ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

October 27, 2010

SUBJECT: Review of Application
Installation Permit 0750-I001
Synthetic Minor Source Operating Permit
Basic Carbide Corporation
900 Blythedale Road
Buena Vista, PA 15018

TO: Installation Permit 0750-I001 and
Operating Permit File No. 0750

THROUGH: Sandra L. Etzel
Chief Engineer
Air Quality Program

FROM: David D. Good
Air Quality Engineer

SOURCE DESCRIPTION:

The tungsten carbide product manufacturing process begins with the purchase of tungsten carbide powders. The powder is then made into grade powder by adding various percentages of cobalt (which is a binder material) and heptane, and then ball milling or attritor milling the powder into proper distribution. A Sweeco brand screening/sifting device filters the tungsten carbide and heptane slurry through a 325 mesh screen (325 mesh =.0017" = 44 microns). A drying and recovery system consisting of a liquid ring vacuum pump used to draw vacuum on the system components; a heated, rotating, water jacketed, vacuum vessel in which heated heptane vapor is cooled and condensed and a recovery tank in which the condensed heptane is collected and reused in the process. The dried tungsten carbide powder is then removed and sent to be pressed and shaped. These parts are then sintered in an electric vacuum furnace where the temperature of the parts may reach 2600^{O}F. At this point the product shrinks about 20% and can now only be machined by diamond grit wheels or EDM.

The emission units regulated by this permit are summarized in the following table:

Emission Unit Identification

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
P001-1	Six (6) Powder Milling Attritors and Six (6) Powder Horizontal Ball Mills		11,000 lbs/day	Tungsten Carbide Powder, Cobalt and Heptane	
P001-2	Two (2) Sweeco Wet Screens		11,000 lbs/day	Tungsten Carbide Powder, Cobalt and Heptane	
P001-3	Six (6) Vacuum Dryers	Condenser	Approx. 640 gal. of Heptane per day transferred from dryers to condenser	Tungsten Carbide Powder, Cobalt and Heptane	S001 (Conden -ser Vent)
P001-4	Hydrostatic Presses		11,000 lbs/day	Milled Tungsten Carbide Powder	
P001-5	Shaping Operations (saws, grinders, lathes etc.)	Torit Downflo Cartridge Baghouse Model DFO 3-24	Approx. 11,000 lbs/day	Green Preforms	Exhausts within building
P001-6	Electric Sintering Furnaces	None	Approx. 11,000 lbs/day	Shaped Green Preforms	
MISCELLANEOUS SOURCES					
B001	Process Boiler	None	0.64 MMBtu/hr	Natural Gas	S002
B002	Building Heater	None	1.975 MMBtu/hr	Natural Gas	S003
T001	Heptane Storage Tank No. 1		4,000 gallons	Heptane (vapor pressure = 1.28 psia @ 77^{O}F)	

OPERATING PERMIT APPLICATION COMPONENTS:

1. Minor Source Permit Application for Basic Carbide Corporation, Buenva Vista, PA, September 19, 2006.

2. Email from Mark Ghion, Basic Carbide Corp., Spreadsheets containing heptane usage and milled powder production for the period January 2006 through September 2007, 10/17/2007.

3. Email from Mark Ghiion, Basic Carbide Corp., Questions regarding the spreadsheets sent in the 10/17/2007 email and the transfer of heptane from the Heptane Reclaim Tank, 10/23/2007.

EMISSIONS TESTING:

No emission testing of the heptane condenser vent or the natural gas-fired boiler and building heater are required. The main dust collection system does not vent to the atmosphere.

APPLICABLE REGULATIONS:

Allegheny County Health Department Rules and Regulations, Article XXI – Air Pollution Control, April 15, 2008.

Sections III and IV of the Minor Source Operating Permit contain the General and Site Level Conditions, respectively. These conditions reference various regulations in Article XXI related to visible emissions, testing, monitoring, recordkeeping and reporting requirements.

New Source Performance Standards (NSPS)
There are no NSPSs that are applicable to sources at the Basic Carbide Corp. facility in Buenva Vista.

National Emission Standards for Hazardous Air Pollutants (NESHAP)
The Basic Carbide facility is not a major source of HAPs and there are no NESHAPs or MACT standards that are applicable to sources at this facility.

Prevention of Significant Deterioration (PSD)
PSD regulations are not applicable. The facility is a minor source for all criteria pollutants.

New Source Review (NSR)
NSR does not apply. The facility is a minor source for all criteria pollutants.

METHOD OF COMPLIANCE DETERMINATION:

Basic Carbide uses heptane in the ball mills to facilitate the milling of the tungsten carbide

powder. Approximately 80 to 90% of this heptane is recovered and reused in the process. The BACT analysis for the heptane recovery system states that 90% of the heptane used is recovered; however, records of heptane usage indicate that the average recovery rate is less than 90% at this facility. The quantity of heptane lost to the atmosphere is determined from the quantity of virgin heptane withdrawn from the Heptane Storage Tank (T001). The quantity of heptane delivered to the tank is provided by the transporter and the quantity withdrawn from the tank is monitored. Records of heptane deliveries and the amount withdrawn from the tank are maintained by Basic Carbide.

The dust collection system is designed to filter and recirculate air through the grind shop to economize climate control devices. This system consists of a manifold system to separate various grades of materials. These grades are individually filtered inside the room by independent "grade specific" cartridges. This filtered air then travels to the main "baghouse" outside of the building where it is again filtered by the main filter bank. This air is then discharged through HEPA filters back into the building. (The air quality in the building is routinely monitored to ensure levels are below OSHA PEL).

BACT ANALYSIS REVIEW FOR THE HEPTANE RECOVERY SYSTEM

In the tungsten carbide process, heptane is used to aid in the mixing operation and acts as the carrier solvent to transport the carbide material between the various stages of the overall process. According to Basic Carbide, it is critical for the economic viability of the operation that the heptane be recovered and re-used (The VOC content of heptane is 100%).

The February 2006 BACT Analysis submitted by Basic Carbide, concludes that the heptane recovery system already in place represents generally-accepted best available control technology. This system was installed in September 2005. The heptane recovery system consists of chilled water-jacketed attritors (mixers) with closed lids, enclosed screens, and enclosed vacuum dryers that vent evaporated heptane to a chilled water condenser. Basic Carbide contends that this system recovers at least 90% of the heptane introduced to the process. The BACT Analysis only examines the technical and economic feasibility of controlling the remaining emissions beyond the 90% heptane recovery rate already being achieved at this facility. The performance of the present heptane recovery system is expressed as the lbs of heptane lost per lb of milled tungsten carbide powder produced. The 90% recovery rate is equivalent to approximately 0.033 lbs-heptane/lb-milled tungsten carbide powder.

Before evaluating the BACT analysis, the Department reviewed data supplied by Basic Carbide regarding the existing heptane recovery system. Basic Carbide prepares monthly spreadsheets of heptane usage, heptane recovery rate and milled tungsten carbide powder production. These data were available for the period 1/1/2006 through 9/30/2007. In 2006, monthly heptane recovery varied from 84% (0.0522 lb-heptane/lb-milled) to 92% (0.0268 lb-heptane/lb-milled) and the average for 2006 was 88% (0.0401 lb-heptane/lb-milled). The 2006 average of 0.0401 lb-heptane/lb-milled is 18.6% lower than the stated minimum recovery rate for this system of 0.033 lb-heptane/lb-milled. For the first 9 months of 2007, the monthly recovery rate also ranged from 84% to 92% and the average was 88% (0.0447 lb-heptane/lb-milled). This 9-month average was 32.3% lower than the stated recovery rate of 0.033 lb-heptane/lb-milled. For the 21 month

period, the average recovery rate was 0.042 lb-heptane/lb-milled, or 21.4% lower than the target recovery rate. During this 21 month period, there were only three months when the heptane recovery rate was 90% or greater.

Table 5 of the BACT Analysis lists five facilities in Pennsylvania that have similar control systems for this process. One facility is achieving 0.02 lb-VOC/ lb-milled powder, three facilities are achieving 0.03 lb-VOC/lb-milled powder, and one facility is achieving 0.05 lb-VOC/lb-milled powder. Four of these systems were installed prior to 2000 and one was installed in 2001. The Buenva Vista facility's actual VOC emission rate of 0.042 lb-VOC/lb-milled is greater than four of the five facilities and this would not be considered BACT for this process. Because an emission rate of 0.030 lbs-VOC/lb-milled or less has been achieved for this type of recovery system, the Department has determined that BACT should be less than or equal to 0.030 lbs-VOC/lb-milled. This would result in achieving a 90+% recovery rate on a consistent basis. The Synthetic Minor Source Operating Permit for this facility restricts emissions of volatile organic compounds (VOCs) to 0.030 lbs-VOC per pound of milled product produced and 45 tons of VOC/year.

POTENTIAL EMISSION CALCULATIONS:

Heptane Recovery System

Potential VOC emissions from the Basic Carbide Buenva Vista plant were determined from the amount of virgin heptane delivered and the amount of heptane withdrawn from the Heptane Storage Tank T001. These data were provided by Basic Carbide and additional information was available in monthly spreadsheets that contained the amount of heptane released to the atmosphere and the quantity of milled product produced. For the period 1/1/2006 through 9/30/2007, 89,953.96 lbs of virgin heptane was used. This is also the amount released to the atmosphere. During this same period, 2,138,445 lbs of milled product were produced. Based on these data, the amount of heptane released to the atmosphere per pound of milled product produced is:

Lbs-Heptane Lost/lb-milled product = 89,953.96 lbs-Heptane / 2,138,445 lbs-product
= 0.042 lb-Heptane/lb-milled product

Since the heptane is essentially 100% VOC, the emission factor is 0.042 lb-VOC/lb-milled product.

The average amount of heptane used in the process per pound of milled product was determined for the period 1/1/06 – 9/30/07. From the data provided by Basic Carbide, the heptane throughput for this period was 755,344.5 pounds and the milled powder produced was 2,138,445 pounds.

Lbs heptane throughput/lb of milled product = 755,344.5 / 2,138,445
= 0.353 lb-heptane/lb-milled product.

The operating permit application lists the maximum production of milled product as 11,000 lb/day and 1,355 tons per year (note: 11,000 lb/day ~ 2,000 tpy). Therefore, potential VOC emissions are:

VOC (lb/hr) = (11,000 lb/day / 24 hr/day) x 0.042 lb-VOC/lb-milled product
= 19.25 lb/hr

VOC (ton/yr) = 19.25 lb/hr x 8760 hrs/yr x 2000 lb/ton
= 84.3 tons/yr

Based on this estimate, potential emissions of VOCs exceed 50 tons per year. To remain a minor source and comply with the consecutive 12-month VOC emission limitation of 45 tons and the BACT limit of 0.030 lb-VOC/lb-milled product, milled powder production must not exceed the following:

Maximum Powder Production = (45 tons x 2000 lb/ton) / (0.030 lb-VOC/lb-milled product)
= 3,000,000 lbs or 1,500 tons of milled product per year

Maximum Powder Production = (3,000,000 lbs/yr) / (8760 hrs/yr) x (24 hrs/day)
= 8,220 lbs milled product per day

Therefore, if the heptane loss to the atmosphere averages 0.030 lbs/lb-milled product, annual powder production will be limited to 3,000,000 lbs per year or 8,220 lbs milled product per day.

Dust Collection System

The main dust collector collects and segregates tungsten powder fines generated in the process. The dust laden air is further filtered and then vented inside the building; therefore, particulate emissions are not released to the atmosphere.

HAZARDOUS AIR POLLUTANTS:

Potential HAP emissions from this facility are due to emissions of the cobalt that is used as a binder in the milled powder. Attachment 1, Table 2 of the permit application states that the average cobalt content of the powder is 9%. The overall efficiency of the dust collection system is 99% and the total amount of powder collected by the system is 1% of the total powder produced. Potential HAP (cobalt) emissions were calculated as follows:

HAP = 8220 lbs-powder/day x (9/100)(1/100)[(100-99)/100]
= 0.074 lbs/day

HAP = 0.074 lbs/day / 24 hrs/day x 8760 hrs/yr / 2000 lbs/ton

= 0.0135 tons/yr

RECOMMENDATIONS:

The facility is in compliance with all applicable regulations of Article XXI and it is recommended that the Minor Source Operating Permit No. 0750 be issued.

REFERENCED DOCUMENTS:

1. Allegheny County Health Department, Rules and Regulations, Air Pollution Control Article XXI, Allegheny County Ordinance No. 16782, April 1, 2007.

2. Minor Source Permit Application for Basic Carbide Corporation, Buenva Vista, PA, September 19, 2006.

3. Email from Mark Ghion, Basic Carbide Corp., Spreadsheets containing heptane usage and milled powder production for the period January 2006 through September 2007, 10/17/2007.

4. Email from Mark Ghion, Basic Carbide Corp., Questions regarding the spreadsheets sent in the 10/17/2007 email and the transfer of heptane from the Heptane Reclaim Tank, 10/23/2007.

5. Letter from ACHD to Mark A. Ghion, Basic Carbide Corporation regarding Review of the BACT Analysis for the Heptane Recovery System, December 12, 2007.