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To: The Effingham Planning Board March 27, 2022

With Regard to: Meena application for a new gas station

My name is Bob Newton. I am a professor emeritus of geosciences at Smith College in Northampton Massachusetts where I taught courses in groundwater hydrology and geomorphology (among others). I have unique knowledge of the Ossipee Aquifer at the site of the proposed gas station as I mapped the surficial geology of the Ossipee Lake 15minute quadrangle for the State of New Hampshire, published in 1974 (Newton, 1974). Since that time, I have been involved in a number of other groundwater studies of the Ossipee Aquifer done in cooperation with the Green Mountain Conservation Group. I have also served over 20 years on the Barnes Aquifer Protection Advisory Committee (BAPAC) in western Massachusetts. This committee advised Planning Boards in the cities of Holyoke, Westfield, Easthampton, and the town of Southampton on projects impacting the Barnes Aquifer. I have literally reviewed hundreds of plans for projects built on this highly productive aquifer. I also recently served a 3year term as the director for the Smith College Center for the Environment, Ecological Design and Sustainability (CEEDS). These qualifications give me unique insight for evaluating the Meena application. I wrote to you in January concerning the extreme sensitivity to groundwater contamination of the Meena site. I write today to comment on the specifics of the Meena plan that has been submitted to the Effingham Planning Board.

Since the Meena site, located in an old gravel pit, is so vulnerable to contamination, it is absolutely critical that its design conform to the highest level of aquifer protection. The submitted Errosion (sic) and Stormwater Management Plan is completely inadequate and shows a fundamental misunderstanding of the stormwater issues associated with a gas station. The plan to collect untreated stormwater and funnel it into the NH DOT infiltration basin is a recipe for disaster. The floor of the infiltration basin is just above the water table and the lack of a significant unsaturated (vadose) zone minimizes any potential adsorption of contaminants that could occur before entering the groundwater. More importantly it is critical that no water runoff this site without undergoing treatment to remove oil and potentially contaminated sediment. In this hydrogeologic situation all parking lots for any purpose (including gas stations) should be curbed so that all stormwater can be run through a hydrodynamic separator (figure 1) before leaving the site. The hydrodynamic separator collects hydrocarbons and contaminated sediments that are washed off the pavement by the stormwater, preventing them from leaving the site. The curbs serve two purposes, they contain stormwater so that it can be collected and moved through the hydrodynamic separator, and they prevent cars from parking on unpaved areas. Oil and gas leaks from parked cars can be a significant source of groundwater contamination and cars have been parked on unpaved areas at the site in the past (figure 2). The use of curbs coupled with a hydrodynamic separator would ensure that all stormwater would be treated before exiting the site. In addition, an emergency shutoff valve should be installed at the outflow of the separator in order to contain contamination in the event of a major spill. Operation of the valve should be explained in the emergency spill plan. It can be argued, that

at this site, no outflow should be allowed from the stormwater runoff system even with a hydrodynamic separator and that all outflow should be captured and transported from the site.

The presence of a Public Water Supply well (#738030) located within approximately 180ft of the proposed UST system is a major problem. Although the submitted Site Plan shows the well and two circles around it, it does not indicate which is the Sanitary Protective Radius. Nowhere in the plan is the Sanitary Protective Radius discussed nor is there any plan for following the required operational restrictions within that zone. For example, the dumpsters are located inside of the 125ft radii and they are specifically prohibited within the Sanitary Protective Zone.

The location of this well within 180ft of the UST system is not acceptable. It should be noted here that, at no time in the past, has the registered PWS well #738030 operated with gasoline USTs in the ground at the site. The old Boyles Market USTs were removed in October of 2015. The well was registered as a public water supply in November of 2015. Installing new gasoline bearing USTs within 500ft of a public water supply well is specifically prohibited by:

New Hampshire ENV-Or 407.06 *UST System Design Requirements (e)*

> (e) At any new UST site at which installation of a UST system is proposed on or after February 2, 2005, no UST system shall be installed closer than the applicable distance specified in Table 407-1:

Table 407-1: Minimum Distance from UST System to Water Supply Wells

Contents of UST	Public Water Supply Well	Non-Public Water Supply Well
Gasoline	at least 500 feet	at least 250 feet
All other regulated substances	at least 400 feet	at least 75 feet

But more importantly, given the hydrogeology at this site, it would simply be unconscionable to place gasoline tanks where they could threaten the health and safety of people drinking the groundwater. Some of the constituents of gasoline like benzene, ethylbenzene, toluene, and xylene (BETEX) are known carcinogens. In fact, a study in New Hampshire in the 1980's showed elevated leukemia deaths for gas station attendants and mechanics (Schwartz, 1987). It has also been shown that children are even more susceptible to gasoline contamination (Irigaray et al., 2007). This coupled with the fact that there is no program for routine testing of the wells in this area means that it is likely that the first indication that there was a contamination problem would be when people started getting sick. The risk of this happening far outweighs any other considerations.

I would also note that the Effingham Planning Board should not rely on NH DES to evaluate the risk associated with this project. In granting the permits to install tanks, DES does not do any evaluation of the hydrogeologic conditions at the site. They treat all sites the same, whether they are underlain by nonpermeable clay in an area far from an aquifer or are in ultra-permeable gravel on top of a major aquifer. They rely on you to do that through the local site plan review process. The issues are clearly addressed in the attached Environment Fact Sheet published by DES in 2020.

After careful review of the documents submitted for this project, I urge you to deny it. It is poorly designed and provides no protection for groundwater resources. The risk to public health is simply too high. In my last letter (January 27) I asked for time to present my findings at one of the public

hearings for this project. I have yet to receive a response to that request. I ask again that you grant me time to make a formal presentation with slides (PowerPoint) using a computer projection system.

Sincerely,

Robert M. Newton PhD
Professor emeritus, Smith College

Enclosure (1)

References Cited

Irigaray P., Newby, J.A., Clapp, R., Hardell, L., Howard, V., Matagnier, L., Epstein, S., Belpomme, D., 2007, Lifestyle-related factors and environmental agents causing cancer: An overview. Biomedicine & Pharmacotherapy. v61(10) p. 640–658.

Newton, R.M., 1974, *Surficial geology of the Ossipee Lake Quadrangle, New Hampshire*: New Hampshire Department of Resources and Economic Development, Concord, New Hampshire, 52 p.

Schwartz E., 1987, Proportionate mortality ratio analysis of automobile mechanics and gasoline service station workers in New Hampshire. American Journal of Industrial Medicine. V.12(1) p. 91–99.

Figure 1. Typical design of a hydrodynamic separator that captures hydrocarbons and sediment from stormwater.

Figure 2. Orthophoto of Boyles Market taken in 2015. Note the 4 vehicles parked in non-paved areas.

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Preventing Groundwater Contamination at Gas Stations — What Municipalities and Water Suppliers Can Do

Generations of automobile drivers have become accustomed to finding gas stations conveniently located along busy roads and highways, at intersections, and in village centers, to support our automobile-dependent lifestyles. As the environmental risks associated with gas stations – particularly the risk of gasoline leaked from underground storage tank (UST) systems – have become increasingly clear, vast improvements have been made in the design, construction and operation of UST systems. Unfortunately, federal and state regulators and UST system designers and installers have *not* succeeded in engineering *all* of the groundwater contamination risk out of these systems. A study by the U.S. Geological Survey, which randomly sampled 225 water supply wells in Rockingham County in 2003, detected the gasoline additive MtBE in 40% of public wells, and found a correlation between MtBE concentration and proximity to USTs.[1]

The main sources of concern with respect to double-walled USTs and groundwater contamination are vapor releases from UST facilities and small spills of fuel that routinely occur when fuel is being dispensed to vehicles. With a view to minimizing the impacts of those releases, the New Hampshire Department of Environmental Services (NHDES) maintains technical standards for the siting, design and installation of UST systems, and an active inspection program to oversee their operation and maintenance. Unfortunately, NHDES does not have the resources to ensure that all UST systems comply with daily operation and maintenance requirements once they are installed, let alone ensure that these systems are leak-free.

In addition to vapor releases and chronic small spills, larger spills sometimes take place during the process of fueling vehicles and portable containers. Well-designed and operated gas stations incorporate a number of measures to minimize the groundwater contamination risk from routine and accidental spills. However, given the limits of NHDES' oversight and the state of the art spill prevention technology, local officials need to ensure that the appropriate restrictions and oversight are in place on the local level, to the extent that communities want to ensure protection of their groundwater resources.

This fact sheet outlines a number of steps that municipal officials and water suppliers should consider taking to minimize the groundwater contamination risk of gas stations.

1 Ayotte, J.D., Argue, D.M., and McGarry, F.J., 2005, Methyl tertiary-Butyl Ether occurrence and related factors in public and private wells in southeast New Hampshire: *Environmental Science and Technology*, vol. 39, no. 1, p. 9-16. (http://nh.water.usgs.gov/Publications/2005/es049549e.pdf)

Siting Restrictions

Given the likelihood that UST systems will release gasoline constituents (most commonly in the form of vapor leaks from underground piping systems or overfills of the UST, vehicle tank or portable container) and the possibility that spilled fuel will be carried off the fueling area by stormwater, municipal officials interested in providing the highest possible level of protection for groundwater used for drinking water should consider restricting the siting of gas stations as they would any other land use that is likely to contaminate groundwater. If the municipality's zoning ordinance prohibits the location of certain high-risk land uses in wellhead protection areas, aquifer protection areas, or other areas of high-value groundwater, gas stations should be considered for inclusion in the list of prohibited land uses.

Municipal officials should also consider including setbacks in zoning ordinances or site plan review regulations to separate UST systems and gas station stormwater discharges from water supply wells, both public and private. A 2002 study of petroleum contamination travel distances at discharge sites in Maine found the *average* distance traveled was 295 feet for gasoline constituents and 140 feet for diesel/fuel oil constituents. About one-third of MtBE contamination plumes, one-quarter of other gasoline plumes, and one-sixth of diesel/fuel oil plumes traveled more than 300 feet.[2] NHDES' rules for the siting of UST systems *at new sites* (Env-Wm 1401.28 (ac)) include the following setbacks:

- 500' between gasoline USTs and public water supplies (PWSs).
- 400' between other USTs and PWSs.
- 250' between gasoline USTs and private wells.
- 75' between other USTs and private wells.
- 75' between any UST and surface water.

Municipalities that feel that these setbacks are not sufficiently protective of public or private water supplies or other water resources can establish more stringent setbacks, as well as applying setbacks to new USTs at existing sites, although NHDES does not recommend that local siting restrictions be applied to replacement USTs.

Whether or not municipalities establish their own UST setback requirements, they should help ensure that UST systems at new sites comply with NHDES' setbacks, since NHDES does not always have the resources to field-check information about existing wells provided to NHDES by UST applicants. This can be done through the local site plan review process in municipalities that have site plan review regulations, and whenever applicants for new USTs notify the municipality, as required by NHDES.

Site Design

The design of UST systems (the tank and underground piping) is thoroughly regulated by NHDES.[3] NHDES is *not* recommending that municipalities establish additional *design* criteria for these tank systems. However, there are several aspects of gas station design that can receive additional attention during site plan review from a groundwater protection standpoint.

[2] Bureau of Remediation and Waste Management, Maine Department of Environmental Protection, "Historical Oil Contamination Travel Distances in Ground Water at Sensitive Geological Sites in Maine," April 30, 2002.

[3] This Fact Sheet deals only with USTs used to store motor fuel at gas stations. For state regulatory requirements for other UST types, please refer to NHDES Fact Sheet WMD-REM-20. For information on above-ground storage tanks, please refer to WMD-REM-5.

Spill Containment
In addition to requiring devices that are designed to contain spills that may occur when USTs are being filled, NHDES rules for new USTs[4] require a concrete pad with positive limiting barriers (PLBs) to contain spills in the fuel dispensing area (Env-Wm 1401.28 (v)). PLBs are grooves in the concrete around the edge of the dispensing area; the rule requires that they be constructed *and maintained* to contain five gallons *for each dispenser* – each dispenser typically has two dispensing hose. The rule also states that dispensing nozzles may not extend beyond the PLBs.

Additional Sump Requirement
Municipalities could drastically reduce the probability of releases by requiring that all tank top connections – including fill, pump, and automatic tank gauging (ATG) risers – occur within full-depth or collared sumps, and by requiring double-walled piping for the underground portion of vent pipes.[5]

Stormwater Management
The guiding principle of stormwater management at gas stations is to keep clean water clean. Relatively clean stormwater, such as from roofs and areas other than the fueling area, may not be allowed to run onto the fuel dispensing area (Env-Wm 1401.28 (al)). The relatively clean stormwater can be managed the same as stormwater from any parking area; it should be directed as sheet flow over grassed areas and/or collected and treated according to accepted stormwater best management practices (BMPs).[6] With this in mind, the site should be designed and maintained with a snow removal plan and designated snow storage areas that do not interfere with the intended stormwater flow.

If the municipality has an opportunity to review the site plan for an existing facility, such as in the case of site alteration or expansion, the design goal should be to keep stormwater off the dispensing pad. Whenever practical, stormwater management at an existing facility should be brought up to date with a canopy draining outside the dispensing area, a properly pitched, impervious concrete dispensing pad, and properly sized PLBs.

Surface and Groundwater Protection Plans
Municipalities should require applicants to submit a plan to minimize the potential for groundwater contamination. Implementation of the plan should be a condition of site plan review approval. The plan should cover the following items:

- A complete description of spill prevention and control measures for the facility. Spill prevention begins with the customer. Signs should be posted at the pump instructing customers not to top off fuel tanks and to notify an employee in the event of a spill. Emergency shutoff switches should be plainly labeled.
- An estimate of the maximum quantity of fuel that could be spilled in the event of an equipment failure, along with an analysis of its fate and a plan for preventing it from reaching groundwater or surface water. The plan should include descriptions of containment and/or diversionary structures or equipment needed in the event of a spill, and a demonstration that the needed equipment, personnel, and other resources would be available to respond to a spill.
- A notification list, including the names and phone numbers of local management, remote management, fire and police, local and state agencies needing to be notified, and spill response contractors.

[4] The rules apply where the concrete pad is disrupted for tank or piping installation after February 2005.
[5] NHDES plans to propose adding these additional requirements to Env-Wm 1401 during 2012.
[6] For more information, please see NHDES report R-WSPCD-95-3, Best Management Practice for Urban Stormwater Runoff.

- ❑ Routine spot cleaning of small spills at fueling areas with dry methods. Dry methods include using rags or absorbents. Fueling areas should never be washed down unless the water is collected and disposed of properly. The plan should specify that an adequate supply of absorbent materials be kept readily available.
- ❑ Storage and disposal of used sorbents and/or rags.
- ❑ Maintenance of PLBs and the stormwater management system, including BMPs.
- ❑ Provisions to ensure that snow plowing and other maintenance will not interfere with the proper functioning of stormwater management, spill containment, and leak detection systems.
- ❑ Employee training: Employees should be trained (upon hiring and annually thereafter) in all aspects of routine operation and maintenance, including routine spill cleaning and containment of contaminated stormwater, as well as spill response and other emergency procedures.

Existing Gas Stations: Local Regulatory Options

Several options exist for local oversight of existing gas stations. Of the approaches listed above, siting restrictions clearly would not apply to existing UST systems at existing gas stations. However, some aspects of site design (stormwater management, PLBs) could be corrected at existing gas stations, and the implementation of a groundwater protection plan is certainly achievable at existing sites. While existing operations would be exempt from requirements enacted in zoning or site plan review regulations, municipalities can institute these requirements through a general bylaw under RSA 31:39, or a health regulation or health ordinance enacted under RSA 147:1, I, if the purpose is to protect public health.

Existing Gas Stations: Non-Regulatory Options

According to a 2001 report by the U.S. Government Accounting Office, 29 percent of regulated USTs nationally are not being operated and maintained properly. The most important non-regulatory role for water suppliers and municipal officials with respect to existing gas stations is to ensure compliance with state requirements with respect to stormwater management, spill containment, and periodic inspection of release prevention and detection systems. NHDES strongly urges municipalities and/or water suppliers to visit gas stations annually (subject to the voluntary cooperation of owners) to verify that the owners are complying with these requirements, as well as any local site plan review conditions.

For More Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at www.des.nh.gov.

Note: This Fact Sheet is accurate as of August 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.