COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office
August 27, 2007

SUBJECT: Technical Support Document
Title V Operating Permit Renewal
Dyno Nobel
Donora Plant
Washington County

TO: Air Quality File TV-OP-63-00070

FROM: Sharene D. Shealey
Air Quality Engineering Specialist
Air Quality

THROUGH: Barbara R. Hatch, P.E.
Chief, Facilities Permitting
Air Quality Control
Southwest Regional Office

Mark A. Wayner, P.E.
Regional Manager
Air Quality Control
Southwest Regional Office

BACKGROUND

Dyno Nobel operates a chemical manufacturing facility in Donora Borough, Washington County. The primary saleable product produced at this facility is solid ammonium nitrate; the facility also produces liquid ammonium nitrate and a relatively small volume of nitric acid for sale. The chief raw material used at this facility is anhydrous ammonia.

The manufacturing process at the Donora facility involves vaporizing ammonia (NH_3) and mixing it with pressurized air to form nitric oxide (NO). The nitric oxide is further oxidized with excess oxygen to form nitrogen dioxide (NO_2). The NO_2 is passed up a column counter-current to water flow that absorbs the NO_2 to form nitric acid (HNO_3). This process, known as the ammonia oxidation process (AOP), produces nitric acid with a strength of 57%. The acid is pumped to a neutralizer and mixed with additional ammonia to produce ammonium nitrate (NH_4NO_3) solution.

The NH_4NO_3 solution is either sold as an end product (approximately 10-20% of NH_4NO_3 manufactured) or pumped to the prill tower where solid NH_4NO_3 prills are produced. The prills are made by spraying NH_4NO_3 solution down the tower with counter-current airflow. The NH_4NO_3 prills are then dried in two stages (pre-dryer and dryer), cooled, screened, and warehoused for shipment.

The Department received an incomplete Title V renewal application August 6, 2004. Proofs of municipal notification and a completed compliance review form were received

September 2, 2004. The application was deemed administratively complete on September 14, 2004.

EMISSIONS

The main sources of *actual* emissions at this facility are the ammonia oxidation process (AOP), a major source of NOx, the prill tower (particulate matter, uncontrolled), and two boilers that provide process steam, each rated at less than 50 mmBtu/hr. Along with these, the pre-dryer, dryer, and cooler each have *potential* particulate matter emissions greater than 100 tons per year. A scrubber controls each of these units, so that actual emissions from each of these have been reported at two tons per year or less in the 2002 – 2006 time period. AIMS reported facility-wide NOx and PM emissions are listed in Table 1. Table 2 lists AIMS reported source specific PM emissions. Emissions of CO, SOx, VOC, and HAP are each reported to be well below major source thresholds.

TABLE 1: AIMS Reported Facility-Wide NOx and PM Emissions

	2006 (tons)	2005 (tons)	2004 (tons)	2003 (tons)	2002 (tons)
Facility-wide NOx	246.5	242.3	231.2	310.8	234.4
Facility-wide PM	61.0	60.5	68.3	68.9	56.5

TABLE 2: AIMS Reported Source Specific PM Emissions

Source (AIMS ID)	2006 (tons)	2005 (tons)	2004 (tons)	2003 (tons)	2002 (tons)
Prill tower PM (103)	33.2	32.7	33.6	39.9	32.6
Pre-dryer PM (105)	2.1	2.1	1.7	2.0	1.6
Dryer PM (106)	1.4	1.4	1	1.4	1.1
Cooler PM (104)	1.2	1.2	1.1	1.2	0.9

The AOP has an 12-month rolling NOx emission limit of 396 tons and an hourly limit of 5.5 lb NOx per ton of nitric acid produced, based on 100% acid. To meet these limits, the exhaust gases from the AOP are controlled by nonselective catalytic reduction (NSCR). Dyno Nobel's NSCR system consists of two combustion chambers.

In January 2005, Dyno Nobel performed stack testing on the AOP, boiler 1 (Cleaver-Brooks), prill tower, and evaporator stacks. The AOP and boiler were tested for NOx emissions and the prill tower and evaporator were tested for particulate emissions. The results of this testing gave the emission rate from the AOP as 3.151 ton NOx/ton nitric acid produced (100% acid basis), boiler 1 NOx emission rates were 1.07 lb/hr and 0.093 lb/mmBtu, prill tower particulate emissions were 0.0202 gr/dscf and 2.29 lb/hr for one of four stacks tested (all four stacks would be 9.96 lb/hr), and the evaporator stack particulate emissions were 0.09 lb/hr. All results were within the allowable limits.

OPERATING FLEXIBILITY

Dyno Nobel has not requested any specific operational flexibility capabilities. Section B of the Title V permit provides the ability to make de minimis increases (§ 127.449), as well as significant modifications (§ 127.541), minor modifications (§ 127.462), and administrative amendments (§ 127.450).

ALTERNATIVE OPERATING SCENARIOS

Dyno Nobel has not requested any alternative operating scenarios.

REGULATORY

The AOP was constructed in 1968, prior to the effective date of August 17, 1971 of 40 CFR 60, Subpart G (Standards of Performance for Nitric Acid Plants). The AOP is therefore not subject to this NSPS.

The facility operates two boilers, each capable of being fired by either fuel oil or natural gas: a Cleaver-Brooks boiler rated at 48.3 mmBtu/hr (boiler #1), and a 1969 Murray boiler rated at 48.1 mmBtu/hr (boiler #2). While the Cleaver-Brooks boiler was installed at Dyno Nobel in 1993, it was actually constructed in 1982 and therefore not subjected to the requirements of 40 CFR 60, Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units). The Murray boiler was constructed and installed prior to the Subpart Dc applicability date.

Based on its construction date and emissions, the nitric acid plant (AOP) at Dyno Nobel is a BART-eligible source as defined by 40 CFR 51 Subpart P – Protection of Visibility. The AOP has actual and potential NOx emissions greater than 250 tons per year, and the facility did not opt to take an emission limitation below the BART threshold. The facility submitted a BART engineering analysis to the Department (Central Office) in January 2007. In this analysis, the company determined that the current control technology used for the AOP, NSCR, is the single most effective control technology for nitric acid plants. Also, based on CALPUFF modeling, emissions from Dyno Nobel have minimal impact on nearby Class I areas and further limitations would have negligible improvement of visibility. Therefore, no further controls are required for this unit under this rule. A condition was included in the renewal to mandate that the NSCR system operate when the AOP is in operation.

The NSCR on the AOP and each of the scrubbers on the ammonium nitrate cooler, ammonium nitrate pre-dryer, and the ammonium nitrate dryer are subject to the Compliance Assurance Monitoring (CAM) rules given by 40 CFR 64. Dyno Nobel submitted a CAM plan for each of these control devices.

The monitoring approach for the NSCR system has five indicators: (1) oxygen concentration in the catalytic combustor outlet, (2) hydrocarbon concentration in the combustor effluent, (3) temperature into the catalytic combustor, (4) temperature out of the catalytic combustor, and (5) daily inspection and maintenance. The first four indicators each have an acceptable range for appropriate operation and are monitored continuously; the daily inspection is performed once per day by qualified personal following a checklist.

The monitoring approach for each of the three scrubbers is identical. The two indicators are: (1) scrubber water ammonium nitrate concentration, and (2) stack opacity. The concentration has an acceptable range (20 – 50%) and is measured once per shift or 3 times per day for a daily average. Concentration within the acceptable range indicates that there are both sufficient water contact with the gas stream and sufficient water flow. Concentration below 20% or above 50% would trigger inspection and corrective action. The opacity reading has a maximum acceptable value (15%) and is measured once per day. Typical operations produce zero opacity. An opacity reading of 20% or greater would trigger inspection and/or corrective action.

PREVIOUS PLAN APPROVALS AND OPERATING PERMITS

Plan approval 63-313-001 was issued May 18, 1973 for the replacement of three American Air Filter RotoClone units, one each on the pre-dryer, dryer, cooler with three Control Research Products Hydro-Clean scrubbers. On average, each scrubber stack has an exhaust flow rate of 22,000 CFM, an inlet particulate loading of 375 lb/hr, and an outlet particulate concentration of 3.75 lb/hr. This plan approval was superseded by plan approval 63-313-001A on August 1, 1985 and then converted to an operating permit.

Plan approval 63-313-005(A) was issued August 1, 1985 to supersede PA-63-313-005. This plan approval was for one 10,000-ton ammonia storage tank. A second plan approval/operating permit was issued under this same number (63-313-005A) on December 2, 1993 for a different source: two tanks for ammonium nitrate storage (tanks T-127 65,000 gallon capacity and T-127B with 20,000 gallon capacity). These tanks were originally constructed for nitric acid storage with T-127 constructed in 1972, and converted 1979 and T-127B constructed in 1977, and converted 1983. These tanks were equipped with demisters for particulate control under the 1993 plan approval. The 1993 plan approval was issued as an operating permit November 29, 1994.

The 1985 plan approval was not incorporated into the initial Title V permit. A new source, 102 Anhydrous Ammonia Storage Tanks, was added to the renewal. This source includes the 10,000-ton low-pressure tank, as well as six 200-ton high-pressure anhydrous ammonia above ground storage tanks.

Plan approval 63-302-044 was issued February 17, 1993 for the installation of a 50.2 mmBtu/hr Cleaver-Brooks fuel oil or natural gas fired boiler to replace a retired boiler. During the initial Title V review, the company submitted information that the rating of this boiler is actually 48.3 mmBtu/hr. The requirements of this plan approval were incorporated into the initial Title V operating permit.

Plan approval PA 63-070A was issued July 29, 1997 for installation of a new low-density prill tower, to replace the existing tower. The old tower was a grandfathered source and therefore had not been subject to permitting. This plan approval established grain loading, hourly, and annual particulate limits for the new prill tower. The requirements of this plan approval were incorporated into the initial Title V operating permit.

RACT operating permit 63-000-070 was issued March 31, 1999 for NOx sources. This permit limited annual and hourly NOx emissions from the AOP, each boiler, and the entire facility. The requirements of this operating permit were included in the initial Title V operating permit.

The initial Title V operating permit was issued February 7, 2000. There have not been any amendments or modifications to the initial Title V, nor have there been any plan approvals at Dyno Nobel since the initial Title V issuance.

Significant changes made to the Title V permit in this renewal are:

- While is it highly unlikely that Dyno Nobel would choose to operate the AOP without the NSCR because of efficiencies, it is required as a condition of this permit that the NSCR system operate at all times when the AOP is in operation. This ensures that the operation of the NSCR is mandated and federally enforceable, meeting the requirements of BART.
- The CAM plans were added.
- Sources 102 and 035 (AOP Cooling Tower) were added. The addition of source 102 is discussed above. Source 035 was added because Dyno Nobel has historically reported emissions from this source.

STREAMLINING

Operating permit 63-302-044 limits the sulfur content of the fuel oil used in the Cleaver Brooks No. 1 boiler to 0.5% by weight or 0.5 lb SO_2/mmBtu heat input. This requirement is more stringent than the SIP limitation given by § 123.22, 1.0 lb SO_2/ mmBtu heat input. Note that this sulfur limitation is equivalent to the sulfur limitation given by 40 CFR 60, Subpart Dc.

CONCLUSIONS AND RECOMMENDATIONS

I have completed my review of the Title V Operating Permit renewal application for Dyno Nobel, Inc. Dyno Nobel has met the regulatory requirements associated with this application submittal. The attached permit reflects terms and conditions as described in

the permit application. It is my recommendation to issue a Title V Operating Permit for this facility with a permit term of 5 years.