Minnesota Green Chemistry Forum Action Plan Nonylphenol ethoxylates in detergents v.2 October 6, 2015

Nonylphenol (NP) is persistent in the aquatic environment, moderately bioaccumulative, and extremely toxic to aquatic organisms. The primary use of NP is as an intermediate in the manufacture of nonylphenol ethoxylate (NPE). To a lesser degree than NP, NPEs persist in indoor and outdoor settings, are toxic to aquatic organisms, and are correlated with mild endocrine disruption effects in humans. In anaerobic settings in the environment, NPEs degrade into NP. MPCA studies consistently find NP, NPE, and other alkylphenols in Minnesota's rivers and lakes and in their sediments, in waste water treatment plant influent and effluent, and in waste water treatment residues generated, land applied, or incinerated.

General population exposure to NP (either directly or as a metabolite of NPE) has been confirmed by biomonitoring data from breast milk, umbilical cord blood, and urine. Exposure is a result of the presence of NP and NPEs in detergents, cleaners, agricultural and indoor pesticides, food packaging and cosmetics. These are potentially products of concern for women and children (EPA).

There have been a number of State, Federal and private responses to concerns over NP and NPE. Using criteria established in the Minnesota Toxic Free Kids Act (TFKA), the Minnesota Department of Health listed NPE as a Chemical of High Concern in 2010, and more recently, has been considering elevating the group of compounds to Priority Chemical status. The states of Washington and Maine have done the same, with related regulatory requirements. Also in 2010, U.S. EPA published its NP and NPE Action Plan. In that document, EPA concluded that one of the largest active uses of NPE was by industrial laundries, as a surfactant in detergents.

Using the information available, the MGCF Steering Committee decided to focus in on institutional laundry detergents. Lessons learned will suggest if other NPE uses such as pesticide surfactant might be considered for a future project.

Project Focus Area: Detergents/cleaners

Background

EPA's Design for the Environment program conducted an alternatives assessment for NPE and found 8 acceptable alternatives to its use as a surfactant in commercial/industrial detergents and in other cleaning applications. Under a voluntary agreement with U.S. EPA, the Textile Rental Services Association (TRSA) committed its members to phasing out NPE from all liquid detergents by December 31, 2013, and from all powder detergents by December 31, 2014.

In 2013, MPCA staff wanted to know the extent of Minnesota's industrial laundries' progress toward NPE phase-out, and if possible, what measurable effects phase-out was producing. MPCA staff generated an initial list of the five largest industrial laundry companies at 25 locations. Direct calling to these listings showed consolidation to 4 companies with 15 facilities in total. By mid-2013, all larger facilities reported switching away from detergents containing NPE. Among smaller firms/facilities, MPCA staff found only two of the smaller facilities using detergents containing NPE. Staff educated these firms about the concerns related to such use and the availability of safer alternative choices.

The CleanGredients® database includes over 300 surfactants reviewed and found to meet EPA Design for the Environment's Criteria for Safer Surfactants. However, each potential NPE alternative must be evaluated on a case-by-case basis as to both its safety profile and functional characteristics. Cost is a considerable factor as well, sometimes screening out alternatives prior to reformulation and performance testing.

The main NPE alternatives currently in use include alcohol ethoxylates, both linear and branched, and glucose-based carbohydrate derivatives such as alkylpolyglucoside, glucamides, and glucamine oxides (EPA Action Plan). Formulators may replace an NPE surfactant with a blend of two or more surfactants (e.g., a linear alcohol ethoxylate, or LAE, plus an alkyl glucoside). Chemicals which meet the Criteria for Safer Surfactants are acceptable for use in an EPA Safer Choice-labeled detergent or cleaning product (EPA Alternatives Assessment).

Primary suppliers to large laundries in Minnesota are Washing Systems, Inc. (WSI) and Ecolab. WSI developed a non-NPE alternative and its Minnesota customers were earliest adopters. Ecolab finished development of its alternative in 2012 with full implementation in Minnesota in 2013. Information MPCA staff gathered from large facilities confirmed that linear alcohol ethoxylates (LAEs) are the most commonly-used alternative to NPE.

Estimates provided voluntarily by twelve of the larger laundries showed they had eliminated about 646,000 pounds (323 tons) of NPE use and discharge per year, statewide. Seven of these twelve laundries which eliminated NPE discharge are in the Metro Twin Cities Main wastewater treatment plant sewershed, and MPCA estimates their total annual reduction at 179 tons. This apparently-large reduction led MPCA staff to expect to see some reduction in Main Plant influent concentrations. However, analysis in the fall of 2014 of 24-hour composite samples of that influent showed little change versus baseline data from influent sampling done in 2006 and 2007.

On the plus side for the Main Plant, even though NP and NPEs remain elevated coming into the plant (~30,000 nanograms/liter), they are removed down to the level of hundreds of nanograms/liter in final effluent. Advanced POTW systems may be having success in removing them from water, but this may not be the case with other public systems, private direct dischargers, or septic systems. In addition, large POTWs are transferring some of these (and other) compounds to their sludge (biosolids), which in many cases is land-applied where further impacts may occur. For these reasons, source reduction remains important.

MPCA staff made calls to some hotels about whether they are doing laundry in-house, versus sending it out to the industrial laundries which accomplished the phase-out. So far, staff have learned that most of the larger hotels are laundering in-house. Other larger institutions which might be doing the same include hospitals and other health care facilities, short and long-term care facilities, and others to be identified. Smaller dischargers could include car washes.

With this information that further commercial/industrial uses of NPE surfactants remain, MPCA chose to use the remainder of its limited sampling funds to work with MCES to sample points upstream in the Main Plant sewershed where residential (domestic) sources were dominant. Results of lab analysis showed those concentrations to be 1 to 2 orders of magnitude lower than Main Plant primary influent, suggesting relatively little contribution from household cleaners, paints, or clothing.

Objectives

- Engage manufacturing and purchasing companies to consider safer alternatives
- Support as necessary
- Elicit substitution by a subset
- Establish and collect measures
- Provide public recognition for successful partners

Possible Partners

- EPA Safer Choice/Design for the Environment program
- Metropolitan Council Environmental Services (MCES)
- League of Minnesota Cities, Coalition of Greater Minnesota Cities, Minnesota Rural Water Association
- Manufacturers/suppliers: Ecolab, Washing Systems, Inc. (WSI), Anderson Chemical
- Users: Fairview, Park-Nicollet, Carlson Companies
- Other key organizations (e.g., WA DOE, UMass-Lowell, GC3, NPPR)

Possible Participants

- American Hotel & Lodging Association
- Hospitality Minnesota (MN Lodging Association, MN Restaurant Association)
- Individual hotel chains
- Midwest Carwash Association
- Heartland Carwash Association
- Minnesota Hospital Association
- Minnesota Ambulatory Surgery Center Association
- Care Providers of Minnesota (residential care facilities)
- Minnesota Educational Facilities Management Professionals Association (MASMS)

Project Staffing

A. MGCF officers, Steering Committee members, project work group, other members/partners
B. MPCA (staff and Macalester interns)
C. U of M Center for Science, Technology, and Environmental Policy (students)
D. St. Olaf (interns)
E. MnTAP (health care waste assessment project)
F. IATP (especially where focused on non-urban)
G. EPA headquarters and Region 5

Steps

1. Preparation (October 2015 to January 2016)

Tasks	Staffing	Budget
a) Update MGCF web page to explain SC strategy, the project selection process, the NPE project, and how members can engage		
b) Develop intern position description(s) and distribute to college intern offices		
c) Plan and begin implementing dialogue on project with MGCF membership		
d) With partners, approach regional/national associations or prominent sector corporations – obtain commitments to collaborate		
e) Identify the universe of possible MN user companies (members/non-members of sector associations) and their key suppliers – finalize outreach database		
f) Identify any well-aligned funding (sources)		

2. Survey Minnesota user companies (members and non-members of sector associations) and their key suppliers (January to May 2016)

Tasks	Staffing	Budget
a) Design this stage depending on intern availability and education needs/goals (sample, targeted, 100%, assistance)		
b) Develop project materials, e-mail and phone scripts, database for intern use		
c) Assign user/supplier contacts to available interns and supervisors		
d) Work with association partners to encourage their membership to participate		
e) With partners, analyze data and draw conclusions on next steps (as needed)		
f) Develop proposals and pursue additional funds as needed to complete project		
g) Dialogue on the project with MGCF membership		

3. As needed, develop additional outreach mechanisms (Month 9 to Month 10); implement (Month 11 to Month 15)

Tasks	Staffing		Budget
	Develop	Implement	
a) Consider letter(s), meeting(s), follow-ups, referrals to third-party assistance or alternative providers; develop those selected			
b) Seek and plan MGCF or partners' meetings, remote networks, or events			
c) Resources permitting, set priorities for one-to-one contacts and follow-up			
d) Develop feasible metrics and collection methods (baseline and post-implementation) on company use reductions and Metro influent			
e) Leverage existing (Governor's Pollution Prevention Award, Environmental Initiative Awards) or create new recognition mechanism (award and/or presentation – possibly at 2017 MN conference)			
f) Dialogue on the project with MGCF membership			
g) Session on results and what lessons learned mean to MGCF at the 2017 Conference			