

# Nitrogen Management Project Protocol (NMPP)



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## In-Person Workgroup Meeting (#7)

April 10, 2012

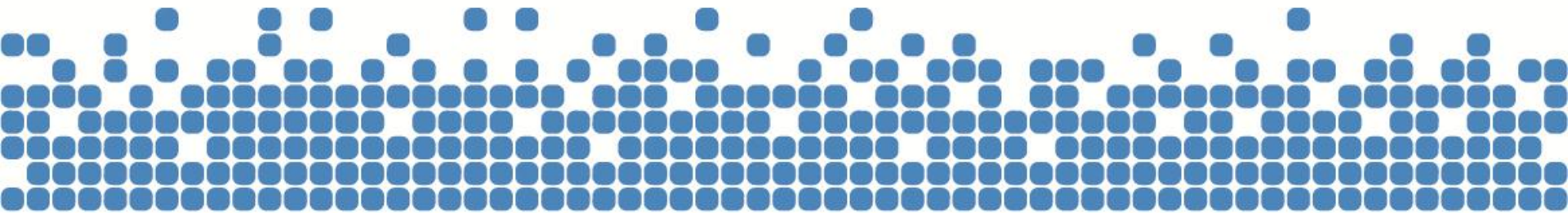
9:30 AM – 1:30 PM PDT

San Francisco, CA



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# Welcome and Introductions





# Purpose

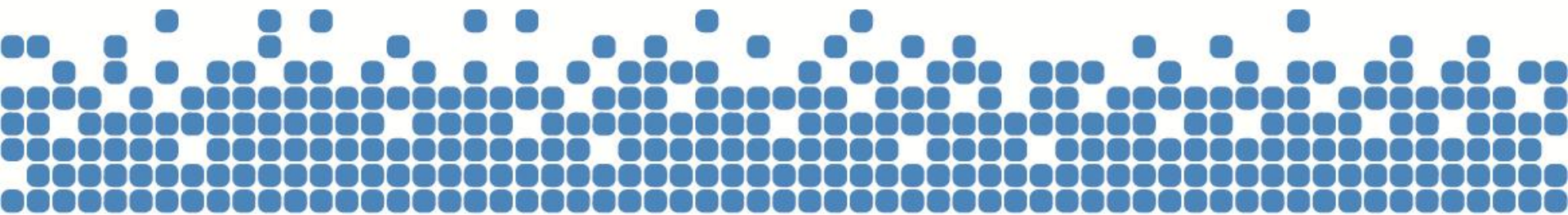
- Provide update on refined scope and ongoing research and analysis
- Walk through draft protocol in detail
  - Focus on sections and issue areas where Reserve is seeking comment
  - Discuss questions, options and identify directions for further improvement
- Next Steps

# Agenda



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9:30 – 10:00	Welcome & Overview
10:00 – 11:15	Project Definitions, Update on Scope & Eligibility Rules
11:15 – 12:00	GHG Assessment Boundary & Manure
12:00	Commence Working Lunch (provided)
12:00 – 12:45	Quantification Methodology
12:45 – 1:15 -	Monitoring, Reporting and Verification
1:15 – 1:30	Other Issues, Wrap Up, & Next Steps



# NMPP Development Timeline



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Methodology Synthesis Paper	May 6, 2011
Workgroup Meeting 1 (conference call)	May 18, 2011
Workgroup Meeting 2 (conference call)	June 27, 2011
Background Paper Completed (draft)	July 18, 2011
Draft protocol to workgroup	July 27, 2011
Workgroup Meeting 3 (Los Angeles)	August 1, 2011
Science Advisory Committee Meeting (Los Angeles)	September 7, 2011
WG Meetings 4 (conference call)	October 25, 2011
WG Meetings 5 (conference call), <i>continuation of mtg 4</i>	November 11, 2011
Second Phase of Background Research	Oct - Dec 2011
Science Advisory Committee (conference call)	January 17, 2012
Workgroup Meeting 6 (conference call)	January 25, 2012
Draft Protocol for WG/SAC review	April 3, 2012
<b>Workgroup Meeting 7 (San Francisco)</b>	<b>April 10, 2012</b>
Revised protocol & start of 30-day public comment period	April 20, 2012
Public workshop	May 2012
Protocol adoption by Reserve Board	June 27 2012



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# Section 2



# Project Definition & Approved Project Activities

- Project definition: “the adoption and maintenance of an approved project activity that reduced N<sub>2</sub>O emissions”
- Approved project activities: Listed in Table 2.2

Approved Project Activities	Description	Applicable Crop(s)	Applicable Region(s)
Reduce N Applied	Reduction in the annual nitrogen application rate compared to recent historic application rates at the site, without going below N demand	Corn	North Central Region

# Scope of NMPP version 1.0



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Potential Nitrogen Management Practice	Comprehensive national data are available to develop performance standard?	A standardized quantification methodology for N <sub>2</sub> O emissions is currently available that meets Reserve criteria?
<b>Reduce N Applied</b>	<b>Yes</b>	<b>Yes – MSU-EPRI</b>
Use of Nitrification and Urease Inhibitors / Use of Nitrification Inhibitors (only)	Yes*	No
Switch from Fall to Spring Application	Yes*	No
Switch from anhydrous to urea	No	No
Change to Slow Release Fertilizer	No	No
Change to Fertigation	No	No
Apply N Closer to Roots	No	No
Add N Scavenging Cover Crops	No	No





# Scope of NMPP version 1.0

- Project activities included in the protocol (Reduce N applied) had both:
  - Sufficient data to develop a performance standard
  - And a quantification methodology meeting Reserve criteria
- Where sufficient data to develop a performance standard was available, preliminary performance standard research and development are summarized in Appendix A. Specifically:
  - Use of Nitrification and Urease Inhibitors / Use of Nitrification Inhibitors (only)
  - Switch from Fall to Spring Application

# Plan for Ongoing NMPP Scope Expansion



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- Appendix D – An adaptation of our “Data Standard” (in development)
  - Will include guidelines on minimal data requirements and procedures that field studies shall meet to be considered for developing a quantification methodology.
- Appendix A – Summary of performance standard research, including preliminary research on other practices & regions
- Expansion of protocol will be Reserve directed; similar to the Reserve process for other protocols
- Work on Version 2.0 to begin immediately. Priorities include:
  - Reduce N Applied (expansion to other regions & crops)
  - California cropping systems (reduce N applied & other practices)



# Defining Field Boundaries (2.2.1)

- Project activities implemented on individual fields.
- Fields are defined with specific boundaries for protocol & project definition purposes:
  - Direct management control of a single entity
  - Contiguous
  - Homogenous management practices
- Did you feel that the field boundary definition was workable for the approved project activity?
  - Are criteria defined well enough?
  - Have we provided enough flexibility?



# Defining the Cultivation Cycle (2.2.2)

- Cultivation cycle defined as:  
“the period starting immediately after harvest of one primary crop and ending after the next primary planted crop is harvested the following calendar year”
- For version 1.0 (corn only), further defined as 365 days.
- Did you feel that the cultivation cycle definition was clear and workable for the approved project activity?
  - Have we provided enough flexibility?
  - Does this definition make sense for multi-crop rotations?



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# Section 3



# Start Date (3.2)

- Each field has a unique start date, defined as the first day of a new cultivation cycle.
- However, fields that are part of an Aggregate will be subject to the Aggregate's uniform reporting start date (proposed Oct 1).
  - What makes most sense for Corn in NCR as “uniform start date?” (e.g. approximately when is the corn harvest occurring / complete in the NCR?)

Note: We realize uniform start dates & reporting periods may get complicated, as more crops & regions become eligible. We are continuing to work on this.



## 3.3 – Crediting Period

- Crediting periods apply to fields, not aggregates
- Defined as 7 eligible crop years, over a period of up to 14 years, non-renewable.
  - Eligible crop year defined as a year in which an eligible crop (corn only, v1.0) is grown on the field.
  - Eligible crop years where the field does not meet the performance standard or a field is withdrawn from verification activities count towards the 7 eligible crop years
- Reporting must be continuous throughout crediting period (including ineligible crop years for multi-crop rotations)
  - Reporting requirements for ineligible years shall be minimal, up for discussion (to be discussed with Section 7)
- Questions? Concerns? Feedback?



## 3.4 – Other Eligibility Criteria

- Management records
  - Past 5 years of historic data required (monoculture), but including at least 3 eligible crop years (multi-crop rotation).
  - Attempting to be flexible for multi-crop rotations, but perhaps this will be too burdensome (e.g. more total years of records needed)? More guidance needed?
- “Consistent” Crop Production System
  - Crops planted during the project must be “consistent” with past management (based on records)
  - Aim is maximum flexibility for non-eligible crops without being overly prescriptive.
  - Did we leave it too open for interpretation? Or do you think “consistent” is clear enough? Do you think this will be difficult to verify?





## 3.4 – Other Eligibility Criteria

- “Within farm leakage” – options:
  1. Do not address (current draft of protocol does not address)
  2. ACR-DNDC protocol option: “Fertilizer use must not be increased on all crops on owned or managed lands that are not part of the project.”
    - Reserve believes the additional effort and farm records that would be needed to report and verify this requirement may outweigh the benefit.
  3. Alberta’s protocol requires enrollment of all fields managed by the same entity .”
    - Reserve would prefer not to require this, to allow more flexibility
  4. Attestation of No N-Use Increase
- How big a risk is “within farm leakage?” Is it enough of a risk to include one of the somewhat onerous mechanisms above? If so, which option is most workable/least onerous? Do you have other proposals?



# Performance Standard (3.5.1)

- The performance standard is applied at the field-level, and each field must pass the performance standard every reporting period (RP) to be eligible for crediting during that RP.
- A field implementing the project activity “reduce N application” passes the performance standard when the field meets or exceeds the state- and crop-specific RTA threshold.
- RTA = Ratio of N Removed-To-Applied
  - $RTA = (\text{crop\_yield} * N\_content\_crop) / (\text{annual N application rate})$
  - Default crop N-contents will be used
  - Extensive guidance provided on determining the applicable N-rate



# Performance Standard (3.5.1)

- The calculation to demonstrate that a field passes the performance standard occurs ex-post (e.g. after completion of the reporting period)
  - However, project developers are encouraged to use a field's historic yields and the target RTA threshold for that field to estimate the N-rate necessary for a given field to pass the Performance Standard Test.
- Each field in an aggregate must pass the performance standard every year to be eligible for that reporting period.
- Any year where a field doesn't pass the PST counts against crediting period's eligible crop years, but does not prevent future eligibility

# Setting the Performance Standard Thresholds



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- State average N-rates and yields were used to calculate the average RTA for each state, and trends in N-rates, yields, and RTAs analyzed.
- Based on trend analysis, RTA threshold set at different percentiles:
  - 75<sup>th</sup> Percentile: No trend, a trend of increasing N-rate, or a trend of decreasing RTA
    - If the RTA at the 75<sup>th</sup> percentile  $> 1$ , we are considering setting the RTA at 1 for that state/crop
  - Percentile TBD ( $>75^{\text{th}}$ ): Decreasing trend N-rate or increasing trend RTA
- Data on “typical distribution” of N-rates and RTA values provided confidentially by a stakeholder were used to estimate RTA distributions for other states.

# Setting the Performance Standard Thresholds



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Table A-8: RTA Thresholds (selected states)

State	Crop	Previous Crop	Most Recent Survey Year	Average N Rate	Average RTA	RTA Threshold (at 75 <sup>th</sup> Percentile)
Illinois	corn grain	corn	2010	184	0.68	0.93
		soybean	2010	179	0.7	0.96
	corn silage	corn	2010	184	0.69	0.95
		soybean	2010	179	0.71	0.97
Kansas	corn grain	corn	2010	150	0.67	0.91
		soybean	2010	136	0.74	1
	corn silage	corn	2010	150	0.66	0.9
		soybean	2010	136	0.73	1
Wisconsin	corn grain	corn	2010	188	0.69	0.94
		soybean	2010	202	0.64	0.87
	corn silage	corn	2010	188	0.72	0.97
		soybean	2010	202	0.67	0.9

# Setting the Performance Standard Thresholds



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- Comments, questions, concerns about the methodology?
- Does this approach, in your opinion,
  - (A) Exclude too many truly “additional” projects?
  - (B) Let too many “non-additional” projects in?
- Considering specifically:
  - States where RTA at the 75<sup>th</sup> percentile would exceed 1 (and we are proposing to set the threshold at 1)?
  - States where RTA trend is increasing (note: these states- MO, OH-- all are above 1 at 75<sup>th</sup> percentile already; can you help us understand what’s happening in MO & OH?)

# Legal Requirement Test (3.5.2)



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*A field passes the Legal Requirement Test when there are no laws, statutes, regulations, court orders, environmental mitigation agreements, permitting conditions, binding contractual obligations, or other legally binding mandates (including, but not limited to, legally mandated nutrient management plans, conservation management plans, and deed restrictions) that require adoption or continued use of approved nitrogen management project activities on the field*

- Is this language so broad that it may preclude some of the ecosystem services credit/payment stacking allowed in Section 3.5.2?
- The Reserve believes water quality regulations, particularly pertaining to nonpoint source runoff, are the likeliest regulations to impact this protocol.
- Reserve found no federal or state laws explicitly requiring project activities. Research into local laws are ongoing in NCR.
  - Do you know of anywhere in the NCR where reducing N-applied is legally required?
- If legal requirement explicit enough to determine a legally required N-rate, the NMPP may credit “above and beyond” N-rate reductions.



# Credit & Payment Stacking (3.5.3)

- Credit stacking is not specifically addressed (at this time) because no water quality trading programs (WQTPs) in the NCR have issued nutrient reduction credits for the approved project activity.
- Payment stacking is allowed, in certain circumstances:
  - Farmer may not have a signed agreement for CPS 590 prior to submitting the field to the Reserve (e.g. NRCS, EQIP funding must be pursued simultaneous to project start)
- Reserve payment stacking policy is inconsistent with some active and developing WQTPs, where stacking of public funds with water quality credits is not allowed.
  - Does the WG feel that public dollars should be used to finance project activities which will generate carbon credits? Should we consider discounting credits based on proportion of public funds received?





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# Section 4



# SS7 – Chemical Inputs

- Increased Emissions from Production and Use of Chemical Inputs -- **Exclude (?)**
  - Does reducing N-rate increase the need for herbicides, pesticides, lime, etc?
  - Do you think it is appropriate to exclude this source for N-rate reduction practices?



# SS8 – Irrigation

- Increased emissions from increased irrigation or changes in irrigation practices -- **Exclude (?)**  
(Reminder, focus on N-rate reduction projects)
  - Do you think N-rate reduction projects under this protocol have the potential to drive farmers to change irrigation practices?
  - Enough to increase emissions and necessitate quantification?



# SSR 3 – Manure

- Increased emissions from Manure Incorporations, Storage, and Handling
  - Is it appropriate to exclude this source?
  - Assuming no switch from synthetic to organic N (or vice versa), we believe a reduction in N-rate would reduce the emissions from incorporation and handling. Is this a good assumption?
  - How big a risk that reduced N-rate potentially increases emissions from manure storage (e.g. increase in manure stored on-site due to reduced land-applied manure)?



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# Section 5



# Section 5 - Overview

- Quantification methodology adapted from the well-vetted, robust MSU-EPRI methodology
- Focusing WG discussion on the issues that arose from our adaptation and that we are seeking comment on:
  - Applicability conditions
  - Baseline
  - Uncertainty
  - Leakage (time permitting)

# 5.1 – Applicability conditions: Eligible N-sources



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- All types of N are eligible :
  - synthetic (e.g. urea) and organic (e.g. manure, compost)
- MSU-EPRI Tier 2 NCR methodology was developed from field studies testing N-rate responses for urea application only (Hoben 2011).
  - The quantification methodology treats all N-sources identically.
- Jarecki et al 2009 justifies this decision somewhat with the finding that total N-application rate is the primary factor influencing N<sub>2</sub>O emissions.
  - Assuming the N-content of the N-source can be determined, do you think this is sufficient justification?

# 5.1 – Applicability conditions: Eligible N-sources



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- Accurately determining N-content is critically important
  - Fertilizer N-content labels will be used primarily (for synthetics and processed organics)
  - and then default N-contents, where labels are unavailable.
- Do we think farmers using unprocessed compost knows roughly the N-content of what they are applying? Unprocessed manure?
  - We are concerned about the highly variable N-contents for these sources.
  - Would it be overly burdensome to require an N-content test? Perhaps a test once every five years (if N-content can be demonstrated to remain roughly the same)?



# 5.1 – Applicability conditions: Organic-to-synthetic-N-ratio



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- The organic-to-synthetic-N-ratio (OSN) must be consistent during the project, as compared to the OSN calculated based on the historic baseline (e.g. past 3-5 eligible crop years).

$$OSN_{f,t} = \frac{NR_{O,f,t}}{NR_{S,f,t} + NR_{O,f,t}}$$

- Does this requirement seem workable at the field level?
- Do you have suggestions on how this requirement could be adapted for growers who use manure as a somewhat infrequent soil amendment (e.g. every 5 years)?

# 5.2 – Determining the Baseline



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- **Step 1:** Determine the historical look-back period and collect historical yield and N-rate data.
  - All eligible crop years in last 5 years, extended until at least 3 eligible years are included.
- **Step 2:** Calculate the historical average RTA.
  - Calculate annual RTA for each of historical baseline years.
  - Calculate the average historical RTA.
- **Step 3:** Determine historical baseline N-rate.
  - Compare historic average RTA to the state-crop RTA average.
  - If greater than state RTA average, use field-specific historic average N-rate for the baseline.
  - If less than state RTA average, must calculate baseline N-rate from RTA average.

# 5.2 – Determining the Baseline (cont'd)



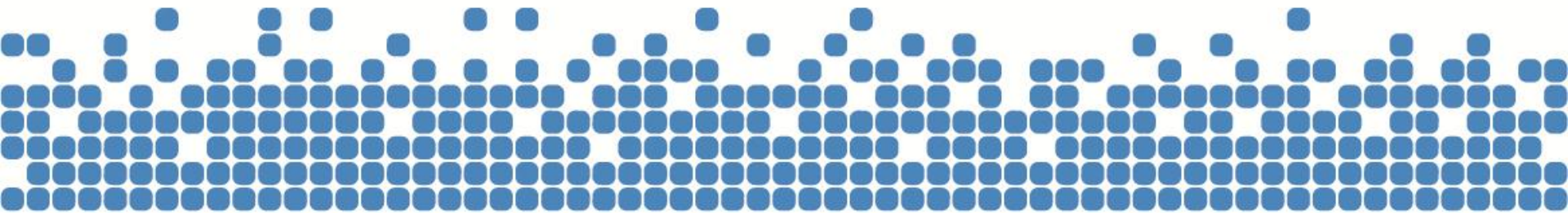
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- Step 4: Adjust baseline for legal constraints.
  - If any legal requirements to implement project activities exist, and the project field can demonstrate that the project activity will go above and beyond the legal requirement, they are eligible for crediting, so long as their baseline is adjusted to reflect the N-rate that is legally required.
- Step 5: Check proportions of organic and synthetic N.
  - Calculate the OSN ratio in the historic baseline, and use Equation 5.11 to calculate the OSNR (allowable range of the OSN, e.g. +/- 10% average OSN).
- Questions? Concerns? Comments?



# Uncertainty Deductions (5.4.4)

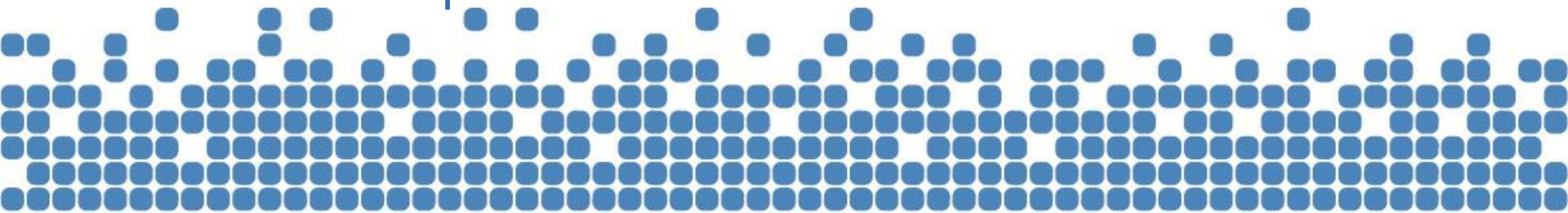
- Ideally, uncertainty deductions:
  1. Include **measurement uncertainty**
  2. Include **structural uncertainty**
  3. Are based on **independent data**
- Uncertainty deductions in MSU protocol
  - Bootstrap estimate of measurement uncertainty
  - No explicit inclusion of structural uncertainty, but impact of **structural uncertainty** is minimal
  - Impact of using independent data is likely not insignificant





# Uncertainty Deductions (5.4.4)

- Uncertainty methodology in NMPP is adapted from in MSU-EPRI protocol, with 3 exceptions
  - 25% increase in uncertainty: conservative to ensure compatibility with Reserve’s requirement to use independent data
    - May be reduced, once independent data available
  - Decrease in uncertainty with the number of fields in aggregate
    - Aggregates with >5-6 fields will offset 25% increase in uncertainty
  - Uncertainty deduction is based on a continuous function, not a look-up table





# Leakage

- Some increases/decreases in project yields are allowable but must be quantified.
- Methodology same as developed for RCPP
- Annual yield of the project field must be normalized (to average county yield statistics) and compared with the past 5 historical years from the same project area.
- Equation 5.22: Leakage deduction, if occurs.



# Section 6 – Project Monitoring

- Are there parameters that should be monitored that are not currently included?
- Are there any unnecessary or redundant parameters? Can we streamline monitoring requirements while maintaining rigor?



# Section 7 – Reporting & Record Keeping

- Are there parameters that should be reported on that are not currently included?
- Are there any unnecessary or redundant reporting requirements? Can we streamline reporting requirements while maintaining rigor?
- What parameters should the Reserve require to be reported on during ineligible crop years to maintain “continuous reporting”?





## Section 8 – Verification Guidance

- Do you have suggestions for how N-rate reductions can be verified?
  - Proposal to use time-stamped photos (as in RCPP) of fertilizer management activities and farm management records.
  - Will photos actually demonstrate implementation of the activity? If so, which specific activities?
  - Do you have other suggestions?




# Mechanics of Aggregation

- Each field has unique start date, but Aggregate has uniform start date
- Crediting period applied to field, not Aggregate
- Eligibility Criteria (including PST) applied at the ‘field’ level
- Fields may join aggregate at any time provided they meet requirements of most current protocol version at entry. Fields generally cannot change aggregates (see protocol for exceptions)
- Three categories (important for verification activities)
  - Small aggregate: 10 fields or less
  - Large single-participant aggregate: >10 fields, all from a single Project Participant
  - Large multi-participant aggregate: > 10 fields, from multiple Project Participants
- Verification requirements different for each category, but non-linear sampling is meant to reward larger aggregates.



# Next Steps

- Continue to refine performance standard thresholds
  - Continue and complete research on legal requirements for water quality, particularly in NCR
  - Revision of Data Standard for re-determined purpose
  - Revisions to NMPP WG Draft, pending WG and SAC feedback.
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- WG Written Comments on draft due **COB April 13.**
  - Revised NMPP released & start of 30-day public comment period ~ April 20.
  - Public Workshop in early May.
  - Protocol before Board for Adoption June 27.



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# Thank You

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