



Sulfolane Investigation Update

January
2012

This update is provided by the Technical Project Team to inform the North Pole community of recent developments in the investigation and remediation of soil and groundwater contamination related to the North Pole refinery.

Sulfolane Nomination ‘Strongly Supported’ to the National Toxicology Program

The National Toxicology Program’s Board of Scientific Counselors announced in December it strongly supports accepting sulfolane into its program in order to conduct additional research on the chemical’s health effects.

Dr. Melissa McDiarmid, a board member and director of the Occupational Health Program at the University of Maryland’s School of Medicine, said that sulfolane and the exposure to residents in the North Pole area “is precisely the situation that the NTP is supposed to serve.”

The National Toxicology Program (NTP) is a federal interagency effort of the National Institutes of Health, Centers for Disease Control and Prevention, and Food and Drug Administration to safeguard public health by conducting cutting-edge toxicity research on new chemicals. The NTP’s Board of Scientific Counselors is a federally chartered advisory committee whose members are university and industry experts appointed by the Secretary of the U.S. Department of Health and Human Services.

Now that the board has announced its endorsement, the sulfolane nomination must go to the NTP Executive Com-

mittee to be presented to the director for final approval. That will mark final acceptance into the program, opening the door for funding of the studies.

Dr. Scott Masten, director of the NTP’s Office of Nomination and Selection,

“The board’s conclusion confirms the community and the state’s position that understanding the potential risk to public health from sulfolane is a priority on a national level, warranting additional high-quality toxicity research by the NTP.”



Ann Farris, DEC’s project manager, is shown inspecting pumping operations. (DEC photo)

said his office will move forward with designing specific studies.

“There are still a number of internal steps we go through before the project is formally approved. Over the next few months we will get a better handle on a timeline for beginning the studies and when we might be able to communicate results,” Masten said.

Ann Farris, an environmental engineer with DEC’s Contaminated Sites Program and coordinator of the project’s Technical Project Team, said,

The sulfolane nomination has been successfully advanced to the federal funding process in part due to letters of support from Fairbanks North Star Borough Mayor Luke Hopkins, Alaska District F Sen. John Coghill, the Alaska Department of Health and Social Services, and others.

The Technical Project Team and its Toxicology Subgroup will continue to follow the nomination closely, interact with NTP scientists to provide information and accelerate the process whenever possible, and to communicate the status to the community.

“I’m glad it looks optimistic that there will be more emphasis placed on the importance of identifying the unknowns, so people faced with this contamination will better understand what it means to them and their families.”

– Rynniva Moss, chief-of-staff for Sen. John Coghill

UAF Groundwater Study

The University of Alaska Fairbanks (UAF) Institute of Northern Engineering and Institute of Arctic Biology have been selected by the Alaska Department of Environmental Conservation to conduct research on some of the factors that control the fate and transport of sulfolane in the groundwater underlying the Flint Hills Refinery and the adjacent North Pole area.

Internationally recognized experts in technical fields related to permafrost, cold regions contaminant hydrogeology, and cold regions microbiology are now involved in the project. These experts will help to develop a better understanding of the interaction of sulfolane with the subsurface conditions that are unique to the North Pole groundwater contamination.

One of the factors that will be investigated thoroughly is the biodegradation of sulfolane. Worldwide, only two similar studies have focused on the degradation of sulfolane in groundwater.

Specific topics the UAF researchers will work on:

- Characterization of the local lithology, hydrology and permafrost and how

these site-specific conditions influence plume migration.

- Interactions between groundwater and surface water and the resulting impact on plume migration.
- Biogeochemistry associated with the plume.
- Roles of sorption and biodegradation in plume development.
- Projection of plume movement.
- Chemical and microbial evidence of biodegradation in the plume.
- Identity of microbes from a plume active in sulfolane biodegradation.
- Effects of temperature and nutrient amendments on biodegradation.
- Potential for aerobic and anaerobic biodegradation in the plume.

“Understanding these complex soil and groundwater mechanisms will enable the DEC to implement the most effective plan for reducing the size of the sulfolane plume,” said Steve Bainbridge, manager of DEC’s Contaminated Sites Program.

DEC will continue to collaborate with Flint Hills through the Technical Project Team to develop site characterization and remediation plans for maximum protection of the health and welfare of North Pole residents.

Update: Water Alternatives and Residential Sampling

Flint Hills Resources (FHR) and its contractors in 2011 continued to work toward providing an alternate water supply to those homes outside the City of North Pole limits with wells impacted by sulfolane.

To date, 230 solutions – a choice between a water treatment system, a bulk water tank or long-term bottled water delivery services – have been installed at residential and commercial locations in the area.

Outdoor work came to a close in October once temperatures started to prohibit the work flow, however, indoor work continues for those residents choosing the indoor treatment system.

Roughly 54 residents are still in the process of making a decision on which long-term solution they would like for their home, making a total of 284 affect-

ed homes. Those residents have been provided bottled water delivery service until their long-term solution is installed.

About 250 additional residences located in or near the plume area with non-detection results have also been provided bottled water delivery service.

Residential well testing efforts have continued by Shannon & Wilson, a geotechnical and environmental consultant contracted by FHR. Shannon & Wilson is currently in the seventh phase* of residential testing and has completed roughly 85 tests in that area. One residential well had a positive detection for sulfolane, while the other 84 had non-detect results.

Monitoring wells have been established throughout the area over the course of this project. In 2011, FHR added 55 monitoring wells to the project. Monitor-

Schedule Update

The Alaska Department of Environmental Conservation is maintaining an accelerated schedule for cleanup activities at the Flint Hills refinery site in North Pole. The aggressive schedule reflects the DEC’s view that understanding and cleaning up the contamination as quickly as possible is one of its highest priorities.

Recent activities:

- The Alaska Department of Health and Social Services’ Health Consultation has been completed.
- DEC continues to oversee Flint Hills Resources’ installation of alternative-water options in homes.
- DEC is reviewing the site characterization report that Flint Hills Resources submitted in December.

Upcoming project milestones:

- Sulfolane nomination awaits final clearance.
- Risk assessment will be finalized.
- Bench and pilot-scale tests of treatment alternatives will continue.
- A feasibility study will be prepared.
- Remedial alternatives will be selected.
- DEC will issue its final approval to operate the new city drinking water wells.

ing wells get sampled on a quarterly basis and the results from these tests will help determine the future of this project and answer questions about how the sulfolane plume is behaving.

FHR’s Groundwater Office, which is in North Pole’s Polar Plaza, just right of the post office, has been open for a little over a year now and will remain open as a source of information to the community and residents who have been impacted. Normal office hours are Monday through Friday, 8 a.m. to 5 p.m. People may also make an appointment by calling (907) 488-0723.

**In a given phase, Flint Hills samples drinking water wells downgradient from the presumed leading edge of the plume. If sulfolane is detected, drinking water wells farther downgradient are sampled in a subsequent phase.*

DHSS Health Consultation

The Alaska Department of Health and Social Services (DHSS) has completed a “health consultation” reviewing potential ways North Pole residents may come in contact with sulfolane from private well water and the potential impacts from those exposures.

DHSS is tasked with evaluating the possible hazards to human health associated with toxic substances in the environment. The department responded to a request from the Alaska Department of Environmental Conservation to evaluate the public health risks of consuming and using private well water contaminated with sulfolane for household purposes.

DHSS reached six important conclusions in its health consultation:

1. North Pole residents who consumed water with detectable levels of sulfolane from their private wells are not likely to experience negative health effects.
2. Using water containing sulfolane from North Pole private wells for most household activities will not harm people's health. 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.

3. Eating sampled parts of edible plants (fruits and vegetables) that were tested for sulfolane uptake from seven North Pole gardens is not expected to harm people's health.
4. Sulfolane exposure from incidental ingestion of soil (such as accidentally eating small amounts of soil) or pica behavior (intentionally eating soil) is not expected to harm people's health.
5. There is no increase in cancer rates for North Pole residences compared to the entire state from 1996 to 2007 (when records were available).
6. There is no association between living in North Pole and an increased prevalence of birth defects from 1996 to 2009 (when records were available).

DHSS also made the following recommendations in its health consultation:

- North Pole residents with detectable levels of sulfolane in their well water should continue to use an alternative source of water for drinking and eating. This also applies to pets and other household animals.
- Flint Hills should continue to ensure that North Pole residents with detectable levels of sulfolane in their well water have a long-term

“Although levels of sulfolane in people’s wells are substantially lower than those that caused subtle health effects in test animals, we cannot say with absolute certainty that there will 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 people.”

– *Nim Ha, acting program manager of DHSS’ Environmental Public Health Program*

alternative water source for drinking and cooking purposes.

- North Pole gardeners should use a water source that has no detectable level of sulfolane for growing edible plants, until more is known on the uptake of sulfolane into fruits and vegetables.

DHSS's top priority is to ensure that North Pole residents have sufficient information to safeguard their health. The department continues to be an active member of DEC's Technical Project Team and is committed to evaluate any new data that emerges on sulfolane that could impact public health.

DHSS will also continue to assist with ongoing health education needs for the North Pole community pertaining to sulfolane exposure, as resources allow.

Development of Sulfolane Toxicity Values Advanced

Following extensive scientific peer review, draft toxicity values for sulfolane were advanced in November 2011 to the U.S. Environmental Protection Agency (EPA) in Washington, D.C., for final clearance.

Chemical toxicity values are instrumental to both the EPA Superfund Program and the Alaska Department of Environmental Conservation's Contaminated Sites Program. The values are necessary in conducting regulatory activities such as risk assessment and cleanup decisions.

Regulators first look to the EPA's Integrated Risk Information System (IRIS)

Program for scientifically established human health toxicity values. The program doesn't yet have a value for sulfolane.

In April 2011, the EPA developed a draft Provisional Peer-Reviewed Toxicity Value (PPRTV) for sulfolane. PPRTVs are developed after an evaluation of scientific information about the human health effects that may result from exposure to environmental contaminants.

The values are derived using the same rigorous methods, sources of data and agency guidance for values generally used by the EPA's IRIS Program. All provisional toxicity values receive

internal review by a panel of six EPA scientists and external peer review by three independently selected scientific experts.

The DEC Technical Project Team's Toxicology Subgroup will continue to work proactively with the EPA during its rigorous scientific evaluation of the potential human health effects from exposure to sulfolane.

The EPA's review of the PPRTV value for sulfolane is expected to be complete the end of January 2012. When it is, the value will be released to the public and the DEC will use it in its risk assessment and cleanup decisions.

TPT Subgroups' Status Report

Chemistry - Recent activities:

- Completed development of methods to accurately detect sulfolane in water, soil and produce. DEC approved commercial laboratory standard operating procedures for those methods.
- Worked with private and state laboratories to develop a method to analyze sulfolane in petroleum-contaminated soil. That method was used in characterizing sulfolane levels on the refinery.
- Instigated a third-party evaluation of all sulfolane data to ensure the highest quality data is submitted to the state.

Toxicology - Recent activities:

- DEC approved the risk assessment work plan, approving the methods to evaluate potential risks from exposure to chemicals on and off the refinery. The risk assessment report will be used to help guide cleanup levels at the site.
- Released results of the Alaska Department of Health and Social Services' health consultation, which reviewed potential ways North Pole may come in contact with sulfolane from private well water and the potential impacts from those exposures.
- Sulfolane received "strong support" from the National Toxicology Program's Board of Scientific Counselors. A detailed study plan will be developed for funding approval and implementation.

Site Characterization and

Remediation - Recent activities:

- The subgroup met four times in the last quarter of 2011 and conducted additional meetings with select members to discuss specific issues.
- Significant recent discussion items:
 - The evaluation of the impact of petroleum interference in sulfolane in soil analysis.

- Details of the current work plan.
- The proposal of additional pump, tracer and injection tests.
- Potential data gaps related to the evaluation of remedial alternatives.
- Detailed expectations for data presentation.
- Feedback on changes to the garden study.

Site Remediation - Recent activities:

(Note: The Remediation Subgroup has met in conjunction with the Site Characterization Subgroup. The Remediation Subgroup's activity will increase as the project transitions from site characterization to site remediation.)

- Conducted two meetings focusing on technologies to be evaluated in the feasibility study and on the use of the Interstate Technology and Regulatory Council protocol to evaluate the practicability of product recovery.

Drinking Water - Recent activities:

- The new public drinking water wells began operating in January 2011. The City of North Pole has requested that DEC issues its final operational approval. DEC's Drinking Water Program engineers are continuing their review of the engineering plans for the wells. DEC's final operational approval for the project is expected in the near future.
- The new drinking water wells have been sampled each month and no sulfolane has been detected in any sample. The sampling frequency for the new wells will be reduced to quarterly for 2012.
- The Church at North Pole, a federally regulated public water system in the plume area, elected to install the point-of-entry water treatment system being offered by Flint Hills. DEC's Drinking Water Program engineers have issued an approval to construct the treatment system; the program issued an interim approval to operate in November 2011.

Sulfolane Survey Results

The risk communication subgroup of the Alaska Department of Environmental Conservation's Technical Project Team (TPT) conducted a community survey last quarter asking which areas of the project are of the most concern to stakeholders affected by the sulfolane release.

SURVEY RESULTS

Topics of the most concern

- Information on what is known about the toxicity of sulfolane.
- How action levels are determined for sulfolane in drinking water to protect public health.
- How DEC determines cleanup levels for sulfolane.

Topics requested for future updates

- Long-term toxicity and health effects of sulfolane.
- Size of the sulfolane plume and remediation efforts.
- Schedule for cleanup.

The risk communication subgroup will continue to address the issues identified from the public survey and will convey project information to the community using multiple avenues of communication. Those include:

- Newsletters such as this one.
- Fact sheets on topics of concern.
- Community open houses and workshops.
- DEC's interactive sulfolane website with current plume maps and updates on recent progress on the project.
- TPT meeting summaries posted on the website.
- Radio interviews discussing key milestone events on the project.

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