

# Energy Impacts

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# Table of Contents

## I. BACKGROUND

A. Division of Air Quality .....	1
B. Division of Chemistry.....	2
C. Division of Municipal Facilities .....	2
D. Division of Waste Managment .....	4
E. Division of Water Quality.....	5
F. Office of the Director .....	7

## II. ENERGY IMPACTS

A. Division of Air Quality .....	8
B. Division of Chemistry.....	9
C. Division of Municipal Facilities .....	10
D. Division of Waste Managment .....	11
E. Division of Water Quality.....	13
F. Office of the Director .....	15

## III. CURRENT NEEDS

A. Division of Air Quality .....	16
B. Division of Chemistry.....	16
C. Division of Municipal Facilities .....	17
D. Division of Waste Managment .....	17
E. Division of Water Quality.....	17

## IV. APPENDIX

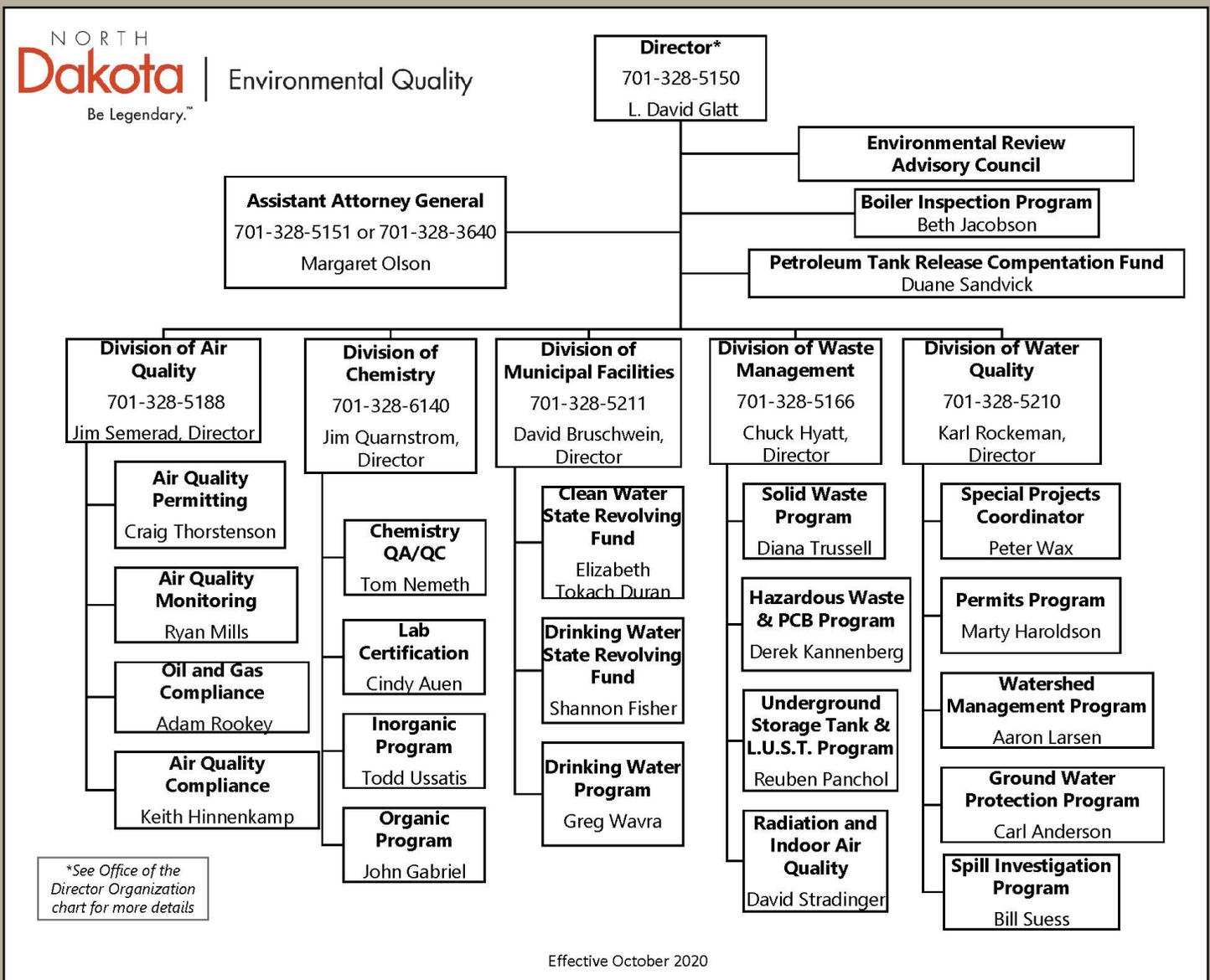


*The Wild Prairie Rose is the state flower of North Dakota.  
Credit: North Dakota Tourism*

# Background

On April 17, 2017, Governor Doug Burgum signed legislation separating the Environmental Health Section from the North Dakota Department of Health to create the standalone Department of Environmental Quality (NDDEQ). Under Senate Bill 2327, the NDDEQ will administer and enforce the same environmental protection programs as the previous Environmental Health Section. The NDDEQ became an official standalone agency effective July 1, 2019.

The NDDEQ is responsible for safeguarding North Dakota's air, land and water resources. The NDDEQ, which has 166 employees, works closely with local, state and federal entities to address public and environmental health concerns and implement protection policies and programs. The NDDEQ consists of the Office of the Director and five divisions: Air Quality, Chemistry, Municipal Facilities, Waste Management and Water Quality.



North Dakota Department of Environmental Quality Organizational Chart

## The Division of Air Quality

The Division of Air Quality is responsible for implementing protective programs and standards to help maintain and improve North Dakota's air quality. Scientists, engineers and technicians manage the implementation of state and federal programs to help ensure compliance with all air quality laws. The division maintains federal delegation of responsibility for U.S. Environmental Protection Agency (EPA) Clean Air Act (CAA) programs and provides technical assistance on environmental matters and during emergency response efforts. Industry is regulated through the issuance of permits that include specific standards to ensure proper operations and compliance with CAA regulations. Division staff work proactively with industry to address air compliance issues as well as citizen concerns and complaints.



The division consists of 35 full-time positions. The division consists of environmental scientists environmental engineers, all of which require the minimum of a four-year degree; and electronic technicians and a data processing coordinator with two-year technical degrees. There is also an administrative support staff member.

### **Program staff responsibilities include:**

- Implementing the Clean Air Act (CAA)
- Evaluating permit applications
- Conducting computer modeling of potential impacts to air quality
- Issuing permits that outline applicable standards
- Completing compliance inspections to ensure standards are met
- Operating an ambient air quality monitoring network
- Responding to complaints and air quality concerns throughout the state
- Preparing state implementation plans for Federal Rules including the Regional Haze Rule and the Affordable Clean Energy (ACE) Rule

## The Division of Chemistry

The chemistry laboratory provides analytical chemistry data to environmental protection, public health, agricultural and petroleum regulatory programs. The laboratory also maintains a certification program for laboratories submitting compliance samples to the NDDEQ.

The department's environmental protection programs use laboratory data to monitor and regulate solid and hazardous waste; municipal wastewater; agricultural runoff; surface, ground and drinking water quality; petroleum products; and other media of environmental or public health concern.

The Division of Chemistry has 16 full-time employees. Thirteen are professional chemist positions requiring the minimum of a four-year degree. Two are laboratory technician positions, and one is an administrative assistant.



## The Division of Municipal Facilities

The Division of Municipal Facilities administers three programs. These are the Public Water Supply Supervision program, the Drinking Water State Revolving Loan Fund program, and the Clean Water State Revolving Loan Fund program. The division consists of 31 full-time employees. Fifteen are environmental scientists, and 13 are environmental engineers requiring the minimum of a four-year degree. There is one grants/contracts officer position, also requiring a four-year degree, and two administrative support personnel.

### Public Water Supply Supervision (PWSS)

This program works with the (currently 505) public water systems (PWS) in North Dakota. The program monitors drinking water quality and provides technical assistance to ensure drinking water meets all standards established by the federal and state Safe Drinking Water Act (SDWA). Currently, 99.4 percent of community water systems meet all applicable health-based standards under the SDWA – one of the highest compliance rates in the region and country. The U.S. Environmental Protection Agency (EPA) goal for 2019 was 90 percent nationwide.

The Municipal Facilities division provides training and operator certification for water treatment and distribution facilities and wastewater collection and treatment plants. There are about 1,131 certified operators in the state. A total of 68 percent of public water systems that require an operator meet operator certification requirements for water treatment (no EPA goal). Sixty-six percent of community water systems that require an operator meet operator certification requirements for water distribution (no EPA goal) in North Dakota.

Staff administer the fluoridation program and provide technical assistance to private systems. A total of 65 communities add fluoride to their drinking water. Of the population served by these communities, 98.5 percent (about 488,935) receive optimally fluoridated drinking water (no EPA goal).

### **Drinking Water State Revolving Loan Fund (DWSRF)**

This program provides low-interest loans to help public water systems finance the infrastructure needed to comply with the SDWA. Staff members also review drinking water projects to ensure compliance with state design criteria before construction and provide technical assistance.

Since the inception in 1998 through December 31, 2020, the DWSRF has approved loans totaling about \$698 million.

### **Clean Water State Revolving Loan Fund (CWSRF)**

This program provides low-interest loans to fund conventional wastewater and nonpoint source pollution control needs. Team members also review wastewater projects to ensure compliance with state design criteria before construction and provide technical assistance.

From 1990 through December 31, 2020, the CWSRF has approved loans totaling about 824 million.

### **Field activities supporting the Municipal Facilities programs include:**

- Inspecting over 570 public water and wastewater systems to ensure compliance with all public health standards.
- Reviewing State Revolving Loan Fund construction projects to ensure they meet state and federal requirements.
- Investigating complaints.



The division is requesting new equipment to replace or upgrade existing instrumentation. A more current information management system will allow the division to keep up with emerging methods and technologies to improve efficiency and effectiveness.

## The Division of Waste Management

The programs in the Division of Waste Management work to safeguard human health and protect and improve North Dakota's natural environment for everyone. This is done by enforcing state and federal environmental laws designed to regulate where and how materials are used and stored, and their ultimate disposal. The division also works to encourage waste reduction, recycling, and beneficial reuse. There are 34 full-time positions and two part-time temporary positions; consisting of 26 environmental scientists, four environmental engineers, four program managers, the division director (all of which require the minimum of a four-year degree), and one administrative support staff member. The division is organized into four program areas.

### Hazardous Waste Program

This program regulates approximately 800 facilities that generate, store, treat, dispose or transport hazardous waste. The program also coordinates assessments and cleanups at Brownfield sites (properties underdeveloped due to actual/perceived contamination). It performs inspections and compliance assistance for businesses and utilities with equipment containing polychlorinated biphenyls (PCBs).

### Radiation Control and Indoor Air Quality Program

This program performs two major functions:

1. Regulating the development, use and security of ionizing and radiation sources to protect North Dakotans and the environment. The program regulates 72 radioactive material licensees, 52 licenses for Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM), and 32 reciprocity license agreements.
2. Evaluating and mitigating asbestos, radon, lead and other indoor air quality concerns, as well as implementing a public awareness and education program concerning these health risks.

### Solid Waste Program

This program regulates the collection, transportation, storage and disposal of nonhazardous solid waste. It promotes resource recovery, waste reduction and recycling. The program helps individuals, businesses, and communities provide efficient, environmentally acceptable waste management systems. The program regulates 383 solid waste facilities, including infectious waste/medical waste facilities, industrial waste landfills, land treatment facilities, municipal solid waste landfills, special waste facilities, transfer stations and inert waste landfills/compost facilities. The division also regulates 832 permitted waste transport companies.

Program staff also administer the Abandoned Motor Vehicle Program, which assists political subdivisions in the cleanup of abandoned motor vehicles and scrap metal.



### **Underground Storage Tank (UST) Program**

This program regulates petroleum and hazardous substance storage tanks, establishes technical standards for the installation and operation of underground tanks, maintains a tank notification program, establishes financial responsibility requirements for tank owners, and provides state inspection and enforcement. The program works with retailers and manufacturers to ensure they meet specifications and standards for petroleum and antifreeze. There are 830 operating facilities and 142 temporarily non-operating facilities currently regulated under this program. The UST Program also supervises cleanup from any leaking underground storage tank facility and other petroleum product releases.

### **Field activities supporting the Waste Management programs include**

- Compliance assistance
- Sampling
- Training
- Site inspections
- Complaint investigations

## **The Division of Water Quality**

The Division of Water Quality protects water quality through five programs. There are 37 full-time positions, consisting of 28 environmental scientists, four environmental science administrators, four environmental engineers (all of which require the minimum of a four-year degree) and one administrative assistant.

### **North Dakota Pollutant Discharge Elimination System (NDPDES) Permit Program**

This program issues the federally required National Pollutant Discharge Elimination System (NPDES) permits for limiting the discharge of pollutants to surface waters. Discharges may include pollutants carried by stormwater, in addition to the direct release of wastewater. Many industries and municipalities are required to obtain these permits. This program also issues permits to septic tank pumpers regulating the collection and proper disposal of domestic wastewater.

The permits may be individual permits issued to one facility or general permits involving multiple facilities under one permit.

### **Watershed Management Program**

This program monitors North Dakota watersheds' health through sampling and analysis of water quality and aquatic life in lakes, rivers, streams, and reservoirs. For those water bodies that are not usable for their designated use, the program helps develop plans to improve water quality in partnership with the local conservation districts and landowners. This program also provides cost-share assistance, information and education to help meet water quality goals.



*Turtle River State Park.  
Credit: Greater Grand Forks Convention & Visitors Bureau*

## Ground Water Protection Program

This program includes:

- Wellhead and Source Water Protection Programs which defines the susceptibility of public water systems to contaminant sources.
- Underground Injection Control (UIC) Program which helps prevent contamination of drinking water by injection wells.
- Ambient Ground Water Monitoring Program, which assesses the quality of groundwater resources concerning agricultural and oil field-related chemical contamination.



*Groundwater agricultural ambient ground water sampling with an audience.  
Credit: Andrew Peterson*

Trained personnel also provide immediate response to emergency spills and continued investigation/enforcement, to fully address environmental impacts. Program staff further fulfill open records requests typically received as part of property transactions or as Freedom of Information Act requests from the media and general public.

## Spill Investigation Program

This program receives and reviews all the spill reports for the state and responds with other NDDEQ divisions and additional state and federal agencies. The response may include collecting additional information, assignment to other agencies, field inspection and on-scene coordination. Program staff collect environmental samples of soil and water and work with the responsible party to ensure spills are remediated and waters of the state, both ground and surface water, are protected. Since the timely response to a critical incident is crucial, this program maintains staff in the field five days a week and one staff person on call during weekends and holidays. One staff person operates phone coverage 24 hours a day, seven days a week, in case of an incident. Staff members also work with various industries to prepare for incident response actions and educate them on proper remediation and spill assessment.

## Field activities supporting water quality programs include:

- Inspection of wastewater treatment facilities and septic tank pumps, as well as completion of compliance audits/sampling to ensure involved parties meet permit requirements
- Inspecting construction and industrial site stormwater controls
- Meetings with local/state entities to assess nonpoint source project goals
- Ambient monitoring of lakes and rivers
- Evaluating domestic water sources for potential contaminant sources
- Annual collection/analysis of samples from vulnerable aquifers
- Overseeing remediation of spills with potential to reach water sources
- Responding to complaints

## Office of the Director

Agency activities are coordinated by the Office of the Director, which has 12.5 full-time employees and an attorney assigned by the Office of Attorney General.

Employees oversee quality assurance procedures; help coordinate public information efforts; assist with staff training and data management activities, emergency response efforts, enforcement of environmental regulations and funding requests.

The Office of the Director works with the department 's divisions, various government agencies, industry and the public to set environmental protection policy and ensure the proper implementation of environmental protection programs.



*The Gold Seal Building, headquarter of the North Dakota Department of Environmental Quality, located in Bismarck, N.D.*

## The Division of Air Quality

Increasing oil well counts and improved unconventional oil and gas extraction techniques have elevated the amount and complexity of work related to permitting, inspections, enforcement and citizen complaint resolution efforts. The number of oil wells registered with the division has more than tripled since 2010 (see Figure 1 in the Appendix). There was also been an increase in oil- and gas-related projects (e.g., crude oil storage tank facilities, oil terminals, gas plants, and refineries).

Even with declines in **new** well production, most **existing** wells stay online and are subject to regulations. A downturn in the oil industry means North Dakota can “catch up” to gas infrastructure needs and gain the ability to meet the [North Dakota Industrial Commission Gas Capture Policy goals](#).

The transition to renewable energy resources has also impacted the division. See Figure 2 in the Appendix for breakdown on electrical generation in North Dakota by industry. Electric energy produced from coal has remained relatively stable since 2000.

Since about 2007, wind power has continued to add to North Dakota’s total electrical generation.

Increased interest in renewable energy generation along with clean coal technologies such as carbon capture and sequestration has resulted in the issuance of environmental protection permits for those activities. Federal regulations and changes in the energy generation market forces have impacted the division’s implementation plans for the Regional Haze and Affordable Clean Energy Rules.

Most facilities that require permits under the federal Clean Air Act require routine compliance inspections by program staff. (See Figures 4 through 9 in the Appendix.) Depending on the complexity and level of public interest, an individual project or facility may require substantially more staff resources. The increased number of regulated air pollution sources and increased complexity in regulations has resulted in continuous recruitment and retention efforts for professional and experienced staff.



*The North Dakota energy industry is diverse and productive. Pictured is the Leland Olds Station in Stanton, N.D. Credit: North Dakota National Guard*

### **Additional direct and indirect impacts on the division include:**

- Expansion of the Tesoro Mandan Refinery and permitting work for proposed diesel refineries, including the Meridian Davis Refinery.
- Increased compliance activities (inspections, testing/report reviews) relating to the Marathon Dickinson Refinery (formally Dakota Prairie Refinery). This facility is being converted to a renewable diesel plant (one of the first of such conversions permitted in the U.S.). Many similar projects are entering the permitting phase.
- Increased permitting and compliance activities relating to gas plants, compressor stations and oil storage terminals. This includes increases in pre-construction modeling as gas plants and compressor stations expand to accommodate the increase in associated gas production from the Bakken.
- The extensive effort with the enforcement initiative to reduce and mitigate fugitive emissions from upstream oil and gas production activities.
- Bakken shale oil field surveys with the EPA utilizing Geospatial Mapping of Air Pollution (GMAP) to gather air contaminants' real-time analytical data.
- Increased oil- and gas-related complaints and questions from the public.
- Expansion/operational problems at the Tioga Gas Plant and Dakota Gasicfication Company.
- Adoption of significant federal regulations (40 CFR 60, Subpart OOOO and OOOOa).
- State planning for large EPA regulations (ACE Rule and Regional Haze).

## **The Division of Chemistry**

The laboratory analyzes water, soil, and other matrices to determine impacts from energy events. A single sample can have one parameter or more than 100. Figure 10 (see Appendix) demonstrates that while general energy sampling is down in 2020, sampling for three long term projects has remained relatively consistent.

Other unique factors that impact Chemistry workload include

- Determining method limits with highly mineralized water samples. Detecting specific elements in samples can require a different dilution and reanalysis of the original sample.
- The EPA's decision to have all drinking water systems on tribal land move to Region 8 jurisdiction has increased our tribal liaison's portfolio from nine to 14 systems since April 2019.
- Implementing the new Lead and Copper Rule.
- The lab is certified through April 2022 by EPA Region 8 for the determination of regulated parameters in drinking water. The division continues to pursue third party certification for parameters in other matrices. It is a process that involves extensive review of methods, quality assurance/quality control, and document management processes.



## The Division of Municipal Facilities

Under state law (North Dakota Century Code 33.1-19), all persons operating water and wastewater systems, with some exceptions, must be certified by the NDDEQ. Figure 11 (located in the Appendix) shows decreased numbers of public water systems with certified operators since 2011, even though the number of operator certification exams has increased.

**Two principal factors have been responsible for the decrease in certification.**

1. Operator turnover (certified operators leaving for higher-paying jobs in the oil field).
2. New systems that do not have a certified operator.

Both factors still exist, but oil field jobs may now be harder to find.

Through training and site inspections, the division continues to stress the importance of having a certified operator. In oil-impacted counties, the immediate need has been for water distribution operators since most new systems obtain drinking water from other regulated sources (no treatment required). Compliance with operator certification requirements for water treatment and wastewater collection/treatment also may decrease if more systems choose to develop/treat their own drinking water sources or treat/discharge wastewater.



*Pictured is a wastewater stabilization lagoon located in Rutland, N.D. Facultative pond systems, such as this, use natural processes to treat wastewater.  
Credit: Shawn Martin*

Figure 12 (see Appendix) shows the number of projects built without approval or facilities constructed that did not meet system requirements. Many were submitted by out-of-state engineering firms (120 to date) unfamiliar with North Dakota requirements, resulting in extended review time. Others have mechanical wastewater treatment plants or sizeable on-site disposal systems, which required additional time to review and approve because small facilities had not historically used them. Finally, several facilities involved as-built situations which needed more time to resolve design and construction issues. Total approved water and wastewater plans and specifications by year are featured in Figure 13 of the Appendix.

Staff also spends considerable time evaluating and addressing non-compliant or failing wastewater systems, many of which were built and expanded without local or state approval and have undergone numerous management changes.

Figure 14 (see Appendix) shows the number of projects on the CWSRF and DWSRF lists increased significantly since 2010. Since 2015, 25 to 30 percent of projects have been in oil-impacted counties. By November, the programs awarded 28 new loans for 2020. More loans result in additional SRF projects to implement, increasing workload on top of keeping pace with more technical reviews for non-SRF and oil field projects.

## Additional workload impacts to those shown in Figures 13 and 14 include:

- Educating systems on SDWA requirements
- Implementing and enforcing the requirements.
- Helping systems understand compliance.
- Providing technical assistance in addressing SDWA violations.
- Responding to complaints.
- Answering calls and emails about proposals for the reactivation of housing facilities.
- Handling vendor and engineer inquiries.
- Site visits and presentations on alternative wastewater treatment systems and project proposals.

## The Division of Waste Management

### Oil Field Impacts

Despite recent volatility in the oil production and recovery sector, the workload has continued to increase. Facilities directly operated by oil field-related businesses and peripheral businesses supporting the increasing general population continue to operate. Oil field service companies and other support businesses, such as tank manufacturers, generate hazardous waste. Even with the slowdown in oil well drilling activity, the service and support companies remain active. The number of facilities that generate 220 pounds or more of hazardous waste annually have increased approximately 10 percent in the past year.

New gas stations and truck stops continue to be built or expanded. Both municipal landfills and oil field special waste landfills deal with new types and significantly increased volumes of waste. Ionizing radiation sources and materials are commonly used in oil exploration and production and require proper training and licensing for safe use. Figures 15 through 20 (see Appendix) show the increase in hazardous waste large-quantity generators (LQGs), municipal solid waste (MSW) and special waste landfills, tons of oil field special waste, number of solid waste inspections, radioactive material licensing inspections, new or expanded underground storage tank (UST) facilities, and new waste transporter permits.



The generation, proper management, and disposal of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) continues to be a priority in North Dakota. TENORM is low-activity radio active waste that is generated primarily in oil field exploration and production activities. It includes materials such as filter socks, tank bottom sludge and pipe scale. Certain types of fracking material can also be considered TENORM. Responding to illegal dumping has historically taken considerable staff time, as TENORM is a significant public concern (see Figure 21 of the Appendix).

The division oversees rejected waste loads at landfills and the cleanup of illegal dumpsites. However, the number of incidents has decreased since the implementation of required TENORM waste containers on all well sites. The NDDEQ has increasingly acted in response to TENORM management incidents, including improper processing, storage, and disposal.

The need for safe and effective TENORM disposal locations is essential. The waste management division is aware of two facilities pursuing TENORM waste permits. TENORM applications have generated significant public interest. The division has responded by working in cooperation with local governments, cities and counties, sharing information and answering questions about potential TENORM acceptance at landfills. We educate through numerous public hearings and workshops, aiming to reach as many interested parties as possible.

The department respects the relationship between the state and local governments. Permit reviews ensure landfill design protects public health and the environment, while county governments maintain jurisdiction over what land use is appropriate in their communities.

The division has three staff members on the Water Quality spill response team, which requires considerable fieldwork and office follow-up. Figure 22 (see Appendix) of this report shows spill response numbers.

In coordination with the public, stakeholders, and the regulated community, the department established a general permitting program July 1, 2020. This program will provide consistent permitting language for certain categories of facilities and streamline the permitting process, reducing review time while preserving protections for public health and the environment.

One of the first categories of facility that the division intends to address through a general permit is the land treatment of petroleum contaminated soils. Previously, the state could address the land treatment through one of three different permitting mechanisms. Developing a comprehensive general permit would ensure a clear and consistent process.

The division continues to issue contracts with cities, counties, and local public health units to provide funds from the Abandoned Auto Program Fund to remove and recycle abandoned cars, campers, trailers and mobile homes, many of which were abandoned during the oil field activity decline.



*Wind Turbines in a sunflower field near Wilton, N.D.  
Credit: North Dakota Tourism*

## **Electric Power Generation**

The electric power generation landscape in North Dakota is also evolving. Renewable energy sources are becoming a more significant component of the overall electricity generation mix. New energy sources come with new waste management demands.

At the same time, companies have decided to retire some legacy coal combustion units. The decommissioning of a powerplant does not mean the end of waste management responsibilities at a site. Landfills commonly require 30 years of post-closure care, including monitoring, which continue to be covered under applicable permits.

The Water Infrastructure Improvements for the Nation Act (WIIN Act) of 2016 provides state programs approval for the control of coal combustion residuals (CCR). In response to the act, NDDEQ adopted amendments to the Solid Waste Management rules, which became effective on July 1, 2020. The amendments included a new chapter (NDAC Chapter 33.1-20-08) entitled Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments that applies to owners and operators of new and existing landfills and surface impoundments of CCR generated by the combustion of coal at electric utilities and independent power producers.

Although the department has long had applicable CCR rules, the new program requires amended permitting and additional review and inspections for CCR units within the state. Facilities have until July 1, 2022, to submit revised permit applications. The department will be working closely with affected facilities to complete appropriate permit requirements and follow-up inspections.

An emerging concern has to do with the disposal of wind turbine blades removed at the end of their usable life. These blades can be more than 100 feet long. There are currently about 1,700 turbines in North Dakota, equaling more than 5,000 blades eventually requiring replacement. The first turbines installed are going through blade swap-out now.

Blades are considered inert waste (less likely than municipal garbage to contaminate water or serve as food for pests). There are approximately two dozen landfills within the state that could potentially accept these blades. We likely have landfill capacity to handle waste blades from North Dakota for the foreseeable future; however, various groups are looking to develop other end-of-life options for these blades. There is little market for recycled blades or fiberglass blade material at this point. Still the Department is seeking to coordinate efforts to identify recycling or alternative use solutions that will work for North Dakota.

## **The Division of Water Quality**

### **Spill Investigation Program**

This program is primarily responsible for responding to spills with the potential to impact waters of the state and which includes oversight of appropriate remediation activities. The program handles two different types of spills, oil field and non-oil field related. Of the reported spills since July 1, 2018, there are currently less than 20 oil field-related spills and less than 20 non-oil field related spills awaiting initial inspection. The NDDEQ spill investigation team has participated in the initial inspection of the vast majority of spills in the state.

Between July 1, 2018, and June 30, 2020, the program reviewed 2,462 total spills and has responded to 1,320, assigning the rest to other agencies. Of the 1,320, there are 378 that need additional additional ongoing department oversight. The program evaluates spills with the most significant potential to adversely impact the environment as soon as possible. July 2018 through February 2020 saw an increase in oil field related spills. The period of March 2020 through June 2020 saw a significant drop in oil field related spills due to the drop in oil prices and the shutting in of numerous wells.



*Fargo Wastewater Treatment facility*

As the number of oil and gas facilities increase and oil wells come back online, we expect the potential for the number of spills to increase once again. Figure 22 (see Appendix) illustrates the change in the number of spills reported and the staff's response for each calendar year.

### **NDPDES Program**

The NDDEQ continues to issue new permits with the influx of Notice of Intents and Applications. Septic pumpers (see Figure 23 in the Appendix) continue to maintain their presence as the need for services continue.

**Except for septic system servicers, the following are federally required permits:**

- Construction stormwater
- Dewatering and hydrostatic testing (including pipelines and tanks)
- Industrial stormwater
- Wastewater general permits (typically small domestic wastewater treatment facilities)
- Wastewater individual permits (typically major municipalities and industries)

Some of these permit types now cover permanent facilities that require more oversight to ensure permit compliance.

The overall increase in permits has resulted in additional inspections and response to complaints in all areas. This is especially true for septic pumpers, stormwater controls, well pads, and hauled wastewater treatment facilities. The numbers of new permits have seen an uptick in construction stormwater (see Figure 23 in the Appendix).

However, the permitting program still must address issues such as abandoned facilities (e.g., RV campgrounds with lagoon systems) that may need cleanup. As the oil and gas industry maintains its variability, companies continue to pursue petrochemical manufacturing and mining produced water. Because of their complexity, facilities engaged in these activities will require highly trained staff to issue permits promptly.

Retraining well-qualified staff is essential to the success of this program.

## Groundwater Protection Program

The oil boom increased the State Water Commission's water appropriation applications for review. Groundwater protection program staff completed approximately 46 appropriation reviews in fiscal year 2019 and 46 reviews in fiscal 2020. The number of appropriation reviews are anticipated to remain about the same in fiscal 2021-2022.

Class I permitting activities include permit application review and comment, preparation of a fact sheet and a draft permit, public notice and public comment period, well completion report review, and issuing a final permit.

The permit application review and approval process generally takes between six and eight months to complete, provided the permit application package is complete and detailed and there are no other unforeseen delays. This timeframe can be highly variable and could be significantly longer depending on the application's completeness and the response time of the applicant to NDDEQ requests for additional information or clarification.

Figure 24 (see the Appendix) also shows the oil field impact on the Underground Injection Control (UIC) Program. Groundwater Protection Program staff conducted 14 UIC inspections in fiscal 2019 and 43 inspections in fiscal 2020.

The program has responded to many requests for information about Class I injection wells. Class I wells are used to inject hazardous and non-hazardous wastes into deep, confined rock formations. They are typically drilled thousands of feet below the lowermost underground source of drinking water. Several oil field waste disposal facilities are evaluating the injection of treated wastewater into Class 1 wells as a disposal option, and the NDDEQ anticipates approximately three Class I permit applications in fiscal 2021-2022.

The number of public water systems in the oil field has increased, and each system requires the completion of a Source Water Protection Area Report. This report includes the delineation of the protection area, completion of a contaminant source inventory and a susceptibility analysis. In fiscal 2019, 35 water systems reports were updated or prepared (for new systems); 61 reports were generated or updated in fiscal 2020. Groundwater Protection Program staff estimate the number of water systems requiring updates and the number of new systems requiring completion of initial reports will remain unchanged during fiscal 2021-2022.

A significant number of calls have come from the public related to sampling private wells (e.g., how to test, where to send samples, what to analyze, perceived impacts to wells, etc.). Workload related to facility siting reviews (e.g., municipal and special waste landfills, pipelines, concentrated animal feeding operations, wind farms, power transmission lines, well pads, construction sites) continues to increase.



*NDDEQ Environmental Scientist Casey Gleich (upper left), former employee Shawna Nieraeth (lower left), and NDDEQ Scientist Jim Uhlman (lower right) provide training for western ambient groundwater sampling.  
Credit: Shannon Suggs*

# Current Needs

Staff completed 287 reviews in fiscal 2020 and 302 reviews in fiscal 2021. We anticipate that the number of reviews will continue to increase in fiscal 2021-2022.

The Western Ground Water Monitoring Program was implemented in 2013 to evaluate groundwater conditions in selected aquifers within northwestern North Dakota oil-producing areas. Staff sample approximately 135 observation wells in 20 aquifers as part of the Western Program. The initial round of sampling was completed between the fall of 2013 and 2015. Sampling is currently being conducted on a 1.5-year rotation; approximately 45 wells are sampled each spring and fall. Based on the results obtained as the sampling program progresses, wells may be added or deleted from the sampling program. Based on the data collected to date, significant impacts to groundwater quality associated with increased oilfield activity have not been identified in the targeted aquifers.

The Agricultural Groundwater Monitoring Program was implemented in 1992 to collect baseline data and evaluate groundwater conditions in selected glacial drift aquifers located within agricultural areas of North Dakota. The goal of the Agricultural Monitoring Program is to assess North Dakota groundwater quality regarding agricultural chemical contamination. Program staff sample approximately 860 wells in 48 aquifers as part of the Agricultural Groundwater Monitoring Program. Sampling is conducted on a five-year rotation, with sampling conducted between April and October each year. Based on sampling results, there were no significant impacts on the targeted aquifers from the application of agricultural products.

## The Division of Air Quality

Air Quality will need to maintain existing resources to train and retain qualified staff, given the increase in workload and complexity of the division's rules and regulations. Training staff to be competent and have the required knowledgebase to regulate effectively takes two to three years.

Resources are also needed for the equipment to enhance air quality monitoring. Items such as Forward Looking Infrared (FLIR) cameras, flame ionization detectors, and analyzers for ambient air quality are needed to readily accurately identify regions with air quality issues.

Currently, the Air Quality division is migrating to a new comprehensive database system that will allow for greater public accessibility and reporting.



*An EPA Geospatial Measurement of Air Pollution (GMAP) program vehicle conducting an air quality survey in ND oil fields. Credit: Adam Rookey*

## The Division of Municipal Facilities

The division continues to experience increases in workload due to oil field development activities.

### Long-term challenges include:

- Implementing new and revised SDWA and State Revolving Loan Fund (SRF) Program requirements.
- Heightened community interest in using the SRF programs for financial assistance to address infrastructure needs.
- Stagnant or reduced federal funding, impacting how the division maintains state delegation for its programs.

## The Division of Waste Management

Oil field development and established oil field activities continue to impact the work focus of the division. Solid waste management facilities are expanding their operations in response to increased population and industrial activity. Some landfills are looking to accept additional waste streams, including industrial and TENORM wastes.

Concurrently, there is a push to develop programs due to new federal regulations or requests from the regulated community for clarity and consistency. Existing facilities will continue to require oversight to ensure long-term compliance. Staffing pressures are likely to continue to increase.

Future needs will capitalize on efficiencies by applying IT solutions to current data collection management methods. Expansion of database capability is needed to accommodate the Freedom of Information Act requests. We see a need to manage permit applications and landfill waste rejection reports through electronic reporting systems.



*Mule deer reclaim territory on a closed powerplant landfill.  
Credit: Diana Trussell*

## The Division of Water Quality

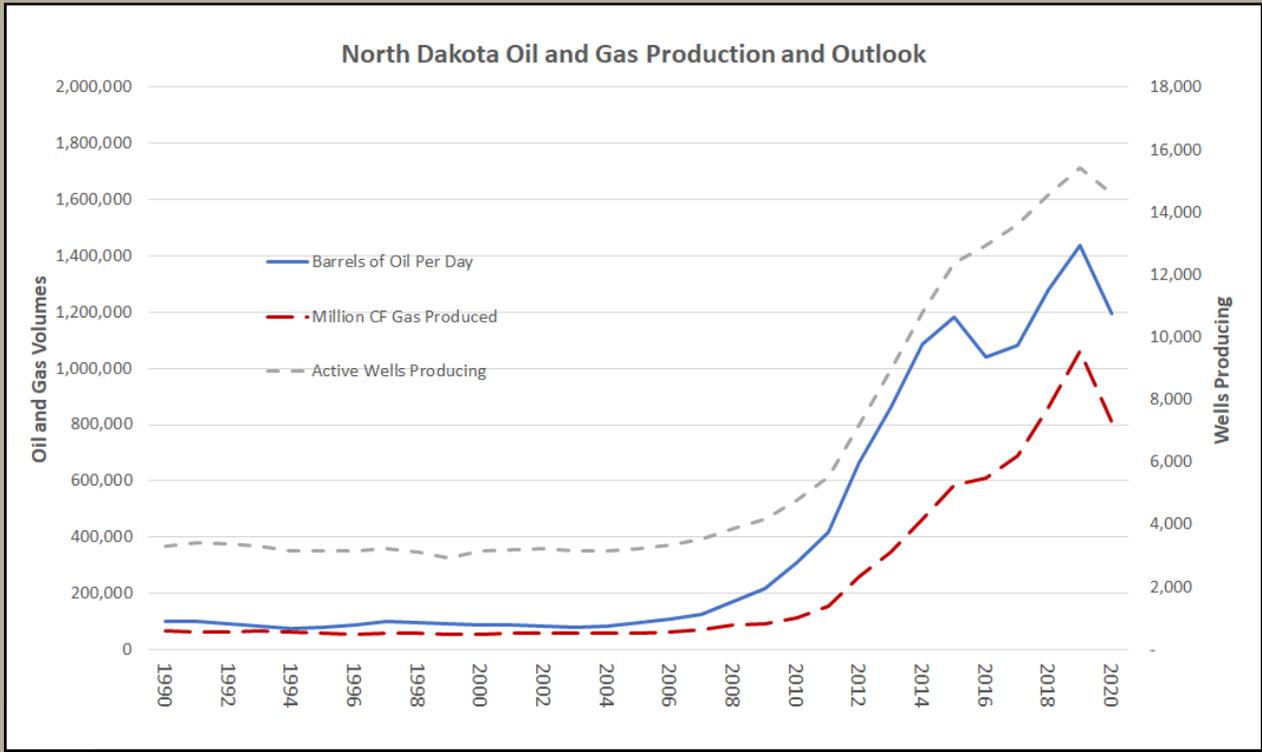
The Division of Water Quality continues to address both current and past spills to ensure appropriate cleanup. Continued oversight of ongoing remediation projects will require the retention of existing trained staff and the training of replacements due to turnover.

The division will continue to prioritize enforcement actions and field/permitting activities.

## The Office of the Director

Changes in federal administration with different agendas and philosophy regarding fossil fuel development and its usage will increase the need for highly trained technical staff. The NDDEQ will continue to follow science and the law when addressing legal challenges from both government and non-government organizations. Legal cost by biennium are charted in Figure 25 of Appendix. Enforcement actions per year are shown in Figure 26.

The Division of Air Quality



\*Updated through August 2020

Figure 1: North Dakota Oil and Gas Production

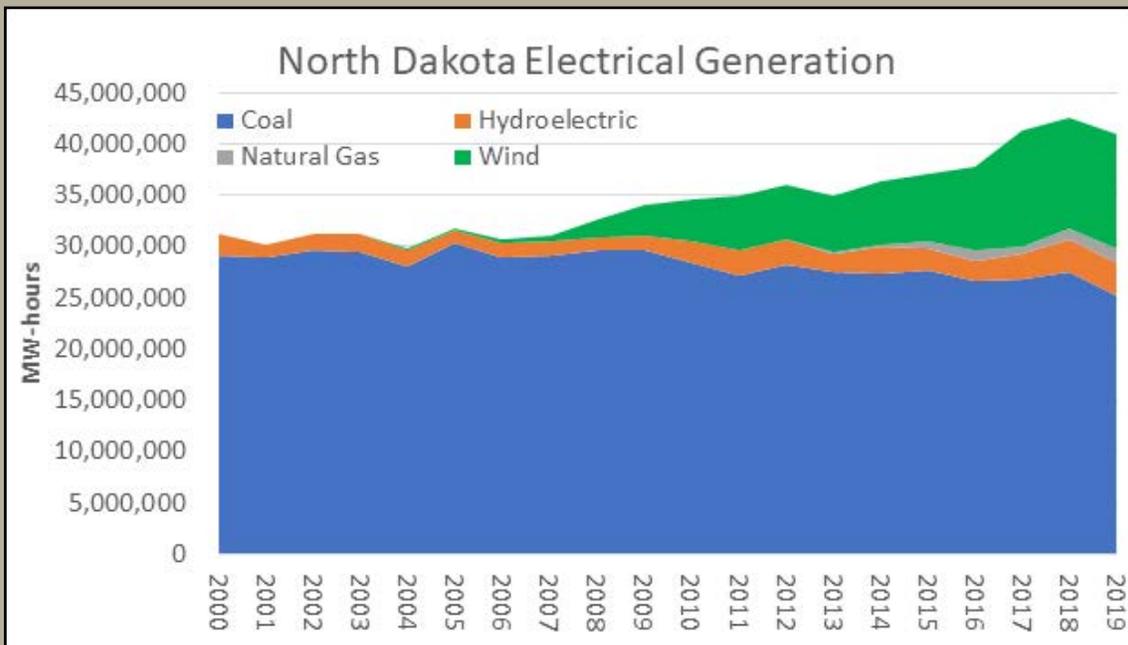


Figure 2: North Dakota Electrical Generation Breakdown by Industry

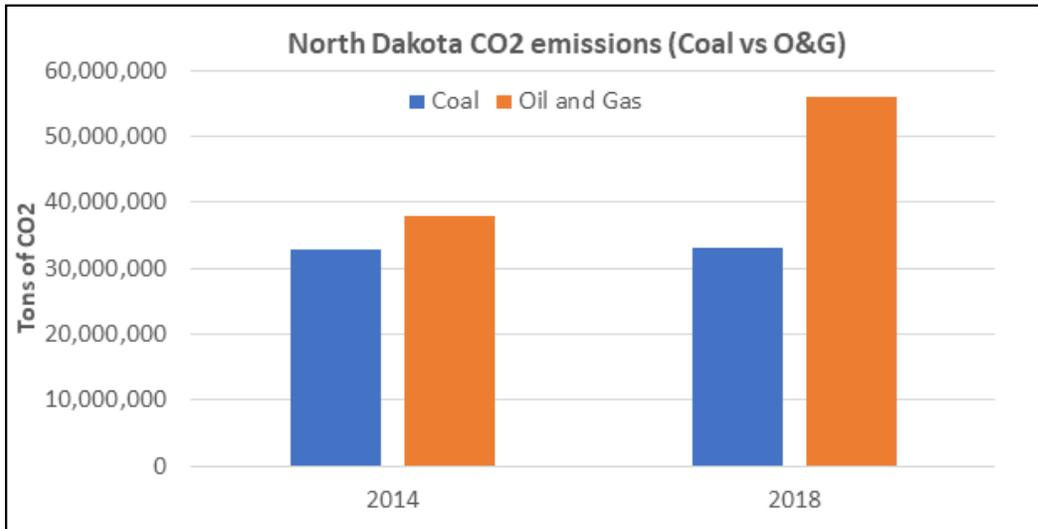


Figure 3: North Dakota CO<sub>2</sub> Emissions

*Oil and Gas CO<sub>2</sub> emissions are derived from calculations based on well operations and flaring (a less certain value). Coal EGU (Electricity Generating Units) CO<sub>2</sub> emissions come from monitoring data (a very accurate value).*

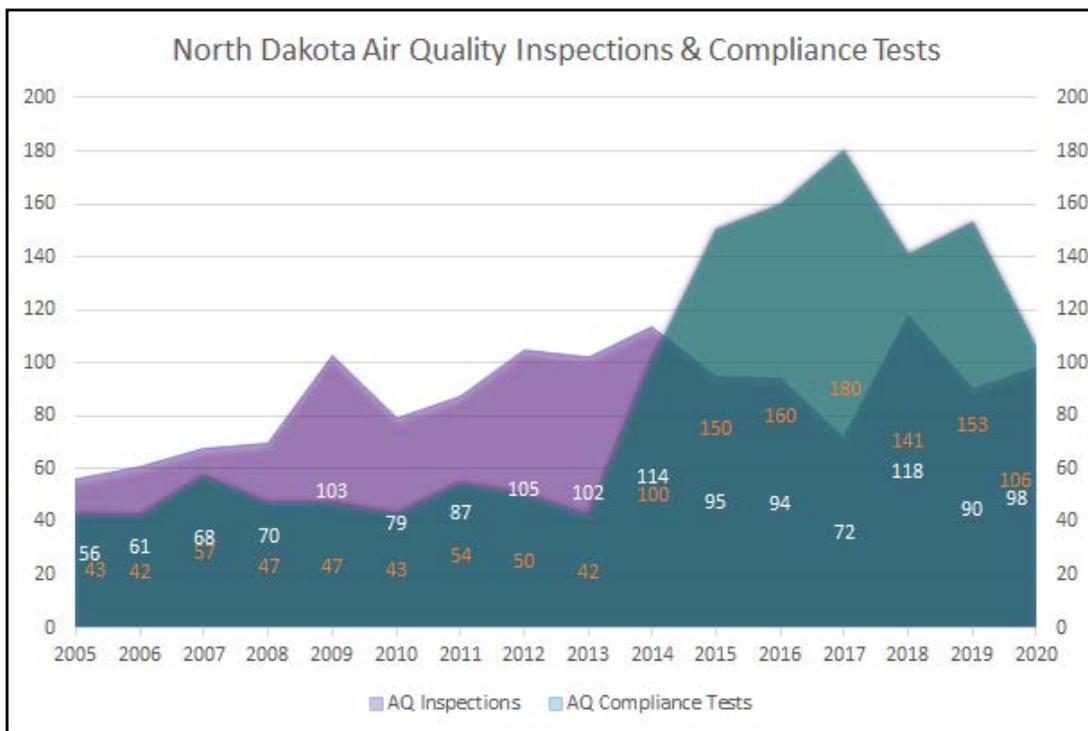


Figure 4: North Dakota Air Quality Inspections by Year\*

\* All numbers taken from the Air Quality Database

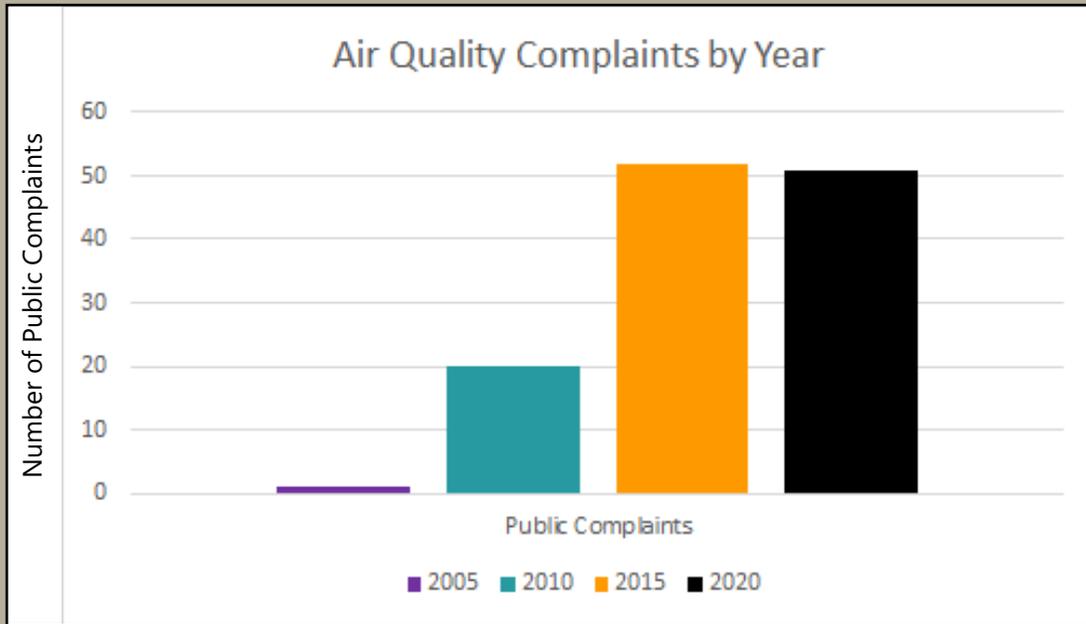


Figure 5: North Dakota Air Quality Public Complaints Addressed by Year\*

\* All numbers taken from the Air Quality Database

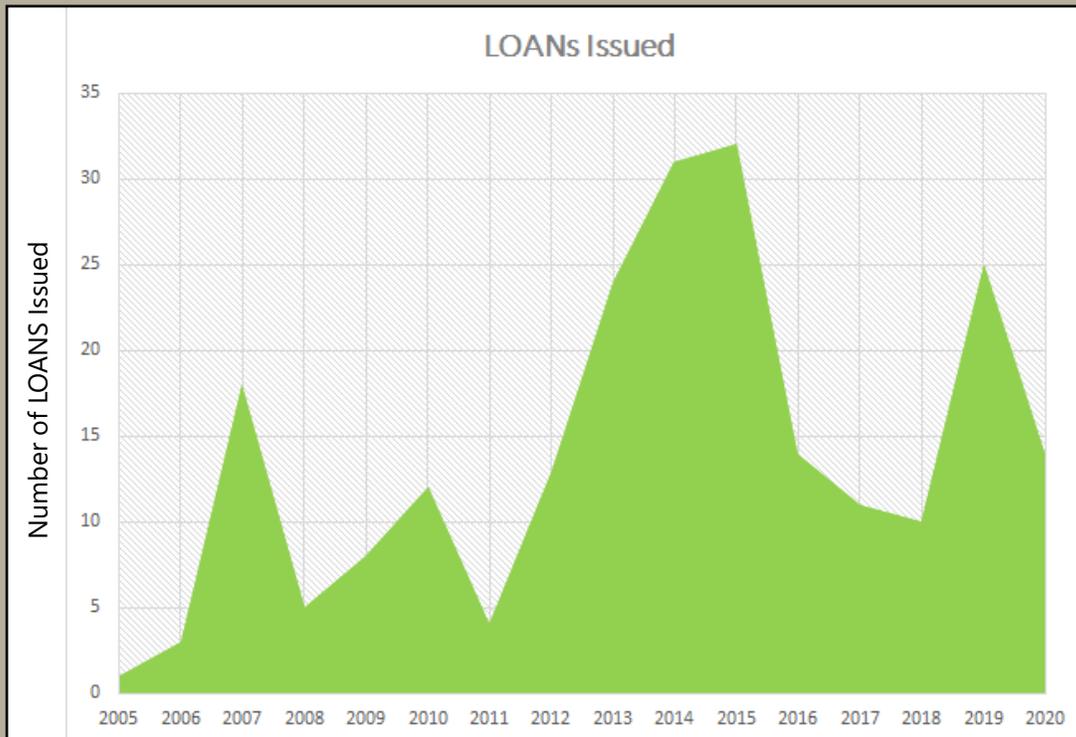


Figure 6: North Dakota Air Quality Letters of Apparent Noncompliance (LOANS) Issued Per Year\*

\* All numbers taken from the Air Quality Database

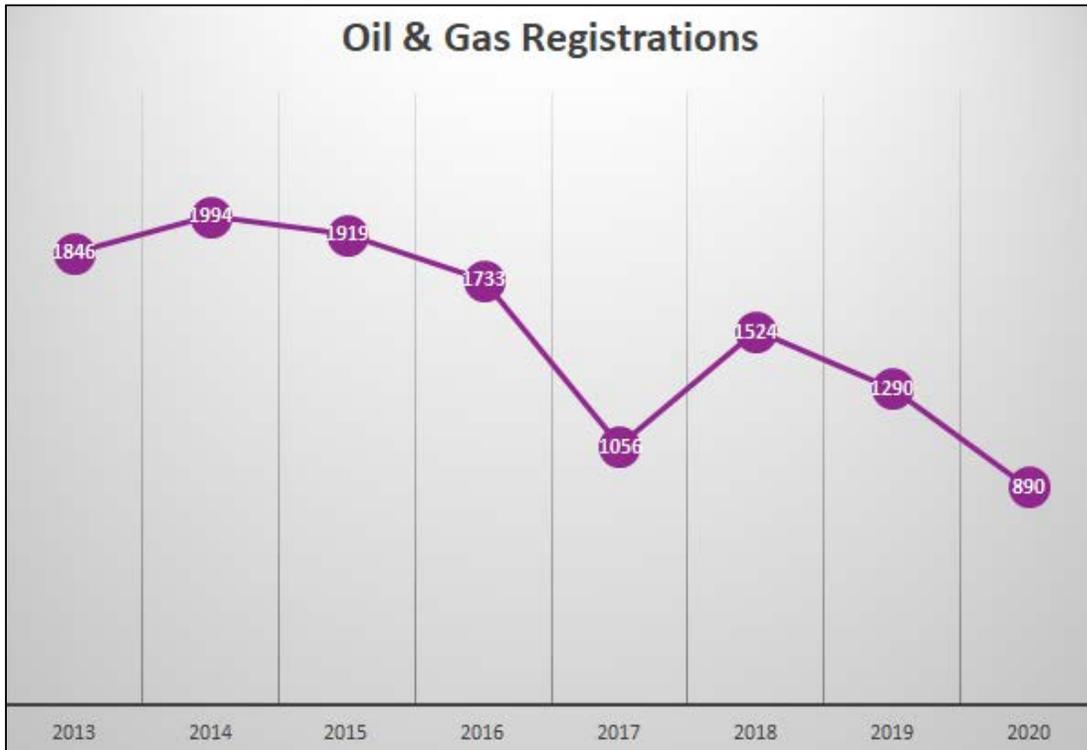


Figure 7: North Dakota Oil & Gas Registration Processed by Year

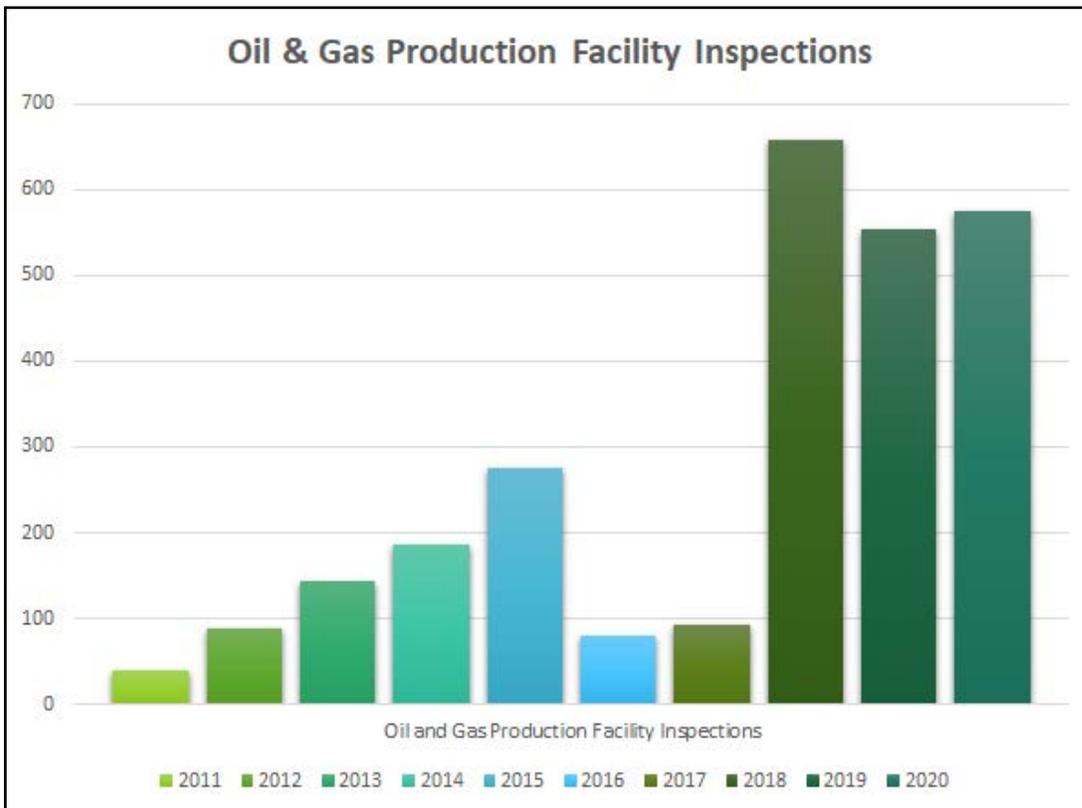


Figure 8: North Dakota Oil & Gas Production Facility Inspections by Year

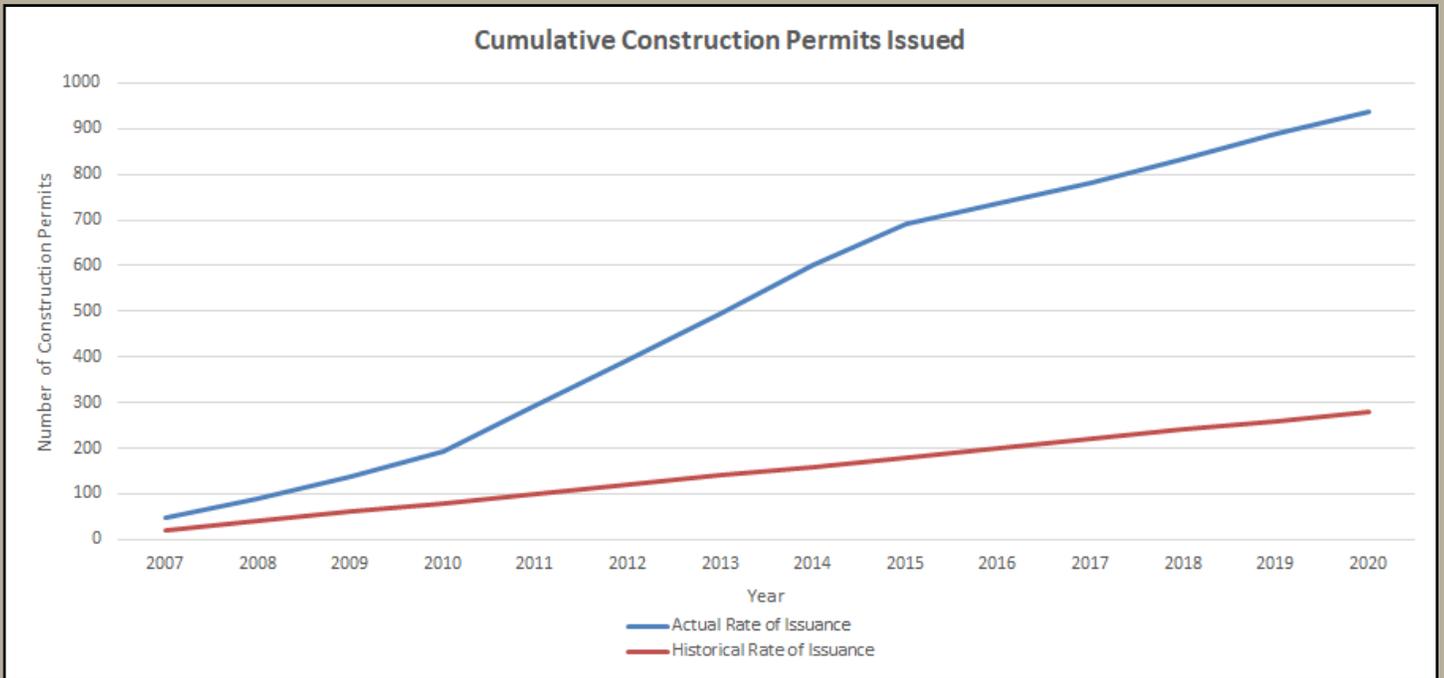


Figure 9: North Dakota Oil & Gas Registration Processed by Year

## The Division of Chemistry

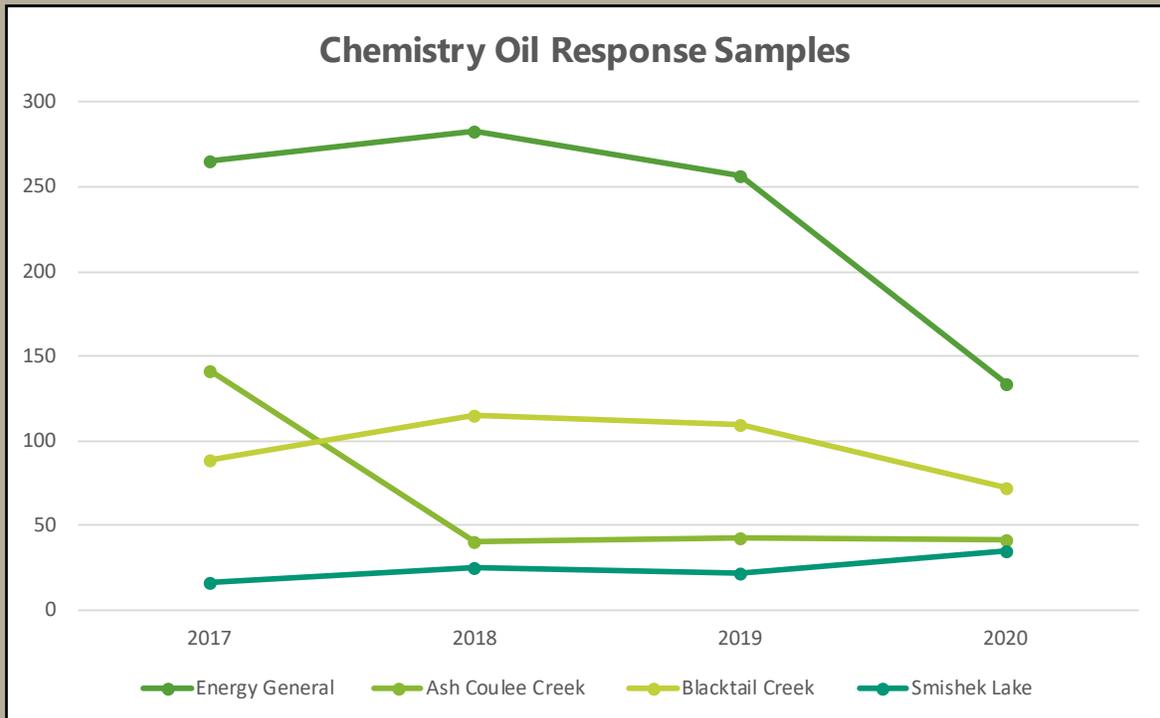


Figure 10: NDDEQ Chemistry Oil Response Samples

## The Division of Municipal Facilities

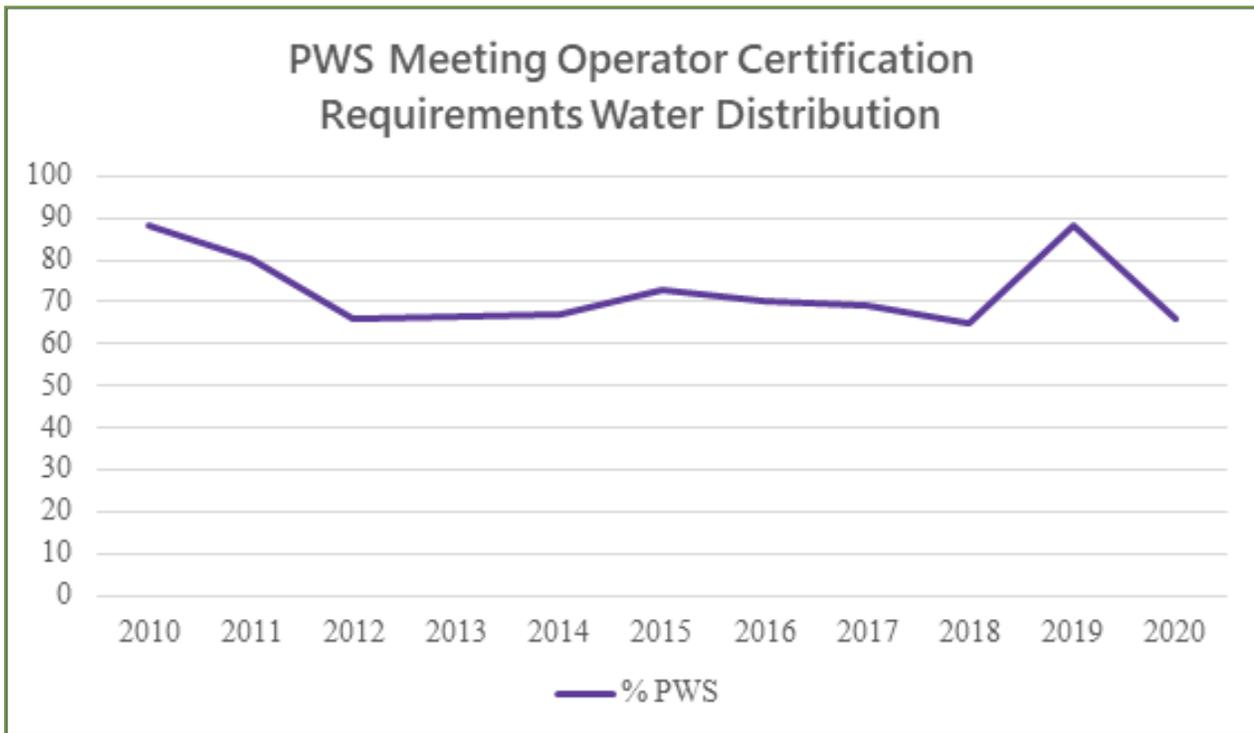


Figure 11: Percentage of Public Water Systems Meeting Operator Certification Requirements by Year



Figure 12: NDDEQ Cumulative Water and Wastewater Projects with Unmet Requirements by Year

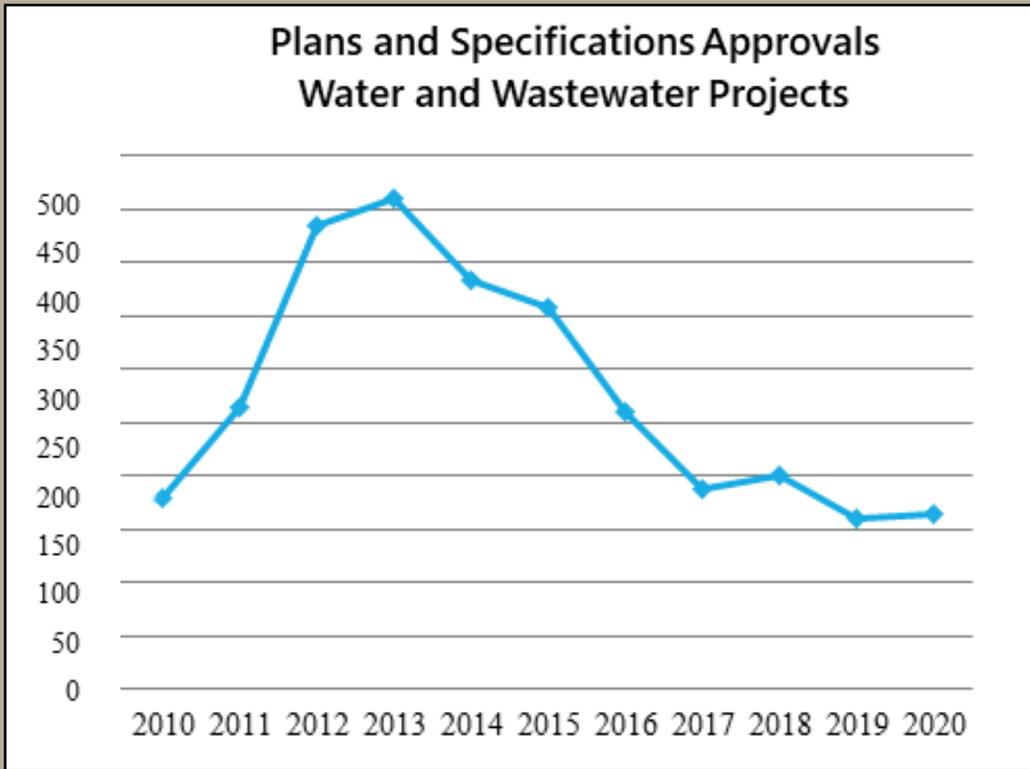


Figure 13: NDDEQ Water and Wastewater Project Approvals by Year

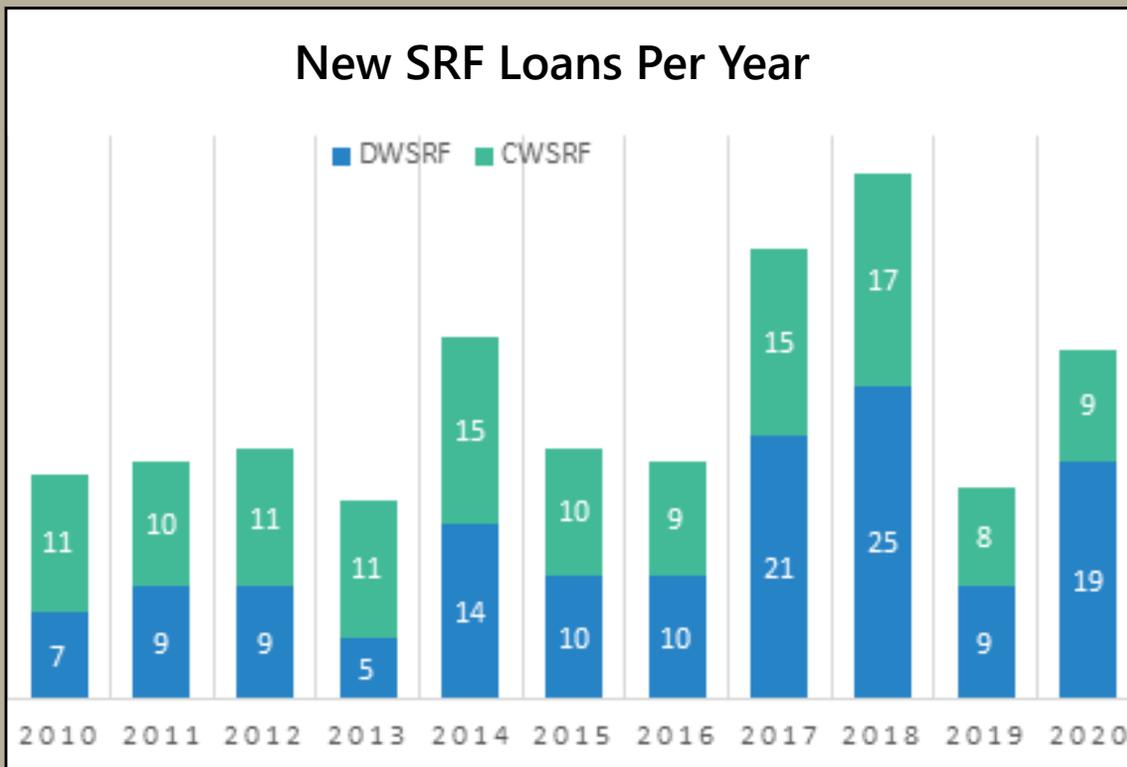
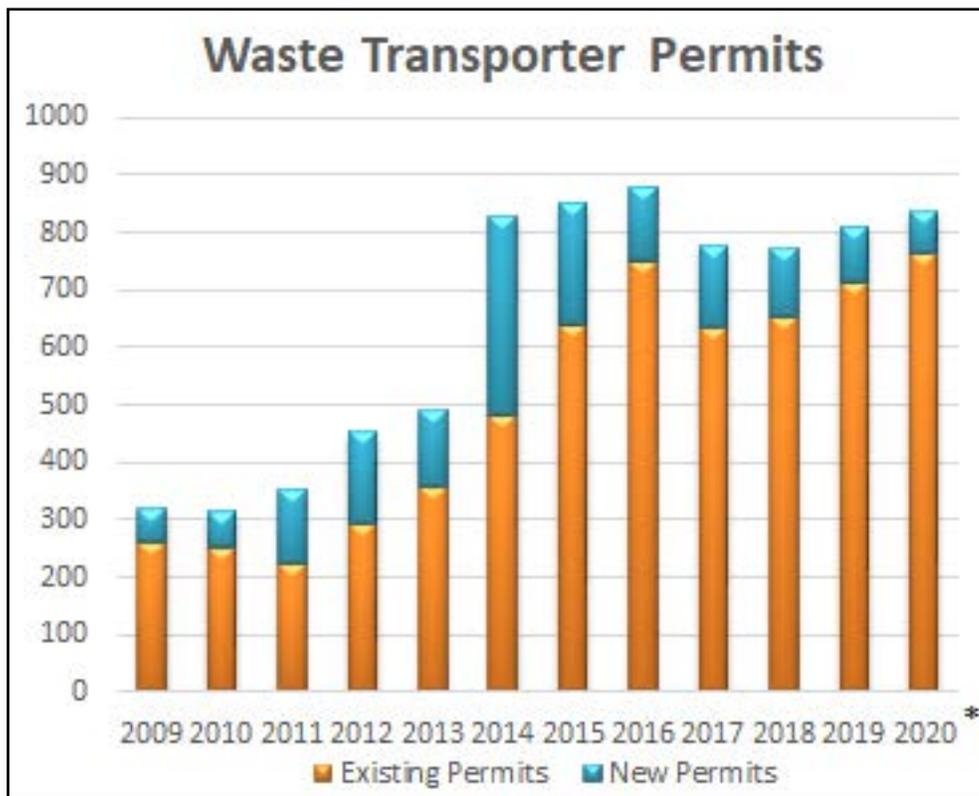


Figure 14: NDDEQ New State Revolving Fund Loans Issued by Year

## The Division of Waste Management



Figure 15: North Dakota Hazardous Waste Large Quantity Generators by Year



\*Updated through November 30, 2020

Figure 16: North Dakota Waste Transporter Permits

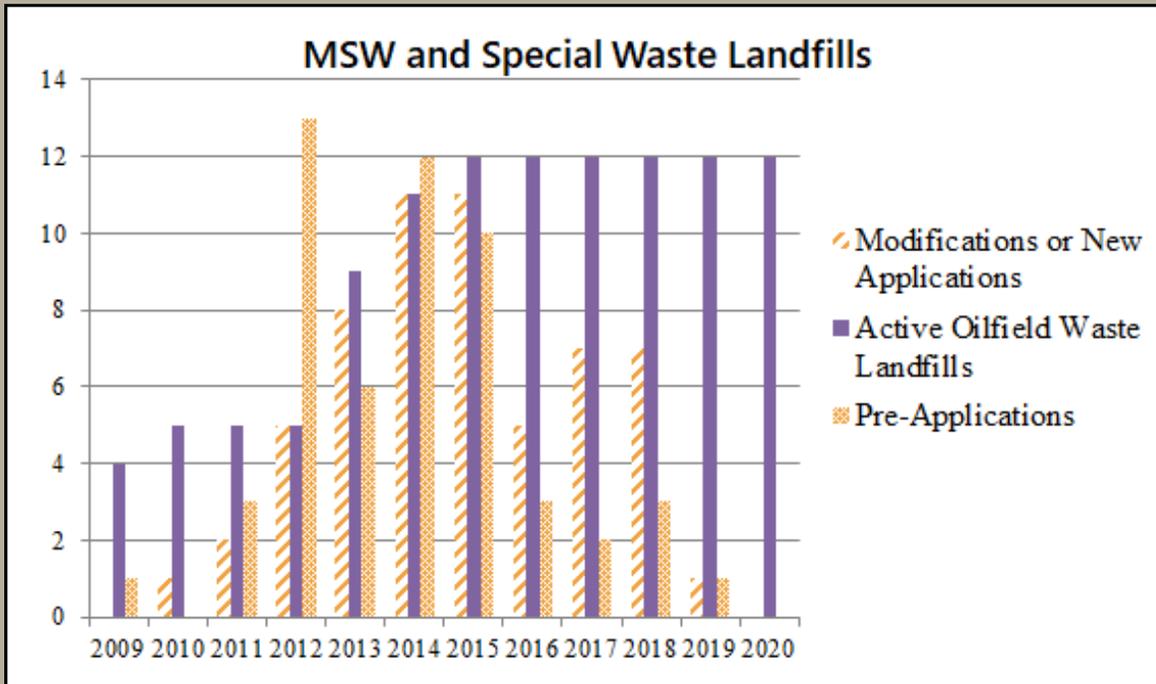
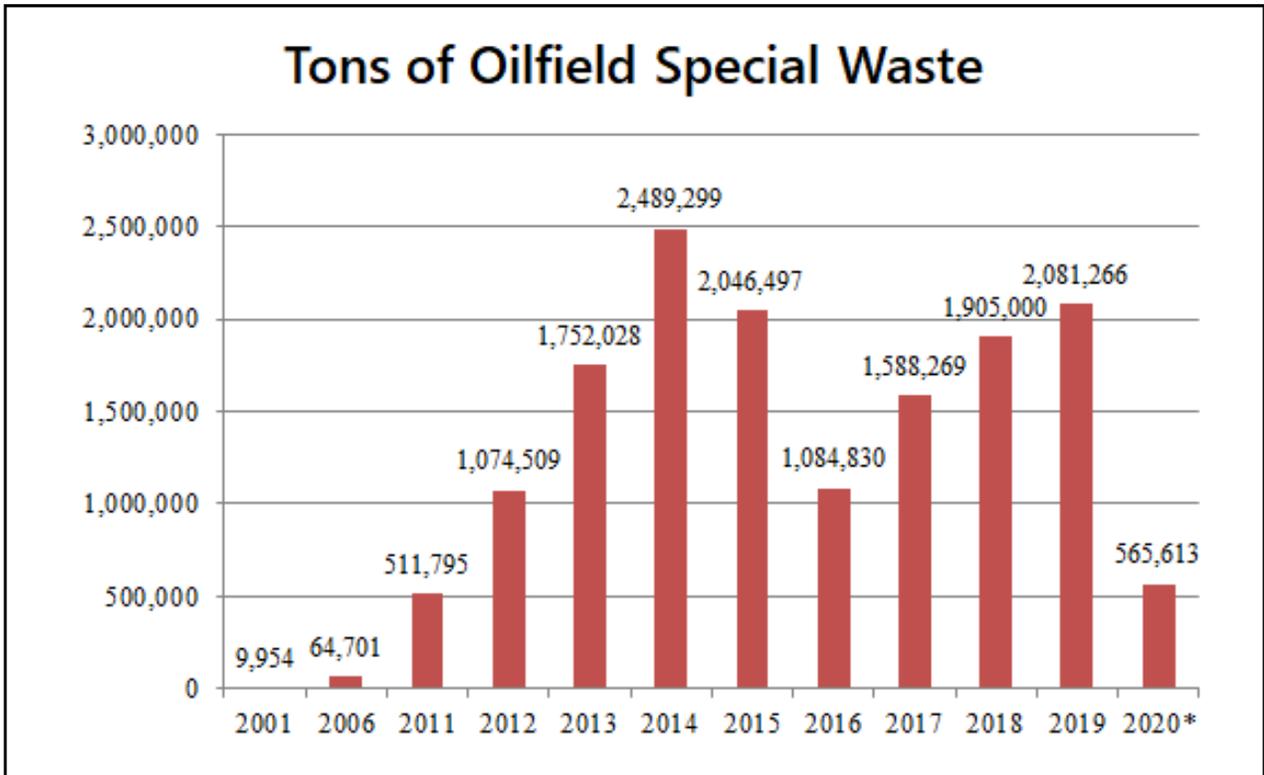


Figure 17: North Dakota Modified Special Waste and Special Waste Landfills



\*Updated through November 30, 2020

Figure 18: North Dakota Waste Transporter Permits



\*Updated through August 31, 2020

Figure 19: North Dakota Waste Transporter Permits

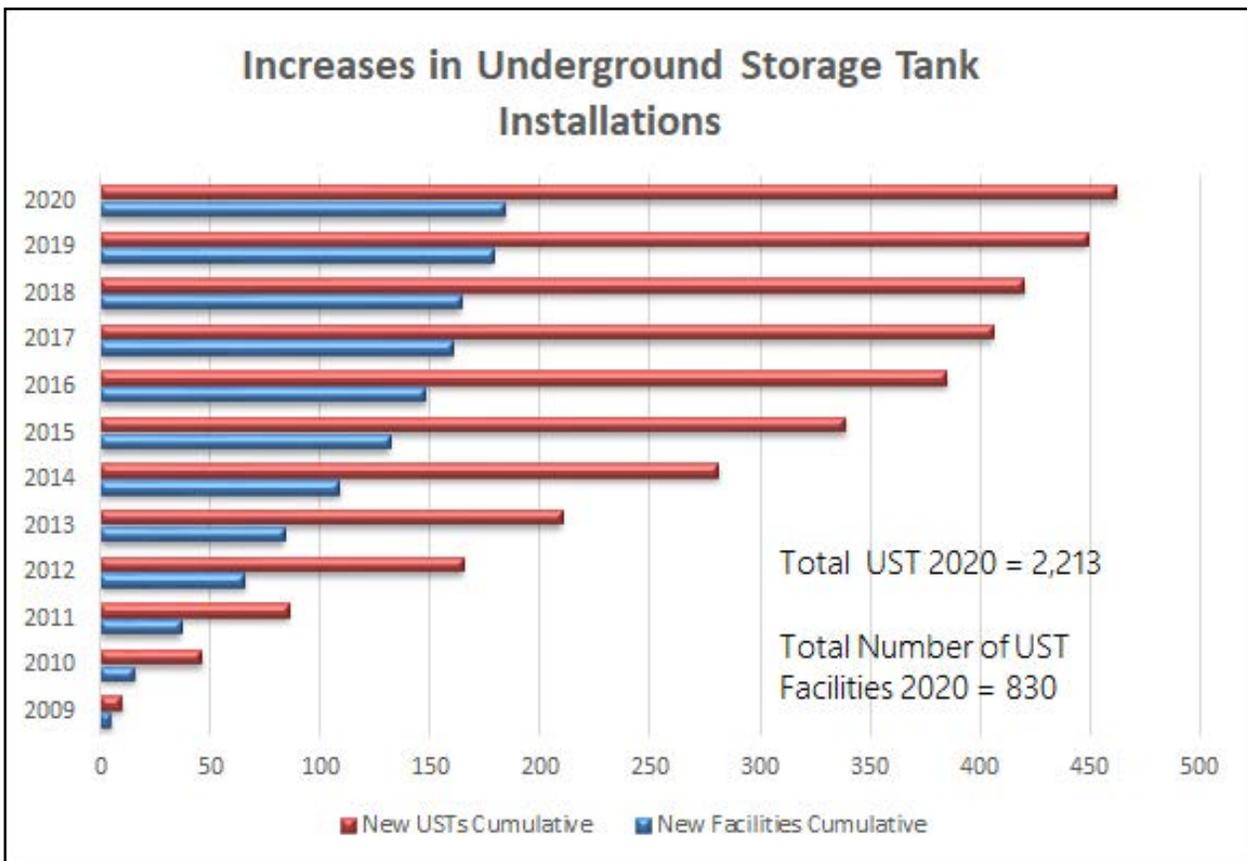


Figure 20: Increased Number of Underground Storage Tank Installations in North Dakota by Year

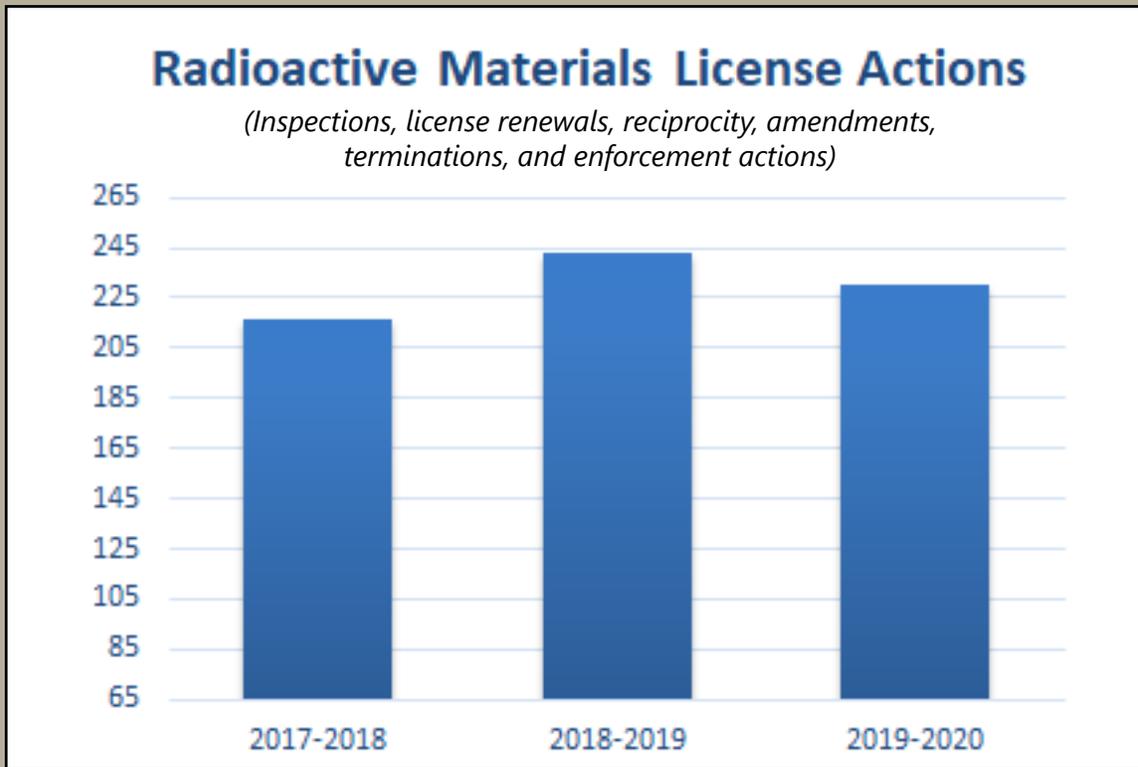


Figure 21: NDDEQ Radioactive Materials Licensing Actions

## The Division of Water Quality

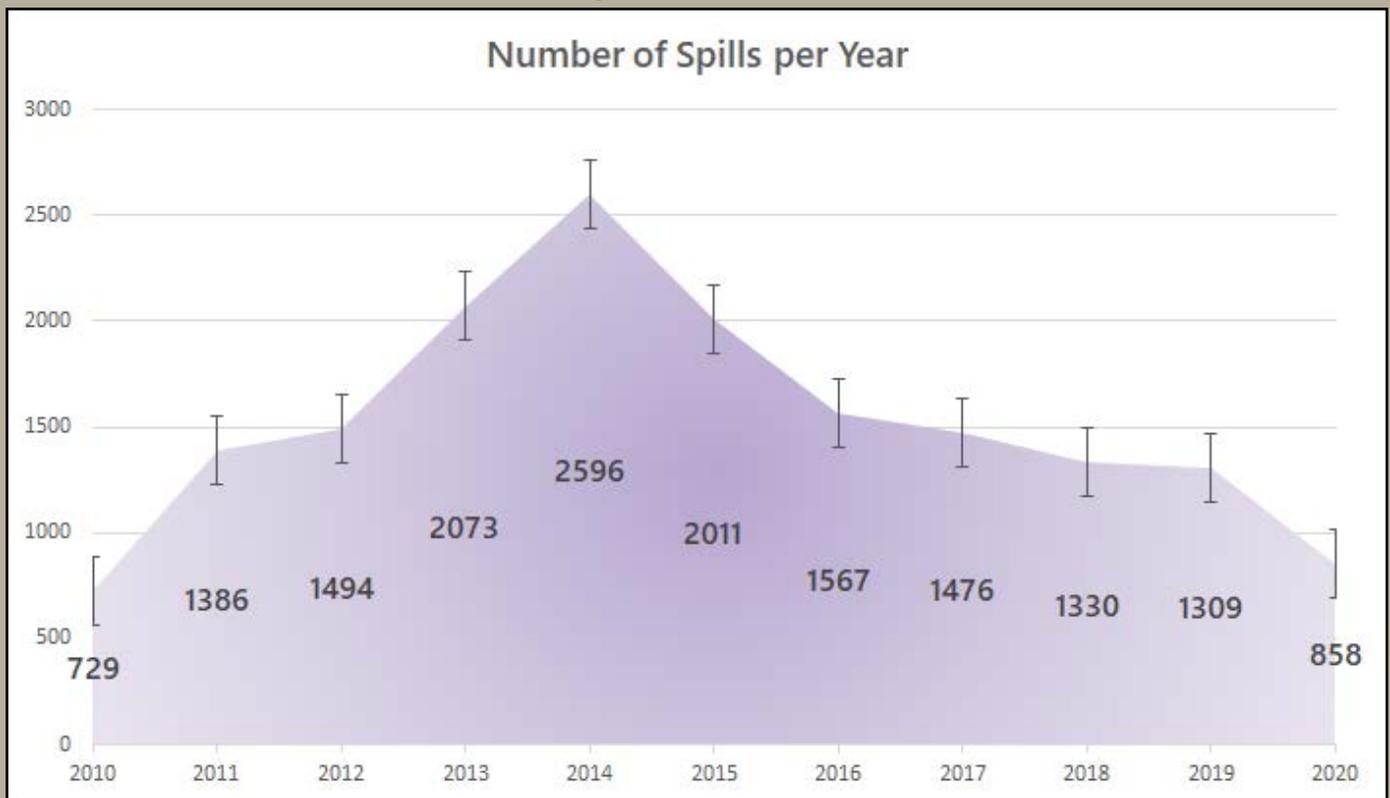


Figure 22: NDDEQ Spill Reported by Year

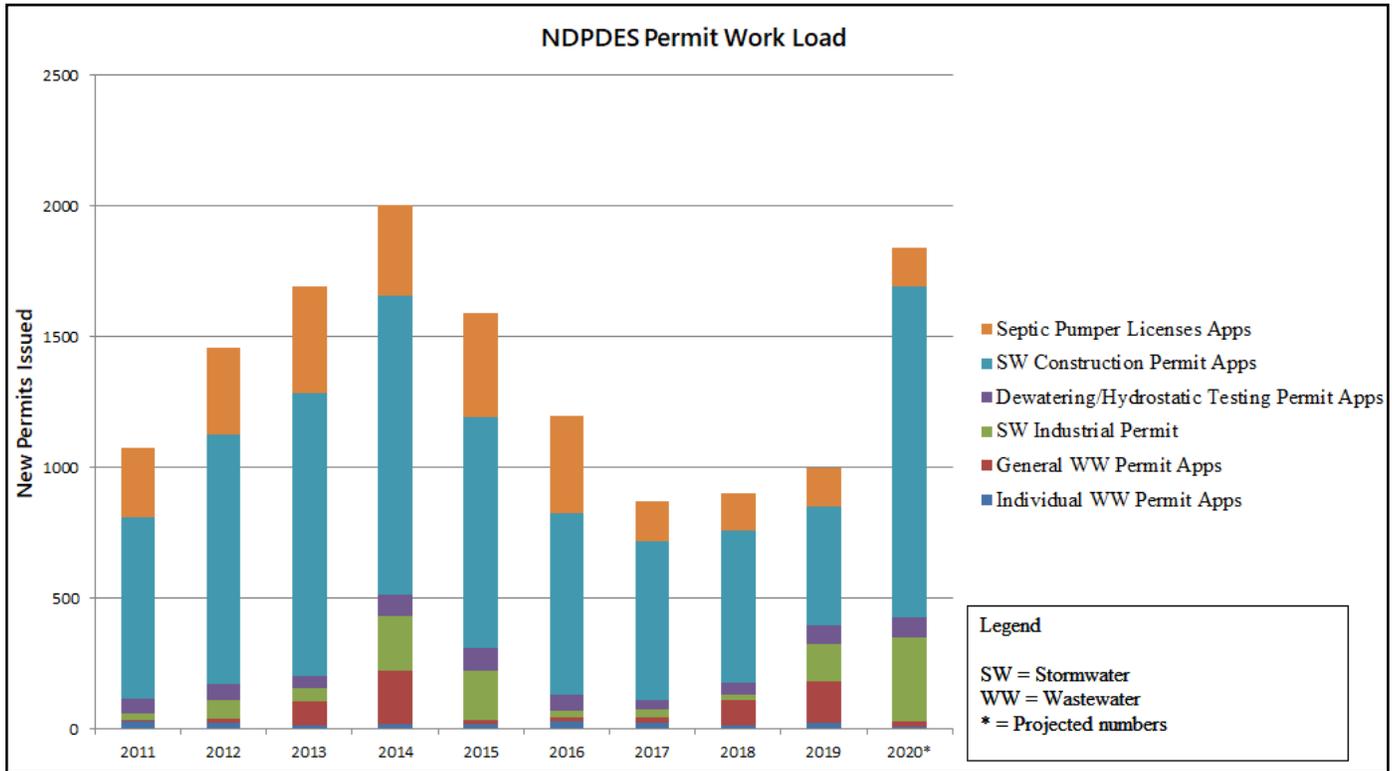


Figure 23: NDDEQ Permits Issued by Year

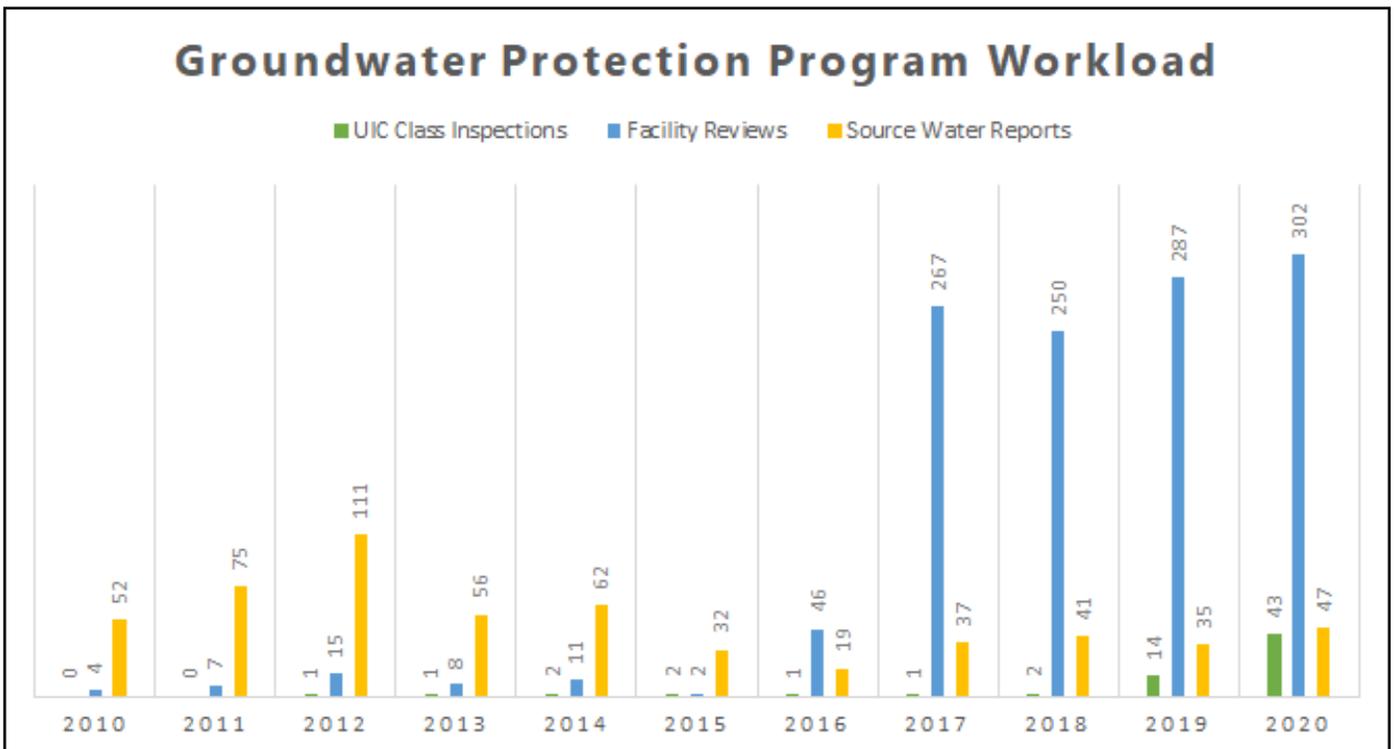


Figure 24: NDDEQ Groundwater Protection Workload

Office of the Director

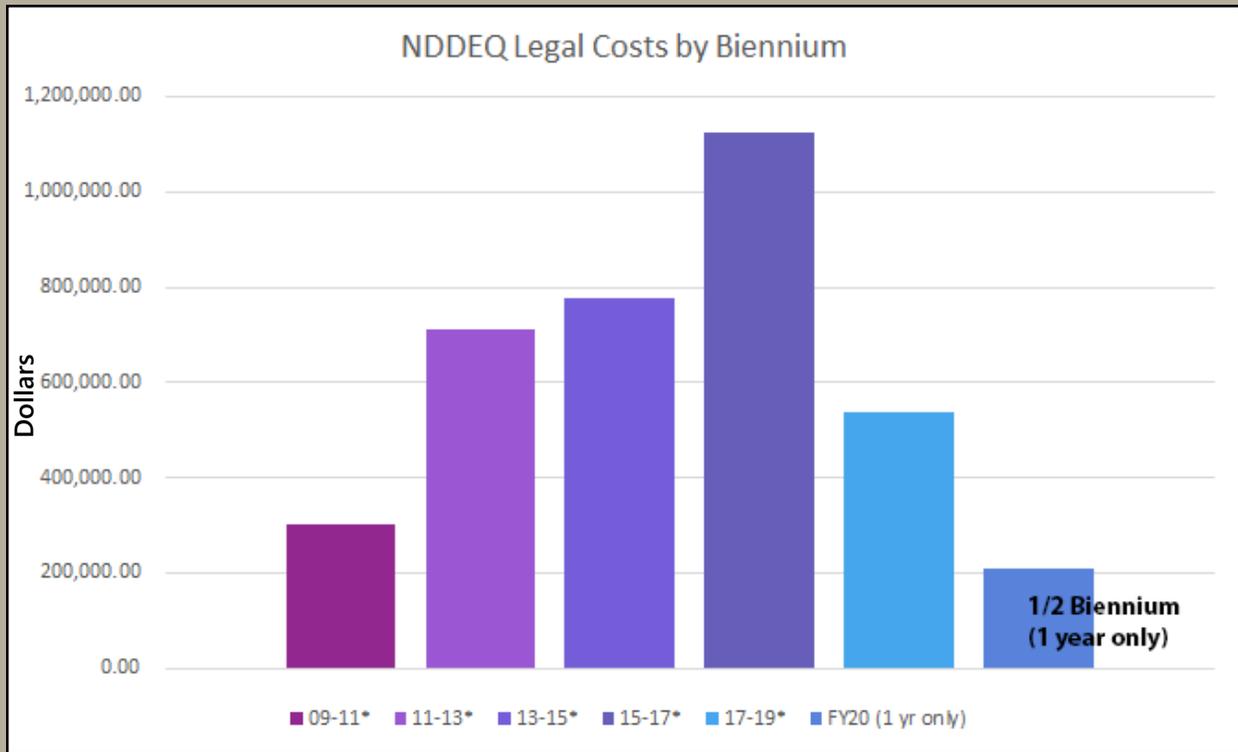
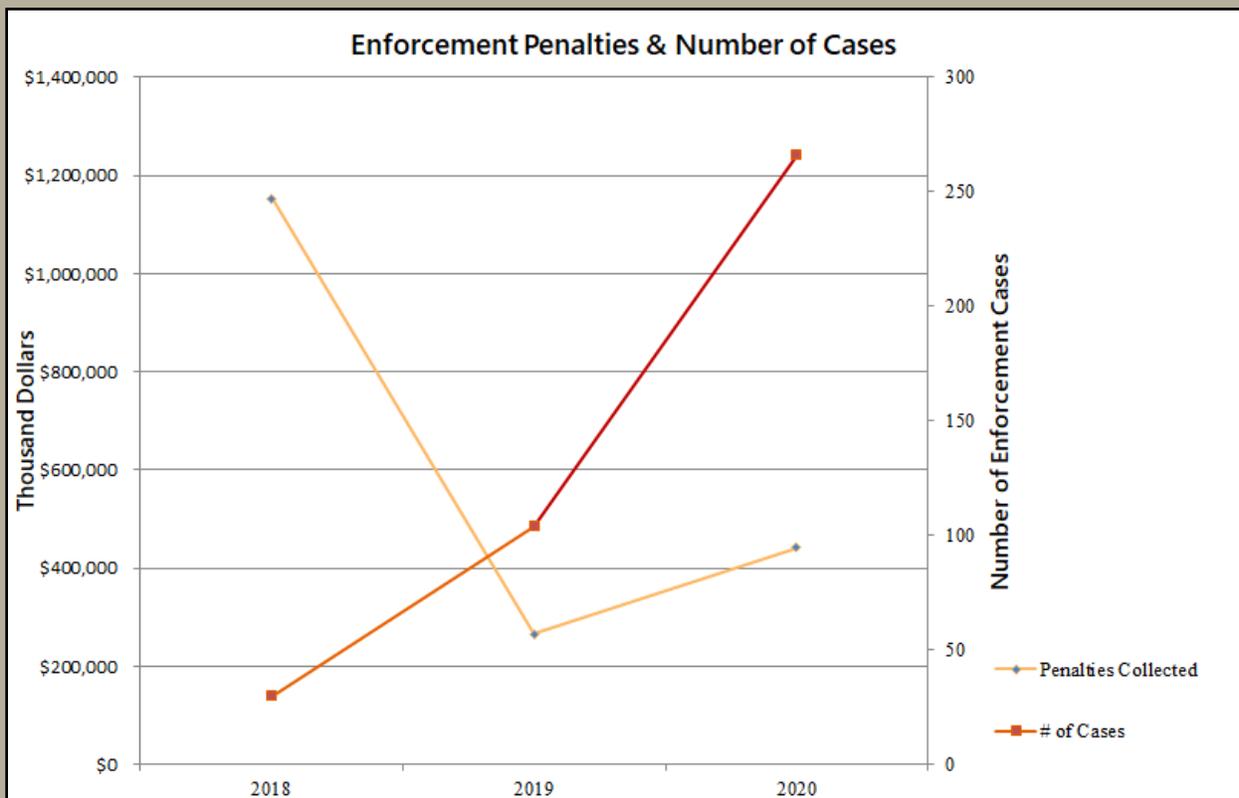


Figure 25: NDDEQ Legal Costs by Biennium



\* Note: Of the 266 cases in 2020, 40 were non-LOAN cases and the rest were LOAN cases.

Figure 26: NDDEQ Enforcement Penalties by Year

