

**Fiscal Impacts of Proposed 15A NCAC 02L Groundwater Rules
Amended January 2013**

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Fiscal Impacts of Proposed Rules

Rule Citation: 15A NCAC 02L .0202 – Groundwater Quality Standards
15A NCAC 02L .0113 – Variance

**DENR Division/
Commission:** Division of Water Quality (DWQ)/ Environmental Management
Commission (EMC)

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Impact Summary: State government: Yes
Local government: No
Private industry: Yes
Substantial impact: No
Federal government: No
Small business: No

Authority: G.S. 143-214.1; 143B-282(a)(2)
G.S. 143-215.3(a)(1); 143-215.3(a)(3); 143-215.3(a)(4); 143-
215.3(e); 143-215.4

Necessity: The proposed rule amendments incorporate the most recent U.S. EPA health effects data into the 1,1-Dichloroethylene (1,1-DCE) groundwater quality standard and clarify existing groundwater rule requirements. This will make the cost of regulatory compliance lower without sacrificing public health and safety. The North Carolina Environmental Management Commission (EMC) approved these proposed amendments on July 14, 2011.

I. Summary

There are three rule change options proposed:

- 1) A change in 02L .0202 (g)(59) to amend the 1,1-DCE standard from 7 ug/L to 350 ug/L;
- 2) A change in 02L .0202 (d) and (f) to allow the EMC to establish a standard less stringent than the maximum contaminant level (MCL) when:
 - a. the MCL is not based on the most recent U.S. EPA health effects data as published in U.S. EPA's Integrated Risk Information System (<http://www.U.S.EPA.gov/IRIS/>),

- b. such a standard would not endanger public health and safety, and,
 - c. compliance with a standard based on the MCL would produce serious hardship without equal benefit.
- 3) A change in .0113 to:
- a. update the Division of Water Quality mailing address, in .0113 (b),
 - b. allow the EMC to issue a state-wide variance to the 02L rules in .0113 (d), and,
 - c. clarify the existing variance requirements in .0113(i).

Following public notification in the North Carolina Register, a public hearing and a 60-day public comment period, on January 10, 2013 the EMC adopted “option one” and “option two” as published , with additional clarifying language in 02L .0202 (b)(4) that maintains protection of private and public drinking water wells at the federal Maximum Contaminant Level.

Clarifying language is as follows:

“Where the groundwater standard for a substance is greater than the Maximum Contaminant Level (MCL), the Director shall apply the MCL as the groundwater standard at any private drinking water well or public water system well that may be impacted.”

This addition of this rule language incurs no additional costs or benefits above those previously estimated in the OSBM approved version of the Fiscal Note.

Option 1:

Rhodia, Inc., a global specialty chemical manufacturer that formerly operated as Rhone-Poulenc in Gastonia, North Carolina, submitted a rulemaking petition to amend the 1,1-DCE groundwater standard in 02L .0202(g)(59) from 7 ug/L to 350 ug/L based on the availability of more recent U.S. EPA health effects data. A change in this standard may result in lower compliance costs for facilities that have a release of 1,1-DCE to groundwater. However, potential compliance costs may increase for public water supply systems that use 1,1-DCE-contaminated groundwater as a source of drinking water. Parties responsible for 1,1-DCE groundwater contamination may not realize any cost savings for this change because 1,1-DCE seldom is the only pollutant that motivates cleanup activities and is often found with other chlorinated solvents. In addition, if contaminated water is currently, or could in the future be, impacting a public water supply groundwater source regulated by the NC Drinking Water Act, the company would still have to treat the water to the 7 ug/L drinking water standard. There is an unresolved question regarding whether Option 1 is a legally viable solution, as some believe that the EMC might not have the authority to change the standard alone.

Option 2:

The DWQ and EMC seek to amend 02L .0202(d) and (f) on the advice of the EMC’s legal counsel that rule language is needed to allow deviation from 2L .0202(d), which requires that the groundwater standard be established at the lowest of the six criteria, one of which is the federal maximum contaminant level (MCL). DWQ staff believe that this

option would have the same impact as Option 1 because it will allow the 1,1-DCE standard to be set above the MCL but without legal challenge.

Option 3:

Proposed changes to 02L .0113 include the addition of a statewide variance option that would allow the EMC to consider a request for a less restrictive groundwater standard when the existing standard is based on outdated health effects data, such as the case with the existing 1,1-DCE standard. DWQ staff anticipate that the EMC will adopt Options 1 and 2, and not Option 3; however, if the EMC adopts Option 3 and not Options 1 and 2, then Rhodia, Inc. will likely request a statewide variance to the 1,1-DCE groundwater standard because this contaminant is solely responsible for cleanup requirements and costs at the Rhodia site. 1,1-DCE has not been identified as the sole contaminant driving cleanup requirements and cost at any other sites in the state. DWQ staff assumes that the benefits of adopting Option 3 would essentially be the same as adopting Options 1 and 2. The inclusion of a statewide variance may reduce the number of future variances submitted to DENR because a statewide variance would apply to sites across the state. Staff time spent reviewing and processing a single statewide variance would likely be less than staff time spent reviewing multiple variances for the same request. The party requesting a statewide variance will incur the cost of gathering the necessary data requirements.

Other proposed changes to the variance procedures in 02L .0113 include an update to the DWQ mailing address and clarification of the existing variance requirements that are not expected to result in any additional costs or benefits.

The approximate effective date of the proposed rules is April 1, 2013.

Based on outreach response from potentially impacted parties and information provided by state regulatory agencies, Rhodia is the only company immediately affected by the proposed rule changes. If Rhodia is the only company immediately affected by this rule change, and no additional costs are placed on drinking water suppliers, the costs of this proposed rule change will be approximately \$5,800 in FY2012-13 and \$27,000 in FY27-28 (adjusted for an assumed 2% annual inflation). Benefits, in the form of opportunity cost-savings for NCDENR and less monitoring for NCDOT in the next 30 years will have an approximate net present value of \$30,000 (using 7% discount rate). Rhodia may experience a cost savings of up to \$945,000 in the next 30 years (in net present value terms). The total 30-year net present value of the proposed rule change would be approximately \$960,000. Net present value is presented over a period of 30 years since this is the estimated time it would take Rhodia to complete cleanup at the site under existing rules using pump-and-treat remediation. The risk analysis section examines additional costs and benefits that may be incurred by additional companies and water supply systems or the need for more water remediation as a result of the rule change. Table 1 is a partial representation of total costs and benefits associated with the proposed rule changes. The full table is presented in Appendix K.

Fiscal Year	2011-12	2012-13	2013-14	2014-15	2015-16
Year Number	0	1	2	3	4
Costs					
Private Company Well Closure Costs	\$0	\$5,834	\$0	\$0	\$0
Total Costs	\$0	\$5,834	\$0	\$0	\$0
Benefits					
State Benefits					
NCDOT Reduced Reporting	\$0	\$3,672	\$3,537	\$3,396	\$3,247
NCDENR Opportunity Cost Savings	\$0	\$0	\$0	\$0	\$0
<i>Private Company Benefits*</i>					
Monitoring Cost Savings	\$0	\$5,969	\$6,088	\$6,210	\$6,334
Well Closure Cost Savings	\$0	\$0	\$0	\$0	\$0
Operations and Maintenance Cost Savings	\$0	\$0	\$0	\$0	\$0
Total Benefits	\$0	\$9,641	\$9,626	\$9,606	\$9,582
Net Impact (benefits-costs)	\$0	\$3,807	\$9,626	\$9,606	\$9,582
Total Impact (benefits+costs)	\$0	\$15,475	\$9,626	\$9,606	\$9,582
30-year Net Present Value (@7% discount rate)	\$960,152				

*Note that private company benefits may be higher by ~\$75,000 based upon information received during the public comment period. If the standard is revised, the affected party may be able to avoid additional construction of a monitoring well.

II. Introduction and Purpose of Rule Changes

Groundwater Classifications and Standards in 15A NCAC 02L .0200 are intended to “maintain and preserve the quality of the groundwaters, prevent and abate pollution and contamination of the waters of the state, protect public health, and permit management of the groundwaters for their best usage by the citizens of NC.” It is the policy of the North Carolina EMC that the best usage of groundwaters of the state is as a source of drinking water. More than 50 percent of North Carolinians rely on groundwater as a source of drinking water.

By regulation, groundwater standards are established as the lowest concentration of the following six criteria contained in 15A NCAC 02L .0202(d) (1) – (6):

- (1) Systemic threshold concentration calculated as follows: [Reference Dose (mg/kg/day) × 70 kg (adult body weight) × Relative Source Contribution (.10 for inorganics; .20 for organics)] / [2 liters/day (avg. water consumption)];
- (2) Concentration which corresponds to an incremental lifetime cancer risk of 1×10^{-6} ;

- (3) Taste threshold limit value;
- (4) Odor threshold limit value;
- (5) Maximum contaminant level; or
- (6) National secondary drinking water standard.

The maximum contaminant level (MCL) of 7 ug/L for 1,1-DCE is the lowest concentration of the six criteria in 02L .0202(d) and was used to establish the groundwater standard. MCLs are federal drinking water standards established by the U.S. EPA Office of Water and are applicable to public water supply systems regulated under the Federal Safe Drinking Water Act.

In March 2011, McGuireWoods, on behalf of Rhodia Inc., submitted a rulemaking petition to the Division of Water Quality Director requesting amendment of the groundwater quality standard for 1,1-DCE contained in 15A NCAC 02L .0202(g)(59) from 7 ug/L to 350 ug/L. The Petition was submitted in accordance with N.C.G.S. 150B-20 and 15A NCAC 02I .501, which allows any person to petition the Director to adopt, amend or repeal an existing rule of the EMC. A copy of the Petition is included Appendix A. A summary of the Petition and background information is included in Appendix B.

1,1-Dichloroethene (DCE) is an industrial chemical not found naturally in the environment. Companies use 1,1-DCE to make plastics, such as flexible films like food wrap, flame retardant coatings, adhesives, and packaging materials. Long term or chronic exposure to 1,1-DCE by drinking 1,1-DCE-contaminated groundwater may cause liver toxicity. 1,1-DCE shows equivocal evidence of carcinogenicity by the oral route of exposure; therefore, it is not known if exposure to 1,1-DCE increases the risk of cancer in humans (<http://www.U.S.EPA.gov/iris/subst/0039.htm> <http://water.U.S.EPA.gov/drink/contaminants/basicinformation/1-1-dichloroethylene.cfm#one>).

The major source of 1,1-DCE in drinking water is discharge from industrial chemical factories.

The U.S. EPA, the federal agency that establishes MCLs, acknowledges that updated health effects data support increasing the 1,1-DCE MCL to 350 ug/L. However, U.S. EPA decided not to update the MCL for 1,1-DCE citing that any potential revision is not likely to provide a meaningful opportunity for cost-savings or health risk reduction to public water systems and their customers <http://edocket.access.gpo.gov/2010/pdf/2010-6624.pdf>.

Rhodia's Petition was presented at the May 2011 EMC Groundwater Committee meeting and the July 2011 EMC meeting. Information is available on the EMC Web site at <http://portal.ncdenr.org/web/emc/agenda/2011/home>. On July 14, 2011, the EMC approved Rhodia's petition and initiated rulemaking to amend the 1,1-DCE groundwater standard as requested. At the July meeting, the EMC granted approval to the DWQ to initiate rulemaking to adopt proposed rule language in one or more of the three options discussed in this fiscal note:

- Option 1: 02L .0202 (g) (59),
- Option 2: 02L .0202 (d) and (f),
- Option 3: 02L .0113 (b) through (i).

Option 1:

The purpose of changing the 1,1-DCE groundwater standard from 7 ug/L to 350 ug/L is to incorporate the most up-to-date health effects data. The proposed change to 02L .0202(g)(59), would have the same impact as the one anticipated for the proposed changes in .0202(d) and (f), assuming that the latter change would only lead to the relaxation of the 1,1-DCE standard to 350 ug/L. To this end, only the impact from .0202(d) and (f) is discussed in this fiscal note.

Option 2:

The purpose of the proposed changes to 02L .0202(d) and (f) is three-fold: 1) to ensure that the most recent U.S. EPA health effects data are used in establishing groundwater quality standards; 2) to ensure that the standard is protective of public health and safety; and, 3) to ensure that the standard is not overly burdensome to regulated parties. If the lowest concentration of the six regulatory criteria for establishing a standard in .0202(d) is the Maximum Contaminant Level (MCL) and the MCL is not based on the most recent U.S. EPA health effects data in .0202(e), then the proposed rule will allow the MCL to be eliminated for consideration as the groundwater standard. At this time, 1,1-DCE is the only standard that is being changed, but this proposed rule change may lead to additional groundwater quality standard changes in the future. If this occurs, DENR will perform fiscal notes for each of these groundwater quality standard changes as part of the rulemaking process.

Option 3:

The purpose of the proposed amendments to 02L .0113 is to update the DWQ mailing address, clarify the existing variance requirements and to allow the EMC to issue a statewide variance to the 02L rules when requested. The allowance of a statewide variance presents an alternate option to Options 1 and 2 that would not change the fundamental way standards are currently established in 2L .0202(d).

The three proposed amendments are located in Appendices C, D and E, respectively. The proposed changes to the rules have been highlighted in yellow. In addition, Appendix F includes a summary of the proposed amendments and the potential economic impact.

Support letters for Rhodia's Rulemaking Petition were received from Radiator Specialty Company, Indian Trail, NC and Duncklee & Dunham Environmental Consulting & Engineering, Cary, NC. Copies are located in Appendix G and H, respectfully.

III. Costs and Benefits by Rule

Each proposed rule revision is listed below with a description of the rule, the proposed changes, and the estimated economic impact expected for various public and private entities. The existing rules serve as the baseline from which economic impacts are evaluated.

The DWQ has collected information from a number of potentially affected parties including members of the regulated community, such as power utility companies, chemical manufacturers, dry-cleaning associations, local governments, state government, treated wood industries, the poultry and pork federations, furniture manufacturers and state regulatory agencies. A list of contacted parties is located in Appendix I. Potentially affected parties identified during the outreach activities are discussed below.

a. 15A NCAC 02L .0202 - Groundwater Quality Standards (Option 1 and 2)

15A NCAC 02L .0202 sets out the criteria used to establish groundwater standards and provides a list of established groundwater standards. There are two proposed options to revise this language: an increase in the 1,1-DCE standard in .0202(g)(59) from 7 ug/L to 350 ug/L and a revision to .0202(d) and (f) to allow a groundwater standard to be established above an MCL, if that MCL was established using outdated U.S. EPA IRIS health effects data. Either of the option would lead to the same impact, at least in the foreseeable future.

Costs and Benefits Associated With Propose Changes to Rule 15A NCAC 02L .0202

These costs and benefits were estimated using the assumption that the change in the 2L groundwater standard would not alter the number of drinking water sources contaminated with 1,1-DCE. The Division of Water Quality believes that this is the most probable scenario. In the risk analysis section, we consider what would happen if more drinking water sources are contaminated as a result of the rule change.

i. Federal Government Impact

No increased or decreased expenditures were identified as a result of the proposed rule changes.

ii. State Impact

DWQ contacted state government agencies potentially affected by this proposal including the Department of Transportation, Department of Agriculture, Division of Waste Management, Division of Air Quality, Division of Water Quality, and Division of Environmental Health.

NCDENR reported that it would realize decreased cost due to reduced regulatory oversight. NCDOT reported that it would realize decreased expenditures due to reduced reporting (text discussions and mapping) requirements and the other agencies reported no anticipated direct impact.

The North Carolina Department of Transportation (NCDOT)

The NCDOT has identified and attempted to quantify the economic impacts associated with the proposed 15A NCAC 02L rule changes. The program within the NCDOT that will be principally affected by this change is the Asphalt Testing Lab Program (ATL Program). In 1989, the North Carolina General Assembly recognized potential environmental and human health hazards at a number of privately owned Asphalt Testing Lab (ATL) sites throughout North Carolina. Asphalt paving companies, private engineering/testing firms, and federal, state, and local government agencies (including NCDOT) used the ATLs for years for quality control testing of asphalt products. It is believed that the release of chlorinated aliphatic compounds used in tests by one or more of ATL users may have resulted in soil and groundwater contamination at some of the ATL sites. The General Assembly directed NCDOT to participate in the investigation and cleanup of the ATLs by furnishing personnel, equipment, or other materials and resources as necessary.

The NCDOT ATL Program consists of conducting comprehensive environmental site assessments along with the development and implementation of corrective actions plans at former asphalt testing labs. Twenty-three Asphalt Testing Program sites may potentially be impacted by a change in the groundwater standard for 1,1-DCE. Groundwater at five of the 23 sites exceeds the proposed 1,1-DCE standard of 350 ug/L. NCDOT does not anticipate a significant reduction in compliance costs because other chlorinated solvents are present in the groundwater and these would have to be cleaned up regardless of the change in the standard for 1,1-DCE. However, the reporting (text discussions and mapping of 1,1-DCE) may be reduced by a limited extent at 18 sites where the 1,1-DCE concentration is below 350 ug/L. NCDOT estimates an annual savings of approximately \$200 per site. If one site were closed each year, savings in the first year would be \$3,600 and decrease by \$200 in each following year.

NCDOT use of chlorinated solvents for asphalt quality control testing was terminated in North Carolina in 1996. NCDOT is currently very active, and has been since the early 1990's, in the assessment and remediation of solvent releases related to asphalt testing activities across the State, despite the fact that NCDOT never owned, operated, or controlled any of the ATLS.

The NCDOT determined that no additional work efforts or cost savings would be realized as a result of the proposed revisions to .0202(d) & (f) and 02L .0113.

Division of Water Quality (DWQ)

The DWQ Aquifer Protection Section (APS) is authorized under 15A NCAC 02L and 15A NCAC 2T to issue permits that allow the discharge of waste onto land or into the subsurface under conditions outlined in the permit (non-discharge permits). If permitted facilities experience a change as a result of the rule amendment, this could potentially affect the Division's workload. Staff examined the Basinwide Information Management System (BIMS) database to estimate the number of potentially affected sites and to determine if there are any current cleanup activities on permitted sites related to the

contaminant 1,1-DCE. There are no reported cleanup activities underway as a result of permitted activities. No Notices of Violation were reported for exceedances of the current standard outside the compliance boundary. Compliance boundaries at a typical DWQ permitted waste site are illustrated in Appendix J. In addition, there are 171 DWQ permitted facilities monitoring groundwater for volatile organic compounds that could include 1,1-DCE, however, there were no reports of 1,1-DCE exceeding the current standard. This information suggests that the change in standards would have no direct impacts on the division.

Division of Waste Management (DWM)

The Division of Waste Management has four sections that manage and regulate specific types of waste: The Hazardous Waste, Superfund, Solid Waste and Underground Storage Tank Sections. While 1,1-DCE is one of several constituents found in groundwater at sites regulated by DWM cleanup programs, according to DWM staff and two independent consultants, it is seldom the only driver for the assessment and/or cleanup of contaminated groundwater. Only Rhodia, Inc., was identified by the DWM as being primarily impacted by the proposed 1,1-DCE standard change.

The Superfund Section's Inactive Hazardous Waste Sites Branch is the agency with regulatory oversight of Rhodia, Inc. Increasing the 1,1-DCE groundwater standard will most likely reduce the time it takes Rhodia to come into compliance with the groundwater standard, and reduce staff time and resources needed for oversight of the facility's cleanup responsibilities.

In Figure 1 of its Petition, Rhodia estimates that it will take 30 years to remediate 1,1-DCE to 7 ug/L using pump-and-treat technology. Rhodia also estimates that it will take 15 years to remediate 1,1-DCE to 350 ug/L using an alternate cleanup technology, in-situ chemical oxidation. For purposes of this analysis, it is assumed that there will be a fifteen-year reduction in the time it will take for Rhodia to cleanup 1,1-DCE groundwater contamination if the standard is changed from 7 ug/L to 350 ug/L.

The annual cost-savings of staff time is \$774, assuming 22 hours of staff time associated with report review and correspondence and an annual site visit for a mid-range engineer position with a total hourly compensation of \$35.18.

The estimated mileage cost-saving of a yearly site visit is \$60, assuming a maximum distance of 120 mile from the Mooresville Regional Office to the Rhodia site and a mileage rate of \$0.50 per mile for a state-owned Ford Explorer, 4X4 at the state Motor Fleet mileage rate.

<http://www.ncmotorfleet.com/documents/NewRateSheetMay2010.pdf>

The total cost-savings is estimated to be \$834 per year.

For Superfund sites, the 02L standard is the Applicable or Relevant and Appropriate Requirement (ARAR) for groundwater cleanup. If the proposed rule language in Option 1, is adopted the ARAR standard would become 350 ug/L. However, if the cleanup affects groundwater that is also a regulated drinking water source, the drinking water

standard (7 ug/L) would be the ARAR. Rules and regulations, including drinking water standards, applicable to public water systems for the State of North Carolina are found in Title 15A, Subchapter 18C of the North Carolina Administrative Codes (see rule 15A NCAC 18C .1518). The party responsible for the pollution would have to clean up the groundwater to the drinking water standard. This means that no additional water treatment costs would be placed on water supply companies or local governments. With adoption of Option 1 and 2 with modifications to include protections for private wells and public drinking water system wells, no additional water treatment costs would be incurred by the local governments and as noted above, the party responsible would have to clean up to the applicable drinking water standard of 7 ug/L.

iii. Local Government Impact

DWQ staff contacted local governments through various associations such as the NC League of Municipalities, NC Councils of Government, NC Association of County Commissioners, and state programs that regulate local government activities such as environmental cleanup and operation of publically owned wastewater treatment plants, public water supply systems and solid waste landfills. DWQ received eleven comments on the potential economic impacts of the proposed rules either directly from or on behalf of local governments. No direct costs or benefits were identified as a result of the propose rule revisions.

The proposed change to groundwater standards does not affect drinking water standards. The drinking water standard for 1,1-DCE would remain at 7 ug/L. This difference in groundwater and drinking water standards potentially could have led to future costs for publically owned and operated public water supply systems if groundwater used as a source water was contaminated above the MCL of 7 ug/L and treatment was required. The Division of Water Resources has identified current and future needs and resources for drinking water, including groundwater, throughout the state so most current/future drinking water sources are known (see link to plans – http://www.ncwater.org/Water_Supply_Planning/NC_Water_Supply_Plan/). Further, there have been very few MCL violations reported for 1,1-DCE. Both state and federal drinking water program data support that 1,1-DCE is not a likely problem even if the groundwater standard is raised to 350 ug/L and the MCL remains at 7 ug/L. The Risk Analysis section contains a discussion of this potential cost.

iv. Private Industry Impact

Companies that pollute groundwater in excess of the 02L .0202 Groundwater Quality Standards may be required to take corrective action in accordance with 15A NCAC 02L .0106. A 50 fold change in the 15A NCAC 02L .0202(g)(59) groundwater standard for 1,1-DCE from 7 ug/L to 350 ug/L could reduce compliance cost at sites with known groundwater contamination above the current standard of 7 ug/L and at sites where future 1,1-DCE groundwater contamination might occur or be discovered. Private companies performing groundwater remediation may experience a reduction of compliance costs in the following ways:

- As a result of a higher standard, the groundwater plume will be smaller and the length of time to cleanup will be shorter.
- A smaller plume and higher cleanup level may allow the use a more economical cleanup technology.
- A lower number of groundwater wells may be needed to determine the boundaries of the contamination.
- Monitoring wells that meet the proposed standard may be closed and no longer monitored.

The type of cleanup technology employed to reduce contaminant levels to the groundwater standard is site-specific and will depend on a number of factors, including, but not limited to, the number and types of contaminants, contaminant properties, extent of contamination, hydrogeologic properties (soil and rock type) and cleanup goals. These factors, including the type of remediation employed at a site, will affect the time and cost to cleanup groundwater to the standard.^{1,2,3,4}

One private company, Rhodia, Inc., was identified as impacted by the proposed 2L rules.

In its Rulemaking Petition, Rhodia states that it will save money if the new standard is adopted. A release of 1,1-dichloroethylene from an above ground storage tank in 1991 is the source of the site's 1,1-DCE groundwater contaminant plume. Division of Waste Management staff verified that this pollutant is the primary factor affecting assessment and cleanup costs at the Rhodia site (Appendix N).

Rhodia began operating a pump-and-treat groundwater remediation system at the site in September 1996. The primary objective of the groundwater extraction system is to hydraulically contain and control the movement of the groundwater contaminant plume to prevent further migration according to Rhodia's *2010 Annual Groundwater and Surface Water Sampling Results and 2010 Annual Groundwater Extraction System Performance Report (Appendix O)*. The secondary objective is to reduce the concentration and mass of dissolved volatile organic contaminants, primarily 1,1-DCE, in the groundwater.

In 1996, 1,1-DCE groundwater concentrations were greater than 100,000 ug/L in wells near the source (132,000 ug/L in MW-16A and 161,000 ug/L in MW 17-B). In 2010, the concentrations were orders of magnitude lower in the same general area (830 ug/L in MW-16A and 3,800 ug/L in monitoring well 17-B), indicating that the pump-and-treat system has been effective in significantly reducing the dissolved 1,1-DCE concentration

¹ Cost Analyses for Selected Groundwater Cleanup Projects: Pump & Treat Systems and Permeable Reactive Barriers. USEPA OSWER EPA 542-R-00-013 February 2001
<http://clu.in.org/download/remed/542R00013.pdf>

² Groundwater Cleanup: Overview of Operating Experience at 28 Sites. USEPA OSWER EPA 542-R-99-006 September 1999 <http://www.epa.gov/tio/download/remed/ovopex.pdf>

³ A Citizens Guide to Pump & Treat: http://clu.in.org/download/citizens/pump_and_treat.pdf

⁴ A Citizens guide to Chemical Oxidation: <http://clu.in.org/download/citizens/oxidation.pdf>

in groundwater. However, the report also indicates that contaminant removal rates are leveling out.

While pump and treat systems are often effective in controlling the migration and reducing the size of the plume, the effectiveness is limited by contaminant tailing and rebound problems associated with this technology. Contaminant “tailing” is the progressively slow decline (leveling out) in groundwater contaminant concentration in the extracted water with pumping duration. Tailing results in longer remediation times since larger and large volumes of water have to be extracted to remove the smaller and smaller concentrations of a contaminant. Contaminant “rebounding” refers to the increase in contaminant concentration in groundwater once treatment stops.

Tailing and rebound are associated with different physical and chemical processes, such as dissolution, diffusion and desorption that take place in the groundwater aquifer. Thus, prediction of cleanup duration cannot be determined by examination of concentration versus time data alone

(<http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/ptmethods.pdf>).

For purposes of this analysis, the assumption is made that it will take Rhodia thirty years to cleanup 1,1-DCE groundwater contamination to 7 ug/L and fifteen years to cleanup to the proposed standard of 350 ug/L using pump-and-treat technology. This assumption is based on remediation time estimates provided by Rhodia in Figure 1 of its Petition.

Rhodia asserts in its Petition that eleven monitoring wells can be closed immediately and monitoring costs saved if the 1,1-DCE standard is amended to 350 ug/L. Cost-savings due to reduced monitoring for these eleven wells would likely be realized over the next fifteen years, the estimated time it would take to reduced the levels in these eleven wells to below the current groundwater standard of 7 ug/L.

There are 44 monitoring wells and 5 extraction wells that are currently being monitored at the site according to Rhodia’s 2010 Groundwater Monitoring Report (Appendix O). This analysis assumes that Rhodia would close eleven wells once the proposed rule becomes effective. These are the wells where the 1,1-DCE groundwater concentration is already less than 350 ug/L. Furthermore, it is assumed that the remaining 38 wells would stay open until the entire site is cleaned up, given the uncertainty related to the speed with which Rhodia would be able to close all the wells. This assumption might lead to the overestimation of the savings portrayed in the analysis. Cost-savings for the remaining 38 wells would be realized for fifteen years beginning in year 16 and ending in year 30 of the analysis, based on the difference between a 30-year estimated remediation time if the standard remains at 7 ug/L compared to a 15-year estimated remediation time if the standard is amended 350 ug/L. Potential cost savings for Rhodia due to reduced monitoring are illustrated in Table 2 below.

Number of wells that can be closed	Estimated monitoring cost saving per year
11	\$5,852
38	\$11,970

Monitoring costs include the cost to sample the well (labor costs) and analyze the groundwater sample (analytical costs). In Figure 1 of its Petition, Rhodia estimated the analytical cost per sample at \$111 (\$15,000 total analytical cost/135 samples = \$111). The labor cost for well monitoring is estimated to be \$155 per well, taken from the DWM UST Program's 2010 reasonable rate document at <http://portal.ncdenr.org/web/wm/ust/rrd>. The total monitoring cost per sample per well is calculated as follows: \$111 + \$155 = \$266 per well.

Based on Rhodia's monitoring requirements in the 2010 Groundwater Monitoring Report, 31 of the wells are monitored once a year and 18 are monitored twice a year. The number of monitoring events for the 11 wells that could be closed immediately was assumed to be two per year. Seven of the remaining 38 wells were assumed to be monitored twice a year and 31 are assumed to be monitored once a year.

The monitoring costs for the 11 wells that could be closed immediately under the proposed rule are calculated as follows: 11 wells × \$266 per well × 2 monitoring events per year = \$5,852 per year (not adjusted for inflation).

The 38 monitoring wells that could be closed in 15 years if the standard is amended to 350 ug/L is calculated as follows:

7 wells × \$266 per well × 2 monitoring events per year = \$3,724

31 wells × \$266 × 1 monitoring event per year = \$8,246.

Total monitoring cost for 38 wells that could be closed in 15 years = \$3,724 + \$8,246 = \$11,970 per year (not adjusted for inflation).

There are costs associated with closing monitoring wells in accordance with North Carolina regulations in Title 15A NCAC 02C .0113. The cost of a well closure is estimated to be \$520 per well as determined by averaging the estimated cost provided by DWM staff (\$584) and an independent consultant (\$455). In year 1 of the analysis, the one-time cost of properly closing the 11 wells, as required by NC regulations, is approximately \$5,720 (not adjusted for inflation). The estimated cost of closing the remaining 38 wells in year 16 of the analysis is \$19,760 (not adjusted for inflation). Note that, Rhodia will incur these well closure costs at some point in time, regardless of the standard. The difference is that if the standard is amended to 350 ug/L, then all of the wells would be closed 15 years earlier than expected and, as a result, costs would be incurred 15 years earlier. Essentially, while Rhodia would experience a cost from closing 11 wells in year 1 and 38 wells in year 16, it would incur an equal saving (not accounting

for the time value of money, i.e. discounting, or for inflation) from not having to close anymore those 11 wells in year 15 and 38 wells in year 30.

In its petition, Rhodia estimated that the operation and maintenance costs of a pump-and-treat system would be \$4,800,000 over a 30-year period, which represents a yearly cost of \$160,000 (not adjusted for inflation). If the standard is amended to 350 ug/L and the site is closed in 15 years, rather than in 30 years if the standard remains at 7 ug/L, then Rhodia will benefit from a 15-year reduction in operation and maintenance costs.

Assuming 1,1-DCE groundwater concentrations will decrease to 350 ug/L in the next 15 years, the estimated cost-savings to Rhodia as a result of amending the groundwater standard from 7 ug/L to 350 ug/L due to reduced monitoring and operation and maintenance costs over a thirty-year period is estimated to be around \$930,000. The cost-savings estimate assumes that it would be cost prohibitive for Rhodia at this stage in its clean-up to decommission its current pump-and-treat technology in favor a different technology, which might have been more cost effective if employed from the beginning. Table 3 is a partial table that represents the estimated cost savings to private industry (Rhodia). The full table is presented in Appendix L.

Fiscal Year	2011-12	2012-13	2013-14	2014-15	2015-16
Year Number	0	1	2	3	4
Costs					
Well Closure Costs	\$0	\$5,834	\$0	\$0	\$0
Total Costs	\$0	\$5,834	\$0	\$0	\$0
Benefits *					
Monitoring Cost Savings	\$0	\$5,969	\$6,088	\$6,210	\$6,334
Well Closure Cost Savings	\$0	\$0	\$0	\$0	\$0
Operation and Maintenance Costs	\$0	\$0	\$0	\$0	\$0
Total Benefits	\$0	\$5,969	\$6,088	\$6,210	\$6,334
Net Impact (benefits-costs)	\$0	\$135	\$6,088	\$6,210	\$6,334
Total Impact (benefits+costs)	\$0	\$11,803	\$6,088	\$6,210	\$6,334
30-year Net Present Value (@7% discount rate)	\$930,522				

*Note that private company benefits may be higher by ~\$75,000 based upon information received during the public comment period. If the standard is revised, the affected party may be able to avoid additional construction of a monitoring well.

Rhodia submitted a list of nine facilities, including the Rhodia site, known to have groundwater contamination above the current 1,1-DCE groundwater standard of 7 ug/L, as well as the number of monitoring wells at each site with contamination above the proposed 1,1-DCE standard of 350 ug/L. According to Rhodia, if 1,1-DCE is the only constituent exceeding a groundwater quality standard and the standard is changed from 7 ug/L to 350 ug/L, monitoring of 47 groundwater wells could cease. DWQ staff contacted the agency that regulates these sites to determine if 1,1-DCE is present above the current and proposed groundwater standard of 7 ug/L and 350 ug/L, respectively, and if 1,1-DCE is the only contaminant being remediated.

Based on information provided by DWM in Appendix N, 1,1-DCE contamination at the Rhodia site was the result of a 1,1-DCE storage tank release and was the sole motivation for the remediation. The company probably will be able to reduce the number of monitoring wells and the number of years needed for remediation. While 1,1-DCE was present at many of the other eight sites, other chlorinated solvents, such as tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, commonly found in groundwater along with 1,1-DCE, also were present above the groundwater standard and are predicted to drive assessment and cleanup. It is unlikely that the assessment and cleanup costs for these sites will be reduced by a change in the 1,1-DCE standard.

For companies, like Rhodia, currently undertaking remediation activities, the cost to decommission an existing system and replace it with a different technology may likely be higher than any potential cost savings. For sites where groundwater contaminated with 1,1-DCE has not yet been discovered or remediation has not yet begun, the proposed standard may result in reduced assessment cost as the contaminant plume based on a standard of 350 ug/L will be less extensive than a contaminant plume based on a standard of 7 ug/L. In addition, a higher standard may give companies more flexibility in the type of remediation system used. Any future benefits resulting from changes in technology or remediation time resulting from this proposed rule change are contingent on the presence of other chemicals, selected technologies and other factors. DWQ does not attempt to estimate them in this analysis.

As part of the public comment process, the agency received a comment from the environmental attorney Mark Fogel, who purports to have a client who is a member of the Environmental Consultant Program and engaged in the Remedial Investigation Phase. According to Mr. Fogel, if the 1,1 DCE standard were changed to 350 ug/L, his client would incur a cost savings estimated at \$75,000 from avoiding an additional triple well nest. Mr. Fogel has not provided the agency with any additional information to ascertain how the savings were computed or when this client expects to incur this cost under the existing rule. Based on information from DWM, it is unclear whether this site is contaminated by pollutants other than 1,1 DCE that would still require the installation of the triple well nest.

Public Benefits

The groundwater regulations in 15A NCAC 02L .0202(e) require the use of the following references, in order of preference, to be used in establishing groundwater standards:

- 1) U.S. EPA's Integrated Risk Information System (IRIS);
- 2) U.S. EPA Office of Drinking Water Health Advisories;
- 3) Other health risk assessment data published by U.S. EPA;
- 4) Other relevant, published health risk assessment data and scientifically valid peer-reviewed published toxicological data.

U.S. EPA's IRIS database provides high quality science-based human health assessments to support the Agency's regulatory activities. The IRIS database contains information for more than 550 chemical substances containing information on human health effects that may result from exposure to various substances in the environment.

No health-based benefits are expected as a result of changing the groundwater standard for 1,1-DCE from 7 ug/L to 350 ug/L because the proposed standard of 350 ug/L is based on the most recent U.S. EPA IRIS health effects data available at <http://www.epa.gov/iris/subst/0039.htm>. The current groundwater standard of 7 ug/L is based on the federal MCL, which was calculated prior to the updated toxicity data being published. According to the U.S. EPA IRIS database, the chemical is less toxic than previously thought and is no longer considered a carcinogen by the oral route.

The revised language in .0202(d) and (f) would allow the EMC to eliminate the use of the federal MCL as a criterion for establishing a standard when the MCL is not based on the most recent EPA IRIS health effects data. Therefore, any future increase in a groundwater standard as a result of changes to .0202(d) and (f) will be supported by the use of the most recent health effects data and increased adverse health effects are not expected.

15A 02L .0113-Variance (Option 3)

The variance rules in 15A 02L .0113 allow an applicant to request a variance to the 02L Groundwater Rules. Variance requests are submitted to the EMC for approval. Proposed revisions to the variance rules update the DWQ mailing address, allow the EMC to issue a statewide variance to the 02L rules and clarify the existing variance requirements. DWQ staff assumes that the benefits of this proposed option would essentially be the same as adopting Options 1 and 2.

The inclusion of a statewide variance may reduce the number of future variances submitted to DENR because a statewide variance would apply to sites across the state. Staff time spent reviewing and processing a single statewide variance would likely be less than staff time spent reviewing multiple variances for the same request. Although, given that in recent years there has been less than one variance request per year, the annualized savings might be minimal. The party requesting a statewide variance, however, will incur the cost of gathering the necessary data requirements. It is unclear what the net effect of this particular proposal would be on the costs the private sector would incur from going through the variance process, which could take as long as two years.

Summary of Costs and Benefits

If Rhodia is the only company immediately affected by this rule change and no additional costs are placed on drinking water suppliers, the costs of this proposed rule change will be approximately \$5,800 in year 1 and \$27,000 in year 16 (adjusted for inflation). State benefits, in the form of less monitoring for NCDOT and less oversight by DWM, have an estimated net present value of \$30,000 over 30 years. Rhodia may save money through the immediate closure of 11 wells and 15 fewer years of operation and maintenance costs. The net present value of this cost savings could be as high as \$945,000 throughout the next 30 years, in net present value terms. The total 30-year net present value of impact from the proposed rule is approximately \$960,000. The risk analysis section examines additional costs and benefits that may be incurred by additional companies and wells or the need for more drinking water remediation as a result of the rule change. Below is a partial representation of total costs and benefits associated with the proposed rule changes. The full table is presented in Appendix K .

Fiscal Year	2011-12	2012-13	2013-14	2014-15	2015-16
Year Number					
Costs					
Private Company Well Closure Costs	\$0	\$5,834	\$0	\$0	\$0
Total Costs	\$0	\$5,834	\$0	\$0	\$0
Benefits					
State Benefits					
DOT Reduced Monitoring	\$0	\$3,672	\$3,537	\$3,396	\$3,247
DWM Opportunity Cost Savings	\$0	\$0	\$0	\$0	\$0
Private Company Benefits*					
Monitoring Cost Savings	\$0	\$5,969	\$6,088	\$6,210	\$6,334
Well Closure Cost Savings	\$0	\$0	\$0	\$0	\$0
Operations and Maintenance Cost Savings	\$0	\$0	\$0	\$0	\$0
Total Benefits	\$0	\$9,641	\$9,626	\$9,606	\$9,582
Net Impact (benefits-costs)	\$0	\$3,807	\$9,626	\$9,606	\$9,582
Total Impact (benefits+costs)	\$0	\$15,475	\$9,626	\$9,606	\$9,582
30-year Net Present Value(@7% discount rate)	\$960,152				

*Note that private company benefits may be higher by ~\$75,000 based upon information received during the public comment period. If the standard is revised, the affected party may be able to avoid additional construction of a monitoring well.

IV. Risk Analysis

The proposed change to the groundwater standard for 1,1-DCE from 7 ug/L to 350 ug/L is responsible for the majority of benefits and costs. The benefit amount for private companies with releases of 1,1-DCE to groundwater hinges on whether or not 1,1-DCE is the only groundwater contaminant that will be responsible for requiring environmental cleanup which includes site characterization, installation of a treatment system, operation and maintenance of the treatment system and monitoring.

A second possible risk was that 1,1-DCE pollution would affect a source of drinking water. This could have created additional costs for public or private water systems. The EMC adopted additional language that provides protection for public and private water systems, minimizing this risk. “Where the groundwater standard for a substance is greater than the Maximum Contaminant Level (MCL), the Director shall apply the MCL as the groundwater standard at any private drinking water well or public water system well that may be impacted.” Thus, the risk considered in the “Impacts on Sources of Drinking Water”, below, are unlikely to occur.

While 1,1-DCE can be found in groundwater as a result of its direct release, as in Rhodia’s case, it is commonly found as a breakdown product and in conjunction with other chlorinated solvents such as 1,1,1-trichloroethane, trichloroethylene and tetrachloroethylene (perchloroethylene). As noted in the previous section, none of the other companies cited by Rhodia has remediation projects that were motivated solely by 1,1-DCE contamination. Other more toxic breakdown products, such as vinyl chloride, are usually present as well. The chlorinated solvents and breakdown products listed are generally found in much higher concentrations and have more stringent groundwater standards than 1,1-DCE as illustrated below.

<u>Contaminant</u>	<u>2L .0202(g) Groundwater Standard in ug/L</u>
1,1-Dichloroethylene	7 (350 proposed)
Tetrachloroethylene (or perchloroethylene)	0.7
1,1,1-Trichloroethane	200
Trichloroethylene	3
Vinyl Chloride	0.03

The presence of more toxic chlorinated solvents above their respective groundwater standard, and in much higher concentrations than 1,1-DCE, would likely trigger more complex and costly environmental cleanup efforts. If this is the case, then little or no benefits will be realized as a result of amending the groundwater standard for 1,1-DCE to 350 ug/L because it is not necessarily the pollutant of greatest concern.

The first analysis made the assumption that one company, Rhodia, would benefit from the proposed rule change and that 1,1-DCE is the chemical motivating the cleanup effort. In addition to Rhodia, there could be current or future unidentified companies that have 1,1-DCE pollution that would benefit from the proposed rule change. For sites where groundwater contaminated with 1,1-DCE has not yet been discovered or remediation has not yet begun, the proposed standard may result in reduced assessment cost, as the contaminant plume based on a standard of 350 ug/L will be less extensive than a contaminant plume based on a standard of 7 ug/L.

In addition, a higher standard may give companies more flexibility in the type of remediation system used. Any future benefits resulting from changes in technology or remediation time resulting from this proposed rule change are contingent on the presence of other chemicals, selected technologies and other factors. DWQ does not attempt to estimate them in this analysis.

While this rule change would surely impact Rhodia, it is unclear how many more companies might be affected. If the proposed rule would impact other companies aside from Rhodia, the costs and benefits estimated in this analysis could increase significantly. This analysis assumed that under the proposed rule change it would take Rhodia 15 years to clean-up the site as opposed to 30 years under the current rules. The benefits to Rhodia estimated could change if this assumption does not hold true.

	Number of Years			
	5	10	15	20
30 year NPV of Private Impact	\$1,941,170	\$1,375,676	\$930,522	\$580,100

Impacts on Sources of Drinking Water

Note: The following information was prepared for OSBM review prior to the EMC adoption (January 10, 2013) of revised language that provides protection for public and private water systems, thus minimizing the risks and costs outlined below. Thus, the risks considered in this section are unlikely to occur.

There are some very specific circumstances in which the standard change may affect groundwater sources that are used for drinking water and create costs for public drinking water treatment. This could happen if groundwater remediated to the new standard is used as a source of drinking water in the future or if a responsible party for the pollution cannot be identified. Each of these instances would be rare in the current environment. Usually an existing or new water company would avoid using a contaminated source of water or would only use one if they believed treatment would be cost effective (benefits greater than costs). DENR knows of no local government that had to bear the cost of additional water treatment from 1,1-DCE pollution because responsible parties are usually identified. We present this analysis to better describe potentially impacted parties and to give a rough estimate of the costs associated with 1,1-DCE contamination to a source water.

Public water systems are defined as those that provide piped drinking water to at least 15 connections or 25 or more people sixty or more days per year. They are further characterized as Community Water Systems, Non-Transient Non-community Water Systems and Transient Non-Community Water Systems as follows:

A "Community Water System" (CWS) means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

A "Non-Transient Non-Community Water System" (NTNCWS) means a public water system that regularly serves at least 25 of the same nonresident persons per day for more than six months per year. Examples of such systems are those serving the same individuals (industrial workers, school children, church members) by means of a separate system.

A "Transient Non-Community Water System" (TNCWS) means a non-community public water system that does not serve 25 of the same nonresident persons per day for more than six months per year. Examples of such systems are those, RV park, diner or

convenience store where the permanent nonresident staff number less than 25, but the number of people served exceeds 25.

Any of these systems could be adversely affected if 1,1-DCE is detected in their source water above 7 ug/L; however, the MCL and surveillance monitoring requirements only apply to Community and Nontransient Non-community systems. According to the DENR Public Water Supply Section (PWS Section), as of September 29, 2011, there are 2,081 Community and 406 Non-transient Non-community active public water systems in North Carolina where groundwater is source water. The systems are further classified below as state, local, federal or private, along with the population served.

<u>Ownership Type</u>	<u>Community</u>	<u>Nontransient Non-community</u>	<u>Total</u>	<u>Population Served</u>
Federal	8	8	16	158,484
Local	549	141	690	6,676,495
State	3	14	17	945
Private	1,520	243	1,763	877,798
<u>Total</u>	<u>2,081</u>	<u>406</u>	<u>2,487</u>	<u>7,713,722</u>

Violations of the 1,1-DCE drinking water standard are not common. The PWS Section anticipates that if the groundwater protection standard for 1,1-DCE were raised from 7 to 350 ug/L, the total number of additional system affected would be small, perhaps one facility every ten years, as would the corresponding increase in workload for staff. Additional activities and cost associated with compliance, monitoring, document review, approvals, inspections and technical assistance were determined to be *de minimis* relative to the overall workload that currently exists.

According to the PWS Section, only three active systems have been in violation of the state and federal drinking water standard for 1,1-DCE since 2001. These systems are identified in Table below.

<u>PWS System</u>	<u>System Type</u>	<u>County</u>	<u>Treatment Type</u>	<u>Year of Last Violation</u>
Harbor House	Private Community	Mecklenburg	Carbon Filter	2009
American Truetzschler	Private NTNC*	Mecklenburg	Carbon Filter	2005
Middlesex Water System	Local Community	Nash	In process of installing treatment system	2011

*Non-Transient Non-Community Water System

According to the PWS Section, the best available treatment technology for 1,1-DCE is a granular activated carbon filter system. Cost information was requested from the three facilities that have implemented or investigated this technology (Harbor House, American Truetzschler, Middlesex), however, no response was received after numerous requests via email and phone.

The PWS Section referenced a 1989 Calgon Carbon Corporation publication (<http://www.calgoncarbon.com/documents/UseofGroundwater.pdf>) that estimates a total capital expenditure of approximately \$125,000 for a complete 300 gpm (gallons per minute) treatment system (which is an average size system). The same source quotes an operation and maintenance expense of about \$42,000 per year. In the table below, information from this publication was used, after adjusting for inflation, to estimate the cost of compliance for a typical water supply system regulated under the NC Drinking Water rules and found to be in violation of the 1,1-DCE maximum contaminant level (MCL). Since this estimate was done some time ago, it likely overstates the actual cost because pollution control technology tends to fall in price over time. Compliance costs for a period of five years are illustrated below, beginning ten years out in the future which is the estimated period of time that the first violation is expected to occur. The full table is presented in Appendix M. Potential costs to come into compliance include the following:

- Installation of a granular activated carbon treatment system;
- Annual operation and maintenance (O&M) of the system;
- Quarterly monitoring.

Fiscal Year	2021-22	2022-23	2023-24	2024-25	2025-26
Year Number	10	11	12	13	14
Costs					
Capital Expenditure	\$251,418	\$0	\$0	\$0	\$0
Annual Operation & Maintenance	\$84,476	\$86,166	\$87,889	\$89,647	\$91,440
Annual Monitoring	\$731	\$746	\$761	\$776	\$792
Total Costs	\$336,625	\$86,912	\$88,650	\$90,423	\$92,232

¹ Capital expenditure is a one-time cost estimated using the inflation-adjusted estimated cost of installing a typical (accepted standard size) granular activated carbon treatment system (\$125,000) from the 1989 Calgon publication “Use of Carbon Absorption Processes in Groundwater Treatment” (<http://www.calgoncarbon.com/documents/UseofGroundwater.pdf>).

² The annual operation and maintenance costs were taken from the 1989 Calgon publication (\$42,000) and adjusted for inflation.

³ The NC Public Water Supply Section estimates the cost of monitoring to be \$150 per sample. A minimum of one sample per quarter (\$600/year) will be required.

*Costs were initially adjusted for inflation from 1989 to present using the IHS Global Insight 10-year GDP deflator forecast, and then a 2% annual inflation factor was applied to compute future values.

Assumptions:

- If the 1,1-DCE groundwater standard is 350 ug/L and the maximum contaminant level for drinking water is 7 ug/L, then every ten years one Community or Nontransient Non-community public water supply system that uses groundwater as source water will have a 1,1-DCE MCL violation and will be required to take corrective action. This assumption is based on NC and USEPA 1,1-DCE MCL violation occurrence data. The first violation will occur in 2021, ten years after the groundwater standard is changed to 350 ug/L.
- A public water supply using groundwater as source water that is in violation of the 1,1-DCE MCL will be able to meet the MCL by installing the standard size carbon filter system described in the 1989 Calgon publication.
- The carbon system will be effective in reducing a 1,1-DCE groundwater concentration of 350 ug/L to 7 ug/L or less.
- The activated carbon will be replaced no more than once a year.
- The system will be monitored quarterly to determine compliance and to ensure the carbon system is working properly.
- Annual operation and maintenance costs will begin the year the carbon filter system is installed.

Based on the information provided by the PWS Section, approximately 71 percent of the potentially impacted water systems are privately owned. Another 28 percent of the systems are owned and operated by local government. The state and federal governments each own and operate less than one percent of all facilities. Below is a breakdown of the estimated total yearly costs that would attributed to private companies, local, state, and federal governments based on ownership share. The costs to federal and state systems are considered to be negligible.

System Type	Ownership Percentage ¹	2021-22	2022-23	2023-24	2024-25	2025-26
Private	71%	\$236,113	\$60,966	\$62,185	\$63,429	\$64,697
Local	28%	\$93,115	\$24,043	\$24,524	\$25,014	\$25,514
Federal	0.50%	\$1,663	\$429	\$438	\$447	\$456
State	0.50%	\$1,663	\$429	\$438	\$447	\$456

¹ Ownership percentage was determined as follows: The number of systems per ownership type was divided by the total number of systems. For example, for private systems the ownership percentage was determined by dividing the number of private systems (1,763) by the total number of systems (2,487) = 0.71 or 71%.

To determine yearly cost distribution the total annual costs were multiplied by the system type ownership percentage. For example, the 2021-22 cost distribution for private systems was determined by multiplying 0.71 (71%) by the total annual cost (\$370,696) = \$263,194.

Other Issues

There are limitations to the type of information that can be obtained to develop fiscal and economic impacts. The following are important factors to consider in estimating costs and benefits:

- Incident response databases at state agencies may not contain enough information to be useful in this analysis about the status of sites, types of substances that need to be cleaned up, and cleanup technology used. Readily available data may not show detailed information on which substances appear at what sites. Most databases do not tell us if a site is cleaning groundwater with pump-and-treat or some other technology. General information about the type of release is shown in most databases. There is little consistency between state regulatory agencies with respect to the types of information collected.
- The actual duration of a groundwater cleanup varies based on many factors. The concentration of substances, vertical and lateral extent of contamination, solubility of substances, the ability of the substance to naturally degrade or attenuate, the type of cleanup technology employed and the potential threat to groundwater and health all play a role in determining the time needed to cleanup a site. The best information available is from the Underground Storage Tank Section and shows that most pump-and-treat groundwater cleanups will take approximately 10 to 15 years, although many of these sites may never meet the 15A NCAC 02L .0202 groundwater quality standards. Because the duration of cleanup varies, the overall cost/benefit for cleanup will vary from site to site.
- Raising a standard could result in a decrease in the number of years that a pump-and-treat cleanup operation is in place where a cleanup currently is underway. Therefore, the change could affect the overall cost of cleanup. There is no standard baseline data for the cost of cleaning up specific substances. The assessment of contamination and the duration of cleanup are the most significant factor in determining costs.

V. Alternative Policies

The proposed rulemaking to change the 1,1-DCE groundwater standard from 7 ug/L to 350 ug/L is the result of a rulemaking petition submitted by Rhodia, Incorporated. The health effects data in the U.S. EPA IRIS database has been updated and a revised health-based groundwater standard of 350 ug/L is considered a viable option to the current standard. The proposed standard of 350 ug/L will incorporate the most recent health effects data as published in the U.S. EPA IRIS database.

One alternative considered by DWQ was to leave the 1,1-DCE groundwater standard at 7 ug/L because the federal maximum contaminant level is 7 ug/L and is a regulatory criterion used to establish groundwater standards in 15A NCAC 02L .0202(d). However, the federal maximum contaminant level is not based on the updated health effects data in U.S. EPA's IRIS database; therefore, this alternative was not considered a viable option. Additional rule language is proposed in 2L .0202(d) and (f) to ensure that the

Environmental Management Commission can establish a groundwater standard using the most recent U.S. EPA IRIS health effects data.

Another alternative, recommended by the NC Division of Public Health, State Toxicologist, Ken Rudo, was to change the 1,1-DCE standard to 35 ug/L based on the updated health effects data in the U.S. EPA IRIS database and a safety factor of 10 to account for its potential carcinogenicity. While the IRIS database lists 1,1-DCE as a Class C, potential human carcinogen, U.S. EPA has determined that data are inadequate for an assessment of human carcinogenic potential for the oral route, which includes drinking water. Therefore, this alternative was not considered a viable option.