August 29 PSC Action & Decision #3: Narrative Overview & Purpose

- **Decision**: The partnership will **update the process for incorporating data into CAST <u>to include additional safeguards to prevent data analysis errors</u>** and **<u>to assess reasonability of modeling results after CBP protocols are applied</u>**. [underline added]

- **Action**: The Management Board charged WQGIT and/or appropriate workgroup to develop proposed solutions including additional safeguards to prevent data analysis errors and to assess reasonability of modeling results after CBP protocols are applied **WQGIT → WTWG (include STAR, STAC and other WG's as needed)**

- **WTWG Broke Charge into two parts: PRE (Track 1) and POST data processing (Track 2)**

  - **<u>Pre/Track 1</u>**: Safeguards and protocols to prevent and protect against data input errors

  - **<u>Post/Track 2</u>**: A process/protocols to assess reasonability of results ("after protocols are applied" means "when we see results")

- **Divide the PSC Decision 3 Charge into 2 main objectives- Track 1 and Track 2**
- Timeline for Completion: <mark>WTWG- June 2023</mark> → <mark>WQGIT</mark>→<mark>MB September 2023</mark>

Track 1:	Track 2
Inventory of CBP QA/QC documentation and QA/QC processes	Identify and define key evaluative terms
Identify/assess areas of weakness in documentation for key inputs	Identify appropriate groups to develop parameters
Identify appropriate groups to address weaknesses	Develop parameters for determining validity of results
Develop additional QA/QC protocols	
Approval by WTWG- June 23→ WQGIT	Approval by WTWG- June 23→ WQGIT

Track 1 RECAP from March Meeting and April Agenda:

- Timeline for Completion: <mark>WTWG- June 2023</mark> → WQGIT→MB September 2023

Track 1: Discussion

✓ Inventory of CBP QA/QC documentation and QA/QC processes

✓ Identify/assess areas of weakness in documentation for key inputs

✓ Identify appropriate groups to address weaknesses

✓ Develop additional QA/QC protocols

Approval by WTWG- June 23→ WQGIT

March Menti-meter Results:
- Do we want to pursue Track 1? **Yes: 2   No: 11**
- Is existing QA/QC framework adequate for Phase 6? **Yes: 14   No: 1**
- If not- how should this be addressed and by whom? Asked for feedback via chat or email- **No feedback provided at this time**

<mark>**Next step at April 6 WTWG meeting:**</mark>
Confirm if WTWG has consensus that the existing QA/QC framework provides sufficient safeguards in response to the associated first part (Track 1) of the PSC Decision #3

- **March meeting Review:**
  - ➢ **Took Menti-meter Poll for feedback on Track 1**
  - ➢ **Set intention to formally vote on whether to pursue Track 1 at the April meeting**

Track 2 RECAP from March Meeting:

- Timeline for Completion: <mark>WTWG- June 2023</mark> → WQGIT→MB September 2023

Track 2: Discussion

✓ Identify and define key evaluative terms

✓ Identify appropriate groups to develop parameters

✓ Develop parameters for determining validity of results

Approval by WTWG- June 23→ WQGIT

Track 2 Clarity of Purpose:

- Address the contention of unreasonable outputs [x] during draft Model review

- Model results: evaluate scientifically, consistently and in a timely manner for errors beyond the use of anecdotal evidence

- Need general parameters to differentiate and address when something is unexpected and illogical vs reasonably expected imperfect model results

- To allow updated Model version to proceed concurrent with agreed upon future collaborative investigations for [x]

- **March meeting Review:**
  - ➢ **Elaborated on the meaning/purpose of Track 2 by presenting scenarios**
  - ➢ **Discussion of steps to improve model output review process**

Track 2 RECAP from March Meeting and April Agenda:

- Timeline for Completion: <mark>WTWG- June 2023</mark> → WQGIT→MB September 2023

March Track 2 Feedback:

- Need to incorporate agreed upon review protocols into the formal updated CAST model review process
- Jurisdictions need more time to review updated model version results for illogical/faulty results
- First step is working with CBP staff to investigate anomalous results

Track 2 April Goals:

- Incorporate suggestions into updated CAST Review Process document and present to WTWG for review and feedback
- Revise accordingly if possible- goal to approve in May
- Develop additional actions and decisions for May if needed- based on April discussion

STOP

- Additional reference slides follow

Reference Slides: February Meeting Input Summary:

Track 1:

- Every model input should be held to the same standard for QA and documentation (QAPP for BMP reporting is the standard).

- Part of the JamBoard seemed like there wasn't a good understanding of what QAPP and QA/QC documents were available. Part of track 1 would be reviewing them and making them readily available on the CAST website or something so everyone is aware and can access these protocols.

- I thought Decision 3 only focused on Track 2.

- Don't think technical WGs should be reviewing this. Do we have the authority to change any of this?

- WTWG won't have an active oversight role on these things. Track 1 is more about documenting where these QA/QC efforts already exist - for example, there have already been efforts to improve these processes since November of 2021. Going through this with the WG will improve our transparency and accountability. And will clear things up so partners know where to go if they have questions.

- Will land use and land cover updates be part of the items that would be inventoried? Review process for LUWG is so extensive. Time commitment of workgroup members should be considered.

Track 2:

- Suggestion to include a reconsideration of the timeline for CAST updates... we need a time period to incorporate the step of seeing if model results make sense.

February Meeting Input Summary:

QA/QC is done by EPA and EPA contractors + partners, stakeholders, etc.

- It is done by both in-house staff and, more importantly, review of inputs, outputs, findings, etc. by stakeholders-typically through asks for review at the workgroup level.

  For example: the AgWG is asked to review all findings from analyses of the data from the Census of Agriculture. CBP office provides data from the Census of Agriculture to any stakeholder who asks – from raw data to processed data.

- In addition, there are formal reviews of all model data for each Phase of the model + formal reviews by STAC or other independent groups.

Track 2: Taking a step back to define possible output scenarios

Scenario 1: Adopted methods produce unexpected "illogical" results

- **Example**: urban phosphorus fertilizer tonnage in WV, CAST-21 update
- **Synopsis**: Adopted methods and data were shown to allow large shifts (outliers)
- **Review of 2016 input data** for WV CBW counties revealed errors in data reported to AAPFCO (several times larger than statewide average)
- **Review of process-** revealed data was being skewed by outliers, adjustment of technical methods at relevant workgroup in a timely manner to better address outliers in data for all jurisdictions
- **Needed now**: standardized sense of how to incorporate this process within CAST review timeline

Track 2: Taking a step back to define possible scenarios

Scenario 2: An error is found to have impacted model results in draft and/or previous CAST version (increased trend in fertilizer use artificially low), error correction and additional years of data show continuing trend of increased fertilizer use

- **Example:** 2016 farm fertilizer data from CAST-19→CAST-21 update
- **Synopsis:** Jurisdictions contend that modelled ag fertilizer applications are inaccurately representing "real world conditions"
- **Errors** in 2015-2016 data reporting and processing methods not produced
  - Farm fertilizer data: there's no evidence that there are errors in the 2015-2016 data reported to AAPFCO
  - Short-term Process: Jurisdictions did not substantiate their claims that results using partnership-approved methods did not accurately represent "real world conditions"
  - Long-term Process: Ag Modeling Team/Fertilizer Team investigate existence of better data sources and processing methods
- **Needed now**: standardized sense of how to address this in a reasonable timeframe

Track 2: Taking a step back to define possible scenarios

Example Scenario 1: Adopted methods produce unexpected "illogical" results

- Example: non-farm phosphorus in WV, CAST-21 update

- Synopsis: Data reported for WV to AAPFCO had errors, adopted methods and data were shown to be susceptible to large shifts (outliers)

- Prior solve: [in process] data correction, adjusting technical methods at the relevant workgroup in a timely manner

- Needed now: standardized sense of how to incorporate this process within CAST review timeline

Example Scenario 2: A process error is found to have impacted model results in draft and/or previous CAST version, no data errors found, unexpected results

- Example: 2016 farm fertilizer data from CAST-19→CAST-21 update

- **Synopsis:** Error correction and additional data years show more drastic increasing fertilizer use trend

- **Errors** in 2015-2016 data reporting and processing methods not produced

- Prior solve: [in process] AMT/FT

- Needed now: standardized sense of how to address this in a reasonable timeframe

Scenario 3: Disagreement with [x]

- Example: Disagreement with [x]

- Synopsis: Various instances where results are questioned or certain aspects/inputs/methods are questioned, usually based on anecdotal information

- Prior solve: We have previously identified methods or datasets that could be improved and formulate plans to address in future versions of CAST

- Needed now: general parameters to distinguish from other scenarios(?), particularly scenario 1 : when is something unexpected and illogical vs reasonably expected imperfect model results for [x]

Track 2: Defining the scenario

Scenario 3: Disagreement with [x]

- **Example**: Contention of unreasonable outputs during draft Model review
- **Synopsis**: Various instances where **results** are questioned or certain inputs/methods are questioned, may or may not be based on anecdotal information
- **Prior solve**: We have previously identified methods or datasets that could be improved and formulate plans to address in future versions of CAST
- **Needed now**: **general parameters to differentiate when something is unexpected and illogical vs reasonably expected imperfect model results**
- **To allow updated Model version to proceed concurrent with agreed upon future collaborative investigations for [x]**