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Re: NSTAR 2014 Yearly Operational Plan

Dear Mr. Corte-Real:

On behalf of Beyond Pesticides, GreenCAPE, and Protect Our Cape Cod Aquifer (POCCA), we are writing to oppose NSTAR's 2014 Yearly Operational Plan (YOP) for Cape Cod and Martha'a Vineyard.

Beyond Pesticides is a national, grassroots membership organization, representing community-based groups and a range of people seeking to improve protections for the environment and individuals from pesticides. Our membership includes residents of Cape Cod and spans the 50 states and groups around the world. GreenCAPE is a local, public-awareness organization that encourages nontoxic methods of pest control, agriculture, home, garden, lawn, and turf care so as to eliminate hazards from the Cape region's air and water. POCCA, a local advocacy organization, seeks to inform the public about the growing problems concerning water issues on Cape Cod.

The YOP outlines the state regulations governing right-of-way (ROW) vegetation maintenance standards and NSTAR's proposed maintenance plan. Despite NSTAR's acknowledgment that Massachusetts's pesticide regulations (333 CMR 11.00 *et al*) require an Integrated Vegetation Management (IVM) approach—one that must prevent unreasonable risks to humans or the environment, especially concerning environmentally and culturally sensitive areas—the proposed YOP anticipates the application of several toxic herbicides without attempting mechanical, biological, and other alternative controls to the exclusion of chemical controls.

In ignoring the legally necessary step of implementing IVM with an intention to avoid pesticide-use[1] only when mechanical, biological, and alternative controls fail and in relying on state

[1] *See* 33 CMR 11.01 ("The purpose of 333 CMR 11.00 is to establish a statewide and uniform regulatory process

pesticide–use designations that inadequately address the unique environs and ecosystems of the Cape Cod, NSTAR not only places the residents, wildlife, aquatic life, and sole drinking water source for residents of Cape Cod at risk but violates the purpose and intent of state pesticide laws.

For the reasons outlined in the following comments, Beyond Pesticides, GreenCAPE, and POCCA ask that the Massachusetts Department of Agricultural Resources (MDAR) reject the YOP and require the stringent application of IVM maintenance standards, employing only the most protective sensitive area protocols of non-chemical mechanical controls and alternatives. We also ask that MDAR take the necessary steps to ensure that the Cape Cod area be adequately protected according to Massachusetts's laws and regulations concerning pesticides and groundwater sources.

I. Identified YOP 2014 Herbicides and Known Hazards

NSTAR identifies five herbicides as a part of its maintenance plan to be applied across "the entire length and cleared width" of the 15 identified ROWs. The herbicides include:

Herbicide Brand Name	**Active Ingredient**
Rodeo	Glyphosate
Krenite S	Fosamine Ammonium
Escort XP	Metsulfuron-Methyl
Arsenal	Imazapyr
Garlon 4 Ultra	Triclopyr

Arguing that these herbicides meet the most stringent health and environmental standards under Massachusetts's regulations because they are "sensitive area" approved chemicals, NSTAR fails to consider not only the wealth of information and scientific research demonstrating significant health and environmental hazards associated with application of many of these herbicides, but also the significant gaps in data and regulatory evaluation underlying the registration of these chemicals.

A. Glyphosate

Glyphosate is a registered pesticide with the U.S. Environmental Protection Agency (EPA) that first received its approval in 1974. Found in numerous products, the most famous being Monsanto's Roundup, products employing glyphosate act as a non- selective herbicide for broadleaf weed and grass control. It is used on food and non-food field crop sites. Since its registration, its popularity has increased dramatically due to claims that it is of low toxicity. These claims could not be farther from the truth.

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which will *minimize the uses of, and potential impacts from herbicides* in rights-of-way on human health and the environment while allowing for the benefits to public safety provided by the selective use of herbicides.") (emphasis added).

i. Glyphosate: Health Hazards to Humans and Other Species

A study published in 1999 found that people exposed to glyphosate are 2.7 times more likely to contract non-Hodgkin Lymphoma (NHL).[2] In 2002, a study of Swedish men showed that glyphosate exposure was *significantly* associated with an increased risk of NHL, and hairy cell leukemia- a rare subtype of NHL.[3] Further, a 2003 review of studies conducted on farmers by researchers at the National Cancer Institute shows that exposure to glyphosate is associated with an increased incidence of NHL.[4] The American Cancer Society states that non-Hodgkin lymphoma is a cancer that starts in cells called lymphocytes, which are part of the body's immune system.[5]

This list continues. Breast cancer,[6] ADD/ADHD,[7] increased risks of late abortion,[8] and endocrine disruption[9] have all been linked to glyphosate exposure. Glyphosate has also been *suggestively* associated with an increased risk of multiple myeloma, according to an Agricultural Health Study published in 2005.[10] Multiple myeloma is another type of cancer that starts in plasma cells- a type of white blood cell.[11]

Health effects are not limited to humans. A 2011 study found that glyphosate changed the toxicological parameters in certain fish.[12] Another study from 2010 found that sublethal residues of glyphosate induced immunological responses in fish and alters their natural immune

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[2] L. Hardell & M. Eriksson, *A Case-Control Study of Non-Hodgkin Lymphoma and Exposure to Pesticides,* Cancer, 85(6), 1999, 1353–1360.

[3] Hardell L, Eriksson M, & Nordstrom M. 2002. Exposure to pesticides as risk factor for non-Hodgkin's lymphoma and hairy cell leukemia: pooled analysis of two Swedish case-control studies. Leuk Lymphoma, 43(5), 1043-1049.

[4] De Roos, *et al.*, *Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men*, Occup Environ Med, 60(9) (2003).

[5] American Cancer Society. *Detailed Guide: Lymphoma, Non-Hodgkin Type:What Is Non-Hodgkin Lymphoma? Cancer Reference Information*. Available at http://www.cancer.org/docroot/CRI/content/CRI_2_4_1X_What_Is_Non_Hodgkins_Lymphoma_32.asp.

[6] Siriporn Thongprakaisang, *et al.*, *Glyphosate induces human breast cancer cells growth via estrogen Receptors*, Food and Chemical Toxicology 59 (2013), 129–136.

[7] V.F. Garry, *et al.*, *Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota, USA*, Environ Health Perspect, 110(Suppl 3): 441–449 (2002).

[8] Arbuckle, T.E., Z. Lin, and L.S. Mery. 2001. An Exploratory Analysis of the Effect of Pesticide Exposure on the Risk of Spontaneous Abortion in an Ontario Farm Population. Environmental Health Perspectives 109:851-857.

[9] Walsh, L. P., McCormick, C., Martin, C., & Stocco, D. M. 2000. Roundup Inhibits Steroidogenesis by Disrupting Steroidogenic Acute Regulatory (StAR) Protein Expression. Environ Health Perspect, 108, 769–776.

[10] A.J.D. De Roos, *et al.*, *Cancer Incidence among Glyphosate-Exposed Pesticide Applicators in the Agricultural Health Study*. Environmental Health Perspectives, 113(1), 49-54 (2005).

[11] National Cancer Institute, *What You Need to Know About: Multiple Myeloma* (2008), available at http://www.cancer.gov/cancertopics/wyntk/myeloma/page2.

[12] L. Glusczak L, *et al., Acute Exposure to Glyphosate Herbicide Affects Oxidative Parameters in Piava (Leporinus obtusidens)*, Arch Environ Contam Toxicol, 61(4):624-30 (2011).

response to bacterial and possibly to other aquatic microorganism.[13] Chronic exposure has been associated with histopathological damage in the gills and liver of freshwater fish species, some of which was irreversible.[14] A study found that Roundup, the most commonly used glyphosate product, alone is "extremely lethal" to amphibians in concentrations found in the environment.[15]

ii. Glyphosate: Environmental Hazards

Beyond health hazards, the environmental impacts of glyphosate to surface waters and surrounding areas are becoming an increasing concern. More than 180 million pounds of glyphosate are used annually in the U.S. The U.S. Geological Survey (USGS) recently published a report which documents the distribution and trends of pesticide use from 1992-2009.[16] Because of this heavy use, glyphosate is routinely detected in surface and groundwater samples. A separate USGS survey detected glyphosate in 36% of samples, and aminomethylphosphonic acid or AMPA (a degradation product of glyphosate) in 69% of the samples.[17]

While some of this data originates from agricultural areas where glyphosate use is in the largest quantities, the fact remains that EPA acknowledges glyphosate's potential to contaminate surface water on a national level because it does not readily break down in water or sunlight. Due to glyphosate's potential for water contamination, EPA set its maximum contaminant level (MCL) at 0.7 parts per million (ppm).[18] Unfortunately, many of the above-noted health effects and environmental impacts have been observed at levels below this MCL.

B. Fosamine Ammonium

Fosamine ammonium was first registered as a pesticide by EPA in 1975. It is systemically absorbed by buds, stems and foliage. Initially, the chemical was registered for various ROW uses, including areas around railroads, pipelines, utilities and highways, reforestation areas, drainage ditch banks, storage areas, industrial plants, and other similar sites. For unexplained

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[13] LC Kreutz, *et al.*, *Exposure to sublethal concentration of glyphosate or atrazine-based herbicides alters the phagocytic function and increases the susceptibility of silver catfish fingerlings (Rhamdia quelen) to Aeromonas hydrophila challenge*, Fish Shellfish Immunol, 29(4):694-7 (2010).

[14] E. Ortiz-Ordoñez, *et al.*, *Effect of Yerbimat Herbicide on Lipid Peroxidation, Catalase Activity, and Histological Damage in Gills and Liver of the Freshwater Fish Goodea Atripinnis*, Arch Environ Contam Toxicol, 61(3):443-52 (2011).

[15] R. Relyea, *The lethal impact of Roundup on aquatic and terrestrial amphibians*, Ecological Applications, 15(4): 1118–1124 (2005).

[16] U.S. Gelogical Service, *National Assessment Shows Geographic Distributions and Trends of Pesticide Use, 1992-2009*, 2013. Available at http://www.usgs.gov/newsroom/article.asp?ID=3594.

[17] Scribner, E. A., Battaglin, W. A., Dietze, J. E., & Thurman, E. M. 2003. Reconnaissance Data for Glyphosate, Other Selected Herbicides, Their Degradation Products, and Antibiotics in 51 Streams in Nine Midwestern States, 2002 *U.S. Geological Survey*, Open-File Report 03–217(101 p).

[18] USEPA. Basic Information about Glyphosate in Drinking Water. Available at http://water.epa.gov/drink/contaminants/basicinformation/glyphosate.cfm.

reasons, this first product was voluntarily cancelled on June 22, 1994. Because a second product had been registered in 1980 for similar uses, except reforestation, two registered products containing this active ingredient continue to be applied to the other ROW categories.

EPA is currently in the process of reviewing fosamine ammonium for registration, meaning that the most recent data supporting labeled uses and assessing hazards is 20 years old.[19] EPA will not complete its registration review until 2015.[20] In the meantime, safety assertions continue to rely on outdated and inadequate health and risk assessment data, much of which raises serious concerns for usage in such water-related environments like Cape Cod.

i. Fosamine Ammonium: Known and Unknown Concerns About Water Supply Exposures

As noted, the manufacturer of the first fosamine ammonium product registered with EPA voluntarily cancelled its use on reforestation areas. No information concerning this voluntarily cancellation is available. Even more alarming, however, is that EPA notes the following in its 1995 RED factsheet regarding the remaining fosamine ammonium registered products:

> This registrant requested to voluntarily cancel direct applications to water, ditch banks, and to other sites which are adjacent to and surrounding domestic water supply reservoirs, supply streams, lakes and ponds. The Agency is processing this request, which involves publishing a Notice of Intent to delete these uses in the Federal Register.[21]

Accordingly, on September 13, 1995, EPA published a *Notice of Receipt of Requests for Amendments to Delete Uses in Certain Pesticides Registrations* that included fosamine ammonium.[22] With no further explanation provided, EPA notes in the table column titled, "Delete From Label" next to fosamine ammonium—"Ditchbank uses."

Despite the mysterious lack of information related to these use changes, concerns clearly remain about fosamine ammonium's application around water-related areas. EPA identifies in its 2010 RED, the continuing need for an ecological risk assessment targeting aquatic species and a drinking water exposure and risk assessment.[23]

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[19] http://www.epa.gov/oppsrrd1/REDs/2355.pdf
[20] http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2010-0215-0002.
[21] U.S. Envt'l Prot. Agency, *R.E.D. Factsheet: Fosamine ammonium*, EPA-738-95-005, Jan. 1995, http://www.epa.gov/oppsrrd1/REDs/factsheets/2355fact.pdf.
[22] U.S. Envt'l Prot. Agency, *Notice of Receipt of Requests for Amendments to Delete Uses in Certain Pesticide Registrations*, 60 FR 47571, Sept. 13, 1995, http://www.gpo.gov/fdsys/pkg/FR-1995-09-13/pdf/95-22492.pdf.
[23] U.S. Envt'l Prot. Agency*, Fosamine Ammonium Summary Document: Registration Review Initial Docket*, June 2010, EPA-HQ-OPP-2010-0215.

C. Metsulfuron-Methyl

Conditionally registered in 1986, [24] metsulfuron-methyl is an herbicide used to control select broadleaf weeds, trees and brush, and some annual grasses. Its stops cell division in the shoots and roots of the plant causing plants to die. Much like fosamine ammonium, metsulfuron-methyl's designation as sensitive-area appropriate suffers from a lack of documented risk assessment to support such designations and faulty registration protocols.

i. Conditional Registration

Federal registration of pesticides is premised on the concept that the manufacturer of a chemical and applicant for registration must at the outset meet certain basic standards of safety and hazard assessment in order for a chemical to be registered. While we would argue that even these existing standards fail to establish any meaningful protections, it is this initial review that provides one of the only checkpoints to a chemical's introduction into the environment and presence in the pesticide marketplace. Conditional registration, however, provides a side road to even this most basic checkpoint.

Conditional registration is allowed under Section 3(c)(7) of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). This provision allows pesticide registration to be granted even though all data requirements have not been satisfied, with the assumption that no unreasonable adverse effects on the environment will occur. When this occurs pesticides are introduced to the market with unknown and unevaluated risks to human and environmental health. While all data must be eventually submitted, it often takes years before EPA acquires relevant data -often with data submitted for the 15-year reregistration review cycle that all registered pesticides must go through. It is rare that the regulatory decision will be altered once data has been submitted, even if those data contradict original assumptions about the safety of the product.

In the case of metsulfuron-methyl, conditional registration occurred nearly 30 years ago, with little scientific evaluation to support claims of safety, let alone its use in the unique Cape Cod area. While EPA announced the chemical's registration review in 2012, it noted that the reason for the review was that the agency "identified a number of data gaps for metsulfuron."[25] Because the review will not be completed until 2017, it does not make sense to employ a chemical which has undergone such sparse registration review and even minimal scientific scrutiny for the full-range of environmental and health impacts.

[24] U.S. Envt'l Prot. Agency, *Details for Dupont Escort XP Herbicide*, Pesticides Product Label System, http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:102:::NO::P102_REG_NUM:352-439.
[25] U.S. Envt'l Prot. Agency, *Metsulfuron Final Work Plan Registration Review*, http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0375-0010.

D. Imazapyr

Imazapyr is a non-selective broad-spectrum systemic herbicide, absorbed by the foliage and roots, with rapid transfer to the xylem and phloem to the meristematic regions, where it accumulates and causes disruption of protein synthesis. This leads to interference in DNA synthesis and cell growth of the plants. The result of exposure is death of new leaves. Arsenal, the intended product to be used on the Cape Code area that contains imazapyr, was conditionally registered in 1992 and underwent registration review beginning in 2006.

i. Imazapyr: Health Hazards to Humans and Other Species

The human health effects of imazapyr are far-ranging. Harmful endocrine and chronic toxicological effects have been documented,[26,27] along with acute effects.[28] Some of these acute effects found that "[a]t high doses [imazapyr and its metabolites] produce[d] a broad spectrum of toxic effects,…including neurotoxicity, manifest[ing] as impaired consciousness and respiratory distress in humans.[29] Studies have found decreased activity in rats[30] and loss of equilibrium and inactivity in fish.[31] General pharmacology studies with imazapyr isopropylamine revealed central nervous system (CNS) effects following oral exposure.[32]

The chemical has been shown to have deleterious impacts on butterflies and other non-target organisms.[33] Incidents reports to the Environmental Incident Information System (EIIS) include impacts to terrestrial and aquatic plants, as well as potential impacts on birds and fish.[34] EIIS also reports several "drift" contamination incidents. One of these involved runoff into a pond resulting in a possible fish kill.[35] Mortality in birds and fish seemed to occur more frequently when imazapyr was applied as part of a pesticide "cocktail", which suggests potential synergistic effects from combinations of multiple pesticides (such ad hoc applications can occur quite frequently). One incident resulted in a bird, fish, terrestrial, and aquatic plant kill.[36]

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[26] Wash. State Dept. of Agriculture, *Imazapyr Risk Assessment,* June 2009, 44, http://agr.wa.gov/plantsinsects/weeds/npdespermits/docs/2009AMECHumanHealthEcologicalEffectsRiskAssessmentImazapyr.pdf.

[27] C.K. Grisolia, *et al.*, *A comparative toxicologic and genotoxic study of the herbicide arsenal, its active ingredient imazapyr, and the surfactant nonylphenol ethoxylate*, Ecotoxicology and Environmental Safety, Volume 59, Issue 1, Sept. 2004, 123-126.

[28] Hsin-Ling Lee, *et al.*, *Acute Poisoning with a Herbicide Containing Imazapyr (Arsenal): A Report of Six Cases*, Clinical Toxicology, Vol. 37, No. 1, Pages 83-89 (1999).

[29] Lee, *et al.* 1999.

[30] *Imazapyr Risk Assessment* at 17 (citing J. Fischer, 1986b, *Toxicity Data Report—Summary of Experimental Results*, Chopper C/A Forumlation: Unpublished summaries prepared by Ammerican Cyanamid Co., Report No. A86-31, MRID, No. 00163195, 5., f.

[31] *Id.* at 17.

[32] *Id.*

[33] J.D. Stark, *et al.*, *Effects of Herbicides (imazapyr and triclopyr) on Behr's Metalmark Butterfly, a Surrogate Species for the Endangered Butterfly, Lange's Metalmark*, Environmental Pollution, 164: 24-27 (2012).

[34] U.S. Envt'l Prot. Agency, *Reregistration eligibility decision (RED): Imazapyr*, 23 (2005).

[35] *Id.*

[36] *Id.*

ii. Imazapyr: Environmental Hazards

Contrary to its sensitive area designation by Massachusetts authorities, imazapyr demonstrates extreme environmental persistence and mobility. One expert testified that "[i]mazapyr is highly mobile and quite persistent in the environment, two factors that contribute to the ability of this herbicide to cause long-term impacts on non-target plants near treated sites. Imazapyr is…highly water soluble, and does not adsorb well to most soils. Thus, any imazapyr released into the environment will readily be transported off site by precipitation, flooding or irrigation runoff."[37] One study found that traces of imazapyr were detected in the groundwater even eight years after application.[38]

When combined with the documented health effects, imazapyr's persistence and water solubility makes it unsuitable for use on such wide-spread ROW areas on Cape Cod and poses a significant threat to humans, the Cape's delicate ecosystems, and its water sources.

E. Triclopyr

Triclopyr is a pyridinecarboxylic acid herbicide that is selective for broadleaf plants and is not toxic to grasses and conifers. Triclopyr kills plants by mimicking auxins—plant growth hormones. Triclopyr damages the plant by causing uncontrolled growth.

Registered with the EPA in 1979, open literature does not provide much in the way of studies and information concerning triclopyr.[39] This fact significantly hinders any thorough discussion of the toxin's full spate of human, environmental, and ecological impacts and leaves many questions unanswered as to the underlying support for claims of safety. As noted in the above discussions of the other proposed YOP herbicides, lack of publicly available data should by no means lead to a presumption of safety.

The little that is known does not invite confidence in MDAR's classification of this herbicide as sensitive area appropriate. It is telling that other jurisdictions have found quite the opposite. San Francisco classified products including triclopyr as a "highest hazard" (Tier 1) pesticide in the "limited use "special concern" category.[40] In this same jurisdiction, triclopyr is flagged in all caps as: "HIGH PRIORITY TO FIND ALTERNATIVE."[41] The following identifies some of the reasons why such precaution has been implemented.

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[37] Expert declaration of Dr. Susan Kegley on behalf of Californians for Alternatives to Toxics for the Humboldt County Superior Court, February 2008, http://www.alternatives2toxics.org/pdfs/kegley_summary_declaration.pdf.
[38] Elisabet Börjesson, *et al*., *The fate of imazapyr in a Swedish railway embankment*, Pest Management Science, June 2004, 544-549, http://onlinelibrary.wiley.com/doi/10.1002/ps.864/abstract.
[39] Marin Municipal Water District (MMWD) Vegetation Management Plan, August 2008, http://www.marinwater.org/documents/Chap4_Triclopyr_8_27_08.pdf.
[40] San Francisco Reduced Risk Pesticide List, Feb. 17, 2010, 7.
[41] *Id.*

i. Triclopyr: Health Hazards for Humans and Other Species

Triclopyr's carcinogenicity has been studied in both rats and mice. In both species, feeding of triclopyr significantly increased the frequency of breast cancer. In male rats, triclopyr caused an increase in the frequency of adrenal tumors. And yet, the EPA refused to classify this chemical as a carcinogen even though its own guidelines call for classifying pesticides as carcinogens if they cause cancer in more than one species.[42]

While there are no reproductive studies of triclopyr in the open literature and only one of TCP, the major metabolite of triclopyr, U.S. Department of Agriculture Forest Service reviews and EPA REDs note some disturbing findings in unpublished reports.[43] These findings include several studies showing adverse maternal and developmental outcomes in fetuses, including fetal malformations. Triclopyr causes severe birth defects in rats at relatively low levels of exposure (NOEL = 5 mg/kg day).[44]

Much like imazapyr, triclopyr demonstrated deleterious effects on butterflies and other non-target organisms.[45] The chemical has also been designated as dangerous to aquatic creatures and plants.[46]

iii. Triclopyr: Environmental Hazards and Impacts

According to the EPA, triclopyr is "very mobile" in soil and triclopyr molecules are not strongly held by soil or sediment particles.[47] Field studies showed considerable variation in half lives under different conditions, with the general range extending from 10-100 days or longer.[48]

Given the documented hazards and many unknowns surrounding this chemical, this mobility presents a significant threat to the Cape Cod region and its extremely porous soil.

II. <u>Unknown Hazards and Inert Ingredients</u>

As noted throughout the known hazards discussion above, all chemicals proposed for use on Cape Cod ROWs have glaring inadequacies in their safety and environmental assessments concerning the identified active ingredients. Yet, even more concerning than these active

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[42] C. Cox, Journal of Pesticide Reform, Winter 2000, Volume 20, No. 4, 14.
[43] MMWD Vegetation Management Plan, August 2008, 4-9 and 4-17.
[44] *Id.*
[45] J.D. Stark, *et al.*, *Effects of Herbicides (triclopyr and imazapyr) on Behr's Metalmark Butterfly, a Surrogate Species for the Endangered Butterfly, Lange's Metalmark*, Environmental Pollution 164: 24-27 (2012).
[46] Marin Municipal Water District Vegetation Management Plan, *Triclopyr*, Draft Aug. 27, 2008, http://www.marinwater.org/documents/Chap4_Triclopyr_8_27_08.pdf.
[47] U.S. Ent'l Prot. Agency, Prevention, Pesticides, and Toxic Substances, *Reregistration eligibility decision (RED): Triclopyr*, 1998, 2-5.
[48] *Id.* at 58-61.

ingredient unknown hazards are the unknown hazards surrounding the "inert ingredient" within each commercial product.

A. Inert Ingredients: Health Hazards

For example, glyphosate is listed as the active ingredient in a number of formulated end-use products like Rodeo or Roundup. The large remaining percentage of the contents of these products, however, are composed of what is merely described as "inert ingredients." These ingredients serve many purposes, often creating a more effective and/or longer lasting herbicide. Chemical companies argue that disclosing these inert ingredients would be revealing trade secrets.

Recent scientific inquiries, however, have revealed that these ingredients are anything but inert; often demonstrating significant toxic effect themselves and increasing the toxicity of the active ingredients. A recent 2008 study was the first to definitively confirm this fact. The researchers found that glyphosate formulated products kill human cells, particularly embryonic, placental and umbilical cord cells, even at very low concentrations.[49] These researchers found that the formulations cause total cell death within 24 hours, through an inhibition of the mitochondrial succinate dehydrogenase activity, and necrosis, by release of cytosolic adenylate kinase measuring membrane damage. This study reports that polyethoxylated tallowamine or POEA, an "inert" surfactant, was responsible for the elevated toxic effects observed.

Other studies have found that the formulated glyphosate products reduces human placental JEG3 cell viability at least 2 times more efficiently than glyphosate, disrupts aromatase activity and mRNA levels,[50] induce a dose-dependent formation of DNA adducts in the kidneys and liver of mice,[51] and induce developmental retardation of the fetal skeleton, a decrease in sperm number and increase in the percentage of abnormal sperms.[52]

In light of such data demonstrating the toxic potential of glyphosate and its formulated products, especially the ingredient POEA, we believe that the use of glyphosate products poses unreasonable human health risks to the applicators, bystanders and other people in the vicinity exposed to the product due to pesticide drift and runoff. We also believe that studies like these conducted on Roundup demonstrate only the tip of the "inert" hazards iceberg and warrant additional research and study of all inerts before continued use.

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[49] N. Benachour, G.-E. Seralini, *Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cell*s, Chemical Research in Toxicology, 22(1), 97-105 (2008).

[50] S. Richard S, *et al.*, *Differential effects of glyphosate and roundup on human placental cells and aromatase*, Environ Health Perspect, 113(6), 716-720 (2005).

[51] Marco, P., Armelle, M., Claudia, B., & Silvio, P. 1998. 32P-postlabeling detection of DNA adducts in mice treated with the herbicide roundup. Environmental and Molecular Mutagenesis, 31(1), 55-59.

[52] E. Dallegrave, *et al.*, *The teratogenic potential of the herbicide glyphosate-Roundup® in Wistar rats*, Toxicology Letters, 142(1-2), 45-52 (2003); E. Dallegrave, *et al.*, *Pre- and postnatal toxicity of the commercial glyphosate formulation in Wistar rats*, Arch Toxicol, 81(9), 665-673 (2007).

The dangers of inerts do not stop with humans. Using glyphosate as the demonstrative chemical again, glyphosate and its formulated products adversely impact aquatic organisms, contrary to industry claims. A study in 2005 found that Roundup as a whole is "extremely lethal" to amphibians in concentrations found in the environment.[53] Another study found that *Rana pipiens* tadpoles chronically exposed to environmentally relevant concentrations of glyphosate formulations containing POEA showed decreased snout-vent length at metamorphosis and increased time to metamorphosis, tail damage, and gonadal abnormalities. Other organisms such as the freshwater mussel, *Lampsilis siliquoidea,* were found to be the most sensitive aquatic organisms tested to date with glyphosate-based chemicals and its surfactant.[54]

EPA in its Reregistration Eligibility Decision (RED) document in 1993 acknowledged that an "inert" ingredient in some glyphosate end-use products was toxic to aquatic organisms and found that these products necessitated labeling: "toxic to fish" as these products are applied directly to aquatic environments.[55] EPA is also aware that glyphosate poses a risk of water contamination since it is not only released directly into aquatic environments, but also via the transport of residues adsorbed to soil particles suspended in runoff water, leaching and drift.

While glyphosate and its inert ingredients have received the most scientific attention because of its large-scale and increasing presence in the environment, concerns over interts' health and environmental effects should not be limited to only glyphosate products.

B. Endocrine Disruptors

Yet another unknown hazard that spans all of these proposed products arises due to the failure of traditional risk assessment protocols and standards to require testing of new endpoints and examine non-monotonic dose responses. Risk assessments justify use patterns for widely used pesticides based on assumptions about toxicity and exposure. Yet these traditional risk assessments are skewed in favor of the continued use of hazardous chemicals because they fail to capture data on non-traditional risks and effects.

Chemicals that produce endocrine-disrupting effects are a prime example. Endocrine-disruption occurs when chemicals interfere with human or other species' hormones and hormone-receptors. In some cases, endocrine-disruption has been linked to genetic impacts as well. Adverse effects from endocrine-disruption are far ranging and include reproductive abnormalities, neurological effects, and diseases such as diabetes, ADHD, and cancer.[56]

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[53] R. Relyea, *The lethal impact of Roundup on aquatic and terrestrial amphibians*, Ecological Applications, 15(4), 1118–1124 (2005).

[54] RB Bringolf, *et al.*, *Acute and chronic toxicity of glyphosate compounds to glochidia and juveniles of Lampsilis siliquoidea (Unionidae)*, Environ Toxicol Chem., 26(10), 2094-2100 (2007).

[55] U.S. Envt'l Prot. Agency, Office of Prevention, Pesticides and Toxic Substances, *Reregistration Eligibility Decision (RED) Glyphosate* (1993).

[56] N Harriott and J. Feldman, Beyond Pesticides, *Pesticides That Disrupt Endocrine System Still Unregulated by EPA*, http://www.beyondpesticides.org/gateway/health%20effects/endocrine%20cited.pdf.

Under traditional risk assessment protocols, "the-dose-makes-the-poison" toxicological theory rules, meaning that most chemicals are only tested to see how much of the poison can be withstood before bad things or adverse effects happen. These traditional risk assessment protocols miss adverse effects like endocrine-disruption. Science, however, has documented in the past two decades a wide range of negative health and environmental impacts occurring at low-doses or resulting in delayed effects from not only pesticides, but the many chemicals in the products that surround us.

III. Effective Alternatives

NSTAR provides little to no argument for why herbicide applications must occur in order to achieve its goal of keeping "ROWs free from hazards and encroachments." The YOP also fails to address the many alternatives available to NSTAR for achieving these goals. Because viable and safe alternatives exist that will achieve the same goals, we believe that the spraying of herbicides is not necessary.

The use of herbicides is not only hazardous to health and the environment, but provides only a temporary solution as many of the chemicals leave the soil bare. These barren conditions favor the return of weeds and unwanted vegetation. Instead, we recommend the adoption of an integrated least-toxic vegetation management system that would employ the use of mechanical, cultural, and biological methods.

NSTAR has complained that alternative measures have not been successful, however, we do not believe that these alternatives have been adequately implemented or executed. Successful vegetation management requires good planning that incorporates well-developed goals and objectives into a rational, comprehensive, and practical program.

Mechanical methods which include cutting, girdling, mowing and grazing animals provide effective means to eradicate unwanted vegetation along rights-of-way when used in a time effective manner. These methods can be labor intensive, but can be a source of employment to many. Utilizing herbivorous animals such as goats have been proven to be a cost effective and efficient way of controlling vegetation and have been successfully implemented in other jurisdictions.

The Maryland Department of Transportation's State Highway Administration recently employed a herd of goats as part of its conservation grazing project to control vegetation along a major highway bypass in the state which has been successful. Google's corporate campus in Mountain View, CA hired 200 goats instead of hiring a mowing crew to manage the weeds and brush growing on their corporate campus in order to reduce fire hazard. The company states that the hiring of the goats costs about the same mowing. Others finding success with goats include the City of Mesa, Arizona Utilities Department that has employed 80 goats to manage 30 acres of brush and weeds at one of their water reclamation plants as an alternative to mechanical mowing. The departments states that goats can clear vegetation from hard-to-reach places, and

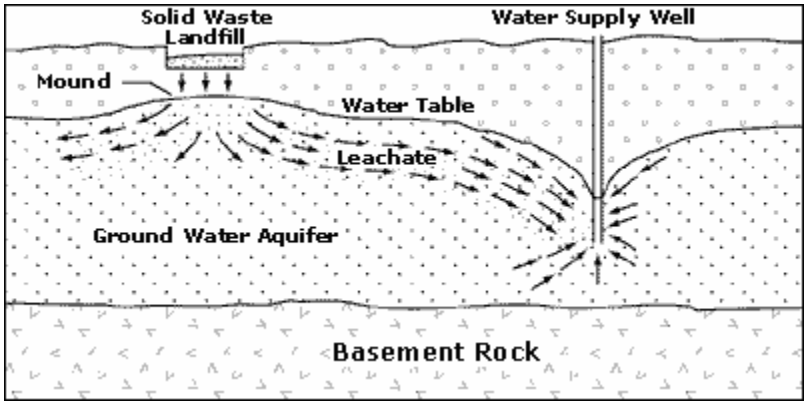
eat the seeds that pesticides and mowing leave behind, preventing vegetation from coming back in successive years. The city expects a savings of $10,000 for this project alone.

Biological methods, such as the use of native vegetation, used in conjunction with mechanical means, create and encourage stable, low-maintenance vegetation that is a more permanent vegetation management strategy. The establishment of desirable plant species that can out-compete undesirable species requires little maintenance and meets the requirements for management. Although native vegetation may take more time to establish itself, native flower and grass species are better adapted to local climate and stress. Native plant species are especially effective in providing increased erosion control, aesthetics, wildlife habitat and biodiversity. Numerous states have established roadside wildflower programs for these reasons.

Other control methods include the use of corn-gluten and steam treatments. Corn gluten is a natural preemergence herbicide and is classified by EPA as a "minimum risk pesticide." Steam treatments involve 800 degrees Fahrenheit temperatures and low pressure. This technique exposes the plant to high temperatures for a short period of time, disrupting the cell functions. Least toxic chemicals such as acetic acid (vinegar) or citric acids are known and registered herbicides and should not be discounted as effective chemical treatments. Many products have recently flooded the marketplace and are growing in popularity.

IV. Cape Cod's Unique Geography and Dependent Economy

As described by the U.S. Geological Service (USGS), "Cape Cod's landscape is defined by the glacier's deposition of loose material. These porous, sandy soils are highly absorbent. Such soils have a profound effect on the quality of underground water. Sandy soils make the underground water supply vulnerable to contamination - *toxic substances on the surface can travel through the soil quickly and can move great distances underground*."[57] The following image accompanies USGS's explanation of this unique and highly sensitive interaction between surface contamination and ground water in the Cape Cod area:



[57] U.S. Geological Service, *Cape Cod's Unique, "Absorbent" Geology*, (emphasis added) http://online.wr.usgs.gov/outreach/landpeople/students/cc_ccarea.html.

It is because of Cape Cod's unique geography and water supply relationship that application of toxic chemicals, even those improperly deemed sensitive area appropriate under more "normal" environmental circumstances, should be evaluated with a heightened degree of attention this delicate interplay.

In the above discussion of each chemical intended for application to Cape Cod ROWs, both known and unknown risks associated with each chemical were discussed in detail. It is not enough to follow application buffer zones around visible water sources and known well accesses in order to avoid these known and unknown hazards. These chemicals if applied to the unique geological surroundings of Cape Cod and under the unpredictable conditions that frequent the Cape Cod area will most certainly place humans, wildlife, and critical environmental resources at risk.

And if for some reason the threat of these health and environmental hazards is not enough of a reason to deny the YOP and require a plan which utilizes the diverse range of non-chemical alternatives, we would also like to point to the economic threat posed by utilizing such potentially hazardous chemicals in the Cape Cod area. Many of the known hazardous identified in the above studies show potentially devastating effects to aquatic species and ecosystems. In an area like Cape Cod where families depend on a robust fishing and tourist economy, adverse impacts to aquatic species and the surrounding ecosystems would be felt tenfold.

V. Conclusion

Based on all of the above concerns we have outlined above and the high potential for human and environmental impacts stemming from both the known and unknown hazards associated with the YOP chemicals, Beyond Pesticides, GreenCAPE, and POCCA believe that it would be irresponsible and contrary to the purpose and intent of Massachusetts's pesticide laws and regulations for MDAR to approve NSTAR's YOP.

This department has been charged with conserving and protecting natural resources and the environment, as well as enhancing the health, safety, and welfare of the people in the state of Massachusetts. To approve the use of any of these chemicals in the unique Cape Cod region when safer, non-chemical alternatives are available, is a failure to protect and uphold human and environmental health and safety in the state.

Thank you for the opportunity to comment.

Sincerely,

Jay Feldman, Executive Director
Aimee Simpson, Policy Director and Staff Attorney
Beyond Pesticides

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cc: Senator Daniel A. Wolf, daniel.wolf@masenate.gov