



# Sulfolane Investigation Update

A publication from the Alaska Department of Environmental Conservation  
to inform the North Pole community of developments related to  
sulfolane contamination from the North Pole refinery


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## Effort to aid construction projects in plume

Construction projects in the North Pole area often require removal of water from excavations because the groundwater table is fairly shallow and will fill excavations if not removed. In some areas of North Pole the groundwater is contaminated with sulfolane. Managing this contaminated groundwater presents an obstacle to construction projects, because no approved method currently exists to treat sulfolane in water removed from excavations.

DEC is currently conducting a three-part effort, through a contract with ERM Alaska, Inc., to respond to this need for summer construction. This effort includes:

- Developing an interim dewatering management plan that provides temporary solutions based on current knowledge of sulfolane. "Best management practices" (BMPs) will be included for managing contaminated water removed from excavations.
- Conducting tests this summer to confirm that the management and disposal methods do not cause contamination elsewhere; and
- Developing a final excavation dewatering management plan this fall. The final plan will expand on the BMPs in the interim plan, as appropriate, and incorporate results of the confirmation testing and any other new information available.

Excavation dewatering operations require a permit through DEC's Division of Water. The Contaminated Sites Program is coordinating with the Division of Water on the approval of permits for excavation dewatering in the sulfolane plume area. 

## Health recommendations: a review

By Ali Hamade

DHSS, Environmental Public Health Program Manager

### Sulfolane and Human Health

Currently, there is little information on the health effects of sulfolane on humans. What we do know about the toxicity of the solvent comes from laboratory studies where test animals were exposed to relatively high levels of sulfolane for short periods of time (up to six months). We hope to gain a better understanding of sulfolane's toxicity in the next 4-5 years, as the federal National Toxicology Program is currently conducting animal studies to evaluate the short- and longer-term health effects of sulfolane.

In January 2012 the Alaska Department of Health and Social Services (DHSS) published a health consultation report

evaluating community concerns about sulfolane in private water wells (view it on the Documents page, "site characterization" section, at [dec.alaska.gov/spar/csp/sites/north-pole-refinery](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery)). The agency concluded that "North Pole residents who consumed water with detectable levels of sulfolane from their private wells are not likely to experience negative health effects. The levels of sulfolane in North Pole wells are low, and below those that caused subtle health effects in test animals. However, we cannot say with absolute certainty that there would not be any health effects from long-term exposure to low levels of sulfolane in drinking water, because no studies have looked at this in animals or humans."

*(Continued, see **Health**, back page)*

## Soil does not retain sulfolane


Is soil contaminated with sulfolane from using well water to water the lawn or flower gardens? In search of an answer, last summer DEC sampled soil at six homes in the North Pole area where lawns and flower gardens had been watered with sulfolane-laden water. The results showed no detections of sulfolane, indicating that using sulfolane-contaminated water on gardens did not leave residual sulfolane in the soil.

Prior research on the chemical indicates that sulfolane shouldn't cling to soil particles, but DEC wanted to confirm that by testing North Pole lawns and flower gardens.

DEC looked for residences within the sulfolane plume where untreated water containing sulfolane (indicated by recent sampling) had been used to water flower gardens or lawns. DEC identified several

possible homes by reviewing responses to a survey sent to North Pole residents in June 2013. Flint Hills representatives recommended additional locations based on their information.

With the permission and cooperation of the landowners, DEC's contractor sampled garden soil at six properties with a range of untreated groundwater sulfolane concentrations from approximately 32 to 288 parts per billion (or micrograms per liter). The samples were analyzed for sulfolane, total organic carbon, and grain size to evaluate the potential for sulfolane accumulation in soil.

The report on the 2013 soil sampling study is available at [dec.alaska.gov/spar/csp/sites/north-pole-refinery](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery), on the Documents page, "site characterization" section. 

## From the Project Manager

Dear North Pole Community, In the more than four years since the sulfolane investigation began, progress may at times have seemed slow, but we continue to learn much. For example, we now know that certain microbes can degrade sulfolane in the presence of oxygen. We've learned that the discontinuities in the permafrost allow the transport of sulfolane between the groundwater above and below the permafrost, and that the gravel pits in the North Pole area are sulfolane-free and it is safe to use the gravel.

The sulfolane contamination and the chemical itself have raised many technical and health-related questions, and the unprecedented nature of the situation has often left immediate answers unavailable to scientists and the general public alike. DEC continues working on many aspects of the investigation, including conducting local sampling to understand certain aspects of sulfolane's behavior and distribution. The articles in this newsletter summarize some of those activities.

As you may know, on April 4, 2014, DEC's Commissioner asked the Spill Prevention and Response Division to reevaluate the cleanup level previously established for sulfolane. While we diligently address this task, other activities proceed. For example, Flint Hills plans to expand the groundwater extraction system at the refinery this summer. Quarterly groundwater monitoring continues, and Flint Hills still operates and maintains all the alternate drinking water systems. Here at DEC, work proceeds to address discharges from dewatering operations.

Please don't hesitate to call or email with questions or concerns – your question is as important to me as it is to you. Thank you for your continued support and patience.

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## Health, *Continued from Page 1*

DHSS continues to recommend using an alternative water supply, other than water wells with sulfolane detections, for potable uses.

DHSS also reviewed the rates of cancer and birth defects in the North Pole area and did not find any unusually high rates of either. This information is based on statistical analysis of reported cases of cancer and birth defects from the State of Alaska Cancer Registry and Birth Defects Registry.

## Gardening Recommendations

DHSS recommends that residents affected by sulfolane use an alternative water source, other than private wells, for growing fruits and vegetables until more information is available.

Very little research has been done on how much sulfolane can be taken up by plants. A study conducted by the Technical Project Team in 2010 tested sulfolane content in a variety of edible plants from seven local gardens. The study gave preliminary evidence that edible plants can take up sulfolane with water. Of the few samples with sulfolane detections, the results suggested that sulfolane tends to concentrate in the leafy parts of these plants. Sulfolane levels found in the plants were low and not likely to cause adverse health effects. The project was very limited in scope, however, so these results should not be used to draw general conclusions for all North Pole gardens or future growing seasons (see the report on the Documents page, "site characterization" section, at [dec.alaska.gov/spar/csp/sites/north-pole-refinery](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery)).

## Summary of health recommendations

- Residents who have wells with sulfolane detections should continue using an alternative water supply for drinking and for growing edible plants. Edible garden plants can take up sulfolane from water, therefore people can be exposed to sulfolane by consuming produce that has been watered with sulfolane-contaminated water.
- Given the concentrations of sulfolane reported to date, residents can still use wells with positive sulfolane detections for most household activities such as bathing, washing clothes and dishes, rinsing foods, and making foods where the water is discarded, such as boiling eggs. Based on currently available information, using well water to shower does not pose a health risk for North Pole residents, although inhaling sulfolane in water droplets during showering needs further evaluation.
- Other exposure routes such as breathing vapors or direct skin contact are unlikely to pose a risk because the chemical has low volatility and is not absorbed through the skin.
- Residents on the city's public water system are encouraged to use city water for gardening.
- Residents who raise chickens or other animals do not have to worry about sulfolane in their meat or other products (milk, cheese, eggs, etc.) as long as the animals are not drinking water that contains sulfolane. ☺

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[dec.alaska.gov/spar/csp/sites/north-pole-refinery](http://dec.alaska.gov/spar/csp/sites/north-pole-refinery)