Triennial Review and Update of Circular DEQ-12B: Nutrient Standards Variances

Presented to:

Water Pollution Control Advisory Council

Helena, MT

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MT DEQ

Montana Department of
ENVIRONMENTAL QUALITY

DEPARTMENT CIRCULAR

DEQ-12A

Montana Base Numeric Nutrient Standards

Montana Department of
ENVIRONMENTAL QUALITY

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DEQ-12B

Nutrient Standards Variances

http://deq.mt.gov/Water/WQPB/Standards

Changes to Federal Rules

- 2014: DEQ adopted nutrient standards and variances
- 2015: EPA updated its rules regarding variances
- Updates affect DEQ's triennial review of nutrient standards and variances
  - Highest Attainable Condition (HAC)
  - Time to achieve HAC
  - Pollutant minimization program

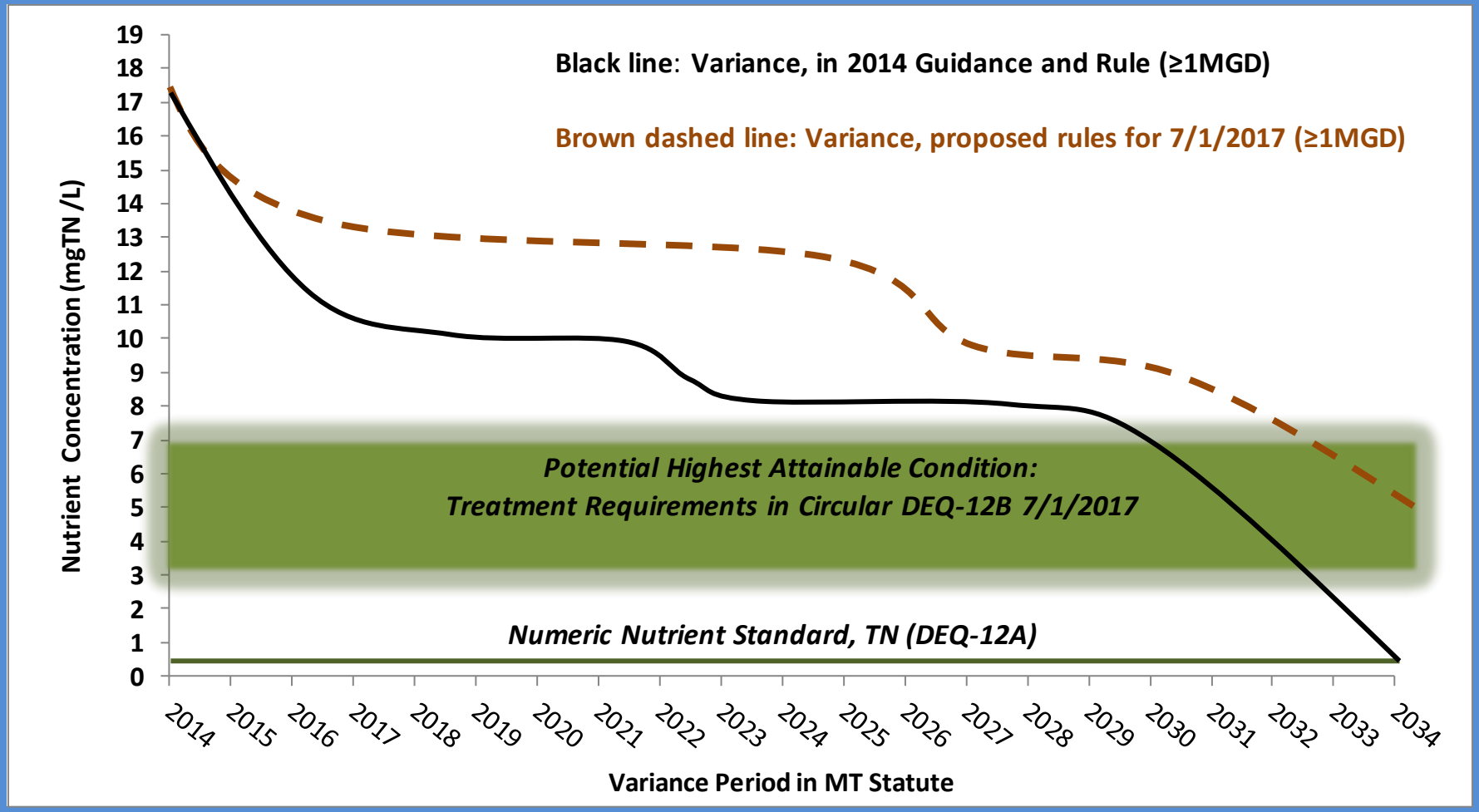


Illustration of variance process over 20 years, as currently constructed and as proposed. Example is for TN for the ≥1MGD group. As currently constructed, the numeric nutrient standards are the highest attainable condition (HAC). Going forward, *where the nutrient standards are unattainable* , the HAC would be in Circular DEQ-12B. HAC may change in the future. The longest time to achieve HAC is illustrated; it may take less time.

Nutrient Work Group Review

- 4 meetings between 9/14/2016 and 3/27/2017
- 5 meetings with technical subcommittee between 2/9/2017 and 3/13/2017
  - Cost analyses and other materials we'll cover

Cost analyses for highest attainable condition

- ≥1MGD, <1MGD categories
  - *mechanical facilities*
- Lagoon category

Identifying HAC

<u>≥1MGD</u>:

- ✓ Identify range based primarily on group costs
- ✓ NWG comments
- ✓ Review other BNR facilities with dual nutrient control

<u><1MGD</u>:

- ✓ Identify range based primarily on group costs
  - ✓ No treatment level reviewed was affordable
- ✓ NWG comments, future collection system costs
- ✓ Engineers' judgements as to what advanced operational strategies can achieve for these facilities

HAC Ranges, Based on Work Reviewed by the Subcommittee

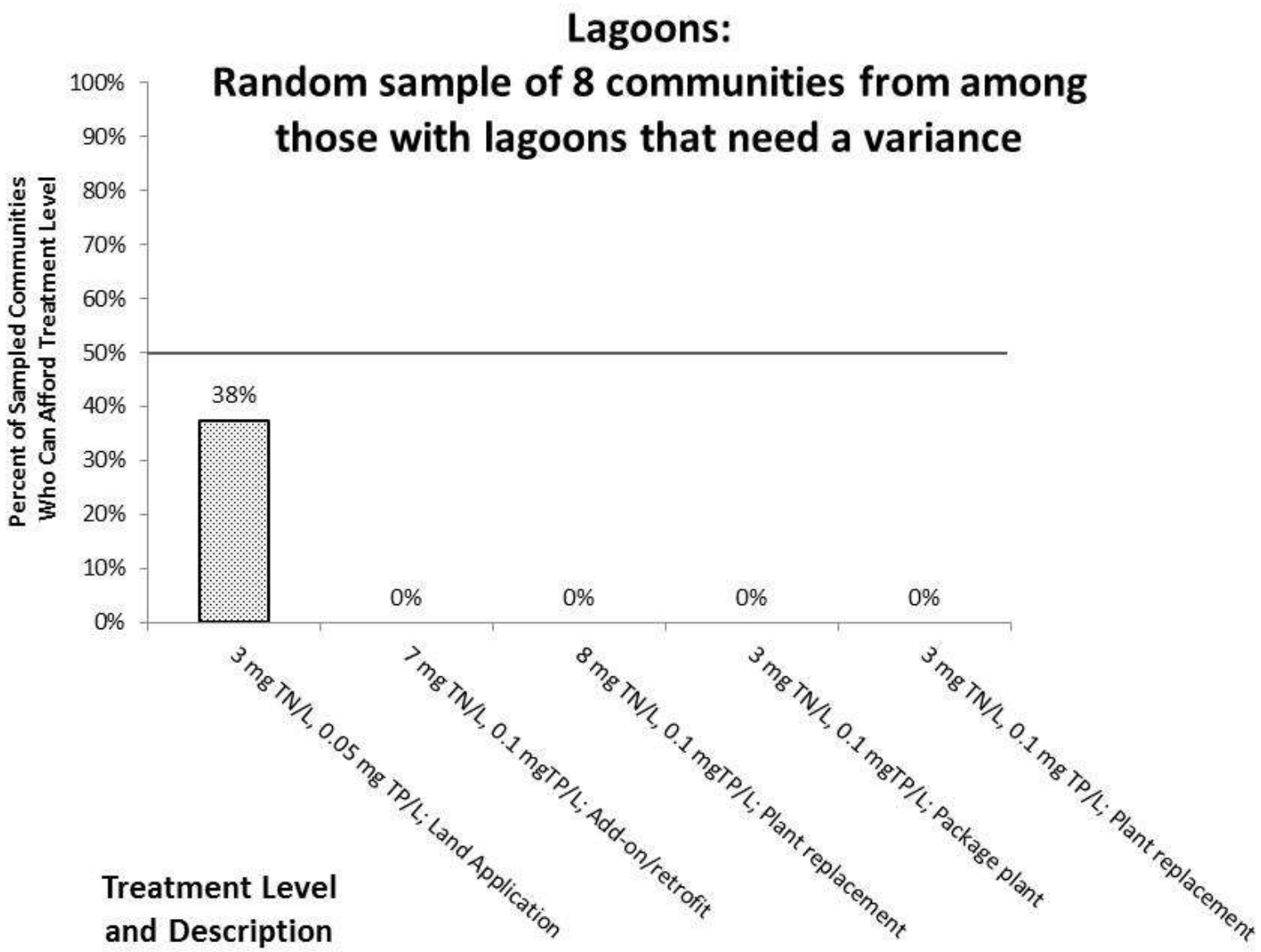
- ≥1MGD Discharge Category: 4 to 7 mg TN/L, and >0.1 to 0.4 mg TP/L.

- <1MGD Discharge Category: 7 mg TN/L and 0.5 mg TP/L were not affordable for most POTWs. Treatment cost estimates for concentrations greater than these were not conducted, so subcommittee relied on the potential for facility optimization. >>7 to 10 mg TN/L, and 1.0 mg TP/L.

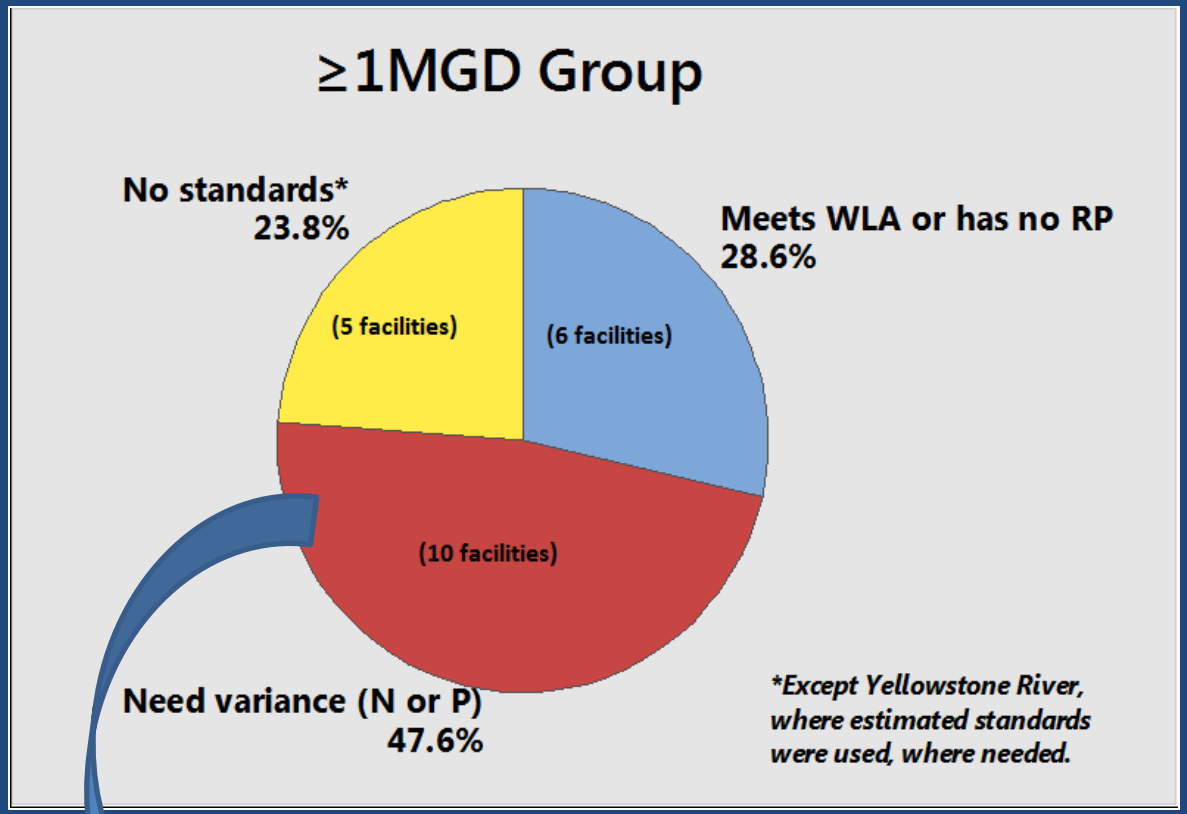
- Lagoon Discharge Category: No change to current method of implementing general variances for communities with wastewater lagoons.

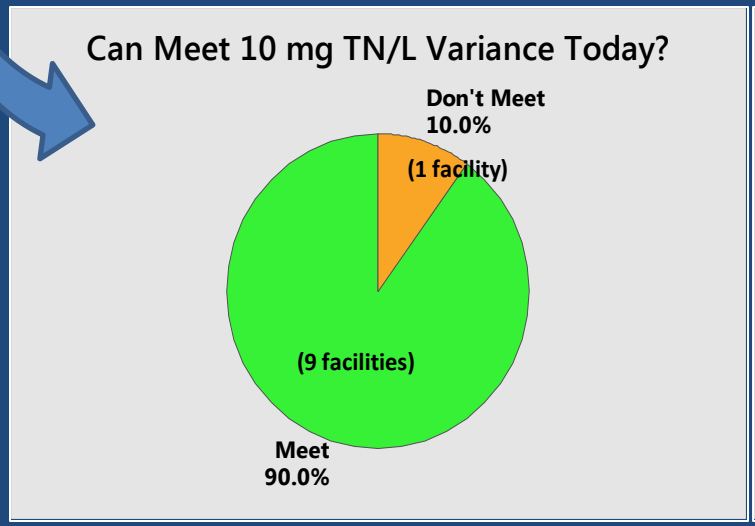
Lagoon Category

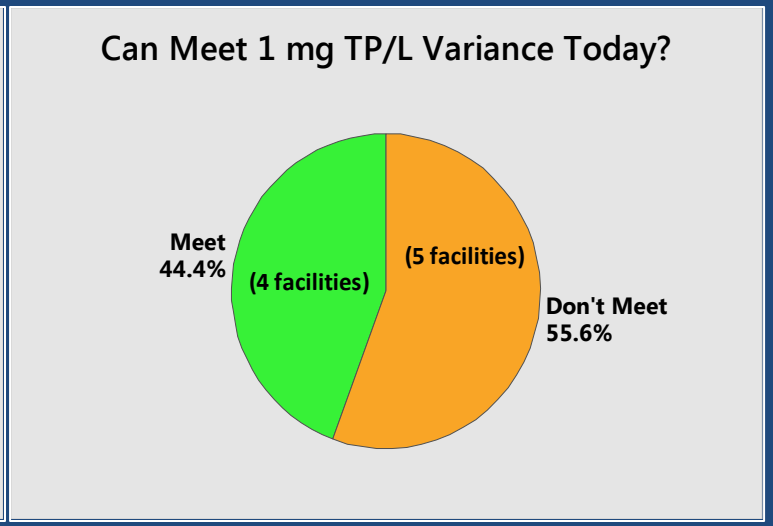
65 individual permits, ≤40 likely need variance (analysis below is <u>only</u> for POTWs)



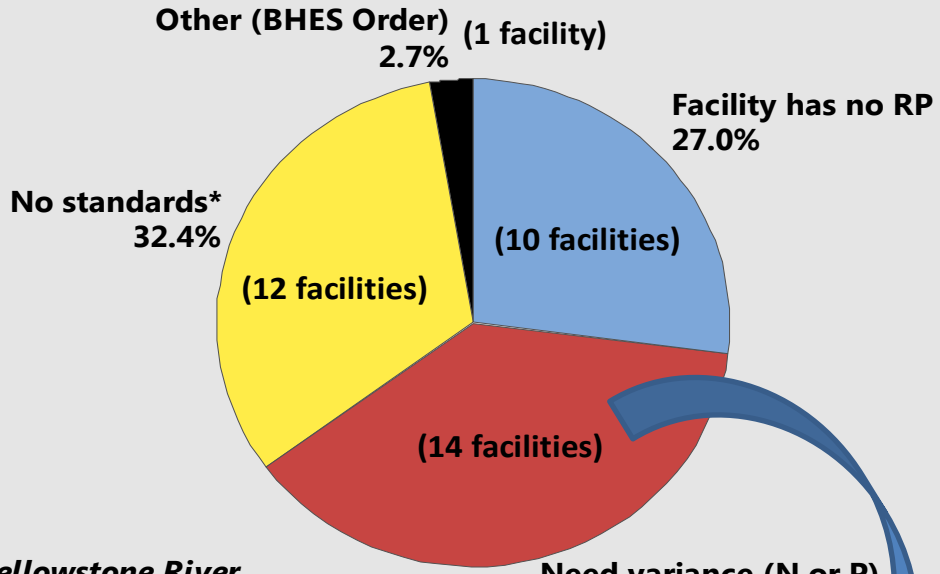
Mechanical Facility Groups (≥1MGD, <1MGD)


≥1MGD Group
No standards*
23.8%
(5 facilities)
Meets WLA or has no RP
28.6%
(6 facilities)
(10 facilities)
Need variance (N or P)
47.6%
*Except Yellowstone River, where estimated standards were used, where needed.


Can Meet 10 mg TN/L Variance Today?
Don't Meet
10.0%
(1 facility)
(9 facilities)
Meet
90.0%

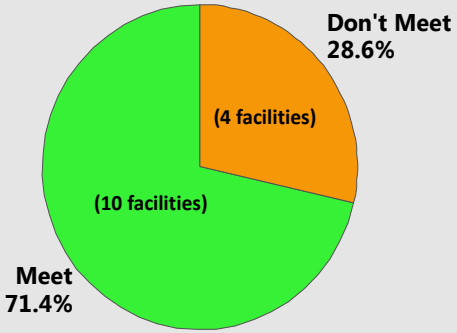

Can Meet 1 mg TP/L Variance Today?
Meet
44.4%
(4 facilities)
(5 facilities)
Don't Meet
55.6%

<1MGD Group

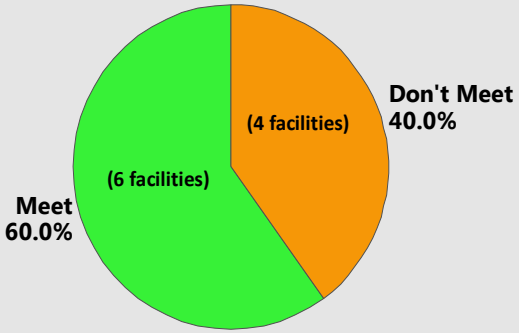


Except Yellowstone River, where estimated standards were used, where needed.

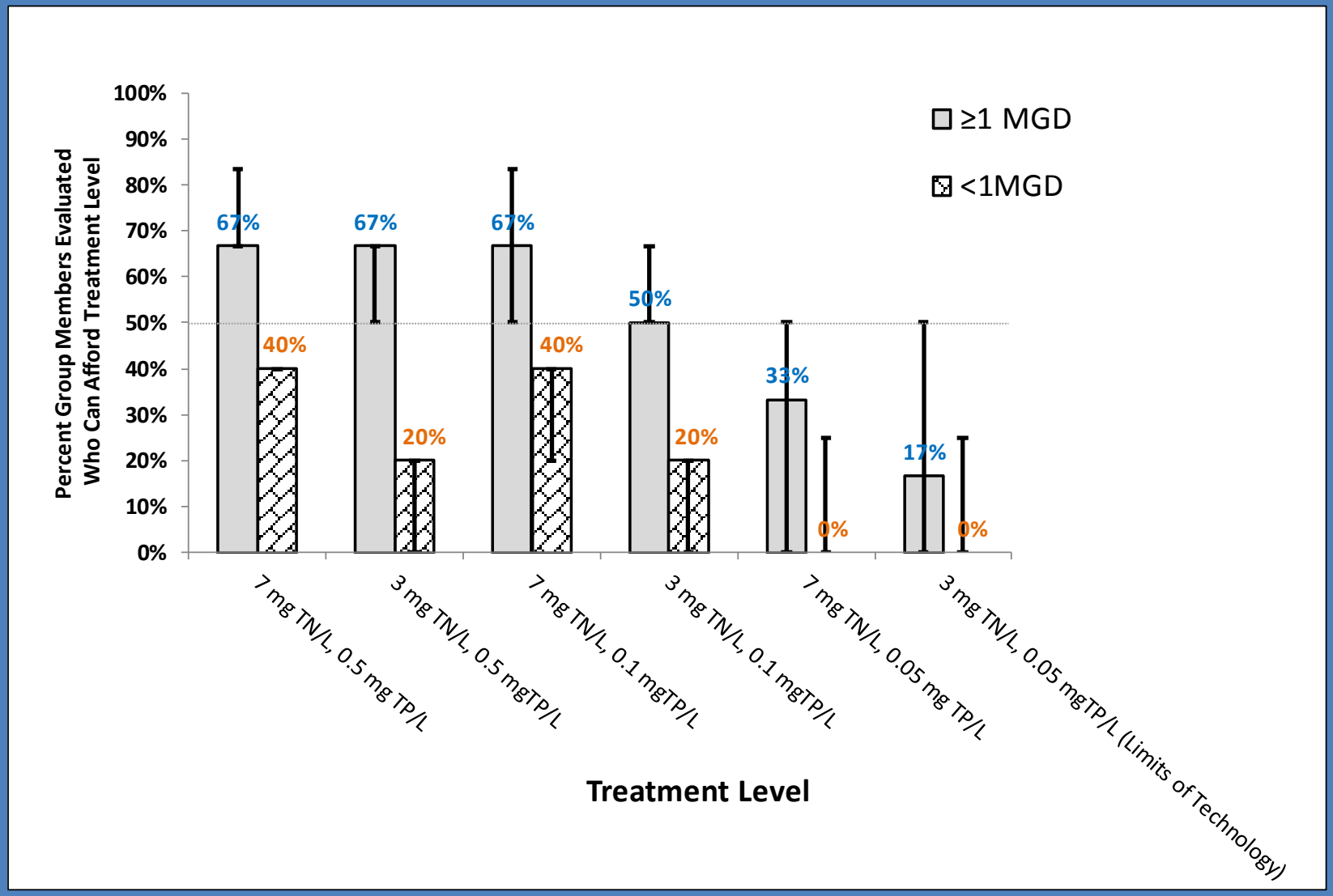
Can Meet 15 mg TN/L Variance Today?



Can Meet 2 mg TP/L Variance Today?



≥1MGD, <1MGD Mechanical Categories



Percent of Members in a Discharger Group (≥ 1MGD, <1MGD) Who Can Affordably Meet (Per DEQ Methods) a Specified Wastewater Treatment Level. Only POTW group members are shown, and, among them, only those that will probably need a variance. Error bars are the % of members who can afford a treatment level, based on a range of cost estimates for the facility upgrades (per class 5 engineering planning estimates).

Some dual nutrient control facilities around the country

95th percentile performance of a non-random sample of facilities with advanced nutrient removal.

	Design Flow (MGD)	Facility	TN (mg/L)	Facility	TP (mg/L)
No permit Exceedences expected					
Dual Nutrient Control Facilities	5.5	Butte (MT)	3.2	Butte (MT)	*too soon*
	8.5	Bozeman (MT)	8.1	Bozeman (MT)	0.58
	2.4	Palmetto (FLA)	3.6	Palmetto (FLA)	0.56
	6.0	Annapolis (MD)	6.8	Annapolis (MD)	0.25
	3.3	Bowie (MD)	4.6	Bowie (MD)	*no data*
	15.0	Largo (FLA)	3.5	Largo (FLA)	0.60
	8.0	Frederick (MD)	9.1	Frederick (MD)	1.07
	5.0	Westminster (MD)	5.7	Westminster (MD)	0.40
	8.1	Cambridge (MD)	3.9	Cambridge (MD)	*no data*
	15.0	Cumberland (MD)	3.8	Cumberland (MD)	0.30

These facilities are mainly from EPA, 2007. *Biological Nutrient Removal Processes and Costs*. Office of Water, Washington, D.C. EPA-823-R-07-002.

<1MGD: Future Collection System Costs

(data provided by Great West Engineering)

	Montana Communities Water and Sewer Replacement Estimates						
Category	Population Range	Average LF Sewer (note 1)	Average Sewer Collection System Cost (note 1&6)	Average Annual Cost per User @ 75 year (note 1&2)	% of MHI @ 75 yr (note 1,2 &4)	Average Annual Cost Per User @ 100 year (note 1&3)	**% of MHI @ 100 yr (note 1, 3 &4)**
1	0-300	10,000	$1,600,000	$337	1.56	$254	1.17
2	300-500	20,000	$3,200,000	$251	0.79	$189	0.60
3	500-1000	23,000	$3,400,000	$178	0.56	$134	0.42
4	1000-2000	40,000	$6,300,000	$166	0.48	$125	0.36
5	2000-3000 (note 5)						
6	3000-4000	75,000	$12,000,000	$125	0.31	$94	0.23
7	4000-5000	92,000	$16,000,000	$118	0.29	$89	0.23
8	5000-6000 (note 7)	92,000	$16,000,000	$59	0.12	$44	0.10
9	6000-7000 (note 7)	158,000	$27,000,000	$144	0.35	$108	0.26
10	7000-8000 (note 5)						
11	9000-10000 (note 7)	314,000	$55,000,000	$217	0.50	$164	0.37

Mostly lagoons (Categories 1–4)

mostly <1MGD (Categories 6–11)

1. Average of communities included in evaluation
2. Based on 75 year service life
3. Based on 100 year service life
4. MHI = Median Household Income
5. No data yet, but working on it.
6. Includes construction costs only not O&M
7. Only one community - need more

Conclusion: For <1MGD group, supports selecting HAC towards upper end of range

Current and Proposed Treatment Requirements in DEQ-12B

<u>≥1MGD Category</u>:

- Current: 10 mg TN/L and 1.0 mg TP/L
- Proposed: 6 mg TN/L and 0.3 mg TP/L

<u><1MGD Category</u>:

- Current: 15 mg TN/L and 2.0 mg TP/L
- Proposed: 10 mg TN/L and 1.0 mg TP/L

<u>Lagoons:</u>

- No major changes
  - Department and permittees implementing Pollutant Minimization Program

Recent Effluent Quality of Facilities Likely to Need a Variance

Facilties in ≥1MGD Category Likely to Need a Variance.						Discharge Effluent Quality	
MPDES ID	Size	Total Actual Average Flow (MGD)	Facility Type Indicator	FLOW (MGD) (Design average, or if private, average of most recent 2 years)	Facility Type (L-lagoon, M-mechanical O-other, with detail)	Median TN (mg/L)	Median TP (mg/L)
MT0020184	> 1 MGD	0.92	POTW	1.8	M	24.2	0.47
MT0022586	> 1 MGD	15	POTW	26	M	17.3	1.90
MT0021938	> 1 MGD	2.7	POTW	5.4	M	8.4	0.15
MT0022535	> 1 MGD	1.384	POTW	1.8	M	7.9	1.34
MT0022641	> 1 MGD	2.8	POTW	5.4	M	5.6	2.36
MT0022608	> 1 MGD	6.225	POTW	8.5	M	4.4	0.17
MT0020028	> 1 MGD	0.677	POTW	1.984	M	3.1	3.38
MT0022012	> 1 MGD	3.64	POTW	5.5	M	2.4	2.10
MT0000256	UNK	see column "FLOW (MGD)"	NON-POTW	1.573	M	1.5	0.30
MT0031755	UNK	see column "FLOW (MGD)"	NON-POTW	0	M	1.3	0.031

Facilties in <1MGD Category Likely to Need a Variance.						Discharge Effluent Quality	
MPDES ID	Size	Total Actual Average Flow (MGD)	Facility Type Indicator	FLOW (MGD) (Design average, or if private, average of most recent 2 years)	Facility Type (L-lagoon, M-mechanical O-other)	Median TN (mg/L)	Median TP (mg/L)
MT0021431	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.01	M	28.2	6.48
MT0000205	UNK	see column "FLOW (MGD)"	NON-POTW	0	M	22.7	0.00
MT0027430	< 1 MGD	0.023	POTW	0.05	M	20.5	7.13
MT0023566	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.01	M	16.9	2.45
MT0022713	< 1 MGD	0.344	POTW	0.344	M	14.8	2.84
MT0024716	UNK	see column "FLOW (MGD)"	NON-POTW	0.51	M	10.7	0.02
MT0022560	< 1 MGD	0.307	POTW	0.434	M	10.6	0.53
MT0021857	< 1 MGD	0.15	POTW	0.37	M	8.7	0.60
MT0020079	< 1 MGD	0.32	POTW	0.54	M	7.0	0.15
MT0026808	UNK	see column "FLOW (MGD)"	NON-POTW	0.28	M	4.9	1.34
MT0029891	UNK	see column "FLOW (MGD)"	NON-POTW	0.48	O	4.5	0.02
MT0020125	< 1 MGD	0.11	POTW	0.502	M	2.9	1.84
MT0031721	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.864	M	1.9	0.00
MT0030350	UNK	see column "FLOW (MGD)"	NON-POTW	0.44	M	0.5	0.24

Time to Achieve HAC

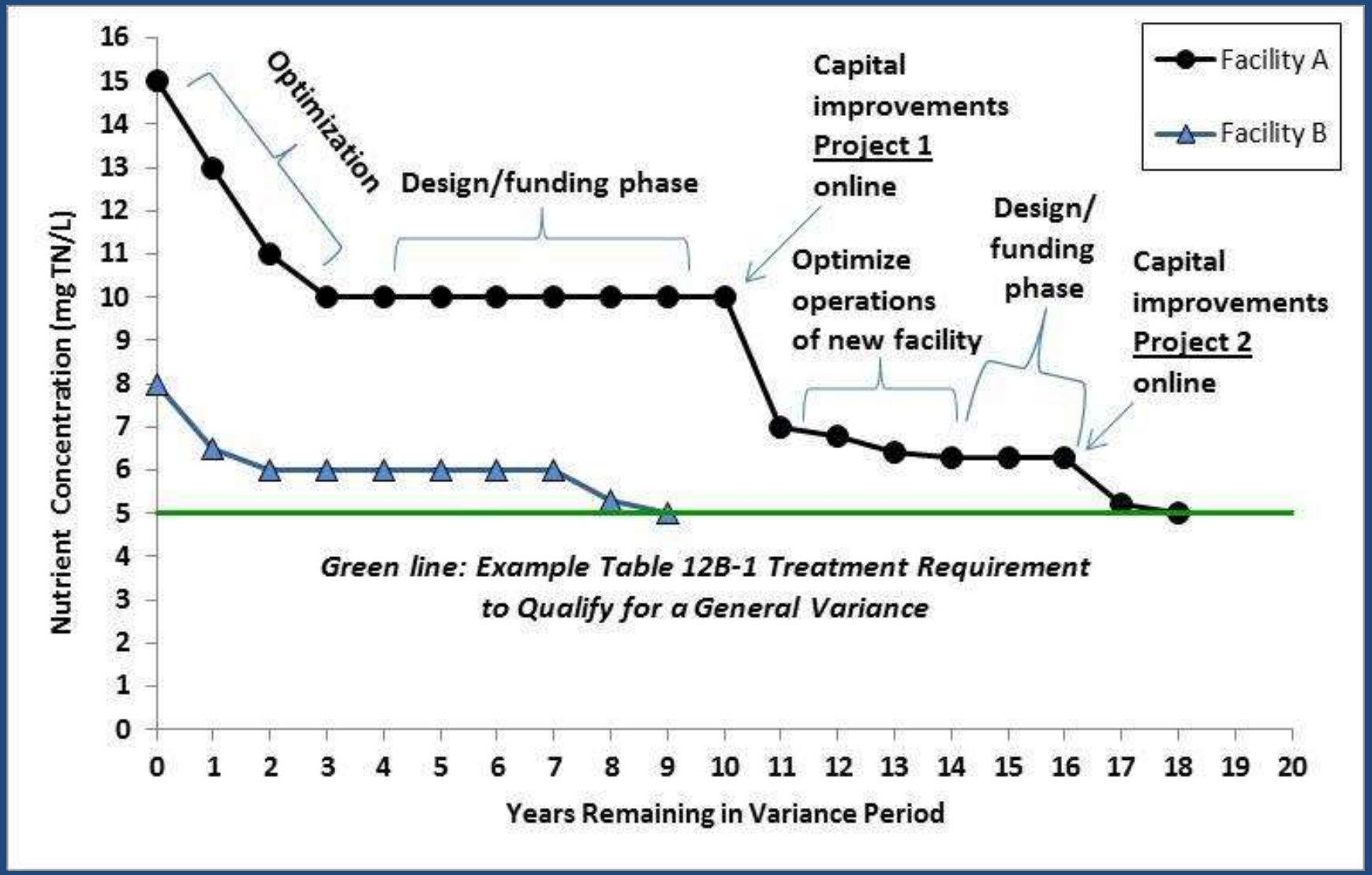


Table 7-1. Steps and Approximate Time to Achieve the Treatment Requirements in Table 12B-1.

Description of Step	Approximate Time to Complete Step (years)
1. Implementation of advanced operational strategies to reduce nutrients using existing infrastructure. Evaluate effects of operational changes and fine tune as necessary. Operations staff identify potential minor capital improvements, if any, that could be made to further advance operational strategies. Prepare optimization study, as required in **Section 2.2** of this circular, including documentation of operational changes and results as well as a preliminary feasibility assessment of the viability of trading, reuse, etc.	**2**
2. **If Table 12B-1treatment requirements are not achieved**, hire an engineer to prepare a preliminary engineering report (PER) that evaluates options for minor and/or major facility improvements, trading or reuse that lead to further nutrient reductions that build upon developed operational strategies, if appropriate. Continue to fine-tune operational strategies. Begin discussion with funding agencies and submit PERs to those agencies, if necessary (for major upgrades).	**1**
3. Go through funding agency timelines and requirements for planning, if necessary. This may involve legislative approval. Implement minor facility improvements, if appropriate, and fine tune operations for further TN and TP reductions.	**2**
4. Design major capital improvements. Go through the department (DEQ) and other funding agency review and approval processes for the design/bidding phase, including MEPA analysis, adjustments of rates and charges, legal opinions, etc. Bid major capital project.	**2**
5. Construct major capital project, including trading and/or reuse, if appropriate. Begin operating new infrastructure and fine tuning operations. Continue with advanced operational training with new infrastructure. Evaluate nutrient reductions achieved with major capital project and operator optimization.	**4**
6. **If Table 12B-1 treatment requirement are still not achieved**, hire engineer to evaluate alternatives in a PER for next steps to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
7. Submit PER to funding agencies for review, approval, MEPA, etc. Legislative approval required? Obtain funding.	**2**
8. Design and bid capital project to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
9. Construct capital upgrades, including trading, reuse, etc., if appropriate. Continue with operational optimization to meet **Table 12B-1** treatment requirements.	**2**

9 steps

If fewer steps are needed to achieve Table 12B-1 treatment requirements (i.e., HAC), then less than full time allotment would generally be needed

Variance Permitting Process for TN, TP Today

- To DEQ, variance treatment requirements are long term averages (LTA), and limits are expressed (per statute) as Average Monthly Limit (AML), so:

Variance (mg/L) * Table 5-2 value$_{95th}$ * Design Flow * conversions = Permitted Load Limit (lbs/day)

From Permitting's Technical Support Document—based on coefficient of variation (CV; SD/mean) as calculated from samples from discharger's effluent

Coefficient of Variation (CV) in the variance permitting process

- Currently based on CV of *past* data
- CVs likely to go up at lower nutrient effluent concentrations; could lead to compliance problems
- Using a fixed CV of 0.6 is a realistic CV for nutrient effluent data at low concentrations

Before and After 7/1/2017

- Table 12B-1 in the Circular defines the treatment level POTWs must meet under the general variance
  - If a facility was treating wastewater <u>better than</u> the levels in the table <u>before</u> 7/1/2017, then their actual treatment level defines the variance limit
  - If a facility does not meet the updated levels in the table on 7/1/2017, but meets them (or does better) afterwards, the <u>table values</u> define the permit limit
  - Treatment requirements under the general variance could change again later (i.e., become more stringent)
    - Updated table values would define group treatment level

Optimization, and Pollution Minimization Program Requirement (PMP)

- Going forward, the optimization plan—which currently must be completed—will be required to be incorporated into facility O&M Manual

- PMP: Required by those under a variance <u>when they achieve</u> treatment requirements in Table 12B-1
  - Time to achieve treatment requirements will vary
  - If one nutrient achieved first, PMP required for it

- PMP is a structured set of activities to improve processes and pollutant controls that will prevent & reduce pollutant loading

- PMP examples:
  - reducing pollutants before they enter the wastewater treatment system
  - BMPs to mitigate nonpoint source nutrient inputs

Guidance Document: Updates

- No change to Limits of Technology definition
  - 4 mg TN/L & 0.07 mg TP/L (reasonable, for "consistently achievable")
- Deleting Section 2.0 nutrient reduction steps (aka glide path)
  - Replacing with description of process for identifying HAC, lessons learned
- Supplementing Section 3.0 with additional guidance on individual variances

2017 Nutrient Standards Variances Triennial Review: Release of Documents

- **April 14th**: MAR notice published. Inform interested parties, send out press release. Materials for public should be ready:
  - (1) Track-changes Circular DEQ-12B; (2) track-changes Guidance Document, (3) Technical Report on triennial review; and possibly (3) YouTube video summarizing key aspects of triennial review will appear shortly after
  - Materials will be available via links to DEQ's webpage, unless hard-copies were specifically requested

- **May 31st:** Public hearing, after 45 days. DEQ, Room 111, 9am-12, Helena.

- **June 23rd:** MAR publication date for the adopted rules.

- **July 1st, 2017**: Variances in Circular DEQ-12B expire.

Thank You

Does WPCAC have any comments on the rule or circular?