

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

NATURAL RESOURCES DEFENSE)	
COUNCIL, INC.,)	
)	
Plaintiff)	Civil Action No. 08-1363 (RJL)
)	
-v.-)	
)	
UNITED STATES DEPARTMENT OF)	
STATE, et al.,)	
)	
Defendants)	
)	
TRANSCANADA KEYSTONE)	
PIPELINE, LP,)	
)	
Defendant-Intervenor)	

DECLARATION OF GALEN W. HARTMAN

I, Galen W. Hartman, declare as follows:

I. EXPERIENCE AND QUALIFICATIONS

1. I am the President and Laboratory Director of Chemical Analysis, Inc., a consulting firm specializing in activities related to the oil and gas industry, where I have been employed since 1974.

2. I have a Bachelor of Science Degree in chemistry and physics from Southeastern State University, and two years of graduate work in organic chemistry and chemical engineering.

3. I have over thirty years of relevant experience in oil and gas refining chemistry, physics, chemical engineering, and environmental impacts and studies; plume dispersal modeling of airborne components; evaluations of Radiuses of

Hazardous Exposures from refinery pollution; leak detections and remediation of spills and contaminations of ground and substrata including aquifers; and Federal and State regulations associated with these matters. I am familiar with the chemistry of heavy crude oil and residues derived from tar sands in the Western Canadian Sedimentary Basin, as well as light and medium crude oils processed in U.S. refineries. I have experience with refinery emissions both at the source and as experienced at ground level, including effects on public health and the environment.

4. My resume is attached as Exhibit A to this declaration.

II. MATERIALS REVIEWED

5. At the request of Plaintiff in this proceeding, I have reviewed the following documents:

(a) the Complaint and First Amended Complaint filed in this action;

(b) excerpts from the Final Environmental Impact Statement for the Keystone Oil Pipeline Project, dated January 11, 2008 ("Final EIS"), relating to air and water emissions from ConocoPhillips' Wood River refinery;

(c) excerpts from Form 6-K filed by EnCana Corporation with the Securities and Exchange Commission on October 5, 2006; Form 8-K filed by ConocoPhillips with the Securities and Exchange Commission on October 5, 2006; and Form 10-K filed by ConocoPhillips with the Securities and Exchange Commission on February 22, 2008, related to the ConocoPhillips refinery in Borger, Texas, and the Keystone Oil Pipeline Project;

(d) a transcript of testimony by Thomas H. Wise presented to the Illinois Commerce Commission on July 21, 2006;

(e) the 2007 Annual Report of the National Cooperative Refinery Association;

(f) Canadian government documents related to the composition of Canadian tar sands crude oils, Canadian oil company material safety data sheets on Canadian tar sands crudes, and various “white papers” on the composition of Canadian tar sands crude oils and mixtures;

(g) A technical paper: Chambers, A.K., et al. *Direct Measurement of Fugitive Emissions of Hydrocarbons from a Refinery*, Air & Waste Manage. Assoc. 58:1047-1056, 2008.

I also consulted standard reference texts, including the Handbook of Petroleum Engineering, Handbook of Chemical Engineering, Handbook of Chemistry and Physics, Dangerous Properties of Industrial Materials, Handbook of Pharmacokinetics, and Handbook of Toxic and Hazardous Chemicals and Carcinogens.

6. The analysis and opinions set forth in this declaration are based on my education, experience, and expertise, as summarized above and as set forth in Exhibit A to this declaration.

7. In this declaration, I explain my opinion that the authorizing of the Keystone pipeline to transport crude oil from Canadian tar sands for refining in the United States can be expected to increase air and water pollution from U.S. refineries. These pollution increases are susceptible to both general and site-specific analysis and, to some extent, site-specific quantification based on publicly available information.

III. THE EFFECTS OF KEYSTONE CRUDE ON AIR POLLUTION FROM REFINERIES

Different chemistry of oil refinery feedstock from Canadian tar sands

8. I am generally familiar with the chemistry of crude oil obtained from the Alberta oil sands region that is the source for crude to be transported via the Keystone pipeline. The oil extracted from the sands is a viscous, dense oil known as bitumen. It must be diluted and converted to synthetic crude to enable transport through a pipeline. I am familiar with the variations in chemical composition and physical properties associated with the various Canadian tar sands crudes and the mixtures of these various crudes that constitute synthetic crudes and blends. While the particular composition of such synthetic crude oils may vary considerably with the geographical location and depth from which the bitumen is extracted, refinery feedstock derived from Alberta tar sands has distinctive characteristics within a predictable range.

9. I am also generally familiar with the chemistry of light and medium crudes processed at Midwest and Gulf Coast refineries (referred to herein as “conventional” crudes). Again, there is a range of compositions, but that range can be characterized relative to the synthetic crude derived from Canadian tar sands.

10. On average, there are major differences between Canadian tar sands crudes and conventional crudes. The average crude derived from Canadian tar sands contains far more sulfur, nitrogen, and heavy metals (including lead, nickel, chromium, boron, arsenic, zinc, and vanadium) than conventional crudes. Other components in Canadian tar sands crudes that are comparatively higher include hydrogen sulfide, oxides of carbon, oxides of sulfur, alkenes, mercaptans, sulfides, sulfates, sulfonic acids, aromatics, carboxylic acids, and phenols.

11. The Canadian tar sand crudes are comparatively higher in viscosity, carcinogenic components, toxic components, corrosivity of metals, and solid residues. Many of the chemicals listed in paragraph 10 are known to be toxic to humans, animals, fish, plants, and microbes at particular levels of exposure.

Different emissions from refining

12. According to widely publicized information from oil and gas companies, some U.S. refineries are planning expansions to accommodate the processing of more crude derived from Canadian tar sands that will be shipped via the Keystone pipeline. Others are retaining the same capacity, but converting some proportion of their feedstock from conventional crudes to Canadian tar sands crude from the pipeline. For refineries that are adding capacity and new process equipment to accommodate more Canadian tar sands crude, as appears to be the case for ConocoPhillips' refinery in Borger, Texas, the increased operations are likely to result in increased air emissions. But even where heavier crudes are replacing lighter crudes barrel for barrel, there will be foreseeable increases in air emissions.

13. As described above, the chemistry of crude derived from Canadian tar sands is, on average, significantly and predictably different from the chemistry of conventional crudes. When processed at the refinery, the heavier, "dirtier" crude releases more of some pollutants, notably hydrogen sulfide, sulfurous acids, sulfur monoxide, sulfur dioxide, carbon monoxide, carbon dioxide, sulfurous acid mists, nitrogen monoxide, nitrogen dioxide, amino oxides, and heavy metals (such as lead, nickel, chromium, boron, arsenic, zinc, and vanadium, as well as organocomplexes of

those metals). Also, components listed in paragraph 10 above would be released from refinery process and pipeline spills within and outside the plant.

14. Because of their distinctive chemical composition, as described above, tar sands crudes require additional processing at the refinery end of production. The more intense processing typically includes such processes as distillation and fractionation (the separation of oil feedstocks into different components); coking, cracking, and hydrocracking (the breaking up of the generally larger hydrocarbon molecules of heavy crudes); sulfur removal; additional heat processing; and catalyst recycling, replacement, and disposal; as well as many other processes. Refineries processing the heavier Canadian crudes generally require additional coking, cracking, and hydrocracking capacity relative to what is required to process conventional crudes. The additional processing can be expected to result in more refinery gas, liquid, and solid releases of these same pollutants, as described in paragraph 13. The significantly higher sulfur content in the Canadian tar sands crude also creates major catalyst poisoning problems and requires substantial efforts to minimize and respond to these problems.

15. Air emissions of hazardous airborne components from refineries come from several sources, including: voluntary and involuntary venting (release of gases); spills; maintenance procedures where lines, vessels, and units are depressurized or purged; so-called "fugitive" losses that include inherent releases due to leaks, tank hatch losses, handling losses, operational losses, breathing (thermal expansion and contraction) of vapor zones of tanks and vessels, displacement of vapor zone of tanks

and other equipment due to additions or subtractions of tank volumes; and “flaring” (the burning of gases to relieve pressures in the plant).

16. Refiners commonly assume in their emissions reports that all hydrogen sulfide is converted to sulfur dioxide in the refining process. In fact, the processing often results in residual hydrogen sulfide, sulfur monoxide, sulfur dioxide, and sulfurous acids. Many of the hydrocarbon gases are not completely pyrolytically (through the heating process) converted to carbon dioxide and water. These incomplete conversions yield carbon monoxides and fragments of hydrocarbons that are not generally reported as air emissions. The same is true of volatile organic compounds that go to the flaring process and are not completely pyrolytically converted to carbon dioxide and water. Benzene, for example, is relatively highly stable thermally and can be emitted from the flare unchanged. Toluene, xylenes, and other aromatic compounds will break down in a manner that results in further benzene emissions, including so-called free radical benzene.

17. Benzene is well known as a carcinogenic compound for many forms of cancer, and the free radical benzene is even more highly carcinogenic than benzene. Air emissions of hydrogen sulfide, sulfur monoxide, sulfur dioxide, sulfurous acid mists, nitrogen oxides, and heavy metals, as well as others identified above, may pose well-documented, severe risks to human health and the environment. These hazardous air emissions can have additive and synergistic effects when emitted simultaneously. Many of these pollutants have odors and contribute to opaqueness of the surrounding air mass. And hydrogen sulfide can numb the olfactory nerves at relatively low concentrations that may prevent the ability to smell and thus prevent the recognition of

higher concentrations of hydrogen sulfide. The debilitating systemic effects of some hazardous air pollutants can contribute to evacuation problems during a spill or catastrophic event.

18. The permitting of refineries under the Clean Air Act does not insure that all of these hazardous air emissions are well-controlled, because many refinery emissions are not closely regulated through permit limits. So-called “fugitive emissions” include releases of pollutants from valves, compressors, pumps, flanges, connectors, and other piping components. In contrast to more highly regulated emissions from stacks and vents, fugitive emissions are notoriously difficult to measure with any degree of accuracy, and are often estimated using standard emission factors. Much of the qualitative and quantitative reporting of fugitive emissions is based on guesswork, and many refineries split up the reporting of such emissions into various categories to minimize their apparent effect. In cases where ground level concentrations have been carefully and accurately measured at given distances from refineries while monitoring meteorological conditions, the actual emissions determined from such measurements almost always exceed the reported emissions of hazardous air pollutants for that refiner’s day. Similarly, a recent study based on direct measurements of fugitive emissions at a refinery in Canada suggests that actual fugitive emissions of some pollutants are many times greater than those calculated and reported through the use of standard emission factors.

19. It is well known throughout the oil and gas industry that some of the most severe air pollution impacts on people living near refineries are due to flaring, venting, and fugitive losses. Spills and maintenance procedures contribute to venting emissions.

In many refineries, the number of tons of relatively unregulated emissions from flaring, venting, and fugitive losses outweigh the total levels of emissions subject to numerical permit limits. The refining of heavier crudes tends to increase the incidence of such flaring, venting, and fugitive losses because of the greater processing described in paragraph 14. It can therefore be anticipated that refineries expanding to process Keystone crude or shifting from conventional crudes to Keystone crude will experience an increase in flaring, venting, and fugitive emissions.

20. I am familiar with the large variations in chemical composition and physical properties associated with the various Canadian tar sands crudes. Based on my review of Canadian sources of information, the description and characterization of these crudes by Canadian government agencies and Canadian industry is lacking sufficient chemical identification for the refineries to design for processing the varying streams of Canadian crude. The refineries are likely to depend presently on better defined feedstock. Having less information about the composition of the highly variable Canadian crude may increase the probability of process upsets that can result in more pollution and environmental impacts.

IV. THE EFFECTS OF KEYSTONE CRUDE ON WATER POLLUTION FROM REFINERIES

21. Differences in chemistry between Canadian tar sands crude and the lighter conventional crudes also mean that refineries replacing or augmenting their conventional feedstock with Keystone crude are likely to discharge more water pollutants. Refinery modifications of equipment, processes, and methods to process the Canadian tar sands crude can be expected to create more waste, emissions, and additional processing chemicals required for these changes. These may result in

additional releases of hazardous chemicals that will be in gas, liquid, particulate, and solid forms that can affect waterways. Airborne gases, liquids, and particulates from elements of feedstock, refined components, processing chemicals, catalysts, and other refinery-related compounds can affect ground surfaces, water run-off, and waterways. Once in the waterways, the hazardous components will (depending on composition and solubility) end up on the surface or bottom of the waterway, or in the water matrix. The distribution of these hazardous components in waterways can be anticipated to have adverse environmental impacts on local fauna and flora.

22. Like air emissions, not all water discharges are subject to permit limits. Refineries regularly experience upsets and bypasses of water treatment systems that release water pollutants in quantities beyond those specified in Clean Water Act permits. Refineries processing Keystone crude can be expected to discharge more pollutants like those described above when upsets and bypasses occur.

V. ANALYZING THE ENVIRONMENTAL IMPACTS OF REFINING KEYSTONE CRUDE

23. Based on publicly available information, one can analyze and describe the reasonably foreseeable environmental impacts associated with particular refineries' processing of oil from the Keystone pipeline. The types of analysis described below could have been performed before the U.S. Department of State ("DOS") released its Final EIS on the Keystone Pipeline Project.

24. While DOS could have requested more specific information from the Keystone permit applicant before releasing the Final EIS, there was also public information (such as in corporate filings with the Securities and Exchange Commission and testimony before state regulatory commissions) specifically linking certain

refineries, in addition to ConocoPhillips' Wood River refinery, to Keystone crude. For example, I reviewed documents describing contracts to bring specified amounts of Keystone crude to particular refineries in Borger, Texas and McPherson, Kansas, as well as more general information regarding supply of Keystone crude to a refinery in Robinson, Illinois. These documents include information about planned expansions to accommodate the new supplies and/or conversions from conventional crude feedstock to Canadian crude feedstock. Such information permits identification of refineries likely to process Keystone crude.

25. Once the refineries are identified, one can consult data such as that published by the U.S. Department of Energy's Energy Information Administration and in the annual Oil & Gas Journal Data Book, which provide detailed information about U.S. refineries' operations. This information includes a breakdown of capacity for each sector of the operations (e.g., vacuum distillation, coking, catalytic cracking, and other processes). There is also information available on current emissions from refineries that are submitted to State environmental agencies and is qualitatively and quantitatively tabulated and categorized in terms of refinery process areas, and types of gases, liquids, and solids. Also, refineries are typically required to file information with State agencies within 24 hours of upsets, to identify qualitative and quantitative information about releases during upsets. Refineries also submit to State tax agencies and oil and gas agencies qualitative and quantitative information about production from various components of their operations. With available information on what grades of oil are currently processed in a plant, and in what quantities, one can estimate the likely increases in the releases of certain types of pollutants resulting from the addition of, or a

shift to, heavier feedstock in the amounts corresponding to Keystone contracts. At the very least, one can identify refineries, in addition to Wood River, that are likely to release more of certain pollutants into the surrounding communities as a result of processing Keystone crude, and describe for those refineries (including Wood River, for which that analysis has, to my knowledge, not been done) the reasonably foreseeable pollution impacts associated with the addition of Keystone crude to those refineries' feedstock. In most instances, there may be enough information to quantify expected levels of increased pollution.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: October 16, 2008

/s/ Galen W. Hartman
Galen W. Hartman

EXHIBIT A
TO DECLARATION OF GALEN W. HARTMAN
CURRICULUM VITAE

Curriculum Vitae

G. W. Hartman
P.O. Box 153008
Irving, Texas 75015

105 Janice Circle
Kemp, Texas 75143
903-432-2506; 903-432-9906 Fax
ghartman@mycvc.net Email

Education:

HS Diploma: S&S Consolidated High School, Sadler, Texas, May, 1962.

AS Degree: Cooke County College, Gainesville, Texas, in Chemistry and Physics, Jan., 1964.

BS Degree: Southeastern State University in Chemistry and Physics, Jan., 1967.

MS Degree Program: University of Texas at Dallas in Organic Chemistry, 1973 and 1974.

MS Degree Program: Massachusetts Institute of Technology (MIT through Texas Association of Graduate Education and Research) in Chemical Engineering, 1973 and 1974.

Experience:

Petrolite Corporation: 1967 - 1968; Project Leader in Refinery Services R&D Laboratory, St. Louis, Missouri. Polymer, organic chemical, chemical engineering R&D; analytical chemistry, process equipment and instrumental equipment design, formulated products and equipment designing in oil and gas refineries and gas treatment plants for various input streams including Canadian, measurement methods and equipment for materials exposed to hydrogen sulfide and hydrogen sulfide safety; US military projects, environmental and safety duties and responsibilities. 2 US patents.

E. I. DuPont DeNemours, Inc. (DuPont Chemical Co.): 1968 - 1973; Research Chemist in Fabrics and Finishes R&D Laboratory, Troy, Michigan. Polymer, organic chemical, chemical engineering R&D; analytical chemistry, Emergency Brigade Captain for laboratory and plant responsible for personnel safety of materials, fire and explosion prevention, training Brigade First Responders, and preparation and implementation of contingency plans for facility. 4 US Patents.

Texas Instruments, Inc.: 1973 - 1974; Process Engineering Manager in US Government Military Products Division 01 and Semiconductor Products Division 03, Sherman, Texas. Polymer, organic chemical, chemical engineering R&D; analytical chemistry, process equipment and instrumental equipment design; US military R&D projects in Paveway,

Tomahawk, Harpoon, HARM, FLIR, SURTASS, and military communication antennae; environmental and safety duties and responsibilities. 2 US patents.

Chemical Analysis, Inc.: 1974 - Present; Laboratory Director and President, Irving, Texas. Wide range of technical activities being 45% R&D in polymer, chemical, and chemical engineering; 20% environmental and toxicological analyses; 15% failure analyses; 10% US and foreign patent applications, and 10% legal and expert testimony. Numerous military R&D projects and failure analyses including projects for the Army, Air Force, Navy, Marines, Pentagon, and NASA. Oil field technical activities include R&D of formulated products, equipment, failure analyses, corrosion evaluations, compliance evaluations of state and federal regulations, preparation and evaluations of contingency plans especially for hydrogen sulfide safety, environmental and toxicological evaluations, well bore failures, explosions, technical support provided for the Texas legislative bill passed for requiring pipeline construction permits for hydrogen sulfide laden streams. Testified numerous times before the Railroad Commission of Texas (RCT) including before the three commissioners and in court cases where hydrogen sulfide and other hazardous component safety were at issue. In 1998, the RCT ordered the plugging of a capped newly drilled hydrogen sulfide laden well and the stopping of construction of a transmission pipeline which was under construction. This was the first time in the RCT history that they ordered the plugging of a drilled well with potential. Mr. M. DeWayne Varnadore was the lead attorney and CAI provided all the technical support in this plaintiff action. Numerous US and foreign patents.

Professional Organization Memberships Present or Previous:

- American Association of Advancement of Science (AAAS)
- American Association of State Highway and Transportation Officials (AASHTO)
- American Chemical Society (ACS)
- American Council of Independent Laboratories (ACIL)
- American Institute of Chemical Engineering (AIChE)
- American Society for Testing and Materials (ASTM)
- International Conference of Building Officials (ICBO)
- International Council of Independent Laboratories (ICIL)
- National Association of Corrosion Engineering (NACE)
- Society of Plastics Engineering (SPE)
- Uniform Building Code Officials (UBC)

CERTIFICATE OF SERVICE

I, Selena K. Kyle, hereby certify that on October 17, 2008, I served the foregoing document:

DECLARATION OF GALEN W. HARTMAN

on the following counsel via the Court's electronic filing system:

Luther L. Hajek
U.S. DEPARTMENT OF JUSTICE
P.O. Box 663
Washington, DC 20044
(202) 305-0492
luke.hajek@usdoj.gov

Timothy K. Webster
SIDLEY AUSTIN, LLP
1501 K Street, NW
Washington, DC 20005-1401
twebster@sidley.com

I declare under penalty of perjury that the foregoing is true and correct.

Executed October 17, 2008:

/s/ Selena K. Kyle
Selena K. Kyle