New Mexico Environment Department

DISCHARGER-SPECIFIC NUTRIENT TEMPORARY STANDARD FOR THE CITY OF RATON WASTEWATER TREATMENT PLANT

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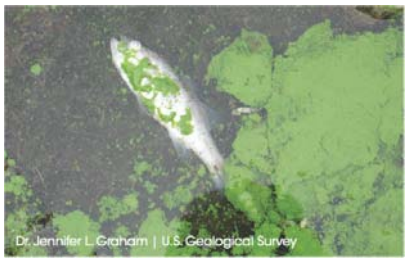
Water Quality Control Commission Hearing
March 10, 2020

1

NUTRIENTS – WHY?

In water, excess N or P causes over-enrichment, leading to:

- excess algae growth
- excess respiration and low O_2
- harmful algal blooms (HAB)
- Fish illnesses and fish kills
- turbidity, odors, drinking water effects
- botulism and other animal health problems



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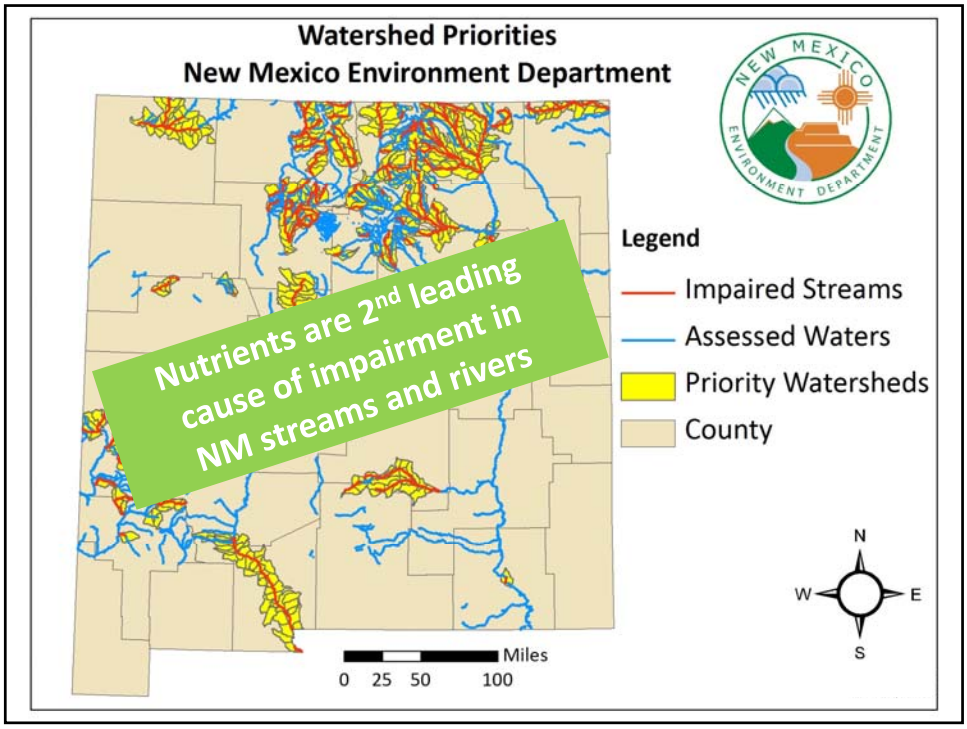

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NM's Narrative Nutrient Standard

"Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a dominance of nuisance species in surface waters of the state."

? ? ? ?

The question is, how to assess for attainment of this standard and define *quantifiable endpoints* AND THEN implement these endpoints to achieve meaningful nutrient reductions in surface waters to attain the standard.

4

4

Making Progress in New Mexico

- In 2004, SWQB developed a weight of evidence *NUTRIENT ASSESSMENT PROTOCOL* for wadeable, perennial streams using threshold values for both cause (TP & TN) and response (chlorophyll-a and DO) variables.
- The thresholds used by SWQB were simply the medians of all sites grouped by ecoregion with no link to designated use impairment or definition of "natural conditions."

5

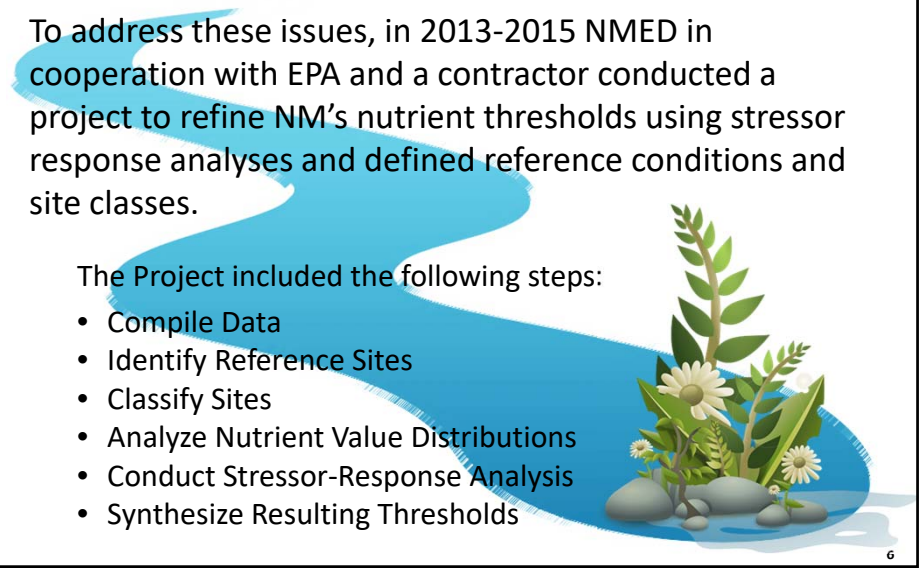
5

Refinement of Nutrient Thresholds

To address these issues, in 2013-2015 NMED in cooperation with EPA and a contractor conducted a project to refine NM's nutrient thresholds using stressor response analyses and defined reference conditions and site classes.

The Project included the following steps:

- Compile Data
- Identify Reference Sites
- Classify Sites
- Analyze Nutrient Value Distributions
- Conduct Stressor-Response Analysis
- Synthesize Resulting Thresholds



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Stressor-Response "Translators"

Site Median	TN (mg/L)			TP (mg/L)		
	Flat	Moderate	Steep	Volcanic	Flat-Moderate	Steep
Thresholds	0.69	0.42	0.30	0.105	0.061	0.030

- TN and TP thresholds (i.e., "numeric translators") represent nutrient conditions above which, "…*produce undesirable aquatic life or result in a dominance of nuisance species…*"
- Protective of stream and scientifically defensible.
- General consensus that TMDLs should be written to targets that are protective of the stream and scientifically defensible.
- But not technologically achievable end-of-pipe.

7

7

History of Temporary Standard

The receiving water has been impaired for nutrients since the mid- to late 1990's.

- NM drafted a TMDL in 2011, but it was tabled due to concerns that the WLA would be unachievable and NMED was directed to work with NM Municipal League to develop alternative limits.
- The workgroup devised a strategy for alternative limits in NPDES permits; however, EPA struggled with the idea because there was no regulatory mechanism to require EPA to incorporate the alternative limits into permits.
- NM incorporated a temporary standard provision into the WQS in 2017 to provide a regulatory mechanism for alternative effluent limits.

NMED + NMML + EPA R6

8

8

Temporary Standards in NM

- Temporary standard (NM) = WQS variance (federal)
  - 20.6.4.10.F NMAC
  - 40 CFR 131.14
- A **time-limited** designated use and criterion
  - for a specific pollutant(s) or water quality parameter(s)
  - that reflects the highest attainable condition during the term of the temporary standard.
- A regulatory mechanism that **allows progress toward attaining underlying designated use and criterion** that is not currently attainable and helps address nutrient management to achieve significant nutrient reductions.
- A temporary standard is a change to the WQS.

9

9

Why this approach?

- **Nutrient concentrations necessary to protect water quality are very low** and result in permit limits that are not economically or technologically achievable for many permittees (typically little to no dilution capacity in NM streams)
- **Needed to create a clear path to compliance** that is achievable and affordable in the near-term and encourages incremental improvements to water quality in the medium and longer-term
- **Temporary standards provide an adaptive management approach** to address excess nutrients.

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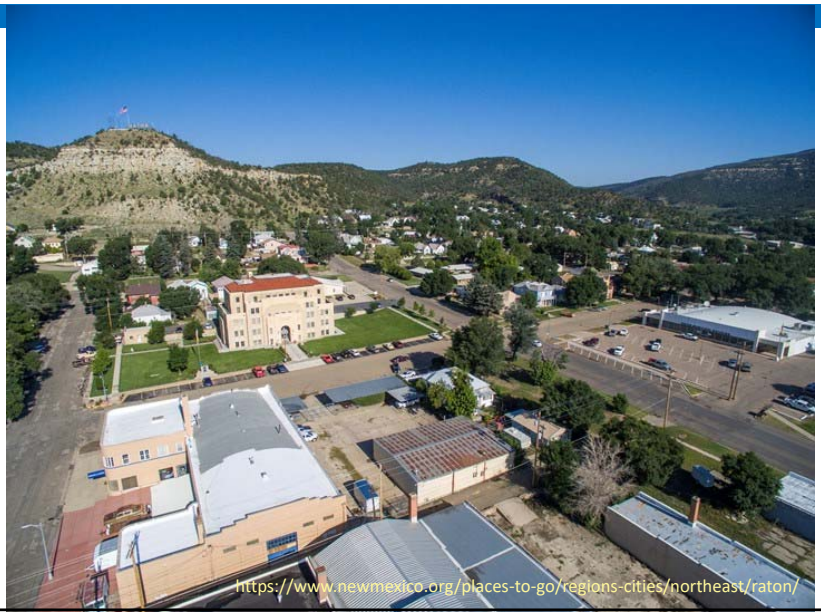
10

Discharger-Specific Temporary Standard for the City of Raton Wastewater Plant



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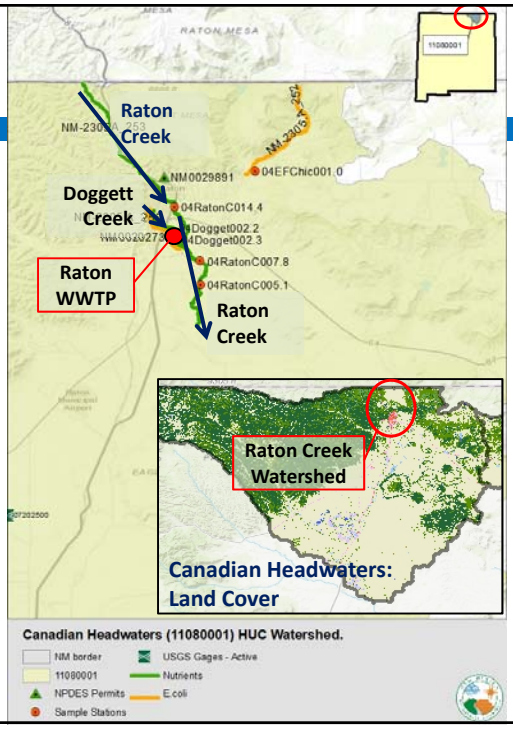
11

Upper Canadian Watershed & Doggett Creek

Perennial water - 20.6.4.99 NMAC

- Warmwater aquatic life, livestock watering, wildlife habitat, & primary contact.
- Land cover is 46% grassland, 31% evergreen forest, 15% shrub and scrub, & 2% deciduous forest.
- No critical habitats identified
- Impaired due to nutrients and *E. coli* bacteria

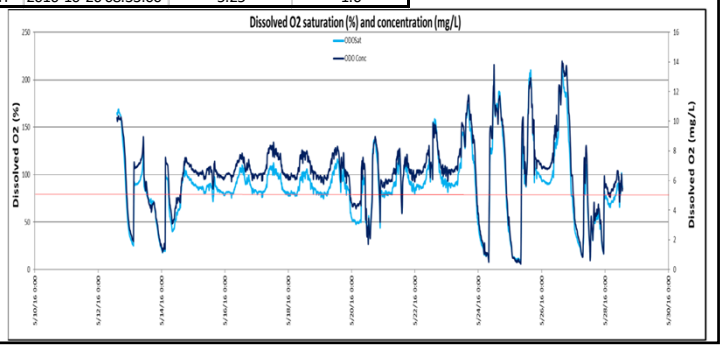


12

12

Doggett Creek DATA

MLOC_NAME	SE_START_DATE	TN calculated* (mg/L)	TP (mg/L)
Doggett Creek below Raton WWTP	2015-03-23 15:00:00	6.03	2.18
Doggett Creek below Raton WWTP	2015-04-22 08:20:00	5.67	2.1
Doggett Creek below Raton WWTP	2015-05-13 10:40:00	4.56	2.68
Doggett Creek below Raton WWTP	2015-07-15 14:50:00	5.47	2.62
Doggett Creek below Raton WWTP	2015-08-27 08:15:00	7.32	1.63
Doggett Creek below Raton WWTP	2015-10-20 08:45:00	5.17	not available
Doggett Creek below Raton WWTP	2016-05-04 23:59:00	5.06	1.66
Doggett Creek below Raton WWTP	2016-06-02 08:19:00	5.00	4.36
Doggett Creek below Raton WWTP	2016-07-13 08:55:00	4.59	3.59
Doggett Creek below Raton WWTP	2016-08-16 13:02:00	7.96	3.73
Doggett Creek below Raton WWTP	2016-09-14 08:35:00	5.33	1.96
Doggett Creek below Raton WWTP	2016-10-26 08:33:00	5.25	1.6



13

Steps for a Temporary Standard – "Factor 6" Demonstration

1. **Determine eligibility**
   - WQS cannot be achieved through TBELs
   - WQBELs derived from WQS cannot be achieved now or through an enforceable sequence of events
2. **Justify the TS based on 40 CFR 131.10(g) "Factor 6"**
   - Estimate cost of technology needed to meet the underlying WQS
   - Evaluate whether that cost would cause ***substantial and widespread*** impact
3. **Determine highest attainable condition (HAC)**
   - May not be able to achieve the underlying WQS, but can current performance be improved? What is the best affordable performance?
   - Determine TS duration

14

14

Applicable In-Stream Threshold Values

- Discharge is to an effluent-dominated stream
- Average catchment slopes are < 15%
- Not in "volcanic" geology site

	TN (mg/L)			TP (mg/L)		
	TN Flat	TN Moderate	TN Steep	TP High-Volcanic	TP Flat-Moderate	TP Steep
Threshold	0.69	0.42	0.30	0.105	0.061	0.030

15

15

Evaluate TBELs

- No technology-based requirements for nutrients applicable to POTWs
- ***Conclusion:*** Technology-based effluent limitations not sufficient to meet water quality standards
- ***Next Step:*** Evaluate other options for attaining WQS

16

16

Evaluate Technology Options for Attaining the Underlying WQS

Target Effluent Concentration (TEC)	Treatment Technology Options
7.0 mg/L TN	Optimization of existing SBR (ICEAS) process to promote nitrification/denitrification
5.0 mg/L TN	Additional optimization (upgrade SCADA system, install new mixers and blowers)
3.0 mg/L TN	Biological nitrogen removal (BNR): • nitrification/denitrification via anoxic/oxic zone or cycle retrofits • addition of a denitrification filter, or • optimization if approaching limit of technology
0.5 mg/L TP	Chemical precipitation (no tertiary filtration)
0.1 mg/L TP	Chemical precipitation with tertiary filtration
TN and TP concentrations approaching underlying WQS	Reverse osmosis (RO)

17

17

Estimate Cost of Reverse Osmosis to Attain the Underlying WQS

Justify temporary standard by showing that the impact on the community will be ***substantial*** and ***widespread*** ["factor 6" in 40 CFR 131.10(g)]

- Estimate ***cost of the technology***
  - Planning level analysis using literature values to calculate capital and O&M costs
  - Annualized costs (Interest rate = 5%: Term = 20 years)

TECHNOLOGY	TARGET EFFLUENT CONCENTRATION	CAPITAL COST	O&M COST	ANNUALIZED COSTS[1]
Reverse Osmosis	TEC <1.0 mg/L TN TEC <0.01 mg/L TP	$10,750,800	$847,916	$1,710,130

- ***Substantial*** and ***widespread*** analysis uses USEPA's 1995 interim economic guidance and spreadsheet tool

18

18

Substantial Economic and Social Impacts

- **Substantial Economic and Social Impact Analysis:** after estimating annualized treatment costs to achieve WQS, **assess magnitude of cost burden** with respect to the community's income and other relevant indicators of financial capability
  1. **Municipal Preliminary Screener – costs per household**
     - Pollution control costs with RO = 2.8% of MHI
  2. **Secondary Test – financial and socioeconomic conditions**
     - Raton Total Secondary Score = 2.0

19

19

Substantial Economic and Social Impacts

- **Raton, NM Conclusion**: municipal primary screener (MPS) combined with information from the secondary test shows that ***impact is likely to be substantial… move to Widespread Analysis***

Assessment of Substantial Impacts Matrix (Table 5-2 from EPA Guidance)

MPS:	**2.8%**
Secondary Test Score:	**2.0**

Secondary Test Score	**MPS**		
	Less than 1.0 Percent	*Between 1.0 and 2.0 Percent*	*Greater than 2.0 Percent*
Less than 1.5	?	X	X
Between 1.5 and 2.5	✓	?	X
Greater than 2.5	✓	✓	?

Key:

✓	Impact is not likely to be substantial
X	Impact is likely to be substantial
?	Impact is unclear

20

20

Widespread Impacts Analysis

Widespread Impacts Analysis: assess the likelihood that substantial economic and social impacts on the community would be widespread

- ✓ 6,350 people
- ✓ One-third White and nearly Two-thirds Hispanic
- ✓ Median age 45.5 (compared to 37.2 for NM as a whole).
- ✓ MHI = $29,600 (compared to statewide MHI of $45,700)

- From 2009 to 2016, **Raton's MHI has shown stagnant or declining** conditions while state and national levels have increased slightly.
- **Wages for jobs in Raton are generally lower** than wages in the state as whole.
- **Annual sewer rates would triple**, from $230, or 0.8% MHI, currently to $822, or 2.8% MHI, with reverse osmosis.
- Almost all households and businesses in the community pay for wastewater treatment. **An increase in wastewater treatment rates would apply to almost the entire community.**

21

21

Widespread Impacts Analysis

- ***Widespread Conclusion:***
  - Any substantial impacts are likely to be widespread across the community.
  - Cost of installing RO to meet underlying WQS would lead to **substantial** and **widespread** economic and social impacts [40 CFR 131.14 and **131.10(g) Factor 6**]

Raton WWTP meets the eligibility requirements for a temporary standard

- ***Next Step:*** Evaluate options for incremental improvements – determine highest attainable condition (HAC)

22

22

Evaluate Other Options for Attaining the Underlying WQS

1. **Moving the discharge location** – not feasible
   - Downstream water (Raton Creek) is also impaired for nutrients
   - Little/no dilution capacity
2. **Seasonal/Zero Discharge** – unknown at this time
   - The City of Raton is collecting data to explore both seasonal and zero discharge options
   - Seasonal Discharge Option: 100% re-use in summer/fall followed by seasonal effluent nutrient limits in winter – requires upgrades or addition of polishing filter, increase capacity of re-use pumps, and increase size of pipes to minimize losses
   - Zero Discharge Option: as part of the proposed temporary standard workplan, the City of Raton will conduct a zero-discharge feasibility study to determine if this option is economically and logistically feasible

23

23

Evaluate Technology Options for Identifying the Highest Attainable Condition

Six potential treatment options were evaluated as candidates for establishing the highest attainable condition.

Cost Element	Option A Additional Optimization and Chemical Precipitation (5.0 mg/L TN, 1.0 mg/L TP)	Option B Denitrification Filters with No additional TP treatment (3.0 mg/L TN, 2.2 mg/L TP)	Option C Denitrification Filters and Chemical Precipitation (3.0 mg/L TN, 1.0 mg/L TP)	Option D Optimize Cycle Times and Chemical Precipitation plus Filtration (7.0 mg/L TN, 0.1 mg/L TP)	Option E Additional Optimization and Chemical Precipitation plus Filtration (5.0 mg/L TN, 0.1 mg/L TP)	Option F Denitrification Filters and Chemical Precipitation plus Filtration (3.0 mg/L TN, 0.1 mg/L TP)
Capital Cost	$681,360	$1,336,200	$1,557,540	$2,252,160	$2,712,180	$3,588,360
Annual O&M Cost	$150,439	$249,115	$330,001	$472,784	$542,337	$721,899
Total Annualized Cost	$205,113	$356,335	$454,982	$653,503	$759,969	$1,009,838
Substantial Impacts Analysis	Impact Unclear (30% incr)	Impact Unclear (50% incr)	Substantial (65% incr)	Substantial (95% incr)	Substantial (110% incr)	Substantial (145% incr)

24

24

Highest Attainable Condition – HAC

- The HAC is expressed as the "interim effluent condition that reflects the greatest pollutant reduction achievable."
- The HAC for Raton WWTP (NPDES permit no. NM0020273) is represented by the target effluent concentrations (TECs) below.

Pollutant Parameter	Highest Attainable Interim Effluent Condition (mg/L)
Total Nitrogen (TN)	5.0, long-term average; 8.0, 30-day average
Total Phosphorus (TP)	1.0, long-term average; 1.6, 30-day average

25

25

Existing Uses

- Adoption of a temporary standard must not cause further impairment or loss of an existing use.
- Existing uses were evaluated using readily available data.
- A comparison of the **long-term average concentrations** for Doggett Creek, the Raton WWTP effluent, and the Highest Attainable Condition is presented below:

Pollutant Parameter	In-stream Concentration	Effluent Concentration	Highest Attainable Condition
Total Nitrogen	5.62 mg/L	7.3 mg/L	5.0 mg/L
Total Phosphorus	2.56 mg/L	2.37 mg/L	1.0 mg/L

26

26

Proposed Actions & Implementation Schedule – PHASE 1, 10 Years

Task	Target Completion Date
NPDES Permit Application/Renewal - Continued Optimization Efforts of Existing System - PER for SBR Upgrades to Achieve Nutrient Removal Goal - Pilot Testing of Coagulation - Zero Discharge Feasibility Study	January 2020 – January 2023
- Design for Phase 1 (coagulation for phosphorus removal) - Funding Applications - Zero Discharge Feasibility Study - continued	January 2023 – January 2025
NPDES Permit Application/Renewal - Evaluate Nutrient Temporary Standard Progress incl. Zero Discharge - Complete Final Phase 1 Design - Bidding & Contract Award - Construction of Phase 1 - Construction Completion & Start Up	January 2025 – January 2029
- Optimization of New Processes - Evaluate Process Changes - Review & Evaluate PER Goals/Objectives and Plans	January 2029 – January 2030

27

27

Proposed Actions & Implementation Schedule – PHASE 2, 10 Years

Task	Target Completion Date
NPDES Permit Application/Renewal - Evaluate Nutrient Temporary Standard Progress - Design Phase 2 (aeration control upgrade for nitrogen removal)	January 2030 – January 2031
- Pursue Funding - Complete Final Phase 2 Design	January 2031 – January 2032
- Bidding & Contract Award - Construction of Phase 2 - Construction Completion & Start Up	January 2032 – January 2035
NPDES Permit Application/Renewal - Evaluate Nutrient Temporary Standard Progress - Optimization of New Processes - Evaluate Process Changes - Review & Evaluate PER Goals/Objectives and Plans	January 2035 – January 2037
- Continued Optimization - Evaluate Nutrient Temporary Standard Progress End of Temporary Standard and End of Facility Life	January 2037 – January 2040

28

28

Justification

A discharger-specific temporary standard is appropriate for the City of Raton WWTP because all the following are met:

- Existing or proposed discharge control technologies will comply with applicable technology-based effluent limitations, feasible technological controls, and other management alternatives [20.6.4.10(F)(1)(c) NMAC];
- The underlying designated use and criterion, including numeric interpretations of narrative criteria, are not attainable now or within a defined period of time, but may be attainable in the longer term [20.6.4.10(F)(1)(a) NMAC];
- It is feasible to make incremental improvements in water quality during the proposed term of the temporary standard; and
- The temporary standard will not result in any lowering of currently attained ambient water quality [20.6.4.10(F)(1)(b) NMAC].

29

29

Recommendation

The Department recommends that the Commission adopt the temporary standard amendment as proposed. Once approved by the Commission and adopted as standards, the SWQB will submit the revised water quality standards, to EPA for formal review and final approval action under Section 303(c) of the CWA.

30

30

Questions?

Surface Water Quality Bureau

www.env.nm.gov/surface-water-quality/

31

31