NEW HAMPSHIRE
DEPARTMENT OF
Environmental
Services

MtBE Settlement Funds

Annual Report

FY 2018

Voices from the Public – New Hampshire Citizen Quotes

“Gas Buggy just landed!!!!!! Thank you SOOOOOOO much for the help!!!!! And they’re coming to drill holes pre-concrete in 2 weeks!!!! Please know how much I appreciate all the help and the difference it will make in both cleanliness and ease of operation. I owe you HUGE!!! Thanks again, Tom”

“Just a shout out: the two staff that came to the house were super pleasant and professional. ☺ Thank you to them and to you for all you do.”

“Thank you Deb. Once again, thank you and everyone within your group that was able to expedite this for me and my family. We truly appreciate your efforts. You are the best!”

“Upon learning that I worked at DES I was cornered by a citizen… He was so grateful to the MTBE bureau for the work they are doing that he wanted to thank me… even though I told him I'm not in that particular bureau. He didn't mention any names but was excited to know that his well was free of contaminants. Keep up the good work MTBE folks!”

When the news of tank removal funding reached an owner, the response was: “Halleluiah! Thank you. It was brought up at the annual state inspection on Wednesday.”

"Hello Deb. Thank you so much for your prompt service. All the folks in your department impressed me to the extreme.”

“On behalf of Little Falls Cooperative, Inc., I would like to take this opportunity to express our heartfelt thanks to you and many members of your MtBE organization… for your help in overseeing the project to connect our little community to City water in order to escape the MtBE contamination that had been present in our well water for several years. Your efforts on our behalf are very much appreciated. For at least five years we were unable to drink or even cook with our well water and relied on bottled water that your agency was nice enough to supply us. We are now connected to City water, and I can’t tell you how satisfying it feels to actually turn on the tap and know we can safely use the water that comes out! Many, many thanks to you from the residents of Little Falls Cooperative, Inc.” Sherman, President of the Little Falls Cooperative

R-WMD-19-01

MtBE Settlement Funds

Annual Report

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EXECUTIVE SUMMARY

The New Hampshire Department of Environmental Services (NHDES) established the MtBE Remediation Bureau (Bureau) in 2014. The Bureau was established using Settlement Funds obtained from the state's MtBE lawsuit. The terms of the settlements require that all funds must be used to address MtBE contamination in New Hampshire.

One of the most important aspects of this program is the implementation of permanent solutions to MtBE contaminated water supplies. Typically, the options for permanent solution involve the construction of additional water infrastructure such as the extension of water lines, the development of water supplies, water supply treatment, or the replacement of MtBE contaminated water supply wells. During state fiscal year (FY) 2018, the Bureau completed water line extensions in Atkinson and Derry. There are six additional water line extension projects in the design or feasibility phase in Alton, Epping, Epsom, Lee, Plaistow and Swanzey. These six projects involve several additional miles of water line that will be added to existing water systems and will connect dozens of users of contaminated water supplies to safe, regulated potable water systems. Additional information on these projects is included in the appendices.

The drinking water supply sampling program has been very active this year and supports all other Bureau program efforts by providing information on the extent and occurrence of MtBE contamination. Their data is useful when defining the scope of water line extensions, investigating the extent of groundwater contamination, and determining the need for water supply well treatment. As of the end of this FY, over 6,404 water supply samples have been collected, with MtBE being detected 825 times by the sampling program.

The Bureau has completed a number of large scale remedial projects. As of the end of this FY, more than 20,000 tons of contaminated soil had been removed and disposed of or treated at appropriately permitted solid waste facilities. In addition to remedial projects, a number of investigations have been completed, including identifying the source and delineating the extent of MtBE contamination plumes in Milan and Middleton. The source of MtBE impact at the Milan site was identified and led to the removal of over 3,000 tons of petroleum impacted soil. As for the site in Middleton, a test pit investigation on the property identified an area of buried vehicle gas tanks that was subsequently remediated.

The prevention program seeks to prevent and reduce MtBE threats to New Hampshire aquifers. The two major classes of gasoline releases that are currently being addressed under this program are underground storage tank and motor vehicle recycling facility (MVRF) releases. Underground storage tank releases of gasoline are the largest single source of MtBE contamination in New Hampshire. To address underground storage tanks, the Bureau has developed an underground storage tank removal program that is designed to remove higher risk tanks and to expedite investigation of releases. As of the end of FY18, 291 tanks have been removed. The average age of the tanks that have been removed is approximately 28 years and many of the tank systems had failed secondary containment or spill prevention system

components or were of high risk single wall tank or piping construction. Removal of these older and in many cases financially neglected tank systems before releases occur is a highly cost effective and prudent aquifer protection measure as well as means to conduct a very comprehensive contamination investigation

The tank removal program has benefits beyond release prevention. Removal of tank systems has facilitated a number of large scale remedial cleanups where previously inaccessible MtBE-contaminated soil continued to serve as a source of groundwater and soil vapor contamination. The resultant removal of residual contamination sources created reinvestment and resale opportunities at a number of properties.

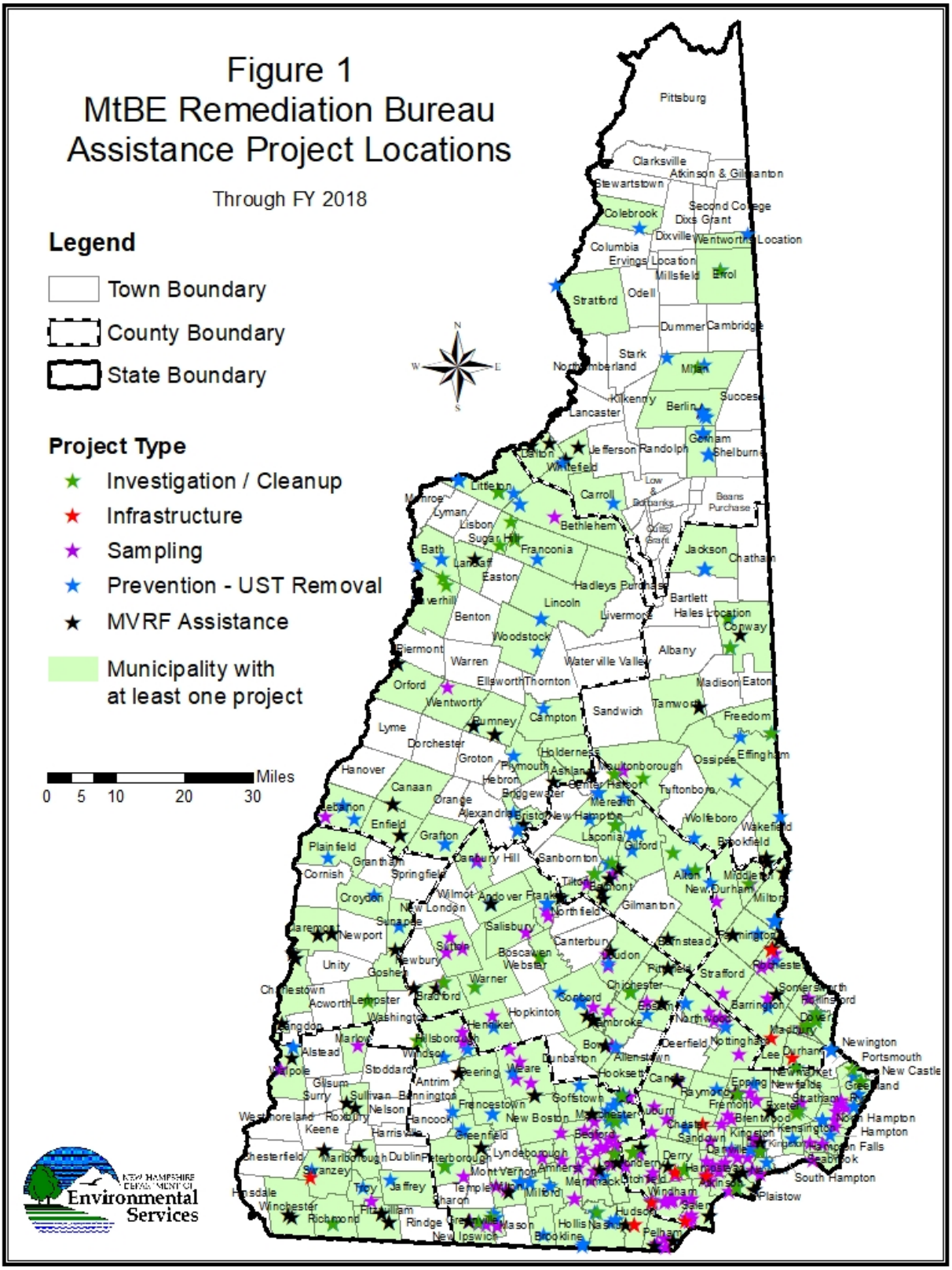
The Motor Vehicle Recycling Facility (MVRF) release prevention program is working actively with the Automotive and Truck Recycling Association of New Hampshire to reduce gasoline releases. As of the end of FY18, over 70% of all active, licensed MVRFs have participated in the program. The program has provided spill prevention equipment to 82 of the MVRFs. This is a large percentage of the most active facilities and should help to significantly improve existing practices and reduce gasoline releases. In addition to the purchase of spill prevention equipment, the Bureau has developed a concrete spill containment pad installation program. About a third (36 facilities) of the active MVRF in New Hampshire are participating in this program. The spill containment pads are being installed in areas used for gasoline transfers, car dismantling or gasoline storage. The concrete pads are being located in the most active portions of the MVRFs and before installation of the pads, existing gasoline contamination issues, if any are identified, are addressed. As a result, the projects combine investigation, remediation and release prevention activities as appropriate.

The Bureau is actively implementing permanent solutions to MtBE contaminated water supplies. Typically, the options for permanent solutions involve the construction of additional water infrastructure such as the extension of water lines, the development of water supplies, water supply treatment or the installation of wells for replacement of MtBE contaminated water supply wells. During FY 2018, the Bureau continued to implement water line extension projects in the design phase in locations to include Atkinson, Derry, Epsom, Hampstead, Lee, Plaistow, Rochester, Salem and Windham. Many of these infrastructure projects are also partially funded by Drinking Water and Groundwater Trust Fund (DWGTF) grants and loans recently awarded by the DWGTF Advisory Commission.

Program assistance has spanned the entire State. Figure 1 graphically depicts the geographical locations of the assistance that has been provided through FY18.

Figure 1
MtBE Remediation Bureau
Assistance Project Locations

Through FY 2018



INTRODUCTION

In 2003, the New Hampshire Department of Justice (DOJ) sued several refiners and suppliers of gasoline seeking damages for the statewide problem of methyl-tertiary butyl ether (MtBE) contamination. The State settled with all but one of the defendants. After deductions from the settlement payments for eligible legal fees and other costs, the court-ordered settlements set aside $81,630,000 for remediation of MtBE contamination. This fund would later be designated the MtBE Settlement Funds. In 2013, DOJ went to trial against ExxonMobil Corporation, the remaining defendant. In April 2013, after three months of trial, the jury awarded the State of New Hampshire $236,372,644, plus pre-judgment interest. On October 2, 2015, the New Hampshire Supreme Court affirmed the jury verdict and later rejected ExxonMobil's motion to reconsider the Court's ruling. ExxonMobil filed a petition for writ of certiorari with the U.S. Supreme Court on January 20, 2016. The U.S. Supreme Court denied the petition in an order that was released on May 16, 2016. In June of 2016, ExxonMobil Corporation deposited $307,174,716 into the New Hampshire Drinking Water and Groundwater Trust Fund (DWGTF), which was established by SB 380 for this expressed purpose. Immediately following the deposit, 10% of the award was transferred to the State's revenue stabilization account, in accordance with State law, leaving $276,455,444 in the DWGTF. Administration of the DWGTF is conducted in accordance with RSA Chapter 485-F, effective March 31, 2016.

The MtBE Settlement Funds are separate and distinct from the DWGTF and is managed under the terms of the settlement agreements and a memorandum of understanding (MOU) between NHDES and DOJ. The MOU outlines an interdepartmental approach to the expenditure and administration of the MtBE Settlement Funds and calls for the preparation of an annual report and submittal of the report to the Fiscal Committee, Governor and Executive Council, and House and Senate Leadership. As the DWGTF activities are reported under separate cover and per RSA 485-F, this annual report will not discuss the DWGTF in any further detail.

During program formation through FY 2017, budgets were approved by the Governor and Executive Council and the Fiscal Committee of the General Court. The MtBE Settlement Funds budget for FY 2018 and 2019 were authorized via the regular budget process during the 2016 legislative session.

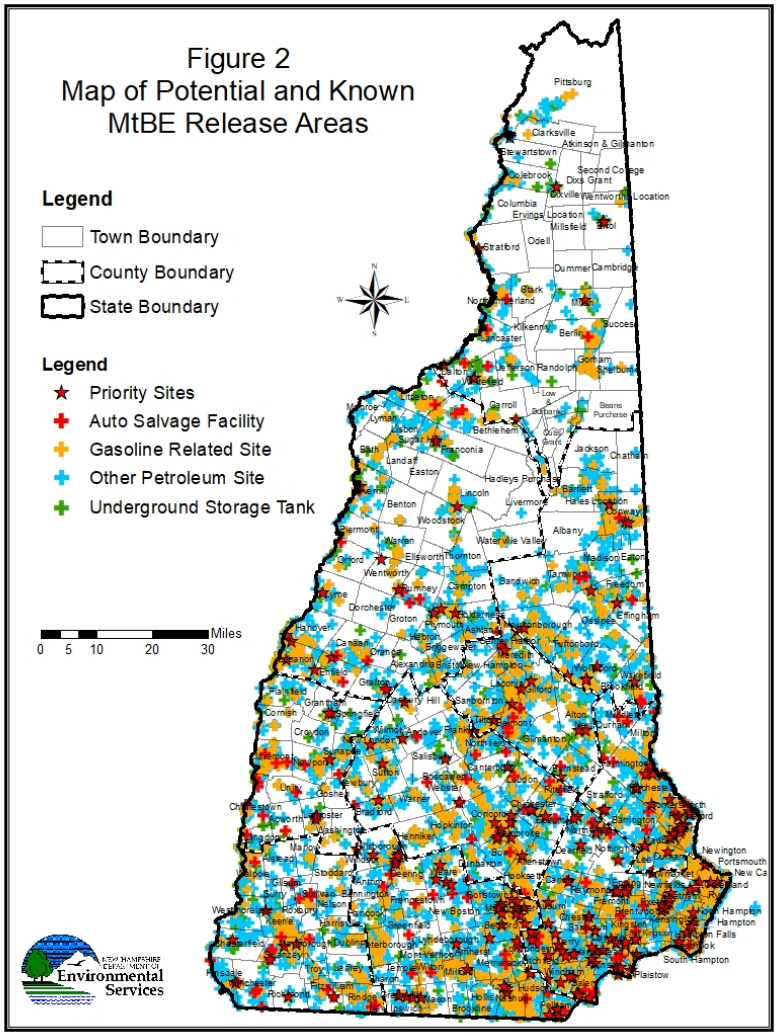
The appropriation for FY 2018 included allocation of funds and approval of staffing to implement the program. Eligible assistance activities discussed in the request included:

- Installation and improvement of public water supply infrastructure in areas having significant MtBE contamination.
- Investigation and remediation of existing contamination.
- Testing at-risk private water wells.
- Implementation of measures to prevent further MtBE contamination.

Challenges and Methods for Identifying and Mitigating MtBE Impacts to Groundwater

MtBE does not readily biodegrade and is very persistent in New Hampshire drinking water aquifers. Although MtBE has not been a component of gasoline sold in New Hampshire since the State's January 1, 2007 MtBE ban, it is still commonly found in our groundwater.

MtBE is a potential carcinogen and causes objectionable taste and odor in drinking water when present at high concentrations. MtBE remains the most common non-naturally occurring contaminant in drinking water supplies in New Hampshire. A 2005 study conducted by the United States Geological Survey (USGS) and NHDES in Rockingham County found MtBE present in detectable concentrations in 40% of public wells tested and in 21% of private wells (J.D. Ayotte, Argue and McGarry, 2005). A follow-up study, published in 2008, confirmed that MtBE contamination of public and private wells is still a statewide problem and likely present at detectable levels in approximately 10% of southeast NH wells (Trends in MtBE Concentrations in Private Wells in Southeast, NH: 2005 to 2015, ES&T, 1/11/2017, vol. 51, issue 3, pp. 1168-1175). As a result, reduction of MtBE concentrations in our aquifers is a priority due to its prevalence and harmful properties.



There are approximately 550 known MtBE sites and a significant number of potential, currently undiscovered sites in New Hampshire (see Figure 2). Based on a review of data for the known sites, the most common source of MtBE contamination is releases from underground storage tank systems (USTs) and, less important but still significant, gasoline releases from auto salvage operations (during gasoline transfers or storage).

UST releases are typically identified during closure of the tanks and piping or during environmental investigations prompted by property acquisitions. As a result, there may be UST releases that have not been identified at facilities still in operation

and under long-term stable ownership. Routine NHDES inspection of operating tank systems and pending closure of outdated tank systems over the coming years may reveal additional gasoline release sites. Discovery of sites and cleanup of existing sites is a priority for protection of New Hampshire aquifers. These sites typically contain subsurface areas of gasoline-contaminated soil. This soil contamination slowly leaches out MtBE and other gasoline contaminants into groundwater over time. Restoration of the impacted aquifer is accelerated by the removal of this ongoing source of groundwater contamination.

Further complicating the problem is the presence of old gasoline containing MtBE. If this gasoline is not properly managed, additional MtBE can be released to New Hampshire aquifers. Old gasoline is present in junked cars that have not been used since 2007 or in inactive underground storage tanks. Motor vehicle salvage yards end up managing cars with old gas. In addition, in practically every community in the state, there are locations where old cars have been abandoned, as well as unlicensed "junkyards" where old vehicles are stored without having their fluids removed. There are also a surprising number of underground storage tanks still in the ground and containing pre-2007 gasoline. These tanks exist at former retail gasoline stations that were shut down due to low profit margins, many of which were converted to auto sales or repair businesses. There were no requirements to remove tanks until 1986, so many of the tanks that discontinued operation prior to the effective date of the regulations may still be in the ground. Additionally, every year legacy gasoline tanks that were covered over and forgotten are discovered during unrelated excavation activities.

MtBE impacts to New Hampshire's groundwater are numerous and varied. Addressing these impacts and preventing further degradation of groundwater quality requires a variety of approaches that need to be implemented in concert. To that end, NHDES established the MtBE Remediation Bureau (Bureau) to identify, investigate, remediate and mitigate the effects of past and potentially ongoing releases of MtBE-containing gasoline and to reduce the potential for further releases of MtBE-containing gasoline to the environment. The Bureau is staffed with professional engineers, geologists and scientists who are working together to implement a comprehensive MtBE corrective action work plan.

ESTABLISHMENT OF THE MtBE REMEDIATION BUREAU

The Bureau was established in April 2014, and was substantially staffed by September 2015. At this point in time all necessary contracts are in place and the associated claims and payment processes are fully operational. The following sections discuss the overall progress that has been made in the development and implementation of programs to address MtBE contamination in New Hampshire since establishment of the Bureau.

Program Essentials – Reimbursement Process

MtBE site investigation, remediation, prevention and drinking water infrastructure construction efforts rely heavily on the reimbursement of environmental consultants, engineers, and contractors who work directly for facility owners. This process leverages business and private sector resources to accomplish more than could be completed solely with program resources and contracts. The reimbursement system model has been operational for several years and has proven highly successful and efficient for the new program and closely tracks the experiences of the State's existing Oil Discharge and Disposal Cleanup Fund (ODD Fund).

Program Essentials - Contracts

The MtBE Remediation Program has contracts in place for laboratory services, environmental consultants, installation of water treatment systems, spill response/underground storage tank removal and a USGS cooperative assistance agreement. A brief discussion of each of the contracts follows.

In FY 2018, NHDES' new multi-year contracts were put in place with Clean Harbors, Accuworx, and National Response Corporation for field work related to the remediation of spills and releases of contaminants.

A laboratory services contract to support a private water supply well sampling and analysis program for identifying and monitoring MtBE-impacted water supplies was put into place last fiscal year. The laboratory contract bidding process secured highly competitive pricing from an in-state laboratory (Nelson Analytical of Manchester) for VOC analysis and pickup of samples from the state offices. New lab contracts are in the process for next fiscal year.

NHDES awarded a contract to Advanced Radon Mitigation, allowing the use of MtBE Settlement Funds for the expedited installation and service of point of entry (POE) water treatment systems associated with MtBE-impacted drinking water supply wells.

The Bureau awarded two multi-year environmental consulting service contracts in 2015. Nobis Engineering of Concord, New Hampshire, is providing services related to the investigation and remediation of MtBE-contaminated sites and Weston Sampson Engineers Inc. is providing services related to the design and construction of drinking water infrastructure. These contracts are valid through FY 2019.

Public Outreach

The DOJ/NHDES MOU included the development of a detailed implementation plan, which was finalized after extensive input from the public on MtBE settlement funds-eligible activities and programs. Outreach efforts continued through FY 2018, including presentations and meetings at the NH Water and Watershed Conference, New England Convenience Store and Energy Marketers Association (NECSEMA) annual meeting, the American Council of Engineering

Companies (ACEC) monthly meeting, Upper Merrimack River Local Advisory Committee monthly meeting, NH Water Works Association monthly meeting, the Granite State Rural Water Association annual meeting, NH BIA's Consultant's Day, and Automotive and Truck Recyclers Association monthly meetings, individual meetings with eight of the nine Regional Planning Commissions, as well as routine meetings with municipal and state officials.

PROGRESS ON WORKPLAN ELEMENTS

The Implementation Plan describes an integrated approach to addressing the MtBE challenges that were discussed in the previous sections of this report. The four main elements of the work plan are:

- Installation and improvement of public water supply infrastructure in areas having significant MtBE contamination.
- Investigation and remediation of MtBE contaminated sites.
- Testing at-risk private water wells.
- Implementation of measures to prevent further MtBE contamination.

Integration of the plan elements is important to improving the overall effectiveness of the program. For example, removal of underground storage tanks, which is a prevention-related project, also serves to eliminate physical obstacles that can hinder remediation and investigation efforts. Sampling of water wells can help to define the extent of contamination associated with a contaminated site and assists in determining the scope of any water line extension project that might be necessary to address MtBE-impacted supply wells. The following sections describe each work-plan element. It is important to note that the integrated nature of the program magnifies the benefits of the individual plan elements.

Site Investigation and Remediation

Gasoline-impacted soils in contact with the water table create long-term sources of MtBE contamination of aquifers because the contaminants slowly and continuously leach from the contaminated soil into the surrounding groundwater. When this contaminated groundwater flows away from the gasoline release site, nearby water supplies and additional portions of the aquifer become contaminated. To minimize impacts from gasoline releases, the timely identification, investigation and remediation of gasoline-contaminated soil (i.e., source areas) is essential. In fact, the most cost-effective method of minimizing the total amount of MtBE released to New Hampshire's aquifers, after prevention of the spill in the first place, is the removal of contaminant source areas. This is because it is easier and less expensive to address a relatively small volume of contaminated soil than an enormous volume of groundwater.

Removal of the source areas immediately reduces the release of high concentrations of contaminants into the aquifer. This allows the concentration of MtBE and other contaminants to more rapidly attenuate over time as a result of dilution and microbial degradation. The

process of reducing the contamination in the aquifer by these attenuation processes cannot truly begin until the ongoing release of contamination from source areas is mitigated. Biodegradation is a very slow process for MtBE, which is why minimization of the amount of MtBE released into New Hampshire aquifers is a crucial part of NHDES' approach to remediation of MtBE impacts to New Hampshire's groundwater resource.

To accomplish this objective, the Bureau funds:

- Soil boring and soil sampling programs to delineate source areas.
- Monitoring well installation and investigative activities to define the extent of groundwater contamination.
- Drinking water well sampling.
- Removal of underground storage tanks to facilitate remediation.
- Remediation of contamination.

As of the end of FY18, NHDES has completed remedial projects in Boscawen, Chichester, Conway, Dover, Epping, Errol, Exeter, Freedom, Greenville, Laconia, Londonderry, Milan, Nashua, New Ipswich, Plaistow, Portsmouth, Richmond, Stratham, Sugar Hill, Tilton and Windsor. These projects typically involved the removal of underground storage tanks and contaminated soil that was inaccessible prior to tank system removal. Approximately 20,000 tons of highly-contaminated soil have been removed and properly disposed. It is noteworthy that all of the remedial projects were completed at sites that were also eligible for one of the State's petroleum reimbursement funds and that the cleanups had the added benefit of reducing the State's long-term liabilities under those funds.

Photo of contaminated soil excavation at Epping Auto Salvage.

The project case study of the Foreast Transportation property in Milan (see Appendix A-9) describes a site that involved many of these measures.

Identification of Impacted Private Water Supply Wells - Private Well Sampling

Based on a review of the existing New Hampshire data on MtBE occurrence, it has been estimated that 10% of all private drinking water wells in New Hampshire are contaminated with MtBE. Further, approximately 1% to 2% of all private drinking water wells are estimated to be above the state drinking water standard. Additional contaminated water supplies will likely be discovered as additional property is developed, commercial and industrial properties are transferred to other parties, unlicensed junkyards are discovered, additional water supply wells are installed as part of property development, and "end of life" tank systems are removed or replaced. To reduce public health impacts from MtBE in drinking water, it is essential to identify the impacted water supplies. The sampling program seeks to accomplish this important task.

Public water supplies are routinely monitored and the monitoring results are provided to NHDES on a quarterly basis. Private drinking water wells are not routinely tested and, if testing is conducted, volatile organic contaminant analysis that would identify MtBE contamination is rarely performed. The sampling program fills this void by collecting and analyzing drinking water supplies in high- MtBE-risk settings.

Photo of water treatment system that addresses complex MtBE contamination issue

To identify water wells that are at risk for MtBE contamination, NHDES uses information available in the state's geographic information system (GIS) and contaminated sites database. In the analysis, areas that are at risk for MtBE contamination are prioritized based on the existence of known or potential sites located within close proximity to the water supplies. The density and proximity of the water supplies are factored into the analysis. NHDES reviews the GIS data and then establishes sampling districts. After the preliminary sampling district has been established, NHDES discusses the sampling district and program with municipal officials before sending out letters requesting voluntary participation in the sampling program. If property owners do not respond to letters and are in a particularly high-risk area, NHDES will attempt to contact the property owner by telephone or make a neighborhood visit to explain the program and existing information available about MtBE risks. As soon as the sampling analytical results become available, the results are forwarded to the property owner. If MtBE is above ambient groundwater quality standards (AGQS), NHDES immediately contacts the property owner and collects a confirmation sample. Following confirmation of an MtBE impact above the AGQS, NHDES offers the property owner bottled water and the subsequent

installation of a point-of-entry treatment system. If public water infrastructure is nearby and an extension of a water line is cost-effective, the Bureau will pursue connection to the water system.

As of the end of FY 2018, 6,404 samples have been collected from wells in 157 different municipalities. Table 1 summarizes the data for 52 municipalities where more than 20 samples have been collected. Municipalities with more than 20 samples typically contain established sampling districts where the Bureau conducted targeted sampling in areas with known releases of gasoline. Municipalities with fewer than 20 samples are usually associated with samples collected for homeowners who reached out to The Bureau expressing concern about MtBE contamination. It is noteworthy that the sampling program is detecting a MtBE-contaminated water well approximately every day. Treatment systems have been installed whenever requested by the property owners with water wells with contamination exceeding the State's AGQS. There continues to be a very high level of participation (59%) in this voluntary sampling program.

Table 1 – MtBE Detections in Water Supply Wells (as of 6/30/2018)

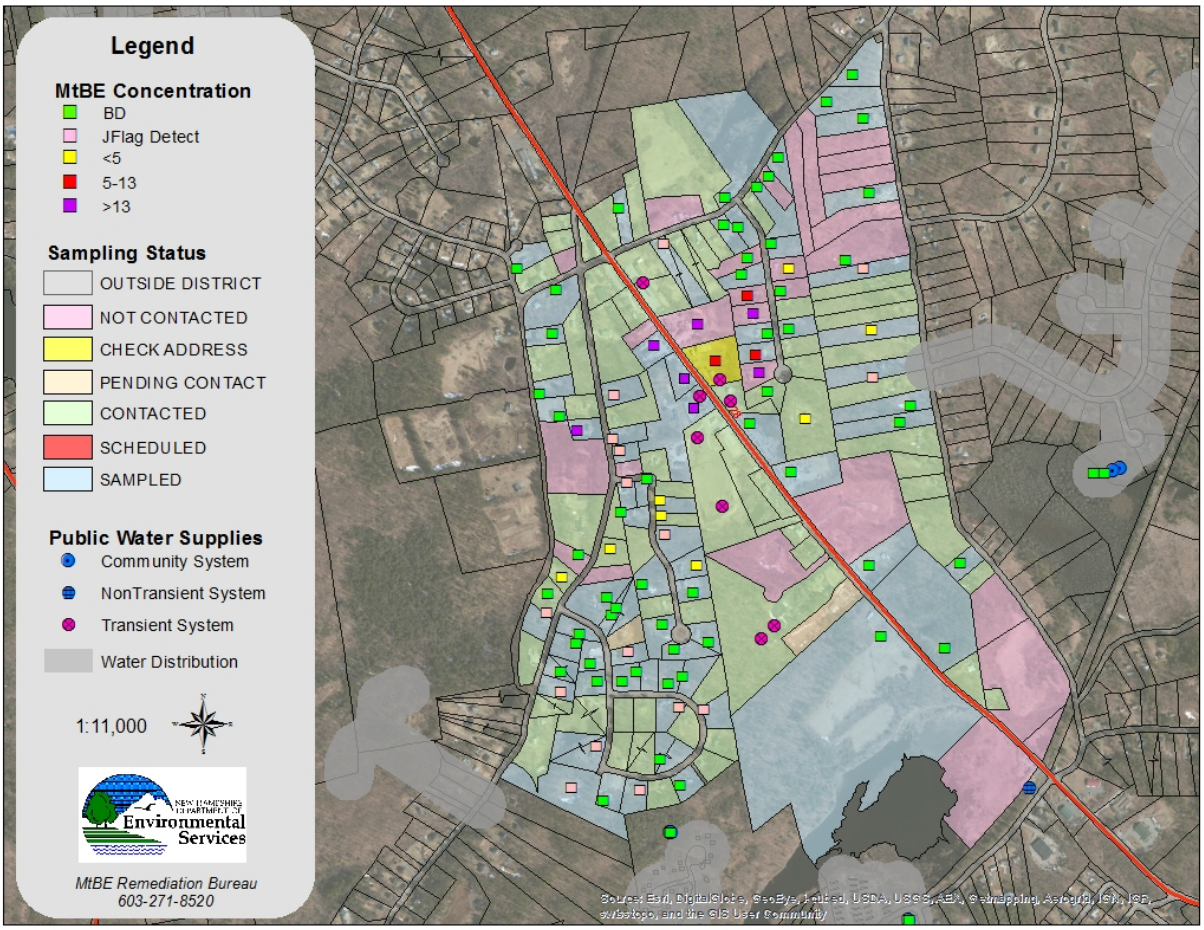
Town	Total Samples	Non Detect	MtBE < AGQS	MtBE > AGQS	Detection Rate
Amherst	230	213	17		7.4%
Atkinson	108	79	29		26.9%
Auburn	67	57	10		14.9%
Barrington	95	88	7		7.4%
Bedford	765	716	49		6.4%
Belmont	29	23	6		20.7%
Bradford	32	31	1		3.1%
Brentwood	27	25	2		7.4%
Candia	42	38	4		9.5%
Danbury	29	26	2	1	10.3%
Danville	99	59	39	1	40.4%
Derry	193	143	43	7	25.9%
Epping	92	72	20		21.7%
Epsom	34	24	10		29.4%
Fremont	101	89	12		11.9%
Greenland	61	60	1		1.6%
Greenville	20	19	1		5.0%
Hampstead	175	141	33	1	19.4%
Hampton	48	44	4		8.3%
Hampton Falls	36	24	12		33.3%

Town	Total Samples	Non Detect	MtBE <AGQS	MtBE >AGQS	Detection Rate
Hillsborough	**104**	**94**	**10**		**9.6%**
Hollis	**51**	**50**	**1**		**2.0%**
Hooksett	**132**	**128**	**4**		**3.0%**
Hopkinton	**21**	**17**	**4**		**19.0%**
Kingston	**163**	**126**	**37**		**22.7%**
Litchfield	**351**	**283**	**67**	**1**	**19.4%**
Londonderry	**166**	**145**	**20**	**1**	**12.7%**
Loudon	**215**	**187**	**28**		**13.0%**
Madbury	**68**	**60**	**8**		**11.8%**
Merrimack	**277**	**261**	**16**		**5.8%**
Middleton	**38**	**28**	**8**	**2**	**26.3%**
Mont Vernon	**111**	**101**	**10**		**9.0%**
New Boston	**31**	**31**			**0.0%**
New Durham	**51**	**37**	**14**		**27.5%**
New Ipswich	**149**	**129**	**20**		**13.4%**
Newton	**159**	**118**	**41**		**25.8%**
North Hampton	**39**	**35**	**4**		**10.3%**
Northwood	**183**	**134**	**49**		**26.8%**
Nottingham	**118**	**103**	**13**	**2**	**12.7%**
Pelham	**216**	**195**	**21**		**9.7%**
Plaistow	**104**	**66**	**37**	**1**	**36.5%**
Rochester	**116**	**111**	**5**		**4.3%**
Rye	**32**	**30**	**2**		**6.3%**
Salem	**94**	**77**	**17**		**18.1%**
Salisbury	**50**	**39**	**11**		**22.0%**
Sandown	**63**	**59**	**4**		**6.3%**
Strafford	**38**	**23**	**15**		**39.5%**
Stratham	**97**	**76**	**21**		**21.6%**
Sutton	**23**	**23**			**0.0%**
Weare	**191**	**173**	**18**		**9.4%**
Wilton	**42**	**40**	**2**		**4.8%**
Windham	**175**	**133**	**42**		**24.0%**
Totals	**5951**	**5083**	**851**	**17**	**14.6%**

Note table only displaying data for municipalities where ≥ 20 samples have been collected. A review of all samples through 6/30/2018 shows 6,404 samples have been collected in 157 municipalities.

To illustrate the typical scope of a sampling district, Figure 3 below depicts the Derry Sampling District. Additional information on the Derry sampling district is contained in the case study in Appendix A-2.

Figure 3 – Derry Sampling District



Permanent Solutions for Contaminated Water Supplies

Immediate response actions taken to address drinking water contamination typically involve provision of bottled water and eventually the installation of point-of-entry treatment (POE) systems. These solutions require constant attention and maintenance. The cumulative costs to maintain POEs are significant and there are contaminant exposure risks if the POEs are not properly maintained or when water use patterns change significantly. As a result, POE installation and provision of bottled water are not the preferred long-term solutions to water quality problems. To ensure that permanent solutions to contaminated water supplies are implemented whenever feasible, NHDES has established a program that assists with the extension of public water supply lines to contaminated properties or the improvement of public water infrastructure when it is cost-effective and necessary to address MtBE contamination problems.

In some cases, a public water system may be contaminated with MtBE. The solution to the contamination may be the installation of a treatment system, interconnection of the public water system to another system or the installation of an alternative water supply well. NHDES is evaluating all known MtBE-contaminated water supplies to determine whether it is appropriate to implement a permanent solution involving water distribution system expansion or development of other water supply infrastructure.

There are 19 drinking water supply infrastructure projects currently under evaluation, in process or completed. These projects include six water line extension projects, three municipal supply well replacement projects and 10 feasibility studies associated with water distribution system conversion/expansion projects. The status of the projects is as follows:

Water line installation at the Little Falls Cooperative in Rochester.

- Five water line extensions completed (Little Falls Cooperative in Rochester, and projects in Atkinson, Derry, Salem and Windham).
- One water line extension project in final construction phase in the summer of 2018 (Fluffy's in Laconia).
- Ten water line extension feasibility studies (Alton Bulk Plant, Grappone Junction Bow, Jenness Road in Epping, Epsom Traffic Circle, Lee Traffic circle, Plaistow fire suppression system conversion, Crown Point Road in Rochester, Swanzey Mini-Mart, and Windham Exit 3).
- Three water well relocation projects (one in Dover to replace the MtBE contaminated Griffin municipal water supply well, one in North Conway to replace a well in proximity to a MtBE contamination plume and one in Salem to replace the Turner-Campbell well field).

Ledge probes for the Windham water line extension.

The Little Falls Cooperative Mobile Home Park (30 homes to the Rochester public water system), and the Windham, Derry (over a dozen MtBE contaminated water supplies connected to Derry's water supply) and Plaistow projects are discussed in the appendices (Appendix A-2 through A-5).

In Dover, The Bureau is assisting the city with the replacement of its Griffin Well. The Griffin Well is contaminated with MtBE that originated from the Madbury Metals recycling facility. The Bureau funded the construction of a test well, completion of a replacement well pump test to determine its vulnerability to the contaminant plume, construction and connection of the replacement well to the distribution system and follow-up studies on the impact of artificial river water recharge on the contaminant plume dynamics. See Appendix A-6 for more details on the Dover project.

In North Conway, the water district would like to replace a water supply well that was damaged during a flood. Unfortunately, the new location is much nearer to an existing MtBE contamination plume. The Bureau funded a pump test and groundwater sampling to determine whether the new well location will alter the existing MtBE contamination plume and threaten the new water supply.

Prevention

Identification and Removal of Underground Storage Tanks (UST)

To address undetected UST gasoline releases and facilitate more effective site investigations and remedial actions at existing sites, the MtBE Remediation Bureau developed a UST removal program that targets removal of the worst of New Hampshire's underground storage tank systems (older tanks, tanks not in service, high-risk single-wall systems, facilities ceasing operations and other tank systems considered to represent a risk for MtBE release to groundwater). This program helps expedite the removal of tank systems that represent a potential source of ongoing or future releases and also provides a means to assist facility owners who have limited financial capacity to complete the necessary tank removals and reduce the risk of potentially costly releases.

Implementation of the UST removal program creates opportunities to:

- Remove leaking tank systems. Investigate past releases.
- Remove or otherwise remediate contaminated soil.
- Remove substandard UST systems before a release occurs.

By the end of the fiscal year, NHDES had removed 291 UST systems by using the State of New Hampshire's tank removal contract or via private contractors working under the reimbursement process, and approximately 20,000 tons of contaminated soil was removed during these projects.

Tank Removal by the Numbers

- 291 underground storage tanks removed.
- Average tank age – 28 years old.
- 20,000 tons of contaminated soil removed.
- 100 Small "mom and pop," residential or government-owned facilities assisted.

The average age of the tanks removed by the program is 28 years and the majority of the tank or piping systems that were removed were the more leak prone single wall systems. The interest in UST removal projects is high and NHDES is actively scheduling additional UST system removals for 2018. As part of the efforts to address underground storage tank issues via this program, NHDES has reached out to municipalities and other state agencies that have obsolete and potentially leaking tank systems. As of the end of FY18, tank removal and/or remedial assistance has been provided to the towns of Meredith, Pembroke and Plainfield and the cities of Berlin, Concord, Exeter and Nashua. NHDES has also removed or provided reimbursement for the removal of underground tanks on behalf of the Marine Patrol Division of New Hampshire Department of Safety, Franconia State Park and New Hampshire Department of Transportation.

post removal.

Tank top uncovered during UST removal.

Tank that was buried under the water table after controlled float out of the excavation.

USTs prior to removal from tank graves.

Motor Vehicle Recycling Facility Spill Prevention Assistance

In the early part of the last decade, NHDES reviewed the locations of licensed Motor Vehicle Recycling Facilities (MVRF) and their proximity to private drinking water supply wells. Water supply wells in close proximity to MVRFs were sampled on a voluntary basis. A high percentage of the MVRF in environmentally-sensitive settings were found to have impacted drinking water wells. NHDES manages several dozen MVRF-related MtBE contamination sites, a number of which were discovered during this initial sampling program. Several of these sites had caused widespread private well MtBE contamination.

MVRFs collect, transfer, store and use automobile fluids when they recycle cars. Poor fluid management practices during the recycling process can result in spills of MtBE-containing gasoline that can contaminate groundwater. NHDES has found that consistent implementation of Best Management Practices (BMPs) minimizes releases of MtBE-containing gasoline to aquifers by reducing spills and releases. Since MVRF program assistance inception, NHDES has purchased gasoline spill prevention equipment and had the equipment delivered to 82 MVRFs that process a substantial percentage of the end-of-life vehicles in New Hampshire. The new equipment minimizes the potential for gasoline spills, facilitates the recycling of gasoline and improves the safe handling of a highly flammable material.

In addition to the purchase of spill prevention equipment, the bureau has developed a concrete spill containment pad installation program. About one-third (36 facilities) of the active MVRF in New Hampshire are participating in this program. The spill containment pads are being installed in areas used for gasoline transfers, vehicle dismantling or gasoline storage. The concrete pads are being located in the most active portions of the MVRFs and before installation of the pads, existing gasoline contamination issues, if any, are identified and addressed. As a result, the projects combine investigation, remediation and release prevention activities as appropriate.

Project case studies for the UST Removal and MVRF spill prevention equipment initiatives are provided in Appendix A-5 and A-6, respectively. Pictures of the spill prevention equipment (Gas Buggy™), an integrated gas tank drill, gasoline transfer and storage system, are provided below.

Warren's picking up a gas buggy to save the State on delivery charges.

Members of the Automotive and Truck Recyclers Association (ATRA) and NHDES next to their equipment.

Picture of a gas buggy and drill system.

PROGRAM FINANCIAL STATUS

Table 2 summarizes the financial status of the program. Approximately $7.5 million of funds have been expended in fiscal year 2018. Since program inception in 2014, over 90% of all expenditures have funded actual cleanup work, water supply testing, water supply infrastructure improvement/replacement projects, MtBE Remediation Bureau labor costs associated with project management, and other direct services. The remainder of the expenditures pay for building rent, Office of Information Technology support services and other routine expenses necessary for program operation.

Table 3 summarizes the larger projects that are currently under way. The bulk of the projected project costs shown in Table 3 are related to infrastructure or prevention projects. There will also be expenditures on remedial projects as the MtBE Remediation Bureau works to expedite the closure of MtBE contaminated sites.

Table 2 - Program Expenses - FY 2018	
	FY 2018 Expenses
Salary and Benefits	
Salary	$820,443
Benefits	$477,228
Subtotal Salary & Benefits:	**$1,297,671**
Operating Expenses	
Current Expense	$14,420
Building Rent	$7,221
Transfers to OIT	$58,579
Transfers to General Services	$45,392
Equipment	$2,437
Telecommunications	$8,410
Indirect Costs	$104,617
Transfers to Other Agencies	$351
Employee Travel & Training	$1,237
Subtotal Operating Expenses:	**$242,664**
Contracts & Reimbursements	
Contractual	$1,430,293
MtBE Fund Reimbursements	$4,599,103
Subtotal Reimbursements & Contractual:	**$6,029,396**
Total Expenses:	**$7,569,731**
Total Spent Since Inception: $27.4 million	

Table 3 - Work in Progress – Large Projects Only

Project Name	Estimated Eligible Project Cost	Approved Work Scopes	Paid	Status
Lowell Road Area wide MtBE	$291,000	$211,066	$187,428	Water Main extension complete; water service connections scheduled for 2019
Metro Plaza FMR Kershaws	$3,100,000	$3,012,522	$2,938,567	Water Main extension complete; water service connections scheduled for 2019
Green Valley 55258 former Getty	$2,000,000	$1,615,523	$157,255	Construction of water main extension scheduled for 2019
Former Fluffy's Convenience Store	$250,000	$200,000	$49,119	Construction of water main extension scheduled for 2019
Plaistow Fire System Conversion Study Phase (Derry, Windham, Salem, Atkinson, Plaistow)	$500,000	$439,854	$319,818	Presently in design phase as part of the Southern NH Regional Water Project. Initial construction anticipated to begin in 2019.
Mobil 13052 (Lee Circle Mobil)	$4,000,000	$206,300	$157,516	Final design work ongoing. Construction of water main extension anticipated in 2020.
Gardner Circle Area MtBE	$400,000	$47,940	$26,918	Final design work pending Town of Londonderry decision to move forward.
Crown Point Road	$2,300,000	0	0	City of Rochester exploring funding options and anticipated to begin preliminary design work in 2019.
Tim & Joni's Towing/Auto Recycling	$4,000,000	0	0	Town of Epping exploring funding options and anticipated to begin preliminary design work in 2019.

Note: Table 3 summarizes large projects that are ongoing but have not been completed as of the end of the fiscal year. Additional smaller projects have been approved and are either lumped together in the table or are omitted. This table includes the estimated total cost of the listed projects, the existing approved budgets, and estimates the amounts paid as of June 30, 2018.

APPENDICES

A-1: Case History – Richmond Four Corners Store

Overview

The Richmond Four Corners Store is in the heart of the Town of Richmond. It is located at the intersection of the two main roads in town and is near the Fire Department and Library.

At A Glance

DES Site#: 199206008

Site Location: 3 Winchester Road, Richmond

Bureau Actions: Contaminated Soil Removal

MtBE Fund Cost: $395,000

Outcomes:

- Leaking tank system removed.
- 2,800 tons of petroleum contaminated soil removed and properly disposed of.
- Completion of a supplemental site investigation and reinstallation of monitoring wells destroyed during the remediation.
- Treatment systems maintained at contaminated water supplies.

History

Richmond Four Corners Store operated as a classic New Hampshire country store and retail fuel station from the early 1900s until 2013. Over that time period, at least five underground storage tanks had been located at the property. In 1992, high levels of gasoline contamination were detected in a neighbor's water supply well. An investigation was completed and point-of-entry treatment systems (POEs) were installed to treat five impacted area water supplies. A number of site cleanup efforts were undertaken, including a 225-cubic yard soil excavation in 1995 and the operation of a groundwater pump and treatment system from 2004 to 2008. Full remediation of the site failed during these previous attempts because access to a significant quantity of contaminated soil was blocked by the presence of an operating underground storage tank and piping system.

In 2013, the Richmond Four Corners Store shut down. In 2014, the property mortgage holder initiated the foreclosure process by conducting an environmental due diligence investigation.

MtBE Remediation Bureau Investigation and Remediation Actions

The Town of Richmond, the property owner and the Southwest Regional Planning Commission worked together to apply for brownfields assistance to remove the existing underground storage tank system from the property in 2014. The Town of Richmond was very engaged with this project because of back taxes owed to the Town, the central location of the property and the boarded-up/in-foreclosure nature of the store. The Bureau quickly became involved with these initial discussions and, collectively, the decision was made to proceed with a joint project that combined the removal of the tank system using brownfields funding, and excavation of soil contamination that surrounded the tank system using MtBE funding.

In July 2014, the Southwest Regional Planning Commission removed the 12,000-gallon underground gasoline storage tank and associated piping. During the removal of the tank system, there was an opportunity to observe the tank system piping. It appeared that the piping was Total Containment, Inc. Enviroflex pipe (aka “yellow pipe”). NHDES has been systematically requiring the removal of this type of piping because it is chemically incompatible with gasoline. NHDES was unaware of this substandard installation of pipe. Upon further inspection of the dispenser piping, the outer pipe appeared blackened and stained indicating the presence of gasoline between the inner and outer pipes of the double-walled system.

During excavation, as the excavator reached the impacted soil, there was enough petroleum vapor from the soil contamination to ignite as the excavator bucket scraped against a cobble. This suggested that gasoline was recently released, in addition to the larger, older gasoline release. Approximately 964 tons of contaminated soil was removed, including some contaminated soil removed from beneath the earthen floor of the building. The excavation project generated a great deal of community interest and one gracious and grateful nearby landowner provided freshly baked corn muffins and lemon bars to the hungry work crew.

Richmond Four Corners Store contaminated soil excavation in July 2014.

A tank closure and remedial implementation report was submitted to NHDES in late 2014. Soil contamination extending under the existing building foundation could not be removed and was left in place. The Town of Richmond subsequently acquired the site for back taxes and held a community charrette with South-west Regional Planning Commission to consider possible future uses of the property. Due to the prominent central location of the property, the Town of Richmond wanted to ensure that the property would be put to its best possible use. In 2015, Richmond received brownfields funding for the demolition of the dilapidated building, which made it possible to remove the remaining contaminated soil. The remaining contamination (1,835 tons of contaminated soil) was removed in November 2015, using MtBE settlement funds.

Current Status

The property is now set for redevelopment. The Town of Richmond is marketing the property to developers for future uses compatible with its central location in town and proximity to town offices. The onsite groundwater monitoring wells now essentially meet ambient groundwater quality standards. Six of the contaminated drinking water supply wells, as of May 2017, meet the State's drinking water standard for MtBE and other VOCs. Three contaminated water supply wells still exceed the State standards (92ppb, 46ppb and 43ppb, versus the State's MtBE standard of 13ppb). Two of the water supply wells exceeding the State's MtBE standard are currently out of use. No 2017 data are available for the two water supply wells that are out of use; however, based on the monitoring well and other drinking water well trends, significant contamination reductions are expected over time. Reduction in area contamination levels will improve area property values and reduce long-term costs for maintenance of water treatment units.

NOTE: Complete NHDES site records can be accessed online at the NHDES website using OneStop for the site number referenced on the first page of the case history.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-2: Case History – Derry Sampling District and Water Extension Project

Overview

The Derry Sampling District was created to address concerns about the presence of an MtBE contamination plume in an area with a high density of private water supply wells. A geographical information system (GIS) analysis of the area found a large number of automobile-related businesses, several known contaminated water supply wells, an existing gas station and dry-cleaner release site.

At A Glance

DES Site#: 199512007

Site Location: Derry

Bureau Actions: Drinking Water Well Sampling

MtBE Fund Cost: Nearing completion, $2.34 million

Outcomes:

- 225 wells sampled.
- 64 Contaminated water supplies.
- 9 POEs installed.
- 9 homes provided with bottled water.

NHDES discussed a proposed sampling approach with municipal officials and notified local elected officials prior to initiation of work. Letters were then sent to property owners in the sampling district. Based on initial sampling results, follow up canvassing of the Blunt Road and Route 28 area was conducted because of the large number of contaminated water supplies found in these areas.

Sampling Results – MtBE

Fifty-seven percent of the property owners elected to participate in this voluntary sampling program and 225 samples were collected and analyzed (multiple rounds collected to evaluate trends). MtBE was detected in 64 samples of these water supplies. Ten water supplies exceed the State's drinking water standard and two additional water supplies exceeded the State's notification standard of 5 ppb. Currently, the known MtBE contamination plume is approximately one mile in length.

Sampling Results – Other

NHDES also provided the option for property owners to have sampling crews collect conventional and radiological samples for analysis. The analyses are paid for by the property owners due to restrictions on the use of MtBE settlement funds. However, sample analysis identified additional, significant water quality concerns in the area. Specifically, of the 17 properties requesting additional testing, 16 exceeded one or more of the State's water quality standards. The following contaminants were detected: arsenic (two properties over standards), chloride (one property over standards), copper (three properties over standards), E. coli or total coliform (six properties over standards), lead (nine properties over standards), manganese (six properties over standards), radon (five properties over standards) and uranium (one property over standards). The Bureau referred the property owners to other programs at NHDES for information on these compounds and provided advice on proper wellhead construction when the well caps were missing or improperly secured.

Water Treatment and Risk Reduction

NHDES offered bottled water to all the properties with wells contaminated with significant levels of MtBE. NHDES subsequently installed POE systems for all property owners whose wells contained MtBE concentrations over the State standard except for one property owner who declined the offer of assistance.

Water Line Extension

NHDES and Derry worked closely together to create a permanent solution for the impacted properties. Derry recently invested in an extension of the water system and an upgrade of a pump station. This made it possible to extend the Derry drinking water system to the impacted area. The water line extension has multiple benefits. For the State, the water line extension eliminates the costs and maintenance challenges imposed by the large number of individual POEs (paid for by the State's Gasoline Remediation and Elimination of Ethers Fund).

The water line extension benefits Derry in multiple ways. In addition to addressing the MtBE-contaminated water supplies, the proposed water line extension will connect the isolated Woodlands Community water system to Derry's core water system. Derry owns the Woodlands Community water system; this system currently has both water quality (corrosivity) and capacity problems. Connection of the Woodlands system to Derry's core system will solve both problems. While Derry will need to fund the additional costs required to interconnect, the MtBE-related funding of the overall project makes it possible to achieve Derry's objective of elimination of this inefficient, duplicative water system.

The Derry town council approved the water line extension project April 5, 2016, and project groundbreaking took place on September 8, 2016. The water main installation is complete and by the end of 2017, Derry anticipates completion of all of the connections.

NOTE: Complete NHDES site records can be accessed online at the NHDES website using OneStop for the site number referenced on the first page of the case history.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-3: Case History – Little Falls Cooperative Mobile Home Park

Overview

At A Glance

DES Site#: 201009016

Site Location: Little Falls MHP Cooperative in Rochester

Bureau Actions: Water Line Extension

MtBE Fund Cost: Approximately $640,122

Outcomes:

- Site Survey, plans and specifications completed.
- Water line extension completed.
- Road repaved to address connection road cuts.
- Thirty homes connected to Rochester water system.
- Water supply wells and well houses decommissioned.

The 30-unit Little Falls Cooperative Mobile Home Park is located in Rochester and is immediately downgradient of a junkyard and a gas station. Gasoline releases from the junkyard resulted in MtBE-contamination of the groundwater. The groundwater contamination plume impacted the water supply of Little Falls Cooperative. The Cooperative obtained its water from four wells and the mobile homes were each connected to one of the four wells. The water system was unregulated because no single well served more than 25 people. Two of the wells were contaminated with MtBE and there was concern that the other wells could become contaminated in the future, particularly if one or more of the existing wells was taken out of service. The former water system had additional problems that needed to be addressed, such as the location of three of the wells in an area subject to flooding and high concentrations of metals. The City of Rochester water line runs by the entrance of the mobile home park. NHDES approved a project to extend Rochester's water line and to connect each of the mobile homes to the municipal water system. In October 2015, contractors working for NHDES completed the water line extension, providing clean, safe drinking water to the homeowners.

Waterline installation workers in a trench box.

Successful pressure testing of installed piping.

Fourteen-hundred feet of water line, a central metering pit and individual metering pits for each house were installed. The total project cost was within the engineer's original project estimate.

Project Status

Now that the water line is in place, the existing water supply wells are unnecessary and are a potential conduit for migration of contamination. The Bureau funded the decommissioning of the water supply wells and well houses in 2016. In 2017, after successful conclusion of the one-year warranty period, the project retainage payment was released to the contractor.

NOTE: complete NHDES site records can be accessed online at the NHDES website using OneStop for the site number referenced on the first page of the case history.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-4: Case History – Windham Water Line Extension

Overview

Gasoline releases from the former Waterhouse Country Store contaminated a number of water supplies in Windham. The MtBE contamination has been spreading to the north and additional water supplies have become contaminated over time. The Bureau funded a water line extension from Pennichuck Water Work Inc.'s (Pennichuck) water system to the contaminated water supplies.

At A Glance

DES Site#: 199511021

Site Location: Windham

Bureau Actions: Water line extension to address MtBE contaminated water supplies.

MtBE Fund Cost: $1.4 million

Outcomes:

- 1.2 miles of water line installed.
- 6 contaminated water supplies connected to Pennichuck water system.
- Hudson pump station upgraded and reliability enhanced.
- Multiple POEs and water supply wells decommissioned.

Project Status and Schedule

During the execution of the project, deficiencies in the Hudson pump station were identified. This critical pump station conveys water from the Pennichuck water system to Windham. The pump station had insufficient capacity to ensure reliable service to the additional properties. In fact, the fire suppression system pumps were running routinely to keep up with existing water demand. Running the fire suppression system pumps is highly undesirable and inefficient because the pumps dramatically increase system water pressures, which then have to immediately be reduced. NHDES approved a project to expedite necessary upgrades to the pump station. It was a complex project, in that the pump station needed to be bypassed using temporary pumps to ensure uninterrupted service during the work. The upgrades were completed on time and on budget, without any significant interruption of water service.

The water line extension was completed during 2016. All connections to the impacted properties have been made. The existing water supply wells have been decommissioned and the point-of-entry treatment systems have been removed. A follow-up project, funded by a Drinking Water SRF loan and nearing completion, further extends the water line to a small, nearby subdivision that has an arsenic-contaminated water supply.

Windham has serious issues with both the quantity and quality of water supply. The bedrock aquifer is high in arsenic and radon and relatively low-yield. During the 2016 drought, at least 30 drinking water wells needed to be re-drilled to increase water yield. The water line extension brought Pennichuck water to the Route 111 and Mammoth Road intersection, providing Windham better drinking water and fire protection options for the future.

NOTE: Complete NHDES site records can be accessed online at the NHDES website using OneStop for the site number referenced on the first page of the case history.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-5: Case History – Town of Plaistow Fire Suppression System Conversion

Overview

At A Glance

DES Site#: 198903017 & 201605008

Site Location: Plaistow

Bureau Actions: Fire Suppression System conversion feasibility study

MtBE Fund Cost: To be determined

Outcomes:

- Feasibility Study complete.
- Negotiations with City of Haverhill initiated.
- Engineering analysis of regional solutions completed.

The Plaistow Lido site is located at the intersection of Route 125 and East Road in Plaistow. The Lido gas station release was one of the largest gasoline releases in the state. The extent of groundwater and drinking water impacts is also unprecedented. Multiple remedies have been implemented at this site, including soil vapor extraction, excavation and chemical oxidation. The contaminant plume has not been significantly reduced by the remedial work completed to date due to the size of the release (greater than 10,000 gallons of gasoline but impossible to accurately estimate) and complexity of the site.

Plaistow is interested in addressing the MtBE drinking water supply contamination issues, primarily from the Lido site, by converting the Town's existing fire suppression system into a potable water system. The fire system distribution network extends to most of the contaminated water supply areas and also extends several miles toward potential potable water sources, such as the City of Haverhill, Massachusetts water system to the south, and to the Hampstead Area water system to the West. The initial project consists of a feasibility study to evaluate whether conversion of the fire suppression system to a potable water distribution system is a viable option for addressing the local MtBE contaminated groundwater. The feasibility study evaluated potential sources of potable water and the cost and work needed to upgrade the fire suppression system. Now that the feasibility study has been successfully completed, the next phase will be the conversion of the fire suppression system and connection to an existing water supply.

Project Status and Schedule

NHDES approved the development of a feasibility study to evaluate the existing fire suppression system piping and storage tank. The scope of work included estimation of potable water demand and the cost for system conversion. The cost estimate also included the additional piping necessary to connect the properties with existing private wells that are contaminated with MtBE. For the fire suppression system to be converted into a public water supply, potable water must be provided. The feasibility study included an evaluation of connecting to an existing water system, such as the Hampstead Water Company or the City of Haverhill, or the development of a new water supply.

The feasibility study was completed in June 2016 and the results presented to the Plaistow Select Board. Initial test results on the integrity of the fire suppression system are favorable and the project is feasible, if a cost effective source of potable water can be developed. The City of Haverhill has expressed a willingness to pursue supplying potable water to the contaminated properties and for fire suppression. The Select Board voted to proceed with discussions with Haverhill. Interconnection to Haverhill's water system would save over a million dollars on necessary repairs to the existing fire suppression system pump station and storage tank. Although this approach is advantageous from an engineering standpoint, this option has proven difficult due to local politics and interstate permitting/approvals.

Photo showing standing water in the vault of the fire suppression system storage tank. The existing infrastructure would greatly benefit from the renovations necessary to convert to a potable water system.

To provide Plaistow with additional options, NHDES funded engineering services to explore interconnection with other New Hampshire water systems. A work group of southern New Hampshire municipalities met to explore this possibility and a series of discussions have been held regarding potential cooperation opportunities and logistics. Based on promising early feedback, Plaistow applied for and was awarded $2 million in Drinking Water SRF funding. Plaistow hopes to bring the project to their 2018 town meeting.

The current, preferred solution is to extend water lines from Derry (Manchester Water Works System source) to the impacted communities. This solution will also solve insufficient drinking water source issues in Atkinson, Hampstead, Salem and Windham. Because the MtBE settlement funds are restricted to MtBE remediation, contributions to the total cost of the project will be provided by the parties that will benefit, for example, the Town of Plaistow $2 million SRF loan, and monies awarded by DWGTF Advisory Commission. Efforts are currently ongoing to finalize the route of the water line extension and to develop an accurate engineer's estimate of costs. This project is moving forward rapidly and is important to the resolution of drinking water contamination in multiple communities, as well as water system capacity shortfalls.

NOTE: Complete NHDES site records can be accessed online at the NHDES website using ONESTOP for the site number referenced on the first page of the case history.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-6: Case History – City of Dover Municipal Water Well Replacement

Overview

The City of Dover's Griffin municipal water supply well was shut down in 2016 due to the presence of MtBE and other contaminants. The Griffin well is located in a key drinking water aquifer in Dover along with another water supply well, the Ireland well. These two wells supply a substantial portion of Dover's drinking water needs.

At A Glance

DES Site#: 198401044

Site Location: Dover

Bureau Actions: Investigation of MtBE contamination and replacement of municipal water supply well.

MtBE Fund Cost: Approximately $1.51 million, some bills still pending.

Outcomes:

- Groundwater contamination extensively investigated.
- Pump test completed.
- Municipal water supply well replaced and connected to water distribution system.
- Artificial recharge pilot test completed.
- New municipal well pump, support building and treatment brought online.

To address the contaminated water supply well, the Bureau provided funding for Dover to complete a series of comprehensive investigations of the contaminant plume (originating from an auto shredder facility). The investigations were essential for proper location of the replacement well and to evaluate the potential threat to the Ireland well. Next, the Bureau funded the installation of a new well and completion of a pumping test. The construction of water lines and ancillary structures and treatment system changes necessary to connect the new well to Dover's water system were funded following a successful pump test.

Project Status and Schedule

By the end of 2016, the investigations and replacement well pump test were completed. In 2017, the connection of the new well to Dover's water system was completed. In spring of 2017, Dover's consultant began pilot testing of an artificial recharge system. Artificial recharge systems infiltrate surface water into groundwater and have been used as a mechanism to store groundwater and to increase the yield of groundwater from aquifers. Dover's consultant is recommending the artificial recharge system for two purposes. First, Dover would benefit from the increase in aquifer water storage but more importantly, the artificial recharge is likely to help create an additional hydraulic barrier between contaminants and the new well and the Ireland well. Although the relocation of the Griffin well to a more protected portion of the aquifer provides significant protection to Dover's drinking water source, sustained pumping at the new location could draw the contamination toward the wells. The artificial recharge system is being designed to minimize that risk.

NOTE: Complete NHDES site records can be accessed online at the NHDES website using OneStop for the site number referenced on the first page of the case history.

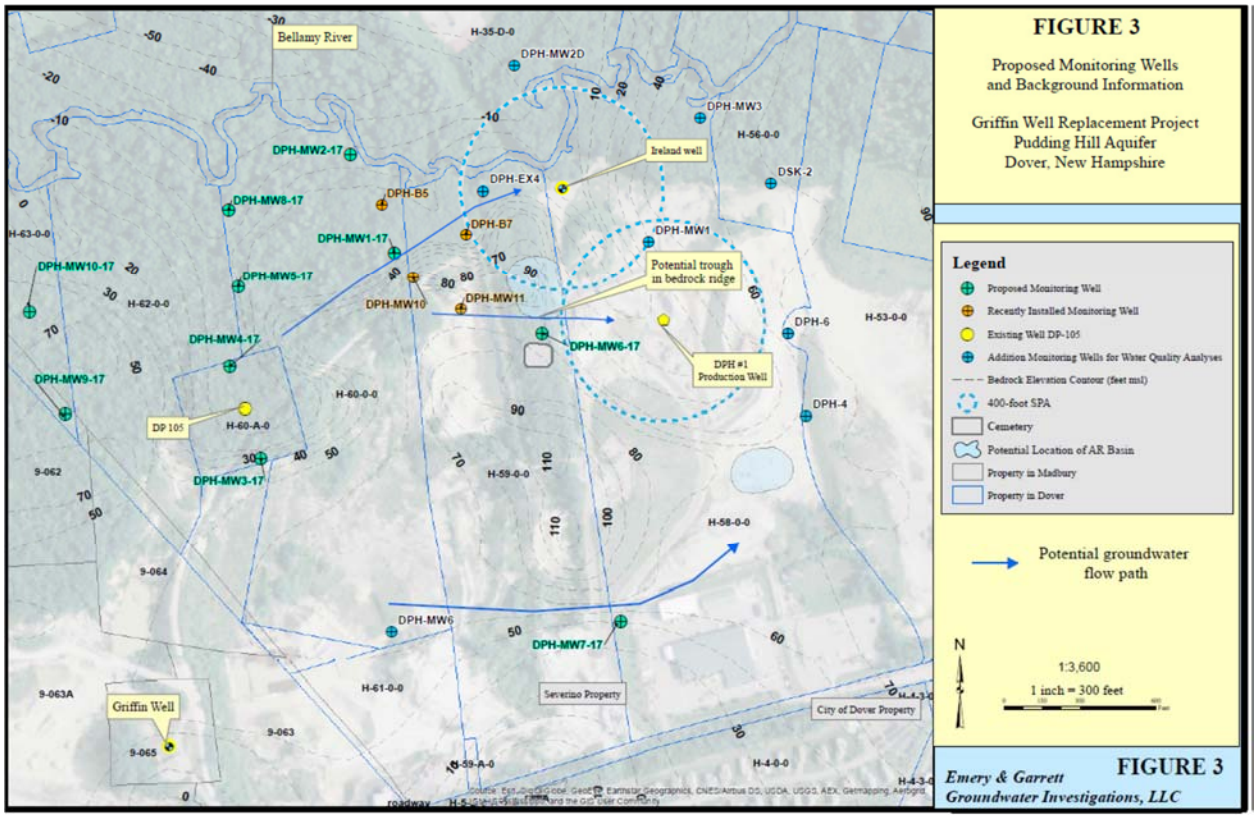


Figure from the Emery Garrett Griffin Well Investigation Project showing bedrock surface elevations, groundwater flow directions, inactive Griffin Well, the location of the two active water supply wells and potential artificial recharge areas. Low concentrations of contaminants have reached the Ireland Well.

A-7: Case History – Underground Storage Tank Removal Program

Overview

The Bureau began the UST removal program on October 1, 2014. NHDES has removed 291 tanks as of the end of FY18. Additionally, UST removal work will continue throughout FY 2019.

At A Glance

Site Location: 132 locations in 88 municipalities

Bureau Actions: Tanks and contaminated soil removed

MtBE Fund Cost: Approximately $3 million, some bills still pending

Outcomes:

- 291 potentially leaking tanks removed.
- Approximately 17,500 tons of petroleum contaminated soil removed and properly disposed of.

Site Selection

UST removal projects are selected to address tanks that pose a threat to New Hampshire aquifers. The tanks that have been removed to date fall into the following categories:

- Tanks that had been out of use for a significant period of time.
- Tanks with problematic installations or obsolete components.
- Tanks that prevent access to contaminated soil.
- Tanks at retail facilities that are terminating gasoline sales operations.

Tanks that are not in use typically are not as well maintained as operating tanks. For example, the sumps are not routinely opened and monthly inspections are no longer conducted. Since maintenance of these tanks decreases and the tanks become a liability for the property owners and the environment, removal of the tanks is a priority.

Older tank systems with obsolete components or substandard installations are also a priority for removal. For example, many of these types of tank systems have either single wall piping or tanks. Current rules require the use of substantially more release-resistant double wall systems. There may also be tank system installations that are particularly problematic. The New Hampshire Marine Patrol's tank system in Gilford was a prominent example of this type of situation. The tank was installed below the water table and the tank sumps typically were filled with water. In a situation like this, any spill or overflow of gasoline will immediately impact groundwater.

The Richmond Four Corners, Chichester Mobil, Bob's Gulf (Dover), Rymes Heating Oil (Peterborough), Conway Circle K, Village Mobil (New Ipswich), Gibbs Oil (Stratham), Jay's Marina (Tilton), Freedom Market (Freedom) and Gulbicki's Towing UST (Laconia) removal projects were selected to facilitate removal of contaminated soil under or surrounding tanks or pump islands. Additional remedial projects, such as Wentworth Mobil (Portsmouth) and Exeter Green Valley were selected at sites at which tanks had been recently removed. The Richmond Four Corners project is highlighted in a separate case study because of its importance to the town of Richmond and the surrounding contaminated water supply well implications.

Release Prevention

One of the key objectives of the UST removal program is to prevent the future release of gasoline. The value of UST system removal as a means of preventing additional aquifer contamination was demonstrated by these initial projects. The Gulbicki's Towing project, for example, revealed the ongoing release of gasoline from the out-of-use tank system. According to the consultant, the USTs were filled by groundwater through holes in the vent lines. The contaminated water was then discharged in the vicinity of the former dispenser island through the fuel lines. With the removal of the USTs and elimination of the ongoing discharge, groundwater quality will improve at this site.

At the Richmond Four Corners Store, the piping system was leaking and the property owner was unaware of this ongoing leak. If the tank system had been returned to active use, additional gasoline would have been released in an area with vulnerable private water supplies. Removal of the tank system and contaminated soil reduced long-term State ODD fund liabilities and accelerated aquifer restoration for the center of the Town of Richmond.

As previously noted, the Marine Patrol tank sumps were frequently full of water and posed no impediment to gasoline releases to the aquifer. Removal of the tank system before a significant release occurred was highly desirable. As can be seen from these situations, removal of unnecessary, unwanted and high-risk UST systems has a number of benefits to the State, as well as property owners.

Submerged Marine Patrol Tank exposed for removal. The hold down straps were broken and the tank was floated so that water would not get in the tank during cleaning.

Remedial Progress

Significant remedial progress was made at fifteen of the facilities. At most of the other tank removals (the 232 tanks that were removed that did not involve significant remediation), some contaminated soil was removed.

Approximately 16,500 tons of contaminated soil was removed from remedial sites addressed by the program. Several of the sites were located in areas with impacted drinking water wells and remedial efforts will have a significant positive impact on water quality in the affected aquifers.

Future

NHDES is evaluating all existing tank systems that did not comply with the December 2015 regulatory requirement to upgrade to double wall technology and is assisting with the removal of those high-risk tank systems. NHDES continues to find non-compliant tanks and/or abandoned tanks and schedules removals of these release-prone tanks on an ongoing basis.

Tank being removed from a tight alley in Gilford. Tanks had to be dragged out and around the back due to power lines and other obstructions.

NOTE: NHDES site records on underground storage tank facilities and remediation can be accessed online at the NHDES website using OneStop by entering the town and/or address of the facility of interest.
http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

A-8: Case History – MVRF Release Prevention Program

Overview

Motor Vehicle Recycling Facilities (MVRF) provide an essential service to the state by recycling end-of-life vehicles, thereby making inexpensive used parts available to consumers. As part of this service, it is necessary to handle significant volumes of automotive fluids which, if handled improperly, can result in a risk to groundwater. NHDES developed an assistance program to help ensure that best practices in the management of automotive fluids are in place. To ensure that the MVRF assistance program is both cost effective and pragmatic, NHDES and the Automotive and Truck Recyclers Association of New Hampshire (ATRA) established a joint work group. After a series of well-attended and thoughtful meetings in 2015, a consensus decision was made to create a grant program that reimburses the cost to purchase spill prevention equipment. Working together with ATRA and the work group was essential and ensured that the spill prevention equipment (WEN Industries Gas Buggy fuel tank drill, gasoline transfer and mobile storage tank system) and concrete spill containment pad projects meshed with MVRF operations while minimizing the risk of spills.

At A Glance

Site Location: Statewide

Bureau Actions: Established work group, created assistance application process, delivery of spill prevention equipment and initiation of impervious concrete pad program.

MtBE Fund Cost: Approximately $2 million, with additional invoices anticipated.

Outcomes:

- 100+ spill prevention devices delivered to date.
- 81 MVRF participating (approximately 80% of licensed facilities.
- 36 concrete spill containment pad projects approved and more than half are under way.
- Approximately 1,000 tons of contaminated soil being removed for concrete pad projects.

Spill Prevention Equipment

New Hampshire MVRFs have a long history of working with WEN Industries, an in-state manufacturer of vehicle recycling spill prevention equipment. Because of the strong relationship between in-state recyclers, ATRA and WEN Industries, it was possible for ATRA to negotiate a significant volume discount on WEN's spill prevention equipment. ATRA also encouraged its members located close to WEN's manufacturing facility to pick up the equipment to save on shipping costs. Additionally, ATRA managed the State's reimbursement request paperwork for the applicants. This greatly simplified the equipment procurement process. All of the spill prevention equipment is now in use at participating MVRFs.

WEN Industries' participation was very important to the program's success. WEN Industries was founded in New Hampshire in 1956 and was one of the first manufacturers of auto dismantling spill prevention products. WEN Industries manufactures the equipment purchased by the assistance program: The Gas Buggy and Fuel Tank Drill System. This equipment is used to safely transfer gasoline from scrapped to operating vehicles. WEN Industries' owner, Jim Hyde, indicated that the equipment order allowed him to hire an additional welder for his Merrimack, NH manufacturing facility. Although the spill prevention equipment assistance is focused on the minimization of MtBE-containing gasoline spills, a significant side benefit is improvements in gasoline transfer safety. In the past, there have been burns and fatalities when gasoline was transferred without considering the potential for sparks (i.e., hand drill use, etc); these types of injuries will be minimized with the new equipment. Feedback from Brian Lee, owner of White Mountain Auto Brokers, indicates that there is another unexpected benefit of the spill prevention program – namely faster fluid transfer. "His boys think the equipment is slick in that it saves about 45 minutes in car processing time." Mr. Lee reports achieving safer transfers and fewer spills, and all at a lower total labor cost.

Spill Prevention Equipment

An important spill management best management practice is the installation of impervious concrete pads in fluids management areas. Approximately one third (36 facilities) of the active MVRFs in New Hampshire applied for participation in this assistance program. The spill containment pads are being installed in areas used for gasoline transfers, car dismantling, car crushing or gasoline storage. The concrete pads are being located in the most active portions of the MVRFs and before installation of the pads, existing gasoline contamination issues, if any are identified, are addressed. As a result, the projects combine investigation, remediation and release prevention activities, as appropriate.

As of the end of FY18, concrete pads have been successfully installed at 27 facilities. Prior to pad installation, geotechnical and contamination identification field work was completed. At the Epping Auto Salvage facility, contamination was identified and over 400 tons of contaminated soil was removed. This remedial action should accelerate the cleanup of a number of contaminated drinking water wells near the facility. Cleanup was also completed at Murray's prior to pad installation. In addition to the 27 completed projects, work scopes were approved for work at another 12 facilities. Most of the additional pads should be installed by the summer of 2018.

Future

NHDES and ATRA will continue to evaluate opportunities for elimination of gasoline releases. The assistance program is working with the State's salvage yard inspector to ensure that facilities are aware of the assistance program and to target resources where they are most needed.

A gas buggy and fuel tank drill system being picked up by Warren's Auto Body. Note the dual fuel filter assembly improvement added to the NHDES order.

A concrete spill-prevention pad installed by the program. Note the positive limiting barrier (PLB) in the photo. The PBL consists of grooves in the concrete designed to trap spills until they can be cleaned up.

A-9: Case History – MtBE Source Investigation in Milan

Overview

In 2011, in a rural area of Milan, the homeowner at 224 Milan Hill Road discovered that their water smelled like petroleum. A sample was collected from their supply well and two petroleum-related compounds, benzene and MtBE, were detected above Ambient Groundwater Quality Standards. Using funding from the Petroleum Remediation Fund Program, NHDES assisted with the installation of a treatment system to provide the residence with potable water. However, the source of the petroleum impact to the well was not known and the project was referred to the MtBE Remediation Bureau.

At A Glance

DES Site#: 198909045

Site Location: 239 Milan Hill Rd, Milan

Bureau Actions: Source Investigation and Impacted Soil Removal

MtBE Fund Cost: $400,805

Outcomes:

- Identified the source of impact to residential water supply.
- 3,000 tons of petroleum contaminated soil removed and properly disposed of.
- Treatment system maintained at the contaminated water supply and investigation into other potential water sources conducted.

History

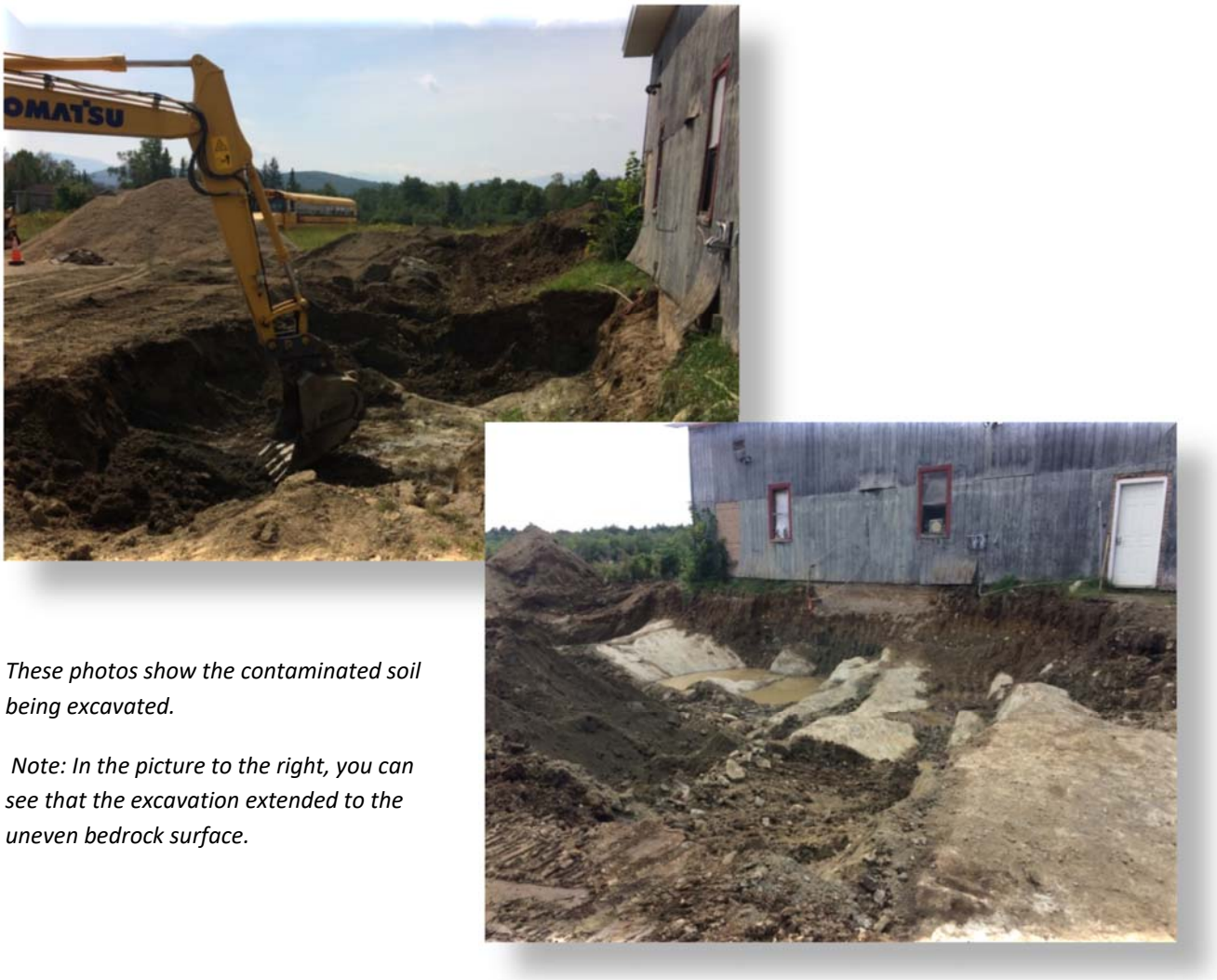
Based on Town records, the 224 Milan Hill Road property has been a residential home since its development in 1897; however, the property across the street at 239 Milan Hill Road was historically a bus maintenance garage. This property is currently occupied by Foreast Transportation, Inc. (Foreast), which is a school bus contracting company using the property for bus storage and maintenance. Following interviews with local residents and a review of NHDES records, it was determined that an underground storage tank (UST) system was formerly located on the Foreast property. The owner of Foreast stated that before purchasing the property in 2000 they were assured in writing that there were no USTs on the property and were not aware of any sources of petroleum contamination. They also had liability concerns and were reluctant to proceed with environmental sampling.

MtBE Remediation Bureau Investigation and Remediation Actions

MtBE Remediation Bureau staff met with the owner of Foreast and explained that there was funding assistance to investigate potential sources of MtBE impact to New Hampshire's groundwater. In addition to funding an investigation, if the source of MtBE impact was identified on the property, there would also be assistance to remediate the contamination.

After easing some of the financial concerns with the understanding that NHDES would be able to fund the investigation, the owner agreed to allow access to their property.

The initial phase of investigation consisted of a site area reconnaissance and records review followed by a geophysical survey and test pit excavation program to determine if the USTs were still in place or had been removed. NHDES records indicated that the tanks had been removed in 1991; however, the removal was conducted by the previous property owner and there was no assessment provided as to whether the USTs had leaked. However, a clue was provided in the closure documents that stated one of the two USTs had been taken out of service the year prior due to "failure," a tacit indication that a leak may have occurred. The geophysical survey and test pit investigation confirmed that the USTs had been removed and soil samples confirmed the historical petroleum release with elevated field screening results and petroleum related compounds above Soil Remediation Standards in samples collected just above the bedrock surface. Bedrock was encountered at relatively shallow depths ranging from 1 to 12.5 feet below the ground surface (see photos below).



These photos show the contaminated soil being excavated.

Note: In the picture to the right, you can see that the excavation extended to the uneven bedrock surface.

Following the discovery of petroleum impacted soil, NHDES and the property owner agreed to proceed with a source area soil boring delineation program followed by excavation of the impacted soil. The MtBE Remediation Bureau engaged one of the Initial Response Contractors to conduct the excavation. Soon after breaking ground, it became apparent that the volume of impacted soil was larger than originally estimated from the soil boring delineation program due to the undulating bedrock surface and areas of deeper bedrock missed by the soil borings. Ultimately, the excavation occupied an area of approximately 11,250 square feet and extended from the maintenance building across the property and beneath Milan Rd. The project lasted 33 days and resulted in the removal of approximately 3,000 tons of petroleum impacted soil.

Current Status

Following completion of the source area cleanup effort, the bedrock monitoring wells were installed on the Foreast property to assess the on-site groundwater quality and provide monitoring points for continued sampling. NHDES also authorized comprehensive private water well sampling in the vicinity of the impacted property to identify any other potentially impacted private water wells. The results of the area sampling did not find other impacted supply wells beyond the 224 Milan Hill Road property well. NHDES is providing assistance to the off-site property owner with the impacted supply well by supplying a point-of-entry treatment system to remove the contaminants while we evaluate other potential drinking water sources, since it will take some time for the bedrock groundwater quality to improve after this initial remediation work. Following extensive geophysical evaluations of the impacted supply well at 224 Milan Hill Road and a neighboring property which did not have an impacted supply well, it was determined that an alternative clean and reliable bedrock water supply well would be difficult to source.

NOTE: Complete NHDES site records on remediation activity can be accessed online at the NHDES website using OneStop by entering the town and/or address of a facility of interest. http://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx