Iowa Nutrient Reduction Strategy Permitting Approach

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Why this strategy?

- 2006
- Excessive nutrients can cause water quality problems
  - In state , downstream
- Numeric nutrient criteria development presents challenging problems
  - Difficult to pin down cause & effect relationship
  - Difficult to comply with permit limits and costly to try
  - Possibly every water body impaired
- A different approach needed

PS and NPS Common Threads

- Acknowledgement of the problem
- Recognition that traditional approaches are not workable (e.g. cost, technically)
- Willingness to want to do something now to make progress
- Needs to be practical in its implementation

Iowa Strategy General Approach

1) Achieve nutrient load reductions through performance-based actions, while

2) Continuing to assess and evaluate the nutrient water quality standards

PS/NPS Collaboration

- PS account for 8% of the TN and 20% of the TP annually
- NPS account for 92% of the TN and 80% of the TP annually
- **Both NPS and PS play important roles on an annual and seasonal basis for Iowa water quality**

Point Source Strategy

- Point sources can have greater impacts at low flows and certain watersheds

- Working closely with CWA regulated community
- Use existing rules (Chapter 567 IAC Chapter 62)

- Use performance-based limits in lieu of nutrient criteria
  - Limits based on the effect of the pollutant in the water and feasibility and reasonableness of treating such pollutant

Point Source Strategy

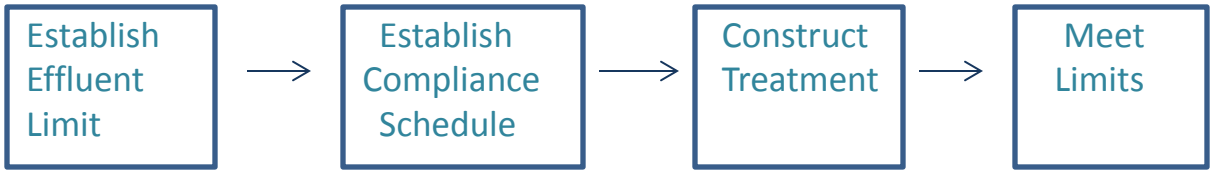
Focus on:

- **100** major municipal wastewater treatment plants
- **31** major industries
- **18** minor industries with biological treatment for process waste
- **Total of 149**

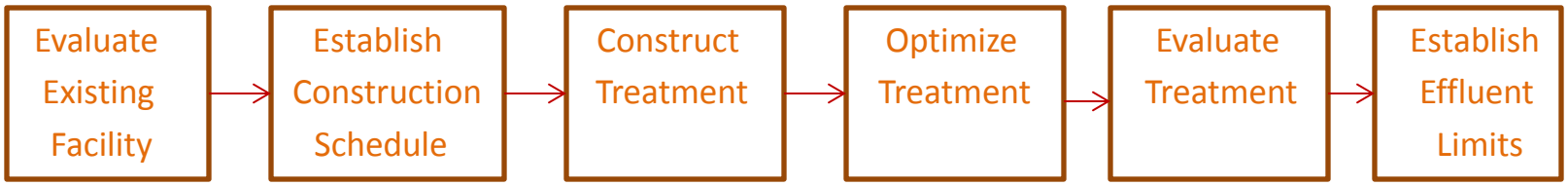
For major POTWs:

- Treat more than 1 million gallons of wastewater a day
- Handle **80 percent** of all municipal permitted wastewater
- Provide wastewater treatment for **55-60 percent of Iowa's population**

Normal Permitting Process



Nutrient Permitting Process



Implementation Details

- Submit feasibility and planning study within two years
- DNR reviews study
- Negotiate Construction schedule
- Amend permit to incorporate the schedule
- Limits incorporated in permit following one year performance evaluation

- **Implementation Flexibilities for Point Sources**
  - **Regulatory certainty – 10 year assurance**
  - **Economic Considerations**
  - **Ability to fine tune**
  - **Annual average permit limits**

Potential Results (estimated 2012)

At the 130 wastewater treatment plants included in the strategy:

- Assume 25 mg/L total nitrogen (TN) and 4 mg/L total phosphorus (TP) discharge concentrations
- Use annual average flows
- Use Biological Nutrient Removal technology limits (10 mg/L TN and 1 mg/L TP)

Currently Point Source Facility Loading

18,300 tons/yr TN

2,900 tons/yr TP

After implementation

7,300 tons/yr TN

730 tons/yr TP

2/3 to 3/4 nutrient reduction possible

Cost and Affordability

Estimated Costs for BNR Improvements for Muncipal Majors (Target Effluent TN = 10 mg/L, Target Effluent TP = 1 mg/L)

Treatment Type	# of Facilities	Combined Design AWW Flow (MGD)	Combined Annual Average Flow[1] (MGD)	Total Capital Cost ($M)	Total Annual O&M Cost ($M)	Total Present Worth Cost ($M)[2]	Total Annual Cost ($M)	$/1,000 gallons Treated[3]	Weighted Monthly Cost/Household[4]	Weighted % of MHI[4]
Activated Sludge	56	533	355	348	25	686	51	0.39	7.75	0.18%
Fixed Film	37	101	67	430	7	524	39	1.59	25.83	0.73%
Aerated Lagoon	9	11	8	110	3	147	11	3.92	85.16	2.13%
Totals	102	645	430	887	35	1,358	101	0.64	11.85[5]	0.29%[5]

Estimated Costs for BNR Improvements for all Industries with Biological Treatment (Target Effluent TN = 10 mg/L, Target Effluent TP = 1 mg/L)

Treatment Type	# of Facilities	Combined Design Flow (MGD)	Total Capital Cost ($M)	Total Annual O&M Cost ($M)	Total Present Worth Cost ($M)[1]	Total Annual Cost ($M)	$/1,000 gallons Treated[2]
Activated Sludge	20	44.2	29.3	2.0	56.1	4.2	0.26
Fixed Film	1	0.6	2.7	0.04	3.3	0.2	1.06
Aerated Lagoon	7	5.8	86.5	2.20	116.0	8.6	4.05
Totals	28	50.7	118.5	4.2	175.5	13.1	0.71

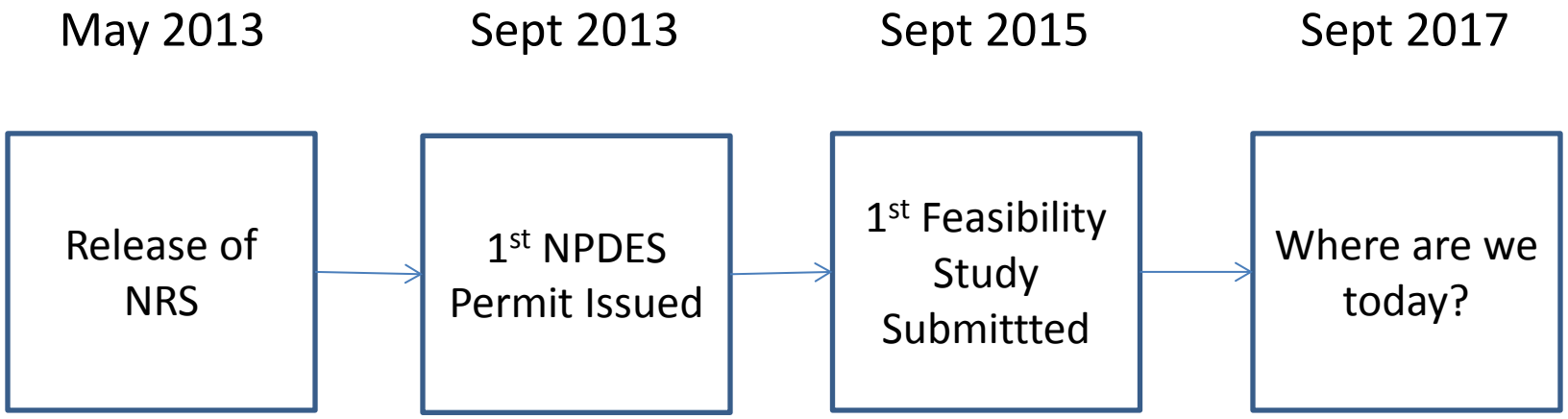
Total Present Worth Cost

= 1.53 ($B)

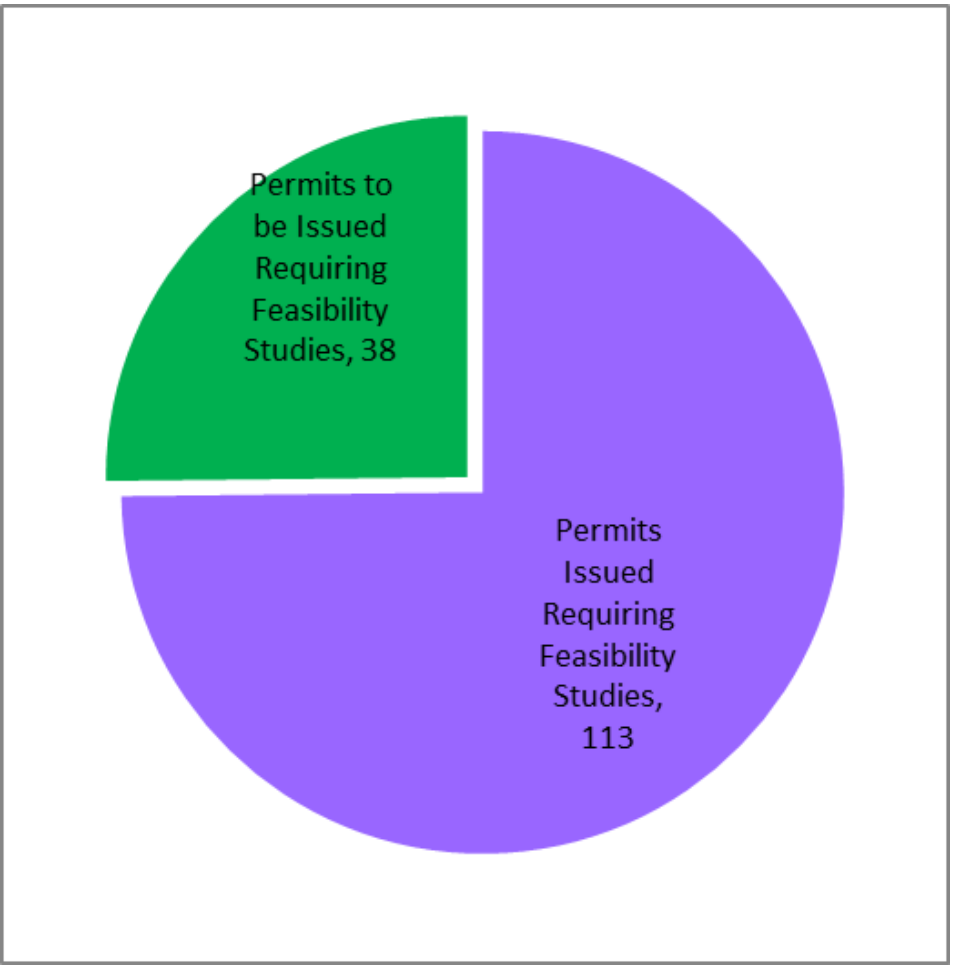
Total Capital Cost

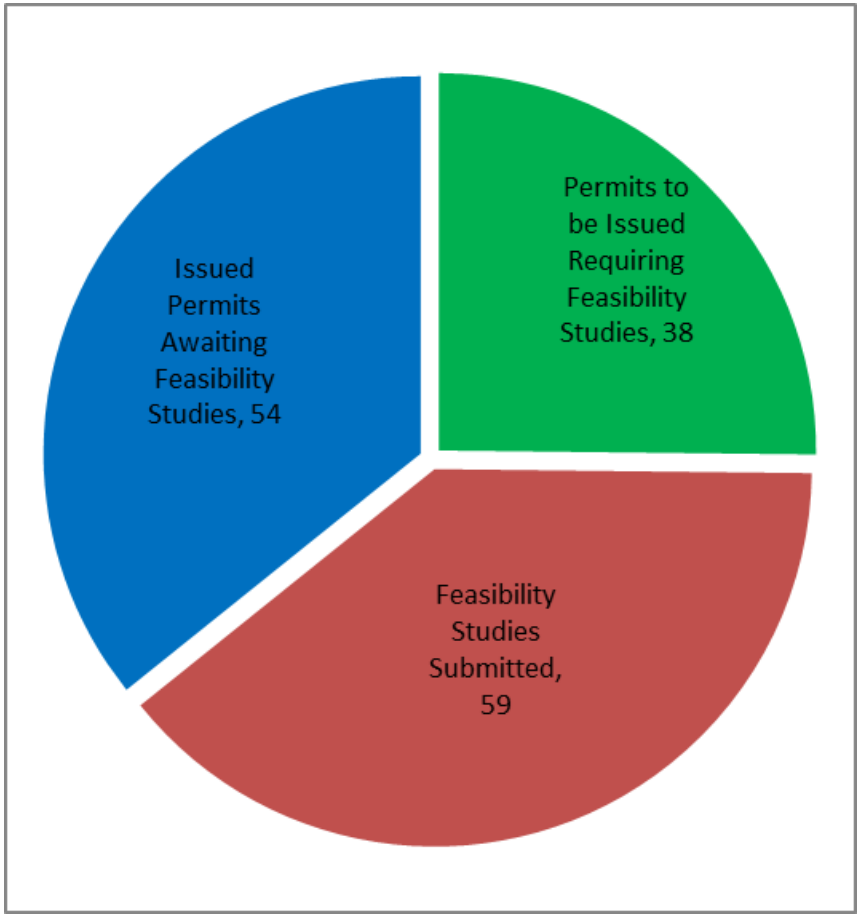
= 1.00 ($B)

Iowa NRS Point Source Progression



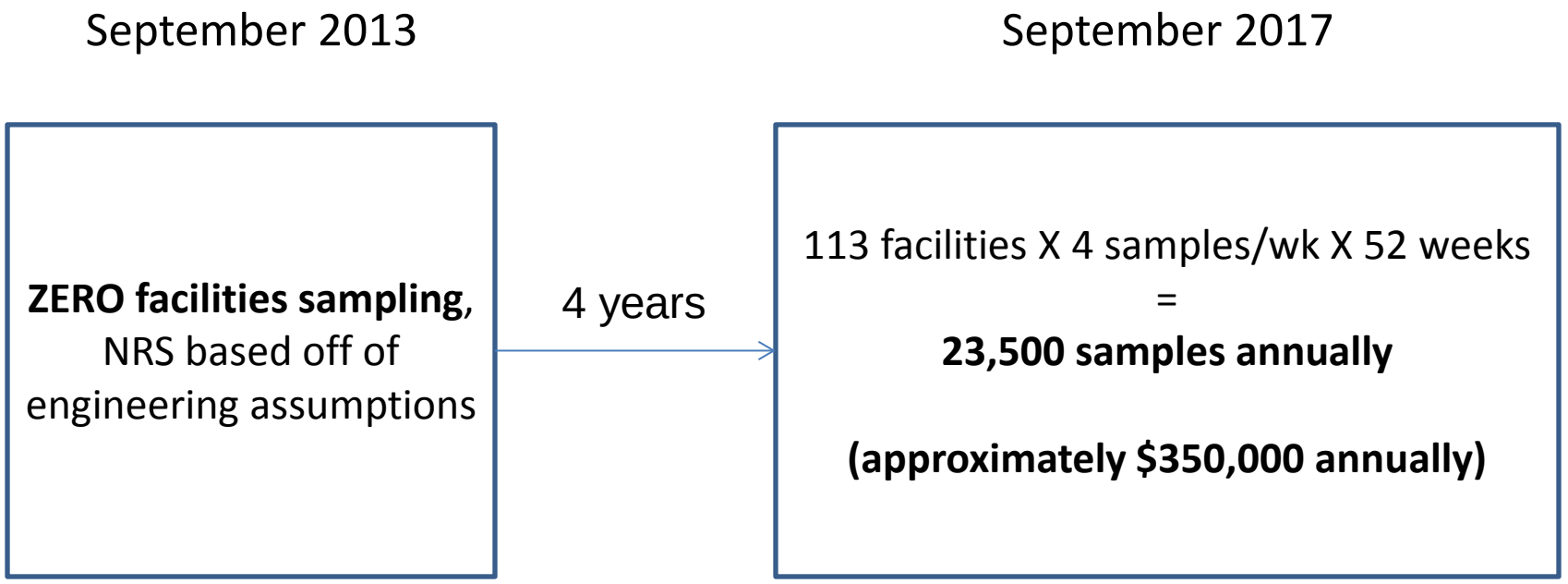
Iowa Progress to Date on Point Sources



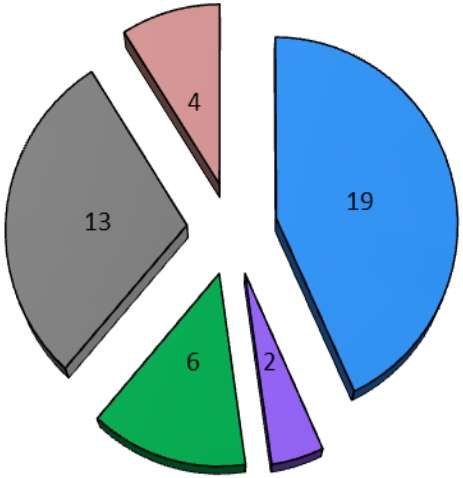


*79 of 103 Major POTWs, 34 of 48 Industries; 86% of the wastewater permitted

Iowa Point Source Monitoring



Nitrogen Municipal Commitments From Feasibility Studies

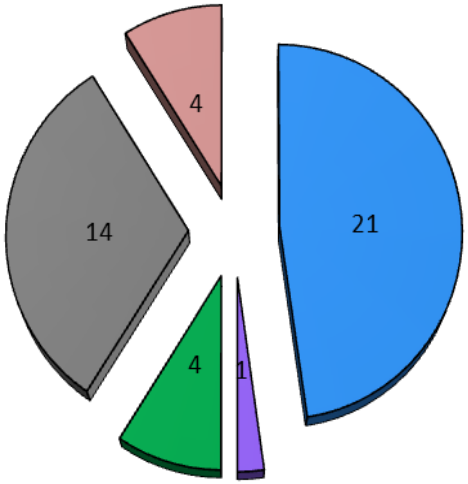


- Construct
- Optimize
- Meets Goals; add limits
- New FS
- FS still under review

Total Feasibility Studies Submitted: 44

Total Permits Amended: 25

Phosphorus Municipal Commitments From Feasibility Studies



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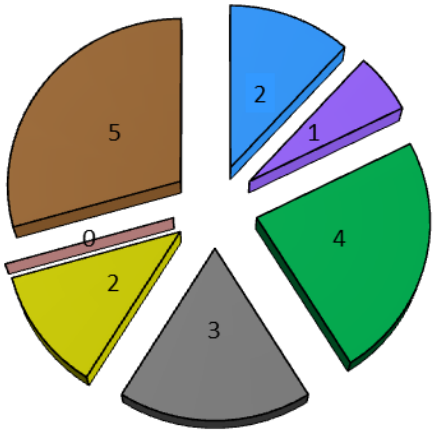

- Construct
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- Below Goals; NRS removed
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Total Feasibility Studies Submitted: 16

Total Permits Amended: 15

Phosphorus Industrial Commitments From Feasibility Studies

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2017 reporting year (5/1/2016-4/30/2017) percent removal (concentration)

	Facility	%
Municipal		
Nitrogen	ATLANTIC CITY OF STP	78.1
	CLEAR LAKE SANITARY DISTRICT	72.2
	ELDRIDGE, CITY OF SOUTH SLOPE	68.3
	ESTHERVILLE CITY OF STP	72.0
	IOWA CITY, CITY OF (SOUTH) STP	73.5
	MOUNT PLEASANT CITY OF STP (MAIN)	85.8
	OELWEIN CITY OF STP	91.9
	SIOUX CITY CITY OF STP	75.2
	WASHINGTON CITY OF STP	73.9
	WEST BURLINGTON CITY OF STP	72.6
	WEST LIBERTY CITY OF STP	79.3
Phosphorus	CORALVILLE CITY OF STP	80.9
	IOWA CITY, CITY OF (SOUTH) STP	82.8
	MOUNT VERNON CITY OF STP	80.9
	SIOUX CITY CITY OF STP	75.2
	WEST LIBERTY CITY OF STP	79.3

	Facility	%
Industrial		
Nitrogen	ARCHER DANIELS MIDLAND CORN	66.1
	ASSOCIATED MILK PRODUCERS	78.8
	GRAIN PROCESSING CORP.	88.5
	MANILDRA MILLING CORPORATION	73.3
	OSI INDUSTRIES (OAKLAND FOODS)	89.3
	REMBRANDT ENTERPRISES, INC.	74.6
	SWISS VALLEY FARMS	66.0
Phosphorus	DAIRICONCEPTS	84.8
	MANILDRA MILLING CORPORATION	80.4
	REMBRANDT ENTERPRISES, INC.	83.6

Performance by all facilities with 10 or more months of data

	Estimate (Target)	POTW	Industry
Total Nitrogen (average)			
number of facilities		63	9
raw waste (mg/L)	25	29.7 (range 11.9 – 83.6)	79.6 (range 16.5 – 314.6)
final effluent (mg/L)	10	16.6 (range 2.1 – 58.3)	21.7 (range 4.5 – 79.9)
% removal	66%	41.8% (range -10.0% - 91.9%)	69.0% (range 20.9% - 89.3%)
Total Phosphorus (average)			
		63	14
raw waste (mg/L)	4	5.1 (range 1.9 – 31.8)	20.6 (range 2.5 – 51.5)
final effluent (mg/L)	1	3.1 (range 0.7 – 24.9)	12.8 (range 0.8 – 73.0)
% removal	75%	40.5% (range -14.7% - 82.8%)	48.8% (range -41.9% - 84.8%)
Annual Load Reduction (2015-2016)			
Total nitrogen (tons)	-	5,069	517
Total phosphorus (tons)	-	937	273

Note: Up from 43 POTWs and 9 industries in December 2016

Performance by treatment type for facilities with 10 months or more of data for 2016-2017 reporting cycle.

Treatment Type	No.	Total Nitrogen			Total Phosphorus		
		Raw (mg/L)	Final (mg/L)	%R	Raw (mg/l)	Final (mg/L)	%R
POTW	63						
Aerated Lagoon	3	22.5	10.6	53.8%	3.9	2.2	44.3%
Activated Sludge	25	33.6	20.0	39.1%	6.0	3.4	45.0%
Rotating Biological Contactor	6	21.3	12.3	40.3%	3.2	2.3	29.8%
Sequencing Batch Reactor	9	28.4	9.5	69.0%	5.2	2.4	55.3%
Trickling Filter	20	29.2	17.6	31.6%	4.9	3.4	30.8%
Industry	9						
Aerated Lagoon	2	167.9	42.2	76.7%	19.8	3.9	78.2%
Activated Sludge	6	52.4	17.2	63.1%	18.9	9	55.6%
Rotating Biological Contactor	0	-	-	-	-	-	-
Sequencing Batch Reactor	1	66.8	7.2	89.3%	51.5	73.0	-41.9%
Trickling Filter	0	-	-	-	-	-	-

Examples of point source progress

- Cedar Rapids
- Des Moines WRA
- Sioux City
- Tyson Fresh Meats
- Clinton

Looking forward…

- Continue to update the list of affected facilities in the INRS
- Issue permits to the remaining facilities listed in the INRS
- Review nutrient feasibility studies as they are submitted and amend NPDES permits to include construction schedules for installing nutrient reduction treatment technologies.
- Continue to analyze raw waste and final effluent data for nutrients as data from more facilities becomes available
- Incorporate baseline efforts, recalculate load reduction based on actual data
- Year 5 Refresh

What questions do you have?

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