NORTH CAROLINA DIVISION OF AIR QUALITY

Air Permit Review including RACT Requirements
(in conformance with Section 172(c) of the CAA)

Permit Issue Date XX XX, 2010

Region: Mooresville Regional Office
County: Rowan
NC Facility ID: 8000182
Inspector's Name: Carlotta Adams
Date of Last Inspection: April 9 and 20, 2009
Compliance Code: C / In Non-Compliance With Procedural Reqr

Facility Data

Applicant (Facility's Name): Akzo Nobel Surface Chemistry LLC.
(Formerly National Starch and Chemical Company)

Facility Address:
Akzo Nobel Surface Chemistry LLC.
485 Cedar Springs Road ., Unit A
Salisbury, NC 28147

SIC: 2869 / Industrial Organic Chemicals, nec
NAICS: 325199 / All Other Basic Organic Chemical Manufacturing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 2D .0951
NSPS:
NESHAP:
PSD:
PSD Avoidance
NC Toxics:
112(r):
Other: RACT for existing sources

Contact Data

Facility Contact	Authorized Contact	Technical Contact
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Application Data

Application Number: 8000182.09E
Date Received: 05/12/2009
Application Type: Modification
Application Schedule: TV-Sign-501(c)(2)

Existing Permit Data
Existing Permit Number: 09900/T06
Existing Permit Issue Date: February 16/2010
Existing Permit Expiration Date: October 31, 2014

Review Engineer: Charles F. Yirka

Review Engineer's Signature: **Date: XX XX, 2010**

Comments / Recommendations:
Issue 09900/T07
Permit Issue Date: XX XX, 2010
Permit Expiration Date: October 31, 2014

I. Purpose of Application

Akzo Nobel Surface Chemistry LLC (Akzo Nobel) is requesting modification to the Title V permit pursuant to 2Q .0513 to address RACT[1] applicability for existing sources. The former National Starch and Chemical Company (National Starch) was split into two distinct facilities with separate ownership, management, and permit; Akzo Nobel and Indopco, dba Henkel (Indopco). This application was processed as a significant modification pursuant to 15A NCAC 2Q .0501(d) since this modification requires a case-by-case determination for RACT applicability and the permit includes requirements not previously addressed.

[1] "Reasonably available control technology" (also denoted as RACT) means the lowest emission limit, which a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. It may require technology, which has been, applied to similar, but not necessarily identical, source categories.

Akzo has the potential to emit over 100 TPY of VOC resulting from batch specialty chemical synthesis. The facility appears to be a minor source with potential NOx emissions of less than 100 TPY. NOx emissions result from the firing of natural gas and from a flare used for ammonia emissions control. The NOx PTE was last established in permit 09900T06. The area in which the facility is located is the Metrolina ozone non-attainment area. As a result, it appears that RACT would only apply to sources of VOC emissions.

The primary source of information used to develop this permit is the air permit application. This permit review is for the application of existing source RACT requirements and intends to convey all pertinent emissions data, rules, policies, and engineering assumptions used to create the Title V operating permit.

In summary:

- A RACT avoidance condition for Indopco was not required. Its predecessor, National Starch, was split up before the final compliance date of the RACT (April 1, 2009).
- RACT applies to Akzo Nobel as before control VOC emissions exceed100 tpy.
- RACT applies to the new Firebird process at Akzo Nobel. The CTG Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products EPA-450 2-78-029 appeared to apply to this new process as this RACT applied to a "similar but not identical source category". See the definition of RACT (footnote on page 1 of this review).
- Since this CTG - RACT applied to the new Firebird process the CTG would appear to apply to the similar existing sources.

II. Facility Description

Akzo Nobel manufactures several specialty polymer products including glue used in hair mousse and other compounds (Area I), sulfonated polystyrenes (Area II), ultraviolet absorbing resin used in hair spray (Area III Old Pilot Plant), and monomers (Area IV Cosmetics Plant) at its facility located in Salisbury, Rowan County, North Carolina. Until October 7, 2008, the facility operated under Permit No. 5279T46, which was issued to National Starch. National Starch previously owned and operated the specialty polymer operations along with the production of pressure sensitive adhesives (PSA) and specialized electronics industry chemicals (e.g., adhesives used for computer chips). In April 2008, Akzo Nobel purchased the specialty polymer plant operations and Indopco acquired the PSA and electronics industry chemical operations.

III. Permit History

Following is an abbreviated chronology of permit actions:

December 31, 2003 – the initial air quality permit (05279T35) was issued to National Starch.

March 17, 2004 to June 27, 2008- thirteen permit revisions (05279T36 to 05279T48) were made to add, delete, and relocate emission sources, re-route emissions to control devices, model toxic emissions, and perform administrative changes to the permit.

June 6, 2007 - the DAQ provided notification that RACT may apply to National Starch

July 27, 2007- Response from National Starch requesting 120 day extension for RACT

November 28, 2007 - Response from DAQ granting extension for RACT

January 28, 2008 - Date of RACT application received February 1, 2008 for National Starch and Chemical Company

February 14, 2008- Acknowledgment letter issued. Request for additional information and application 8000055.08E created

February 28, 2008 – National Starch submitted an application [8000055.08F] requesting the renewal of Permit No. 05279T45. The request included the renewal of the permit for the specialty polymer operations sold to Indopco, dba Henkel.

October 7, 2008 – Permit 05279R49 was issued to Indopco, dba Henkel for the PSA and specialized electronics industries operations, formerly owned by National Starch facility. Permit No. 09900T00 was issued to Akzo Nobel for the specialty polymer products manufacturing, formerly owned by National Starch.

November 25, 2008- Akzo Nobel submitted a permit application [8000182.08D] for the renewal of their Title V permit.

November 30, 2008 – Expiration date for Akzo Nobel's permit. The permit remained in effect until a decision was made concerning the request for permit renewal.

January 2009 - RACT application was revised addressing Akzo RACT applicability only.

April 1, 2009 – Compliance date for the VOC RACT as per 2D .0909(d)(1)(c).

April 16, 2009 – Permit 09900T01 was issued as an administrative amendment to change the facility name from Akzo Nobel SPG, LLC to Akzo Nobel Surface Chemistry LLC.

May 27, 2009 – Permit 09900T02 was issued as Part I of a significant modification to allow Akzo Nobel to operate the Area 4 Zephyr process under an alternative operating scenario in which the use of condensers for VOC emissions control is not required.

June 8, 2009 – Permit 09900T03 was issued as a minor modification to increase the allowable ammonia emissions released from the ammonia flare (ID No. MV2F) to 21.5 pounds per hour, the value for which a modeling demonstration showed compliance with the ammonia AAL.

June 19, 2009 – NC DAQ published a public notice for draft Permit 09900T04 and sent a copy of the draft permit to the EPA for comments. This permit revision removes a NAA NSR avoidance that is no longer applicable to the facility.

July 7, 2008 - NC DAQ granted Akzo Nobel permission to construct the Firebird process emission sources as requested in the Notice of Intent to Construct Application No. 8000055.08J

August 5, 2009 - Permit 09900T04 issued to Akzo for modification removing PSD avoidance limit 8000182.09D

August 20, 2009 - Akzo Nobel submitted a revised application to add the proposed Firebird process.

October 9, 2009 - DAQ requests additional information regarding existing source RACT.

October 19, 2009 – Teleconference with Akzo to discuss RACT application modifications as per request for additional information from DAQ.

November 24, 2009 – Permit 09900T05 was issued for new Firebird process

December 24, 2009 – RACT application was amended for existing sources

February 16, 2010 – Permit 09900T06 was issued for additional boiler, facility remains minor source for NOx

March 16, 2010 – Draft permit and review sent to supervisor for comments

April 20, 2010 – Comments received from supervisor re Draft permit and review

May 13, 2010 – Draft permit and review with supervisor questions sent to applicant for comments

June 18, 2010 – Comments on permit review received from applicant. No comments regarding Draft permit

XX XX, 2010 – Proposed permit sent to public notice and EPA review.

XX XX, 2010 – Public notice and EPA review of Proposed permit over.

XX XX, 2010 – Issue permit

IV. Facility Compliance Status

The DAQ has reviewed the compliance status of this facility. Ms. Carlotta Adams of the Mooresville Regional Office (MRO), with assistance from Mr. Joe Foutz inspected the facility on April 9, 2009 and April 20, 2009. Ms. Adams identified one item of non-compliance with a NAA NSR avoidance condition limiting VOC emissions from Area 4 sources and miscellaneous process tanks to less than 40 tons per year. Vent condensers controlling emissions from the Zephyr process were operating above the permitted maximum temperature of 15 ^{o}C. This non-compliance issue was resolved with the issuance of Permit No. 09900T02, which allows the Zephyr process to operate under an alternative operating scenario not requiring condenser control. On August 25, 2009, Mr. Frank King (MRO) conducted a 112(r) inspection and found the facility operating in compliance with all applicable requirements. Continued compliance is expected.

V. Regulatory Approach for RACT Applicability

The applicable CTG, RACT, and thus the regulatory approach, were established and applied with the permitting of the Firebird process. Given there are no RACT determinations, the CTG; "Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products" (EPA-450 2-78-029, December 1978) was
applied to this new process as this RACT applies to a "similar but not identical source category". Guidance in an EPA publication entitled "Enforceability Aspects for RACT for the Chemical Synthesis Pharmaceutical Industry" (EPA-340/1-80-016; January 1981) was followed for the reactor, centrifuge, dryer, and solvent recovery system. As the other existing processes at Akzo appear to be similar to the Firebird process, the same CTG was followed.

1. 15A NCAC 2D .0951: MISCELLANEOUS VOLATILE ORGANIC COMPOUND EMISSIONS

Akzo Nobel is located in Rowan County, which is part of the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone non-attainment area (also called the "Metrolina" non-attainment area). In accordance with 15A NCAC 2D .0902(f) (VOC) and 15A NCAC 2D .1402(e) (NOx), sources located in the Metrolina non-attainment area with potential VOC and/or NOx emissions greater than 100 tpy or 560 pounds per day (between May 1 and September 30) are required to determine and implement RACT. Akzo Nobel has the potential to emit greater than 100 tpy VOC, and is therefore subject to the VOC RACT rules. This regulation requires the facility to install and operate reasonable achievable control technology (RACT) for the both existing processes and the new processes including the Firebird Process, a new process for which a permit was recently issued.

The facility assessed the feasibility of implementing control technologies including carbon adsorption, thermal and catalytic oxidation, and absorption (scrubbers) for VOC emissions for the RACT evaluation. A wide range of hydrocarbon, chlorinated and alcohol solvents are used. The wide variety of solvents limits the viability of adsorption because different solvents adhere at different rates for different adsorbents. While it is likely that a system could be designed to

handle such variability, this type of system was not identified in the literature or data searches. These systems would not be reasonably available for AKZO to consider. Therefore, **adsorption is considered technically infeasible with the exception of a subset of the 20 tanks with potential emissions**. As a representative tank, the tank with the highest emissions was used in the analysis as the cost for each individual canister system would be nearly the same. The costs were based on the design and engineering for installation on 20 different Flammable Liquid tanks which would need to meet OSHA PSM and EPA RMP requirements, for purchase, installation, tank fittings, racking, piping, individual canisters with periodic replacement and maintenance of the carbon, flame arrestors, back flow preventors, and pressure relief devices, and periodic waste disposal of the carbon. As the following table demonstrates **the cost effectiveness is not reasonable for RACT**:

Source	Cost Effectiveness
Maximum Emission Tank	$7,064/ton VOC

Thermal oxidation is effective at reducing VOC (non-acidic and non-halogenated) emissions. The Celquat and Littleford are in close proximity therefore these sources were evaluated together. The costs of the existing thermal oxidation system THOX (now in use and associated with Indopco) were used in the analysis (excluding the cost for the scrubbers associated with acid gas controls). Another option evaluated was a control system for all sources, essentially a duplicate of the existing system. As the following table demonstrates **the cost effectiveness is not reasonable for RACT**:

Source	Cost Effectiveness
Celquat and Littleford	$4,340/ton VOC
All manufacturing lines	$4,399/ton VOC

Page 10 of the revised application indicated **catalytic oxidation was not a technically feasible option** for batch operated process units due to the unsteady state conditions yielding varying concentrations and pollutants.

Scrubbers would appear to be a technically feasible option for IPA abatement as IPA is miscible in water however Celquat and the Littleford dryers VOC emissions are a mixture of isopropyl alcohol and IsoparE^{TM} from ExxonMobil Corporation. EPA Air Pollution Control Technology Fact Sheet EPA-452/F-03-015 states that the typical collection efficiencies for wet scrubbers controlling VOCs range from 70 to greater than 99 percent. Though IPA appears to be readily removed by water the Isopar is not soluble and may separate and may require the addition of an organic solvent. The applicant did not provide the cost of providing this type of control but noted that it would require moderate capital investment and moderate to significant operating costs, have potentially significant environmental impacts, and have significant space demands. **Scrubbers though feasible for IPA only are deemed technically infeasible for mixtures of solvent.**

Condensers are considered technically feasible. It was established that the RACT proposed for the **recently permitted Firebird process** was chilled water condensers with the outlet temperature not exceeding **25 ^{o}C**. With condensers, **97 percent** of the VOCs (IPA-isopropyl alcohol) used is expected to be reclaimed for reuse in the process.

A review of the EPA's RACT/BACT/LAER Clearinghouse (RBLC) shows no RACT determinations for facilities with the same SIC or NAICS as Akzo Nobel. The database also lists no RACT determinations for chemical manufacturing facilities similar to the Firebird process or

any existing processes at Akzo Nobel. Given that there are no RACT determinations, guidance in an EPA publication entitled "Enforceability Aspects for RACT for the Chemical Synthesis Pharmaceutical Industry" (EPA-340/1-80-016; January 1981) is followed for the all reactors, centrifuges, dryers, solvent recovery systems and storage tanks. This document states that where surface condensers are to be used as the control device for RACT, the following outlet gas temperature must not exceeded:

- -25 ^{o}C when condensing VOC of vapor pressure greater than 40 kPa (5.8 psi) measured at 20 ^{o}C.
- -15 ^{o}C when condensing VOC of vapor pressure greater than 20 kPa (2.9 psi) measured at 20 ^{o}C.
- 0 ^{o}C when condensing VOC of vapor pressure greater than 10 kPa (1.5 psi) measured at 20 ^{o}C.
- 10 ^{o}C when condensing VOC of vapor pressure greater than 7 kPa (1.0 psi) measured at 20 ^{o}C.
- 25 ^{o}C when condensing VOC of vapor pressure greater than 2.5 kPa (0.5 psi) measured at 20 ^{o}C.

Additionally, this publication calls for a 90% reduction in VOC emissions from air dryers and production equipment exhaust systems if potential emissions are at least 330 pounds per day. All centrifuges and filters having an exposed liquid surface must be enclosed if the liquid exerts a total VOC vapor pressure of 0.5 psi or more at 20 ^{o}C.

For the Firebird process the vapor pressure of IPA at 20 ^{o}C was estimated using the Antoine Equation at 0.6 psi.

The RACT proposed by Akzo Nobel for the Firebird process appeared reasonable as it provides the control consistent with the EPA recommendations in the above referenced guidance document. The maximum outlet gas temperature of 25 ^{o}C proposed for the Firebird condenser is appropriate since the vapor pressure of IPA is between 0.5 and 1.0 psi at 20 ^{o}C. Potential VOC emissions from all of the Firebird processes are 145 pounds per day and thus the 90% reduction in VOC emissions is not necessary. Akzo Nobel will minimize VOC emissions by reclaiming approximately 97% of the IPA used in the process. All liquid/solid separation is achieved by the centrifuge which, during normal operations, has no liquid surfaces exposed to the atmosphere. Therefore, no enclosures are needed. **For the Firebird process RACT, the permit required that VOC emissions from the reactor, condenser, dryer, and solvent recovery system be controlled by condensers with an outlet temperature not greater than 25 ^{o}C.**

Evaluation of Condensers as RACT for Existing Processes:
The RACT proposed by Akzo Nobel for the Firebird process appeared to be applicable to the existing processes. The larger emissions sources e.g. Littleford dryers were identical to the new Firebird process. Furthermore, it appears as with the Firebird process the applicable CTG would dictate that VOC emissions (based on the vapor pressure from the reactors, condensers, dryers, and solvent recovery systems) be controlled by condensers with a CTG specified outlet temperature not greater than a specified value in ^{o}C**.** Finally, it appears the CTG may dictate the % reduction in VOC emissions based on the daily emissions rate.

<u>Cost Effectiveness - Based on CTG Dictated Condenser Temperatures</u>
To determine the potential control efficiency of the condensers as applied to the existing source (which may have a secondary condenser), the emissions on a pound per batch basis were calculated for the existing systems performance to the design target temperature which is 10 ^{o}C below the CTG document. A summary of the performance levels is summarized below:

Area - Source	Batch	CTG Temperature	Akzo Design Target Temperature	Existing VOC lb/batch	Revised VOC lb/batch	Marginal Control Efficiency

1 - Littleford Dryers	NA	25C	15C	NA	NA	10% *est.*
1 - Celquat	936-01	25C	15C	14.47	13.39	7%
1 - Starch Synthetics	933-42	25C	15C	4.27	2.93	31%
2 - SPS	931-46	0C	-10C	6.91	0.768	89%
2 - Specialty Chemicals	25-269A	25C	15C	1.61	0.934	42%
3 - OAA	937-57	25C	15C	10.16	5.90	42%
3 - Cosmetics	28-2930	0C	-10C	81.07	10.96	86%

For the process areas, Celquat, Starch Synthetics, Specialty Chemicals and OAA, the existing secondary condensers perform at a level that is only marginally above the RACT level in the CTG. These process areas, as a result, would not see significant reduction by the addition of/increased performance in the secondary condensers. SPS and Cosmetics, however, could see significant reduction potential due to the more volatile solvents present in those areas. The Littleford dryers are already equipped with a condenser system for the avoidance of major source review. The Littleford Dryers are used to dry the product from the Celquat lines and the existing temperature level within this area is near that of the RACT level. It is likely that the level of performance is similar to the Celquat as it is the same solvent and similar performance levels. Consequently the Little ford dryers are conservatively estimated at a control efficiency of 10%.

Akzo Nobel indicated the seven process areas could potentially add or improve condenser function. Since the location of each area and the level of performance was dictated by the CTG each area was considered separately. The following table summarizes the results presented in Table 5 of the application:

Area - Source	**Cost Effectiveness**
1 - Littleford Dryers	$6,765/ton VOC
1 - Celquat	$924,491/ton VOC
1 - Starch Synthetics	$44,820/ton VOC
2 - SPS	$1,092,436/ton VOC
2 - Specialty Chemicals	$128,618/ton VOC
3 - OAA	$152,243/ton VOC
3 - Cosmetics	$32,464/ton VOC

As the above table demonstrates **the cost effectiveness appears to exceed that considered acceptable for RACT. RACT is no additional control.**

Summary

The CTG for the pharmaceutical industry was considered as a potentially applicable strategy in establishing case-by-case RACT for Akzo-Nobel even though the SIC, NAICS codes differed. The CTG appears to be concerned with currently uncontrolled (i.e. beyond reflux condensers) emissions of VOC greater than 15 lb/day. The CTG prescribes condensers temperatures and efficiency depending on the vapor pressure of the material and the amount of VOC emissions per day. The existing systems already use condenser systems for reactors, dryers, etc. and vapor-balance/conservation vents on storage tanks. The focus of the analysis was therefore on the marginal reductions of VOC.

Regulatory RACT Review for the new Area 1- Firebird Process

The Firebird process was addressed in the previous permit 09900T05 and review. This process consisted of a reactor, centrifuge, tanks (wash, filtrate, reclaim, and storage), solvent recovery, and a dryer. RACT was determined to be the existing condensers. The applicable CTG prescribed operating temperatures as a function of vapor pressures. As these processes employ the solvent IPA, RACT requires the operating temperature to be a maximum of 25°C.

A. Area I – New Firebird Process

The following table summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area I: Firebird Process			
R-90 CTG-1(a), CTG-1(b) **RACT**	reactor (4,000 gallon capacity)	C900-X1	condenser
C-900 CTG-1(a), CTG-1(b) **RACT**	centrifuge	C900-X1	condenser
V-91 through V-93 CTG-1(a), CTG-1(b) **RACT**	three wash tanks	C900-X1	condenser
V-94 through V-97 *****	four filtrate tanks (10,000 gallon capacity each) located at the Tank Farm	N/A	N/A
V-98 and V-99 CTG-1(b) **RACT**	two isopropyl alcohol reclaim tanks (15,000 gallon capacity each	V98-X1	condenser
CP-900 CTG-3(a), CTG-3(b)	98% IPA storage tank (20,000 gallon capacity)	N/A	N/A
Tank 51 CTG-3(a), CTG-3(b)	86% IPA storage tank (10,000 gallon capacity)	N/A	N/A
Tank 64 CTG-3(a), CTG-3(b)	10% IPA storage tank (2,000 gallon capacity)	N/A	N/A
Tank 48 CTG-3(a), CTG-3(b)	IPA test tank (10,000 gallon capacity)	N/A	N/A
SRSF1 CTG-1(a), CTG-1(b) **RACT**	One solvent recovery system	DC9001-X2	condenser
LDS3 CTG-1(a), CTG-1(b) **RACT**	Littleford drying system No. 3	CD-LDS3; LF3-X1 and LF3-X2	internal fabric filter venting to two parallel condensers

RACT as prescribed by the applicable CTG:

CTG-1(a) **<u>This applied:</u> For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **<u>This applied:</u> If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) 25 °C when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi). (IPA vapor pressure at 20 °C is 0.6 psi).**

CTG-3(a) **<u>This did not apply due to vapor pressure (IPA 0.6 psi):</u> For storage tanks storing VOC with a vapor pressure greater than 28 kpa (4.1 psi) at 20 °C a 90% effective vapor balance or equivalent, on**

delivery to all tanks greater than 7,500 liters (2,000 gallons) capacity except where tanks are equipped with floating roofs, vapor recovery, or equivalent.

CTG-3(b) **This did not apply due to vapor pressure (IPA 0.6 psi): For storage tanks storing VOC with a vapor pressure greater than 10 kpa (1.5 psi) at 20 °C, require pressure/vacuum conservation vents set at ± 0.2 kPa, except where more effective control is used.**

B. Area I

The following table contains summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area I			
ES-A1-1 CTG-1(a), CTG-1(b)	Littleford Drying System No.1	CD-A1-LDF-BF1, CD-A1-LDF-C1a, and CD-A1-LDF-C1b	internal fabric filter (43 square feet of filter area) venting to two parallel condensers (75 and 25 square feet of surface area, respectively)
ES-A1-2 CTG-1(a), CTG-1(b)	Littleford Drying System No.2	CD-A1-LDF-BF2 and CD-A1-LDF-C2	internal fabric filter (24 square feet of filter area) venting to a condenser (220 square feet of surface area)
ES-A1-3 [1]	Littleford packout system	CD-A1-LDF-BF3	internal fabric filter (33 square feet of filter area)
C-1 CTG-1(a), CTG-1(b)	centrifuge process	CD-A3-2-X2-C-1	condenser
CP-12*	process vessel	N/A	N/A
R1 CTG-1(a), CTG-1(b)	chemical reactor vessel (5,500 gallons capacity)	R1C	condenser (125 square feet of surface area)
R2 CTG-1(a), CTG-1(b)	chemical reactor vessel (5,500 gallons capacity)	R2C	condenser (125 square feet of surface area)
R5 CTG-1(a), CTG-1(b)	chemical reactor vessel (2,000 gallons capacity) with process condenser R5C-1	R5C-2	condenser (104 square feet of surface area)
R6 CTG-1(a), CTG-1(b)	chemical reactor vessel (1,500 gallons capacity) with process condenser R6C-1	R6C-2	condenser (80 square feet of surface area)
7R*	mixing vessel (6,000 gallons)	N/A	N/A
8R CTG-1(a), CTG-1(b)	reactor (4,000 gallons) with process condenser 8RC-1	8RC-2	condenser (125 square feet of surface area)
B2[1]	natural gas/No. 2 fuel oil-fired boiler (12.5 million Btu heat input) built in 1970	N/A	N/A
B3[1]	natural gas/No. 2 fuel oil-fired boiler (12.5 million Btu heat input) built in 1978	N/A	N/A
B6[1]	natural gas/No. 2 fuel oil-fired boiler (12.5 million Btu heat input) built in 1978	N/A	N/A

RACT as prescribed by the applicable CTG:

CTG-1(a) **Existing controls, this does not apply; RACT is no additional control*: For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **This does not apply; RACT is no additional control*: If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

C. Area II

The following table contains summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area II			
MV1 CTG-1(a) CTG-1(b)	reactor vessel (4,000 gallons) with process condenser MV1C-1	MV1C-2 OR V-VRU1	condenser 150 square feet of surface area) OR refrigerated vapor recovery unit
MV2 CTG-1(a) CTG-1(b)	reactor vessel (4,000 gallons) with process condenser MV2C-1	MV2C-2 OR V-VRU1 OR MV2F	Condenser (250 square feet of surface area) OR refrigerated vapor recovery unit OR ammonia flare used during Hydrovance® production[7]
MV3 CTG-1(a), CTG-1(b)	chemical reactor vessel (4,000 gallons) with reflux column/condenser MV3C-1 and/or process condenser MV3C-2	CD-A2-2-MV3C-3	condenser (250 square feet of surface area)
MV4 CTG-1(a), CTG-1(b),	chemical reactor vessel (4,000 gallons) with process condenser MV4C-1	CD-A2-2-MV4C3 OR CD-A2-2-T20PS (optional)	condenser (80 square feet of surface area) OR packed-tower scrubber (7 gallons per minute liquid injection of caustic solution)
S4V, S7V, and S10V CTG-1(a), CTG-1(b)	Three lacquer tanks	V-VRU1	refrigerated vapor recovery
S12V CTG-1(a), CTG-1(b)	DCE stripper		
S9V CTG-1(a), CTG-1(b)	neutralizing stripper vent		
S11V CTG-1(a), CTG-1(b)	neutralizing stripper vent		
S25V CTG-1(a), CTG-1(b)	neutralizer vessel		
T16V, ST46, ST47, ST49, and T30V CTG-3(a)	five storage tanks		
DCE-1 CTG-1(a), CTG-1(b)	DCE distillation column S23 bottoms receiver (wet receiver tank)		
S23 CTG-1(a), CTG-1(b)	DCE distillation column with condenser/ overheads receiver (dry receiver tank)		

S20V [CTG-1(a), CTG-1(b)]	batch distillation vessel		
S12 [CTG-3(a)]	distillate tank for S20V		
SAT-1-1, SAT-1-2, SAT-1-3, SAT-2-1, SAT-2-2, SAT-2-3, and D14 [CTG-1(a), CTG-1(b)]	Seven slow add tanks	V-VRU1	refrigerated vapor recovery unit
T18 and T27 [CTG-3(a)]	Two storage tanks	V-VRU1	refrigerated vapor recovery unit
S22V [CTG-3(a)]	water/DCE storage vessel		
T13 [CTG-3(a)]	water/DCE flashing unit		
RCV-1 [CTG-1(a), CTG-1(b)]	distillate receiver for reactors (ID Nos. MV1 and MV2 when used as striping vessels)	V-VRU1	refrigerated vapor recovery unit
T20V [CTG-1(a), CTG-1(b)]	sulfonated polystyrene (SPS) stripper vessel (4,000 gallons capacity) with process condenser T20VC-1	T20VC-2 OR CD-A2-2-T20PS OR V-VRU1	condenser (360 square feet of surface area) venting to atmosphere OR packed-tower scrubber (7 gallons per minute liquid injection of caustic solution) OR refrigerated vapor recovery unit
S-13-V [CTG-1(a), CTG-1(b)]	chemical reactor with process condenser S-13-VC1	S-13-VC2	condenser (100 square feet of surface area)
S5V [CTG-1(a), CTG-1(b)]	sulfonation vessel venting to atmosphere OR reactor; 4,000 gallons with process condenser A2-1-1S5V-C	N/A OR S5VC-2	N/A OR condenser (30 square feet of surface area)
S1R and S6V[1]	Two sulfonation vessels	N/A	N/A
R12 [CTG-1(a), CTG-1(b)]	chemical reactor vessel (2,000 gallons capacity) with process condenser R12C-1	R12C-2	condenser (104 square feet of surface area)
T-13V [CTG-1(a), CTG-1(b)]	chemical reactor vessel (4,000 gallons capacity) with process condenser T13VC-1	T13VC-2	condenser (250 square feet of surface area)

RACT as prescribed by the applicable CTG:

[CTG-1(a)] **Existing controls, this does not apply; RACT is no additional control*: For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

[CTG-1(b)] **This does not apply; RACT is no additional control*: If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

D. Area III

The following table summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area III			
R04 **CTG-1(a), CTG-1(b)**	process tank	CD-A3-1-R04C	condenser (250 square feet of surface area)
R-02 **CTG-1(a), CTG-1(b)**	chemical reactor	R-02-C	condenser (282 square feet of surface area)
V09[1]	process tank	N/A	N/A
HOOD[1]	process development laboratory exhaust hood	N/A	N/A
ES-EH2[1]	quality control laboratory exhaust hood	N/A	N/A
B4, B5[1]	two natural gas/No. 2 fuel oil-fired boilers (12.5 million Btu per hour maximum heat input each) built in 1978	N/A	N/A
ES-A3-2-B7 [1] **NSPS Dc**	natural gas/No. 2 fuel oil-fired boiler (16.3 million Btu per hour maximum heat input)	N/A	N/A

RACT as prescribed by the applicable CTG:

CTG-1(a) **Existing controls, this does not apply; RACT is no additional control*:** **For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **This does not apply; RACT is no additional control*:** **If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

E. Area 4 – Cosmetics and Resyn

The following table summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area 4 - Cosmetics and Resyn			
A3FD **CTG-1(a), CTG-1(b)**	fluid bed dryer with product receiver cyclone	A3FDCD1 OR A3FDCD2[2]	rotoclone scrubber; 3.5 gallon per minute minimum water injection (6,500 cfm) OR fabric filter[2], 1,320 square feet of filter area
A4SD **CTG-1(a), CTG-1(b)**	spray dryer with two parallel product receiver cyclones	A4SDCD1	vortex scrubber; 110 gallon per minute minimum water injection (20,000 cfm)

A4CAHS[1]	crotonic acid pneumatic transfer system; weigh bin to receiving hopper (work bin)	CDA4CAHS	fabric filter; 60 feet of filter area
CP-1 **CTG-1(a), CTG-1(b)**	12,000 gallon reactor with process condenser	CD-A3-2-X2-CP-1	condenser
CP-4 **CTG-1(a), CTG-1(b)**	pearlization process	CD-A3-2-X2-CP-4	condenser
CP-6 **CTG-1(a), CTG-1(b)**	pearlization process	CD-A3-2-X2-CP-6	condenser
CP-2, CP-13[1]	two 4,000-gallon monomer slow add tanks	N/A	N/A
CP-3, CP-14[1]	two 750-gallon catalyst slow add tanks	N/A	N/A
CP-11[1]	process vessel	N/A	N/A
CP103, CP112, CP113 **CTG-3(a), CTG-3(b)**	three 10,000 gallon storage tanks (VOC)	N/A	N/A
CP104, CP105 **CTG-3(a) CTG-3(b)**	two 6,000 gallon storage tanks (VOC)	N/A	N/A
CP115, CP116 **CTG-3(a) CTG-3(b)**	two 1,377 gallon storage tanks (VOC)	N/A	N/A
CP101 **CTG-3(a), CTG-3(b)**	15,000 gallon storage tank (HAPs)	N/A	N/A
CP108, CP109 **CTG-3(a), CTG-3(b)**	two 20,000 gallon storage tanks (VOC)	N/A	N/A
CP124 **CTG-3(a), CTG-3(b)**	20,000 gallon storage tank (HAPs)	N/A	N/A
CP102[1]	10,000 gallon storage tank (acrylic acid)	N/A	N/A

RACT as prescribed by the applicable CTG:

CTG-1(a) **Existing controls, this does not apply; RACT is no additional control*:** **For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **This does not apply; RACT is no additional control*:** **If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

CTG-3(a) **This did not apply due to vapor pressure or existing controls:** **For storage tanks storing VOC with a vapor pressure greater than 28 kpa (4.1 psi) at 20 °C a 90% effective vapor balance or equivalent, on delivery to all tanks greater than 7,500 liters (2,000 gallons) capacity except where tanks are equipped with floating roofs, vapor recovery, or equivalent.**

CTG-3(b) **This did not apply due to vapor pressure or existing controls:** **For storage tanks storing VOC with a vapor pressure greater than 10 kpa (1.5 psi) at 20 °C, require pressure/vacuum conservation vents set at ± 0.2 kPa, except where more effective control is used.**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

F. Area 4 – Ethyl Acetate Recovery System

The following table summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Area 4 - Ethyl Acetate Recovery System			
DEC1[1]	decanter; 250 gallons	N/A	N/A
DEC2[1]	decanter; 125 gallons	N/A	N/A
V15[1]	rich phase tank; 1,200 gallons	N/A	N/A
S01 CTG-1(a), CTG-1(b)	ethyl acetate azeotrope 200 gallon still with reflux condenser (overheads to DEC-2; bottoms to CP-107)	CDS01	condenser; 100 square feet of surface area
CP107 CTG-3(b)	10,000 gallon reclaim tank (ethyl acetate)	N/A	N/A
CP106 CTG-3(b)	30,000 gallon reclaim tank (ethyl acetate)	N/A	N/A
V18 CTG-3(b)	water rich phase tank; 1,200 gallons	N/A	N/A
S02 CTG-1(a), CTG-1(b)	wastewater still with reflux condenser (overheads to DEC-2; bottoms to wastewater treatment plant)	CDS02	condenser; 75 square feet of surface area

RACT as prescribed by the applicable CTG:

CTG-1(a) **Existing controls, this does not apply; RACT is no additional control*: For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **This does not apply; RACT is no additional control*: If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

CTG-3(a) **This did not apply due to vapor pressure or existing controls: For storage tanks storing VOC with a vapor pressure greater than 28 kpa (4.1 psi) at 20 °C a 90% effective vapor balance or equivalent, on delivery to all tanks greater than 7,500 liters (2,000 gallons) capacity except where tanks are equipped with floating roofs, vapor recovery, or equivalent.**

CTG-3(b) **This did not apply due to vapor pressure or existing controls: For storage tanks storing VOC with a vapor pressure greater than 10 kpa (1.5 psi) at 20 °C, require pressure/vacuum conservation vents set at ± 0.2 kPa, except where more effective control is used.**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

G. Area 4 – Isopropyl Acetate Recovery System

The following table contains a summary of RACT applicability for the permitted emission sources and associated air pollution control devices:

Area 4 – Isopropyl Acetate/ Ethanol Recovery System

CP-300SC1 **CTG-1(a), CTG-1(b)**	isopropyl acetate/ethanol stripping column with reflux condenser and tank	CD-A3-2-X3-DC5001	vent condenser
CP-300DC2 **CTG-1(a), CTG-1(b)**	ethanol/water distillation column/reflux condenser and tank	CD-A3-2-X3-DC5003	vent condenser
CP-300EC3 **CTG-1(a) , CTG-1(b)**	isopropyl acetate/ethanol liquid extraction column with associated phase tanks	N/A	N/A

RACT as prescribed by the applicable CTG:

CTG-1(a) **Existing controls, this does not apply; RACT is no additional control*:** **For each vent from reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers that emit 6.8 kg/day (15 lb/day) or more of VOC, require surface condensers or equivalent controls.**

CTG-1(b) **This does not apply; RACT is no additional control*:** **If surface condensers are used, the condenser outlet gas temperature shall not exceed (v) a prescribed temperature when condensing VOC of vapor pressure greater than 3.5 kPa (0.5 psi).**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.

H. Miscellaneous Storage Tanks

The following table summarizes RACT applicablility for the permitted emission sources and associated air pollution control devices:

Miscellaneous Storage Tanks			
CP123 **CTG-3(a) CTG-3(b)**	20,000 gallon 2-ethylhexyl acrylate storage tank	N/A	N/A
ST31 **CTG-3(a) CTG-3(b)**	10,000 gallon vinyl acetate storage tank	N/A	N/A
ST38 **CTG-3(a) CTG-3(b)**	10,000 gallon heptane storage tank	N/A	N/A
T610 **CTG-3(a) CTG-3(b)**	toluene storage tank; 9,000 gallons	N/A	N/A
T650 **CTG-3(a) CTG-3(b)**	heptane storage tank; 9,000 gallons	N/A	N/A

RACT as prescribed by the applicable CTG:

CTG-3(a) **This did not apply due to vapor pressure or existing controls*:** **For storage tanks storing VOC with a vapor pressure greater than 28 kpa (4.1 psi) at 20 °C a 90% effective vapor balance or equivalent, on delivery to all tanks greater than 7,500 liters (2,000 gallons) capacity except where tanks are equipped with floating roofs, vapor recovery, or equivalent.**

CTG-3(b) **This did not apply due to vapor pressure or existing controls*:** **For storage tanks storing VOC with a vapor pressure greater than 10 kpa (1.5 psi) at 20 °C, require pressure/vacuum conservation vents set at ± 0.2 kPa, except where more effective control is used.**

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**

***As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

I. Wastewater Treatment Plant

The following table summarizes RACT applicability for the permitted emission sources and associated air pollution control devices:

Wastewater Treatment Plant			
1, 2, and 3[2]	Three aerated effluent lagoons located in the facility wastewater treatment plant	N/A	N/A
CERCLA-1[1]	CERCLA cleanup project air stripper	CD-CERCLA-1a and CD-CERCLA-1b	catalytic oxidizer (900 cubic feet per minute gas flow rate) and one packed-column scrubber (22 gallons per minute of 50% NaOH scrubbing medium)

RACT as prescribed by the applicable CTG:

1. **These sources have emissions less that 15 lb/day of emissions therefore are exempt from RACT as per 2D .0903.**
2. **As allowed by 2D .0951 the applicant demonstrated through case by case RACT that RACT was no additional control.**

3. 15A NCAC 2D .0943: SYNTHETIC ORGANIC CHEMICAL AND POLYMER MANUFACTURING

This regulation applies to synthetic organic chemical and polymer manufacturing facilities which produce as an intermediate or a final product any of the organic chemicals listed in 40 CFR Part 60.489.

Because none of the intermediates or products associated with the Firebird Process are listed, ***this regulation does not apply.***

4. 15A NCAC 2D .0958: WORK PRACTICES FOR SOURCES OF VOLATILE ORGANIC COMPOUNDS

This condition requires work practices to be followed when using VOCs and immediate implementation of corrective measures when these practices are not followed and monthly visual inspections of all operations and processes utilizing VOCs during normal operations along with recordkeeping and semi-annual reporting.

The most recent facility inspection indicates Akzo Nobel is adhering to the work practices for all existing affected sources, conducting monitoring, maintaining records, and submitting reports in a timely manner.

VI. NSPS, NESHAPS, NAA/NSR, CAM, 112(r), PE Requirements, Zoning Consistency, and Attainment Status:

NSPS, NESHAP/MACT, CAM, 112(r), PE Requirements, Zoning consistency did not apply. The facilities status is a NAA/NSR major source for VOCs located in a NAA. There is an open application addressing 112(j).

VII. Facility-Wide Air Toxics:

This modification did not trigger a state toxics review. The facility is subject to these requirements.

VIII. Facility Compliance Status:

The dates of the last inspection were April 9 and 20, 2009. The inspector Ms. Carlotta Adams indicated the facility was in non-compliance with procedural requirements.

The DAQ recommends issuance of permit 0900T07.

IX. Summary of Changes Made to the Previous Permit (ID No. 09900T07):

Page(s)	Section	Description of Change(s)
Cover	-	-amended all dates and permit revision numbers.
All	Header	-amended permit revision number.
4	Equipment Listing	-added RACT designations to RACT affected Firebird sources as established in permit 09900T05
9	Table	-added 2D .0951 referring to 2.2 A.6.

Page(s)	Section	Description of Change(s)
13	Table	-added 2D .0951 referring to 2.2 A.6.
16	Table	-added 2D .0951 referring to 2.2 A.6.
19	Table	-added 2D .0951 referring to 2.2 A.6.
24	Table	-added 2D .0951 referring to 2.2 A.6.
29	2.2 A.6.	-added facility-wide permit condition for 2D .0951 indicating RACT was no additional control.
30-39	3.0	-updated General Conditions to version 3.1 and acronym attachment.