

**City of North Oaks  
Special Council Meeting  
Monday, February 26                      7:30 p.m**

**Notice:**

A Special Meeting of the North Oaks City Council has been announced for Monday, February 26 beginning at 7:30 p.m. This two-hour meeting will address the ground water contamination report prepared by Dr. John Erdmann of Wenck Associates, Inc. The purpose of the meeting will be [for the City of North Oaks] to formulate a plan for going forward on this issue [with the assistance of Dr. Erdmann and Wenck].

**Agenda - 2 hours**

**1. Review objectives for the meeting**

- a. Clarify questions raised during review of the Wenck Report
- b. Determine future course of action for City of North Oaks
- c. Determine specific actions and tasks to be completed

**2. Introductions**

**3. Review of Wenck & Associates Report – Major Findings and Recommendations [John Erdmann & Keith Benker – Wenck & Associates] (10 minutes)**

**4. Prepare future course of actions and details for those initiatives and plans, identify recommendations the City of North Oaks should make to MPCA and others, and formulate a multi-year course of action/schedule/tasks to be completed (75 minutes)**

- a. Quality of the Technical and Engineering Work
  - i. Contamination Plume – Width and Movement
  - ii. Extraction Wells
  - iii. Contamination of the Prairie du Chien aquifer
- b. Scope and Quantity of Future Monitoring and Testing
- c. Solutions for Private Home Drinking Water
  - i. Deeper Drinking Water Wells
  - ii. Granular Activated Carbon (GAC) Filtration Units
- d. Minnesota Decision Document
- e. St. Paul Regional Water Services Wells

**5. Determine the actions to be taken, discuss role for Wenck/Erdmann, and City actions and tasks including confirming present practices/actions. (30 minutes)**

**6. Other related items**

## Questions Submitted by Interested Residents.

The following questions and points have been raised by interested residents and have been organized by subject.

- **Quality of the Technical and Engineering Work**

1. **Contamination Plume – Width and Movement**

*Q. 1. What additional data and subsequent analysis would be needed to predict the timing and number of homes impacted by vinyl chloride and VOCs?*

For point 1 of Memorandum of “Recommendations”, you recommend “informing MPCA that vinyl chloride and other VOC occurrences should be anticipated in additional wells on the west side of Gilfillan Lake.”

*Q. 2. Estimating expected contamination on West Shore Rd.*

*(a) From the available data, what can we conclude on the contamination levels which we must expect in the years to come?*

*(b) What can we conclude on the contamination that existed in the 1980ies in the East Gilfillan area?*

*(c) Do you know of any contamination data taken in the East Gilfillan area, i.e. Gilfillan Rd. and Lily Pond Rd., before 1993? Would such data, if they existed, help in predicting the contamination on West Shore Rd.?*

*(d) Is there anyway to estimate the natural decay of the contamination?*

The contamination presently seen at West Shore Rd. is commonly associated with the contamination seen in 1993 in the East Gilfillan area. According to data and statements provided by the MPCA, the contamination seen now at West Shore Rd. must have passed the East Gilfillan area about 25 years ago, and the contamination detected in 1993 in the East Gilfillan area will arrive on West Shore Rd. in another 10 years.

*Q. 3. Present extent of plume. Do data exist showing the present contamination levels over the entire width of this plume on the east side of Lake Gilfillan, and would such data be valuable in estimating the extent of future contamination on West Shore Rd.?*

You state in your report that the contamination plume that was detected in 1993 measured about 2000 ft. in width.

*Q. 4. Item 9. It is noted that the VOC plume has been observed to be about 2000 feet wide on the east side of the lake -- roughly the length of West Shore Road. Based on what is known about the direction of flow, what is the potential range of wells that could be contaminated west of the lake? It is also noted that the VOC plume's center of mass probably remains beneath Lake Gilfillan. Is it possible that we will observe vinyl chloride levels west of the lake that are higher than those observed to date?*

*Q. 5. How does Dr. Erdmann interpret the successive increased levels of VOC detections noted in the well at 12 West Shore Road, a home that is located at the leading edge of the plume.*

**Q. 6. *At the last City Council meeting Dr. Erdmann attended, he publicly stated that the contamination detected in residential wells on the west side of the lake should be gone in five years. Please explain how you could arrive at this conclusion.***

Wenck memorandum dated December 29, 2006 clearly states:

- Groundwater in the Prairie du Chien aquifer is contaminated (4 wells detected VOC's)
- There has been a significant shortcoming in management of the groundwater contamination as there was a failure to anticipate transport of vinyl chloride to the west side of Gilfillan Lake
- The remnant plume on the east side of the lake is 2000 feet wide
- Occurrences of vinyl chloride in additional wells on the west side of Gilfillan Lake should be anticipated

**2. Extraction Wells**

**Q. 1. *Does the diminished capacity of this extraction well over an extended period, suggest that a substantial slug of contamination escaped capture and will eventually make its way to wells on the west side of Lake Gilfillan?***

In point #6 of “**Key Findings**”, you identify “another significant shortcoming,” which was the failure to remedy the decrease over time in the on-Site extraction well flow rates. You go on to say that “the well’s width of capture and downgradient limit of capture decreased by more than half of the initial period.

**Q. 2. *Extraction well operation. Have recent data shown the expected decline in contamination at this and the 6 Blue Goose Rd. well?***

The residential well on 11 Robb Farm should show no contamination at the present time if the extraction wells were operating as expected. The levels of contamination that you quote in your report are lumped over a longer time period.

**Q. 3. *Regarding Table 4: Extraction Well Flow History. What is known about the flow rates between 1995 and 2002?***

Flow rates are reported from 1989 to 1995, then 2002 to 2005.

**Q. 4. *In Item 6 it is explained that "the dimensions of the extraction well's capture zone are directly proportional to the well's flow rate. Thus, the well's width of capture and downgradient limit of capture decreased by more than half from the earlier to the later period." Did more vinyl chloride escape into the groundwater than would have if the extraction rate had been maintained?***

**Q. 5. *You note in item 10 that the operation of an extraction well in the Ski Hill ravine will probably move contamination into wells that are currently contaminant free. Is this an argument against extraction? Do you recommend extraction of the contamination? If extraction is not done, what happens to the contamination?***

**Q. 6. *There are limits for emissions. Has NOHOA, Connestoga-Rovers & Assoc. (CRA), and the city acquired the proper permits?***

I am deeply distressed we would even consider the activation of EW-3 well to be used as an extraction well, with the probability of “the unintended consequence of contaminating additional residential wells”. (Wenck 1806-1, Item 10). I understand the water would be pumped onto the ground to allow the PVC to flash into the atmosphere. I am concerned that we have a number of small children living in the homes around this well site. Simply dumping it on the ground is not acceptable and may be illegal. According to the EPA, "vinyl chloride emissions from polyvinyl chloride (PVC), [ethylene dichloride](#) (EDC), and vinyl chloride monomer (VCM) cause or contribute to air pollution that may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness. Vinyl chloride is a known human carcinogen which causes a rare cancer of the liver."{1}

***Q. 7. Why have we not tried to increase the flow rate of extraction well EW-1, EW-1A to replace the draw of the homes put on municipal water, and attempt to slow the movement of the pollution west?***

Items 7 & 8 (Wenck 1806-01) appear to be in conflict. Item 7 sentence 1 states “Increased pumping from EW-1/EW-1A would not have prevented the arrival of VC in residential ...”. I disagree with this opinion.

Item 8 starts “Ironically, provision of municipal water to the residences on the east side of Gilfillan lake undoubtedly hastened the arrival of vinyl chloride on the west side of the lake.... On a par with the on-Site extraction system.” We need to consider using extraction wells in areas already polluted to hold the plume, instead of using extraction wells to move it into new areas.

***Q. 8. An extraction well has been installed at Ski Lane, is it reasonable to assume this new well will increase the contamination levels in wells upgradient from the extraction well?***

### **3. Contamination of the Prairie du Chien aquifer**

***Q. Contamination of the Prairie du Chien aquifer. Your conclusions based on 1993 and recent contamination data are different. Would you care to elaborate how you arrived at your conclusions?***

At a City Council Meeting about a year ago, Mr. Frehner, CRA, stated emphatically in response to a question that it would not be possible that the Prairie du Chien aquifer would be contaminated through downwards movement of the contaminated water from the St. Peter aquifer, downstream of the contamination source, because the water flow rates in the Prairie du Chien are considerably higher. He further concluded from the 2005 data that the Prairie du Chien aquifer was not contaminated from the source, and hence never would see contamination originating from the dump site.

- **Scope and Quantity of Future Monitoring and Testing**

***Q. 1. Do you see any reason why in August of 2003 CRA would suggest that residential well sampling be stopped after extraction well shutdown?***

In point #5 “**Key Findings**”, you identify the “significant shortcoming” of a “failure to anticipate the transport of vinyl chloride to the west side of Gilfillan Lake.”

***Q. 2. In conjunction with greater frequency in monitoring of residential wells, wouldn't well-placed nests of monitoring wells provide more reliable data to construct a hydro-geological model capable of predicting the future pattern of movement and the concentrations of the vinyl chloride and other VOCs?***

In point 2 of **Memorandum of "Recommendations"**, you urge higher frequency in monitoring for wells along the west shore of Gilfillan Lake.

***Q. 3. Doesn't the width of this plume on the east side of Lake Gilfillan suggest the need for carefully positioned nests of monitoring wells on the west side of Lake Gilfillan in order to detect the full width of the contamination plume when it arrives?***

In point #9 of **"Key Findings"**, you note that the "plume's center of mass probably remains beneath Gilfillan Lake. You go on to say that "the remnant plume is roughly 2,000 feet wide on the east side of the lake and that "occurrences of vinyl chloride and other VOCs in additional wells on the west side of Gilfillan Lake should be anticipated."

***Q. 4. Residential wells west of Ski Lane have not been tested for VOC's. Is it reasonable to conclude the trailing edge of the plume has been adequately delineated?***

***Q. 5. Are additional data needed? For prediction of future contamination related to the Hwy 96 dump site, what additional data would be helpful?***

- **Solutions for Private Home Drinking Water**

1. **Deeper Drinking Water Wells**

***Q: From your other conclusions, do you expect that contamination has occurred in the Prairie du Chien aquifer as well?***

***Q: Assuming that more contamination of wells occurs as you anticipate in point #1, what is the efficacy in terms of percent removal of VOCs from groundwater such as that found in this area?***

***Q: What reasons do you see for offering deeper wells as a remedy to residents with contaminated wells?***

In Point #3 of **"Key Findings"**, you review 1993 data showing contamination in the Prairie du Chien aquifer. In the past the MPCA and the RP's have suggested that deeper wells could be a solution to homes with contaminated wells.

***Q. What is the long term plan to provide clean water to the area? This is what we need to concentrate on.***

The pollution is in the aquifer. It is unclear of the benefit of the extraction well (EW-1,EW-1A) in reducing or eliminating additional contamination. With the transport of contamination to both the Prairie du Chein and St. Peter aquifers (Wenck 1806-01, Item 11), there needs to be a long term supply solution developed.

## **2. Granular Activated Carbon (GAC) Filtration Units**

*Q: What are the capital costs, the life of the system, and the operating costs of GAC systems?*

In point #4 of **Memorandum of “Recommendations”**, you urge the MPCA to consider means for providing safe water other than deeper wells, such as GAC systems.

## **Minnesota Decision Document**

*Q. What is the Minnesota Decision Document (MDD)? What is the content? What is the process for approval?*

*Q. Should the City of North Oaks be concerned about the MPCA’s plan to prepare an amendment to the MDD?*

- a. What changes are likely for amendment?*
- b. Municipal water amendment?*
- c. Monitoring and testing changes?*

## **St. Paul Regional Water Services Wells**

*Q. Given the long period of pumping needed, is the installation of future extraction wells an exercise in futility in trying to capture contamination when the use of the St. Paul Regional Water Services wells can exert such power that they are likely to substantially draw down water levels of both the St. Peter and Prairie du Chien aquifers and move contamination from the St. Peter down to the Prairie du Chien aquifer?*

In point #11 of **“Key Findings”**, and in the Appendix 3 of your report you discuss the great potential impact of the existing and planned St. Paul Regional Water on existing wells in North Oaks and impacts on efforts to try to control the levels of vinyl chloride and other VOC contamination that are already beyond the range of capture of existing extraction wells.

*Q. Based on your statement that the St. Paul Regional Water Services well will draw contamination downward into the PdC aquifer, can it be presumed that the Jordan aquifer is and will be safe in the future?*

## **Other Comments**

*Q. Are the city, MPCA, CRA, and the home owners association considering the legal ramifications of the significant decrease in property values by knowingly facilitating the movement of contamination into an uncontaminated area???*

## **QUESTIONS AND ANSWERS**

### **Review of Highway 96 Site Groundwater Impacts for City of North Oaks**

City Council member Beth Cliffe provided the following questions in an e-mail dated September 29, 2006, to Jeff Roos, McCombs Frank Roos Associates, Inc. John B. Erdmann, Ph.D., P.E., Wenck Associates, Inc., prepared the answers below.

#### **1. What is your reaction to the research that has been done?**

My reaction to the investigations conducted at and in connection with the Highway 96 Site is overall positive. The investigations and remedial actions performed to date have met industry standards and, in general, have been a cut above average. Since the great majority of the investigative work has been performed by Conestoga-Rovers and Associates, Ltd., (CRA) on behalf of the responsible parties, this is primarily an affirmation of CRA's work. But I also commend the roles played by the Minnesota Pollution Control Agency and the Minnesota Department of Health.

That is not to say the work has been perfect in all regards. See points 5 and 6 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

#### **2. Has the perimeter of the plume(s) been conservatively identified and characterized?**

The extent of vinyl chloride contamination in the St. Peter Sandstone aquifer is adequately delimited. The finding of vinyl chloride and other volatile organic compounds (VOCs) in four residential wells in the vicinity that extend into the Prairie du Chien-Jordan aquifer indicate some degree of contamination in this aquifer directly underlying the St. Peter Sandstone and caution against the replacement of contaminated St. Peter wells with Prairie du Chien wells. See points 2 and 3 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

#### **3. Efficacy of research to date – Are there any “gaps” in the data collected to date? Is it comprehensive enough?**

The investigations performed to date been more than sufficiently comprehensive with respect to industry standards. Nevertheless, data gaps are sometimes inevitable simply because of the hydrogeologic setting or other factors. In the present case, the unavailability of VOC data for groundwater beneath Gilfillan Lake is a data gap of this kind. Gilfillan Lake is shallow (maximum depth < 10 feet) and does not materially influence groundwater flow in the St. Peter aquifer because glacial deposits that are approximately 50 to 100 feet thick separate the lake from the aquifer. But the lake represents a barrier to groundwater sampling.

#### **4. Should there be more vertical profiling to evaluate the plume?**

No. More vertical profiling would yield marginal benefit. There is a clear general pattern of plume deepening in the downgradient direction: VOCs occur in the glacial drift and upper St. Peter aquifer on and very close to the old dump property; VOCs occur throughout the thickness of the St. Peter in most of the area east of Gilfillan Lake that is now served with municipal water; and VOCs occur in the basal St. Peter in a handful of wells west of Gilfillan Lake. Apart from

this general pattern, the determinant of whether or not VOCs occur in a given well is the well's map-view location, not its depth.

**5. How would the MDH proposed reduction of the vinyl chloride health standard affect the situation?**

The practical effect of the proposed Health Risk Limit (HRL) reduction for vinyl chloride, from 0.20 to 0.08 micrograms per liter (ug/L), would be virtually nil for the near term. The change would not trigger action for additional wells beyond those three for which granular activated carbon filters are currently supplied (or offered) because vinyl chloride has not been detected in any additional wells. The HRL reduction would, however, cause the Minnesota Department of Health to issue drinking water advisories for all three residential wells with vinyl chloride detections, as all the vinyl chloride detections in these wells since 2004 have exceeded the proposed HRL of 0.08 ug/L.

Beyond the near term, the proposed HRL reduction would probably result in additional drinking water advisories. Because it is difficult to measure vinyl chloride at concentrations as low as 0.08 ug/L, virtually every future vinyl chloride detection can be expected to exceed the proposed HRL. At the same time, occurrences of vinyl chloride and other VOCs in additional wells on the west side of Gilfillan Lake should be anticipated (see point 9 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks). Thus, beyond the near term, additional drinking water advisories can also be expected.

**6. How would future plans of the St. Paul Regional Water Services Commissioners to install "super wells" with possible "dewaterization" of and well interference of private drinking wells affect the plume?**

The existing and planned St. Paul Regional Water Services' wells have the potential to induce significant contaminant transport downward from the St. Peter to the Prairie du Chien in the Gilfillan Lake-Site vicinity. See point 11 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

**7. How would the probability of an amendment to the Minnesota Decision Document impact residents?**

It appears that an amendment to the Minnesota Decision Document for the Highway 96 Site has been under discussion that would remove the specification of public water supply as the automatic remedy for newly impacted wells west of Gilfillan Lake. The Minnesota Pollution Control Agency is evidently reluctant to require the provision of public water supply based on impacts to a very small number of wells. This, I submit, is common sense. The drafters of the existing Minnesota Decision Document apparently did not foresee the present scenario. However, the current amendment drafters should not fall into similar shortsightedness by simply ruling out the public water supply alternative. Individual-well remedies make sense for the present, when only three wells are at issue. But as stated elsewhere, occurrences of vinyl chloride and other VOCs in additional wells on the west side of Gilfillan Lake should be anticipated. Therefore, the Decision Document amendments should retain a broad scope of alternatives with provision for re-evaluation in light of changing future conditions.



**8. What other recommendations do you have for residents to insure their well water is safe from VOCs?**

First, I recommend that residents in the Gilfillan Lake-Site vicinity avail themselves of every opportunity to have their well water sampled for VOCs by the Site's responsible parties and/or the state (Minnesota Pollution Control Agency or Minnesota Department of Health).

Second, I recommend the use of granular activated carbon (GAC) filtration units for drinking water from residential wells near Gilfillan Lake (in addition to those three residences where vinyl chloride has been detected) as follows:

- a) The five wells in Area 3 west in which VOCs other than vinyl chloride have been detected (see Figure 1 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks),
- b) The eight wells within Area 4, but outside the municipal water supply area, in which VOCs other than vinyl chloride have been detected (see again Figure 1 of Wenck's January 3, 2007 Key Findings memorandum), and
- c) Other wells in Area 3 west where residents desire an extra margin of safety.

Residents who use GAC filters should follow the manufacturer's recommendations regarding the frequency of filter replacement.

**9. What else should the City be doing? NOHOA?**

Wenck's January 3, 2007 Recommendations memorandum to the City of North Oaks presents the following four specific actions for the City:

- a) Communicate Wenck's finding to the Minnesota Pollution Control Agency (MPCA) that vinyl chloride and other VOC occurrences should be anticipated in additional wells on the west side of Gilfillan Lake.
- b) Urge the MPCA to continue residential well sampling in the western portion of Area 3 at frequencies appropriate to each well's location. Higher frequency monitoring is needed for wells along the west shore of Gilfillan Lake, and for wells near the vinyl chloride plume axis. A minimum frequency of annual sampling is recommended for the remaining portions of Area 3 west.
- c) Urge the MPCA to require groundwater extraction at EW-3 at a rate that will ensure capture of the full width of Area 3 west.
- d) Urge the MPCA to consider means other than deeper wells for providing safe water to residents with impacted St. Peter wells. Point-of-entry treatment with granular activated carbon may be a preferable alternative.

In addition to the above four points, and in light of the discussion under question 7 above, the City should urge the MPCA to retain for possible future consideration, all reasonable alternatives for providing safe water to residents with impacted St. Peter wells.

More generally, both the City of North Oaks and the North Oaks Home Owners' Association should maintain periodic communications with the MPCA, Minnesota

Department of Health, and Minnesota Department of Natural Resources' Division of Waters. It is especially important to stay in touch with the MPCA during the current drafting of changes to the Minnesota Decision Document for the Highway 96 Site.

The responsible parties' consultant, Conestoga-Rovers and Associates, Ltd., has produced a long stream of high-quality reports on the Highway 96 Site and the adjacent portion of North Oaks, continuing through the present. The City has wisely made the more recent reports available to all through the City's web site, and this practice should continue. Knowledgeable staff, officials, and community members associated with the City and the NOHOA should also continue to review these reports and communicate their questions appropriately.

#### **10. Response to the Ski Lane ravine experiment?**

Operating an extraction well in the Ski Lane ravine area is reasonable and necessary. Conestoga-Rovers installed and tested extraction well EW-3 in that location in late 2006. A report has not been available as yet for Wenck's review.

## **Additional Questions Submitted by Members of North Oaks City Council**

From: John Schaaf

The following are my thoughts, questions and general observation extracted from Dr. Erdmann's report dated 12/29/06.

### **A. Cover letter:**

1. Dr Erdmann's (JE) comments "concerning groundwater impacts" begs the question did he discover other "tangential impacts"? Examples might be, well abandonment, financial/economic impacts, secondary or tertiary source of contamination.
2. Item #1: Is it possible to calculate the likelihood of further occurrences and to what degree of accuracy?
3. Item # 3 What is the quantifiable definition of "higher frequency /minimum frequency?"
4. Item #4: What might examples be of "consider means other" be?

### **B. Key finding report:**

1. Item #2: is it possible that the tangential "flanking/ down gradient" well are in a unique geological formation that could/would make the direction and flow of the VOC's unpredictable? Is it possible to draw predictability tables off of the currently known concentration of VOC and location?
2. Item#3: is the density, specific weight, viscosity different in each of the five detected VOC's? If so would/could their respective contamination pattern and or speed of travel be different?
3. Item #4: "data have met industry standards", what are those standards, who created and endorses them and how often are they updated?
4. Item #6: What assurance can the RP and or consultant provide to the upkeep of the extraction system? Is there a set of written practices that govern such extraction wells over long periods of time?
5. Item #8: Statement that the lack of resident well water demand "hastened the arrival of VC on the west side of Gilfillan". This statement assumes; that there was/is only one source and one plume and that the "holding in place" dynamic is more powerful than hydrostatic pressures and Pascal's Law. I have not been able to find any data from (JE) to validate the plume "hold in place" theory.
6. Item# 9: "Center of mass probably"- Can this theory be modeled for probability, multiple source directions/paths, depth, concentration, specific weight, direction of travel, time to dissipation. If so what would it take to perform such a calculation and report? What geometric shape might the "plumes(s)" be in, conical, elliptical, convex, concave, stratified or? Can/does the shape of a "plume(s) affect the speed and direction of travel?
7. Item # 10: "will probably" means what % of movement over what period of time? His statement begs at least 8 "material" follow up questions those being potentially more significant than the issue(s) current at hand.
8. Item # 11: "induce significant contamination", what does the term "significant" mean? Can it be quantified and modeled? As with #7 above the follow up questions and answers to his statement maybe more problematic than the current issue(s) at hand.

### **C: Figure #1 (Map) and chronology table #2:**

1. After performing some very rudimentary vector analysis it appears to me that there maybe the potential of more than one plume and direction of travel. Please note there were several barrel findings (47 barrels of VOC-North side-1987/88) (305 barrels of VOC 5/95 South side) (111 barrels of VOC-8/94 North side). Theoretically both north dump and south dump sites could have provided multiple leakage sources, plumes and direction/depths of travel. Has competent analysis and or authority denied the potential of multiple plumes and travel speed directions? If so where might that information be found?
2. Using (JE) supplied data map plotting; it appears that the direction of travel is 300-340 degrees NNW. Once again if there were multiple plumes it would be most helpful to know that.