State of Oregon Workplan: Protecting Public Health from Nitrate Exposure in the Lower Umatilla Basin Ground Water Management Area

Background

In accordance with Oregon's Groundwater Quality Protection Act of 1989, the Oregon Department of Environmental Quality (DEQ) and the Oregon Department of Agriculture (ODA) declared the Lower Umatilla Basin a Groundwater Management Area (LUBGWMA) in 1990 because regional nitrate-nitrogen concentrations exceeded 7 milligrams per liter (mg/L). This area encompasses Hermiston, Boardman, Irrigon, Stanfield, Echo and surrounding areas in Morrow and Umatilla counties. An interagency group formed after the GWMA declaration conducted a four-year hydrogeological investigation to determine the extent and potential sources of contamination. The identified sources of excess nitrate in groundwater included fertilizers, septic systems, wastewater treatment effluent, animal wastes, industrial wastes, and food processing waste waters (source: LUBGWMA, https://lubgwma.org/).

Exposure to high nitrate and nitrite concentrations in drinking water can cause methemoglobinemia (decreased ability of the blood to carry oxygen to tissues), which is a serious health concern for infants and pregnant or nursing women. Related symptoms include decreases in blood pressure, increased heart rate, headaches, abdominal cramps, vomiting and in some cases death.

At the national level, research has found "relatively high nitrate concentrations…in some privately owned wells with shallow depths and permeable soils. Drinking of water from such sources, combined with nitrate intake from the diet, may result in overexposure to nitrate in some individuals."[1] The Oregon Health Authority (OHA) estimates there are approximately 4,500 domestic wells in the LUBGWMA, serving an estimated 12,000 household members.[2] The demographics of the area tend to be, compared to the state, more ethnically diverse (Hispanic: Umatilla 28%, Morrow 38%, Oregon 13%), higher representation of American Indian/Alaska Native populations (Umatilla 4.3%, Morrow 2.5%, Oregon 1.8%) and with a higher poverty rate (persons in poverty: Umatilla 13.9%, Morrow 12.7%, Oregon 11.4%) (source: US Census Bureau, https://www.census.gov/quickfacts/fact/table/morrowcountyoregon,umatillacountyoregon,OR/PST045219).

Oregon's groundwater quality protection program consists of several programs spread among different state agencies. Four state agencies, OHA, DEQ, ODA and the Oregon Water Resources Department (WRD) implement the majority of federal and state programs relating to groundwater. OHA is the primacy agency administering and enforcing drinking water quality standards for public water systems

[1] Agency for Toxic Substances and Disease Registry. 2017. Toxicological Profile for Nitrate and Nitrite. Accessed 12/07/2021 at https://www.atsdr.cdc.gov/toxprofiles/tp204.pdf.

[2] OHA developed this estimate by overlaying the DEQ LUBGWMA boundary on Oregon WRD-provided domestic well locations and estimating household size as 2.7 members which is a rounded from Umatilla and Morrow County rates.

(PWS) under the Safe Drinking Water Act (SDWA) and Oregon law. PWSs are required to monitor, report results and, where necessary, treat water to ensure nitrates in drinking water do not exceed Maximum Contaminant Levels (MCLs). Several PWSs in the area have been impacted by nitrate contamination in the past and have had to either install treatment or drill deeper wells. Currently, all but one PWS in the LUB GWMA are meeting MCL requirements for nitrates.[3] DEQ is responsible for implementing a range of programs that may directly or indirectly affect groundwater quality (including wastewater permitting, onsite septic management, underground injection control, water reuse, biosolids management, hazardous waste, cleanup and tanks programs), and also is responsible for overseeing the implementation of the state's Groundwater Quality Protection Act and rules. DEQ's laboratory provides monitoring support to many program areas relating to groundwater, including groundwater monitoring for the Groundwater Management Areas.

Nitrate challenges in the Lower Umatilla Basin come from a variety of sources and have included contributions from industrial land application and confined animal feeding operations. The LUBGWMA was established, as required by Oregon statute, to allow for the identification and implementation of practices that will reduce nitrate loading and reduce groundwater nitrate concentrations below 7 mg/L. To accomplish such tasks, the LUBGWMA Committee was formed and is composed of local area residents and governments representing a broad range of interests within the local area and basin. Under statute, several additional agencies are required to be involved, including Morrow & Umatilla County and city planning agencies, DEQ, OHA, WRD, ODA, and Oregon State University's (OSU) extension agricultural research center. Umatilla and Morrow County Soil and Water Conservation Districts (SWCDs) are also involved. Morrow SWCD is designated the lead agency for developing and implementing the Second Local Action Plan.

Sampling efforts in the LUBGWMA have included initial reconnaissance sampling, regular sampling, synoptic events, and real estate transaction data that have included public water supply systems, domestic drinking water wells, monitoring wells from cleanup sites and permitted facilities, industrial, and irrigation wells. These data show varied nitrate levels from non-detect to elevated concentrations above the MCL of 10 mg/L. While these data are not exhaustive, they can provide insight into areas of concern that are the focus of the actions described by OHA and additional actions described by DEQ and ODA.

Based on historical sampling efforts of private drinking water wells in the area primarily for nitrate and due to limited regulatory authority over private drinking water wells in Oregon, local and state agencies have recommended installation of resin or reverse osmosis based systems to remove the contaminants from households. Some limited households have installed these systems, but complete data are not available. At least 2 of the 30 wells DEQ monitors have these systems.

In addition, concurrent with work on nitrates in the LUBGWMA, state agencies and EPA worked on perchlorate concerns in the area in early to mid 2000's which led to some analyses and evaluations addressing both contaminants, including DEQ and EPA's CERCLA programs conducting a Preliminary Assessment/Site Investigation of the area for perchlorate. As part of that work, EPA, DEQ and others

[3] The one exception is the Hat Rock State Park, where the treatment system recently failed. The Park is currently closed for the season and the ranger is provided with bottled water until the treatment system can be corrected.

conducted a study to test the effectiveness of the reverse osmosis treatment systems for removing both nitrate and other contaminants such as perchlorate.

The Local Advisory Committee convened as part of the Groundwater Management Area designation and process has developed two action plans to identify voluntary practices that will reduce nitrate loading and reduce groundwater nitrate concentrations. The First Action Plan was developed in December 1997. The Second Action Plan, finalized in October 2020, identifies and relies upon voluntary actions that will reduce groundwater nitrate concentrations while sustaining this reduction so that public and private drinking water remains safe to drink.

The sections below describe work that OHA will do supported by additional actions on the part of DEQ and ODA to carry out public health interventions to reduce human exposures to nitrates in domestic well water in LUBGWMA.

I. OHA Workplan Components

Oregon's goal is to eliminate LUBGWMA domestic well water consumer exposure to high nitrates, which under the federal Safe Drinking Water Act is defined as a level above 10 mg/l. While efforts are underway to reduce the introduction of nitrates into the groundwater, additional efforts are needed to protect public health from exposure to elevated nitrates in domestic well tap water. This can be accomplished through enhanced outreach and education, increased domestic well sampling and, where necessary, point of use or whole house domestic water treatment or substitution with bottled/trucked water. OHA has identified four elements of a workplan to accomplish this goal. The "Implementation Resources and Needs" section discusses opportunities and constraints to implement these workplan elements based on anticipated staff and financial resources.

A. Outreach and education. Conduct an outreach and education program with development of culturally and linguistically accessible materials targeting low-income households, including people of color and vulnerable communities. This would include local outreach and education support from (and resources to) local public health authorities, community-based organizations (CBOs), non-governmental organizations (NGOs) and possibly the Yellowhawk federal tribal health center on the Confederated Tribes of the Umatilla Indians reservation.
Once the program coordinator position is filled (projected for spring 2022), a two-phase outreach and communications plan can be developed to first (Phase 1) harness currently available materials and partnerships. This first phase could begin in summer 2022. Given grants resources detailed below, Phase 2 development of new outreach materials by partners in conjunction with community members could commence by winter 2023. This recognizes that new legislatively approved resources would not be available until late summer 2023 and time would be needed to develop and execute mini grants. These materials would be ready to incorporate in outreach events and activities by fall 2024.

B. Hazard assessment. Conduct a detailed hazard assessment of available nitrate data for LUBGWMA wells and demographic analysis of affected communities. Once the new environmental epidemiologist position is filled (projected for spring 2022), this project would assume primary importance and could be performed using currently available data, to be

completed by the end of calendar year 2022. Collection and incorporation of new data into the hazard assessment would come later.

C. Domestic well water screening, testing and interpretation. Hold community screening events for well owners to bring sample jars of water for onsite evaluation to indicate whether follow up testing is needed. OHA will provide testing vouchers or fund access to well water testing for nitrates, ideally as part of an expanded scope that includes lead, bacteria and arsenic. OHA will also provide educational support to interpret test results and provide guidance to well users. OHA will facilitate and coordinate resources to local and tribal public health authorities and local CBOs and NGOs to partner in these actions to ensure successful uptake of domestic well testing resources. Commencement and activities for this component could commence in fall of 2023, however, are dependent upon availability on outreach and education resources in component (A) and on additional resources needed to conduct community screening, and partnerships with outreach partners and contracts with environmental laboratories. OHA will request these resources for this component as part as a policy option package to the Oregon Legislature in spring 2023. Availability of federal grants or funding could supplement these resources and activities could commence sooner dependent on completion of the health hazards component in (B).

D. For well users with test results indicating high levels of contaminants, offer relief in the form of bottled/trucked potable water, installation and maintenance of water treatment systems or connection to nearby community water systems. Given availability of water testing results as well as contract resources detailed below, these activities could commence in fall or winter 2023.

II. OHA Implementation Resources and Needs

There are currently very limited OHA resources allocated to addressing domestic well concerns in Oregon. Additional staff, pass-through funding to partners and contractual support for environmental laboratories and water treatment professionals are needed to successfully fulfill this workplan. Needed resource considerations, and the status of each, include:

A. Staffing:
   a. Domestic Well Safety Program Coordinator- A program coordinator (Program Analyst 2) would lead implementation of the workplan, including guiding outreach development and delivery, develop and track grants and contracts, coordinate and or conduct data entry, and meet program administrative requirements. OHA lost federal Centers for Disease Control funding for this position in August 2020. The OHA's Public Health Division, Environmental Public Health Section (EPH) recently received approval to use short term (through June 2023) state funding to recruit and fill the position on a limited duration basis. Based on available funds coordination, Phase 1 outreach and education activities (component (I)(A Phase 1) will occur through June 2023. OHA plans to request a permanent, state-funded position from the 2023 Oregon Legislature.
   b. Environmental Epidemiologist- OHA has new permanent funding from the 2021 legislative session and is currently actively recruiting for an environmental

epidemiologist (Epidemiologist 2) to conduct the detailed hazard assessment and demographic analysis to support LUBGWMA work as indicated in component (I)(B).

B. Grants and contracts: OHA would need to obtain funding to accomplish the following activities. Absent federal funding, OHA plans to request funding support for these activities with a legislative request in spring 2023:
    a. Provide mini grants for local and tribal public health authorities and local community based and nonprofit organizations to develop and deliver culturally and linguistically accessible outreach and education materials (workplan component (I)(A Phase 2)), hold outreach events (including rapid colorimetric nitrate tests) and support local domestic well users in navigating the process of testing and treating domestic well water (workplan component (I)(C).
    b. Contract with accredited environmental laboratories to provide domestic well testing free of charge to consumers (workplan component (I)(C).
    c. Contracts for alternative sources of water for consumers in the form of bottled/trucked potable water, and installation and ongoing maintenance of water treatment systems (workplan component (I)(D). Coordination of state and local agency resources would also be conducted to provide alternative sources of drinking water. Relief in the form of connection to nearby community water systems would require negotiation of terms with those systems.

C. Other services and supplies: Resources are needed to operate and maintain staff travel expenses, telecommunications, databases and applications.

OHA plans to submit a Domestic Well Safety Program funding request (Policy Option Package, or POP) to the 2023 Oregon Legislative Session. That POP would include request for position authority and funding for a permanent Program Analyst, funding for grants to local partners and contracts for services and supplies described above. In addition, OHA will seek to identify federal grants that might fund additional program activities.

III. DEQ Workplan Components

A. Ongoing Activities: DEQ continues to help facilitate the LUBGWMA local advisory committee as the lead state agency on implementation of the Second Action Plan. In this plan, the committee describes plans to develop nutrient and irrigation best management practices and guidelines. The committee also plans to pursue a United States Geological Survey (USGS) led effort to study, characterize, and develop a comprehensive groundwater and hydrology transport model for the Lower Umatilla Basin. Additional activities that DEQ is currently involved in include:

    a. Permitting of sources with the potential to discharge nutrients that could affect groundwater:

        i. DEQ's regulatory waste discharge permits are designed to reduce nitrate loading to the groundwater from various potential sources, including food processing industrial wastewater discharges and large-scale septic systems, and

will continue to do so. DEQ is reviewing permits as they are renewed to evaluate conditions and land application practices to ensure requirements reflect land application at agronomic rates with focus on areas where we believe there are higher levels of nitrates in groundwater and where domestic wells are present.

ii. DEQ provides oversight of solid waste permits which includes split sampling at regional landfills and other potential sources for groundwater impacts.

b. DEQ provides on-going groundwater monitoring activities which includes sampling, analysis, and reporting from a representative well network (~30 sites per event).

c. DEQ and EPA are providing direct oversight of the Umatilla Depot Superfund restoration activities including operating a groundwater pump and treat system to reduce nitrate sources.

d. DEQ's groundwater, state revolving fund (SRF) and aquifer storage and recovery/aquifer recharge (ASR/AR) programs continue to work with regional stakeholders on water supply infrastructure projects, many of which include utilization of Columbia River water during the winter in an effort to dilute nitrate concentrations within groundwater.

e. DEQ facilitates the use of financial incentives to encourage the use of technologies that reduce nitrate contributions from septic systems to groundwater, including promoting Clean Water Loans and the new onsite septic financial aid program offered through DEQ to make repairs more affordable as described in the Second Action Plan and in the following section.

B. Additional/Pending Activities:

a. DEQ will evaluate available data (recent and historic) to provide consultation and support to OHA as they develop targeted outreach and testing efforts described under Items II. A-C of this workplan. Specifically, DEQ will use available data and mapping to make recommendations on where to focus outreach and sampling efforts within the LUBGWMA to address areas of greatest risk for potential private drinking water contamination.

b. DEQ is providing onsite septic system resources to assist with repair and replacement of onsite septic programs with an emphasis on low/moderate income households. Two types of resources will be available in 2022:

i. Onsite septic system loan program (administered via Craft3, a non-profit Community Development Financial Institution)

ii. An additional financial aid program will be developed and funded through a $15M ARPA appropriation, that may provide grants, in addition to loans, for low/medium income households to address repair or replacement of failing onsite septic systems.

c. Pursue funding and legislative concepts in 2023 that would support enhanced DEQ capacity for groundwater monitoring to support efforts to characterize water quality conditions and changes over time, and staffing to support groundwater assessment, SRF projects, water quality permitting, and agronomy work.

IV. ODA Workplan Components

A. Ongoing Activities, Confined Animal Feeding Operations Permit Program:

ODA and DEQ operate the Confined Animal Feeding Operations (CAFO) Permit Program, including groundwater protections through CAFO National Pollutant Discharge Elimination System (NPDES) and Water Pollution Control Facility (WPCF) water quality permit programs through a MOU (7-2021) that describes each agency's roles and responsibilities. ODA currently lists 13 permitted CAFOs in the LUBGWMA. All 13 are registered to an NPDES CAFO Permit with five facilities on Individual CAFO NPDES Permits and eight facilities registered to the No. 1-2016 CAFO General NPDES Permit. All the Individual Permit holders are large CAFOs. For the General Permit registrants, one is small, one is medium and six are large CAFOs.

a. The existing CAFO permitting program provides robust, comprehensive oversight of the CAFOs requiring permit coverage in the LUBGWMA. ODA and DEQ jointly issue CAFO Individual and General Permits that prohibit any nutrient discharge to surface or ground waters of the state and contain a numeric effluent limit of zero (0) mg/l of nitrate (subject to lab quantitation limits).

b. The permits also require an ODA-approved Nutrient Management Plan that details how all nutrient applications from all sources will conform with ODA-approved agronomic rate calculations and permit conditions.

c. The large, individually permitted CAFOs all have groundwater monitoring wells required by their permits. All permits require extensive permittee inspections, sampling and record keeping documenting compliance. ODA conducts routine inspections at a minimum of one every 10 months and more frequently on the larger, individual permitted facilities.

A. Additional/Pending Activities:

a. ODA will continue to work with DEQ to make changes to CAFO permits as they are reviewed, or as new applications are received for the LUBGWMA. Current permit changes being implemented in the LUBGWMA are as follows:

i. Require surveillance nitrate sampling for all drinking water wells located on the respective CAFOs.

ii. Require any new Large Tier I or II CAFO or existing CAFO implementing changes that would create a new Large, Tier II CAFO to undergo a two-step permitting process. In step one, upon receipt of a complete application and design package and completion of the public notice and participation process, the agencies would grant approval to construct the new or expanded CAFO facilities. As part of the

public participation process ODA has increased its outreach by engaging the Environmental Justice Task Force as well as reaching out directly to the nine federally recognized Tribes of Oregon. In step two, once the new or expanded facilities are constructed, they must be inspected for operability and approved prior to occupation and operation.

iii. Require any new or substantially modified earthen manure and process wastewater storage facility to have a double layer synthetic liner with a leak detection system.

b. There are a group of other livestock and irrigated agriculture operations located in the LUBGWMA that are defined as non-point sources and are regulated by ODA's Agricultural Water Quality Program (AGWQ). The AGWQ program has supported grant applications for Soil and Water Conservation Districts to work with landowners on best management practices dealing with water quality issues including water conservation and manure and nutrient management. The AGWQ program also responds to complaints and ensures compliance through inspections of operations with potential risk to surface and groundwater. The normal pre-inspection process involves an assessment of risk to both surface and groundwater resources.

c. Under HB 5006 (2021) Statewide Adjustments and Budget Reconciliation Adjustments, Section 91 added General Fund for the agriculture water quality management program including in part $500,000 one-time funding to continue work related to the State's GWMA's. Of this, $250,000 is to contract with a facilitator to coordinate a task force around the LUBGWMA with state agencies and local partners. The other $250,000 will be used to complement existing research ODA is doing related to fertilizers and nitrate levels that are impacting groundwater.

V. Conclusion

Based on these current and planned activities, OHA along with DEQ and ODA have developed a workplan to better protect public health from excessive nitrate levels in drinking water in the LUBGWMA. Oregon's state agencies are committed to better identifying the communities exposed to nitrates in drinking water, communicating the risks of exposure to affected private well owners and users, providing access to private well testing and reducing the risk of exposure to those well users.