



GREAT PLAINS SYNFUELS PLANT CORRECTIVE ACTION FACT SHEET

North Dakota Department of Health
Division of Waste Management
By: Derek Hall

Telephone: 701-328-5166
Fax: 701-328-5200
Web site: www.ndhealth.gov/wm
Revision: 10/2009

1. **FACILITY NAME** - Great Plains Synfuels Plant- Dakota Gasification Company
2. **State/EPA ID#** - NDD000690594
3. **ADDRESS AND LOCATION** -
PO Box 1149
Beulah, ND 58523
Located 7 miles NW of Beulah, ND
4. **REFINERY CONTACT** - Rick Nelson, Sr. Environmental Engineer
PHONE: (701) 873-6613
FAX: (701) 873-6404
E-MAIL: rnelson@bepec.com
5. **STATE/TRIBE CONTACT** - Derek Hall
PHONE: (701) 328-5166
FAX: (701) 328-5200
E-MAIL: dahall@nd.gov
6. **LEAD AGENCY** - North Dakota Department of Health, Division of Waste Management
7. **SETTING AND OPERATIONS HISTORY**

The Great Plains Synfuel Plant is located approximately 7.5 miles northwest of the city of Beulah, North Dakota. The facility lies within the Knife River drainage basin in the Missouri Plateau section of the Great Plains Region. The facility is constructed on approximately 535 acres of land.

In the 1970's, a consortium of energy companies obtained federally guaranteed loans to finance the construction of the Great Plains Synfuels Plant. Operations began in 1984. The consortium abandoned the plant in 1985, and the United States Department of Energy (DOE) assumed ownership in 1986. In 1988, the DOE sold the plant to the Dakota Gasification Company, a wholly-owned subsidiary of Basin Electric Power Cooperative (BEPC).

The facility is co-located with the Antelope Valley Station, which is a coal-fired steam electric generation plant also owned by BEPC and Freedom Mine, operated by Coteau Properties, a subsidiary of the North American Coal Corporation.

Operations at the facility produce a synthetic natural gas from lignite coal. The coal gasification process involves the breaking down of the molecular structure of coal to produce carbon monoxide and hydrogen that are in turn combined to produce methane.

After being crushed to the proper size, which is the first stage of the gasification process, the lignite is conveyed to the gasifiers (fourteen 40-foot high cylindrical vessels) where oxygen and steam are introduced, causing a high-temperature combustion/gasification reaction. This reaction produces raw gas containing carbon monoxide, carbon dioxide, hydrogen, sulfur, nitrogen and other substances. The raw gas exiting the gasifiers is split with approximately one-third of the gas being sent to shift conversion. In the shift conversion unit, the gas is passed through a cobalt-molybdenum catalyst to adjust the hydrogen-to-carbon monoxide ratio of the re-combined gas to the ratio needed for methanation.

When the raw gas is cooled, a liquid condensate is produced (raw gas liquor) which contains tars, oils, phenols and ammonia. These co-products are removed from the raw gas-liquor by various process units and are either sold as products or used in fuels in the plant boilers to generate steam. Other co-products, such as naphtha, sulfur, cresylic acid and carbon dioxide, are recovered in different areas of the plant. Some of these products are being sold, such as carbon dioxide, which is being used in Canada for secondary oil recovery in petroleum production.

After the co-products have been removed from the raw gas, the gas is then further purified in the Rectisol unit by passing through cold methanol. This process removes sulfur-containing compounds, naphtha, acid gases, carbon dioxide and organic impurities.

The final step in the process is methanation, where partially purified raw gas passes over a nickel catalyst, causing the carbon dioxide and carbon monoxide to react with the free hydrogen to form methane. The resulting methane, after leaving the methanation unit, is further cleaned and compressed to be shipped to the purchasers through a gas pipeline.

In 1997, the ammonium sulfate unit came on-line. This unit diverts some of the gas stream to produce ammonia which is combined with sulfur scrubbed from the emission control system. Ammonium sulfate is resized from a very fine particulate solid with the consistency of sugar to customer specification. This product is sold under the name DakSul 45, which is derived from the 21 percent nitrogen and 24 percent sulfur contained in the fertilizer.

8. **REGULATORY INSTRUMENT (PERMIT/ORDER)**

INSTRUMENT: Hazardous waste storage (containers/containment building) and corrective action Permit.

ISSUED BY: North Dakota Department of Health

DATE: Permit renewed August 29, 2006.

9. **REGULATED UNITS**

There are two RCRA-regulated hazardous waste management units on-site. These are the Container Storage Area and Bulk Storage Facility. The Container Storage Area is a building utilized for storing containerized solid or liquid hazardous wastes. The Bulk Storage Facility is a containment building utilized to store non-liquid solid and hazardous wastes.

10. **WASTE GENERATION/TREATMENT/DISPOSAL PRACTICES**

Wastes generated during facility operation include: lab solvent wastes (D001), heavy metal wastes (D009), acetone/toluene/acetonitrile (D001), mineral spirits (D001), spent caustic/acid (D003), waste 1,1,1-trichloroethane (D), spent shift catalyst (D), waste lab chemicals (various D and U listings) and process clean outs (Bevill exempt wastes).

DGC operates a special waste landfill for the coal ash and other process wastes generated during the coal conversion process. Much of the nonhazardous waste generated on-site is subsequently disposed in the special waste landfill, including Bevill exempt wastes. Bevill exempt wastes are certain high volume, low toxicity wastes produced by industry. DGC produces two Bevill exempt wastes, one non-wastewater and one wastewater. The non-wastewaters include the coal gasification ash, boiler cleanout and other process unit clean outs. The wastewater stream includes wastewaters discharged and managed by the oily water sewer system.

11. **POTENTIAL FOR RELEASES**

The RCRA Facility Assessment (RFA), dated February 1992, identified twenty-two Solid Waste Management Units (SWMU's), and five Areas of Concern (AOC's). In 1995, an additional AOC, the Rectisol Area (1400 Area), was identified. The September 1998 RCRA Facility Investigation Report (RFI) eliminated 17 of the SWMU's from the list. Four more SWMU's were removed from the list in the May 2007 RFI Addendum. Both a site-wide ground-water monitoring plan and oily-water sewer monitoring plan were established with the approval of the CMS final report in

August 2009. One new AOC, the Phenosolvan Unit (1600 Area), was discovered in May 2009, and is currently in the process of being added to the permit.

12. **CORRECTIVE ACTION STATUS AND STABILIZATION ACTIVITIES**

- A. Stabilization measures needed? Yes
- B. Stabilization measures implemented? Yes (If yes, list measures)

In August 1994, the Fire Training Area (SWMU #13) was surveyed. In September 1994, 750 cubic yards of contaminated soils/scoria were removed and land-farmed in a permitted special waste landfill.

In July 1995, the Oily Water Sewer (SWMU #6) was surveyed using a robotically operated video camera. Based upon the results of the video data, approximately 1000 feet of corroded piping was replaced during the summer of 1996.

In September 1997, DGC installed two recovery wells located in the Tank Farm (Areas #1810/1820) and Rectisol (Area #1400) Areas. These recovery wells capture contaminated ground water and direct it to the oily water process sewer which is connected to the oily water treatment system.

In October 1997, the area surrounding the Ash Water Sumps (SWMU #17) was covered with concrete. This allowed for the collection of ash water runoff from disposal vehicles to be captured rather than allowed to infiltrate to ground water.

Contaminant recovery in the Rectisol and Tank Farm Areas was discontinued in 2009. Monitoring wells continue to be tested on a quarterly basis. Natural Bioattenuation continues to play a significant part in contaminant removal throughout the facility and in fact has been selected by the department as the final remedy "No Action" for three of the AOC's, the Rectisol Area, Rail Loading Area, and Tank Farm due to the nature of the contaminant.

- C. Have all necessary stabilization measures been completed (for all areas/units)? Yes
- D. Current human exposures under control? Yes
- E. Current ground water releases under control? Yes
- F. RFI imposed for all areas/units? Yes - for those needing investigation
- G. RFI Workplan approved? Yes
- H. RFI final report approved? Yes 1/08
- I. CMS Workplan approved? Yes 6/08
- J. CMS final report approved? Yes 9/09
- K. Was a human health risk assessment done (or is it being done)? Yes
- L. Was an ecological risk assessment done (or is it being done)? Yes
- M. Final Remedy selected? Yes 10/09
- N. Describe final remedy selected: "No Action"
- O. Has a TI waiver been requested? No
- P. CMI initiated? No
- Q. CMI completed? No
- R. Other relevant corrective action status information: None

13. **COMMUNITY INVOLVEMENT**

Public notices were advertised in local papers and radio during the permit public comment period.