



What are the Health Effects of Pipelines and Oil Spills?

Research and Resources Compiled by [NS NOPE](#)

NS NOPE is a North and West Vancouver residents' group opposing the proposed new Kinder Morgan Trans Mountain Pipeline.

Created May 19 2015, Last update May 19 2015

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What are the Health Effects of Pipelines and Oil Spills?

Summary

Exposure to an oil spill can cause both short and long term effects on human health. The oil contains chemicals such as volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) as well as heavy metals which have a broad range of potential effects on human health. Exposure pathways can be from inhalation of toxic fumes, direct contact with skin or by ingestion.

Acute toxic symptoms immediately following an oil spill can include:

- Respiratory symptoms such as cough, throat irritation, shortness of breath
- Ocular (eye) symptoms such as redness, watering, itching and soreness
- Dermal (skin) and mucous membrane symptoms such as redness, irritation, rash or blisters
- Gastrointestinal symptoms such as nausea, vomiting and diarrhea
- Neurological symptoms such as headache, dizziness, irritability, confusion, and weakness.

Long Term effects from an oil spill have had fewer studies completed, but the research is focused on:

- Immunological and endocrine effects such as changes in hormones and immune system markers
- Genotoxic effects such as changes in DNA, and effects on children of exposed parents
- Carcinogenic effects such as leukemia other cancers
- Hematologic effects such as changes in blood profiles and liver enzymes
- Respiratory effects such as COPD (chronic obstructive lung disease)
- Mental health effects such as anxiety, depression and post traumatic stress disorder.

The health effects from pipelines and oil spills in other jurisdictions have been significant, and we know that no matter how well prepared we are for a spill,

they have happened and will continue to happen. The proposed Kinder Morgan/Trans-Mountain (KM/TM) pipeline expansion from Alberta to the Westridge Terminal in Burnaby, BC will triple the amount of diluted bitumen being transported in the pipeline and increase the number of tankers transporting it to Asia from about 60 per year to 1-2 per day. The chance of a serious spill will increase significantly. Are we willing to take that risk in such a densely populated area with limited evacuation routes?

What is known: The KM/TM pipeline transports Dilbit which is a mixture of bitumen (tar) with condensate or diluents (solvents), mixed together so that it will flow through the pipeline. When dispersants are used to clean up an oil spill, there is an even greater mixture of chemicals. The main constituents of crude oil, bitumen, diluents, and dispersants are toxic and have had significant human health effects. Some people are more vulnerable to toxic exposures, and first responder emergency personnel will also experience greater risks. It's important to consider our mental health as well physical health, and studies show that the mental health effects can be severe.

What is not yet known: Since there are still relatively few studies on human health effects, we can't say with certainty what the long-term effects will be. Air quality monitoring at the time of the spill is often lacking, screening of local people is not centrally coordinated, baseline evaluations are not done and the follow up health assessments are often absent. Many of the oil spills worldwide have not been studied for the impact on human health so the data is limited. There is a need for long term studies to monitor exposed individuals. Unfortunately, research carried out after oil spill disasters have happened concern people who have already undergone a burden of disease and suffering. The people of Vancouver should not have to take that risk.

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Why Did North Shore NOPE Create This Resource List?

In 2012, we started to gather research, reports, news reports, personal accounts, and other information about the health effects of oil spills. We used Google Scholar and Google, checked reference lists, and visited academic libraries. There is a surprisingly large amount of information, with a consistent message that not enough research has been carried out about and we don't really know what the long-term effects of oil spills will be on our health. This document reflects the

resources NSNOPE has identified and read; **it is by no means comprehensive** but can guide you to many sources of information to help inform you.

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Resource List – How To Use This Document

Organized alphabetically by topic, you will find both “Research and Reports” and “News, Personal Accounts and Other Resources.” While evidence-based research is critical, news reports and personal accounts tell the first-hand story of people’s experience living and working in an oil spill area. We suggest starting by reading the overviews to gain a broad understanding of the issues.

Note:

1. Some links will download a pdf file instead of opening a web page; check for downloaded files.
2. Links go to external web sites which may change or be removed.
3. To comply with copyright law, we link to the abstract of journal articles that are not available for free.
4. North Shore NOPE retains a single, printed copy of each document in its library for research, review and study.

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1. Overviews – Start Here . * *Recommended Resources* *

These reports summarize the research on the physical and mental health effects of oil pipelines and spills. Start here for an overview of the issues.

1. The 2014 Vancouver Coastal Health report, [Short- and long-term health impacts of marine and terrestrial oil spills](#) (Eykelbosh) reviews the literature assessing physical health impacts, mental health and related community health impacts, and impacts on community health and resilience, research gaps in the health impacts literature, and public health considerations for oil spill response planning. Of note, on page 6 (Table 2) you will find 16 significant oil spills from the past 25 years and whether there were health studies. Table 5

on page 53 shows the results of health effect studies along with the strengths and weaknesses of the research methods. Pdf:

<https://www.vch.ca/media/VCH-health-impacts-oil-spill.pdf>

For a summary of the report, see [Health effects of oil spills and implications for public health planning and research](#).

2. North Shore NOPE's expert witness, Dr Tim Takaro, physician-scientist and professor at Simon Fraser University, provides a 2015 review of **Major human health impacts of the Kinder Morgan Trans Mountain Pipeline**. It covers activity at the Westridge terminal, studies of emissions that are carried out, Burnaby and North Shore populations, detailed information about the health impacts of benzene and 1,3 butadiene (the two chemical toxicants in the pipeline), and other health impacts.
3. [Consequences of oil spills: a review and framework for informing planning](#). Chang et al. Ecology and Society 19(2):26, 2014.
This paper reviews the consequences of oil spills on health, along with other areas of impact, and discusses it in relation to Vancouver, considering the densely populated area, the local conditions, the risks of dilbit, the economy of Vancouver, etc. Gaps in knowledge are identified.
4. [Crude oil spill exposure and human health risks](#). J Occup Environ Med. 2014 Oct;56(10):1029-41. (Abstract available online. This paper is not freely available online.)
This review article summarizes the human health literature about 10 oil spills. It says that to fully understand these effects, there is a need for longitudinal (long-term) studies, of which there are few, and that close follow-up studies are needed to determine the long-term health effects. It also suggests the establishment of a registry to assess the adverse health outcomes in exposed cleanup workers over time.
5. [Adverse health effects of oil spills: a review of the literature and a framework for medically evaluating exposed individuals](#). Levy. International Journal of Occupational and Environmental Health, Volume 17, Issue 2

(01 April 2011), pp. 161-168. (Abstract available online. This paper is not freely available online)

This paper also reviews the literature on acute and chronic health effects from oil spills. It suggests how medical evaluations should be undertaken after exposure, preferably by physicians trained in occupational health and safety, with a medical history, medical exam, and lab tests.

6. [How public health impact is addressed: A retrospective view on three different spills](#). Toxicological & Environmental Chemistry Vol. 94, No. 3, March 2012, 442–467. (Abstract available online. This study is not available for free online.)

This literature review focuses on how communities have responded to the health effects of oil spills over time, e.g., medical surveillance programs and government plans. It highlights the need for surveillance and research methods to be determined in advance of a spill. Three spills are considered: Exxon Valdez, Prestige, and Deepwater Horizon.

First-hand personal accounts can paint a different picture, one of how oil spills affect individuals living and working in a community after a spill. These articles illustrate what could happen in our community.

1. [Impact of Exxon Valdez oil spill, 26 years later](#) [10 min video]. Global News BC, April 30 2015.
After the April 2015 Vancouver oil spill, Dr Riki Ott and Anita Burke discuss the impact of oil spills from their personal experience. Burke describes the health effects she suffered from the Exxon Valdez spill and notes that the average life expectancy of a cleanup worker is age 51 [minute 8]. Ott notes that if we pushed the costs of health monitoring onto the oil industry, it may cause the industry to take more precautions or cease development [minute 10].
2. [Investigation: Two years after the BP spill, a hidden health crisis festers](#). Antonia Juhasz, The Nation, May 7 2012.
This powerful news report details the experience of a family who were sick as a result of the spill, and outlines the research that confirms these health effects.

3. [What sickens people in oil spills, and how badly, is anyone's guess.](#) Lisa Song, InsideClimate News, Jun 18, 2013.
This news article describes the inconsistent guidelines for various spills, and the difficulties in determining appropriate guidelines given the limitations of science, lack of long-term research, and the different combination of chemicals in spills.
4. [The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 1.](#) Elizabeth McGowan and Lisa Song, InsideClimate News, June 26 2012.
A fascinating account of the events during the spill, including health effects experienced, and the fact that understanding and quantifying these effects requires further study because there has been relatively little long-term research. It is of particular interest because it is the only Dilbit spill on record and Dilbit is carried in the Trans Mountain Kinder Morgan pipeline.
[The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 2.](#) Elizabeth McGowan and Lisa Song, InsideClimate News, June 27 2012.
[The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 3.](#) Elizabeth McGowan and Lisa Song, InsideClimate News, June 28 2012.

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2. Air Pollution from Tanker Emissions

As the number of oil tanker ships carrying bitumen from the Westridge terminal in Burnaby, BC to Asia increases, there are potential health impacts from the increase in tanker emissions.

2.1. Research and Reports

[The environmental effects of freight.](#) Organisation for Economic Co-operation and Development, Paris, 1997.

- An overview of the impact of transportation of goods, including shipping.

2.2. News Reports, Personal Reports and Other Resources

[Health risks of shipping pollution have been underestimated.](#) John Vidal. Thursday 9 April 2009. The Guardian (UK)

- Reports on pollution from shipping. Pollution from the world's 90,000 cargo ships leads to 60,000 deaths in the United States. Shipping is responsible for 18-30% of all the world's nitrogen oxide pollution and 9% of the global sulphur oxide pollution.

[How 16 ships create as much pollution as all the cars in the world.](#) Fred Pearce. 21 November 2009. Daily Mail (UK)

- Reports on ship pollution due to burning marine heavy fuel, or bunker fuel, which leaves behind a trail of potentially lethal chemicals: sulphur and smoke that have been linked to breathing problems, inflammation, cancer and heart disease.

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3. Alberta Health Impacts Related to the Tar Sands

Reports from the Alberta tar sands help to inform the pipeline story, offering information about the health effects of the chemicals found in the oil and gas industry.

3.1. Research and Reports:

[Air quality in the Industrial Heartland of Alberta, Canada and potential impacts on human health](#), Simpson IJ et al. *Atmos. Environ.*, 81,702-709, 2013. [Abstract](#) (Abstract available online. This paper is not freely available online.)

- Measured the levels of air pollutants near major chemical, petrochemical, and oil and gas facilities and found high levels of volatile organic compounds (VOCs), plus higher rates of leukemia and non-Hodgkin lymphoma (blood cancers) in the communities closest to the facilities compared with neighbouring counties.

[Cancer incidence in Fort Chipewyan, Alberta, 1995-2006.](#) Alberta Cancer Board, 2009.

- Found higher-than-expected numbers of cancers of the blood and lymphatic system, biliary tract and soft tissue as well as all cancers combined.

[Characterization of trace gases measured over Alberta oil sands mining operations: 76 speciated C2-C10 volatile organic compounds \(VOCs\), CO₂, CH₄, CO, NO, NO₂, NO_y, O₃ and SO₂.](#) Simpson IJ et al. *Atmos. Chem. Phys.*, 10 (9), 11931-11954, doi:10:5194/acp-10-11931-2010, 2010.

- This is the first peer-reviewed study to characterize volatile organic compounds emitted from Alberta's oil sands mining sites.

[Environmental and health impacts of Canada's oil sands industry.](#) Royal Society of Canada, 2010.

- This is a major review of Canada's oil sands.

[Environmental and health impacts of Canada's bitumen industry: In search of answers](#). Timoney, K. Environ. Sci. Technol. 2012, 46(5):2496-2497.

- The critical review and response to the Royal Society of Canada's 2010 report (above) point to the difficulties in research and interpretation of research to real-life situations; future studies are needed. [Full critical review](#) by Kevin Timoney and [Royal Society response to the criticism](#)

[Environmental and human health implications of Athabasca oil sands \(Health Study in Fort Chipewyan\)](#). Athabasca Chipewyan First Nation, Mikisew Cree First Nation, University of Manitoba, 2014.

- This report is the first report of its kind to draw an association between oil sands produced environmental contaminants and declines in community health and well-being in Fort Chipewyan, Alberta. This report has been peer reviewed by Health Canada and other health and environmental agencies. Videos included.

[Oil sands development: a health risk worth taking?](#) Environ Health Perspect. 2009 Apr; 117(4): A150–A156.

- This is a report on tailings ponds and from oils sands and the relation to cancer.

3.2. News Reports, Personal Accounts and Other Resources

[Air pollution and cancer spikes linked in Alberta](#). Environmental News Network. October 23 2013.

- Reports on Isobel Simpson's paper showing high levels of the carcinogens 1,3-butadiene and benzene and other airborne pollutants in Alberta oil and gas industry areas. The researchers also obtained health records spanning more than a decade that showed the number of men with leukemia and non-Hodgkin's lymphoma was greater in communities closest to the pollution plumes than in neighboring counties.

[Alarming new study finds contaminants in animals downstream of oil sands](#). Carol Linnett, Desmog Canada, July 7, 2014.

- Findings include generally high concentrations of carcinogenic PAHs (polycyclic aromatic hydrocarbons), and heavy metals arsenic, mercury, cadmium and selenium in kidney and liver samples from animals harvested by community members. Bitumen extraction and upgrading is a major emitter of all of these contaminants.

[Alberta's oil legacy: bad air and rare cancers](#). Andrea Nikiforuk, The Tyee, 24 October 2013.

- Reports on elevated levels of cancers in the oil industry areas of Alberta.

[Bitumen facility blamed for Peace County health woes](#). Kim Trynacity. CBC News, May 28, 2013.

- Reports of families leaving Peach County after experiencing health problems when a new emission-producing process, Cold Heavy Oil Production with Sand or CHOPS, began.

[Carcinogens emitted from Canada's main fossil fuel hub](#). Neela Banerjee. LA Times, Oct 25 2013.

- Reports on the air quality study by Dr Isobel Simpson.

[Edmonton air carcinogens: study find alarming levels of chemicals](#). Bob Weber, Canadian Press, Oct 23 2013.

- Reports on the air quality study by Dr Isobel Simpson.

[Heavy air pollution in Canada linked to cancer spikes in rural region](#). Catherine Griffin, Science World Report, Oct 23 2013.

- Reports on the air quality study by Dr Isobel Simpson.

[Peace County families get hearing](#). Kim Trynacity. CBC News, Oct 7, 2013.

- Report on 8 families from Three Creeks and the Reno Field area who moved away from their homes, claiming adverse health effects from the tanks.

[Regulator belatedly investigates Peace River oil sands pollution](#). Andrew Nikforuk. The Tyee, September 20, 2013.

- Reports on public hearings into pollution from bitumen deposits around Peace River's in situ heavy oil sands projects that has forced the eviction of 6 families, sickened livestock and devalued property.

[Tar sands refineries: communities at risk](#). Aaron Sanger, Forest Ethics, Sept 17 2012.

- Describes the pollution from refineries.

[UCI-led study documents heavy air pollution in Canadian area with cancer spikes](#). University of California Irvine News, October 22 2013.

- Reports on the air quality study by Dr Isobel Simpson.

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4. Benzene, 1,3 Butadiene, Hydrogen Sulphide and other Chemicals in Dilbit

The Kinder Morgan Trans Mountain pipeline carries Dilbit. This section has information about the toxic chemical constituents found in Dilbit which include benzene, 1,3 butadiene, and hydrogen sulphide. These compounds have both acute (immediate) and chronic (long-term) health effects. For chronic

exposure, there may be a long time between the starting point of exposure to diseases being found, which makes it difficult to prove cause and effect.

See also: [Dilbit](#)

4.1. Research and Reports

Human health impacts of the Kinder Morgan Trans Mountain Pipeline. 2015. Tim Takaro, physician-scientist and professor at Simon Fraser University, and expert witness for NSNOPE. * **Recommended** *

- Comprehensive sections on the health effects of benzene and 1,3 butadiene.

[Benzene](#), Canadian Centre for Occupational Health and Safety (CCOHS).

- Details about benzene toxicity and health effects.

[Benzene](#). Agency for Toxic Substances and Disease Registry , US Center for Disease Control.

- Includes Medical management guidelines for acute chemical exposure for emergency responders, and information for health care providers including health effects and minimal risk levels.

[Benzene](#). National Environmental Health Monographs, Air Series No. 2. Australia, 1997.

- Detailed information about benzene.

[Benzene: US EPA Toxicity and Exposure for Children's Health](#) US Environmental Protection Agency.

- Information about benzene and children.

[Benzene](#). International Agency for Research on Cancer, World Health Organization.,

- Information about benzene from <http://monographs.iarc.fr/ENG/Monographs/vol100F/>

[Health effects of hydrogen sulphide: knowledge gaps](#). Dr Sheldon Roth and Verona Goodwin. Alberta Environment, 2001.

- A summary of how hydrogen sulphide affects the body.

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5. Child, Fetal and Genetic Health Effects

Toxic compounds related to oil pipelines can cause problems in pregnancy and in children. Perhaps less well-known are changes in the genetic material of parents, including fathers, that can affect their child's health when born. As well, the mental health of children can be impacted by oil spills.

5.1. Research and Reports

[Birth defects among offspring of firemen](#). American Journal of Epidemiology. (1990) 131 (2):312-321. (Abstract available online. This paper is not freely available online)

- This research study on Vancouver firemen found that for paternal employment as a fire fighter there were increased risks for heart defects in their offspring.

[Chemical found in crude oil linked to congenital heart disease](#). Science Daily, May 1 2011.

- Dr Gail McCarver's research is the first report that exposure to ethyl benzene, a compound present in crude oil, is associated with congenital heart disease. Reports on a conference presentation abstract.

[Fetal exposure to environmental contaminants may underlie CHD. Environmental link to congenital heart disease strengthened](#). Brian Hoyle. Medscape Medical News, May 2 2011. (Requires free login to Medscape. Copy and paste this URL into your browser: <http://www.medscape.com/viewarticle/741923>)

- Additional report on McCarver's research (see above) linking ethyl benzene exposure to CHD.

[Teratogen update: Paternal exposures – reproductive risk](#). Teratology 60: 161-172, 1999.

- Review of the father's exposures to toxins and impact on children he may have.

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6. Dilbit (Diluted Bitumen)

The Trans Mountain Kinder Morgan pipeline carries Dilbit (diluted bitumen), which is bitumen diluted with chemicals referred to as diluents. Diluents help bitumen flow through the pipeline. Condensate is the most common diluent and the specific components are a trade secret. It is toxic and may be more difficult to clean up. The main type of Dilbit transported in the Kinder Morgan Trans Mountain pipeline is expected to remain Cold Lake Winter Blend dilbit. Chemical constituents include benzene and 1,3 Butadiene; the high amounts of volatile organic compounds (VOCs) present are released as vapours from the marine terminal and tankers during loading operations. While most of the oil spills that have been reported are of crude oil, the Marshall, Michigan Kalamazoo River spill is the only Dilbit spill on record.

See also: [Benzene, 1,3, Butadiene and Other Chemicals in Dilbit](#).

See also: [Oil Spills – Marshall, Michigan Kalamazoo River \(Enbridge\), 2010 \(Dilbit spill\)](#)

6.1. Research and Reports

[Crude Monitor Website](#).

- This website provides information about the chemical composition of Alberta oil from samples taken at different times.

What is Dilbit? Concerned Professional Engineers

- Dilbit is a product resulting from the mixture of high viscosity bitumen from the Alberta oil sands with a low viscosity “condensate” to facilitate the flow of the bitumen through the pipeline.

Heavy Crude Oil/Diluent Mix Material Safety Data Sheet (MSDS)

- Gives the hazardous ingredients of Dilbit and describes the toxicological properties

Fact sheet: A brief on condensate and diluents

- Condensate spill research is lacking. Effects are likely similar to crude oil, but condensate may be more difficult to contain or clean up because it is lighter in nature, making spill recovery techniques such as containment booms ineffective.

6.2. New Reports, Personal Accounts and Other Resources

[A Dilbit primer: How it’s different from conventional oil.](#) Lisa Song, InsideClimate News, 2012.

- Information about Dilbit and its properties, and the difficulty of clean up in the Marshall, Michigan dilbit spill.

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7. Dispersants Used in Oil Spill Cleanup (Corexit)

Dispersants are used to clean oil spills. There are health impacts from dispersants alone, and from the combination of oil and dispersant together. Corexit is the oil dispersant used in the Deep Water Horizon oil spill cleanup in the Gulf of Mexico.

See also: [Oil Spill – Deep Water Horizon \(BP\), Gulf of Mexico, 2010](#)

7.1. Research and Reports

[The chaos of cleanup: analysis of potential health and environmental impacts of chemicals in dispersant products.](#) Earth Justice, 2011. Download complete report: http://earthjustice.org/sites/default/files/Oil_Dispersants_Report.pdf

- Reports on the chemicals in oil dispersants used to clean up oil spills: of the 57 ingredients, 5 are associated with cancer, 33 with skin irritation, 33 with eye irritation, 11 with respiratory toxicity or irritation, and 10 suspected kidney toxins.

[Oil + Dispersant](#) Toxipedia, 2014.

- Information about oil dispersants and toxicity, including toxicity of a variety of dispersant products.

[Potential effects of oil dispersant chemicals on human health and the aquatic environment](#). Toxipedia, 2012.

- Chart showing the potential human health impacts of the 57 chemicals in oil dispersants.

7.2. News Reports, Personal Accounts and Other Resources

[BP oil dispersant Corexit contained cancer-causing chemicals](#). Farron Cousins, DeSmogBlog, September 27 2011.

- News report on the 2010 Gulf of Mexico spill using Corexit, suggesting it was used in spite of knowledge of its toxicity.

[BP oil spill: Two years later dispersants' effects still a mystery](#). Alon Harish, World News, July 9 2012/

- Report of sickness experienced by fisherman cleaning up the spill, and the difficulties of studying how dispersants act under pressure at ocean depths.

[Chemicals meant to break up BP oil spill present new environmental concerns](#). Abraham Lustgarten, Propublica, April 30 2010.

- This report on dispersant health effects also notes that there is insufficient understanding of the fate of dispersed oil in aquatic ecosystems.

[Report released analyzing toxicity of dispersants used in Gulf oil disaster](#). Earth Justice, August 25 2011.

- News report 5 of the 27 ingredients in dispersants eligible for oil cleanup are linked to cancer

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8. First Responders and Oil Spill Cleanup Workers

First responders and oil spill cleanup workers are at high risk of health effects since there is a clear dose-response relationship between oil spill exposure and the severity of effects. There is a need to improve the safety equipment and training on how to use it since those who use proper health protective devices during work had a lower frequency of health problems. Much of the research in the Oil Spill categories in this document involves cleanup workers – see the Oil Spill sections.

See also: [Oil Spill](#) sections

8.1. Research and Reports:

[Birth defects among offspring of firemen](#). American Journal of Epidemiology. (1990) 131 (2):312-321. (Abstract available online. This paper is not freely available online.)

- This research study on Vancouver firemen found that for paternal employment as a fire fighter there were increased risks for heart defects in their offspring.

BP Gulf spill response: protecting the responders. National Institute of Environmental Health Sciences.

- Presentation about training for responders.
- URL to access the article:
https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCMQFjAA&url=https%3A%2F%2Ftools.niehs.nih.gov%2Fwetp%2Fpublic%2Fhasl_get_blob.cfm%3FID%3D8613&ei=E08cVdTqH8_woATGr4KIDA&usq=AFOjCNE9CWnDpcZX2-uvop56A3keq9p5CQ&sig2=EgWxnXZlvKNpKZeYJGJR7A&bvm=bv.89744112,d.cGU&cad=rja

Emergency responder health: what have we learned from past disasters? Weinhold, B. Environ Health Perspect. 2010 Aug; 118(8): A346–A350.

- Questions how to deal with health risks to emergency responders, including the more than 40,100 emergency responders at the 2010 BP Deepwater Horizon spill, especially given that studies show 11-16% of the general population is substantially more vulnerable to toxic exposures.

Health consequences among subjects involved in the Gulf oil spill clean-up activities. American Journal of Medicine, 2013. 126(11): 966-974. >> Copy and paste this URL into your browser to read the full-text: [http://www.amjmed.com/article/S0002-9343\(13\)00494-4/fulltext](http://www.amjmed.com/article/S0002-9343(13)00494-4/fulltext)

- In this study, clean-up workers exposed to the 2010 Gulf of Mexico oil spill and dispersant (Corexit) experienced significantly altered blood profiles, liver enzymes, and somatic symptoms. See also: letter by Piacentino et al critiquing the study methodology >> [http://www.amjmed.com/article/S0002-9343\(14\)00025-4/fulltext](http://www.amjmed.com/article/S0002-9343(14)00025-4/fulltext)

Mental health service use by cleanup workers in the aftermath of the Deepwater Horizon oil spill. *Social Science and Medicine*. Volume 130, April 2015, Pages 125–134. (Abstract available online. This paper is not freely available online)

- Higher rates of mental health problems have been seen among disaster relief workers. This study looked at how relief workers used mental health services.

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9. Northeastern BC Health Effects from Oil and Gas Activities

Oil and gas activities taking place in Northeastern BC can help to inform us about health effects.

9.1. Research and Reports

Environmental pathways of potential impacts to human health from oil and gas development in northeast British Columbia, Canada. Krzyzanowski. *Environmental Reviews*, 2012, 20(2): 122-134, 10.1139/a2012-005. (Abstract available online. This paper is not freely available online.)

- The northeast British Columbia region has experienced increased rates of cancers and other illnesses that have been linked to the contaminants and stressors associated with upstream oil and gas sector.

[Human health risk assessment](#). BC Ministry of Health.

- This was a three phase process with a number of published reports from the BC Ministry of Health. Of particular interest is the literature review which notes conflicting evidence about health effects.

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10. Oil Spill – Deepwater Horizon (BP), Gulf of Mexico, 2010

The Deepwater Horizon Gulf of Mexico spill was the largest accidental marine oil spill in the history of the petroleum industry. Corexit, a dispersant used to clean up the spill, also caused health problems. A large amount of research has been done on the health effects of this spill.

See also: [Dispersants Used in Oil Spill Cleanup \(Corexit\)](#)

10.1. Research and Reports:

[The 2010 Deepwater Horizon oil spill: The trauma signature of an ecological disaster](#). The Journal of Behavioral Health Services & Research January 2015, Volume 42, Issue 1, pp 58-76. (Abstract available online. This paper is not freely available online.)

- This paper notes that the people affected showed resilience, and that it was in part due to economic losses partially offset by large-sum BP payments.

[Air quality implications of the Deepwater Horizon oil Spill](#). Proceedings of the National Academy of Sciences vol. 109 no. 50 , 20280–20285.

- Whether the oil evaporates or is burned in situ on the water surface, a small but significant percentage is converted into aerosol particles smaller than 1 µm in diameter. These particles can penetrate into the lungs with potential health effects. This study looked at how air quality is affected not only by direct emissions from the spill and related operations but also by the reaction of products in the atmosphere such as ozone and secondary organic aerosols.

[Assessing the effects of the Gulf of Mexico spill on human health. A summary of a June 2010 workshop](#). Institute of Medicine of the National Academies.

- In addition to the physical stressors, the Deepwater Horizon oil disaster has disrupted delicate social, economic, and psychological balances in communities across the Gulf region. Report covers at-risk populations, short- and long-term health effects, monitoring, surveillance, and research methodologies.

Behavioral health and disasters. Special issue of the [The Journal of Behavioral Health Services & Research](#) January 2015, Volume 42, Issue 1, pp 3-4. (Abstract available online. These papers are not available for free online)

- This journal special issue has 11 research articles on the mental health effects of the gulf oil spill.

[Behavioral health in the Gulf coast region following the Deepwater Horizon oil spill: findings from two federal studies](#). January 2015, Volume 42, Issue 1, pp 6-22. (Abstract available online. This paper is not available for free online)

- This research shows that though many area residents undoubtedly experienced increased levels of anxiety and stress following the spill, findings suggest only modest or minimal changes in behavioral health at the aggregate level before and after the spill. Most importantly, the studies do not address potential long-term effects of the spill on physical and behavioral health nor did they target subpopulations that might have been most affected by the spill.

[A Conceptual Framework for Understanding the Mental Health Impacts of Oil Spills: Lessons from the Exxon Valdez Oil Spill](#). Psychiatry: Interpersonal and Biological Processes: Vol. 75, No. 3, pp. 203-222, 2012. (Abstract available online. This paper is not available for free online)

- Reports on way of understanding the mental health impacts, looking at the Exxon Valdez (Table 1 lists the impacts on mental health from studies on the Exxon Valdez) and the Gulf spill. It states that each study provides an important piece of the puzzle about what contributes to mental health problems in an oil spill, and who is most vulnerable, but the whole picture has not emerged yet.

[Deepwater Horizon Research Consortium Website](#). National Institute for Environmental Health Sciences.

- NIEHS is leading the five-year, \$25.2-million Deepwater Horizon Research Consortia program, which created community-university partnerships aimed at addressing the health effects stemming from the oil spill. Findings from this trans-NIH program will help improve community preparedness and response to disasters and minimize disaster-related health impacts such as stress, exposure to contaminants, and effects on women of childbearing age and their children.

[The Deepwater Horizon oil spill and ongoing mental health impact](#). The Journal of Behavioral Health Services & Research January 2015, Volume 42, Issue 1, pp 1-2. (Abstract available online. This paper is not freely available online)

- An overview of the articles found in this special issue. The services provided to victims of the spill also resulted in improvements in physical health outcomes which support the use of collaborative care approaches to meet community health needs. Also noted, those with higher degrees of self-efficacy, the ability to cope with difficulties, reported fewer mental and physical health symptoms.

[The Deepwater Horizon oil spill and the Mississippi gulf coast: mental health in the context of a technological disaster](#). American Journal of Orthopsychiatry. 2014, Vol. 84, No. 2, 142–151 (Abstract available online. This paper is not freely available online) >> Copy and paste this url into your browser to see the abstract: <http://psycnet.apa.org/journals/ort/84/2/142/>

- This study of 1, 146 people affected by the gulf spill and seeking services shows effects on life domains (e.g., 47.8% were affected by worsening financial or social or physical situations), and clinical symptoms (e.g., 39% with post-traumatic stress symptoms).

The Deepwater Horizon oil spill: mental health effects on residents in heavily affected areas. Osofsky. Disaster Medicine and Public Health Preparedness. Volume 5 / Issue 04 / December 2011, pp 280-286. Abstract available online. (This paper is not freely available online)

- The greatest effect on mental health related to the extent of disruption to participants' lives, work, family, and social engagement, with increased symptoms of anxiety, depression, and posttraumatic stress.

Early psychological impacts of the Deepwater Horizon oil spill on Florida and Alabama communities. *Environmental Health Perspectives*. 2011;119(6):838-843.

- This study finds that the impacts of oil spills extend beyond communities where oil reaches the shoreline. This underscored the need to extend public health education and outreach, psychological monitoring, and mental health services beyond the direct spill areas.

Effects of stress related to the Gulf oil spill on child and adolescent mental health. J. Pediatr. Psychol. first published online October 10, 2014. (Abstract available online. This study is not freely available online)

- This study helps to empirically demonstrate that the linkage between stress related to the Gulf oil spill and post-traumatic stress disorder symptoms in youth is not simply due to pre-existing symptoms.

Gulf Oil Spill Health Hazards. Sciencecorps, Lexington, MA, 2010.

- This document summarizes the health hazards of crude oil, dispersants (Corexit), and the combination. It was written to advise the public of the risks during the Deepwater Horizon spill. Other resources from Sciencecorps, including posters for the public and oil cleanup workers: http://www.sciencecorps.org/gulf_oil_spill_health_hazards.html

Gulf oil spill response efforts. Research section of the National Institute of Environmental Health Sciences website.

- Outlines the research being carried out after the spill. The GuLF STUDY (Gulf Long-term Follow-up Study) is a 10-year health study for individuals who helped with the oil spill cleanup. University-community partnerships are researching reproduction and birth outcomes, general health and well-being among coastal residents, and seafood safety. Researchers are also analyzing individual and community resilience post-disaster, and determining the impact resilience may have on behavior and mental health of children and adults living in the Gulf region. Training includes how to protect the health and safety of workers, and addresses the mental health impact experienced by cleanup workers and emergency responders.

Health consequences among subjects involved in the Gulf oil spill clean-up activities. American Journal of Medicine, 2013. 126(11): 966-974. >> Copy and paste this URL into your browser to read the full-text: [http://www.amjmed.com/article/S0002-9343\(13\)00494-4/fulltext](http://www.amjmed.com/article/S0002-9343(13)00494-4/fulltext)

- In this study, clean-up workers exposed to the 2010 Gulf of Mexico oil spill and dispersant (Corexit) experienced significantly altered blood profiles, liver enzymes, and somatic symptoms.

See also: letter by Piacentino et al critiquing the study methodology >>
[http://www.amjmed.com/article/S0002-9343\(14\)00025-4/fulltext](http://www.amjmed.com/article/S0002-9343(14)00025-4/fulltext)

[Health effects of the gulf oil spill.](#) Solomon, Janssen. *JAMA*. 2010;304(10):1118-1119. (Abstract available online. This paper is not freely available online)

- A summary of health effects, and recommendations for physicians.

[Health risks associated with crude oil spill exposure.](#) American Journal of Medicine. 127(9):886. (Abstract available online. This paper is not freely available online)

- This study assesses the hematological and liver function indices among the subjects participating in the Gulf oil spill cleanup operations in comparison with the standardized normal range reference values, and finds that they are at risk of developing alterations in hematological profile and liver function. >>Copy and paste this url into your browser to read the abstract: <http://www.amjmed.com/article/S0002-9343%2814%2900402-1/abstract>

[Individual and community level determinants of mental and physical health: Findings from the Gulf states population survey.](#) The Journal of Behavioral Health Services & Research January 2015, Volume 42, Issue 1, pp 23-41. (Abstract available online. This paper is not freely available online.)

- This study's findings point to the need for persons who are most directly affected through direct exposure to be the primary focus for any public health intervention effort. However, factors that characterize indirect exposure, such as earning a low income or job loss, are widely prevalent and may contribute to a greater burden of overall adverse population health than do factors that characterize direct exposure.

[Integrated care: Meeting mental health needs after the Gulf oil spill.](#) Psychiatric Services 65:280–283, 2014.

- Describes an integrated behavioural initiative in primary care clinics with culturally-tailored onsite and tele-medicine services delivered to adults and children affected by the oil spill.

[Mental health needs assessment after the Gulf Coast oil spill – Alabama and Mississippi, 2010.](#) Prehosp Disaster Med. 2012;27(5):1-8. . (Abstract available online. This paper is not freely available online.)

- In this research study, between 15.4 - 24.5% of the respondents reported depressive symptoms, with 21.4-31.5% reporting symptoms consistent with an anxiety disorder, and 16.3-22.8% reporting 14 or more mentally unhealthy days within the past 30 days. Between 32.1% and 35.7% of all households reported decreased income since the oil spill,

[Mental health service use by cleanup workers in the aftermath of the Deepwater Horizon oil spill.](#) *Social Science and Medicine*. Volume 130, April 2015, Pages 125–134.

- Higher rates of mental health problems have been seen among disaster relief workers. This study looked at how relief workers used mental health services.

[Mental health symptoms among participants involved in the Deepwater Horizon oil spill cleanup.](#) *Occup Environ Med*. 2014 Jun;71 Suppl 1:A29

- In this preliminary study, persons who worked on oil-spill cleanup were more likely to report adverse mental health outcomes than those who did not.

[National Institute of Environmental Health Sciences. Database of reports](#) – Search for Deepwater Horizon.

- This search for documents on Deepwater Horizon finds a variety of materials from NIEHS, including training materials.

10.2. News Reports, Personal Accounts and Other Resources

[Assessing the health effects of the oil spill](#). Bryan Walsh, Time, June 25, 2010.

- A report about how little is known about the health effects of oil spills.

[Blood tests show elevated health risks for Gulf spill cleanup workers](#). Jennifer A. Dlouhy, FuelFix, September 16 2013.

- Reports on a health study showing that people hired to clean up the beaches and marshes during the spill have significantly altered blood profiles that put them at increased risk of developing liver cancer, leukemia and other disorders.

[BP's 'Widespread human health crisis.'](#) Dahr Jamail, Al Jazeera, October 27 2013.

- Reports on health problems experienced by people from the roughly 900 km impact zone of the Gulf of Mexico spill and comments from toxicologists Dr Susan Shaw, Dr Riki Ott, and Dr Wilma Subra.

[Cancer risk to BP cleanup workers](#). Andy Rowell, Oil Change International, September 18 2013.

- In the days after the BP oil spill disaster, The *Exxon Valdez* veterans, like Riki Ott, pleaded that BP and the authorities learn from the lesson from Alaska.

[Gulf spill pictures: 10 new studies show impact on coast](#). National Geographic, April 22, 2012.

- 10 studies are reported, from mental health effects in humans, to dolphins showing serious signs of illness, to changes in the food chain that may affect human health.

[Oil spill's human health impacts might extend into the future](#). Katherine Harmon Courage. Scientific American, August 16, 2010.

- 300 people had come forward with spill-related symptoms in the few months after the rig exploded. Of those, some three quarters were people directly involved in the clean-up effort, noted the authors of [a new commentary piece](#) in *JAMA, Journal of the American Medical Association*.

[One year later: The health effects of the BP oil spill](#). Erin Marcus, New America Media, March 20 2011.

- An interview with Dr Gina Solomon, an associate professor of clinical medicine at the University of California, San Francisco, and Senior Scientist at the Natural Resources Defense Council. Dr Solomon was on the Louisiana coast during the oil spill, studying its effects.

[Two years after the BP spill, a hidden health crisis festers](#). Antonia Juhasz, The Nation, May 7 2012.

- This powerful news report details the experience of a family who were sick as a result of the spill, and outlines the research that confirms these health effects.

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11. Oil Spill – Exxon Valdez (Exxon), Prince William Sound, Alaska, 1989

The 1989 Exxon Valdez oil spill in Alaska was the largest spill in US waters until the Deepwater Horizon spill in 2010. Dispersants were used in this spill.

11.1. *Research and Reports*

[Community patterns of psychiatric disorders after the Exxon Valdez spill](#). American Journal of Psychiatry, Volume 150 Issue 10, October 1993, pp. 1517-1523. (Abstract available online. This paper is not available for free online)

- Looks at the prevalence of anxiety, depression and post-traumatic stress disorder after the spill. When compared with the unexposed group, members of the high-exposure group were 3.6 times as likely to have generalized anxiety disorder, 2.9 times as likely to have PTSD, 1.8 times as likely to have a CES-D Scale score of 16 and above, and 2.1 times as likely to have a CES-D Scale score of 18 and above. Women exposed to this event were particularly vulnerable to these conditions, and Alaska Natives were particularly vulnerable to depressive symptoms after the oil spill.

[A Conceptual Framework for Understanding the Mental Health Impacts of Oil Spills: Lessons from the Exxon Valdez Oil Spill](#). Psychiatry: Interpersonal and Biological Processes: Vol. 75, No. 3, pp. 203-222, 2012. (Abstract available online. This paper is not available for free online)

- Reports on way of understanding the mental health impacts, looking at the Exxon Valdez (Table 1 lists the impacts on mental health from studies on the Exxon Valdez) and the Gulf spill. It states that each study provides an important piece of the puzzle about what contributes to mental health problems in an oil spill, and who is most vulnerable, but the whole picture has not emerged yet.

11.2 *News Reports, Personal Accounts and Other Resources*

[Exxon Valdez spill effects linger 25 years on](#). Daniel Lak. Al Jazeera, 24 Mar 2014.

- One person's account of health effects, including aplastic anemia.

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12. Oil Spill – Hebei Spirit, Korea, 2007

This large oil spill took place off the coast of Taean, Korea in 2007, contaminating 167 km of coast. Research studies on health effects began during the second week of the spill and went on until 2013.

12.1. *Research and Reports:*

[Burden of disease attributable to the Hebei Spirit oil spill in Taean, Korea](#). Kim et al. *BMJ Open* 2013;3:e003334 doi:10.1136/bmjopen-2013-003334

- This study shows the burden of disease, excluding cancers and degenerative diseases, increased, particularly for asthma, post-traumatic stress disorder, and rhinitis. They estimate the direct cost and loss of productivity, noting that there are economic outcomes from health problems.

[The duration of acute health problems in people involved in the cleanup operation of the Hebei Spirit oil spill](#). *Marine Pollution Bulletin* 64 (2012) 1246–1251. (Abstract available online. This paper is not freely available online)

- This study looks at how health was affected one year after the spill. Prevalence of symptoms at the time of the first survey, in order of highest to lowest, were respiratory symptoms, back pain, headaches, neurovestibular symptoms, eye symptoms, and skin symptoms. At the time of the second survey, 12 months after the first, the prevalence of continuing symptoms, from highest to lowest, were headaches, eye symptoms, neurovestibular symptoms, respiratory symptoms, skin symptoms, and back pain.

[Health effects of oil spill: reflection of five years after the Hebei Spirit oil spill](#). Presentation by Hae-Kwan Cheong, Sungkyunkwan University School of Medicine, Korea.

- Details of various oil spills and health effect studies, the Hebei Spirit spill and the long-term health effects study, and calls for more research to be done on the health effects of oil spills.

[Hebei Spirit oil spill exposure and subjective symptoms in residents participating in clean-up activities](#). *Environ Health Toxicol.* 2011; 26: e2011007.

- Study conducted at the second week of the 2007 crude oil spill off the coast of Korea, including the physical symptoms reported in 42-82% of residents.

[Long-term health effects of Hebei Spirit oil spill on cleanup workers](#). *Epidemiology*: January 2011 - Volume 22 - Issue 1 - pp S128-S129.

- Residents and children in oil spill area showed increasing symptoms of allergic disease, multi-chemical sensitivity, and higher level of oxidative stress biomarkers according to increasing indices of oil spill exposure,

[Respiration effects of the Hebei Spirit oil spill on children in Taean, Korea](#). Jung et al. *Allergy, Asthma & Immunology Research.* 2013 5(6): 365-370.

- This study shows that children who lived close to the oil spill area had more asthmatic symptoms, increased impaired lung function, and an increased prevalence of asthma than those who lived far from the oil spill area.

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13. Oil Spill – Marshall Michigan Kalamazoo River (Enbridge), Michigan, 2010 (Dilbit spill)

This spill is significant since it is the only Dilbit spill on record, and Dilbit is the material carried by the Trans Mountain Kinder Morgan pipeline. This spill took place in the Kalamazoo River in Marshall, Michigan, where 30% of households (those who reported more acute symptoms) opted to relocate out of the affected zone. There are no long-term studies planned even though this is the first Dilbit spill on inland waters in the United States.

See also: [Dilbit](#)

13.1. Research and Reports:

[Acute health effects of the Enbridge oil spill](#). Michigan Dept of Community Health, Nov 2010.

- A surveillance system received 147 health care provider reports on 145 patient, identified 58% of individuals with adverse health effects from four community surveys along the impacted waterways, identified one small worksite with symptomatic employees, and tracked 41 calls placed to poison control.

[Enbridge oil spill public health assessment](#). Michigan Department of Health and Human Services.

- A series of reports including these 3 on health: Public health assessment, Evaluation of air contamination, and Drinking water public health assessment. In this spill, the residents were more frequently impacted than the clean-up workers. Of 500 residents, about 58% reported one or more effects compared to only 4% living in distant communities.

[For health care providers, Enbridge oil spill](#). Michigan Department of Health and Human Services,

- Reporting forms and information for health care providers treating people with health concerns from the Enbridge oil spill.

13.2. News Reports, Personal Accounts and Other Resources

[The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 1](#). Elizabeth McGowan and Lisa Song, InsideClimate News, 2012.

- Fascinating account of the events during the spill, including health effects experienced, and the fact that "the potential for health effects exist. However, understanding and quantifying these effects requires further study. There has been relatively little long-term research..."
- [The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 2](#). Elizabeth McGowan and Lisa Song, InsideClimate News, 2012.
- [The Dilbit disaster: inside the biggest oil spill you've never heard of. Part 3](#). Elizabeth McGowan and Lisa Song, InsideClimate News, June 28 2012.

[Enbridge is still cleaning up 3 years after Kalamazoo River oil spill](#). Teviah Moro. Hamilton Spectator, October 16 2013.

- Personal stories about the health impacts and activities during the oil spill.

[Experts fear long-term health impact of Michigan spill](#). CTV British Columbia, August 15 2012.

- A personal report stating “You had nausea, you didn’t want to eat... I don’t want anyone to ever go through what we’ve gone through here,” plus comments from toxicologist Dr Riki Ott about long-term health impacts from triggering effects where “it can trigger illnesses that your body is carrying but hasn’t expressed yet because your body successfully fought back... And it can weaken your body to the extent that other illnesses will crop up.”

[Kalamazoo River oil spill health questions go unanswered without long-term study](#). Fritz Klug, MLive Michigan, December 11 2011.

- Since this spill is unique – the first major diluted bitumen spill in the inland US – the long-term effects should be studied, however they are not.

Lessons from the Kalamazoo River tar sand oil spill. Wilderness Committee. Copy and paste this url into your browser: <https://www.wildernesscommittee.org/kalamazoo>

- Links to a series of articles from InsideClimateNews.

[Toxic rocks and declining health: 3.5 years after Enbridge’s tar sands pipeline disaster](#). Sonia Grant. Rabble.ca, Jan 14, 2014.

- Reports of people with compromised immune systems and other health effects from this spill.

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14. Oil Spill – Mayflower (ExxonMobil), Arkansas, 2013

In March 2013, a pipeline ruptured in Mayflower, near Little Rock, Arkansas, spilling crude oil.

14.1. Research and Reports

[Poisons in the pipeline: Tests find toxic stew in oil spill](#). Environmental Working Group, June 2013.

- Two months after the ExxonMobil pipeline rupture in Mayflower, Arkansas, there were seven highly toxic compounds present, including lead, benzene and others that cause cancer and developmental problems.

14.2. News Reports, Personal Accounts and Other Resources

[ExxonMobil Arkansas oil spill still poses health risks for locals](#). May 14, 2013.

- Personal reports of health effects and air sampling showing the presence of 30 toxic chemicals which can cause them.

[Five months after oil spill, sickened Mayflower residents offered free health assessments](#). Elizabeth McGowan. Inside Climate News, Sept 4 2014.

- Experience of people who were sickened and needed to relocate, pointing out the gaps in the health care and the need for nurses with expertise in this area.

[This is what happens when a pipeline burst in your town](#). Nora Caplan-Bricker. New Republic, November 18 2013.

- Personal reports from people who became sick after the Mayflower spill. “The key question that people have – ‘will I be affected 20 years later given my two-week exposure? – is something no one can answer’... If people in Mayflower develop cancer five years from now, it will be nearly impossible to point a finger at the oil spill.”

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15. Oil Spill – Other

This resource list does not include all studies on the health effects of oil spills: see the references in the papers in the [Overviews](#) for a more complete picture of the literature on other oil spills.

[The human health implications of crude oil spills in the Niger delta: an interpretation of published studies](#). Niger Med J. 2013 Jan-Feb; 54(1): 10–16.

- An average of 240,000 barrels of crude oil are spilled in the Niger delta every year, mainly due to unknown causes (31.85%), third party activity (20.74%), and mechanical failure (17.04%).

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16. Oil Spill – Prestige, Galicia, Spain, 2002

The Prestige oil tanker oil spill took place in Galicia, Spain in 2002 releasing two different types of fuel oil.

16.1 Research and Reports

[Biomonitoring of human exposure to Prestige oil: effects on DNA and endocrine parameters](#). Pérez-Cadahía et al. *Environmental Health Insights*. 2008;2:83-92.

- In 2003, researchers evaluated cleanup workers for heavy metals and DNA damage. It found significant increases in blood aluminum, nickel and lead compared to controls. Higher levels of genetic damage and endocrine alterations (prolactin and cortisol) were also observed in the exposed population. DNA damage levels were influenced by age, sex, and the use of protective clothes, and prolactin concentrations by the last two factors. Surprisingly, the use of mask did not seem to protect individuals from genetic or endocrine alterations.

[Endocrine and immunological parameters in individuals involved in Prestige spill cleanup tasks seven years after the exposure.](#) Environment International. Volume 59, September 2013, Pages 103–111.

- The objective of this study was to evaluate if the endocrine and immunological alterations are still present in subjects involved in Prestige oil cleanup activities seven years after the exposure. Alterations observed in cortisol, kynurenine and NK cells recommend the surveillance of these individuals for early detection of possible health problems related to the endocrine or immunological systems.

[Health effects of oil spills: Lessons from Prestige](#) American Journal of Respiratory and Critical Care Medicine, Vol. 184, No. 10 (2011), pp. 1094-1096.

- In various studies on cleanup workers of the *Prestige* oil spill, potential genotoxic effects have been evaluated. A number of studies observed early effects on DNA during active exposure to the oil spill. Because oil spills will occur again in many areas of the world, there is a need for a concerted, international action regarding human health effects. Although every spill has unique characteristics, common guidelines for preventive measures, the design of studies on the evaluation of long-term health effects, and surveillance of exposed cleanup workers and residents are necessary.

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17. Oil Spill – Red Butte Creek (Chevron), Salt Lake City, Utah, 2010

In June 2011, a pipeline ruptured and spilled oil into Red Butte Creek in Salt Lake City, Utah.

17.1. Research and Reports

[Health effects of oil spills and implications for public health planning and research. Red Butte Creek Oil Spill Public Health Assessment.](#) Utah Dept of Health, 2011. URL to website: <http://www.health.utah.gov/enviroepi/appletree/redbuttecreekoilspill/>

- Toxicological evaluation of benzene, toluene, ethylbenzene, naphthalene, and multiple chemical exposure evaluation; child health; community health.

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18. Oil Spill – Vancouver and Surrounding Area

Vancouver and the surrounding areas have experienced oil spills, most recently in English Bay where the Marathassa spilled bunker fuel in April 2015. Kinder Morgan has reported 82 spills since installing the existing pipeline, 13 of which were in the past 10 years. The most recent spill was the 2007 Burnaby spill

of the Barnett Highway. Vancouver Coastal Health and the National Collaborating Centre on Environmental Health have reported on the impacts of oil spills in 2014.

18.1. Research and Reports

Major human health impacts of the Kinder Morgan Trans Mountain Pipeline. Tim Takaro et al. For NSNOPE and BROKE. **Recommended** [\[link to come\]](#)

- Background information on what Kinder Morgan's Trans Mountain pipeline expansion is, what exists currently (e.g., volatile organic compound testing, 82 past oil spills), health effects from other oil spills, impacts of benzene and 1,3 butadiene, and case scenarios that could affect health.

[Vancouver -- Short- and long-term health impacts of marine and terrestrial oil spills.](#) Vancouver Coastal Health, 2014. **Recommended**

- Literature review assessing physical health impacts, mental health and related community health impacts, and impacts on community health and resilience, research gaps in the health impacts literature, and public health considerations for oil spill response planning.

[Health effects of oil spills and implications for public health planning.](#) Eykelbosh A. National Collaborating Centre for Environmental Health, 2014. **Recommended**

- Summarizes the physical impacts, mental health and community impacts, how to mitigate impacts, and implications for public health planning and research.

[Air quality and health impact assessment update,](#) Chevron CAP, Sept 18, 2013. Fraser Health and Metro Vancouver.

- Gives the health effects of benzene and emissions testing.

[Consequences of oil spills: a review and framework for informing planning.](#) Chang et al. Ecology and Society 19(2):26, 2014.

- This study presents a Vancouver case. It reviews the consequences of oil spills on health, along with other areas of impact, and discusses it in relation to Vancouver, considering the densely populated area, the local conditions, the risks of dilbit, the economy of Vancouver, etc. Gaps in knowledge are identified.

[Risk-based approach to assessing acute human health risks during and after a spill.](#) Cindy Ott. SLR Global Environmental Solutions, 2014.

- This report was commissioned after the 2007 Kinder Morgan oil spill at Barnett Highway, Burnaby, BC. It describes lessons learned for how to monitor and assess human health risks.

[Symposium on land based spill preparedness and response in BC.](#) March 25-27, 2013. Summary Report. BC Ministry of the Environment, 2013. [Full report and other symposium documents also available](#)

- Cindy Ott presented on public health concerns. Best practices to monitor impact to human health include pre-planning and collection of baseline data, training and equipping first response teams, community engagement, occupational and offsite monitoring for human health, and continuous and long term monitoring initiated at first response.

[Toxic oil spill in English Bay – The truth about oil recovery and long-term effects on ecosystems](#). Simon Fraser University Video Library, April 29, 2015. [2 hour video]

- Community presentations by a variety of speakers, including on health effects: Riki Ott at 54:18 and Anita Burke at 1:20:30.

18.2. News Reports, Personal Accounts and Other Resources

[Concerns raised over oil spill air testing](#). Alex Butler. Abbotsford News, Jan 11, 2015.

- In Jan 2012, there was a spill at the Sumas terminal of the Kinder Morgan pipeline and neighbouring residents reported feeling ill. Adequate air monitoring was not done.

[Cost of an oil spill in Burrard Inlet: \\$40 Billion... for starters](#). Weyler. The Common Sense Canadian. May 10 2012.

- Looks at the economic costs of an oil spill in Vancouver and estimates \$1 billion for health costs alone.

[Monitor human poisoning after spills: doc](#). Michael Mui, 24 Hours Vancouver, April 29, 2015.

- Interview with Dr Riki Ott after the Marathasa spill calling for monitoring systems to be in place and Vancouver Coastal's Dr James Lu 's comments.

[Oil spill damage also mental](#). Michael Mui, 24 Hours Vancouver, September 24, 2014.

- A news report on the Vancouver Coastal Health review of past oil spills worldwide and interview with medical health officer Mark Lysyshyn.

[Vancouver oil sands tanker spill could cause evacuation nightmare. Diluted bitumen creates toxic could public would be forced to flee, as occurred in Kalamazo](#). Mitchell Anderson, The Tyee, 2012.

- After the diluted bitumen rupture near Kalamazoo, Michigan in 2010, off-gassing chemicals acutely impacted the health of almost 60% of residents living within a mile of the spill, and a 3-week voluntary evacuation was implemented. Vancouver's situation is considered.

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For more information, contact [North Shore NOPE](#)