Overview of NC Groundwater and Surface Water Quality Standards

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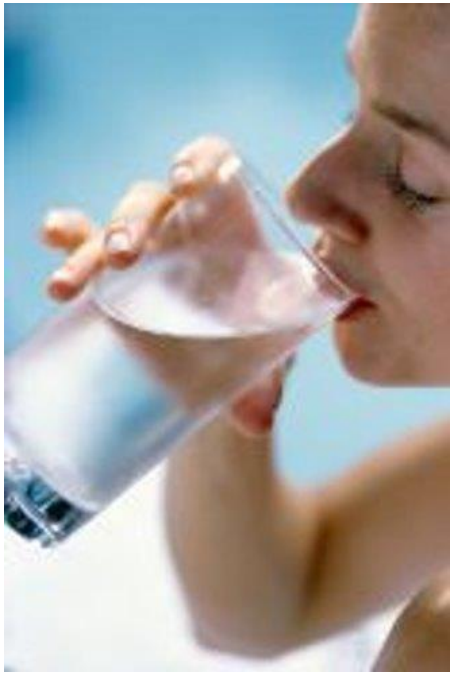
Water Quality Standards

Groundwater Standards



Drinking Water Standards

Surface Water Standards

What are Water Quality Standards?

- State regulations or rules that serve to protect the surface & ground waters of the state from the deleterious effects of pollution
- Legally enforceable
- Waters are protected based on their designated "best uses"
- Expressed as a numeric value, a narrative statement or a combination of both

	Groundwater Standards	Surface Water Standards
Federal Requirement	No	Yes
North Carolina Rule	15A NCAC 02L .0202	15A NCAC 02B .0200
Population	Human Adults	Human Adults/Children (WS) Aquatic Life/ Wildlife
Target use	Ingestion Household use	Ingestion Recreation Fish Consumption
Standard endpoints	Noncancer Cancer Aqueous taste and odor	Human Standards ▪ Noncancer ▪ Cancer ▪ Aqueous taste and odor Aquatic Standards

15A NCAC 02B rules

2020-2022 SW Triennial Review

In progress

Information on current rulemaking can be found here:

Surface Water Standards | NC DEQ

15A NCAC 02L .0202 rules

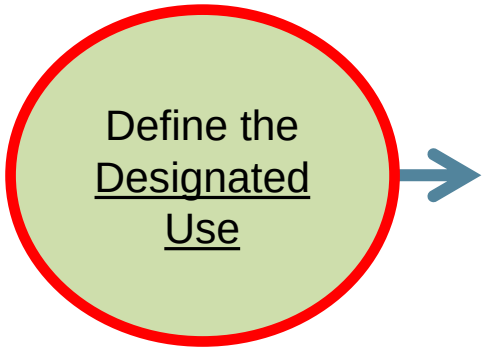
Most recent review:

In progress

Information on current rulemaking can be found here:

Groundwater Triennial Review and Rulemaking

How are Water Quality Standards Developed & Applied?



Surface waters → 02B .0200 Water Classifications

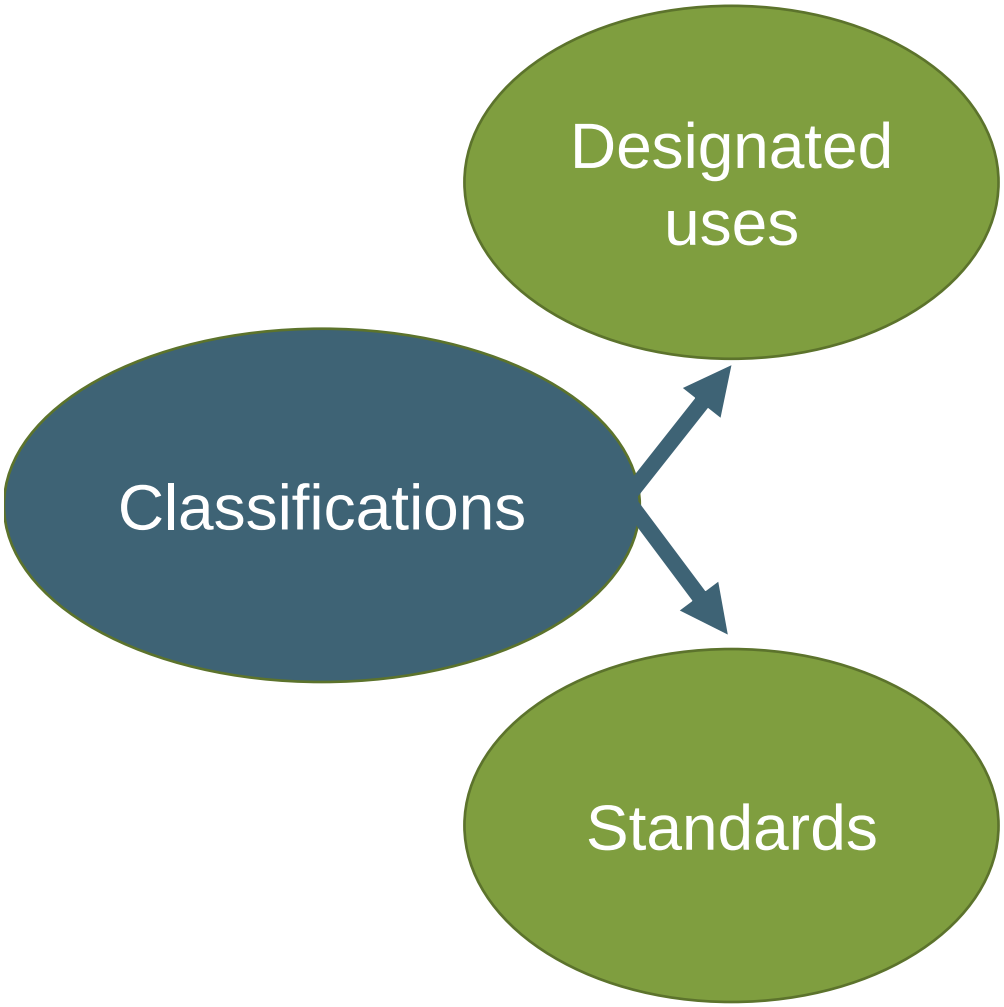
Groundwaters → 02L .0201 Water Classifications

Water Classifications

15A NCAC 02B & 02L rules

Water Body Classifications:

- Define the designated uses
- Describe the standards to attain the designated uses



Water Classifications

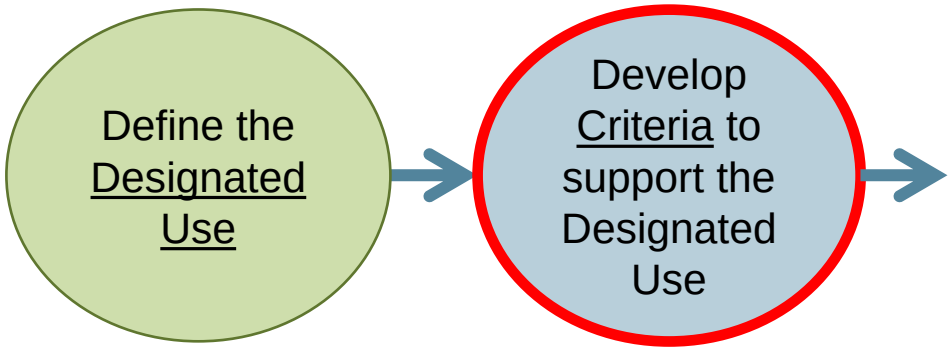
Surface waters

- Multiple classifications that describe a variety of uses
- 15A NCAC 02B .0200s
- Examples: Class C, Class WS (water supply), Class B
- Health & ecology related uses: fish consumption, water supply (fish + water), aquatic life, recreation

Groundwater

- Protect groundwater as a resource for human consumption
- 15A NCAC 02L .0202
- Examples: Class GA, GSA
- Health related use: water consumption (does not consider cost or treatment)

How are Water Quality Standards Developed & Applied?



Surface waters → Clean Water Act & 02B .0200's

Groundwaters → 02L .0202

Developing Surface Water Criteria

Criteria sources:

- EPA National Recommended Criteria (NRWQC)
  - Recommended criteria for substances of national concern
- NC narrative standard for toxics per 15A NCAC 02B .0208
  - Provides ability to generate numeric criteria for substances with no standard in 02B rule
    - Aquatic toxicity information (LC50, chronic values)
    - RfDs or CPFs from EPA or other sources

Example: 02B Human Health Criteria

- Per 15A NCAC 02B .0208

- **Fish Consumption** protects for exposure through consumption of fish tissue.

- **Water Supply** protects for exposure through consumption of drinking water & consumption of fish tissue.

- Both consider non-cancer & cancer information

"An unacceptable health risk for cancer shall be considered to be more than one case of cancer per one million people exposed (10^{-6} risk level)."

Example: Water Supply Calculation

Water + Fish consumption

Noncarcinogen

$$WQS = RfD \times RSC \times \frac{BW}{WCR + (FCR\ x\ BCF)}$$

Carcinogen

$$WQS = \frac{RL}{CPF} \times \frac{BW}{WCR + (FCR\ x\ BCF)}$$

RL = Risk Level = $1x10^{-6}$

WQS = Water Quality Standard

Toxicity values

RfD = Oral Reference Dose

CPF = Carcinogen Potency Factor or Cancer Slope Factor (CSF)

Exposure estimates

RSC = Relative Source Contribution

BW = Body Weight = 70 kg (adult) or 10 kg (child)

WCR = Water Consumption Rate = 2 L/day (adults) or 1 L/day (child)

FCR = Fish Consumption Rate = 17.5 g/person-day

BCF = Bioconcentration Factor or Bioaccumulation Factor (BAF), if available

Developing Groundwater Standards

Established as the ***least*** of the following:

1. Non-cancer threshold concentration (RfD)
2. 1/ million cancer risk concentration (Cancer Slope Factor)
3. Aqueous Taste threshold
4. Aqueous Odor threshold
5. Federal Maximum Contaminant Level (MCL)
6. Federal Secondary Drinking Water Standard (Taste and Odor)

Developing Groundwater Standards

Using the following references in order of preference:

1. EPA Integrated Risk Information System (IRIS)
2. EPA Drinking Water Health Advisories
3. Other EPA health risk assessment data
4. Other published health risk assessment data and published toxicological data

Groundwater Standards

Water consumption

Noncancer

$$GWQS = \frac{RfD \times BW \times RSC}{WCR}$$

Cancer

$$GWQS = \frac{RL \times BW}{CPF \times WCR}$$

RL = Risk Level = $1x10^{-6}$

Toxicity benchmarks

RfD = Oral Reference Dose

CPF = Carcinogen Potency Factor or Cancer Slope Factor (CSF)

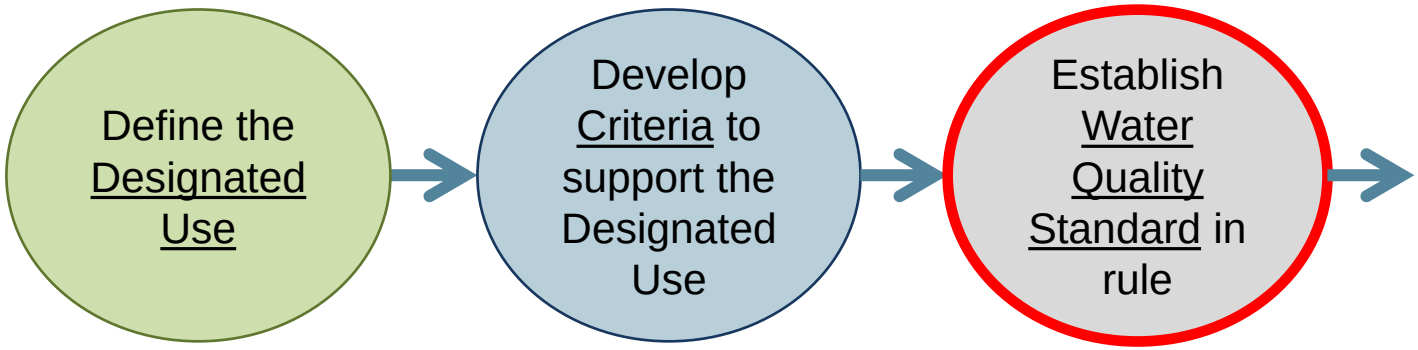
Exposure estimates

RSC = Relative Source Contribution (0.1 for inorganics; 0.2 for organics)

BW = Body Weight = 70 kg (adult)

WCR = Water Consumption Rate = 2 L/day (adults)

How are Water Quality Standards Developed & Applied?



Surface waters → Triennial review

Groundwaters → Triennial review

Surface Water Triennial Review Process

Development

- Staff review current standards, available guidance & literature
- Public notice & hearings

State Approval

- EMC approval
- RRC approval
- NC Attorney General sign off

Federal Approval

- EPA Clean Water Act review
- Endangered Species Act review
- NC notified of approval/disapproval of Triennial Review

Groundwater Triennial Review Process

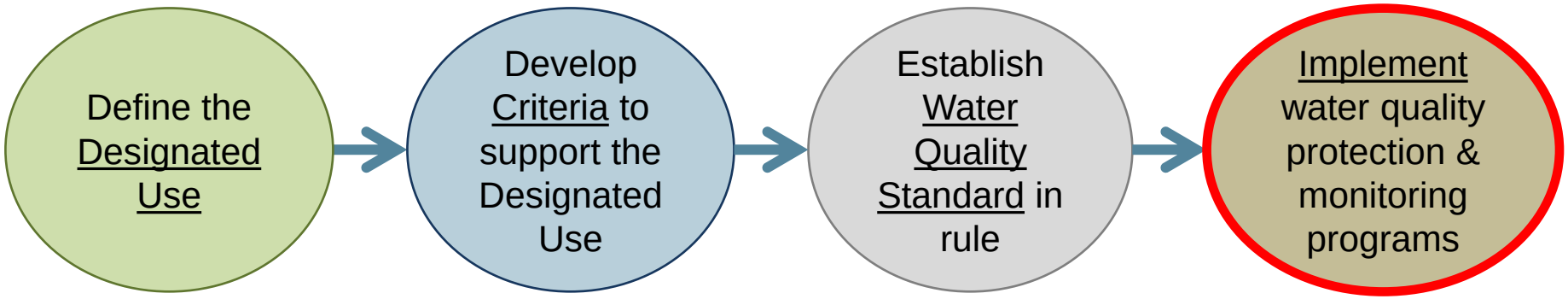
Development

- Staff review available guidance & literature and develop Triennial Review package
- Staff present TR to Environmental Commissions (GWWMC/EMC)
- Public notice & hearings

State Approval

- EMC approval
- RRC approval
- NC Attorney General sign off

How are Water Quality Standards Developed & Applied?



Surface waters → Permitting, 303(d), TMDLs

Groundwaters → Site clean-up, monitoring, risk assessments

Surface WQS implemented in various programs:

- NPDES permitting uses WQS as part of developing permit and monitoring limits (dilution & background also considered)
- Ambient data used to identify excursions of WQS and determine if listing a water body on the federal *303(d) impaired waters list* is necessary
- TMDLs allocate loadings for point and non-point sources in the watershed to lower in-stream concentrations to acceptable levels
- Standards also used in investigations to:
  - determine compliance with regulated activities
  - determine if unusual scenarios may result in an impact to designated uses

Groundwater standards are implemented in and enforced by various programs:

- DWR's Groundwater Resources Section:
  - monitoring wells network
  - site assessment and groundwater corrective action activities
  - permitting and compliance programs
- DEQ’s Division of Waste Management:
  - regulation of solid waste disposal
  - hazardous waste management
  - underground storage tanks
  - Superfund cleanups

Water Quality Standards Contacts

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DWR Classifications, Standards & Rules Review website:

https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards

Questions?

Title 15A NCAC Subchapter 02B – Surface water and wetland standards

Section .0100: Procedures for Assignment of Water Quality Standards

.0101, .0103, .0104, .0110

Section .0200: Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina

.0201, .0202, .0203, .0204, .0205, .0206, .0208, .0211, .0212, .0214, .0215, .0216, .0218, .0219, .0220, .0221, .0222, .0223, .0224, .0225, .0226, .0227, .0228, .0230, .0231

Section .0300: Assignment of Stream Classifications

.0301 - .0317

Title 15A NCAC Subchapter 02L – Groundwater Classifications and Standards

Section .0100: General Considerations

Section .0200: Classifications and Groundwater Quality Standards

.0201 Groundwater Classifications

.0202 Groundwater Quality Standards

IMACs

15A NCAC 02L .0202(c): substances which are not naturally occurring and for which no standard is specified shall not be permitted in concentrations at or above the practical quantitation limit (PQL)

What are IMACs?

Interim Maximum Allowable Concentrations

How are chemicals chosen to receive IMACs?

Any person may petition the Director per the guidelines in 15A NCAC 02L .0202(c).

Are IMACs legally enforceable?

Yes, per 15A NCAC 02L .0202

Who establishes IMACs?

The Director of the DWR.

How are IMACs developed?

Follow the requirements for groundwater standards in consultation with DHHS & DWM.