No. HP107);
  - xylene storage tank (ID No. HP105);
  - butyl acrylate storage tank (ID No. HP101);
  - ethyl acrylate storage tank (ID No. HP102);
  - toluene storage tank (ID No. HP103);
  - heptane storage tank (ID No. ST38);
  - xylene storage tank (ID No. ST20);
  - methyl acrylate storage tank (ID No. HP108);
  - two bulk process tanks (ID Nos. HP200 and HP201);
  - catalyst shot pot (ID No. V800);

- tackifier tank (ID No. V801);
- two crosslinker tanks (ID Nos. V802 and V803);
- two monomer slow add tanks (ID Nos. V811 and V821);
- two solvent slow add tanks (ID Nos. V812 and V822);
- two catalyst slow add tanks (ID No. V813 and V823);
- four blend tanks (ID No. V814, V815, V824, and V825) with condensers (ID No. CDV814, CDV815, CDV824, and CDV825, respectively);
- reactor/process condenser R81X1 (ID No. R81) with vent condenser (ID No. CDR81X2); and
- reactor/process condenser R82X1 (ID No. R82) with vent condenser (ID No. CDR82X2).
- The increase of the number of Area 8- PSA batches allowed from 550 to 1,000 batches per year.

On January 29, 2008, in response to a “Notice of Intent to Construct,” NC DAQ granted National Starch permission to route various Area 8 – PSA exhaust streams to the existing thermal oxidizer (CD-TO1) with the stipulation that National Starch is not allowed to use the thermal oxidizer to control emissions from the affected sourced prior to receipt of a permit.

Changes to the Title V permit are as follows:

Page(s)	Section	Description of Change(s)
Cover	-	Amend permit revision numbers and issuance/effective dates.
8 and 9	Sec. 1, Table Area 8	Add thermal oxidizer ( <b>ID No. CD-TO1</b> ) venting to packed bed scrubber ( <b>ID No. CD-TO1S</b> ) as control devices for Area 8 sources.
18	Sec. 1, Table	Remove footnote 2 for control device ( <b>ID No. A3FDCD2</b> )
26	Sec. 2.1. D	Add thermal oxidizer ( <b>ID No. CD-TO1</b> ) venting to packed bed scrubber ( <b>ID No. CD-TO1S</b> ) as control devices for Area 8 sources.
40	Sec. 2.2. A.5.c.	Add n-hexane to the table of TAPs not exceeding the TPER.
41	Sec. 2.2.B.1.a.	- Change the “Hushpuppy” process limit from 550 to 1,000 batches per 12-month period - Require all Area 8 – PSA tanks and process equipment, with the exception of the heat-up of the reactor, the addition of monomer, catalyst, and solvent feed, and the removal of reactants, to be controlled by thermal oxidizer ( <b>ID No. CD-TO1</b> ). - Add requirement to maintain the minimum combustion bed temperature of thermal oxidizer ( <b>ID No. CD-TO1</b> ) at least 1,650°F at all times emissions from Area 8 operations are routed to the device for emission control.
41	Sec. 2.2.B.1.d	Require the operation of the thermal oxidizer ( <b>ID No. CD-TO1</b> ) to be monitored as provided in Section 2.1 F.5.c
50	Part II	Delete Part II

## 2. Application Chronology:

The application chronology is detailed on the attached IBEAM Reports.

## 3. New Equipment/Change in Emission and Regulatory Review

### Area No. 8 PSA Process

The applicant has requested that the allowed production for Area 8 – PSA be increased from 550 to 1,000 batches per 12-consecutive month period and that emissions from all reaction steps, with the exception of the heat-up of the reactor, the addition of monomer, catalyst, and solvent feed, and the removal of reactants, be routed to the existing thermal oxidizer for control.

VOC emissions are estimated using the “Emissions Master” software which uses Antoine, Clapeyron, Riedel equations and Raoult’s Law to predict partial pressure based on liquid molecular concentrations of various organic compounds and accounts for volume displacements in tanks, reactors, and process vessels due to transfers, heating, and container purging in emission calculations. This software can be found at (<http://www.mitchellsscientific.com/EmissionMaster.htm>). In the original review (Permit 05279T39) for the Area 8 –PSA process, the evaluation of the worst-case product for VOC and HAP is based on "Hushpuppy" production. Potential VOC and HAP emissions, with vent condenser control for the four blend tanks and both reactors, are estimated at 33.0 pounds and 17.4 pounds per batch, respectively. Additionally 2.1 tons per

year of VOCs/HAPs are emitted from the storage tanks. At 550 batches per year, the controlled potential VOC and HAP emissions are 11.2 tpy and 6.9 tpy, respectively.

In this application, National Starch used previous emission estimates obtained from the "Emissions Master" software for "Hushpuppy" production to determine after control emissions and assumed 98% emissions reduction for each step of the process that will be controlled by the thermal oxidizer. For each batch, the Emissions Master's program estimated uncontrolled VOC emissions at 59.3 pounds. The condensers currently associated with the reactors and blend tanks are expected to remove 26.4 pounds/batch of VOCs and the thermal oxidizer is expected to destroy another 19.6 pounds/batch of VOCs, assuming 98% control efficiency. Approximately 12.9 pounds of VOCs generated per batch (primarily from the heating of the reactors) will not be routed to any control device. VOC and HAP emissions from processing 1,000 batches are expected to 6.62 tpy and 6.32 tpy, respectively. With the production increase and thermal oxidizer control, potential VOC emissions decrease by 4.6 tpy and HAP emissions decrease by 0.6 tpy.

The recuperative thermal oxidizer (ID NO. CD-TO1) currently controls emissions from numerous sources at the EEM Organic Plants 1 and 2. After modification, the oxidizer will also be used to control VOC emissions from the following sources:

- 2-ethylhexyl acrylate storage tank (ID No. CP123)<sup>1</sup>;
- vinyl acetate storage tank (ID No. ST31)<sup>1</sup>;
- isopropanol storage tank (ID No. HP107)<sup>1</sup>;
- xylene storage tank (ID No. HP105)<sup>1</sup>;
- butyl acrylate storage tank (ID No. HP101)<sup>1</sup>;
- ethyl acrylate storage tank (ID No. HP102)<sup>1</sup>;
- toluene storage tank (ID No. HP103)<sup>1</sup>;
- heptane storage tank (ID No. ST38)<sup>1</sup>;
- xylene storage tank (ID No. ST20)<sup>1</sup>;
- methyl acrylate storage tank (ID No. HP108)<sup>1</sup>;
- two bulk process tanks (ID Nos. HP200 and HP201);
- catalyst shot pot (ID No. V800);
- tackifier tank (ID No. V801);
- two crosslinker tanks (ID Nos. V802 and V803);
- two monomer slow add tanks (ID Nos. V811 and V821);
- two solvent slow add tanks (ID Nos. V812 and V822);
- two catalyst slow add tanks (ID No. V813 and V823);
- four blend tanks (ID No. V814, V815, V824, and V825) with condensers (ID No. CDV814, CDV815, CDV824, and CDV825, respectively);
- reactor/process condenser R81X1 (ID No. R81) with vent condenser (ID No. CDR81X2); and
- reactor/process condenser R82X1 (ID No. R82) with vent condenser (ID No. CDR82X2)

1. The thermal oxidizer (ID No. CD-TO1) will control emissions from the storage tanks **only** when material is being transferred from these tanks to the process.

Mr. Graham Donaldson, the consultant who prepared the application, was asked to explain how the thermal oxidizer would be able to control the Area 8 – PSA processes in addition to the sources it now controls given that it is sized to handle 1,000 scfm of incoming air and that the May 2005 application for this control device appears to show that 1,000 scfm of air enters the oxidizer from the EEM Organic Plants. Mr. Donaldson explained that the thermal oxidizer was originally designed to control Area 8 – PSA processes as well as EEM sources. The combined exhaust streams from the EEM and PSA areas are approximately 1,000 scfm. The thermal oxidizer has been operating under capacity and will operate as designed following modification. At the design airflow, turbulence within the oxidizer will increase and should enable greater VOC destruction.

According to the permit application, the thermal oxidizer operates at 1650 °F, with a 1 second residence time, and destroys 98% of VOC emissions. The compounds expected to be present in the exhaust streams from the Area 8 – PSA process include acrylic acid, ethyl acetate, ethyl acrylate, n-hexane, toluene, vinyl acetate, and xylene. Of these, toluene has the highest auto ignition temperature (AIT, the temperature at which a flammable mixture is capable of self igniting), at 997 °F. Provided that sufficient turbulence is present within the oxidizer, a thermal oxidizer operating at more than 550 °F above the

highest AIT and one second residence time (which this oxidizer does) is capable of achieving 99% or greater control efficiency. Thus, the applicant's 98% control efficiency estimate appears reasonable. The gases leaving the thermal oxidizer will continue to enter the post-packed bed scrubber (ID No. CD-TO1S). The post-scrubber is used to control acid gas emissions that result from the incineration of halogen compounds emitted from the EEM Organic processes. Mr. Graham Donaldson, licensed engineer in the State of North Carolina, certified the application, including Form C3, which states thermal oxidizer will provide 98% VOC destruction for controlled Area 8 emission sources.

The applicable regulations are:

15A NCAC 2D .0958 - Work Practices for Sources of Volatile Organic Compounds

15A NCAC 2D .1806 - Control and Prohibition of Odorous Emissions (State Enforceable Only)

15A NCAC 2Q .0711 - Toxic Air Pollutant Emission Rates Requiring a Permit (State Enforceable Only)

15A NCAC 2Q .0317 - Avoidance Conditions

- for 15A NCAC 2D .0531: Non-Attainment New Source Review (See Section V of this review for additional detail)
- for 15A NCAC 2D .1111: Maximum Available Control Technology (See Section IV.D. of this review for additional detail)

#### 15A NCAC 2D .0958

This regulation requires that work practice standards be implemented for sources of VOC. Monitoring, recordkeeping and reporting is required for each activity as may be applicable. The Permittee will be responsible for identifying each source and developing specific monitoring protocols and corresponding record log(s). Compliance with this requirement is expected to continue following modification.

#### 15A NCAC 2D .1806

This regulation requires the facility to take measures to prevent objectionable odors beyond the facility boundary. As odorous emissions are not expected to increase as a result of this modification, continued compliance is expected.

#### 15A NCAC 2Q .0711

This rule allows facility wide emission of TAPs to be exempt from ambient impact assessment provided emissions remain below the listed toxic pollutant exemption rates (TPERs). The applicant has stated that this process will result in four TAPs, ethyl acetate, n-hexane, toluene, and xylene, however, facility-wide emissions of these TAPs will remain below their respective TPER.

<b>Toxic Air Pollutant</b>	<b>TPER</b>	<b>Pre-Modification</b>	<b>Post-Modification</b>
ethyl acetate	36 lb/hr	2.58 lb/hr	0.10 lb/hr
n-hexane	23 lb/day	below TPER	0.11 lb/day
toluene	14.4 lb/hr; 98 lb/day	4.0 lb/hr; 5.9 lb/day	0.034 lb/day
xylene	16.4 lb/hr; 57 lb/day	below TPER	4.6E-4 lb/day

This condition will be updated to include n-hexane as a toxic air pollutant emitted facility-wide below the TPER.

#### 15A NCAC 2Q .0317 Avoidance of 15A NCAC 2D .0531

This facility is located in a non-attainment area for ozone where plant modifications may be subject to the New Source Review Offset Interpretive Rule if potential emissions of VOC or NO<sub>x</sub> exceed 40 tons per year. To avoid non-attainment area new source review for the Area 4 and 8 sources added in 2005, the facility opted to take a 40 tons per year limit for VOCs. The permit limited "Hushpuppy" processing to 550 batches per year and required VOC emissions from the four blend tanks and both reactors to be controlled with vent condensers. Avoidance will be maintained at the increased production rate of 1,000 batches per year with condenser and thermal oxidizer control. Potential VOC emissions will actually decrease by 4.6 tons per year.

#### 15A NCAC 2Q .0317 Avoidance of 2D .1111 (40 CFR 63, Subpart FFFF)

To avoid applicability of the Miscellaneous Organic Chemical NESHAP (40 CFR 63, Subpart FFFF), National Starch requested in permit application No. 8000055.07A, a MACT avoidance limit. While potential HAP emission rates from the facility have exceeded major source thresholds, actual HAP emissions in previous years have been less than 10 tpy of any individual HAP and 25 tpy of total, combined HAP. Actual individual and total HAP emission rates reported in the 2005 and 2006 emissions inventories did not exceed 5 tpy and 20 tpy, respectively. To demonstrate compliance with the facility-

wide HAP emission limitations, each month National Starch is required to calculate and record actual HAP emissions for the previous calendar month and the previous 12-month calendar period. Actual HAP emissions are expected to decrease following this modification.

#### 4. PSD and Non-Attainment Area New Source Review (NAA-NSR) Issues:

According to the review prepared by Fern Paterson for Permit 05729T45, "National Starch is located in Rowan County, which is designated as attainment for NO<sub>x</sub>, PM-10, CO, SO<sub>2</sub>, and lead and as non-attainment for ozone under the 8-hour ozone standard. Therefore, proposed modifications must be evaluated to determine whether permitting is required under the Prevention of Significant Deterioration (PSD) program pursuant to 15A NCAC 2D .0530 or the Non-Attainment New Source Review (NNSR) program pursuant to 15A NCAC 2D .0531. National Starch, which is a chemical processing plant with a 100-tpy major source threshold, is an existing major source under the PSD program. All modifications at the Specialty Products Group processes, including Areas 4 and 8, are considered to be a single project because they occurred within two years of each other and they are within a single business unit." The modification is not subject to PSD/NNSR permitting as summarized below:

##### Summary of Emissions Increases

Pollutant	PM-10 (tpy)	VOC (tpy)
Area 4 – Resyns Line (2005)	5.56	15.4
Area 4 – Resyns Line (2008)	+2.37	no change
Area 8 – PSA Process (2005)	0	18.1
Area 8 – PSA Process (2008)	no change	-4.8
<b>Total Emissions Increases</b>	<b>7.93</b>	<b>28.9</b>
<i>PSD Significant Emission Rate</i>	<i>15</i>	<i>N/A</i>
<i>NNSR Significant Emission Rate</i>	<i>N/A</i>	<i>40</i>
PSD/NNSR Permitting Required?	No	No

#### 5. Facility Compliance Status:

Ms. Carlotta Adams of the Mooresville Regional Office (MRO), with assistance from Mr. Joe Foutz and Ms. Tonisha Dawson, inspected the facility on November 7, 8, and 13, 2007 and identified several issues of non-compliance with toxic requirements. On February 15, 2008, National Starch received a notice of violation (NOV) for not having a daily record of hourly formaldehyde and ammonia emission rates, for not installing and operating a nitrogen suppression system to control methylene chloride emissions from tank operations, and for not conducting required monitoring, inspection, and maintenance of the LUWAC condenser pursuant to 5A NCAC 2D .1100 (state-enforceable, only). No civil penalties have been assessed at this time. On August 8, 2007, MRO issued to National Starch a NOV for exceeding a 40 ton per year (tpy) VOC emission limitation in May 2007 and July 2007 at their Littleford Drying System No. 2 (Area I) pursuant to 15A NCAC 2D .0317. A civil penalty of \$10,325 was assessed.

The proposed modifications are limited to Area 8 processes; processes which do not emit formaldehyde, ammonia, or methylene chloride and are separate from Area I. During the last inspection, these processes appeared to be operating in compliance with all applicable permit conditions and are expected to remain in compliance following permit modification.

#### 6. Draft/Proposed Permit Reviews:

- Ms. Carlotta Adams of the Mooresville Regional Office (MRO) was provided a draft permit and permit review document on March 19, 2008 and requested no changes.
- Mr. David Simons (National Starch) was provided a draft permit for review on March 19, 2008. Mr. Simons provided one comment on March 20, 2008. Contrary to what is listed in the draft permit, the thermal oxidizer only controls VOC emissions from the storage tanks when materials stored in the tanks are transferred to the PSA Process.
- A 30-day Public Notice period is required for this application. A Public Notice of Intent to Issue an Air Quality Permit was published in The Salisbury Post (legal classifieds) on XX, 2008. The public comment period ended on XX, 2008. <ADD INFO>

- A 45-day U.S. EPA Review period IS required for this application. Ms. Katy Forney and Ms. Gracy DeNois (U.S. EPA, Region IV) were provided electronic copies of the draft permit and draft permit review document on XX, 2008. The 45-day period ended on XX, 2008. <ADD INFO>

## 7. Other Regulatory Considerations

- The application fee of \$867.00 was received on March 17, 2008.
- The Reduction and Recycling Form was received on January 17, 2008.
- Mr. Graham C. Donaldson, a professional engineer licensed in the State of North Carolina, sealed the sections of the application relating to the thermal oxidizer.
- A zoning consistency determination is not required since there are not any new processes or equipment that will be added.

## 8. Title V Permit History

The following list provides a very brief summary of Title V permit revisions for this facility relevant to this modification:

<u>Permit No</u>	<u>Issuance Date</u>	<u>Description of Revision</u>
05279T35	November 2003	Initial Title V permit.
05279T39	September 2005	Significant modification to add reactor to Area 4 for "Resyn" product line, add new production area with two reactor trains (Area 8; PSA), add a new production area with one reactor train (EEM Organics Plant 2), and route emissions from the EEM Plant 1 scrubber (ID No. CD-PPS-1) to the EEM Plant 2 thermal oxidizer and post scrubber.
05279T45	March 2008	Fulfill the "Part II" significant modification requirement for the emissions sources and modifications associated with 05279T39 and establish a MACT Avoidance limit pursuant to 15A NCAC 2Q .0317 to avoid applicability of the Miscellaneous Organic Chemical NESHAP (40 CFR 63, Subpart FFFF).
05279T46	March 2008	Minor modification to add bagfilter as optional control for the Area 4 Resyn fluid bed dryer.

## 9. Recommendations

The permit modification application for National Starch Cedar Springs, located in Salisbury, Rowan County, North Carolina have been reviewed by NC DAQ to determine compliance with all procedures and requirements. NC DAQ has determined that this facility appears to be complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources.

The MRO and RCO recommend issuance of permit revision 05279T47.