



**DAKOTA
GASIFICATION
COMPANY**
A BASIN ELECTRIC POWER
COOPERATIVE SUBSIDIARY



RESPONSIBLE CARE[®]
OUR COMMITMENT TO SUSTAINABILITY

2017

Responsible Care[®] Performance Report

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On the cover: Dakota Gasification Company employees (from left) Troy Johnson, chemical production shift supervisor; Eli Severson, process operations field technician; and Scott Hellman, chemical production shift supervisor, keep the Great Plains Synfuels Plant running safely and efficiently.

Message from the Chief Operating Officer

This report highlights efforts made in 2017 to improve health, safety, security, and environmental performance at Dakota Gasification Company's Great Plains Synfuels Plant. We are proud of our accomplishments in 2017 and look forward to continued improvement in 2018.

Employees' efforts in 2017 resulted in earning a Responsible Care® award in energy efficiency. We also safely commissioned and began commercial operations at our new urea facility at the Synfuels Plant.

The Synfuels Plant underwent an extensive Process Safety Management audit, which went well and touched on several elements that encompass the Responsible Care program.

These achievements show the dedication employees in all areas of the Synfuels Plant have in bettering the health, safety, security, and environmental performance at the facility.

Construction on our urea production facility was completed with an outstanding safety record. The urea facility was commissioned and started up safely as Dakota Gas employees worked additional hours to bring the units online. The new facility produces urea, liquefied carbon dioxide, and diesel exhaust fluid.

With our employees' continued commitment to the principles embodied in Responsible Care, Dakota Gas will continue to produce a wide slate of products that benefit the world's economy in a safe, sustainable, and environmentally responsible manner.



Dave Sauer
Dave Sauer



Dave Sauer, Dakota Gas senior vice president and chief operating officer.

Responsible Care®

Responsible Care® is a voluntary management system developed by the American Chemistry Council (ACC) that is committed to continuously improving health, safety, security, and environmental (HSSE) performance. Dakota Gas' vision statement, mission statement, and Responsible Care policy demonstrate the integration of health, safety, security, and environmental performance with day-to-day business activities.

As part of the Responsible Care program, Dakota Gas chooses to:

- › Implement and continuously improve a comprehensive environmental, health, safety, and security management system;
- › Commit to the Responsible Care Guiding Principles;
- › Implement the Responsible Care Product Safety Code, Process Safety Code, and Security Code;
- › Report HSSE performance measures publicly;
- › Attain and maintain Responsible Care certification through third-party audits; and
- › Establish HSSE goals, objectives, and targets that demonstrate continuous improvement.

Safety and health

The continuous improvement of safety and health performance at Dakota Gas has been a top priority for decades. Dakota Gas personnel have worked diligently for the last 30 years to implement effective safety management systems.

Dakota Gas employees are actively involved in the safety management system through the following programs.

- › Our Power, My Safety (OPMS) focuses on improving working conditions through condition inspections, quality safety communications, and performance measurement.
- › Preventing Risks and Injuries to Dakota Gas Employees (PRIDE) facilitates safety conversations through behavioral observations.
- › The Joint Safety Committee provides valuable insight into the use and implementation of health and safety policies and procedures.
- › The Compliance, Safety & Industrial Hygiene group assists PRIDE, OPMS, and the Joint Safety Committee in continuously improving Dakota Gas' safety management system.

In 2017, OPMS launched Continuous Improvement Initiative #4, which has started determining how to best report facilities' safety leading indicators and safety successes at each respective facility.

Dakota Gas' indicators include completed continuous improvement inspections, safety communications (toolbox talks, safety meetings, etc.), site audits, and corrective actions. New initiated corrective actions and two success stories are also included in the leading indicator activities that are being measured on a monthly basis.

The triennial Process Safety Management (PSM) audit occurred in 2017. Three auditors reviewed Dakota Gas' Process Safety Management System and noted 21 opportunities for improvement. The opportunities include improvements to the Process Hazard Analysis program and contractor management.

The auditors also indicated that Dakota Gas has an advanced and well-implemented mechanical integrity program, a thorough contractor on-boarding process, and efficient implementation of critical aspects of the PSM standard.

2017 safety and health achievements

- › In response to a Responsible Care Management System (RCMS) audit observation, a confined space entry permit review process was developed to communicate opportunities for improvement to management.

- › Audits have been conducted on all 157 safety showers to ensure they are functioning appropriately.
- › Corrective action plans are developed for every injury. The actions are intended to reduce the likelihood of recurrence of the injury incident.
- › In an effort to reduce chemical exposure potential, HSSE and Operations have narrowed a list of more than 1,250 sample points to specific sample points that pose the highest risk of exposure.

2018 safety and health goals

- › Work toward resolving potential Process Safety Management observations.
- › In 2018, HSSE will continue to work with Operations to develop recommendations for the sample points posing the greatest potential for chemical exposure.

Emergency preparedness

The Dakota Gas Protection Services Department has continued its proactive approach toward fire prevention and emergency preparedness.

Fifteen emergency response exercises were conducted in 2017. These exercises included five security drills, four plant-wide shelter-in-place exercises, and four full-scale rescue exercises involving the industrial fire brigade and Operations personnel.

In addition, Dakota Gas employees also held tabletop and functional exercises with local stakeholders and Canadian emergency response agencies with jurisdiction along the Souris Valley Pipeline.

Transportation Security Administration inspectors initiated a security exercise to test/evaluate Dakota Gas' reporting protocol. Protection Services also conducted the following training sessions for Dakota Gas employees and contractors: industrial fire brigade, portable fire extinguisher and stand-pipe fire hose, hazardous materials response, chemical security awareness, and new hire hands-on respiratory training.

2017 emergency preparedness achievements

- › Dakota Gas underwent two compliance inspections by the Department of Homeland Security (DHS) in 2017. These inspections yielded no findings, resulting in the approval of Dakota Gas' site security plan.
- › DHS was notified of new feedstock materials for the urea unit through the top-screen Chemical Security Assessment Tool (CSAT) 2.0.

2018 emergency preparedness goals

- › Coordinate and conduct emergency response exercises with local and state emergency response agencies.
- › Participate in a full-scale emergency response exercise with Souris Valley Pipeline personnel and Canadian stakeholders.

Environmental management

Air quality

Dakota Gas made progress toward minimizing facility emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter emissions.

The largest facility sources of SO₂, NO_x, and particulate matter emissions are the multi-fuel boilers and superheaters used to provide most of the steam needs for the facility. The boilers are controlled by a flue gas desulfurization system, which scrubs SO₂ emissions from the flue gas. NO_x emissions are controlled through good operating practices, such as the use of automatic oxygen trim systems on boilers and superheaters. A wet electrostatic precipitator is used to control particulate matter emissions from the boilers.

The flue gas desulfurization system was operational 95.4 percent of the time in 2017, which was less than both the 99.1 percent the system was operational in 2016 and the Responsible Care goal for 2017 of 96 percent online.

However, improvements were made to the overall removal efficiency of the system, with 97.0 percent of the SO₂ scrubbed from the flue gas in 2017 compared to 96.4 percent in 2016. The total SO₂ removed by the system was well above the Responsible Care goal of 95 percent removal efficiency for both 2016 and 2017.

Average annual opacity increased slightly in 2017 compared to 2016 from 4.5 percent average annual opacity in 2016 to 5.5 percent average annual opacity in 2017. The annual average opacity exceeded the Responsible Care goal of 5 percent in 2017.

Other sources of SO₂ emissions include the flares. Main flare SO₂ emissions in 2017 were an average of 57.5 pounds per hour SO₂, slightly higher than the average of 48.5 pounds per hour SO₂ in 2016. Start-up flare SO₂ emissions were reduced from an average of 5.2 pounds per hour in 2016 to 4.7 pounds per hour in 2017.

Dakota Gas maintains plant-wide applicability limits (PALs) for SO₂, NO_x, and greenhouse gases. The facility tracks plant-wide emissions of these pollutants monthly and compiles emissions into 12-month rolling totals. The facility remained in compliance with 12-month rolling totals for SO₂, NO_x, and greenhouse gas PALs for all of 2017.

Vision

Working together safely and efficiently to deliver quality products for long-term success.

Mission

Dakota Gasification Company converts lignite coal into diverse revenue streams in a safe, profitable, and environmentally responsible manner, providing long-term value and stability to the cooperative and our community.

Cooling tower emissions

The vapor emitted by the cooling tower has historically been a source of complaints within the community due to the odor. One measure by which the facility tracks odor from the cooling tower is through the cooling tower ammonia levels. Cooling tower ammonia levels increased slightly in 2017 compared to 2016, with average annual ammonia levels of 536 parts per million (ppm) recorded in 2017 compared to 500 ppm in 2016. However, cooling tower ammonia levels still remain well below the Responsible Care goal of 800 ppm.

Dakota Gas has continued efforts to reduce the impact of odors from the cooling tower. A recent project involving the addition of a reboiler to the ammonia stripper unit has resulted in a significant reduction in ammonia emissions from the cooling tower.

2017 air quality achievements

- › Developed a model for ammonia and methanol emissions from the cooling tower. The model showed that methanol emissions are significantly reduced by existing cooling tower processes.
- › Reduced coal lock vent scrubber downtime and permit deviations from uncontrolled releases from gasification coal locks in 2017.
- › Reduced baghouse inspection deviations in the ammonium sulfate processing area.

2018 air quality goals

- › Limit total NO_x emitted from the plant to no more than 750 pounds per hour annual average.
- › Limit total SO₂ to no more than 900 pounds per hour annual average.
- › Regarding cooling tower emissions, limit the amount of ammonia in the cooling water to less than 800 ppm annual average.
- › Regarding cooling tower emissions, limit the superstill overhead stripper downtime to no more than 3 percent for the calendar year.
- › Keep the flue gas desulfurization percent SO₂ removal to 95 percent minimum with 96 percent uptime for the calendar year.
- › Limit the amount of SO₂ emitted from the main flare to no more than 80 pounds per hour annual average (10 percent of the permitted limit).

- › Limit the amount of SO₂ emitted from the start-up flare to no more than 25 pounds per hour annual average (less than 6 percent of the permitted limit).
- › Continue to maintain opacity at or below 5 percent annual average on the main stack (well below the permitted limit of 20 percent).
- › Continue to increase the coal lock vent scrubber uptime (the sulfur and PM control device for the gasifiers).
- › Develop and implement mercury control technology for the Riley boilers.
- › Develop the predictive emissions monitoring system (PEMS) for the new urea boiler.

Groundwater

Dakota Gas maintains more than 120 groundwater monitoring wells throughout the plant and adjacent property. Groundwater Monitoring Plans developed by Dakota Gas and approved by the North Dakota Department of Health outline the specific sampling requirements for each of the five permits that require groundwater monitoring.

Sampling methods are carefully chosen for each well to ensure sample integrity and quality consistent data. A site-specific groundwater sampling procedure was developed to ensure consistency of sample collection, handling, and equipment cleaning between monitoring wells. Field data collection instruments are calibrated daily to ensure accurate data. The wells are strategically located to provide early detection of any release to groundwater and to ensure groundwater protection standards are met.

Statistical analysis is performed on the groundwater data, including historical analysis, to identify any statistically significant increases of any of the indicator parameters, which aids in early detection of a potential release. All chemical analysis is performed by a laboratory that has been certified under the North Dakota Laboratory Certification Program. Dakota Gas continually searches for methods or equipment to improve sample and data quality.

2017 groundwater achievements

- › Maintained greater than 95 percent reliability for the groundwater recovery wells.

2018 groundwater goals

- › Continue to maintain greater than 95 percent reliability for the groundwater recovery wells.

Surface water

Dakota Gas will be surveying the facility for potential sources of nutrients generated by the plant and will review strategies to mitigate these nutrients before reaching storm ponds, which in turn will reduce nutrients discharged to waters of the state.

Storm water discharges are conducted under the North Dakota Pollutant Discharge Elimination System (NDPDES) with a permit from the North Dakota Department of Health. Samples are collected prior to the discharge of storm water to waters of the state. The Synfuels Plant also collects downstream samples to ensure the plant does not adversely affect downstream water bodies. Storm water discharges are closely monitored by Dakota Gas Environmental staff.

2018 surface water goals

- › Identify and implement strategies to reduce NDPDES pollutants. For example, evaluate the potential of a rain garden to capture excess nutrient runoff from fertilizer production areas.

Landfill disposal/reclamation

The Synfuels Plant operates its own permitted solid waste landfill, located a half-mile east of the plant. This landfill is predominantly used to dispose of the plant's gasifier ash. A leachate recovery system minimizes the amount of liquid in the landfill. The landfill's design, coupled with the recovery system, protects the local groundwater from contamination and provides water for use in the ash handling area. In 2017, more than 6.5 million gallons of leachate were recycled back to the plant for use.

Approximately 1,250 tons of gasifier ash are disposed in the landfill each day. The landfill is filled in phases; currently ash is being placed in Phase 9. The north half (Phases 1-5) of the landfill has a permanent 8-foot clay/soil cap that has been seeded with native grasses to prevent erosion. The first filled phase of the southern half of the landfill – Phase 10 – was capped and seeded in 2017. Ongoing inspections, haying, and vegetative assessments are completed to promote healthy vegetative growth. The landfill is expected to be in operation through 2026.

Dakota Gas also monitors two closed landfills. They are clay-capped and reclaimed to provide long-term protection to the surface and groundwater in the area. The closed landfills are planted with native grasses and maintained for erosion protection and wildlife habitat. Leachate recovery from these landfills is also sent to Ash Handling to be reprocessed.

2017 disposal/reclamation achievements

- › Reduced leachate levels in landfill by permanently capping landfill Phase 10.

- › Developed a new landfill Plan of Operations that takes into account recent legal and regulatory updates and trained Operations/Maintenance personnel on it.
- › Reduced landfill track-out by properly cleaning all truck tires and improving road conditions.
- › Removed construction debris, landscaped, and re-seeded the closed construction landfill that was temporarily used as a lay-down yard/parking lot for the construction of the urea project.

2018 disposal/reclamation goals

- › Reduce leachate level 80,000 gallons in closed landfill SP-100 from current leachate level.
- › Run plant air to resume operation of leachate recovery pumps from closed landfill/landfill areas (closed landfill SP-101 and closed areas of active landfill SP-109).
- › Improve the southeast corner leachate collection pond in the active landfill to enhance leachate handling.



Sarah Kurl, process operations field technician, conducts gas monitoring for hot work activities to ensure a flammable atmosphere is not present.

Environmental protection and recycling

Dakota Gas sends materials off-site for recycling, including metal, batteries, mercury-containing devices, fluorescent and high-intensity discharge lamps, and computer electronic equipment.

The generation of hazardous wastes has significantly decreased over the life of the plant through the use of non-hazardous solvents and ongoing recycling efforts. Current generation of hazardous wastes is limited to small amounts of laboratory wastes and outdated warehouse chemicals.

Dakota Gas has reduced the amount of accidental releases over the past six years through environmental awareness, training, and routing multiple pressure relief valves to flares instead of the atmosphere. When liquid spills do occur, the affected area is immediately reclaimed, and in most cases, the spilled material is recycled back to the unit of origin or to the gasifiers.

2017 environmental protection and recycling achievements

- › Implemented new computerized waste handling training on proper spill reporting, handling, and disposal practices.
- › Identified all process waste streams at the plant and verified compliance with current waste handling regulations.
- › Developed and implemented a computerized process for documenting process product transfers, odor complaints, and routine environmental inspections.

2018 environmental protection and recycling goals

- › Ensure proper waste characterization and disposal by identifying waste storage areas (e.g., used oil disposal areas) around the plant site, and training plant personnel on proper disposal practices and when to contact environmental for waste characterization.



Jeff Kopp, maintenance field technician, wears appropriate personal protective equipment while performing maintenance work at the plant.

For more information on the American Chemistry Council's Responsible Care® Program or Dakota Gas' environmental, health, safety, and security performance, contact Chris Breiner, compliance specialist and Responsible Care coordinator, at dgccares@bepec.com or 701-873-2100.