August 7th, 2017

To: Pam Biersach

From: Clean Wisconsin, Clean Water Action Council, Midwest Environmental Advocates, and Wisconsin League of Conservation Voters

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Subject: Economic Impact of Proposed NR 151 Targeted Performance Standards

The draft NR 151 rules recently issued by the Wisconsin Department of Natural Resources to address drinking water contamination in Northeast Wisconsin represent a good step towards better managing livestock waste that is polluting groundwater. It is imperative that the Economic Impact Analysis (EIA) conducted for these rules consider the benefits cleaner drinking water will provide for Wisconsin citizens in the affected counties. Reducing well contamination in parts of WI exceptionally vulnerable to groundwater pollution from surface sources like livestock waste will reduce health risks and health costs for Wisconsin citizens, save taxpayers and citizens money on well replacement or water filtration systems, and improve real estate values and quality of life for all residents in vulnerable areas of the state regardless of whether their well has been contaminated to date.

Additionally, the federal and state government, counties, and local municipalities spend tens of millions of dollars each year managing non-point source agricultural pollution. Just this year, Wisconsin committed up to $20 million to fund manure digesters that could in theory help reduce groundwater contamination by treating manure and reducing pathogens before that waste is spread on farm fields (WPSC, WDNR, WDATCP 2017). Numerous cost share and grant programs help farmers build manure management infrastructure, develop plans to carefully apply manure to minimize groundwater and surface water contamination, and install field conservation practices that help retain water and the nutrients and pathogens in it. These are all continuing costs citizens and taxpayers bear as part of efforts to responsibly manage manure and reduce water pollution from agricultural sources. The proposed rules will incrementally reduce this burden for addressing water contamination from livestock pollution.

We present below research that documents tangible economic benefits resulting from clean drinking water and ask the WI DNR to incorporate these benefits into the EIA.[1]

Economic effects of contaminated groundwater on property values

The limited studies available indicate that groundwater contamination can affect property values, much like the better-studied relationship between surface water quality and property values. Such potential costs should be considered in the EIA, particularly since this is likely to be an issue when the contamination is as widely-known as it is in the affected counties. It is also important to note that the studies found that the value loss is only temporary and values rebound once the contamination is addressed, underscoring how rules like these can have a real economic impact on property values.

While studies on the effects of groundwater microbial contamination on property values are lacking, of most relevance, Guignet et al. (2016) investigated the effect of agricultural contamination (nitrates, pesticides, and metals) of Florida property values and found a 2-6% decline in value as a result of contamination. Higher reductions were found when contamination exceeded regulatory standards (e.g., health standards); properties declined in value 7-15% when nitrate levels exceeded twice the regulatory standard.

Other relevant studies to consider:

a. Boyle et al. (2010) found that Maine home prices declined 0.5%-1.0% for every 0.01 mg/L arsenic contamination above the regulatory limit.
b. Case et al. (2006) found a 4.65% reduction in prices of Scottsdale, AZ, residential condominiums where groundwater was contaminated by volatile organic compounds.
c. Malone & Barrows (1990) found that nitrate contamination of residential property wells in Portage County, WI, created costs like sellers' remediation or treatment of the problem prior to sale.

[1] Note: all dollar figures presented below have been converted into 2017 dollars from the original study using the Bureau of Labor Statistics inflation calculator to provide consistency across different study years.

Economic Value of Avoided Illnesses

The value of avoided illness is another important economic impact that should be considered. Table 1 summarizes studies investigating household-level costs of relevant gastrointestinal illnesses from contaminated drinking water sources or incidental exposure to contaminated water from recreation. Except for severe cases, the majority of the cost comes from lost productivity (i.e., work days lost). Where visits to health care providers are involved, the listed costs underestimate the full economic impact of the illnesses because they do not include payments made by insurance companies.

An additional study of a 24-day salmonella outbreak from contaminated drinking water in Alamosa, CO (Ailes et al. 2013) calculated costs to insurers, businesses and government in addition to households. The study calculated that the city's 156 businesses lost over $500,000 due to closures and additional expenditures for clean water and ice. Governmental organizations were calculated to spend over $700,000 in response to the outbreak. Of total outbreak-related costs calculated in the study, the largest percentage was borne by households (33%), followed by governmental organizations (26%), and businesses (24%).

Economic Value of Avoidance Measures

A third category of important economic impact that should be considered is the cost of measures being taken to avoid drinking contaminated water, such as purchasing bottled water, buying treatment devices or digging new wells. The revised rule should reduce the need for people to take such measures. Table 2 summarizes findings from studies quantifying costs to avoid contaminated drinking water.

Other figures to consider relating to avoidance costs:

- The Wisconsin Department of Administration's Fiscal Estimate for this rule revision states the average cost to replace a contaminated well at $12,000 (WDoA 2017).
- An April 22, 2016, Door County Pulse article quotes Stonehouse Water Technologies as saying that the filtered dispenser system they donated to Algoma High School to provide clean drinking water to area residents costs $8,000-$9,000 plus $1,500 for installation and $4,000- $5,000 for annual maintenance and filters (Lundstrom 2016).

- The Groundwater Collaboration Workgroup's Final Report recommended a one-time appropriation of $300,000 for reparations including providing safe water supplies, treatment systems, and new well construction, as well as $10,000 annually to supply emergency clean water supplies (GCW 2016).
- Costs estimated to be associated with the temporary water supply program authorized by Wis. Admin. Code Ch. NR 738.
- Costs estimated to be associated with the well compensation program under Wis. Admin. Code Ch. NR 123.

Table 1. Summary of studies of household-level gastrointestinal medical costs associated with exposure to contaminated drinking or surface water.

Exposure	**Medical Costs**	**Costs Included**	**Source**
Recreational exposure from swimming or wading in six US states (AL, IN, MI, MS, OH, RI).	Mean cost per case of acute gastrointestinal illness was $189 (range: $7-$1,396)	Medications, doctor visit, ER visits, lost productivity.	DeFlorio-Barker et al. 2017
Recreational exposure from various boating-related activities in Chicago-area waterways.	Mean cost per case of acute gastrointestinal illness was $212 (range: $4-$3,381)	Medications, doctor visits, ER visits, lost productivity.	DeFlorio-Barker et al. 2017
Recreational exposure from Orange County, CA, beaches	Mean cost per gastrointestinal illness was $51	Doctor visits, lost productivity.	Dwight et al. 2005
Cryptosporidium outbreak in Milwaukee, WI, drinking water supplies.	Per case costs for mild illness was $196; moderate illness cost $804; severe illness cost $13,220.	Hospitalization, doctor visit, ER visits, ambulance transport, medications, lost productivity.	Corso et al. 2003
Giardia-contaminated groundwater in Luzerne County, PA.	Per case costs calculated to be $912-$1,208.	Hospitalization, doctor visit, ED visit, lab tests, medications, lost productivity.	Harrington et al. 1989

Table 2. Household costs of contaminated drinking water avoidance

Contamination	Avoidance	Cost	Source
Giardiasis in Luzerne County, PA	Transporting water, boiling water, buying bottled water	Monthly household costs of $239-$753.	Harrington et al. 1989
Bacterial, mineral, and organic in rural WV	Transporting water, boiling water, buying bottled water, installing home systems, repairing water systems	Monthly household costs of $50-$56.	Collins & Steinback 1993
Giardiasis in Milesburg, PA	Transporting water, boiling water, buying bottled water	$25-$66 per month	Laughland et al. 1993
Perchloroethylene in College Township, PA	Transporting water, boiling water, buying bottled water, installing home systems	$41-$50 per month	Abdalla 1990
Trichloroethylene in College Township, PA	Transporting water, boiling water, buying bottled water, installing home systems	$25-$55 per month.	Abdalla et al. 1992
Nitrates in MN	Bottled water	$213 (range: $40-$672) per year.	Lewandowski et al. 2008
Nitrates in MN	Reverse osmosis: system not specified (presumably point-of-use)	$97 (range: $28-$224) per year.	Lewandowski et al. 2008
Nitrates in MN	Distillation system	$1076 (range: $213-$3,360) initial cost.	Lewandowski et al. 2008
Nitrates in MN	New well	$8,064 ($3,360-$16,800) initial cost	Lewandowski et al. 2008
Nitrates in MN	Reverse osmosis: point-of-use system	$497 (up to a 4-person household) per year.	Sargent-Michaud et al. 2006.
Nitrates in MN	Reverse osmosis system: point-of-entry system	$1,510 (2-person household) - $3,072 (4-person household) per year.	Sargent-Michaud et al. 2006.
Nitrates in MN	Bottled water	$777 (2-person household) - $1,555 (4-person household) per year.	Sargent-Michaud et al. 2006.

In conclusion, we look forward to seeing an economic analysis of the impacts of these proposed rules that considers both the moderate and reasonable, though not insubstantial, costs this rule will present for agricultural producers as well as the clean water benefits it will provide to every citizen in Northeast Wisconsin that lives in the counties impacted by the rules. Thank you for considering our comments.

Please direct any follow up to:

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