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Senate Rules Committee

June 9, 2025

Submitted by Greg Pettit

Dear Chair Jama, Vice Chair Bonham and Member of the Committee,

My name is Greg Pettit. I retired from DEQ in 2014, after working for DEQ for over 37 years. My positions included 12 years as Administrator of the Laboratory and Environmental Assessment Division, and 11 years as Manager of the Water Quality Monitoring Section. Most importantly, however, in 1986 I conducted a statewide survey of agricultural chemicals in groundwater. The survey found widespread contamination of private drinking water wells throughout the state with nitrate, arsenic, and pesticides well above health based drinking water standards. In 1987 I became the Agency Groundwater Quality Coordinator and was the lead for the development of the Oregon Groundwater Quality Protection Act that was adopted in 1989.

I believe the committee is aware of the extent of private well contamination in Oregon and the serious public health threat in causes based on testimony I and many others provided. I know that you and your colleagues are seeking solutions to this problem that all the affected stakeholders can support.

There are three declared Groundwater Management Areas (GWMAs) in Oregon; Northeastern Malheur County, Southern Willamette Valley and the Lower Umatilla Basin. Of these three, only one has had success in reducing contaminant levels in private wells. That is the Northeastern Malheur County GWMA. I knew this one had improving trends, but I had a lot of questions about what they did and how it had become successful. In April while I was in Ontario on another business, I had an opportunity to visit with Clinton Shock, PhD. Clinton is a Professor Emeritus of Crop and Soil Science, Oregon State University. From before the GWMA was declared until recently he was the Director of the OSU Malheur Experiment Station. What I learned from Dr Shock was a remarkable success story, and one from which any of us trying to address this issue should learn valuable lessons. Following our visit, Dr. Shock provided me with a detailed report on the issues they had to address, and how that was done. I have attached that report to this testimony and I sincerely hope you all have a chance to read it.

In the limited time for my testimony, I will summarize issues addressed in the report, followed by my observations of critical issues.

The report addresses the following issues: Writing the “Plan”, Continuity of community involvement, Broad participation and support, Key participants, Conditions at the onset of the groundwater management area, Principal changes that made a difference, Appendix, and solving groundwater contamination by DCPA residues.

My conclusions:

1. Persistence in overcoming obstacles. There were many social, financial and scientific obstacles that had to be overcome. These included dealing with DEQ unrealistic expectations and revolving personnel. Finding funding for research at the experiment station and finally proving alternative practices that benefited all stakeholders. This was accomplished by persistence, partnership and good science.
2. The focus was on finding solutions, not defending existing practices. It took Dr. Shock years to experiment, perfect and prove alternative farming practices that were beneficial to both farmers, and impacted well owners.
3. This is truly a win-win story. We can solve these problems. The practices developed have greatly reduced leaching of nitrate to groundwater and eliminated the DCPA (Dacthal) pesticide contamination issue. At the same time, they improved yields, product quality, and reduced costs.

Thank you for this opportunity to provide testimony.

Attachment: Progress in Northeastern Malheur Groundwater Management Area, Clint Shock, April 16, 2025

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in the Northeastern Malheur Groundwater Management Area

Clint Shock

16 April 2025

1. Writing the "Plan"

   The ODEQ appointed a citizen's committee in 1989. Charged with helping to formulate a local groundwater management Plan, the citizen committee defined various environmental issues of concern, even beyond ODEQ's priorities including other water issues, invasive weeds, and more. Some of the local environmental concerns predate ODEQ's groundwater initiative by an earlier Malheur County citizen's committee (1978-1981) not associated with the state government. The early local county committee published their findings, but never garnered state support.

   The citizen's groundwater committee (1989-1991) was unhappy with ODEQ's writing of various parts of the local groundwater management Plan in the name of the committee. The draft Plan was rejected 5 times by the citizen's committee. The worst sticking points were criteria for success (that were judged to be infeasible short term over a few years). Failure of our community to successfully meet the groundwater improvement criteria in the Plan would trigger ODEQ's assumption of command and control of irrigation and nutrient use in the region. Short term rapid groundwater improvements were considered infeasible by the committee for a range of reasons. Infeasibility to quick water quality improvements would be hampered by the slow movement of groundwater to the river, substantial nitrate in the vadose zone (the layer of soil between the plants root zone and groundwater), and the lack of proven available options to change 1980's farming practices.

   The repeated rejections of the Plan by the citizens committee were accompanied by a revolving ODEQ employee representation to the committee. The 6th version of the Plan was only accepted by the committee because wording submitted by

the committee to ODEQ was included. The wording of the 6th version provided an additional description for “plan success” -- grower adoption of new practices that could lead to groundwater improvements. The opportunity for voluntary adoption of improved practices provided a key incentive for innovative research and changes by growers.

Unfortunately, several descriptive parts of the groundwater function in the Plan were retained by ODEQ despite of coherent committee objections to their accuracy (Appendix, Part 1).

2. Continuity of the committee and community involvement

Shortly after the plan was adopted, ODEQ showed no further interest in meeting with the citizen’s committee or local leaders. An open controversy within the committee was “why are we meeting when ODEQ no longer is involved or interested.” The committee decided to continue meeting regularly anyway and work on local problems.

After a couple of years, the citizens who remained active was reformed into a Malheur County appointed “Water Resources Committee.” Years later following expanded water quality incentive programs of the Oregon Water Enhancement Board (OWEB), the county Water Resources Committee was reorganized into the Malheur-Owyhee Watershed Council. All these activities were closely coordinated through the Malheur County Soil and Water Conservation District (SWCD) until about 2012. The SWCD and cooperative NRCS office have remained active in implementing water quality improvement and irrigation efficiency projects over the past three and a half decades and even before the start of the groundwater management area. The Malheur-Owyhee Watershed Council eventually became both a Malheur Watershed Council and an Owyhee Watershed Council. The Owyhee Watershed Council was constructively born out of increased interest by ranchers in the Owyhee watershed that had been generated by a highly successful Malheur-Owyhee Watershed Council project along the Owyhee River. The division of the council was a process of complementary growth. Both councils generated successful subgroups, one of which was The Lower Willowcreek Working Group where Jerry Erstrom was honored with a 2011 World Irrigation and Drainage recognition. A constructive subgroup under the Owyhee Watershed Council is the Jordan Valley Cooperative Weed Management Area which functions with great effectiveness.

The OSU Malheur Experiment Station energetically sought and received research support to help understand and address irrigation efficiency and nutrient management problems. Commodity groups were central to the continuity of funding.

3. Approach to innovation, philosophy of change, and incentive programs

   As a community, we sought solutions to contamination problems that would be cost effective. How could crops be fertilized and irrigated so that yields and/or crop quality be improved using lower levels of water and nutrient input? Could more different weed control options be found to more selectively control weeds, lower input costs, and reduce groundwater contamination? Could grower options to protect groundwater be found that also increased profitability? Better profitability greatly facilitates adoption.

   While many growers have initiated changes and improvements on their own, financial incentives are very important. Many millions of dollars of nutrient management, water quality, and water conservation projects have been implemented in Malheur County. Projects have been written by the watershed councils, Malheur County SWCD, and SCS/NRCS. Projects have envisioned benefits to growers and the environment. Funding has come from many sources. Growers and ranchers have successfully implemented these projects. These projects a huge commitment by many parties.

4. Broad participation and support.

   Groups involved to the research and outreach included the Malheur County Soil and Water Conservation District, the OSU Malheur County Extension, the OSU Malheur Experiment Station, the Malheur County Water Resources Committee, the Malheur-Owyhee Watershed Council, Western Laboratories of Parma Idaho, the Irrometer Company of Riverside California, the Malheur Onion Growers, the Idaho Eastern Oregon Onion Growers, the Nyssa-Nampa Sugar Beet Growers Association, the Oregon Potato Commission, the Oregon Wheat Commission, ODEQ, USEPA, and Clearwater Supply (a drip irrigation dealer).

5. Key participants

   In the beginnings of the groundwater program, Barry Fujishin, Herb Futter, Lynn Jensen, and Jim Nakano were key players in getting the county started in the right direction. Dedicated participants from the very first onset of the ODEQ groundwater committee in 1989 until their deaths or retirements included Lynn

Jensen (OSU, Ontario) and growers Jim Nakano, Jerry Erstrom, and Dale Luther (Citizens Committee and other roles). They are all now deceased. Other key people along the way for various lengths of time included Barry Fujishin, Reid Saito (Onion growers), Yasu Teramura (grower), many other growers, Kathy Pratt (MOWC), Ron Jones (SWCD and ODA), Karen Leindecker (OWEB), Jim Klauzer (drip irrigation with Clearwater Supply, Ontario), Kelly Weideman (MOWC then MWC), Ken Diebel and Andy Bentz (MWC0Greg Capps, Linda Rowe, and Gary Faw (all of the SWCD), Eric Eldredge, Tim Stieber, Charles Stanger, and Erik Feibert (OSU, Ontario), Robert Sanders (local potato grower then later head of the Oregon Potato Commission, Portland), Al Mosley (OSU, Corvallis), Dale Westerman (ARS, Kimberly, ID), John Taberna (Western Labs, Parma, ID), Herb Futter, Ed Peterson, and Lynn Larsen (SCS then NRCS, Ontario), Carl Hill and others from the Owyhee Watershed Council, and Al Hawkins (Irrometer Company, Riverside, CA). They have had very different and constructive roles.

6. Conditions at the onset of the groundwater management area

Through 1990, much of the fertilizer applications were based on blanket fertilizer doses for a particular crop, rather than a prescription based on soil or plant tissue analyses. Many of the blanket doses in 1990 were excessive and delivered too much fertilizer N. Fertilizer was often applied in the fall when no crop was present in the field to take up nutrients. Growers typically followed sound crop rotations and incorporated crop residues into the soil. Malheur Experiment Station research showed production practices in the 1980's and early 1990's applied vastly more fertilizer N was applied than what was recovered in the sequence of 4 to 5 harvested crops typical of a crop rotation. The nitrogen balance on onions between N applied and N recovered in the harvested crop was especially negative.

Typically, much of the fertilizer for the next year was applied in the fall of the preceding the crop year. Fall applications subjected the nitrogen to loss by leaching or movement toward the soil surface in dry winters. Following fall applied N fertilizer, nutrient movement toward the soil surface often resulted in plant stand losses during the subsequent spring.

The predominate use of surface flood irrigation pushed soil nitrate deep into the soil profile, which Lynn Jensen and the Malheur Experiment Station found was especially problematic for onions. Studies were initiated examining the fate of N in the soil comparing furrow, drip, and sprinkler irrigation. Specifically, how could

onion yield and quality be increased while reducing N inputs and confining N movement through the soil profile?

7. Principal changes that made big differences

    a. Fall fertilizer applications were dramatically decreased, basically through outreach, reasoning with growers about the inefficiencies of fall fertilization and grower self-interest.
    b. Research that described the precise soil moisture requirements for onions allowed the discovery of how to increase bulb yields and quality while using less water. Careful management of precise drip irrigation eliminated most water movement and nutrient leaching below the root zone. OSU results were published and presented. Growers started implementing results.
    c. The increased use of split fertilization through side-dressing during crop growth increased N fertilizer use efficiency. The adoption of drip irrigation to replace surface flood irrigation allowed the possibility of spoon-feeding nutrients to crops as the nutrients were needed, vastly reducing nutrient applications. Tissue and soil testing with rapid receipt of data allowed growers to make accurate fertilizations with the actual limiting nutrients, thereby reducing waste and expense. Much of the N fertilizations were shown to be unnecessary. OSU results were published and presented. Growers started implementing results. Western Labs in Parma Idaho provided rapid turnaround of tissue and soil data allowing real time nutrient management of onions, potatoes, sugar beets, and other crops.
    d. Deep rooted crops such as corn, wheat, and sugar beets in the crop rotation were proven to efficiently recover nutrients that had escaped the root zone of shallow rooted crops such as onions and potatoes. Deep-rooted crops recovered nitrate that otherwise would be lost. Tissue testing of the deep-rooted crops allowed financial savings by avoiding or reducing fertilizations through the entire crop rotation. Growers started implementing experimental results.
    e. Excessive nitrogen supply to sugar beets was found to result in excessive nitrate and ammonium in the beets. These excesses in turn reduced sugar extraction from the beets and sugar recovery in the factory. The excessive N supply to the beets can come from both fertilizer, residual supplies in the soil, and nitrogen mineralization of organic matter in the soil. Growers started implementing the experimental results.
    f. Substantial N is mineralized from the soils in the Treasure Valley when the soil warms in the summer. Taking mineralized N into account substantially reduced the crop needs from N fertilization, providing cost savings. Substantial N mineralization is unusual and was a surprising OSU research outcome for the Treasure Valley. The N mineralized was apparent in the

weekly soil test results. Many of the repeated spoon-fed N applications that would routinely be applied later in summer proved to be unnecessary.

g. Where well water containing substantial nitrate was used for irrigation, nitrate in the well water can supply much or all of a crop's N fertilizer needs.
h. DCPA sold as the herbicide Dacthal degrades into long lasting residuals and the residuals contaminate groundwater. The replacement of DCPA with less costly, more effective, and less persistent herbicides provided growers with win-win options (Appendix 2). DCPA residuals in the groundwater have been vastly reduced.

Appendix

1. ODEQ writing of the plan erected Impediments to cooperative community consensus and actions included ODEQ's incorporation of unsupported assertions in the citizen's management plan beyond the unrealistic assumptions of the feasibility of rapid groundwater nitrate improvements.

   ODEQ insisted that the region had been underlain by a singular pristine aquifer, while well records showed a high probability that shallow aquifers had formed in response to agricultural water application. Well records showed that the Malheur, Owyhee, and Snake Rivers were "losing rivers" across the groundwater management meaning that groundwater elevations were lower the further one was from the river, forcing early settlers to live adjacent to the rivers.

   Furthermore, ODEQ insisted that the groundwater arsenate contamination was due to grower application of lead arsenate to orchard crops, for which there was no evidence, while the probable cause was legacy arsenate from geologic recent volcanic eruptions and depositions. Historically the Lower Treasure Valley had high frost risk and the areas with the greatest arsenate were highly inappropriate for establishing orchards. Orchards were located elsewhere.
   Realistic discussions among the committee revealed numerous concerns. The citizens committee wanted to make progress on several problems that were not the focus of the groundwater management plan. ODEQ removed the concerns about the groundwater contamination of DCPA residues. DCPA was sold as Dacthal and used for weed control on onions at that time. Citizen committee concerns included irrigation induced erosion delivering sediment and nutrients to runoff, invasive weeds, and expansion of Junipers in rangelands.

2. Solving groundwater contamination by DCPA residues.

Problem: Groundwater in northeastern Malheur County had become contaminated with DCPA residues from the herbicide Dacthal used to control weeds for onion production. Place and time: Malheur County, Oregon 1985-2001.

Visualized solution: Find herbicides for onion production that are effective, less costly, and do not leave residues that can pollute groundwater or contaminate the crop.

Testing or demonstrations: The movement of Dacthal residues was measured in runoff and leachate. Weed control options were evaluated using less expensive products that could provide effective weed control. The herbicides Buctril, Goal, Prowl, and selective grass herbicides provided excellent weed control. When applied carefully, these herbicides did not damage the onions.

Outcomes: Growers adopted the alternative products for weed control in onion because the products were effective, highly selective, and reduced the cost of production. Growers voluntarily dropped the use of Dacthal. Production costs to growers declined. Dacthal residues in northeastern Malheur County groundwater have subsequently declined.

Collaboration: growers, chemical companies, Idaho-Eastern Oregon Onion Committee, Oregon Department of Environmental Quality, EPA, OSU Malheur Experiment Station, OSU Malheur County Extension, weed scientists at other locations in Idaho and Oregon.