

MINUTES
ENWRA Technical Committee and Managers Meetings

Tuesday, January 28, 2014 3:00-5:00 pm

Meeting room: Chancellors 2/3

Embassy Suites, 1040 P Street, Lincoln

Technical Committee Meeting - 3:00 to 4:45 pm

- Pilot study sites – Katie will get together WQ analysis of major ion lab results for pilot sites and get pricing options from Midwest for adding pesticides (and daughter products) and circulate potential alternative sampling and analysis options to technical committee for review and consideration (fall is best for pesticide sampling)
- Airborne Electromagnetic (AEM) survey work done in LENRD and LPSNRD in July & August 2013
- NET grant - Group decided to go again for NET and Katie and others interested will meet with Mark Brohman to discuss previous application and upcoming NET application and how to strengthen like last year. Katie will get info together regarding other funding sources and schedule technical committee meeting regarding those and potential NET scope updates and application approach/structure (February?). Discussion points during meeting:
 - Focus on how geophysical mapping results are used by districts (will have Clarkson-Howells, possibly more out of Sprague/Firth HEM as examples)
 - Decide on potential restructuring of next application – (suggestion to send in applications from each district instead of all in one from ENWRA, difficulty would be if some get it and others don't, etc.)
 - Get with partner agencies again and revamp the updated scope/match items after outcome from potential February technical committee meeting (previous match items may not be reusable for next application - example: USGS real-time monitoring installations near gaging stations and DEQ monitoring well contract installations)
- Potential actions for 2014 (new priorities since ENWRA Long Range Plan [LRP] meeting in April 2013) & future work (non-NET related) – Group agreed LRP planned for every other year
 - Archive ~3,000-6,000 unregistered drillers logs and after this set solicit other drilling companies: adequate location information is critical on usefulness, suggestion was made to go through well drillers association, suggestion to go for NET grant to do this. Katie will work with technical committee further on coming up with a plan to get them sorted/scanned and update them on the % with adequate location information.
 - Piecemeal work on Dakota with existing available registered well data (5-10 yrs old) and test hole logs – PMRNRD work on area of Dakota being developed with domestic wells recently w/ nitrate concerns, could continue in other areas – fits in with LRP, no real decision made here, Katie will follow-up with technical committee
 - LPSNRD interest in paleovalley aquifer which extends into LPNDRD and UBBNRD relative to AEM flights conducted for Dwight-Valparaiso-Brainard (DVB) area: group will consider combining mobilization/coordinating timing of potential flights in their districts and even statewide to get more line km for the price tag (discussion point for potential upcoming technical committee meeting maybe before FY15 budget time if we can)
 - Get contacts for partner agencies and their areas of expertise/experience, make annual (at minimum) commitment to touch base with partner agency priorities in ENWRA area and suggestions they may have for ENWRA (next one can be at potential upcoming NET grant application meeting)
 - Mead HEM flights: Katie will get results from Larry.
 - DNR mentioned RFP coming out soon for the consultant groundwater models in ENWRA area (two separate areas: upper portion and lower portion).

- ENWRA Recharge Study presentation by John B Gates (overview, results to date, two journal articles, recommendations for future work in light of the results). Discussions:
 - Soil type had a big influence, sand versus clay versus silt etc., max recharge in valleys, less recharge on uplands
 - At a minimum, there is 40% of recharge not attributable to diffuse recharge (rainfall infiltrating down from surface through vadose): topographic low spots where water collects (road ditches, losing streams, ponds) could be that missing percentage, propose study on remote sensing and installations at ponds/ditches, would have to modify installation protocol for the stations – Katie follow-up with John on potential locations and equipment needed as ENWRA districts plan on doing new stations.
 - Confident on the regional ENWRA picture, will need to include other methods/sources for recharge comparisons in future studies like was done for these papers
 - Oakland site showed stress on dryland corn
 - Question on remote sensing data - monthly crop maps available derived from photos of the infrared spectrum, used to calculate evapotranspiration (ET), was used in one of the study articles, good when no runoff.
 - Using HEM with recharge studies - resolution on HEM is not fine enough to discern 10 millimeter thickness of clay layers that could so heavily affect the downward movement of water through the vadose but could look into further
 - CFC SF6, chloride tracer work mentioned
 - Question about installation methods affecting results - it is apparent when there is something wrong with a sensor/seals and you can see it readily in the data
 - Land use affecting recharge – yes in high plains, no in ENWRA area, the clay rich soils (at least at the 3 pilot sites) far exceed effects on diffuse recharge compared to land use
 - Surface cracks in clay when it dries – discussion on impact of cracks on recharge: water would fill in and swell clay back up, topographic setting and material below depth of crack matter (clay VS sand below the cracks and depth to groundwater)

Managers Meeting - 4:45 to 5 pm

- Completed & Ongoing tasks (abridged):
 - Firth CSD Pilot Study Bulletin is out on ENWRA website
 - USGS/UNL journal article interpreting the vadose work and existing complimentary data is complete (Recharge study summary above).
 - Annual water samples and transducer water level and temperature downloads collected at ENWRA pilot study sites (see above technical committee discussions)
 - NET grant application, scope was presented at Managers retreat in August (see above technical committee discussion regarding not making the cut), suggestion to move annual managers meeting to retreat in August instead of at Annual Legislative Conference.
 - Oakland Bulletin in Progress, rough cut goal is April 1st, will depend on review schedules for final
 - Monitoring well, weather, and recharge station equipment maintenance and website updates will continue
 - Coordinator time split ENWRA and CSD, CSD work will be in in ENWRA areas
- Budget: ~\$538,000 currently in ENWRA budget, will be at \$486,000 after FY14 commitments. Katie will be working on additional potential funding sources and present to technical committee during upcoming NET grant application discussions
- Upcoming ENWRA activities: Katie has punch list from above, ENWRA presentations to each of the District Boards, PMRNRD is scheduled for March, Katie will be contacting other ENWRA NRDs for best timing and potential topics the districts might want covered.

MINUTES
ENWRA Technical Committee Meeting
Thursday, April 10, 2014 10:00 am to 1:00 pm
Lower Elkhorn NRD
601 E. Benjamin, Ste 101
Norfolk, NE

AEM Discussions 10:00 to 11:00 – Jim Cannia and Jared Abraham – XRI Geophysics, LLC

- Background info., Clarkson-Howells review, AEM in Google Earth (GE) for public, 508 system etc.
- AEM Process (example: adding data after flights, final steps can be redone to add test hole data)
- Potential pricing/logistics of recon: flying smarter, optimizing routes, fuel is a primary cost variable
- Real-time block approach: wider spaced grid lines to cover more areas - have reserve line km amt. set for doing a detail area (closer line spacings) within the grid patterns to get more targeted info for less \$ in same mobilization based on pre-analysis work during the flights

Technical Committee Meeting 11:00 to 1:00 - Actions for 2014 and 2015

NET scope, Funding, Recharge, other items

- Group agreed to plan recon lines with or without NET funding – approximate same amount of lines, actual routes may be adjusted but current transect map good for planning at this stage
- NET study scope discussions:
 - committee decided to take out block areas
 - no bonus lines, no double up lines, stick to ~1,050 line km total at this time
 - need to pare down scope to reduce estimated budget so that total is less than 1 million (not \$999,999 either)
 - meet with partners DNR, DEQ, USGS, CSD and meet w/NET after TC reviews draft app. text & approx. budget cap (KAC to do)
 - NRDs will keep each other updated on potential AEM plans in their districts in order to coordinate (plan for after Sept. 2 to count toward potential NET match)
 - can forgo some shallow resolution for potential add'l depth though till w/recon
 - highlight by doing initial broad stroke approach and then narrowing down we save \$ on future priority areas (informed decisions)
 - focus on this simplified theme w/out blocks of starting rough with recon lines with good large coverage area and goal of having better guidance where more specific local detail may be needed
 - include public ed. (town hall) & GE for public
 - recon may identify settings to install recharge stations or recharge areas that may need further assessment (potentially w/other technology to get near surface detail)
 - can generate surface/ground water connection diagrams like in previous HEM bulletins
- Other funding: Different sources discussed. Foundations will be smaller \$ amounts but some were parallel to our scope goals – keep deadlines on radar. Large federal grants have stiff competition, USDA NIFA letter of intent due April 17th – not enough time from this meeting to get letter in (need to run application through managers etc.). Water Funding Taskforce – try for first application opening if anything just to get in early. Previous examples discussed where getting in early set the stage for later funding.
- Discussed recharge articles briefly, group agreed we need more stations in different soil and topography settings per UNL/USGS WRR article and John Gates.
- Archive unregistered driller logs: may be ready soon for next set of unregistered driller's logs, even test logs where no wells were put in is good information – will solicit potential sources.
- Pesticide event at pilot study sites: group receptive to adding pesticides to annual event and moving to fall – bring up before next event (this spring 2014 event is already in works) and also revisit pre-screening options.

1:00 Adjourn

MINUTES
ENWRA NDNR NDEQ USGS Technical Advisor Meetings
Friday, May 30, 2014 8:00 am to 12:30 pm
Partner Agency Offices - Lincoln, NE

NDNR AEM Discussions 8:00 to 9:30 am - with Jesse Bradley, Amy Zoller, Dustin Wilcox

NDNR indicated that they will provide ENWRA ~\$500,000 for additional transect lines (to achieve more of a grid across all of ENWRA) to compare against their modeling work. Consultant selection is currently in progress on their end to develop two numerical groundwater models that will be used to support the NDNR's evaluations of the Lower Platte River and Missouri River Tributaries basins within the ENWRA study area. The NDNR plans to evaluate the ENWRA AEM survey results (transect flights currently proposed for spring 2015) in conjunction with their upcoming numerical models (northern model area due by end of 2015 and southern model area due by 2016, see attached NDNR model boundaries and RFP tasks) as part of the proposed partnership on the project. Very preliminarily, it appears we could double the amount of our transects, but we will see once we get costs and additional transect lines on paper (see attached rough draft of potential additional lines and associated info for your review, input, and changes).

NDNR would want base of aquifer and aquifer thickness information out of the framework at a minimum and then would also benefit from updates to the specific yield, hydraulic conductivity, and transmissivity values etc. if we could develop a way to get them through the AEM resistivity values. The group will need to think about if XRI will/could add that to their product scope or if USGS or CSD will be involved on that end of things to get the AEM results to fit NDNR's model inputs and will need to decide on a portion of the budget for doing that VS flying "x" amount of lines etc. A letter to the NRD managers summarizing the plan and pledged funding has been drafted (Jesse Bradley will review, update and put on his letterhead once the technical committee has made comments) so the managers will be ready to sign off on the upcoming ENWRA interlocal agreement modifications. Jesse will work on getting the interlocal agreement modifications for the funds and expectations between ENWRA and NDNR once the managers approve of the approach (goal is to have the contract agreement in place by August 1 or earlier if possible).

NDEQ Agency Discussions 10:00 to 11:00 am - with Marty Link, Dave Miesbach, Jennifer Swanson

The NDEQ provided general agency information and interests relative to ENWRA and really did not have anything specific to provide or add or request regarding ENWRA's AEM plans/upcoming NET application on the flight scope other than to indicate that the data will be useful in groundwater quality considerations.

USGS AEM/NET Discussions 11:30 to 12:30 - w/Bob Swanson, Ginny McGuire, Chris Hobza, Amanda Flynn

USGS is thinking about the new additions to the planned recon transect lines to see how they could fit into the scope. Several ideas were discussed as potential upcoming products complimenting/using/furthering the AEM results with USGS match funds (thickness of till map, Dakota thickness map, tops and bottoms of aquifer systems, [brackish water study - using geophysical logs was discussed], base of aquifer like previous NET submittal scope, Crustal dept. interest in data). A decision was not made at the meeting about USGS's potential scope in the plan, but ENWRA will send USGS the revised recon line map once NDNR approves it and USGS will consider the potential products for the upcoming NET submittal with ENWRA in the meantime.

MINUTES
ENWRA Technical Committee Meeting with XRI
Thursday, June 19, 2014 11:00 am to 12:30 pm
Lower Platte South NRD Office - Lincoln, NE

AEM Discussions – ENWRA Technical Committee with Jared Abraham, Jim Cannia and Greg Steele

Current Recon/Transect Line Map:

Map e-mailed 6/4/14 to technical committee with additional/revised/updated transects in LCNRD and LPSNRD depicted: ~1,368 miles total at this stage (meeting handout attached). Katie sent shape files to Jared and Jim directly after the meeting and will get technical committee updated shape files once the baseline check is done for overhead utilities on Google Earth and Jared gets natural gas/utility maps looked at (subscription service of XRIs).

Transect Line Routes:

We will need more upfront planning before flights than previous 2013 block areas required (will need multiple logistic bases selected and map out utilities). Power Lines/pipelines which are sometimes along CSD test hole routes in ROWs will need to be 200 to 500 meters away if they are parallel to our transects (can cross over them perpendicular and lose a bit of a line where you cross - not a big deal). The newest method of processing the data uses model of spatially constrained soundings (quazi 3-D, like “nearest neighbor” in GIS but in x, y & z directions) and couplings (like from power lines/pipelines) contaminate the inversion (even worse than previous methods) so we will lose the whole transect along that area if we fly parallel to a power line/pipeline. XRI will screen the line locations with the readily available utility line maps and get Katie a list of utility companies we will need to contact. Katie will go through and make contact with utilities that may have overhead power lines and find out what needs to be done to get the line locations digitally mapped.

AEM system 304 VS 508 systems:

508 system: Bigger loop than 304 system used last year at DVB and CH blocks (21m – egg shaped tubes), still flown by helicopter, biggest pro is better on the signal to noise ratio: being able to distinguish better resolution at depth, also more stable in the air and can fly in higher winds, can see deeper than 304 (seeing ~550m penetration in TX, even in presence of lots of conductors when 304 system was like 850 to 950ft). Geological resolution in first 20 feet is not as good as 304 system (304 system was 6m resolution, HEM was 1m, 508 is like 10m in that initial 20 feet).

Discussions: Would like both deep and shallow resolution but based on the “better signal to noise ratio” and Jared’s recommendation for 508 system discussion, group generally agrees on 508 system for transect lines at this time.

Flight Schedule:

LENRD is tentatively scheduled for September-Oct. 2014. Group discussed potential combination of northern portion of ENWRA with LENRD flights in fall but would need to work out NDNR contract ahead of time (contract scheduled to be in place by end of August).

Costs:

Jared worked-up cost options for splitting up AEM flights into northern half (\$440,000) and southern half (\$441,000) of ENWRA area ~1370 miles for \$881,000 (Costs received July 16, 2014 – start date: September 2014).

TO DO:

The technical committee will need to weigh-in on the costs and then give the blessing on the transect map. Katie will then get recon line map to Jesse at DNR for review.

MINUTES

ENWRA NDNR CSD USGS Partner Agency Meetings

Month of August 2014

Partner Agency Offices - Lincoln, NE / Conference Calls / e-mail correspondence

NDNR ILCA Discussions 8/13/14 - with Jesse Bradley and Jim Schneider

NDNR indicated that the draft ILCA was ok with the changes discussed: edits from attorneys and ENWRA will receive one lump sum payment in December 2014 following NDNR's receipt of the first semi-annual report from ENWRA for the project instead of half in Dec 2014 and half in June 2015. NDNR will provide ENWRA ~\$500,000 for additional transect lines to compare against their modeling work (transects will be flown in fall 2014 and spring 2015). Consultant selection complete on their end to develop two numerical groundwater models that will be used to support the NDNR's evaluations of the Lower Platte River and Missouri River Tributaries basins within the ENWRA study area.

The details of how NDNR would want base of aquifer and aquifer thickness information out of the framework as well as potential other parameters will still need to be refined but NDNR offered to schedule a meeting with the consultant, NDNR and ENWRA to discuss the details on the AEM data and plan for the models. NDNR also indicated the proposed 1,380 miles of flight line locations, ENWRA's plan to use XRI, and the schedule to fly north half in fall and south half in spring were each acceptable.

USGS Discussions 8/13/14 to 8/28/14 - w/Bob Swanson, Ginny McGuire, Chris Hobza, Amanda Flynn

Several ideas/iterations were discussed as potential upcoming products complimenting/using/furthering the AEM results with USGS match funds. USGS is offering to: use existing CSD test hole data, the interpreted AEM survey data, the new testhole data advanced for this study, and registered well log data to produce a Scientific Investigations Map (SIM) defining and mapping the top of the water-bearing unit of the Dakota formation within the ENWRA area (asking \$76,000, providing \$44,000 in Cooperative Water Funds [CWF]). USGS would also assist ENWRA in preparing the AEM data for the Nebraska NDNR evaluation (asking \$12,000, providing \$8,000 in CWF). This work will refine the existing base of principal aquifer using AEM data in order to evaluate its utility for ground water models. The specifics of this task (such as the definition of the base of aquifer, the model cell size, etc.) are dependent on the results of the AEM surveys and preliminary modeling. Lastly, the USGS will contribute \$20,000 towards the operation, maintenance, record-working, and publication of real-time water-level and temperature data at the two existing coupled ground water/surface-water gages on the Elkhorn River.

CSD Agency Discussions: 8/15/2014 w/Dana Divine and Mark Kuzila and **8/29/14** w/ Sue Lackey

We will keep the same concept as we had in the NET grant application the previous year 2013 but we changed the number of test holes from 20 to 30 and expanded the cross-section map product to have more of a narrative and the pricing and match amounts went up accordingly (~1.5X last year's scope & \$):

- \$82,500 asking from the Trust for test holes – control for AEM and builds TH database for all kinds of users (\$90,000 in-kind match)
- \$60,000 asking from the Trust for cross-section CSD publication – degree of match with prev. known stratigraphic info. and new understandings from AEM and how it will help water managers (\$52,500 in-kind match)

XRI: 8/15/14 and 8/19/14 Discussed where we are at with the power line mapping and flight schedule. Potential cost savings discussed if all lines were done in fall 2014: generally estimated at \$30 to \$40k and XRI flexible on contract payment schedule. Based on amount of lines/coordination/timing, we are sticking with fall (currently scheduled to start the week of October 1st) and spring mobilizations.

NET Application Notes: The general NET application contents were presented to the ENWRA managers at the manager's retreat in Alma, NE on 8/26/2014. Based on follow-up ENWRA and agency discussions, ENWRA's Draft NET Application dated 8/21/14 was changed to reflect NET's suggestion of moving possible year 2 expense requests to year 1 so we are not asking for more from the Trust in year 2 than year 1 – the change was made to the application 8/29/14 and the application was e-mailed and hand delivered 9/2/14.