**Summary of Testimony by Anthony Swift, Natural Resources Defense Council**

The U.S. onshore hazardous liquid pipeline system is receiving higher volumes of new, more corrosive form of crude oil called diluted bitumen. These blends have properties which pose potential new risks to the U.S. onshore liquid pipeline system, public safety and the environment. Pipeline regulators have not assessed the risks of this new product or considered whether new pipeline safety and spill response regulations will be necessary to protect the public and environment.

Timely federal action is urgently required, as an increasing amount of diluted bitumen comes into our nation through existing pipelines that may not be sufficiently designed to handle it. It is critical that the risks of this product inform agencies conduct environmental review, make siting determinations and consider design and safety requirements for new pipelines such as TransCanada's Keystone XL.

Actions which may address the specific risks of potentially corrosive products such as diluted bitumen include, but are not limited to:

- Evaluate the nature and magnitude of new risks posed to pipelines and hazards created by spills. Regulations should be updated accordingly.
- Ensure active engagement by PHMSA in all stages of pipeline infrastructure development.
- Expand protections for at risk resources, including open-source aquifers such as the Ogallala.


**Testimony of**

**Anthony Swift**
**Policy Analyst, International Program**
**Natural Resources Defense Council**

**Before the**

**House Committee on Energy and Commerce**
**Subcommittee on Energy and Power**

**Committee on**
**Energy and Commerce**
**United States House of Representatives**

**June 16, 2011**

TESTIMONY OF ANTHONY R. SWIFT
POLICY ANALYST, INTERNATIONAL PROGRAM
NATURAL RESOURCES DEFENSE COUNCIL

HEARING ON "PIPELINE SAFETY OVERSIGHT"
BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER,
COMMITTEE ON ENERGY AND COMMERCE
U.S. HOUSE OF REPRESENTATIVES

June 16, 2011

Chairman Whitfield and Ranking Member Rush, and Members of the Committee, thank you for the opportunity to testify today on pipeline safety oversight. My name is Anthony Swift. I am a policy analyst for the Natural Resources Defense Council (NRDC) specializing in energy issues. Since the Enbridge pipeline spill last summer in Michigan, I have been studying the safety implications of diluted bitumen or raw tar sands crude transported through existing pipeline technology. NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.2 million members and online activists worldwide, serviced from offices in New York, Washington, Los Angeles, San Francisco, Chicago, and Beijing.

**Introduction**

Pipeline safety is of major concern in the United States today. A recent series of pipeline disasters has increased public awareness regarding the potential dangers of diluted bitumen to the U.S. hazardous liquid pipeline system. Diluted bitumen is a corrosive, acidic and potentially unstable blend of thick raw bitumen and volatile natural gas liquid condensate. Last year's pipeline spill of over 840,000 gallons of diluted bitumen into the Kalamazoo River in Michigan demonstrated just a few of the risks associated with transporting corrosive, acidic and unstable

diluted bitumen in aging pipelines. These concerns have been intensified by the rapid increase of diluted bitumen imports into the United States in recent years.

Chemical assays of diluted bitumen blends, reports from refiners receiving diluted bitumen, large spills in the United States and Canada involving diluted bitumen or pipelines that carry it as part of their product mix, and the safety record of the Alberta pipeline system are large warning signs of the risk of transporting bitumen blends. Responsible federal officials need to address these serious questions as part of the environmental review of the project.

Diluted bitumen is much thicker, or viscous, than conventional crude and must be pumped through a pipeline at high pressure. As thick, abrasive diluted bitumen moves through the pipeline, it generates significant friction, which heats the pipeline. For instance, TransCanada's proposed Keystone XL pipeline would run at temperatures of up to 150 degrees Fahrenheit. It is typically diluted with light, highly volatile natural gas liquids which increase the risk of explosion in the event of a spill. We have learned the hard way that relying on conventional technologies and equipment to drill and complete a deep offshore well in the Gulf of Mexico introduces risks that drilling a well in West Texas does not. TransCanada's Keystone XL pipeline, which would move 830,000 barrels per day of hot corrosive tar sands diluted bitumen through the heart of the Ogallala Aquifer, creates hazards that a conventional crude pipeline carrying light, low-sulfur crude oil through West Texas does not. This is a new technology with new potential risks. It is imperative that our pipeline safety regulators put updated regulations in place that will prevent unnecessary leaks and spills.

In my testimony this morning I will describe how volumes of diluted bitumen are increasing in the U.S. onshore pipeline system, the potential risks that this increase poses to the

environment and public safety, and gaps in the federal regulatory response to diluted bitumen transported in pipes.

**The U.S. pipeline system is carrying increasing volumes of potentially corrosive diluted bitumen**

Over the last few years, the U.S. onshore hazardous liquid pipeline system has been used to transport increasing volumes of corrosive grades of crude oil. During that time, pipeline regulators have not moved to assess or address the risks to the public and environment that this trend poses. While U.S. refiners have witnessed a decades-long trend of declining crude quality, most of this can be attributed to heavy sour coming into our Gulf Coast refineries from oil tankers.[1] Gulf refineries process this crude and then move it through conventional pipelines in the form of refined product, sparing much of the U.S. onshore pipeline system the wear and tear of transporting the heavier, sour crudes. Sour crudes are more corrosive and can lead to both internal and external corrosion of the pipeline. However, this is changing as the U.S. pipeline system is used to transport increasing volumes of heavy, corrosive diluted bitumen from Canada's tar sand region.

Historically, the United States has imported the majority of Canadian tar sands crude in the form of synthetic crude oil, a substance similar to conventional crude oil. It has already gone through an initial upgrading process. Importing tar sands oil into the United States as diluted bitumen—instead of synthetic crude oil—is a recent and growing development. After running short on upgrading capacity, Canadian oil producers are increasingly mixing raw bitumen, a

[1] While the API gravity and sulfur content of crudes refined in the U.S. has been increasing, a significant portion of this effect is due to the import of sour, heavy fuels into the U.S. Gulf where it is refined (U.S. Energy Information Administration, Petroleum & Other Liquids, Crude Oil Input Qualities, 2011, http://www.eia.gov/dnav/pet/pet_pnp_crq_a_EPC0_YCS_pct_a.htm).

thick, semi-solid substance, with a diluent such as a volatile natural gas liquid condensate. The hot mixture is then piped to and through the United States at high pressure.

Over the last ten years, diluted bitumen exports to the United States have increased six fold, to almost 600,000 barrels per day (bpd) in 2010— comprising more than half of the approximately 900,000 bpd of tar sands oil currently flowing into the United States.[2] By 2019, Canadian tar sands producers plan to increase this amount to as much as 1.5 million bpd of diluted bitumen.[3]

**Diluted bitumen may pose an increased risk to pipeline systems**

There are already many signs that diluted bitumen presents new risks to pipeline integrity and, when spilled, generate unique hazards. The physical and chemical properties of diluted bitumen blends, as well as the documented poor safety record of pipelines that have been used to carry diluted bitumen, raise serious questions that need to be addressed, particularly as an increasing amount of diluted bitumen moves through U.S. pipelines.

Heavy diluted bitumen has a number of chemical and physical characteristics which increase its risks to pipeline systems. Diluted bitumen has significantly higher sulfur content,[4] which can lead to sulfide stress corrosion cracking,[5] and higher chloride salt content,[6] which can

---

[2] "Oil Sands Statistics 2000-2007," Canadian Association of Petroleum Producers, http://membernet.capp.ca/raw.asp?x=1&dt=NTV&e=PDF&dn=34093; http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/sttstc/crdlndptrlmprdct/stmtdcndncrdlxprttpdstn-eng.html.

[3] Andy Burrowes, Rick Marsh, Marie-Anne Kirsch et al., *Alberta's Energy Reserves 2009 Supply/Demand Outlook 2010-2019*, Calgary, Alberta: Energy Resources Conservation Board, 2010, p. 3, http://www.ercb.ca/docs/products/STs/st98_current.pdf.

[4] *Canadian Crude Quick Reference Guide Version 0.54*, Crude Oil Quality Association, 2009, http://www.coqa-inc.org/102209CanadianCrudeReferenceGuide.pdf.

[5] Karl Sieradzki, Stress Corrosion Cracking, Technical Paper, http://www.azgovernor.gov/estf/stress.pdf.

[6] *Planning Ahead for Effective Canadian Crude Processing*, Baker Hughes, 2010, p. 4, http://www.bakerhughes.com/assets/media/whitepapers/4c2a3c8ffa7e1c3c7400001d/file/28271-canadian_crudeoil_update_whitepaper_06-10.pdf.pdf&fs=1497549; A. I. (Sandy) Williamson, *Degradation Mechanisms in the Oilsands Industry*, Calgary, Alberta: Ammonite Corrosion Eng. Inc., 2006, Presentation to the National Association of Corrosion Engineers, slide 27,

lead to chloride stress corrosion. It also has higher quantities of highly abrasive quartz, rutile, and pyrite particles.[7] Additionally, it is generally transported at higher temperature and pressure than conventional crudes moved through the U.S. pipeline system. The unstable blend of heavy bitumen and volatile natural gas liquid condensate create problems for leak detection and presents significant additional hazards in the event of a spill. (Exhibit 1: NRDC Technical Letter to the Pipeline and Hazardous Materials Safety Administration (PHMSA))

While the use of onshore pipelines to move large quantities of diluted bitumen is relatively recent, there are many early indications that the characteristics of diluted bitumen pose increased risks to pipeline systems. The Alberta pipeline system, which moves significant quantities of diluted bitumen, has had sixteen times more spills per mile due to internal corrosion than the older U.S. system. (Exhibit 2: Tar Sands Pipelines Safety Risks) On April 29, 2010 the Rainbow pipeline, which carries a variety of crude blends including Peace River diluted bitumen,[8] leaked 1.3 million gallons in northern Alberta.[9]

As imports of this corrosive crude increase, the U.S. pipeline system may already be showing the strain. Midwestern states with the longest history with heavy Canadian tar sand crude are North Dakota, Minnesota, Wisconsin and Michigan.[10] Over the last five years, crude oil pipelines in these states have spilled almost three times as much crude per mile than the

---

http://www.naceedmonton.com/pdf/FtMacPresentation/Ammonite_Degradation%20Mechanisms%20in%20OS%20Operations_NACE_Fort%20Mac_10%2006.pdf.

[7] S.A. Lordo, "New Desalting Chemistry for Heavy/High Solids Crude," 2010, pg. 12, http://coqa-inc.org/20100211_Lordo_Solids_in_Crude.pdf.

[8] Crude Monitor, Peace River Heavy, 2011, http://www.crudemonitor.ca/crude.php?acr=PH.

[9] Dina O'Meara, *Rainbow oil pipeline leak largest in 36 years*, Calgary Herald, May 3, 2011, http://www.calgaryherald.com/news/Rainbow+pipeline+leak+largest+years/4720888/story.html;

[10] The sulfur content and API gravity of crude transported in pipeline to refineries in the northern region of PADD II are significantly above the national average, (U.S. Energy Information Administration, Petroleum & Other Liquids, Crude Oil Input Qualities, 2011, http://www.eia.gov/dnav/pet/pet_pnp_crq_a_EPC0_YCS_pct_a.htm).

national average.[11] The Enbridge Lakehead System, which transports the majority of Canadian crude exported to the United States from Alberta to refineries in the Midwest,[12] was also responsible for over half of all crude oil spilled in the United States in 2010, [13] while accounting for less than five percent of the country's crude transmission mileage.[14] Prior to the 840,000 gallon diluted bitumen spill (2010) on Enbridge's line 6B in Kalamazoo, Michigan, in-line inspections revealed 329 corrosion anomalies on that line alone.[15]

Meanwhile, TransCanada's Keystone pipeline, one of the first pipelines dedicated to moving diluted bitumen from Canada to the United States, has had twelve leaks over the last year; its first year in operation.[16] The largest of these, which occurred in May 2011 was approximately 21,000 gallons,[17] a large spill by most reporting categories.[18] The Department of Transportation responded this month by issuing the pipeline with a Corrective Action Order, after determining that the pipeline was an "immediate threat to life, property and the

---

[11] ND, MN, WI and MI have approximately 5,475 miles of crude pipelines, or 10.9% of the approximate 50,214 U.S. crude pipeline mileage (PHMSA, State Mileage by Commodity Statistics, 2011, http://primis.phmsa.dot.gov/comm/reports/safety/MI_detail1.html?nocache=8335#_OuterPanel_tab_4; Bureau of Transportation Statistics, Table 1-10: U.S. Oil and Gas Pipeline Mileage, 2009 http://www.bts.gov/publications/national_transportation_statistics/html/table_01_10.html). Meanwhile, between 2007-2010 crude pipelines in ND, MN, WI, and MI spilled 38,220 barrels of crude, or 30.3% of the 125,862 barrels of crude spilled in the U.S.

[12] Jeffery Jones, Enbridge eases oil shipping lines as glut shrinks, Reuters, Apr 21, 2011, http://ca.reuters.com/article/businessNews/idCATRE73K7EO20110421.

[13] Enbridge spilled over 31,400 barrels of crude in a series of 18 spills in IL, MI, MN, ND and WI in 2010; making up nearly 60% of the 53,300 barrels of crude spilled in the U.S. that year.

[14] The U.S. portion of Enbridge's Lakeshead system consists of 1,900 miles of liquid petroleum pipelines, comprising approximately 3.8% of U.S. crude pipeline mileage (Enbridge, LakeHead System, http://www.enbridgeus.com/Main.aspx?id=210&tmi=210&tmt=1; Bureau of Transportation Statistics, Table 1-10: U.S. Oil and Gas Pipeline Mileage, 2009 http://www.bts.gov/publications/national_transportation_statistics/html/table_01_10.html).

[15] Todd A. Heywood, *Feds say Enbridge pipeline may never restart*, Aug 27, 2010, http://michiganmessenger.com/41372/feds-say-enbridge-pipeline-may-never-restart.

[16] RL Miller, *Keystone pipeline spilled tar-sands oil 11 times in past year. Do we really want to supersize it?*, Grist.org, May 12, 2011, *available at* http://www.grist.org/oil/2011-05-12-lets-supersize-a-disaster *last accessed* May 2011.

[17] Edward Welsch, *TransCanada Pipeline Spills Oil in North Dakota*, Wall St. J., May 9, 2011, *available at* http://online.wsj.com/article/SB10001424052748703730804576313432899153672.html *last accessed* May 2011; http://www.argusleader.com/assets/pdf/DF174518518.PDF .

[18] State Department, Supplemental Draft Environmental Impact Statement, 3-93, 2011, http://www.keystonepipeline-xl.state.gov/clientsite/keystonexl.nsf?Open.

environment."[19] The Keystone pipeline is the newest hazardous liquid pipeline to ever receive such an enforcement action.[20] These failures provide early signs that minimum design requirements for conventional pipelines may not be sufficient for the Keystone system. (see Attachment 3: NRDC et. al. Comments to the Office of Pipeline Safety In response to the Advanced Notice of Proposed Rulemaking Titled "Safety of On-Shore Hazardous Liquid Pipelines")

**Limits of leak detection technology**

Pipeline leak detection technology continues to have significant limits when it comes both to real-time leak detection and detection of "small" persistent leaks. Past experience with spills on the Keystone and other diluted bitumen lines demonstrate that operator detection and response are often the most significant component dictating total overall time before pipeline shutdown.[21] During the Kalamazoo spill in Michigan, the pipeline involved wasn't finally shut down until twelve hours after the leak first occurred.[22] An investigation of Keystone I's May 7 spill by North Dakota authorities showed that while the leak detection system indicated a spill had occurred at 3:51 AM, the pipeline was not shut down until 4:35 AM – a response time of

[19] Department of Transportation, Corrective Action Order, June 3, 2011, http://blog.nwf.org/wildlifepromise/files/2011/06/320115006H_CAO_06032011.pdf.
[20] A review of all CAO's on record issued by PHMSA for hazardous liquid pipelines, available at: PHMSA, Enforcement Action Database, 1985-2011, http://www.phmsa.dot.gov/pipeline/enforcement.
[21] NRDC Pipeline Study.
[22] Deborah Hersman, Chairman of the National Transportation Safety Board, Testimony before Committee on Transportation and Infrastructure, September 15, 2010, http://www.ntsb.gov/speeches/hersman/daph100915.html (last accessed January 12, 2011). See also: Matthew McClearn, "Enbridge: Under Pressure," *Canadian Business*, December 6, 2010, http://www.canadianbusiness.com/markets/commodities/article.jsp?content=20101206_10023_10023 (last accessed January 12, 2011). See also: Eartha Jane Melzer, "Pipeline spill underlies fears of new tar sands development," *Michigan Messenger*, August 10, 2010, http://michiganmessenger.com/40744/pipeline-spill-underlines-fears-of-new-tar-sandsdevelopment

forty-four minutes.[23] This was after a third party called to provide visual confirmation of the spill as operators where validating leak detection data.[24]

However, in many ways most concerning is the challenge that the detection of small, persistent leaks pose to detection systems. This problem is demonstrated by a recent 63,000 gallon spill on an Enbridge pipeline in Canada.[25] That spill was the result of a leak the size of a pinhole that went undetected by the company and was eventually discovered by nearby residents.[26] Undiscovered seeping leaks can dramatically increase the impacts of what would otherwise be small spills.

Meanwhile, computational pipeline monitoring (CPM) systems used to detect pipeline leaks are only able to detect leaks that comprise a certain percentage of overall pipeline capacity. This presents potential problems for all pipelines. On high-capacity pipelines like Keystone XL, which would carry 830,000 bpd, the inability to detect a leak below 1.5% – 2% of overall flow rate could lead to disaster, leading to an undetected "seep" as large as 16,600 barrels (or nearly 700,000 gallons) per day. [27] The reality of these risks, and the limits of current leak detection technology, must be understood when siting pipelines.

**Diluted bitumen spills present new risks to the public and environment**

In addition to the increased risk of pipeline spills, diluted bitumen spills themselves pose new challenges and hazards to the public and environment. By itself, bitumen is far too thick, or viscous, to move through a pipeline, even at high pressure. Natural gas liquid condensate, the

[23] North Dakota Public Service Commission, Summary of Keystone Release Incident, May 16, 2011, http://www.argusleader.com/assets/pdf/DF174518518.PDF.
[24] *Id.*
[25] *No coverup in N.W.T. pipeline leak: Enbridge, CBC News Canada*, June 7, 2011, http://www.cbc.ca/news/canada/north/story/2011/06/07/nwt-enbridge-pipeline-spill.html.
[26] *Id.*
[27] State Department, SDEIS for Keystone XL, 3-127, 2011.

substance often used to dilute bitumen to allow it to travel through a pipe, is primarily composed of smaller, volatile hydrocarbons. These include small aromatic hydrocarbons such as benzene and small paraffinic and naphthenic hydrocarbons like pentane and hexane.[28]

While conventional crude has relatively small concentrations of light, volatile hydrocarbons, these smaller hydrocarbons may make up as much as 30% of diluted bitumen.[29] The low flash point and high vapor pressure of the natural gas liquid condensate used to dilute the bitumen increase the risk of a leak exploding with catastrophic results.[30] Some blends of diluted bitumen contain more than nine percent pentane content.[31] Pentane is an extremely flammable natural gas liquid that has been known to ignite from static discharge, even under carefully controlled and monitored conditions.[32] Pentane vapor adversely affects the central nervous system when inhaled, and pentane liquid readily evaporates at room temperature, absorbing latent heat from the environment.[33] As a senior process engineer working on tar sands diluted bitumen issues noted:

> "The safety risks associated with solvent release are high. On the basis of the likelihood and consequences, the risk rating matrix could rank a solvent release as high as 1 or 2 [extremely high or high risk] if a paraffinic hydrocarbon is used."[34]

---

[28] El Paso Corporation, Material Safety Data Sheet for NGL Condensate, 2007, http://www.elpaso.com/msds/A0021-Natural%20Gas%20Condensates.pdf.
[29] IHS CERA, Oil Sands, GHGs, and European Oil Supply, March 2010, Pg. 19, http://www.ceps.eu/system/files/article/2011/03/MARCH%2021_Final_JACKIE%20FORREST.pdf
[30] There are numerous cases of pipeline explosions involving NGL condensate, including the January 1, 2011 explosion of a NGL condensate line in northern Alberta ("Pengrowth investigates pipeline explosion in northern Alberta," *The Globe and Mail*, 2 Jan. 2011, http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/pengrowth-investigates-pipeline-explosion-in-northern-alberta/article1855533/, last accessed 12 Jan. 2011); and the 2007 explosion of an NGL pipeline near Fort Worth Texas after it had been ruptured by a third party ("No Injuries In Parker Co. Gas Pipeline Explosion," *AP/CBS 11 News*, 12 May 2007, http://www.keiberginc.com/web_news_files/pipeline-explosion-pr1.pdf, last accessed 12 Jan. 2011).
[31] Crude Monitor, Access Western Blend, 2011, http://www.crudemonitor.ca/crude.php?acr=AWB.
[32] Vining Wolff, Solvent Slurries in Bitumen Production, Knovel Engineering Cases, March 18th, 2011, http://engineeringcases.knovelblogs.com/2011/03/18/solvent-slurries-in-bitumen-production/.
[33] *Id.*
[34] *Id.*

Diluted bitumen contains benzene, polycyclic aromatic hydrocarbons, and n-hexane, toxins that can affect the human central nervous systems.[35] As the Environmental Protection Agency noted, following the Kalamazoo diluted bitumen spill in Michigan, high benzene levels in the air prompted the issuance of voluntary evacuation notices to residents in the area by the local county health department.[36] A report filed by the Michigan Department of Community Health found that nearly 60 percent of individuals living in the vicinity of the Kalamazoo spill experienced respiratory, gastrointestinal, and neurological symptoms consistent with acute exposure to benzene and other petroleum related chemicals.[37] In addition to their short term effects, long term exposure to benzene and polycyclic aromatic hydrocarbons has been known to cause cancer.[38]

In additional to its volatile components, diluted bitumen also contains vanadium, nickel, arsenic and other heavy metals in significantly larger quantities than occur in conventional crude.[39] These heavy metals have a variety of toxic effects, are not biodegradable, and can accumulate in the environment to become health hazards to wildlife and to people.[40]

---

[35] "Material Safety Data Sheet: DilBit Cold Lake Blend," Imperial Oil, 2002, http://www.msdsxchange.com/english/show_msds.cfm?paramid1=2479752, last accessed 12 Jan. 2011.
[36] Environmental Protection Agency, Comments regarding SDEIS for Keystone XL project, June 6, 2011 http://www.epa.gov/compliance/nepa/keystone-xl-project-epa-comment-letter-20110125.pdf.
[37] Martha Stanbury et al., *Acute Health Effects of the Enbridge Oil Spill*, Lansing, MI: Michigan Department of Community Health, November 2010, http://www.michigan.gov/documents/mdch/enbridge_oil_spill_epi_report_with_cover_11_22_10_339101_7.pdf, last accessed 12 Jan. 2011.
[38] *Toxicological Profile for Polycyclic Aromatic Hydrocarbons*, Agency for Toxic Substances and Disease Registry, 1995, http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=122&tid=25, last accessed 12 Jan. 2011.
*Benzene*, Agency for Toxic Substances and Disease Registry, 1995, http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=14, last accessed 12 Jan. 2011.
[39] "Athabasca Bitumen," Environment Canada, Emergencies Science and Technology Division, http://www.etc-cte.ec.gc.ca/databases/OilProperties/pdf/WEB_Athabasca_Bitumen.pdf.
"Tar Sands," South Dakota Sierra Club, http://southdakota.sierraclub.org/LivingRiver/tarsands.htm.
[40] The bioaccumulation of heavy metals is well established in academic literature (see, for example, R. Vinodhini and M. Narayanan, *Bioaccumulation of heavy metals in organs of fresh water fish Cyprinus carpio (Common carp)*, Int. J. Environ. Sci. Tech, 5 (2), Spring 2008, 179-182, http://www.ceers.org/ijest/issues/full/v5/n2/502005.pdf, last accessed 12 Jan. 2011). Heavy metals are elemental in nature and cannot biodegrade and have a variety of toxic

**Diluted Bitumen presents new challenges for spill response and cleanup**

The characteristics of diluted bitumen also create significant new challenges for cleanup efforts. In the case of conventional oil spills, mechanical devices such as booms, skimmers, and sorbent materials, the primary line of defense against oil spills in the United States,[41] contain and recover oil floating on the water surface.[42] However, unlike conventional crude oils the majority of diluted bitumen is composed of raw bitumen which is heavier than water. Following a release, the heavier fractions of diluted bitumen will sink into the water column and wetland sediments. In these cases, the cleanup of a diluted bitumen spill may require significantly more dredging than a conventional oil spill.[43] Eleven months have passed since the Enbridge spill in the Kalamazoo river watershed, and the Kalamazoo River is still closed. Spill responders attribute the difficulties of cleanup to the blend of crude spilled—a combination of Cold Lake diluted bitumen and Western Canadian Select diluted bitumen. Mark Durno, Deputy Incident Commander with EPA, recently stated:

> "I truly believe the characteristics of this material is the reason we still have such a heavy operation out here. Because it was a very heavy crude, we ended up with a lot more submerged oil than we anticipated having to deal with."[44]

---

effects ("Toxicological Profiles," Agency for Toxic Substances and Disease Registry, 2010, http://www.atsdr.cdc.gov/toxprofiles/index.asp, last accessed 12 Jan. 2011).

[41] "Oil Spill Response Techniques," EPA Emergency Management, Environmental Protection Agency, 2009, http://www.epa.gov/oem/content/learning/oiltech.htm.

[42] *Understanding Oil Spills and Oil Spill Response*, Environmental Protection Agency, 2009, Chapter 2: Mechanical Containment and Recovery of Oil Following a Spill, http://www.epa.gov/oem/docs/oil/edu/oilspill_book/chap2.pdf, last accessed 12 Jan. 2011.

[43] *The Northern Great Plains at Risk: Oil Spill Planning Deficiencies in Keystone Pipeline System,* Plains Justice, 2010, p. 7, http://plainsjustice.org/files/Keystone_XL/Keystone%20Pipeline%20Oil%20Spill%20Response%20Planning%20Report%202010-11-23%20FINAL.pdf.

[44] Rebecca Williams, *Oil Lingers in Kalamazoo River*, The Environment Report, Radio Interview, Apr 4, 2011, http://www.environmentreport.org/show.php?showID=520.

Further, heavy oil exposed to sunlight tends to form a dense, sticky substance that is difficult to remove from rock and sediments.[45] It would be tempting to call this material "tar", but commercial tar does not contain the corrosive sulfur chemicals or toxic heavy metals characteristic of Canadian bitumen. Removing this tarry substance from river sediment and shores requires more expensive and time-consuming cleanup operations than required by conventional oil spills.[46] These factors increase both the economic and environmental costs of diluted bitumen spills.

These are just early signs of trouble. They do not eliminate the need for additional study; rather, they present an urgent and compelling case that more study is needed. As the United States transports increasing volumes of this more toxic heavy crude through its onshore pipeline system, it is imperative these risks are properly understood and addressed. The environmental assessment for Keystone XL should be informed by a clear understanding of the real risks of this pipeline so that appropriate alternatives may be considered. Beginning with a default assumption that proposed Keystone XL will be safe undermines the National Environmental Policy Act (NEPA) review process.

Regulators cannot use risk-based standards to effectively ensure the safe, reliable, and environmentally sound operation of the nation's pipeline system until they have apprised themselves of the nature or magnitude of risks from transporting an increasing amount of diluted bitumen through U.S. pipelines. This is an area that requires proactive due diligence. It is imprudent to adopt a reactive wait-and-see approach toward these risks.

[45] *Understanding Oil Spills and Oil Spill Response*, Environmental Protection Agency, 2009, Chapter 4: Shoreline Cleanup of Oil Spills, http://www.epa.gov/oem/docs/oil/edu/oilspill_book/chap4.pdf.
[46] *Id.*

**Government oversight and regulation can prevent serious oil pipeline leaks and spills**

Addressing diluted bitumen pipeline safety risks may require a variety of changes in the design, operation and corrosion control practices for these pipelines. Such changes cannot be left to the good will of the oil pipeline industry. Actions which Congress may take to address some of the safety risks posed by corrosive products such as diluted bitumen include:

1. *Congress should require that PHMSA conduct a detailed study of pipeline transport of tar sands*

Rather than ignoring the problem and blindly presiding over an unprecedented expansion of pipeline infrastructure intended to transport diluted bitumen over sensitive resources, Congress should direct our pipeline safety regulators to fully study the risks and develop the appropriate regulations to address them. Fortunately, the Senate is advancing S.275, "The Pipeline Transportation Safety Improvement Act of 2011," a bill which directs PHMSA to conduct an analysis of whether there is an increased spill risk for pipelines transporting tar sands crude oil and if current pipeline safety regulations are sufficient to address that risk. This is a necessary first step in the right direction. We urge the House to support this measure.

Additional steps are also necessary. A thorough understanding of the impacts tar sands diluted bitumen has on pipeline integrity only provides PHMSA with half of the information it needs to effectively use risk-based standards to ensure the safety of tar sands pipelines. The agency must also have a thorough understanding of the potential impacts of a diluted bitumen spill. Risk-based spill standards must not only consider the frequency of a spill risk, but also the nature and severity of that risk. Diluted bitumen includes concentrations of volatile, highly flammable natural gas liquids transported at high pressure and temperature. The potential for

large-scale explosion and conflagration is both real and substantial. Furthermore, cleanup of diluted bitumen presents responders with unique challenges. Congress should direct the Environmental Protection Agency to work with PHMSA to develop coordinated cleanup responses specifically targeted to this relatively new environmental risk.

*2. Congress should direct PHSMA to engage in all stages of pipeline development*

PHMSA should be actively engaged in all stages of major pipeline infrastructure development, including the environmental review process, project design, construction and operation. While PHMSA does not have siting authority for hazardous liquid pipeline, the agency cannot effectively establish risk-based safety standards unless it is appraised of the public and environmental resources at risk and the magnitude of that risk.

The U.S. State Department is currently considering an application for a Presidential Permit by TransCanada for a pipeline project called Keystone XL. That project is currently undergoing an environmental review as part of the National Environmental Policy Act (NEPA). PHMSA does not appear to be actively engaged in the environmental risks assessment for Keystone XL. It should be. As it stands, in their latest environmental review of Keystone XL, the Department of State's pipeline experts have determined that the Keystone XL pipeline will have a leak due to pipeline corrosion once every 3,400 years and a leak due to flooding and washout once every 87,600 years. State's prediction that the proposed Keystone XL pipeline will have a leak due to "Materials and Construction" once every 3,300 years is even more surprising, given that the first Keystone pipeline, built by the same company, using the same grade steel that would be used to build Keystone XL, has had a dozen leaks in less than a year of operation. Of course, few people expect the Department of State to have significant pipeline safety expertise.

PHMSA does and should be using their expertise to support the federal NEPA process for Keystone XL. This should include the development of a report addressing pipeline safety issues specific to diluted bitumen, prior to the completion of the NEPA review process.

You simply cannot have an agency that purports to use risk-based standards to regulate pipeline safety take a hands-off approach when it comes to where a pipeline is built, what happens if it spills, and how those two dynamic variables affect each other. PHMSA should be actively engaged at all levels of the pipeline project planning, design, and construction process. This should include a report establishing pipeline safety guidelines and regulations specific to diluted bitumen. That report should inform the environmental impact statement process for Keystone XL and the routing of the pipeline.

*3. Congress should direct PHMSA to provide additional protections for open-source Aquifers*

The Ogallala Aquifer is a prime example of an absolutely essential water resource that should receive the highest level of protection under pipeline safety regulations. The Ogallala Aquifer, considered one of the great fresh water resources of the world, contains approximately two-thirds of the volume of the High Plains Aquifer system. It covers approximately 174,000 square miles underneath eight states.[47] It is one of the largest fresh water aquifer systems in the world. The Ogallala Aquifer is a vital water source for irrigating U.S. farmland. However, the aquifer is very porous. A pipeline spill here would likely have substantial impacts, potentially causing long-term damage that would be extremely difficult to contain and remediate.

Given the importance and sensitivity of this resource, one would assume that PHMSA's risk based standards would afford it the highest level of protection. This is not the case. In fact,

[47] United States Geological Service, High Plains Regional Groundwater Survey, June 14, 2011, http://co.water.usgs.gov/nawqa/hpgw/factsheets/DENNEHYFS1.html

the Ogallala Aquifer receives the lowest level of federal oversight under current pipeline safety regulations. This is a potential disaster waiting to happen. Current plans are to construct the Keystone XL tar sand pipeline through the heart of the Ogallala Aquifer in an area in Nebraska called the Sandhills. With over a billion acre-feet of groundwater,[48] this is the richest area of Ogallala Aquifer. In many parts of the Sandhills, the water table is at surface level. We really don't know how a spill will impact the Sandhills region or what challenges attempting to remediate contamination in the Aquifer here will entail. PHMSA's records show that there are currently no crude oil pipelines going through Nebraska's Sandhills.[49] TransCanada, which wants to build a pipeline through that environmentally sensitive region, has not presented a special plan in the event of a worst case scenario, possibly because the company "anticipate(s) that most spills will be small and easily removed with a shovel,"[50] During the Gulf spill, we witnessed the sad consequences that come of allowing an accident prone company to replace expensive but prudent safety measures with reckless optimism. Let us not court a similar disaster in the deep waters of our nation's greatest fresh water aquifer.

**Conclusion**

It is in the public's best interest for our pipeline safety regulators to evaluate the risks that high volumes of heavy, corrosive and abrasive crudes, such as diluted bitumen, will have on the U.S. pipeline system. After PHMSA has identified these risks, the agency should adopt appropriate safety regulation. Both should be done before significant new pipeline projects, such

[48]U.S. Fish and Wildlife Service, *The Sandhills: Building Partnerships for an Ecosystem*, http://www.fws.gov/mountain-prairie/pfw/ne/ne4.htm#Whatis.
[49] Review of hazardous liquid pipelines in NE Sandhills counties (National Pipeline Mapping System, http://www.npms.phmsa.dot.gov/PublicViewer/, last visited June 10, 2011).
[50] State Department, Supplemental Draft Environmental Impact Statement, Appendix C "Spill, Countermeasure and Prevention" Adobe pg. 15. http://www.keystonepipeline-xl.state.gov/clientsite/keystonexl.nsf?Open.

as the proposed Keystone XL pipeline, are permitted and constructed. We hope that you will closely consider the concerns that we have raised today and act to ensure the future safety of our hazardous liquid pipeline system. It would be tragic to wait until the United States has a catastrophic diluted bitumen spill to take these risks seriously.

NRDC thanks you for the opportunity to present its views. As the nation continues to strive towards greater standards of pipeline safety, we look forward to working with the Committee to develop policies that foster a balanced and environmentally sustainable outcome.