

WYOMING WATER ASSESSMENT AND PROTECTION PROGRAM (SWAP)



SOURCE WATER ASSESSMENT PROGRAM EXECUTIVE SUMMARY

Source Water Assessment Prepared For:
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SOURCE WATER ASSESSMENT SUMMARY FOR Dyno Nobel Inc.

PWS Source Water Assessment Summary

The Dyno Nobel Inc. water facility is a non-transient, non-community system that is located several miles west of Cheyenne. The facility is engaged in the production of fertilizer and organic chemicals. While the bulk of the water produced is used in this process, the facility also provides water to about 100 people per work day on a year round basis. Source water for the PWS is obtained from 11 wells that are completed in the Ogallala Formation. Water produced at each well is piped to a common transmission line and then directly to the plant. A valve system directs a portion of the total flow for use as potable water in the administrative and work areas. There are no storage facilities nor disinfection equipment provided. A connection to the Cheyenne Board of Public Utilities (PWS #5600011) transmission line is available for emergency use.

While the facility's water sources received low land use susceptibility ratings, they generally received high ratings for point source and transportation corridor contaminant susceptibility. The high ratings for these contaminants resulted from the presence of oil and gas wells and a trichloroethylene plume within the source water areas for the wells, in addition to various pipelines and railroads.

Delineation Methods

Because the Dyno Nobel facility is classified as a non-transient non-community groundwater system and obtains water from a porous sandstone aquifer, Lidstone delineated the source water area for this system using calculated fixed radius (CFR) methods. This method was used to estimate the two and five year time of travel radii for the groundwater system based on data obtained from the Wyoming SEO, the PWS sanitary survey, and the SWAP guidance document.

CFR is an appropriate method to use when groundwater flow to the well, spring or tunnel can be characterized as porous. This process was implemented for small communities that derive water from deeper, confined aquifers, or for non-community water systems. A factor of safety (FS) of 1.5 was applied to all systems where portions of the data were suspect. At the ground surface, the radius can be used to delineate an area around the well to be used for wellhead protection. The radius is the distance from the well to a point where groundwater (and contaminant) can reach the well over a specified time period. Input data requirements are limited, consisting of the pumping rate, open area (screened interval) of the well, porosity of the aquifer, and the selected time of travel (2 years and 5 years).

Groundwater Sources

This facility obtains its source water from eleven wells that are completed in the Ogallala Formation to depths ranging from 190 to 350 feet. The Ogallala Formation is exposed throughout the wellfield and its outcrop extends westward approximately six miles to the Islay Escarpment. This formation is composed of up to 300 feet of heterogeneous deposits of well- to poorly-sorted, fine- to very coarse-grained sandstones; siltstones and claystones; variably

cemented conglomerates; minor volcanic ash; and some algal limestones. The proportion of the coarse-grained materials that primarily yield water to wells decreases to the east. The thickness of the Ogallala Aquifer ranges from zero west of the wellfield where the sediments are unsaturated to a maximum of 150 feet in the City of Cheyenne's Happy Jack wellfield. The Ogallala Aquifer is generally recharged through the direct infiltration of precipitation and from stream flow in losing reaches of streams. Groundwater in the Ogallala Aquifer generally flows toward the east. Additional information on these eleven wells is included on the attached Well Information Sheets.

As shown on the enclosed source water area maps, the contaminant inventory zones for these wells are centered around the wellheads. Zone 2s for the wells extend between 916 and 1,795 feet radially from the wellheads, while Zone 3 radii range from 1,448 to 2,838 feet. Differences in the size of the contaminant inventory zones are primarily due to differences in the pumping rates of individual wells and local aquifer permeability.

Integrity Summary

The Dyno Nobel, Inc. water facility uses 11 wells for its water supply. The completion dates of these wells vary from prior to 1983, when less stringent construction standards were required by the State of Wyoming, to after 1993, when stringent standards were in place. Available records indicate that most of the wells were properly sealed to protect against surface infiltration of potential contaminants and flooding around the wellheads. All eleven of the wells have long conveyance lengths. As shown on the Integrity Summary Table, the wells received scores ranging from 2 to 4, which is a direct reflection of the well completion date and conveyance lengths.

Water Source Sensitivity Summary

Dyno Nobel obtains its source water from the confined Ogallala Aquifer. As shown on the Source Sensitivity Summary Table, the wells each received a sensitivity score of 6.

These wells received an intermediate score for two reasons. The first reason is that source water is obtained from a confined aquifer which is known to be relatively insensitive to contamination. The second reason is that laboratory analysis of water samples from the wells within the last five years detected several contaminants that are listed on EPA's primary and secondary drinking water standards. These included nitrate, fluoride, and trichloroethylene among others. While trichloroethylene was detected at concentrations that exceeded the EPA's maximum contaminant levels, the remaining contaminants were generally detected at concentrations below the EPA's maximum levels.

Water System Susceptibility Rating

Susceptibility is defined as the potential for a public water supply to draw water contaminated at concentrations that would pose a threat or concern to human health. The Dyno Nobel, Inc. water system scores low for land use susceptibility. The presence of oil and gas wells and solid/hazardous waste sites within Zones 2 and 3 resulted in a high point source contaminant

susceptibility for Zone 2 and a medium score for Zone 3. Many of the wells also received high point source susceptibility ratings due to the presence of a trichloroethylene contaminant plume. This plume originated from a former Atlas missile site and currently affects the area shown on the attached source water area map. Because a railroad and pipeline run through Zones 2 and 3, many of the wells were assigned a high susceptibility for transportation corridor contaminants in Zone 2. Susceptibility ratings for each type of potential contaminant source are summarized on the attached susceptibility tables.

A review of your PWS's routine water analysis results revealed that one or more chemicals that are considered contaminants in drinking water were detected at some time within the last five years. Chemical detections have a large impact on your PWS's sensitivity score because it may indicate that there is a pathway for contaminants to reach the water supply. However, it is likely that these chemicals are present only in small amounts and are not a danger to your health. Some of these chemicals may also occur naturally in water.

For more information about which chemicals were detected, please contact the PWS for a copy of the most recent Consumer Confidence Report or water analysis results. Chemical detections at levels that are a concern to human health are reported on the EPA's website: http://www.epa.gov/enviro/html/sdwis/sdwis_query.html. To see if your PWS has exceeded the federal primary or secondary drinking water standards, just click on the State of Wyoming and then type in the name of your PWS. Consumer Confidence Reports are prepared by the PWS on a yearly basis. The reports should include information about any chemicals found in the water, even those found at very low levels. Please contact Kim Parker at DEQ, 307-777-7781, or WARWS for assistance. You may also contact EPA to find out what contaminants were detected. You may have to fill out a Freedom of Information Act request to obtain the water test results for your PWS. Please call EPA's Safe Drinking Water Hotline at 1-800-426-4791.

**POINT SUSCEPTIBILITY SUMMARY TABLE
FOR Dyno Nobel Inc.
Point Source Susceptibility Summary**

It may appear from the results of this point source susceptibility summary table that your system has too many PSOCs influencing the final ratings. In some cases, a specific PSOC falls within a specific contaminant inventory zone shared by multiple wells or intakes. When this is the case, that PSOC will be scored for each intake. For example, an underground storage tank may appear within a contaminant inventory zone shared by four different wells. This would cause that single storage tank to be entered into the table four times, or once for each well or intake.

Point Source Type	Low	Medium	High
Sol/Haz Waste Site	N/A	4	4
Oil & Gas Well	N/A	16	4
Misc. Site	1	4	8

- * Illustrates the number of PSOCs in a particular rating class for all water sources
- * N/A - Not Applicable