MEETING SUMMARY NOTES

1. Which reports are pending or planned and what are the timelines for completion for each?

2. **What is the purpose of each report? For example, what is the purpose for the groundwater model – to test alternatives? Or predict future conditions?**

Here is a description and status of U.S. Geological Survey projects/reports related to BAPP:

- ***Gruber's Grove Bay Mercury Site Assessment, U.S. Geological Survey Data Release***

Data were collected to assess mercury (Hg) concentrations and isotopic compositions at Gruber's Grove Bay (GGB), Wisconsin for future management decisions related to the site. Bed sediments (52 samples), soils (13 samples), and suspended particulate matter (12 samples) were collected for Hg analysis from regions of GGB and upstream sites with no known Hg discharge (Weigand's Bay and Lake Wisconsin). These data will be provided for presentation and release to the Restoration Advisory Board for the Badger Army Ammunition Plant and the general public by the US Army Environmental Command

The highest concentrations and isotopic signatures (δ202Hg) were observed in soils collected from historic water settling ponds from the Badger Army Ammunition Plant (BAAP). Sediments from the upper portion of GGB showed higher isotopic compositions than sediments from the Wisconsin River. Hg concentrations in sediments were also higher in the upper portion of GGB and decreased towards the river. Sediments collected from the GGB margin (the confluence with the Wisconsin River) were within the concentration and isotopic ranges of Weigand's Bay and further upstream sites. Suspended particulate matter collected from the Wisconsin River and GGB site were isotopically similar to particulate matter from upstream and reference sites.

The review process for this data information product has been completed and the data are available to the public. The results of this study were presented at the September 2019 RAB meeting.

Janssen, S.E., and Krabbenhoft, D.P., 2019, Gruber's Grove Bay Mercury Site Assessment: U.S. Geological Survey data release, https://doi.org/10.5066/P990MFHU.

- ***Plume Delineation and Monitoring Network Optimization at the Badger Army Ammunition Plant, Sauk County, Wisconsin, U.S. Geological Survey Scientific Investigations Report.***

A consistent data aggregation and interpolation method is applied to derive the likely maximum groundwater plume extents in four 3-year time intervals between 2000 and 2018. The plume extent is defined by the enforcement standard for each contaminant of concern, and represents the maximum concentration observed in each 3-year time period.

A series of statistical analyses using the Monitoring and Remediation Optimization System (MAROS 3.0) program are applied to the available contaminant concentration data for two distinct periods: from 2000 to 2012, and 2013 to 2018, with the break between periods coinciding with changes to the monitoring network in 2013. Statistical trends in the concentration of contaminants are determined (where sufficient data are available) for individual wells and for contaminant plumes.

A draft version report has been completed and the report is in peer review. The estimated release date is July 2020.

- ***Presentation of Water Quality Data as a Story Map at the Badger Army Ammunition Plant, Sauk County, Wisconsin, U.S. Geological Survey Web-based Visualization Product.***

This project will provide a series of base maps of the BAAP site and surrounding area, including coverage of all areas in which any groundwater quality monitoring wells are located. Base maps will include an outline of the boundary of the three main contaminant plumes associated with BAAP. Plume boundaries may be based on previous work presented in the 2018 RIFS, or on previous work conducted by USGS, as determined in consultation with AEC.

Maps will display approximately 166 wells that are part of the current monitoring network and sampled on a routine basis. The maps will also display approximately 52 residential wells in the area that have been sampled periodically, specifically in 2004, 2009 and 2018. Mapped well locations will be linked to a database of groundwater quality analytical results, such that a user can click on a well location and pull up available water quality data. Data to be displayed will be limited to three constituents of concern for each separate contaminant plume. For monitoring network wells, analytical results from the three most recent years of sampling events will be displayed in a table. For residential wells, results from the three historical sampling events will be displayed. Personally Identifiable Information associated with residential wells will not be displayed. No reference to owner's name or address will be available; wells will only be identified by a well identification number. Measures will be taken to obscure or mask the exact locations of residential wells so that ownership cannot be discerned by users.

The target date for completion of this product is September 30, 2020.

- ***Development of a Groundwater Flow and Transport Model, U.S. Geological Survey***

The purpose of this project is to develop a groundwater-flow and transport model capable of describing the three contaminant areas-of-concern at the Badger Army Ammunition Plant (BAAP) site: 1) the Propellant Burning Ground plume in the southwest part of BAAP, 2) the Deterrent Burning Ground/Landfill no. 5/Landfill no. 3 plume in the northeast part of BAAP, and 3) the Central Plume of unknown origin. The model will produce results quantifying likely contaminant transport at the site under various conditions. The model will be designed to help AEC communicate with stakeholders and to test ideas regarding plume migration and remediation. In particular, the modeling effort will be directed toward understanding a) the general decline in contaminant concentrations, b) the episodic rebounds in concentrations, and c) controls on plume behavior that condition potential remedial measures (pump and treat, bioremediation, natural attenuation from degradation). The ultimate aim of the modeling work is to test remediation strategies. Remedial options to be tested for each plume include natural attenuation, pump-and-treat, and enhanced biodegradation. This is not currently a predictive modeling effort to predict concentrations at individual wells or match history of the plumes.

The purpose and scope described above constitutes phase 1 of the project to be completed by September 30, 2020. Deliverables for phase 1 include preliminary

documentation and archive of the model and presentation of preliminary results at the September 2020 RAB meeting.

3. There is a 60-day period for public comment.
   What happens after 60 days?
   The comment period on the RI/FS will close 15 May. After that, the Army will consider all the comments received to finalize the RI/FS and prepare the Proposed Plan.

   Does the RAB still have an opportunity to comment on the path forward of the RI/FS?
   Once the Army publishes the Proposed Plan the community will have 30 days to comment on the proposed plan.

4. **Is it possible to change strategy on cleanup activities based on potentially new information discovered at a future time? For example, information from these reports or models?**
   Yes, it is always possible to change strategies. However, if it is after the Record of Decision (ROD) is signed, it may require an amendment to the ROD or an explanation of significant differences (ESD).

5. **What is the status of the contract to dredge Gruber's Grove Bay?**
   The contract is out for proposals. Proposals are due 18 June. We will let you know when the contract has been awarded.

6. **How do regulators deal with proposed alternatives? For example, will Wisconsin Department of Natural Resources (WDNR) comment on the alternative?**
   The regulators will review the RI/FS and the Proposed Plan. Any comments submitted will be considered by the Army.

7. **Has vegetable oil ever been used on a large scale for bioremediation?**
   Yes. The Army has had success at many sites. One example is Cornhusker Army Ammunition Plant. In situ bioremediation of groundwater is a widely used technology for contaminated site treatment because of its relatively low cost, adaptability to site-specific conditions, and effectiveness.

   Are there potential side effects from using vegetable oil? For example, if it goes into the river, will it cause algal blooms? Are there examples of where it did work in other parts of the country?
   Vegetable oil contamination and algal blooms should not be a concern with a properly implemented program. A bioremediation project was successfully implemented at the Department of Energy's Savanah River site, located 1,600 feet from the Savanah River. EVO in the groundwater completely degraded before reaching the river (https://web.ornl.gov/info/news/pulse/no394/feature.shtml).

   During bioremediation, the EVO is expected to remain in the aquifer for about two years before degrading. EVO tends to adhere to the soil particles and groundwater flows through the distributed EVO. Even if the EVO were to move with the groundwater, it would not move more than a few hundred feet before degrading. Estimated groundwater flow velocities at the BAAP are 306 feet/year, 109 feet/year, and 143.feet/year for the PBG plume, DBG plume, and the Central Plume, respectively (section 4.4.4, November Draft Final RI/FS).

   Proposed EVO treatment lines are shown in appendix J of the RI/FS.

Another helpful reference: Introduction to In Situ Bioremediation of Groundwater (U.S. Environmental Protection Agency, 2013, https://semspub.epa.gov/work/11/171054.pdf).

8. Is there a way to test if rises in the groundwater table are causing COC exceedances in locations? Are more clean-up actions needed because if it's linked to the rains?

   To test if rising groundwater (near source areas) affects COC exceedances, more sampling would be required during and after groundwater level rises. Continuous real-time groundwater-level monitors would need to be located near the waste pits. Rises in groundwater levels can be immediately identified and sampling could be coordinated with these rises.

9. **What actions have been going of for the past 30 years?**
   The November 2019 Draft Final RI/FS is a good reference for production and remediation history at the BAAP. Additional information is available in the administrative record.

10. **Was more mercury exposed as a result of dredging? Did they use the right technology to clean it up?**
    When dredging occurred in 2001 and 2006, mercury was removed and properly disposed. However, not all mercury in the bay was removed and the dredging method utilized did expose some new mercury. The technology used was what was available at that time. The majority of the mercury in the bay is contained within the light flocculent material. In the previous dredging events, that light flocculent material was not captured, as the Army became aware of in subsequent sampling of the bay. The Army's intent is to use a dredging technology that will capture the flocculent.

11. **Where is the source of the mercury?**
    Production/process wastewater discharging into Gruber's Grove Bay was the source of the mercury. Process wastewater has not been discharged since 1977 when manufacturing operations were terminated.

12. **RI/FS should look at the source areas more, as compared to once it's in the groundwater.**
    All soil source areas were closed in accordance with Wisconsin law and have appropriate closure documents. The RI/FS includes source area treatments for groundwater.

13. **What is the source area of the central plume? How did they identify and treat the source area?**
    All soil source areas were closed in accordance with Wisconsin law and have appropriate closure documents. The RI/FS includes source area treatments for groundwater.

14. **What technology could be done at the source areas? For example, take off the cap and remediate?**
    All soil source areas were closed in accordance with Wisconsin law and have appropriate closure documents. The RI/FS includes source area treatments for groundwater.

15. **Can you do anaerobic remediation under the cap to clean up the source area?**
    Any actions that disturb the cap or cover would expose the waste and could cause additional contamination to migrate into groundwater.

16. What does it take for WDNR to reopen site for cleanup?

This is a WDNR question. The WDNR can reopen a site if new information becomes available.

17. Should the RI/FS look at more than just groundwater? For example, look at soils also?

No. This is a groundwater specific RI/FS. The Army has received closure approval from the WDNR on all soil-related investigations and response actions at BAAP. These actions include excavation of contaminated soil, installation of clay and geomembrane caps covering waste pits and landfills, and operation of a soil vapor extraction system (PBG waste pits).

18. There are new releases near the cap. Is this enough to revaluate the treatment technologies proposed?

There are no new releases near the cap. Rising groundwater coming into contact with contaminated soil is causing the increases we are seeing in sampling results. The treatment technologies proposed considered this data.

19. DNT sorbs to the sediment, so pump and treat alternative action may not be appropriate.

Pump and treat is a viable technology for remediation of DNT. Pump and treat techniques might have some limits of effectiveness in treating groundwater for COCs. However, *"2,4- and 2,6-DNT only have a slight tendency to sorb to sediments, suspended solids, or biota based on their relatively low organic-carbon partition coefficients"* (EPA Technical Fact Sheet, 2012). Pump and treat systems were operated at the Propellant Burning Ground (PBG) plume during 1993–2012 (Interim Remedial Measures, IRM) and 1996–2015 (Modified, Interim Remedial Measures, MIRM). The IRM and MIRM pump and treat systems at the PBG plume reduced quantities of DNT near the source areas (Section 3.1.1, November 2019 RI/FS)).

20. What is the timetable for cleaning up and paying for the BAAP?

Once an RI/FS is approved a proposed plan with a selected alternative will be prepared, a public comment period held and the proposed plan finalized, a ROD will be prepared, and approved. Typically this is about two years. Then remediation would begin with a remedial design and then construction. The Army will request funding annually for on-going remediation programs.

21. Is it possible to cap the bottom of the source area?

No. This is not a feasible alternative.

22. Why is 2,6-DNT vs Total DNT listed as a COC?

This was based on a conservative approach when the risk was higher for 2,6 DNT it was the basis for the COC risk analysis.

23. Why are there two different cancer risks for on-site vs off-site people? Should it be the same for both groups of people?

The original BAAP boundaries were used for the on-site risk because that property has deed restrictions on groundwater use and access.

24. Currently, the Army is performing Monitoring and Natural Attenuation (MNA), so why is that listed as an alternative action?
Under CERCLA, MNA is considered a remedy.

25. What are the three reasons for being listed as CERCLA?
There is joint oversight of the remedial efforts by the USEPA and the WDNR. The BAAP was nominated for the NPL but was not listed. The remediation program is proceeding under CERCLA authority as it provides the best option for implementing the remaining BAAP remedies. The WDNR issued a RCRA license rather than a permit to BAAP. While WDNR issued the RCRA licenses, they did not have the authority to implement the RCRA HSWA amendments. BAAP had a joint permit where WDNR had closure authority for the RCRA regulated units and EPA had corrective action authority for solid waste management units (SWMUs), which included the BAAP groundwater plumes. The RCRA regulated units were closed with WDNR oversight. EPA's Federal Corrective Action permit expired in 2009 and was not renewed. Since the Army no longer owns the property where the current groundwater source areas are located, there is no authority for WDNR to issue a RCRA corrective action permit.

26. What was the specific reasons for not being authorized to create a new water system? What was the written Opinion of the Army on this ruling?
In December of 2011, the Army completed and submitted to the WDNR, a Revised Alternative Feasibility Study, Groundwater Remedial Strategy report. The selected groundwater remedy was Monitored Natural Attenuation (MNA). Due to the relatively long remedial timeframe for the MNA remedy to achieve the proposed cleanup levels, the proposed remedy included construction and operation of a municipal drinking water system that would provide residents in the communities surrounding the former BAAP with drinking water while groundwater contamination continued to diminish over time. During an evaluation by the Army's Office of General Counsel it was determined the Army did not have the legal or funding authority to procure and operate a municipal water system as identified in the 2011 Revised Alternative Feasibility Study.

27. Are the source areas still producing high levels of COCs? If so, why only treat the groundwater? Why not go to the source area and clean it up completely?
There is a fixed mass of COCs contributing to the groundwater plumes. This contamination is not readily available to remediate due to its depth and distribution.

28. **Are there restrictions for depth and/or screening intervals for new wells where contamination is known to occur?**
On the former BAAP there are deed restrictions that govern new well depths and screen intervals. The Army does not control the groundwater use or access outside of the former BAAP property.

29. **Does the Army have plans to test future installed wells?**
The Army continues to evaluate its monitoring plan and will adjust as necessary.