NEWTON GRAVEL PIT MINUTES
CITY OF MANITOWOC/DNR
April 6, 2016, 9:00 am
City Hall 2nd Floor Conference Room

Attendees: Dave Henderson, Jeff Maletzke – AECOM
Dan Koski, Kathleen McDaniel, Greg Minikel, Karen Dorow – City of Manitowoc
Tauren Beggs and Liz Heinen – WDNR
Dave Johnson – WDNR

1. Potable Well Sampling
    a. Sampling was completed on March 30 & 31st.

The Orchard Lane property (garden) was not sampled during the March event. K. Dorow has been unable to contact the property owner. D. Henderson will stop at the property on one of his upcoming visits to try and sample.

2. Water main update
    a. Update on construction/hookup/Abandonment

3617 Viebahn (Trembley) is the only property that has not been hooked up as of 4/6/16. This property is scheduled to be hooked up the first week of May. All other properties have been hooked up to municipal water and all wells with the exception of 2717 CTH CR have been abandoned. 2717 CTH CR signage is being worked on for the non-potable well. Pressure on the main is fairly high. The plumber is installing valves to reduce the pressure on the shorter laterals to reduce the pressure. MPU needs the higher pressure on the main to make it all the way down CTH CR.

    b. Safe Drinking Water Loan Program – June 30, 2016 Financial Assistance Application Due

Scored pretty well on the ITA/PERF, in the top 10. SWDLP Application is being worked on and will be submitted prior to the June 30th deadline.

3. Soil Drum Status
    a. T. Beggs and D. Henderson to discuss.

T. Beggs said the results were less than the 20 times the TCLP limits so the soil would not be considered a hazardous waste. In the RAOR include implementation of long term storage and the plan to dispose of the contents of all of the drums (drill cuttings) under the cap. Include a statement in the remedial design phase.

4. Update on current impacted wells
    a. 3504 CTH CR – Priority IAC

The property owner requested an agreement before construction of the new well. We put together the agreement and he came back with some revisions. They were made

and returned to him and he put us off because of the construction going on at his company. When staff met out there with the driller the property owner determined he would like a work order rather than an agreement. A work order was prepared and sent to the property owner. He requested some modifications to the work order which we supplied and returned to him. He returned the work order signed with a large addendum to the work order which looked like an agreement, but it was not the agreement we initially sent. K. McDaniel is not comfortable with anyone from the City signing the addendum. He is asking for things that we are not going to promise such as releasing him from any and all liability to any future contamination found on his property. D. Koski mentioned that we discussed the DNR sending him a letter that he could be a potential conduit. D. Johnson's final say is the well on this property is a potential conduit. The City is struggling to come to an agreement with him. The City wants to install the new well and has tried to come to an agreement with him. We are continuing to try and work with him, but at what point do we ask the DNR to get involved? City asked if DNR says he could be a potential conduit and he does not want to move without an agreement what are the next steps. L. Heinen will draft a letter that his well is contaminated, the City has offered to replace his well and to abandon the existing well, he has liability as his well could be acting as a conduit and include a time limit on the response - 30 days - and send a draft to Kathleen. If a draft letter is agreed upon, the letter will be submitted to DNR Drinking & Groundwater Program administration seeking approval to send out. Kathleen will respond to Mr. Bruenig right away that the DNR will be following up with him, before this happens if he would like to proceed with the original agreement we can move forward with the new well. If he does not agree after DNR letter the offer will be removed from the table and he will be on his own for replacement and abandonment.

b. 4002 Thunder Ridge Road

Waiting for ground to dry out before drilling

c. 3303 Hecker Road

Waiting for ground to dry out before drilling

5. Technical Memo Updates
    a. Pond Feasibility – Complete

Everyone got pond feasibility technical memo. It was sent out right before the meeting. It is a summary of the work AECOM did and characterizes horizontal and vertical delineation. In summary the groundwater plume laterally is about where we thought it is. Vertical delineation contamination at 30 feet, clean at 40 feet. We still have a well at 20 feet that is clean. Not sure why. Lab results are included. This will also be part of the RAOR.

b. SVE

All of the design information from the pilot study and all the technical data will be included with the RAOR.

c. Potable Well Plume Delineation

Waiting for spring weather. D. Henderson gave a quick summary of the plans.

d. Contaminant Characterization

Saw some of this in the groundwater technical memo.

6. Remedial Action Options Report (RAOR) Presentation

D. Henderson and J. Maletzke co-presented. D. Henderson stated that the RAOR was at about a 10 – 20% design. AECOM is trying to pick most feasible remedial alternative based on budget and design which is about 10 – 20% complete. We have gone a lot further with this one because of our wish to get work done this year yet. Two components Conceptual Site Model (CSM) and the RAOR. Three areas – Western Source Area, Groundwater Treatment Area and downgradient potable well area. Elevations – Source area is the high point, top of the hill is about 720amsl (a little higher at the high point), base of the hill is about 690amsl and Silver Creek is 680amsl. From a geology standpoint it is primarily outwash sands and gravels with a couple discontinuous clay and silty clay lenses and bedrock at about 100 feet below the ground surface at the source area. This is all summarized in existing reports. The water table from the top of the hill is about 25 – 30 feet below top of hill. At the bottom of the hill is shallow, less than 10 feet below ground and in some places less than 5 feet below ground. Flow primarily east southeast. Average flow range is estimated at 47 – 70 feet per year. J. Maletzke can provide more data on flow rates if DNR would like.

Contaminants of concern are VOCs (petroleum, chlorinateds – parents and daughters). Different sample area and different mixing explains why PCB is different from past to now. PCBs don't come and go. Variability is a function of where samples were obtained. Image of grayed out soil borings though the years gives us the data for the cap. Free product is a little heavier than motor oil and is a mixture of oils, chlorinateds, benzene, xylene, and paint thinner type products. The mixture is lighter than water but denser than gasoline and motor oil. Because we put in these temporary wells to define the edge of the plume we were able to do an isoconcentration map which is included in the tech memo. WT-16 is still causing question on another potential source out there as well as Viebahn Street.

Potable well target zone impacts in bedrock greater than 100 years or more before they disappear. We are not planning any remediation in these areas, only source control in terms of long-term monitoring, replacing wells and water main extension if feasible.

<u>Remedial Action Options</u>

Talk about engineering design processes in the western source and groundwater treatment area. Initial design parameters - Design life >50 years. Possible phased remedial approach which is a new concept. We would like to design our system so if there are advancements in remediation in the future we keep the options open to be able to incorporate new developments if appropriate.

Phased construction scheduling based on City budget constraints. Phase over two, possible three construction seasons. We need to keep our focus on how we are going to get the City to closure on the site and what will closure mean.

RAO – Engineering Design Process – function well and reasonable cost for best value
Looked at several different options

- Natural attenuation – Lowest cost alternative
- Excavate and remove source area to Title C landfill – Highest cost alternative
- Source area treatment system – Mid cost alternative
- Permeable Reactive Barrier (PBR)

Sustainability - Power

Mechanical wind power for a source of soil vapor extraction. Cost of construction – designed to be used on a farm or residence – not 50 year design piece of equipment and must be monitored and maintained. Would last to 10 -15 years and would need to be monitored and annual maintenance. Cost not feasible.

Wind power as an electrical source – D. Henderson met with professor at Lakeshore Technical College (LTC) – Recommended purchasing from Kingspan out of Scotland the small windmill like LTC has – low maintenance at a cost of $31,000 for 5 – 6 kw system and need to purchase battery bank that is about $15,000 - $25,000 and replace batteries every 8 to 12 years. We determined it did not make sense mechanically and electrically for the life cycle of our treatment.

Solar is less expensive than wind. Cost would be around $20,000 and would have to put in battery packs.

Quote for WPS to extend the electricity from police garage to the area was $12,000 for winter installation and $9,000 without winter construction. At the price differentials for each alternative the best alternative for the City is to extend the grid. If DNR would like to make this a demonstration site and fund it we could do solar or wind with our preference being solar. LTC would be willing to do inspections with students but would it would still cost us something.

Sustainability – Water Treatment Area

PRB has between 10 and 20 years of life. Iron filings get masked/coated and are not efficient. By trenching in a PRB there is a permanent change the aquifer. The wall would be about 40 feet deep, 500 feet long. We don't want to change the aquifer when we are looking at a > 50 year design.

Medium impact is the pond alternative, D. Johnson from the DNR's idea. Would include excavation (within the gravel pit trucking). Could incorporate phytoremediation adjacent to the pond and solar aeration equipment within the pond. One of the processes of the forestry department would be to come out and do core samples of the trees used for phytoremediation. Potentially may be able to drain pond into creek with gravity.

Western Source Area – We have regulatory requirements we must follow. PCBs are greater than 50ppm so EPA and TSCA rules. By TSCA 761.61 rules we must cap it at a minimum. DNR - NR700 rules look for free product recovery.

Excavation alternative – 10% design with a 1 to 1 slope would cost between $3,000,000 and $5,000,000. Visual inspection of soil to determine which landfill it would be hauled to. This alternative is cost prohibitive.

Western Source – Engineered Treatment System – Cap, SVE and LNAPL Recovery
Cap – TSCA regulatory requirement and NR 500 requirement. City surveyed the whole property. AECOM engineered a cap to meet NR500 code requirements (landfill type cap). Dimensions of the cap are 220 feet by 310 feet. A NR 500 cap would consist of a six inch layer of soil (no rocks), two foot layer of clay or a Geosynthetic Clay Liner (GCL), on top of clay/GCL we need have to have a 40 mil impermeable geomembrane, on top of that we have to have a two foot rooting zone. 1-1/2 foot material – sandy and 6" of top soil. Cost out both clay construction and the GCL installed and the GCL is less expensive for the smaller area. Did a grading plan for it, set up the limits for it, gave it the correct NR 500 drainage. We are assuming that we are going to put in a treatment pond which would catch the surface drainage. Cost is about $130,000.

Soil Vapor Extraction System (SVE) - Did the pilot study. Designed the system with five extraction wells, four inch diameter stainless steel. Recommending stainless steel because we will need to eventually aggressively clean. For a long term install stainless will last longer than PVC. D. Henderson showed map of radius of influence. There is good air flow through the soil so we will have good coverage with installing five wells. Trenching and piping – we assume we will be putting a treatment building in. Trenching from each well will be piped in two foot layer rooting zone of the cap above the GCL. Equipment will allow us to bounce around from well to well. Power coming from the grid. Good coverage and reasonable design.

Free product plume – Planning six extraction wells. Goal is to cover the middle of the free product plume with extraction wells and over cover it with SVE. D. Henderson believes we are close but may need some adjustments when we begin the work.
Cost for SVE and free product is about $212,000. This includes building, equipment, power and eight wells, two SVE only, three free product only and three SVE and free product underneath the cap, SVE and free product recovery. For Cap, SVE and free product recovery cost is $330 ,000 - $350,000. Design is between 50% and 70% complete.

Groundwater treatment area - We know the plume is stable.
Alternatives – No TSCA requirements here, only DNR.
Do Nothing – cost minimal but will continue to source bedrock. Estimated cost is long term monitoring. DNR wants source control and to see decreasing trends to make sure it is still doing something.

PRB – Water flows through the PRB and is treated. Remember it may come in at 100 ppm but may not exit at zero ppm. Just because water goes through the wall does not mean water coming out will be at zero. We would need to do a pilot study, lab studies, design the width of the wall, design how much iron goes into the wall. Wall would need

to be 500 feet long and we have contamination to 40 feet, so needs to be 40 feet deep. This will affect the aquifer. If the wall would start to plug up, the plume will dive under or go around edges. We would need to dig up the wall if it started to plug up or understand that the water is going to flow around it. Good alternative but not for a > 50 year design. Estimated $1,100,000 to $2,300,000 – 40 feet deep. 50 foot deep would be about $2,800,000. D. Johnson not sure how effective the PRB would be with VOCs. There is an unknown limited life. There would need to be more monitoring wells to make sure wall is working as planned. If it fails, then would have to excavate, haul, and replace.
Engineered Pond – Need D. Johnson's input for the pond.

Can we put a pond in that does not intercept the plume 100% horizontally and vertically. There are flowable sands that will make constructability difficult. D. Henderson thinks we are ok at a 20 foot depth. If we need to go 30 or 40 feet deep what is the angle of repose? Solar Bee mixer could be placed in the pond with a mixing blade to aerate. It would have a battery that would need to be replaced every eight to ten years. D. Henderson contacted the manufacturer and for our application they felt we should be able to get by with one in the size of our pond with a 30 year design life. When we know water contamination is at zero drain pond to Silver Creek. Low impact, long life. We can't pilot study this alternative.

There are three pond alternatives -
1.) At base of hill, bottom of gravel pit, three to ten feet to the water table. 400 feet long and 20 feet deep, shelf and a 12 foot road all around, solar mixer would sit in the middle. Pond must intersect the plume horizontally and vertically. Does the surface intercept the plume or does the very bottom intercept the plume? For function base of the pond needs to intercept lateral base of the plume. To intercept whole plume as it stands would need to go onto Roberts property. Estimated cost $435,000. This design would be missing the bottom of plume by 10 – 15 feet. Pond is almost 150 feet wide. Three to one slope pond would have a 20 foot wide bottom. Lowest cost alternative. Does not cover the whole plume, would need to be 550 feet long to cover the whole plume so costs would increase.

D. Johnson had two points – the bench will allow for a little more warming and a little more evapotranspiration. The more it is kept open and push evapotranspiration capture will be increased. Every situation he has seen you have radial flow into the system and the more evapotranspiration you make go out the more you will capture. The more you pump out the deeper you will intercept. D. Johnson thinks we could capture pretty much everything with this design. There is room and we are talking about phytoremediation so we could come out of the end of the pond engineer a canal and if needed, and could put extra steps, activated carbon filters or short PRB wall and discharge into the stream. Meander the stream which increases the capture zone. This would be a huge modeling effort, more consulting costs. D. Johnson said we could do a rough estimate using evapotranspiration based on the surface area. Using the mixer will keep the water temperature up and keep it open in winter. Would probably want to put in a geomembrane lined channel with an earth base. When the creek floods it will come back into the pond. There will be a time of year where we will have backflow. Most of the year it should drain out. If water table moves down will lose the flow. We know the history of the water table so should be ok. Cost is about $400,000+.

2.) Same pond moved several hundred feet into the hill. 400 feet long moved several hundred feet into the hill 20 feet deep, tied it into the edge of the cap. Get closer to catching the bottom of the plume but probably don't yet. Cost goes to $675,000. The east edge of the hill is clean so we wouldn't have to worry about contaminated soil.

3.) Move pond as far west as possible can. Cap becomes narrower. Possibly intercept bottom of the plume. Taking out a lot of the hill so cost goes to over a million. We need to be careful with this alternative that we don't have free product entering the pond.

We could go back to alternative 1 and dig down 30 to 40 feet but the pond would become hugely wide. Constructability becomes an issue and costs go up. Can put in a sinuous drain and phytoremediation, pond may freeze up in the winter but that should be ok with the volume. We can't pilot test some of these things and that is a risk.

If we don't have complete draw up D. Johnson suggested installing a series of wells at the base of the hill and using farm type windmills with pumps to pump water back into the pond influencing the eto of the pond. There are many things we could do. Once we get the volume down and go the creek outlet we could build in a membrane, activated charcoal or polish if we have to. We have DNR approval that pond will be considered a treatment pond so not a water of the state regulated as a stormwater pond. We still need to get the WPDS permit to go to the creek. Contaminated groundwater is already discharging to the creek, so remediating the water and discharging it to the creek could improve water quality.

T. Beggs felt that alternative #1 looks best, extending the loop out. We would do the best we can on our property to try and capture as much horizontal width of the plume as we can and a maximum of 20 feet deep. Minnesota did a study that D. Johnson will supply to D. Henderson. Groundwater monitoring well sampling showing radial flow into it and results improving will show that it is working. Once we get radial flow it can be put into a g-model to see capture zone. To do that type of modeling now would cost $20,000 to $30,000 to figure that out. Intuitively we already know the answer.

D. Johnson suggested that if we could take a little bit of the hill out in the southwest corner, and extend the pond it would increase capture area.

D. Henderson asked if we miss something vertically, what is the DNR response going to be? If we build this and put monitoring wells up gradient and down gradient for both contaminant concentration and draw down and we prove we are missing something going underneath it, in 5 – 10 years what will DNR response be? Natural attenuation take care of rest? T. Beggs stated we are doing two things here. We are treating at the source and we have a lot of mass that has already moved down gradient and we would also be treating that with the pond and potential phytoremediation.

D. Henderson presented the Forest Service piece. They will come out and survey the site and do a hydrological balance. They will core all of the trees and survey the vegetation and see what is in the trees contaminant wise. After that they come to the

site and take some sand/soil and tests the soil and sees what will grow in it. They will determine the riparian and woody species that will grow the best here. They come out and make a small scale plot monitored for a length of time. After the small scale plot, they write a paper with recommendations, gives us a plan on what works best. This would be an alternative remedial action in the future.

Roberts property – The isoconcentration drops onto his property. The area is pretty wet. Maybe we plant trees in that area with Tony Robert's permission.

Cost – If pond is extended 100 feet, cost goes up about 20%, cost may go from $400,000 to $500,000 plus cost of drainage to the creek. AECOM needs to discuss with the City from a budget standpoint what we are able to do this year. We don't have a handle on what phased construction means yet.

T. Beggs felt the pond should come first. Prioritizing public health (preventing further groundwater contamination from migrating to the public's water supply) is the top priority compared to the cap. We could set the bottom grade of the cap and slope it to set up for the cap next year. What we knock off the hill and what comes from the pond could be used to level the surface for the cap.

We will need to decide what to do with the 70,000 +/- cubic yards of sand from the pond excavation. Do we reach out to Fricke? There is a 10-15 foot drop off between our property and his. They probably have a non-metallic mining reclamation plan for his property. Talk to Fricke to see if we could dump spoils from pond over the edge at the property line and they can call it for their reclamation use.

We need to get consensus in writing on the three remedial alternatives and what the focus should be as well as if we miss the bottom of the plume we will not be penalized for it. We want to build something this year and D. Henderson needs to complete the RAOR, so the DNR has 30-60 days to review it and still be able to construct something this year.

D. Johnson stated when we look at the pond it is all going to depend on the Q, flow coming in and flow going out so it starts to draw into the pond. The deep underflow that is still contaminated should still be influenced by the pond. Depending on the Q we may want to put in a second bubbler to enhance it. Also get the Q up with flowing to the stream. Alternative one is really good, would be nice to hook it a little to the west and should design pipe or stream right away. We should have quite a bit of draw and do have options for increasing the draw. D. Henderson suggested a 12 inch pipe from the pond with a weir discharging to the creek, or go with stream with probably some kind of liner and possibly a weir and meander as much as we can and should design it right away. D. Johnson recommended going with the stream and meandering as much as possible.

If we put in the pond as the first phase and if we find that it is working, would we need to do the cap and the SVE? Could we save some money. Cap and mass removal is a DNR requirement. TSCA requirements are needed for PCBs above 50ppm per the DNR and EPA One Cleanup Program Memorandum of Agreement. If the pond is working and

we want to enhance it SVE and free product removal would be the second phase and still have a phased hierarchy and maybe one component will not need to be installed. The DNR has given no indication that SVE and free product removal would not be required. Mass removal is a requirement, so further evaluation will be needed after the pond is installed before this may even be potentially considered. This gives us some options and may save some money. Creek would be poly lined, 4 feet deep, will need to make it so it does not leak and discharge to Silver Creek. D. Johnson indicated that if the stream discharge was not clean going into the creek there are enhancements we can do to the pond to help with that (ie: another mixer, the bench could have dark material to raise temperature to increase volatilization). There are a lot of enhancements that you can do with the treatment pond. The plan would be to design the pond conservatively large to insure success. D. Koski asked for the pond for anyone working out there do they need to be 40 hour trained. Answer was no. D. Henderson would have them take a two hour awareness training.

L. Heinen asked if we came to closure would we ever need the material excavated from the pond to refill it. We would leave the pond as is and not fill it in.

When we start looking at costs, if the pond is working then may only have to do the cap and not have to do SVE. The pond and the cap would be about $800,000 - $850,000 keeping in mind phased construction.

What does closure mean? D. Johnson and T. Beggs said they have not done a project with a pond like this that has gone to closure. We know monitoring of potable wells will go on for a very long time. D. Johnson said that they have had a number of cases where they closed out on one area and had other active areas. Switch from short term monitoring if we are seeing decreasing trends transferring to long term for closure.

T. Beggs informed the group that for the RAOR and remedial design report there will be a charge of $1,050 to review each report. We have had many reports and meetings with the DNR with no fees to date. Total fees would be $2,100 for the two reports and $1,750 for closure fees. Because we get so much done and we are all on the same page, the DNR will continue these technical meetings at no charge, but fees must be paid for each report submittal. If additional report submittals are needed such as a soil management plan, etc. then applicable fees will need to be paid at that time as well.

To reiterate where we are…

- Alternative #1, pond at the base of the hill
- Expand the pond as much as we can to capture the horizontal plume while staying on City property.
- Depth to be kept at 20 feet, understanding that the plume is still going under it, but the pond should still capture the contamination at the greater depth.
- Enhanced evapotranspiration
    - Meandering creek
    - Phytoremediation
    - Maximizing the bench with dark materials – D. Henderson was thinking that the bench would have vegetation
- Meandering creek

    - Engineered design discharge
    - Lots of meanders, wide – lots of surface area
    - Ability for phytoremediation
    - Concrete or plastic lined, amended bentonite bottom
    - WPDS permit to discharge to Silver Creek
    - We won't know if we need to do any other treatment at the end of the meandering creek until samples are taken
- Constructability over time look at construction phasing. Priority is groundwater treatment first. From a public interest standpoint we are working to keep contamination from migrating into potable wells.

7. Other topics

   T. Beggs asked how it went with the potable well testing at 3320 Hecker Road – Mancheski. All was fine during the well testing.

   L. Heinen asked about 3504 CTH CR – How long have we been working with him to try and install a new well? K. McDaniel - initially contaminated in January 2014 and we started discussions with those homeowners in February 2014, give or take a month. He was part of the second round of well installation – about 2 years.

   US forest service would like to do a site visit. D. Henderson will coordinate the visit.

7. Schedule next meeting – May 26, 2016, 10:00 a.m.

   K. McDaniel sent out an invitation for the next meeting.