

Governor's Task Force on the Seacoast Cancer Cluster

Interim Progress Report

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12/14/2016



A report on the progress and recommendations of the Governor's Task Force for the Seacoast Cancer Cluster that met from June 2016 to November 2016.

Governor's Task Force on the Seacoast Cancer Cluster

Interim Report and Recommendations

The Governor's Task Force on the Seacoast Cancer Cluster (Task Force) was formed in June 2016 to help coordinate communication with policy makers and community members who have concerns about the rhabdomyosarcoma (RMS) cancer cluster and potential environmental exposures and help inform them of the state's investigation into these matters. Members of the Task Force were invited (Addendum A) by Governor Maggie Hassan to participate and included elected officials; representatives of the NH Department of Health and Human Services (DHHS), the NH Department of Environmental Services (DES), and the Environmental Protection Agency (EPA); and members of the DHHS Community Advisory Group (CAG) for the cancer cluster investigation. The Task Force was asked to coordinate communications and make recommendations for how best to address the concerns of constituents around the health impacts of environmental exposures in the Seacoast.

The Task Force held its initial meeting on [June 22, 2016](#) to discuss the roles and responsibilities of the Task Force and to get an overview from DHHS on the investigation into the cancer cluster. During this meeting, it was decided that DHHS would maintain a [website](#) to publicly provide information about the Task Force, including meeting agendas, minutes and presentations. It was also decided that the Task Force would meet monthly to hear updates on the DHHS cancer cluster investigation and to review environmental concerns in the Seacoast area (e.g., Coakley Landfill, Schiller Station, Seabrook Station, Naval Shipyard, etc.). The Task Force also discussed the potential to establish subcommittees, as needed, to focus on specific environmental concerns identified as needing further investigation.

A subsequent meeting was held on [July 20th](#), when the EPA presented information on monitoring conducted at and adjacent to the Coakley Landfill and elevated levels of PFCs detected in May 2016 and shared plans to complete additional testing of private wells in the area. DHHS shared that the case investigation questionnaire had been finalized with input from experts at the Centers for Disease Control and Prevention, oncologists, epidemiologists and RMS researchers. DHHS also [presented](#) on radiologic monitoring that occurs in the State with emphasis on Seabrook Station-related monitoring and shared that there has been no activity greater than the normal expected background levels other than a brief incident in 2011. Representatives from C-10 Research & Education Foundation, a non-profit organization, presented information on the radiologic monitoring that they conduct related to Seabrook Station and the intended benefits of this approach.

The Task Force met on [September 14th](#) and was presented with [an overview](#) of the case investigation protocol developed by DHHS and an overview of the clinical and epidemiological information that is known about rhabdomyosarcoma. Members of the Task Force requested DHHS clarify whether a suspected cancer cluster in Waycross, GA had been determined to be a cluster. DES and EPA provided [updates](#) on well testing around Coakley Landfill, which revealed no exceedances of NH/EPA standards for PFCs or 1,4 Dioxane. The Task Force determined that a subcommittee focused on Coakley Landfill be chaired by Mindi Messmer for the purpose of developing recommendations to ensure the protection of residents in the area around Coakley.

On [October 12th](#), the Task Force convened to hear presentations from DES on air monitoring around Schiller Station and received reports related to [SB93 fuel](#) and Elliot, ME [Air Quality Monitoring Study](#). The Task Force reviewed a [letter](#) from the Portsmouth Naval Shipyard regarding their monitoring protocols and discussed whether any further action would be prudent.

The Task Force met on November 9th to hear the recommendations of the Coakley Subcommittee (Addendum B) and to hear comments from the Coakley Group and Rye Water District. A number of people shared their concerns about a development in Greenland that has private wells and their interest in continuing to have the Task Force work to ensure they are protected from contaminants in their water and in Berry's Brook. DHHS provided an update on the cluster investigation that included outreach underway in New Hampshire and planning with Massachusetts, Maine, and Vermont for further outreach. The Task Force agreed to convene on November 16th to codify a set of recommendations for future activities around the DHHS cancer cluster investigation and environmental concerns in the Seacoast. Those recommendations are detailed below.

Recommendations of the Task Force

Seacoast Cancer Cluster Investigation and Department of Health and Human Services

- 1) DHHS will complete information gathering, analysis and develop a report to share with the NH Legislature's Health and Human Services Oversight Committee.
- 2) DHHS will convene the Community Advisory Group review the final report and plan for further communication of the results.
- 3) DHHS will continue to proactively monitor for additional cases of rhabdomyosarcoma and pleuropulmonary Blastoma (PPB) and will share findings where possible.
- 4) DHHS will continue to work with the CDC, academic centers studying RMS and PPB and any other states where RMS or PPB clusters are identified in the future.
- 5) DHHS will review data in NH Cancer Registry for any adult or pediatric cancer cases from 1995 (when registry data are reliable) to 2001 to identify any cases from the 10-town area that may warrant outreach.
- 6) Encourage an appropriate institution to undertake an RMS and PPB cancer study to assess potential environmental triggers using all newly identified cases and information from other areas where higher incidences of RMS and/or PPB cases are identified.

Schiller Power Station

- 1) Identify sites with disposal of ash from Schiller.
- 2) Determine source of coal in order to identify radioactive content.
- 3) Assess ash for heavy metals (cadmium), dioxin and radioactive components such as cesium 137.
- 4) Expand investigation to cover oil and gas power plants in Newington north of Schiller.

Seabrook Station

- 1) Review materials from Seabrook Station sent by email.
- 2) Consider site visit to Seabrook Station.
- 3) Consider subcommittee to review protocols for ongoing monitoring, historical, scheduled or routine releases of nuclear radiation, and safety protocols and practice in routine setting and in response to an accident.

Portsmouth Naval Shipyard

- 1) Consider site visit to Portsmouth Naval Shipyard.
- 2) Consider subcommittee to review materials and protocols for ongoing monitoring, historical, scheduled or routine releases of nuclear radiation, and safety protocols and practice in routine setting or in response to an accident.

Coakley Landfill

- 1) Produced subcommittee recommendations (Addendum B).
- 2) The chemical composition of the incinerator ash waste placed in Coakley Landfill and Rye Landfill is largely unknown. A sample of the ash should be collected and analyzed for a full suite of parameters, including but not limited to, semi-volatile organic compounds, dioxins, furans, metals and radionuclides.
- 3) Require DES to update current drinking water standard with justification for levels.
- 4) Request EPA and DES response to Subcommittee recommendations

Pease Air Force Base

- 1) Continue collaboration with existing citizen and government groups investigating and remedying water contamination at Pease.

Recommendations for Legislative Action:

- 1) Request the Health and Human Services Oversight Commission to create a Cancer Cluster Subcommittee.
- 2) Create a commission for either water quality and health assessment or specifically monitoring, investigation and oversight of the Coakley Landfill and two other Rye landfills.

ADDENDUM A

Governor's Task Force for Seacoast Cancer Cluster Investigation Invitee List

Representative David Borden*	District 24	david@davidbordennh.com
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*Member of the Community Advisory Group for the Cancer Cluster Investigation

Addendum B. Report of subcommittee to task force

Introduction

On September 14, 2016 Chairman Rep. Tom Sherman, MD of the Governors Task Force to Investigate the Seacoast Pediatric Cancer Cluster, appointed Task Force member, Mindi Messmer, a Rye resident and Environmental Scientist to chair a subcommittee to focus on Coakley Landfill. Senator Nancy Stiles, Michael Wimsatt, Director of the Waste Management Division of the New Hampshire Department of Environmental Services, and Representative David Borden (Rye and New Castle) were appointed to the Subcommittee.

The goal of the subcommittee is to review the evidence of any potential imminent threats posed by Coakley Landfill to the environment and to recommend specific steps required to address and threats to the Governor's Task Force and ultimately to governor Hassan.

The Subcommittee met in public meetings on October 13th, 20th, 26th and 31st, in the Rye Junior High School. On October 20th subcommittee members joined a site visit to the Coakley Landfill along the abandoned railroad track bisecting the Ground Management Zone.

The committee heard comments from several community residents, the US Environmental Protection Agency (EPA), the NH Department of Environmental Services (DES), the US Geological Survey (USGS), the Rye Water District and from the Coakley Landfill Group.

Committee members met with landowners who lived near the site during the period of disposal and capping.

Committee members attended a tour of the Coakley Landfill conducted by the Coakley Landfill Group.

Committee members have begun a comprehensive review of the history and documentation of the landfill.

Background

Based on historical information, the Coakley Landfill property was mined for sand and gravel and was a rock quarry as early as 1969. Up to 20 feet of material had been excavated from the site by 1971.

In March 1971, the town of North Hampton requested approval to use the Coakley property as a landfill. In April 1971, a permit was granted to the town of North Hampton to operate a landfill.

In January 1972, an agreement was made between North Hampton, Portsmouth and Coakley Landfill outlining responsibilities for operation of the landfill. Other users included the towns of

New Castle, Newington and Pease Air Force Base (Pease). The agreement with Pease prohibited the disposal of ordinance and other materials.

The Record of Decision (ROD) for OU1 issued in 1990 specified remedial plans which included a cap and extraction and treatment of groundwater. Correspondence dated April 2, 1987 from Michael J. Robinette of DES entitled "Coakley Landfill – Remedial Investigation Status Report/Preliminary Screening of Technologies, Jan. 27, 1987" commented that a "5. A liner for the dump is not addressed." As of February [136 N.H. 407] 1990, the EPA's proposed "Remedial Action" or "Preferred Alternative," included "placing a cap over the landfill to minimize the migration of contaminants from the landfill; and "collection and treatment of groundwater to remove and prevent further migration of contaminants " This containment and cleanup plan, bearing an estimated cost of \$20,200,000, represents a compromise between less expensive, less environmentally protective plans and more costly, more protective ones." Clearly, installing controls on migration of groundwater was originally planned.

When the ROD for OU2 was issued in 1994, the remedial approach for Coakley included a cap and monitored natural attenuation (no active groundwater control). The remedy included institutional controls (ICs) [controls on groundwater use], natural attenuation and groundwater monitoring. The active groundwater pump and treat portion of the 1990 ROD was not implemented. "The key element of this alternative is based on the ability of the groundwater contamination to naturally attenuate, which the EPA is projecting to take roughly 11 years. This compares to the estimated five to 10 years it would take to actively pump and treat the groundwater until cleanup levels are met." (USEPA, 1994). In 1999 the USEPA approved the removal of groundwater extraction and treatment from the remedial objectives (USEPA ESD, 1999).

In 1992, USEPA and NHDES filed an action under CERCLA (Superfund) against a group of businesses and municipalities that were allegedly responsible for the contamination (later Coakley Landfill Group [CLG]). In March 1992, CLG signed a Consent Decree with NHDES and USEPA requiring CLG to implement the remedial action for the site that shifted the "lead" from USEPA to CLG for the implementation. USEPA and NHDES have input into the process but CLG leads. The CLG is comprised of City of Portsmouth, North Hampton, Hampton, the US Air Force, US Navy and many businesses.

In 2016, the State of NH determined that two pediatric cancer clusters were identified in the 5-town area. Area residents became concerned that there was an environmental trigger responsible for the cancers.

When the Task Force began looking at Coakley Landfill, Chairman Tom Sherman requested that monitoring wells be sampled for PFCs since Pease Air Force Base is a primary PRP and PFCs were an emerging contaminant responsible for shutting down the Haven Well in Portsmouth.

In September 2016, CLG, USEPA and NHDES agreed with members of the Governor's Task Force that groundwater may flow from Coakley Landfill to the northeast, east and southeast. It was also brought to their attention that historically there had been many drinking water wells

recorded in these areas and that residents were still drinking water from private wells. NHDES and EPA agreed to send postcards to residents to identify private well use in this area. Approximately 51 drinking water wells have been reported to date.

However, the NHDES and EPA have agreed to conduct a more extensive survey for the potential for additional wells in this area. If found, EPA and NHDES have stated that they will test a subset of additional wells identified.

On September 26, 2016 USEPA issued the Fourth Five-Year Report for Coakley (<https://www3.epa.gov/region1/superfund/sites/coakley/448390.pdf>).

Subcommittee Findings

The following sections summarize the Subcommittee findings gained through inquiry process.

I. Cancer

There is no proven link between the pediatric cancer cluster and the Coakley Landfill. Determining a possible link was not a goal of the Subcommittee.

However, during the last Subcommittee meeting on October 31, 2016 a former resident of Greenland communicated that his son died from rhabdomyosarcoma at the age of 42. As a young boy aged approximately 12 to 15, his son had dug in the dirt along the railroad tracks every day after school.

II. Hydrogeologic Information

During the course of the Subcommittee inquiry, members became aware that groundwater flows radially from Coakley Landfill. The Subcommittee requested that DES inquire whether residents of Rye and North Hampton used private drinking water wells. This request was based on review of current and historical groundwater flow data and observations obtained from a historical map showing numerous private wells in the area historically (Figure 1).

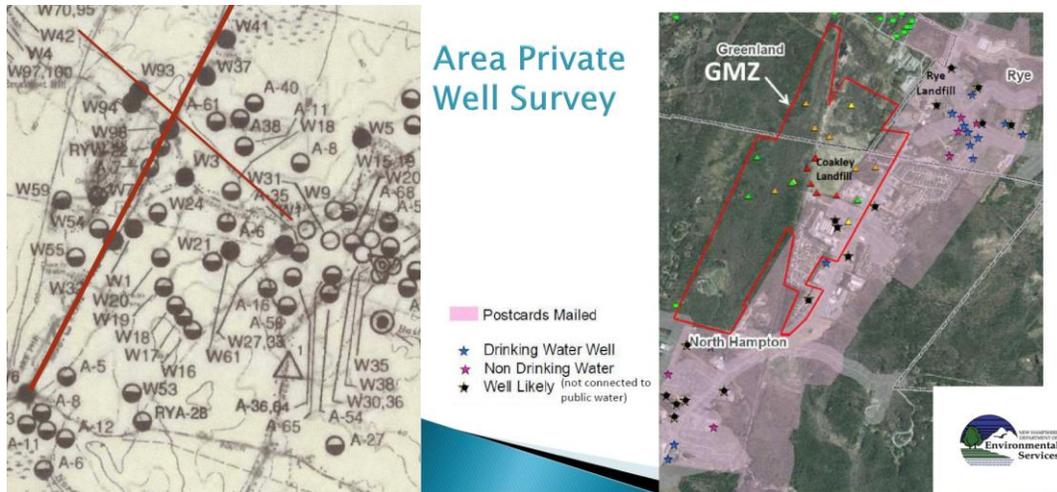


Figure 1. (left) USGS publication map showing historical drinking water wells in Rye and North Hampton. Red lines indicate location of Breakfast Hill/Washington Roads and Lafayette Road oriented northeast southwest. Figure 2. (right) shows current understanding of existing water supply wells within the postcard survey area.

As of the date of this report, DES has identified 36 private and commercial wells used to supply drinking water in Rye and North Hampton (Figure 2). Fourteen [14] wells identified in postcard survey for Rye; thirteen [13] have been sampled and one refused to be sampled. Five [5] additional potential wells identified in the crosscheck with Rye Water District billing records; will offer sample collection pending outcome additional reconnaissance efforts. In North Hampton (Six [6] wells identified in postcard survey for North Hampton; four [4] have been sampled and two [2] either refused or were none responsive to request to sample. Eleven [11] additional potential wells identified in the crosscheck with Aquarion billing records; will offer sampling pending outcome of additional reconnaissance efforts. DES initiated the sampling program in early November to test private wells for 1,4-dioxane, PFCs and VOCs. Results are pending in mid to late November 2016.

The Subcommittee also learned that the bedrock beneath the Coakley Landfill and adjacent areas is very porous and permits groundwater flow and thereby contamination migration readily (see Figure 3).



Figure 3. Photograph of bedrock outcrop in Rye, NH showing fractured and porous bedrock.

Additionally, Coakley Landfill sits on a topographic high and groundwater flow from the landfill is radial (in all directions) to Rye, North Hampton and Greenland (see Figure 4 and 5).

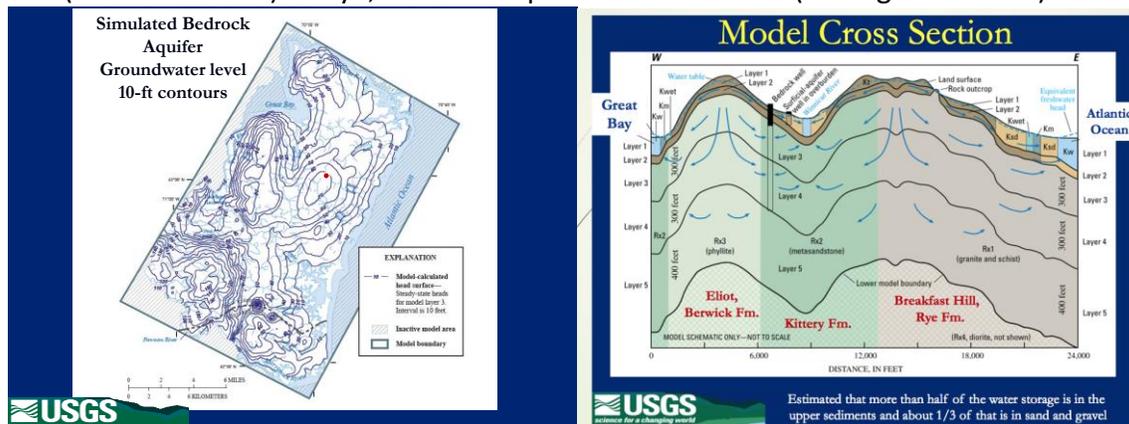


Figure 4. (left) USGS Simulated Bedrock Aquifer. Red dot indicates approximate location of Coakley Landfill. Figure 5. (right) shows groundwater flow laterally away from Coakley in all directions depending on hydraulic conductivity.

III. Waste/History/Exposure

Municipal waste haulers, industrial waste haulers, construction firms, industries, and private citizens all transported wastes to the Coakley Landfill during its operation. According to historical records, approximately 120 tons per day of raw refuse was dumped at Coakley Landfill between 1971 and July 1982. Between July 1982 and July 1985 the landfill reportedly only accepted approximately 90 tons per day of incinerator ash generated from Pease as part of the waste to energy program with the City Portsmouth.

However, the historical record contains many statements from different individuals who say they witnessed illegal dumping at Coakley Landfill. Accounts include dumping of drummed and un-drummed liquid solvent wastes brought from Pease Air Force Base and other locations in tanker trucks and dumped at Coakley Landfill during the day and during the night. According to a "Memorandum in Support of Municipal Good Faith Offer" dated June 4, 1991 the state approved the landfill for "unusual wastes from federal facilities such as the Portsmouth Navy Yard and Pease Air Force Base". According to the document, this approval indicates that Coakley was "an appropriate disposal facility, even for potentially hazardous wastes."

The "Memorandum in Support of Municipal Good Faith Offer" dated June 4, 1991 lists of 42 potentially responsible parties (PRPs), summary of waste manifests which specified the disposal of drums and hazardous materials that were disposed at Coakley Landfill. The document also requested EPA to send notice letters to 70 additional PRPs based on Coakley disposal records.

Oil spill debris from the cleanup of oil tanker spills and oil barges were placed in the northeast section of the landfill adjacent to Breakfast Hill Road between 1978 and 1979.

A. Historical Aerial Photographs

Aerial photos dated April 1973 indicate that filling operations were being conducted in the southwest area of the landfill with three trenches visible containing standing liquid (Figure 6).



Figure 6. aerial photograph from 1973.

Stockpiled drums and a tanker trailer are visible near the office building located along Breakfast Hill Road on aerial photographs from 1984 (see Figure 7). Numerous leachate trenches are also visible along the western edge of the landfill draining to the north and parallel to the railroad tracks west of the landfill on the 1984 aerial photographs (see Figure 7).





Figure 7. Aerial photos from 1984.

B. History of Complaints

The first complaint from a resident was recorded in October 1979 who complained of leachate breakouts on the western side of the landfill.

In 1983, a resident from Lafayette Terrace complained to the State of New Hampshire about the quality of his drinking water. Subsequent sampling of his and other drinking water wells contained volatile organic compounds (VOCs) contaminants from the Coakley Landfill. Later in 1983 the residents were connected to North Hampton water supply.

A state soil engineer documented that he experienced “swelling” on the back of his hand accompanied by a rash like irritation while walking on the railroad tracks adjacent to the western side of the landfill in a memo dated August 25, 1983. He stated that a similar observation was communicated to him by several residents. The swelling and rash eradicated in a short period of time and was followed by several hours followed by an extended period of irritation. He noted a “methane-like” odor.

IV. Migration

The migration time frames and pathways for site contaminants may significantly differ based on release mechanisms and chemical characteristics. Waste liquids were reportedly historically placed in trenches, which in some cases may have been directly on top or in the upper surfaces of the bedrock, located along the southwestern, western and eastern sides of the landfill. Other wastes may have been deposited in drums or containers. Additionally, incinerator ash from the waste to energy program was deposited on top of the landfill materials. The

migration rates of these materials will vary greatly depending on their exposure to infiltration and whether or not they were contained and their ability to dissolve. This may result in successive releases to groundwater and surface water.

Groundwater flow and contaminant migration are likely to travel through preferential pathways such as fractures or bedding planes with increased permeability (see Figures 8 and 9). A large fracture is oriented approximately northeast-southwest and parallel to Berry’s Brook and Little River located to the west of the landfill. Another set of fractures are oriented approximately northwest-southeast. Bailey Brook, which is connected to the Garland Well in Rye, is oriented along a northwest-southeast fracture (see Figure 9).

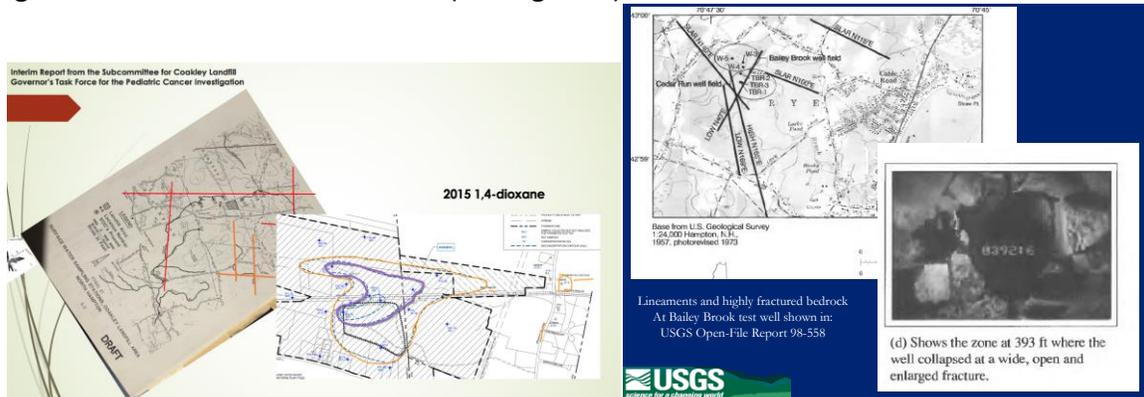


Figure 8. (left) bedrock fractures identified in the Coakley Landfill area and 1,4-dioxane concentration contour plan. Figure 9. (right) shows fractures identified in Bailey Brook area during installation of Rye Water District wells.

Groundwater flow to the west is bifurcated when it reaches the headlands of Berry’s Brook, Little River and Norton Brook. This bifurcation is likely to be a result of enhanced permeability along a fracture influenced by seasonal groundwater withdrawal by Breakfast Hill Golf club to the northwest and possibly Aquarian Water to the southwest. Breakfast Hill Golf Club withdraws large volumes of water seasonally from an overburden well located northwest of Coakley Landfill. Withdrawal rates have ranged up to 140,000 gallons per day historically. While this is an overburden well, groundwater contribution to this well is likely to originate in part from the upper portions of the bedrock.

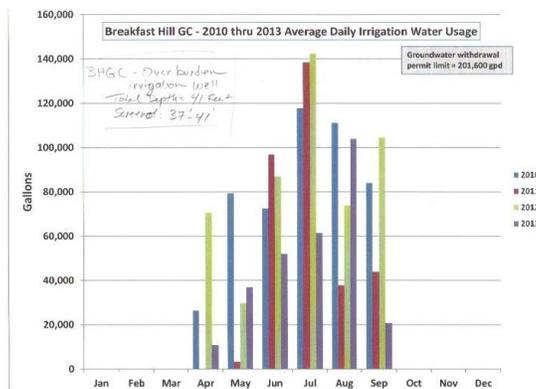


Figure 10. Breakfast Hill Golf pumping volumes 2010 to 2013.

Levels of 1,4-dioxane in groundwater within the groundwater management zone (GMZ) exceed DES regulatory criteria since 2009. The lateral extent of 1,4-dioxane concentrations in bedrock groundwater expanded laterally between 2013 and 2015 (see Figures 13 and 14). Additionally, the centroid of the plume representing the highest concentrations also expanded between 2013 and 2015 and the concentration increased to 0.74 ug/L in the Breakfast Hill Golf Clubhouse sample.

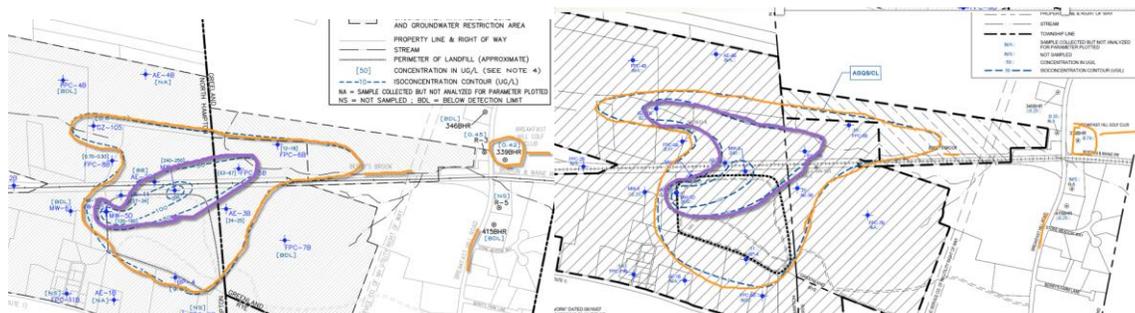


Figure 11. (left) 1,4-Dioxane concentrations in bedrock groundwater wells in 2013 and in 2015 (Figure 12, right).

PFCs and 1,4-dioxane were also detected at levels below regulatory criteria in drinking water supply wells located in the clubhouse of Breakfast Hill Golf Club 925 ppt), a residence on Breakfast Hill Road at 8.1 ppt and are therefore migrating outside of the GMZ. The EPA Five Year Review (2016) states that “contaminants such as 1,4-dioxane and some metals may be migrating toward residential wells.”

The current remedial measure relies on the ability of site contaminants to naturally attenuate. PFCs and 1,4-dioxane are resistant to biodegradation, therefore, the current remedial measure is not protective or effective in stopping migration of contaminated water.

V. Drinking Water Protection

In addition to compounds detected historically, two types of compounds that are resistant to breaking down naturally in groundwater have been detected in monitoring wells located on the Coakley Landfill and wells located on adjacent properties northwest of Coakley Landfill. These compounds include 1,4-dioxane and perfluorinated chemicals (PFCs).

The DES criteria for 1,4-dioxane is 3 ug/L which is an order of magnitude higher than the criteria Massachusetts has implemented for the same compound. Therefore, the Subcommittee questions whether or not these criteria are protective enough. Concentrations in private drinking water outside of the GMZ exceed Massachusetts’ criteria.

Levels of PFCs were detected above EPA criteria of 70 parts per trillion (ppt) in 11 wells located within the GMZ (Figure 13).

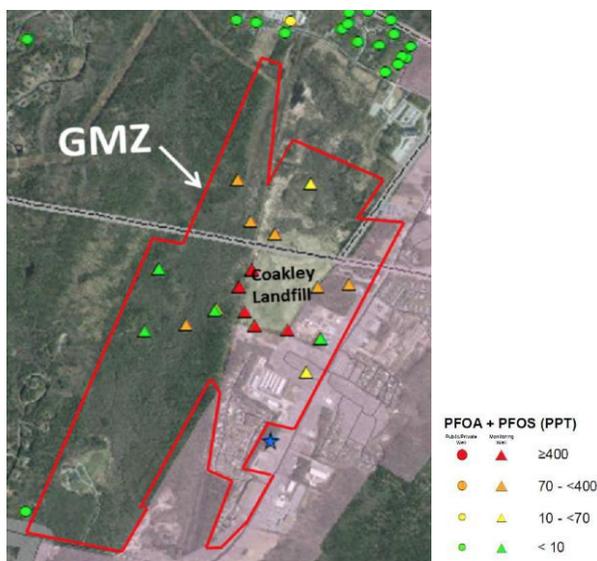


Figure 13 PFCs detected in groundwater samples.

The criteria for PFCs in drinking water have been adjusted downward recently in many states and for EPA. These reductions in acceptable limits are the results of new studies of the health effects of PFCs. EPA has proposed a 70 ppt threshold which DES has proposed to adopt. However, states like New Jersey, Vermont and state representatives in Pennsylvania have proposed much lower standards including 14 ppt, 20 ppt and non-detect, respectively. The lower standards are based on the inclusion of toxicology studies that indicate damage to mammary development and prenatal development while the EPA has rejected use of this data to conclude a higher standard at 70 ppt. Therefore, the Subcommittee questions whether or not the 70 ppt criteria are protective enough for drinking water in New Hampshire. PFC concentrations in private drinking water outside of the GMZ exceed Vermont and proposed NJDEP and PA criteria.

The EPA Five Year Review (2016) concludes that proposed new development in Greenland along Breakfast Hill Road should not be allowed to install private drinking water wells due to the “strong potential for these wells to cause groundwater contaminant migration from the Site to the proposed residential development.” Since that time, the developer and the City of Portsmouth have established an agreement to provide water from the Town of Rye to the new development.

Several residents of Stone Meadow and Falls Way developments in Greenland discussed their opinions about the need to provide drinking water to residents at several Subcommittee meetings. Written comments were also submitted. EPA has stated in a Subcommittee meeting that while they agree that residents in Stone Meadow should receive supplied water, they have no ability to enforce the PRPs to do so.

Members of the Task Force reported concerns relating to the potential for migration toward the Town of Rye drinking water supply wells located off Garland Road. PFCs were detected in

two drinking water supply wells in the Town of Rye in samples collected in April 2016. A total of 2 parts per trillion (ppt) was detected in the Cedar Run well and 12 ppt in the Garland well.

VI. Other Landfills

During the course of the Subcommittee inquiry, members became aware of two additional unlined landfills in Rye. These are the Breakfast Hill Landfill (or Rye Landfill) at the corner of Lafayette Road and Breakfast Hill Road and the Grove Road Landfill. Both landfills are actively being monitored in accordance with their Groundwater Management Permits issued by DES. The landfill monitoring has been historically conducted by CMA Engineers of Portsmouth, New Hampshire.

The Rye Landfill reportedly took in mostly municipal solid waste however, during the time period that Coakley Landfill and Jones Avenue Landfill were closed Rye Landfill took an unknown volume of incinerator ash from the Pease waste to energy program. Groundwater flows to the east from the landfill toward several residences that still use private drinking water wells.

The Grove Road Landfill is located off Grove Road and is in close proximity to the Garland Well located in Rye that is one of several wells that supply drinking water for the Town of Rye.

Data Gaps

There is much that is currently unknown about the landfill such as the nature and vertical and lateral extent of known contaminants in groundwater. Additionally, the migration time frames and pathways of contaminants in groundwater are not well understood. EPA concludes in the Five-Year Report (2016) that data gaps preclude the ability to determine the protectiveness of the remedial measure. Data gaps include, among others, the need to identify the extent of contamination to the northwest, southwest and east (Figure 14).

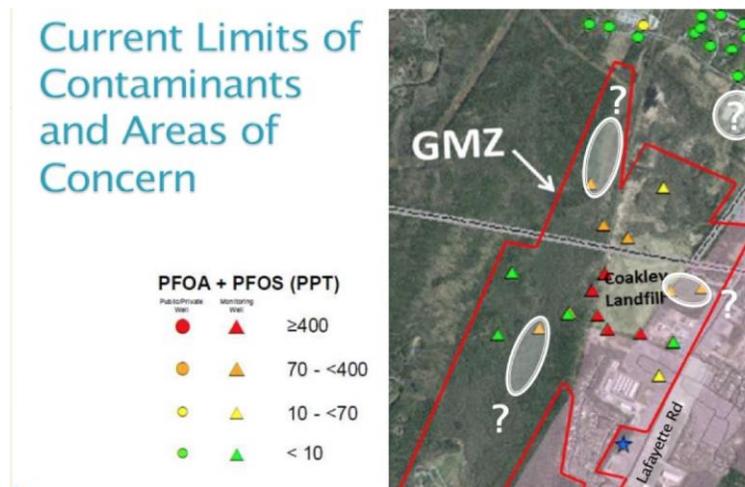


Figure 14 Areas where extent of contamination is unknown.

PFCs have been detected up to 12 ppt in the Garland well and 2 ppt in the Cedar Run well which supply drinking water to the Town of Rye. It is unknown whether the results are repeatable and if seasonal drought conditions have affected the concentrations of PFCs detected in these wells.

While some private wells adjacent to the landfill have been tested for known contaminants, the risk of contamination of private wells over time is unknown. The effect of seasonal drought conditions and increased demand on the aquifer are also unknown.

While EPA concludes in the Five Year Review (2016) that residential wells (likely referring to those in Greenland) should be sampled twice per year there are currently no plans to implement the sampling program. Therefore, it is unknown if seasonal fluctuations or drought conditions have affected the concentrations of emerging contaminants or others in these private drinking water wells.

The extent of contaminants in surface water and sediment in four surface water bodies that originate at the Coakley Landfill that flow into the towns of North Hampton, Rye, Portsmouth and Greenland (Little River, Berry's Brook, Norton Brook and Bailey's Brook). According to a NH DES memo from Timothy Drew, Bureau Chief, dated October 10, 1985 "since the groundwater and surface water appear to be in such close communication along the north and west perimeter of the Coakley site ... the potential for significant adverse environmental and public health impacts to the streams and ponds off-site." EPA concludes in the Five Year Report that conditions within the landfill have mobilized arsenic and manganese in the groundwater (EPA, 2016) however, further characterization of surface water and sediment is not currently planned.

The possibility exists that other previously unrecognized contaminants such as dioxins, that are typically associated with waste to energy incinerator ash may be present in site groundwater. The chemical composition of the incinerator ash is unknown. Additionally, it is possible that historically Agent Orange or radioactive materials by Pease, Portsmouth Naval Shipyard or hospital incinerator wastes were deposited at Coakley Landfill. On October 31, 2016 the Subcommittee chair requested a query from the DES for historical dioxin sample results from the Coakley Landfill database. The DES in turn requested the information from Coakley Landfill Group (CLG). To date the Subcommittee has received no response from CLG.

Several members of the Task Force, Subcommittee and the public have asked for the breakdown of responsibility of the PRP group. In a Subcommittee meeting held on October 13, 2016 Peter Britz, of the City of Portsmouth, agreed to provide the Subcommittee with a copy of the Consent Decrees and the PRP financial responsibility. On October 26, 2016 and November 9, 2016 when asked again for the documents, Peter Britz stated that the Subcommittee and/or Task Force would have to submit a formal written request to the CLG requesting the information and CLG could not provide it since it includes information regarding private PRPs. This information may be helpful in determining how much of particular types of unknown materials may have been placed in the landfill.

Subcommittee Recommendations

DRINKING WATER PROTECTION

A. Sample Drinking water wells

- a. Within 1-mile radius of the Groundwater Management Zone (GMZ).
- b. As/if emerging contaminants are identified specify standardized analysis in drinking water.
- c. Proactive monitoring – seasonal evaluation. Perhaps at a minimum quarterly for 1,4-dioxane and perfluorinated chemicals (PFCs).

B. Drinking Water to Residents

- a. Proactive Approach (i.e., Saint Gobain, Manchester, NH) – supply bottled water to residents where emerging contaminants or other contaminants are detected as a protective measure.
- b. Provide access to public drinking water as soon as possible by extending water lines to areas where emerging contaminants or other contaminants detected within the GMZ are detected so that residents can connect to public water.

C. Mandate Rye Community Water Supply Testing (Rye Water District Town Wells and Aquarian Wells)

- a. **Twice per year - Seasonal**
 - i. PFCs
 - ii. 1,4-Dioxane
 - iii. Volatile organic compounds (VOCs) plus tentatively identified compounds (TICs)

SLOW/MONITOR ASSESS THE MIGRATION

A. Install sentinel wells between Coakley Landfill and the Wellhead Protection Zone - Rye

B. Permanently implement contaminant assessment and limitations on groundwater withdrawal within 1-mile radius of the GMZ or which may affect contaminant migration.

Install treatment facility if emerging contaminants or other contaminants are detected above criteria.

C. Encourage regulators to implement Institutional Controls (ICs) on all new wells/withdrawals within 1-mile radius of the GMZ.

D. Reassess feasibility of remedial approach

- a. Encourage the United States Environmental Protection Agency (USEPA) to reassess monitored natural attenuation (MNA) for emerging contaminants.
- b. Assess whether remedial approach should be pick up and line.
- c. Install active groundwater control measures.

- E. **Regional Groundwater Model Adaptation for Local Use**
 - a. Model localized groundwater flow.
 - b. Model advective transport of 1,4-dioxane, PFCs and other contaminants, as appropriate.

ASSESSING THE PROBLEM

- A. **Further Site Characterization/Conceptual Model Re-Evaluation**
 - a. Re-examine historical records at USEPA and New Hampshire Department of Environmental Services (NHDES).
 - b. Assess whether current testing parameters are sufficient.
 - c. Assess nature and extent of contaminants laterally and vertically.
- B. **Breakfast Hill and Grove Road Landfills in Rye, New Hampshire**
 - a. Sample all existing wells for 1,4-dioxane and PFCs immediately.
 - b. Add these compounds to the sample parameter list for regular monitoring.
 - c. Assess need for remediation.
 - i. Pick up and line
 - ii. Groundwater Control
- C. **Assess contaminants over full length of surface water bodies within the GMZ and flowing away from the GMZ, including but not limited to, 1) Berry's Brook, 2) Little River, 3) Norton Brook, and 4) Bailey's Brook for the following:**
 - a. Metals
 - b. VOCs
 - c. 1,4-Dioxane
 - d. PFCs
 - e. Other potential contaminants identified as part of activities conducted under "Assessing the Problem" (A) above.
- D. **Conduct an environmental assessment on any property abutting the GMZ prior to new construction.**

PUBLIC HEALTH ASSESSMENT

- A. **Forward Cancer Cluster Monitoring in seacoast adults and children.**
- B. **Develop and participate in a rhabdomyosarcoma (RMS) and pleuropulmonary blastoma (PPB) cancer study to assess potential environmental triggers using information from other areas where higher incidences of RMS and/or PPB cases are identified.**

FUTURE COMMITTEE/REGULATORY COORDINATION

- A. Consent Decree; provide financial solvency and PRP responsibility to the Task Force.**
- B. Recommend legislative action to implement Ongoing Coakley Oversight Commission.**
- C. Request that USEPA implement public comment periods upon issuance of annual and 5-year reports.**
- D. Provide definitive schedules for all items to the oversight commission and 5-town area on a quarterly basis.**
 - a. Implement Tasks as specified.
 - b. Provide budget updates after (A, above).
- E. If emerging contaminants or other contaminants are detected outside of the GMZ that are also detected within the GMZ conduct a 5-year review annually for three years.**