

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

IN THE MATTER OF THE APPLICATION BY)
TRANSCANADA KEYSTONE PIPELINE, LP)
FOR A PERMIT UNDER THE SOUTH DAKOTA)
ENERGY CONVERSION AND TRANSMISSION)
FACILITIES ACT TO CONSTRUCT THE)
KEYSTONE XL PROJECT)

Docket No. HP 14-001

**STANDING ROCK SIOUX TRIBE
MOTION TO RECONSIDER ORDER GRANTING MOTION IN LIMINE
TO PRECLUDE KEVIN E. CAHILL PH.D.**

COMES NOW, intervenor, Standing Rock Sioux Tribe, by and through counsel, and respectfully moves the Public Utilities Commission for reconsideration of its Order dated July 23, 2015 granting the Motion in Limine to Preclude the Testimony of Kevin E. Cahill Ph.D. By this motion, the Tribe requests an order reconsidering and vacating the preclusion of Cahill’s rebuttal testimony and expert report.

This motion is based upon Amended Conditions 1 and 3 incorporated in the South Dakota permit issued to TransCanada for the Keystone XL Pipeline Project (Amended Final Order, HP 09-001 June 29, 2010); SDCL §§ 19-12-01 (admissibility of relevant evidence) and 1-26-18 (right to respond to evidence offered by opposing party in administrative hearing); the Memorandum of Points and Authorities below; and the papers and pleadings on file herein

**MEMORANDUM OF POINTS AND AUTHORITIES
IN SUPPORT OF RECONSIDERATION**

“Administrative agencies have the inherent authority to correct adjudications which appear to be erroneous.” *Jundt v. Fuller*, 736 N.W.2d 508, 512 (S.D. 2007) *citations omitted*. Of course, all state agencies must follow South Dakota law. SDCL §1-26-36(1). The Order Granting Motion in Limine does not comport with South Dakota law. *Burley v. Kyttec Innovative Sports Equipment*, 737 N.W.2d 397, 401-403, 411 (S.D.

2007) (circuit court judgment reversed and remanded, due to improper exclusion of expert testimony in violation of liberal rules of relevancy). The *Burley* case is directly on point and governs the introduction of Dr. Cahill's testimony. The *Order Granting Motion in Limine* to exclude Dr. Cahill should be reconsidered and vacated.

Cahill's testimony was timely pre-filed in rebuttal to opinions given by Staff witnesses Brian Walsh and Kimberly McIntosh that the State Department's *Final Supplemental Environmental Impact Statement* adequately evaluates Keystone XL's impacts on South Dakota under the National Environmental Policy Act (NEPA), 42 U.S.C. §4321 *et seq.* It directly relates to Staff testimony and exhibits, and is relevant to:

- Amended Condition 1 – “Keystone shall comply with all applicable laws” – i.e. NEPA.
- Amended Condition 3 – “Keystone shall comply with and implement the recommendations set forth in the Final Environmental Impact Statement.”).

Staff witness Brian Walsh pre-filed testimony on the interplay between the Amended Conditions and the Final SEIS, as follows:

Q. Have you reviewed the Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone XL Project?

A. Yes.

Q. On March 12, 2009, the DENR submitted comments on the scope of the Draft EIS to the U.S. Department of State. In addition, on May 20, 2011, the DENR submitted comments on the Supplemental Environmental Impact Statement. Do you believe that DENR's comments were adequately addressed by the Department of State now that the FSEIS is available for review?

A. Yes. DENR's comments were adequately addressed in the FSEIS.

Q. In your opinion, do the FSEIS and conditions set forth in the PUC's Amended Final Decision and Order adequately address the protection of South Dakota resources?

A. Yes. If the pipeline is constructed and operated as designed and in compliance with all applicable laws and regulations, permit conditions, and the recommendations of the FSEIS, risks to South Dakota resources will be minimized.

Pre-filed Testimony of Brian Walsh, April 2, 2015.

In response, Cahill provided expert rebuttal testimony as follows:

Mr. Walsh is incorrect when he asserted in his pre-filed testimony that “pursuant to the recommendations in the FSEIS risks to South Dakota’s natural resources is minimized.” Simply put, the application in the FSEIS of the IMPLAN economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline...

The economic costs of an oil spill on local economic activity can be near devastating. The State Department considers none of these effects in their quantitative analysis... Just as it ignores the possibility of negative socioeconomic effects from the construction and operation of the proposed Keystone pipeline, the State Department ignores the possibility of negative impacts on productivity and quality of life associated with living with the risk of an oil spill.

Pre-filed Rebuttal Testimony and Expert Report of Kevin E. Cahill, Ph.D., April 28, 2015, 19-20.

Thus, Mr. Walsh’s testifies on the import of the Final SEIS with respect to protection of South Dakota resources and quality of life. Compliance by TransCanada with Amended Condition 1 requires federal environmental reviews that properly evaluate the potential impacts on South Dakota. Mr. Walsh’s testimony includes his opinion that it does; Cahill’s rebuttal gives a different opinion with supporting analysis. Both testimonies are relevant and admissible evidence in this proceeding on whether Keystone XL complies with conditions 1 and 3.

In South Dakota, the presentation of rebuttal evidence in a contested administrative proceeding is a right. SDCL §1-26-18. As the Nebraska Supreme Court explained, “The parties are to be given a chance to rebut or to comment on any evidence considered by the agency in making its decision.” *Langvardt v. Horton*, 581 N.W.2d 60, 69 (Neb. 1998). The test on the admissibility of rebuttal evidence in this docket is not whether it addresses an Amended Condition – as the presentation of rebuttal evidence is a right under South Dakota law, the test is whether it addresses testimony or evidence presented by the opposing party. Cahill’s testimony does so, without any question.

With respect to the relevancy of expert testimony, the South Dakota Court has ruled, “We interpret our rules of evidence liberally with the general approach of relaxing traditional standards of opinion testimony.” *Burley v. Kytac Innovative Sports Equipment*,

737 N.W.2d at 405. Dr. Cahill's rebuttal testimony and expert report directly address testimony and exhibits pre-filed by Staff and TransCanada, and relates to Amended Conditions 1 and 3. It is relevant, admissible rebuttal evidence which the Standing Rock Sioux Tribe has a right to introduce in this proceeding under South Dakota law. *The Order Granting Motion in Limine to Preclude Rebuttal Testimony of Kevin E. Cahill* should be reconsidered and vacated.

RESPECTFULLY SUMMITTED this 24th day of July, 2015

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**BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN RE APPLICATION BY TRANSCANADA KEYSTONE PIPELINE, LP
FOR A PERMIT TO CONSTRUCT KEYSTONE XL PIPELINE**

DOCKET NO. HP 14-001

**REBUTTAL TESTIMONY BY KEVIN E. CAHILL, Ph.D.
on behalf of STANDING ROCK SIOUX TRIBE**

APRIL 28, 2015

**Motion for Reconsideration - Cahill
Exhibit A**

Q. State your name and occupation.

A. My name is Kevin E. Cahill. I serve as Project Director / Senior Economist for ECONorthwest, an economics, finance, and planning consulting firm with offices in Portland and Eugene, Oregon, Seattle, Washington, and Boise Idaho. I am also a Research Economist for the Sloan Center on Aging and Work at Boston College, in Chestnut Hill, Massachusetts.

Q. Summarize your education and professional background.

A. My resume is attached as Appendix A to the REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D., ON BEHALF OF THE STANDING ROCK SIOUX TRIBE.

I earned my Ph.D. in Economics from Boston College in 2000, after receiving my M.A. in Economics from Boston College in 1997, and my B.A. with honors in Mathematics and Economics from Rutgers College in 1993. Since earning my Ph.D., I have worked as a research economist both in academia (Sloan Center at Boston College, 2005-present; Center for Retirement Research, Boston College, 2003) and as a consultant providing expert reports and testimony. I specialize in applied microeconomics – including but not limited to the economics of aging, health and labor economics – applied econometrics and statistical methods and public policy. I have conducted extensive research and analysis related to patterns of labor force withdrawal, occupational changes with age and related economic issues and statistical analyses.

Q. Summarize your publications.

A. My resume lists my academic papers and publications. This includes co-authoring a forthcoming essay entitled *Evolving Patterns of Work and Retirement*, to be published in THE HANDBOOK OF SOCIAL SCIENCES (8th Edition), as well as nearly 50 published academic articles, papers and professional and expert reports. My publications have addressed a wide range of labor and health economic issues ranging from *Linking Shifts in the National Economy with Changes in Job Satisfaction, Employee Engagement and Work-Life Balance*, in 56 JOURNAL OF BEHAVIORAL AND EXPERIMENTAL ECONOMICS (2015), to *Did the 9/11 Compensation Fund Accurately Assess Economic Losses* in TOPICS IN ECONOMIC ANALYSIS AND POLICY, Vol. 6, Issue 1 (2006).

Q. Describe any professional honors or awards you have received.

A. My professional activities, honors and awards are listed on my resume. They include the 2011 Lawrence R. Klein Award for Best MONTHLY LABOR REVIEW article in 2011, and Teaching Excellence Award, Boston College, Graduate School of Arts and Sciences, 1998.

Q. Describe any professional presentations you have given at professional or academic conferences.

A. I have made many professional presentations, on a wide variety of topics related to applied microeconomics and public policy. They are listed on my resume. My presentations range from *How Might the Affordable Care Act Impact Retirement Transitions?* Presentation at the 89th Annual Conference of the Western Economic Association International, Denver, CO June 28, 2014, to *The Role of the Economist in Assessing Damages for Defendants*, Presentation at Liberty Mutual Group, Marlton, NJ March 18, 2005.

Q. Do you have a leadership role in any professional associations?

A. My leadership roles and professional memberships are listed on my resume. I am a founding Editorial Board member of WORK, AGING AND RETIREMENT. I serve as an At-Large Vice President of the National Association of Forensic Economics. I am a member of the American Economics Association and the Gerontological Society of America, among other professional organizations.

Q. Describe your experience providing expert witness testimony in legal proceedings.

A. My experience providing expert witness testimony in legal proceedings is described on my resume. I have provided expert witness testimony in over a dozen court proceedings, ranging from opinions on economic loss and damages in state court contract claims, to the apportionment of damages across purchaser and product groups in federal anti-trust litigation.

Q. On whose behalf are you testifying today?

A. I am providing rebuttal testimony on behalf of the Standing Rock Sioux Tribe, to rebut testimony presented by the Staff of the Public Utilities Commission, namely the direct testimony of Kimberly Lorrene McIntosh and Brian Walsh.

Q. Are you familiar with the petition by TransCanada for re-certification under SDCL §49-41B-27 of its permit to construct the Keystone XL Pipeline in South Dakota?

A. Yes. Appendix B to my report outlines the documents that I have read and analyzed regarding the Keystone Pipeline, the Keystone XL Pipeline and the re-certification of the South Dakota permit. My review included many of the documents filed with the Public Utilities Commission in HP 14-001, the pre-filed testimony of key witnesses of the Commission Staff, as well as the U.S. Department of State *Final Supplemental Environmental Impact Statement on the Keystone XL Pipeline Project*.

Q. Is the Final SEIS relevant to this certification proceeding?

A. Yes, it is definitely relevant. It is my understanding that under the statute, “the utility must certify to the Public Utilities Commission that (it) continues to meet the conditions upon which the permit was granted.” The Amended Conditions require compliance with applicable health and safety and environmental laws, including the National Environmental Protection Act of 1969 (NEPA). It is also my understanding that NEPA requires that projects affecting the quality of the human environment, such as the Keystone XL Pipeline, undergo a rigorous environmental review. The Department of State released the FSEIS in January, 2014. I respectfully strongly recommend that the PUC evaluate the FSEIS in determining whether the Keystone XL Pipeline continues to comply with all applicable health and safety laws.

Q. Did you evaluate the efficacy of the FSEIS as a complete and accurate review of the impacts of the Keystone XL Pipeline?

A. Under the Council on Environmental Quality regulations, “Environmental impact statements shall be prepared using an inter-disciplinary approach which will insure the integrated use of the natural and social sciences.” 40 CFR §1502.6. Accordingly, the FSEIS contains a chapter on the Socioeconomic Impacts of the Keystone XL Pipeline. As a labor and health

economist and applied econometrician, I evaluated the socioeconomic impacts analysis in the FSEIS.

Q. Explain further.

A. I shall elaborate by reference to the pre-filed testimony of Brian Walsh, on behalf of the Commission staff. Mr. Walsh gave the opinion that pursuant to “the recommendations in the FSEIS, risks to South Dakota’s natural resources is minimized.” (p. 2, lines 22-23). As a labor and health economist and applied econometrician with extensive experience analyzing the economic consequences of risk, I can attest that Mr. Walsh is incorrect. The application in the FSEIS of the Impact Analysis for Planning (IMPLAN) economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. The State Department wrote, “The economic effects of the potential pipeline spills are beyond the scope” of the FSEIS (FSEIS, p. 4.10-32). That statement, and other significant shortcomings, demonstrates the inadequacy of the FSEIS under NEPA. Mr. Walsh’s assertion that the FSEIS protects the natural resources of South Dakota ignores the fact that extremely important data on negative socioeconomic factors were not factored into the IMPLAN model. My report analyzes the deficiencies in the FSEIS in more detail.

Q. Do you have any other reasoned opinions on the pre-filed testimony in this docket?

A. Yes. The pre-filed testimony of Kimberly Lorrene McIntosh highlights the same misconceptions. Her opinion that any oil spill may be totally remediated “given sufficient time and resources” and the natural environment totally protected notwithstanding the operation of an oil pipeline (p. 4) lacks grounding in reality. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the Keystone Pipeline, be remediated such that the expected benefits of the pipeline are greater than the expected costs to the residents and businesses in South Dakota.

Q. Do you have any opinion on the impacts of the Keystone XL Pipeline on the Standing Rock Sioux Tribe?

A. The Tribe receives negligible, if any, economic benefits from this project. According to the State Department, “Keystone estimates that only approximately 10 percent of

the construction workforce would be hired from the four proposed project area states.” (FSEIS, p. 4.10-2). The purported benefits associated with operations are even more negligible. So the state of South Dakota as a whole would receive little or no economic benefit from the Keystone XL Pipeline, and the net economic impact could very well be negative. The economic impacts associated with the environmental risks of the project have not been adequately evaluated for the Tribe, or for South Dakota generally, so it is not possible to ascertain the net quantitative impacts at this time.

Q. Do you have anything else to add?

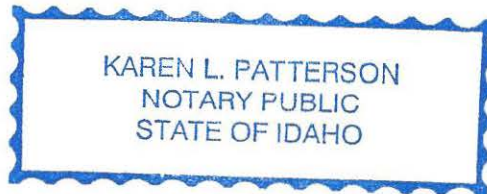
A. I respectfully request that the Public Utilities Commission accept my REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D., ON BEHALF OF THE STANDING ROCK SIOUX TRIBE into evidence and give it due consideration in this proceeding.

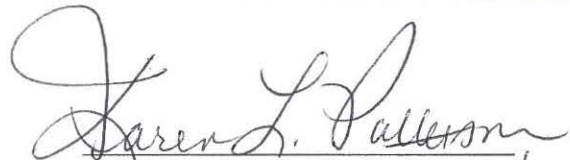
Dated this 28 day of April, 2015

By: 
Kevin E. Cahill

STATE OF IDAHO)
 :
COUNTY OF ADA)

SUBSCRIBED and SWORN to before me
this 28th day of April, 2015




NOTARY PUBLIC exp. 04.05.19

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE PETITION OF
TRANSCANADA KEYSTONE PIPELINE, LP
FOR ORDER ACCEPTING CERTIFICATION
OF PERMIT ISSUED IN DOCKET HP09-001
TO CONSTRUCT THE KEYSTONE XL
PIPELINE

PETITION FOR ORDER
ACCEPTING CERTIFICATION
UNDER SDCL §49-41B-27

DOCKET HP14-001

**REBUTTAL EXPERT REPORT OF ECONOMIST KEVIN E. CAHILL, PH.D.
ON BEHALF OF THE STANDING ROCK SIOUX TRIBE**

April 28, 2015

Rebuttal Expert Report of Economist Kevin E. Cahill, PhD on Behalf of the Standing Rock Sioux Tribe

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I. INTRODUCTION

A. Summary of Opinions

1. Economics is the study of the efficient allocation of scarce resources. Decision making in the face of scarcity is simply a fact of life and, because resources are scarce, it is necessary to choose how to produce, distribute, and consume those resources. To allocate resources efficiently economists generally agree that it is important to consider not just the benefits of decisions, but also the costs.
2. Ms. McIntosh ignores this fundamental reality of economics when she states that “I do not believe there are any petroleum spills that can not [sic] be remediated given sufficient time and resources.”¹ I don’t think anyone would argue that Ms. McIntosh’s response is not accurate. While accurate, it is not meaningful, and in many respects it is nonsensical from an economic standpoint. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs to the residents and businesses in South Dakota and other jurisdictions along the route of the proposed pipeline.
3. The socioeconomic analyses conducted to date are grotesquely insufficient in this regard. They are incomplete, inadequate and fail to employ professional methods and standards for conducting such analyses. The quantitative analyses that I have reviewed in this matter as they pertain to socioeconomic impacts, including the State Department’s Final Supplemental Environmental Impact Statement for the Keystone XL Project (FSEIS), have all been conducted in the absence of any quantitative assessment of potential negative socioeconomic impacts.² Not surprisingly, when socioeconomic costs are assumed to be zero and socioeconomic benefits are assumed to be positive, the conclusion is a positive socioeconomic impact. Such an approach is inconsistent with commonly-accepted principles and practices in the field of economics.

¹ Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

² United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, January 2014.

4. This fundamental flaw applies to two recent analyses in particular that I have reviewed, and their resulting conclusions regarding socioeconomic impacts are grossly insufficient as a result. First, in its FSEIS, the State Department uses the Impact Analysis for Planning (IMPLAN) economic forecasting model to conduct a large part of its socioeconomic impact analysis. The IMPLAN methodology is a valid technique in some cases; however, the State Department's application of the IMPLAN model in this case contains no quantitative analyses of non-positive socioeconomic impacts of either construction or operations of the Keystone oil pipeline. Nowhere in the entire 11-volume report's socioeconomic assessment is there any mention of the prospect of jobs lost in the State of South Dakota in future years. The reason is due to the fact that negative impacts are simply impossible given the IMPLAN methodology used by the State Department. As a result, in no way does the State Department analysis reflect the net socioeconomic impact of the Keystone oil pipeline on the State of South Dakota.
5. The State Department's justification for not including the implications of pipeline spills in its socioeconomic analysis is that it did not have the resources to do so. In the State Department's words, "The economic effects of potential pipeline spills are beyond the scope of this operations assessment."³ One has to wonder what the actual economic implications of a spill involve if simply estimating the costs of a spill is too much work for an agency with an annual budget of more than \$50 billion.
6. The IMPLAN methodology that the State Department uses, therefore, naively assumes a positive impact and then portends to calculate just how positive. This methodology is seriously flawed, as any spill from the Keystone oil pipeline will have at least some negative impact on the local, if not state, economy. The State Department's socioeconomic estimates, in contrast, use the following dollar value for negative impacts: \$0.
7. The State Department fails to conduct even the most rudimentary assessment of impact on Quality of Life (QoL) and productivity – a survey of individuals who have experienced the negative implications of oil spills due to the construction and operations of oil pipelines.
8. The State Department fails to conduct any kind of real-world comparables analysis as part of its socioeconomic assessment, such as the socioeconomic implications of oil spills on local

³ FSEIS, p. 4.10-32.

economies – including jobs lost – to evaluate the economic impact of an unplanned release of oil. Such an analysis could include places where the construction of an oil pipeline or comparable project was performed recently.

9. While the SEIS implicitly assumes a zero dollar value for negative socioeconomic impacts and ignores other well-known methods to quantify costs, the SEIS is very explicit about the miniscule positive socioeconomic benefits to the State of South Dakota and the Standing Rock Sioux Tribe. Further, according to the SEIS, “Because of the specialized nature of the work, Keystone estimates that only approximately 10 percent of the construction workforce would be hired from the four proposed Project area states.”⁴ Apparently South Dakota’s own workers are not good enough for this work. Further, neither the construction nor the operations of the Keystone oil pipeline will have any meaningful impact on the estimated 37.2 percent employment rate of the Standing Rock Reservation.⁵
10. The second document is a risk analysis of the proposed Keystone oil pipeline conducted by a research team hired by TransCanada Keystone Pipeline, LP.⁶ This report spans a full 36 single-spaced pages and includes potentially-valuable information about the source of spills (corrosion, natural forces, excavation damage, other outside force damage, material and/or weld failures, equipment, and incorrect operation) and the costs associated with each cause. The authors use the term “total cost” to describe costs, however, the term “socioeconomic” is not mentioned once in the entire report and neither is the word “jobs” (as in jobs lost), an interesting juxtaposition with the SEIS that touts socioeconomic benefits almost entirely in terms of jobs created.
11. Any decent economic analysis contains a summary of high-level findings. The TransCanada Keystone Pipeline, LP risk assessment does not. In fact, the word “dollar” and the symbol “\$” are completely absent from the report summary. One has to wonder what the point of this study is if: 1) the entire methodology section is grounded with an expected cost risk equation, and 2) the main conclusion is silent about what these expected costs are.

⁴ FSEIS, Section 4.10 (Socioeconomics), January 2014, p. 4.10-2.

⁵ United States Department of the Interior. 2014. *2013 American Indian Population and Labor Force Report*. Washington, D.C. Available at: <http://www.bia.gov/cs/groups/public/documents/text/idc1-024782.pdf>.

⁶ McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). *Risk Analysis of the Proposed XL Pipeline Route*. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute.

12. The authors even acknowledge their inability to identify costs in any meaningful way and conclude that they are unable to conduct even a rudimentary cost-benefit analysis. It is very concerning that those most knowledgeable about spills are unable to attempt a straightforward cost-benefit assessment.
13. Even more egregious, when examining the extent to which the spills in their database are indicative of the proposed Keystone oil pipeline, the authors limit their comments to biases that operate in favor of their client. The authors are silent about well-known biases that operate in the other direction, such as the pressure under which the pipeline will operate and the caustic nature of the tar sands oil. The fact that the authors are silent about biases that go against their client's interests calls into question their entire analysis and makes one wonder what else they are not telling the reader.
14. The evidence presented by TransCanada's research team runs counter to an independent study – most notably, one not funded by TransCanada, but also not funded by the intervenors in this case – conducted by Professor John Stansbury from the University of Nebraska – Lincoln. Economists are oftentimes faced with this type of situation, where experts in a particular field disagree. The response of a well-trained economist is to conduct what is known as a sensitivity analysis. Simply put, you perform your calculations using different scenarios and show how the results change when the underlying assumptions change. Clearly there are differences of opinion among experts with respect to the consequences of an oil spill. None of the socioeconomic impact analyses I have seen include any kind of sensitivity analysis with respect to these obvious differences of opinion among qualified experts.
15. Simply put, the socioeconomic impact analyses of the Keystone oil pipeline are a statement about the expected socioeconomic benefits of the project – marginal in the case of South Dakota – in the absence of any costs or risks. As a PhD economist I find it inexplicable why the quantitative portion of the socioeconomic cost analysis in the SEIS completely ignores the cost side of this cost-benefit analysis. A balanced and well-informed socioeconomic impact analysis would, at an absolute minimum, at least attempt to model the potential negative implications of the construction and operating impacts of the Keystone oil pipeline to arrive at net impacts.
16. Because of these shortcomings, Mr. Walsh is incorrect when he asserts in his pre-filed testimony that pursuant to “the recommendations in the FSEIS, risks to South Dakota's

natural resources is minimized.”⁷ As noted above, and as explained in detail below, the application in the FSEIS of the IMPLAN economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. Minimized does not imply minimal and certainly does not imply zero, as the State Department assumes in its IMPLAN analysis.

17. In further regard to Ms. McIntosh, she also provides other testimony regarding a generic or non-specific “petroleum spill” or “hydrocarbon spill.” Such generic or sweeping statements ignore the specifics of the Keystone pipeline, or the risks associated with the corrosive and toxic nature of the tar sands oil that would flow through the pipeline.
18. This report is structured as follows. The remainder of this section presents my qualifications, assignment, compensation and materials considered. Section II contains a summary of the relevant background information in this case as it pertains to my rebuttal report. Section III presents and comments on the pretrial testimony of Ms. McIntosh. Section IV follows up on my comments regarding Ms. McIntosh’s testimony with an assessment of the IMPLAN methodology used by the State Department to assess socioeconomic impact. Section V follows up on my comments regarding Ms. McIntosh’s testimony and Mr. Walsh’s testimony with an assessment of the empirical analysis contained in the SEIS and TransCanada’s risk assessment. Section VI follows up on my comments regarding Ms. McIntosh’s testimony by noting some obvious inconsistencies in the SEIS analysis and TransCanada’s assessments of risk. Section VII comments on how Ms. McIntosh trivializes the potential costs of the Keystone oil pipeline. Section VIII summarizes the main points of this report.

B. Qualifications

19. My name is Kevin E. Cahill, Ph.D. I hold a B.A. in both economics and mathematics from Rutgers College and an M.A. and Ph.D. in economics from Boston College, with a focus in applied econometrics and labor economics. I am currently a project director and senior economist at ECONorthwest, a Northwest-based economic consulting firm, and a research economist with the Center on Aging & Work at Boston College (“the Center”). I have been

⁷ Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification of Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April), p. 2.

with ECONorthwest since April 2012. I have been affiliated with the Center since its inception in 2005. Prior to joining ECONorthwest, I was a manager at Analysis Group, an economics and financial consulting firm headquartered in Boston, Massachusetts. While at Analysis Group, I worked as an economist on a variety of litigation-related cases involving contract disputes, antitrust issues and improper marketing, and the calculation of damages in such cases. My casework at Analysis Group also included an assessment of competition in the pharmaceutical benefit manager industry, an analysis of topping bids in mergers and acquisitions, and an assessment of age discrimination claims within cash balance pension plans.

20. In addition to my consulting work, I conduct economic analyses related to public policy. My research focuses on applied microeconomics with a concentration in the economics of aging. My work has been published in academic journals, including *The Gerontologist*, *Research on Aging*, *Monthly Labor Review*, *Topics in Economic Analysis and Policy*, *Current Medical Research and Opinion*, *Journal of Managed Care Pharmacy*, *Expert Opinion on Pharmacotherapy*, as well as by the Center for Retirement Research, the Center on Aging & Work, and the U.S. Bureau of Labor Statistics.
21. Prior to joining Analysis Group, I served as the associate director for research at the Center for Retirement Research at Boston College, as an economist and expert witness with Tinari Economics Group, and as an associate at Abt Associates, Inc., a for-profit public policy research firm based in Cambridge, Massachusetts. I am a member of the American Economics Association and I am currently vice president at-large on the Board of the National Association of Forensic Economists.
22. I have previously testified in deposition and at trial. My expert opinions pertained to lost profits to business, lost earnings, including fringe benefits and pensions, and other economic losses.
23. Although I hold positions with ECONorthwest in Portland, Oregon and with Boston College in Chestnut Hill, Massachusetts, I currently reside in Boise, Idaho and have been a resident of Boise since March 2010. Prior to living in Boise, Idaho, I was a resident of Marshfield, Massachusetts.

24. My professional and academic qualifications, publications in the past ten years, and testimony in the past four years are described in my curriculum vitae, which is attached as Appendix A.

C. Assignment

25. I have been asked by counsel for the Standing Rock Sioux Tribe to rebut the testimony offered by Brian Walsh and Kimberly Lorrene McIntosh as it pertains to the socioeconomic impacts of the Keystone oil pipeline.⁸

26. To the extent relevant to my rebuttal comments, I have also been asked by counsel for the Standing Rock Sioux Tribe to: (1) review TransCanada's Petition for Order Accepting Certification under SDCL §49-41B-27 and the FSEIS issued by the State Department; (2) assess the methodology used by the State Department to determine the socioeconomic impact on the citizens of South Dakota; and (3) comment on the extent to which the claims by the State Department reflect current conditions and knowledge with respect to the true socioeconomic impact of the Keystone oil pipeline on the citizens of South Dakota and the Standing Rock Sioux Tribe.

27. I would like to note that I feel an incredible pride in our country. I am deeply appreciative of the fact that I live in a country where civilians can offer without fear of retribution opinions on an analysis conducted by a government agency that pertains to such a high-profile project as the Keystone oil pipeline.

28. I am willing to testify under oath as to the opinions expressed in this report.

29. I may offer additional opinions if additional relevant information becomes available.

D. Compensation

30. I have been compensated for my time on this matter at my standard hourly rate for litigation-related work through ECONorthwest. This rate is \$300 per hour. None of my compensation is based on the outcome of the Keystone oil pipeline. The time that I have spent on this matter was conducted through ECONorthwest and is unrelated to my work with the Center.

⁸ Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September); Pre-filed Testimony of Brian Walsh. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

31. Under my direction, staff at ECONorthwest assisted with the preparation of this report. Staff at ECONorthwest were compensated for their time on this matter according to their standard hourly rate for litigation-related work through ECONorthwest.
32. Should other parties involved in this case request further analyses from me, they will be billed through ECONorthwest at my hourly rate for litigation-related consulting services. This rate is currently \$300 per hour. Any follow-up work that I deem requires the assistance of ECONorthwest staff will also be billed at ECONorthwest's standard hourly rates for litigation-related consulting services.

E. Materials Considered

33. I have reviewed documents provided by counsel for the Standing Rock Sioux Tribe and other documents that are publicly available. A list of these documents is contained in Appendix B.

II. BACKGROUND

34. The Public Utilities Commission of the State of South Dakota (PUC) is considering an application by TransCanada Keystone Pipeline, LP (Applicant) for certification under SDCL §49-41B-27 to site and build the Keystone XL hydrocarbon pipeline project (the Keystone oil pipeline) through western South Dakota. The Applicant sought and obtained a permit from the PUC in 2010 to build and operate the Keystone oil pipeline on June 29, 2010.⁹ My understanding is that, while permits are perpetual, if construction does not start within four years of approval, then an applicant must certify that a project continues to meet the conditions of the initial permit.¹⁰ In this case, the Applicant must certify to the PUC that the Keystone oil pipeline continues to meet the conditions of SDCL §49-41B-27.¹¹

⁹ Petition for Order Accepting Certification under SDCL §49-41B-27. In re: The Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (TransCanada Keystone Oil Pipeline Petition).

¹⁰ SDCL 49-41B-27 states: "Construction, expansion, and improvement of facilities. Utilities which have acquired a permit in accordance with the provisions of this chapter may proceed to improve, expand, or construct the facility for the intended purposes at any time, subject to the provisions of this chapter; provided, however, that if such construction, expansion and improvement commences more than four years after a permit has been issued, then the utility must certify to the Public Utilities Commission that such facility continues to meet the conditions upon which the permit was issued." (Source: South Dakota Legislature, Legislative Research Council, http://legis.sd.gov/Statutes/Codified_Laws/DisplayStatute.aspx?Type=Statute&Statute=49-41B-27, accessed April 13, 2015.)

¹¹ TransCanada Keystone Oil Pipeline Petition.

35. The Applicant, through their attorneys, have submitted a petition and supporting documents that they believe “provides the necessary basis for the Commission to find that the Project continues to meet the conditions upon which the June 2010 permit was issued.” As such, they have requested that the PUC accept certification of the Keystone oil pipeline through western South Dakota.¹²
36. In January 2014 the United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs (State Department) issued a Final Supplemental Environmental Impact Statement (FSEIS) for the Keystone oil pipeline in order to “assess the potential impacts associated with the proposed Project and its alternatives.”¹³ The State Department states that the FSEIS includes several changes from the initial EIS, dated November 2008, including “an expanded analysis of potential oil releases; expanded climate change analysis; updated oil market analysis incorporating new economic modeling; and expanded analysis of rail transport as a part of the No Action Alternative scenario.”¹⁴ The State Department does not include its socioeconomic impact analysis among its highlighted list of changes.
37. According to the SEIS, construction for the Keystone oil pipeline will “contribute approximately \$3.4 billion to the U.S. GDP” and “[c]onstruction spending would support a combined total of approximately 42,100 jobs throughout the United States.”¹⁵ Further, the FSEIS states that “[a]bout 12,000 jobs, or 29 percent of the total 42,100 jobs, would be supported in Montana, South Dakota, Nebraska, and Kansas, approximately 3,900 (or 1,950 per year if construction took 2 years) would comprise of direct, temporary, construction workforce in the proposed Project area.”¹⁶
38. Regarding operations, the FSEIS states that the Keystone oil pipeline will “require approximately 50 total employees in the United States: 35 permanent employees and 15 temporary contractors” and that “[t]he total estimated property tax from the proposed Project

¹² Petition for Order Accepting Certification under SDCL §49-41B-27. In re: The Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (p. 6).

¹³ United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Executive Summary, January 2014, p. ES-1.

¹⁴ FSEIS, p. ES-1.

¹⁵ FSEIS, p. ES-20.

¹⁶ FSEIS, p. ES-20.

in the first full year of operations would be approximately \$55.6 million spread across 27 counties in three states.”¹⁷

III. MS. MCINTOSH’S STATEMENTS ARE ECONOMICALLY NONSENSICAL

39. Economics is the study of the efficient allocation of scarce resources. Decision making in the face of scarcity is simply a fact of life and, because resources are scarce, it is necessary to choose how to produce, distribute, and consume those resources. To allocate resources efficiently economists generally agree that it is important to consider not just the benefits of decisions, but also the costs.
40. In her pre-filed testimony, Ms. McIntosh is asked, “Are there spills that cannot be remediated?”¹⁸ In response, she states, “I do not believe there are any petroleum spills that can not [sic] be remediated given sufficient time and resources.”¹⁹ I don’t think anyone would argue that Ms. McIntosh’s response is not accurate. While accurate, it is not meaningful, and in many respects it is nonsensical from an economic standpoint. The relevant issue is given *limited* resources and time, can petroleum spills, in particular those that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs.
41. A socioeconomic cost analysis has been conducted by the State Department as part of the FSEIS. I have reviewed this analysis and others pertaining to this case to assess if Ms. McIntosh’s statements, even if corrected to be economically meaningful, would be considered valid among qualified professionals in the field of economics. As I explain in the following sections, the answer is no. In particular, the socioeconomic analysis contained in the FSEIS is in no way an accurate reflection of the net socioeconomic impact of the Keystone oil pipeline.

¹⁷ FSEIS, p. ES-20.

¹⁸ Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

¹⁹ Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September), p. 4.

IV. THE CURRENT SOCIOECONOMIC ANALYSES ARE FUNDAMENTALLY FLAWED FROM A METHODOLOGICAL STANDPOINT

42. The methodology that the State Department uses for assessing socioeconomic impact of the Keystone oil pipeline examines “the potential impacts to socioeconomic resources associated with the construction and operation of the proposed Project and connected actions, and discusses potential mitigation measures that would avoid or minimize the potential impacts.”²⁰ The State Department explains that “[e]conomic activity is defined as the production of goods and services required to meet the demand for construction of the proposed Project. Funds spent by Keystone would trigger production activity, which could be expressed in terms of employment and earnings.”²¹
43. The State Department then concludes that the relevant research question is to estimate the magnitude of the (positive) ripple effects throughout the economy, including direct and indirect impacts, as well as induced impacts, described as “the spending of earnings that would be received by employees working for either the construction contractor or for any supplier of goods and services required in the construction process.”²² The State Department’s promise to discuss “potential mitigation measures that would avoid or minimize potential impacts” is oddly relegated to another section of the report,²³ and is not used to inform the State Department’s economic calculations in any way.
44. The State Department is rather explicit about its abdication of its responsibility to assess negative impacts, claiming it does not have the resources to do so. In the State Department’s words, “The economic effects of potential pipeline spills are beyond the scope of this operations assessment.”²⁴ One has to wonder how a government agency with an annual budget exceeding \$50 billion does not have the resources to quantify the negative impacts associated with an oil spill.

²⁰ FSEIS, p. 4.10-1.

²¹ FSEIS, p. 4.10-13-4.

²² FSEIS, p. 4.10-14.

²³ The State Department states, “Section 4.13.5, Potential Impacts, discusses the potential impacts of a spill on socioeconomic resources.” FSEIS, p. 4.10-10.

²⁴ FSEIS, p. 4.10-32.

A. The IMPLAN Model Does Not Take into Account the Impact of Potential Oil Spills

45. The State Department uses the Impact Analysis for Planning (IMPLAN) economic forecasting method, a straightforward input-output model. As described by the US Department of Agriculture, “IMPLAN provides quick estimates of staffing and program impacts to state and local economies for strategic planning.”²⁵ The key component of the IMPLAN model is the multiplier that it generates (i.e., the number that is used to inflate the number of jobs that the researcher inputs to get the number of additional indirect and induced jobs).
46. The assumptions used in calculating this multiplier are crucial. As it turns out, besides State Department staffing, there is nothing in the FSEIS to suggest that the State Department’s application of the IMPLAN model has anything to do with the Keystone pipeline per se. To state the obvious, the State Department’s economic forecasting model should take into account the fact that the model is being used to assess the impacts of an oil pipeline and, as such, should consider the negative implications on socioeconomic activity that come with it.

B. The IMPLAN Model Does Not Allow for Negative Impacts

47. The economic impact analysis conducted by the State Department is seriously flawed because the IMPLAN model does not consider the possibility that the Keystone oil pipeline could have a negative impact on population and employment (numbers), housing (numbers), schools (numbers), and tax revenue. A serious economic analysis would, at a minimum, (1) acknowledge the possibility of negative impacts and (2) attempt to address them in the socioeconomic analysis. The State Department does Step 1, but then, mysteriously, ignores all of this information for the purposes of quantifying socioeconomic impacts.
48. In fact, the State Department’s analysis contains what at first appears to be a fairly comprehensive list of potential social and economic impacts that they include in their analysis. Specifically, the following is a list of the impacts considered by the State Department: “[o]verburdening of the local housing stock because of demand generated by the temporary and permanent workforces; substantial burden on public service providers serving the proposed Project area, such that they would need to expand their service capacities to meet those

²⁵ US Department of Agriculture, National Resources Conservation Service, “IMPLAN Model/NRCS Economics,” http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/alphabetical/econ/?&cid=nrcs143_009748.

demands; substantial changes to local social or economic activities, including changes in employment and income levels resulting from the proposed Project construction and operations; substantial changes in economic impacts, including output and spending; substantial effects to potential environmental justice populations; substantial changes in fiscal revenues, including tax receipts, of local jurisdictions; substantial changes in private property values; and substantial effects to transportation resources.”²⁶

49. Most glaringly, the list includes nothing about oil spills. As noted earlier the socioeconomic impacts of oil spills is not quantified and is not included among the State Department’s impacts.

50. Regarding the State Department’s assessment of the impact of “substantial changes in private property values,” the State Department is apparently most concerned about the impacts associated with construction on “short-term visual, noise, and land disturbance effects.”²⁷

Regarding operations, the State Department concludes that the impacts could even be *positive*: “Based on the literature search, the Final EIS stated that residential and agricultural properties located on or adjacent to pipeline easements could have property values worth more or less than comparable nearby properties that were not encumbered by pipeline easements.”²⁸ One has to wonder why the Standing Rock Sioux Tribe—and numerous intervenors—would be opposed to something that has the potential to *increase* property values. The answer is obvious—it wouldn’t. It is only through the State Department’s omission of oils spills that they reach such a perverse conclusion.

51. The State Department concludes that, “The largest economic impacts of pipelines occur during construction rather than operations.”²⁹ The construction process is a mere two years. The bulk of time is associated with operations, and here the State Department’s refusal to examine the socioeconomic costs of a spill is paramount. Regarding operations, the State Department concludes: “[t]he 35 new permanent employees associated with the proposed Project would have a negligible impact on housing in the Project area;”³⁰ “Once in place, the labor requirements for

²⁶ FSEIS, p. 4.10-10.

²⁷ FSEIS, p. 4.10-31.

²⁸ FSEIS, p. 4.10-35. The State Department concludes: “The Final EIS concluded it did not appear that operation of the proposed Project would have a major impact on residential and agricultural property values. The analysis in this Final SEIS does not change this conclusion.” It is unclear what kind of “analysis” with respect to property values was done as part of the FSEIS.

²⁹ FSEIS, p. 4.10-32.

³⁰ FSEIS, p. 4.10-32.

pipeline operations are relatively small;”³¹ “[t]he Final EIS ... concluded that it was not likely that proposed Project operation would disproportionately adversely impact such populations during normal operation of the proposed Project;”³² and “[t]he operational workforce ... would result in negligible impacts on public services based on the law enforcement agencies, fire departments, and medical facilities in the proposed Project area.”³³ In contrast, the State Department concludes that “The impact [of operations] to local property tax revenue receipts would be substantial for many counties.”³⁴ If the benefits were so high relative to the costs, one has to wonder why so much effort has been undertaken by the intervenors to express concerns about the Keystone oil pipeline. The obvious answer is that the State Department’s analysis is in no way an accurate assessment of the socioeconomic impact of the Keystone oil pipeline on the citizens of South Dakota.

52. The question that the State Department should have asked is: what is the *net impact* of the proposed Keystone oil pipeline on the socioeconomics of the community? How were businesses in these areas impacted? How were individuals in these areas impacted? How were property values impacted? Did individuals have to move out of the area as a result of the spill? How was wildlife affected? And, most importantly, what was the *dollar value* associated with each of these events? Only until such an assessment is done, can the true socioeconomic impact of the Keystone oil pipeline be understood.

V. THE CURRENT SOCIOECONOMIC ANALYSES ARE GROSSLY INSUFFICIENT FROM AN EMPIRICAL STANDPOINT

53. This section presents an assessment of the State Department’s empirical analysis of the socioeconomic impact of the Keystone oil pipeline on four project area states—South Dakota, Montana, Nebraska, and Kansas—as well as the rest of the country.³⁵ The State Department socioeconomic analysis covers impacts associated with construction and operations of the Keystone oil pipeline. The socioeconomic categories included in the analysis are: population,

³¹ FSEIS, p. 4.10-32.

³² FSEIS, p. 4.10-32.

³³ FSEIS, p. 4.10-32.

³⁴ FSEIS, p. 4.10-34.

³⁵ FSEIS, p. 4.10-2. As described in footnote one of the FSEIS, “The proposed Project pipeline would go through Montana, South Dakota, and Nebraska, with two additional pump stations in Kansas. There would also be a pipe yard and rail siding located in North Dakota.”

housing, local economic activity, environmental justice, public services, tax revenue, property values, and traffic and transportation. The State Department's socioeconomic impact analysis with respect to these categories is based on the IMPLAN methodology discussed above. In doing so, the State Department starts with existing conditions (e.g., current population) and estimates the effect of adding people and jobs to the baseline condition. The impact on property values is considered independently from the other socioeconomic considerations, as is the risk associated with an oil spill. The result is that risk burden of an oil spill and the costs associated with any that occurs is not taken into account when estimating impacts on population, housing, the local economy, and public services.

A. The FSEIS Analysis Inexplicably Separates Oil Spills and Property Values from Other Socioeconomic Considerations

54. The State Department applies its IMPLAN model to estimate impacts to population, housing (number of units), and public services. The State Department then discusses, almost as an aside, the estimated number of residents impacted by the risk burden of a potential oil spill and the impact that a spill will have on property values, among other outcomes, including quality of life for those living and working in the affected area. The State Department's IMPLAN analysis, on the other hand, implies that an oil spill has no quantifiable negative socioeconomic impact on the local economy.

B. The FSEIS Analysis Ignores Impacts on Quality of Life

55. The State Department fails to conduct even the most rudimentary assessment of the impact on Quality of Life (QoL) and productivity – a survey of individuals who are currently subjected to the risk of an oil spill. The socioeconomic impact analysis presented in the State Department report is almost entirely hypothetical, as if real-world outcomes did not exist. In fact, not only do real-world examples exist, they are plentiful. Moreover, it is very easy to obtain data on quality of life – you simply ask people. Individual surveys are a very basic part of research. An entire industry focuses on surveys, as most anyone with a telephone can attest.

56. Examples of relevant questions to ask residents in areas that already experienced an oil spill are as follows. “Compared to your living situation prior to the oil spill, has your quality of life been enhanced, has it remained the same, or has it been adversely impacted?” “On a

scale of one to ten, where one is no impact and ten is extreme impact, how would you rate the impact of the oil spill on your quality of life?” “On a scale of one to ten, where one is not at all valuable and ten is extremely valuable, how valuable would it be to you to eliminate the oil spill that you were subjected to?” “In the last week, in what ways were you affected by the oil spill?” “[For those who responded at least once to the previous question] On a scale of one to ten, where one is none and ten is completely, to what extent did these episodes interrupt your daily life?” “Would you say that the oil spill had a negative impact on your quality of life? Yes or No.”

57. An important note for a serious analysis is that these questions should be asked of all residents in the surrounding area, not just those who the State Department believes a priori are directly impacted by the oil spill. Such an approach would enable an assessment of the breadth of the socioeconomic impact of an oil spill.
58. If the State Department was serious about the impact of an oil spill on residents in the State of South Dakota, the State Department should simply ask people who would be most affected, such as members of the Standing Rock Sioux Tribe. One has to wonder why, as part of the FSEIS, the State Department has not presented the results of any interviews with those individuals who will, on a daily basis, bear the risk of a potential oil spill and then the costs if one occurs.

C. The FSEIS Analysis Ignores Impacts on Productivity

59. The State Department in its analysis of the impacts of operations on local economic activity claims that employment and earnings impacts of the Keystone oil pipeline will be “negligible.”³⁶ While I agree that the potential positive impacts of the Keystone oil pipeline will be negligible, I strongly disagree that this implies that the overall impact will be negligible. The economic costs of an oil spill on local economic activity can be near devastating.³⁷ The State Department considers none of these effects in their quantitative analysis.

³⁶ FSEIS, p. 4.10-32.

³⁷ One notable example is the BP Gulf of Mexico spill. A report by Oxford Economics on the impact of the 2010 BP spill estimates the negative economic effect on solely the tourism sector of the coastal areas affected by the spill of \$22.7 billion over the three years following the spill. See: Oxford Economics. Not dated. *Potential Impact of the Gulf Oil Spill on Tourism*. p.2

60. Even if no spill occurs in the near term, the risk of a spill is enough to influence local economic activity. To measure this potential impact, the survey described above could be easily supplemented to ask individuals about the impact of the risk of an oil spill. For example, “If the Keystone oil pipeline project moves forward, will that influence any of your decisions to live, work, and invest in your local community?” “[For those who responded yes to the previous question] On a scale of one to ten, where one is none and ten is a lot, what impact does the risk of a spill have on your plans to live, work, and invest in your local community?”
61. While there may be questions about the reliability of data concerning the magnitude of any impact on productivity and willingness to remain a productive citizen in one’s local economy, one would certainly be able to ascertain from a survey if there was no impact. People would just say so.
62. Again, one has to wonder why, as part of the FSEIS, the State Department has not talked to anyone who has experienced the risk of an oil spill.

D. The FSEIS Analysis Erroneously Assumes No Harm for Living with the Risk of an Oil Spill

63. The State Department assumes that the socioeconomic impact on quality of life is zero for living with the risk of an oil spill. While the State Department identifies short and long-term health risks associated with exposure to an oil spill, it does nothing to attempt to determine if the risk of these health conditions—or even the presence of the conditions themselves—has any effect on economic productivity or quality of life. Just as it ignores the possibility of negative socioeconomic effects from the construction and operation of the proposed Keystone pipeline, the State Department ignores the possibility of negative impacts on productivity and quality of life associated with living with the risk of an oil spill.
64. If the State Department were serious about socioeconomic impact, the survey mentioned above would be asked of people who are subjected to potential oil spills. Only then can the State Department’s assumptions about the risk of living with a potential oil spill be validated.

E. The FSEIS Analysis Fails to Conduct an Analysis of Relevant Real-World Benchmarks

65. The State Department fails to conduct any kind of real-world analysis of socioeconomic impacts to cities that have already been subjected to something like the proposed Keystone

oil pipeline. Such an analysis is common in economics and is fairly straightforward to conduct, mainly because the relevant data is widely available. The U.S. Census Bureau and the U.S. Bureau of Labor Statistics publish very detailed historical socioeconomic information about cities, counties, states, and regions. These data can be used to examine changes over time with respect to a variety of economic characteristics.

66. Further, an analysis of existing locations subject to potential oil spills can be done two ways, each of which would shed light on the possible impact to South Dakota. The first way is to examine socioeconomic data from cities that experienced a change such as the proposed Keystone oil pipeline and compare these data to analogous data from some other comparable city. A second way to conduct the analysis is to use information prior to the intervention as a benchmark. That is, for the city to serve as its own “control,” obviously taking into account other changes over time using multivariate regression analysis. Each method is valuable and each method is common in the field of economics.

F. The FSEIS Analysis Shows Minimal Socioeconomic Benefits to South Dakota or the Standing Rock Sioux Tribe

67. While the FSEIS implicitly assumes a zero dollar value for negative socioeconomic impacts and ignores other well-known methods to quantify costs, the SEIS is very explicit about the miniscule positive socioeconomic benefits to the State of South Dakota or the Standing Rock Sioux Tribe. With respect to the construction of the Keystone oil pipeline, less than 10 percent (8.3%) of the direct and induced jobs would be held by residents of South Dakota, so more than 90 percent of the short-term (<2 years) job benefits associated with Keystone oil pipeline construction are outside of South Dakota. Further, according to the SEIS, “Because of the specialized nature of the work, Keystone estimates that only approximately 10 percent of the construction workforce would be hired from the four proposed Project area states.”³⁸ Apparently South Dakota’s own workers are not good enough for this work.
68. Operations of the proposed Keystone project are estimated to create 50 jobs across the entire country (35 on a permanent basis). In March 2015, total employment in South Dakota was 419,200. This means the proposed Keystone project will increase long-term total

³⁸ United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Section 4.10 (Socioeconomics), January 2014, p. 4.10-2.

employment in South Dakota by no more than 0.012 percent ($0.000119 = 50 / 419,200$).³⁹ Actual increases in employment in South Dakota will be even lower (zero for all practical purposes) because not all jobs created by the proposed Keystone project will be located in South Dakota. Further, neither the construction nor the operations of the Keystone oil pipeline will have any meaningful impact on the estimated 37.2 percent employment rate on the Standing Rock Reservation.⁴⁰

69. Because of the shortcomings described above with respect to the socioeconomic analysis contained in the FEIS, Mr. Walsh is incorrect when he asserted in his pre-filed testimony that pursuant to “the recommendations in the FSEIS, risks to South Dakota’s natural resources is minimized.”⁴¹ Simply put, the application in the FSEIS of the IMPLAN economic forecasting model contains no quantitative analysis of non-positive socioeconomic impacts of either construction or operation of the Keystone XL Pipeline. Minimized does not imply minimal and certainly does not imply zero, as the State Department assumes in its IMPLAN analysis.

VI. THE CURRENT SOCIOECONOMIC ANALYSES ARE INCONSISTENT WITH TRANSCANADA’S OWN RISK ANALYSIS

70. In June 2013 a group of researchers under contract from TransCanada Keystone Pipeline, LP published a risk analysis of the proposed Keystone oil pipeline.⁴² This report spans a full 36 single-spaced pages and includes potentially-valuable information about the source of spills (corrosion, natural forces, excavation damage, other outside force damage, material and/or weld failures, equipment, and incorrect operation) and the costs associated with each cause. The authors use the term “total cost” to describe costs, however, the term “socioeconomic” is not mentioned once in the entire report neither is the word “jobs” (as in jobs lost), an

³⁹ U.S. Bureau of Labor Statistics. 2015. “Total Nonfarm Employment.” *State and Metro Area Employment, Hours, & Earnings*. < <http://www.bls.gov/sae/data.htm>>

⁴⁰ United States Department of the Interior. 2014. *2013 American Indian Population and Labor Force Report*. Washington, D.C. Available at: <http://www.bia.gov/cs/groups/public/documents/text/idc1-024782.pdf>.

⁴¹ Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification of Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April), p. 2.

⁴² McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute. Expert Report of Kevin E. Cahill, Ph.D. 20 April 28, 2015

interesting juxtaposition with the SEIS that touts socioeconomic benefits almost entirely in terms of jobs created.

71. Any decent economic analysis contains a summary of high-level findings. This risk assessment does not. The reader is promised at the beginning that, “an attempt is made to select reasonably conservative values for the incidence costs that make up the risk profile for these individual system elements;”⁴³ however, these results are scattered throughout the document and missing from the summary. In fact, the word “dollar” and the symbol “\$” are completely absent from the summary. One has to wonder what the point of this study is if: 1) the entire methodology section is based on an expected cost risk equation, and 2) the main conclusion is silent about what these expected costs are.
72. One explanation for the lack of an answer is that, for whatever reason, the authors do not want the reader to know what it is. Another explanation is that the authors themselves are not capable of this level of analysis (as far as I can tell, none of the authors have a doctorate in economics). Either way, the authors wave their hands and report the following as one of their “key findings”: “Given the tremendous uncertainty in incident costs, both the pipeline operator, TransCanada and the regulators have a great deal of incentive to make the special regulatory conditions imposed on the pipeline effective.”⁴⁴ This statement is completely vacuous because the reader is left with no idea about the magnitude of the incentive. The magnitude of the incentive, or the expected cleanup cost, is absolutely critical to any worthwhile analysis because this is the foundation for the cost side of the cost-benefit analysis. Lest it gets overlooked, the cost to TransCanada to cleanup a spill is just a subset of the overall cost, including damage to private property, potential job loss, and of course, diminished quality of life for those living in the area.
73. The authors even acknowledge that their inability to identify costs in any meaningful way render them unable to conduct their own cost-benefit analysis, even with respect to the much smaller issue of risk-reduction strategies. “While total damage or incident cost can be a good consequence measure, the inability to model the component costs (e.g., damage to property, emergency response, environmental damage) and generate the total cost from them means

⁴³ McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 4.

⁴⁴ McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 35.

that risk reduction strategies that would lower the component costs cannot be valued.”⁴⁵ It is concerning that those most knowledgeable about spills from TransCanada’s perspective – TransCanada hired this particular researcher team to conduct the analysis – are unable to attempt a straightforward cost-benefit assessment.

74. Interestingly, John Stansbury from the University of Nebraska – Lincoln, conducted his own independent analysis of worst-case spills from the proposed Keystone oil pipeline. Professor Stansbury concludes: “According to TransCanada, significant spills ... are expected to be very rare ... However, TransCanada made several assumptions that are highly questionable in the calculation of these frequencies. The primary questionable assumptions are: (1) TransCanada ignored historical data that represents 23 percent of historical pipeline spills, and (2) TransCanada assumed that its pipeline would be constructed so well that it would have only half as many spills as the other pipelines in service, ... even though they will operate the pipeline at higher temperatures and pressures and the crude oil that will be transported through the Keystone XL pipeline will be more corrosive than the conventional crude oil transported in existing pipelines.”⁴⁶
75. Economists are faced with this kind of sometimes-contradictory evidence from experts in other fields fairly frequently. The response of a well-trained economist is to conduct what is known as a sensitivity analysis. Simply put, you perform your calculations using different scenarios and show how the results change when the underlying assumptions change. Clearly there are differences of opinion among experts with respect to the consequences of an oil spill. But inexplicably, none of the socioeconomic impact analyses that I have seen take these differences of opinion into account. Further, not only do the socioeconomic analyses not take these differences of opinion into account, the SEIS analyses assert that no differences exist because the socioeconomic impact of a spill is assumed to be nonexistent.
76. Finally, in addition to the internal flaws of the SEIS and TransCanada’s risk assessment, the two documents contradict each other. While the risk assessment is silent about what expected costs are in the summary section, the report does state that, “While [variation]

⁴⁵ McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 36.

⁴⁶ Stansbury, J. Undated. Analysis of Frequency, Magnitude, and Consequence of Worst-Case Spills from the Proposed Keystone XL Pipeline. Research Report. Lincoln, Nebraska.

makes cost a difficult metric to quantify consequences, the average cost of an incident should be a viable measure, as it conveys risk in spite of the scatter.”⁴⁷ The SEIS, in contrast, values the consequences of a spill at zero dollars as opposed to the average cost of an incident.

VII. MS. MCINTOSH’S TESTIMONY TRIVIALIZES THE POTENTIAL COSTS OF THE KEYSTONE OIL PIPELINE

77. Ms. McIntosh makes a number of generic statements regarding pipeline spills or spill cleanups that ignore the specific risks that residents, businesses and government entities would face from the Keystone pipeline and the tar sands oil that the pipeline would transport. For example, in response to the question, “What kind of remediation activities are conducted in response to a hydrocarbon spill in soil?”⁴⁸ Ms. McIntosh responds, “Evacuation and off-site disposal/treatment of impacted soil, excavation and onsite treatment of impacted soil and in-situ soil vapor extraction.”⁴⁹ A generic response to a generic question trivializes the threat posed by the Keystone pipeline and spills of tar sands oil. For example, from an economics standpoint, a spill of tar sands oil in Michigan required a massive clean-up effort that cost over \$1.2 *billion* dollars that still continues more than four years after the spill.⁵⁰
78. The magnitude of the Michigan spill helps illustrate just how insufficient Ms. McIntosh’s responses are. Ms. McIntosh states that the South Dakota Department of Environment and Natural Resources (DENR) has the resources to “oversee the assessment and cleanup of a crude oil release from existing crude oil pipelines and has the resources to oversee a release from the Keystone XL pipeline, if one should occur. ...”⁵¹ In response to another question about the funds available for such efforts by the DENR, she replies that as of June 2009, a few months just prior to her testimony, the relevant fund contained approximately \$2.8

⁴⁷ McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. (2013). Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute, p. 35.

⁴⁸ Pre-filed Testimony of Kimberly Lorrene McIntosh On Behalf of the Commission Staff. September 2009. Before the Public Utilities Commission State of South Dakota. Keystone XL Project Docket HP09-001. (McIntosh Testimony). Page 3.

⁴⁹ McIntosh Testimony, page 3.

⁵⁰ Ellison, G. 2014. “New price tag for Kalamazoo River oil spill cleanup: Enbridge says \$1.21 billion.” *The Grand Rapids Press*.

⁵¹ McIntosh Testimony, page 5.

million.⁵² In the context of Ms. McIntosh's testimony, \$2.8 million sounds like a sizable amount. In the context of the Michigan tar sands spill, however, the \$2.8 million reported by Ms. McIntosh would cover *less than 1 percent* of the cost of the Michigan spill (0.2% = \$2.8 million / \$1,200 million).⁵³

79. Further, Ms. McIntosh's response to a question about what happens if an oil spill contaminates a property owner's potable water well and cleanup efforts cannot remediate the contamination is also insufficient.⁵⁴ Ms. McIntosh provides no specific information regarding the extent to which such events have happened in the past or the risks of such an event posed by the Keystone pipeline or tar sands oil. Questions begged by Ms. McIntire's response include: "Why didn't the State Department's EIS consider analyses of such events?;" "How often have such events happened in South Dakota?;" "How often have such events happened from spills of tar sands oil?;" "How do such events affect property values?;" "What if property owners and those responsible for the remediation disagree over the effectiveness of the cleanup; and, if so, what are the potential litigation costs, how much time does such litigation take, and what if a jury or court awards no damages?;" "What happens if none of the alternative water-supply options are feasible?" Answers to these questions are fundamental to any socioeconomic cost assessment, yet these considerations are not taken into account in any meaningful way by Ms. McIntosh or the FSEIS.
80. Ms. McIntosh's responses could have benefited from reference to the risk assessment of the Keystone pipeline and spills of tar sands oil. Unfortunately, Keystone released the results of their risk analysis in 2013, years after Ms. McIntosh's testimony. However, even if Ms. McIntosh had access to Keystone's risk analysis, the study has obvious deficiencies from an econometrics standpoint that limit its usefulness when considering the risk potential of the pipeline.
81. For example, the general approach to the risk assessment focused on a subset of available information on past spills. That is, the analysis considered a spill's data only if that data

⁵² McIntosh Testimony, page 6.

⁵³ Ellison, G. 2014. "New price tag for Kalamazoo River oil spill cleanup: Enbridge says \$1.21 billion." *The Grand Rapids Press*.

⁵⁴ "Q: What if you can't achieve remediation of a well? A: The responsible party is required to supply the well owner/user with an alternate source of drinking water. This may require drilling a new well in a different location, drilling a deeper well in a deeper formation or hooking the well user up to rural or city water supply." McIntosh Testimony, page 5.

included specific information on the exact source of the spill. Not all of the entries in the spill database include such details, which means that the data used in the risk assessment is not necessarily representative of spills. The problem with lack of representativeness is that the resulting analysis could be biased. In a standard economic analysis such limitations would be spelled out; here, no such effort was made.

82. Second the analysis appears to give equal weight to all spills, rather than focusing on pipeline and operator details most relevant to the Keystone pipeline and tar sands oil spills. For example, rather than looking exclusively at the history of pipeline spills for all operators, the analysis could have also considered TransCanada's history of pipeline spills. For example, the TransCanada Keystone pipeline in North Dakota and Kansas had 14 spills as of June 2010, the time of a report on the pipeline. The pipeline operator shut the pipeline down for two weeks to replace parts of the pipeline. This frequency of leaks on a relatively recent pipeline begs the question of how does the leak performance of the pipeline compare with the assumptions in the risk assessment of the pipeline?
83. Perhaps more importantly is how the authors address the extent to which the spills in their database are relevant to the proposed Keystone oil pipeline. The authors, interestingly, only comment on the extent to which the bias might be in favor of their client. As any thoughtful reader of the materials in this case can attest, biases also operate in the other direction. For example, the pressure under which the pipeline will operate and the caustic nature of the tar sands oil imply that the costs could be higher for the Keystone oil pipeline in the event of a spill relative to the spills in their dataset. The fact that the authors are silent about biases that go against their client's interests calls into question their entire analysis and makes one wonder what else they are not telling the reader.


VIII. CONCLUSION

84. Ms. McIntosh's testimony ignores the fundamental economic concept of scarcity and trivializes the potential cost of the Keystone oil pipeline. Ms. McIntosh also makes numerous meaningless generic statements about pipeline spills and cleanup costs that ignore the specific risks of the Keystone oil pipeline, and the economic consequences of such risks.
85. As I have attempted to explain in this rebuttal report, from an economics standpoint, the relevant issue is given *limited* resources and time, can petroleum spills, in particular those


that can be expected from the proposed Keystone oil pipeline, be remediated such that the expected benefits of the oil pipeline are greater than the expected costs to the residents and businesses in South Dakota and other jurisdictions along the route of the proposed pipeline. My opinion is that the socioeconomic analyses conducted to date are grotesquely insufficient in this regard.

86. If the State Department and TransCanada are serious about conducting an analysis of the socioeconomic impact of the Keystone oil pipeline, such an analysis, at a minimum, would include: (1) an IMPLAN model that takes into account the impact of potential oil spills; (2) an IMPLAN model that estimates net effects; (3) a survey of individuals currently living in areas that have experienced an oil spill; (4) a survey of individuals currently living in areas at risk of an oil spill; and (5) a comparative analysis of socioeconomic impact based on areas where an oil pipeline was introduced.
87. Without these changes, the socioeconomic analysis as it currently stands does not represent the *net* socioeconomic impact of the Keystone oil pipeline. Instead, the State Department's socioeconomic assessment represents potential economic benefits only. The elephant in the room—the risks and costs associated with pipeline spills—is simply ignored.
88. Given this fundamental shortcoming, and other severe flaws that I have identified in this report, the socioeconomic analyses conducted to date are in no way valid assessments of the net socioeconomic impact of the proposed Keystone oil pipeline. At a minimum the conclusions should be disregarded. More informatively, the expected benefits should be weighed against the expected costs – as opposed to the existing zero-risk, zero-cost method.

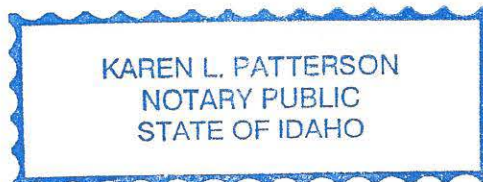
Respectfully Submitted,



Kevin E. Cahill, PhD

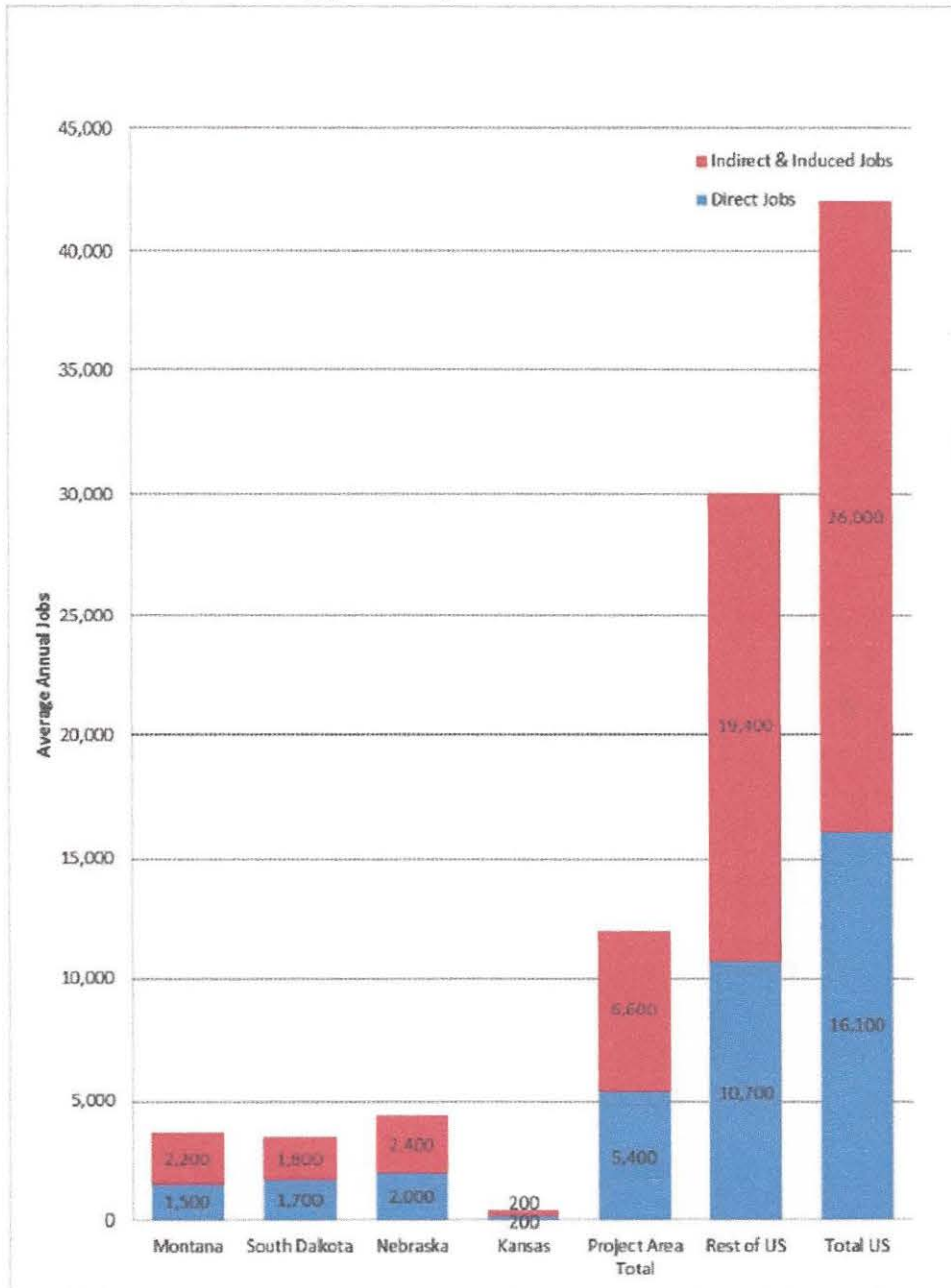


Karen L. Patterson
Notary Public
County of ADA
04.05.19 exp.



IX. EXHIBITS

Exhibit 1: Total Employment Supported by Construction of the Keystone Oil Pipeline



Source: United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Section 4.10 (Socioeconomics), January 2014, p. 4.10-3.

X. APPENDIX A: Curriculum Vitae

CURRICULUM VITAE

KEVIN E. CAHILL

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Education

Ph.D. Economics, Boston College, Chestnut Hill, MA, 2000
M.A. Economics, Boston College, Chestnut Hill, MA, 1997
B.A. Mathematics and Economics (with honors), Rutgers College, New Brunswick, NJ, 1993

Professional Experience

2012 – present	ECONorthwest: Project Director / Senior Economist
2005 – present	Sloan Center on Aging and Work at Boston College: Research Economist
2005 – 2010	Analysis Group, Inc.: Associate (2005 – 2008); Manager (2009 – 2010)
2004 – 2005	Tinari Economics Group: Economist and Expert Witness
2003	Center for Retirement Research at Boston College: Associate Director for Research
2000 – 2002	Abt Associates, Inc.: Associate

Academic Papers and Publications

Cahill, Kevin E., Jacquelyn B. James, and Marcie Pitt-Catsoupes. *forthcoming*. “The Impact of a Randomly-Assigned Time and Place Management Initiative on Work and Retirement Expectations.” *Work, Aging and Retirement*.

Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. *forthcoming*. Evolving patterns of work and retirement. In L. George & K. Ferraro (Eds.), *The Handbook of Aging and the Social Sciences (8th Edition)*. New York, NY: Elsevier.

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- Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2012. "Older Workers and Short-term Jobs: Employment Patterns and Determinants." *Monthly Labor Review*, 135(5), 19-32 (May).
- Quinn, Joseph F., Kevin E. Cahill, and Michael D. Giandrea. 2011. "Early Retirement: The Dawn of a New Era?" TIAA-CREF Institute *Policy Brief* (July).
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- Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2009. "Bridge Jobs: A Comparison across Cohorts." *Research on Aging*, 31(5), 549-576.
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- Cahill, Kevin E., Michael D. Giandrea, and Joseph F. Quinn. 2008. "A Micro-Level Analysis of Recent Increases in Labor Force Participation among Older Workers." Center for Retirement Research at Boston College Working Paper, 8 (February).
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Cahill, Kevin E., and Mauricio Soto. 2003. "How Do Cash Balance Plans Affect the Pension Landscape?" Center for Retirement Research *Issue in Brief*, No. 14 (December).

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"401(k) Plans and Retirement Saving: Lessons for Personal Accounts." 2002. Summary document of a presentation by William G. Gale and James M. Poterba prepared for the Social Security Administration (November).

Beecroft, Erik, Kevin E. Cahill and Barbara D. Goodson, 2002. "The Impacts of Welfare Reform on Children: The Indiana Welfare Reform Evaluation." Abt Associates Inc. (December).

Burstein, Nancy, Jean I. Layzer, and Kevin E. Cahill. 2001. "National Study of Child Care for Low-Income Families: Patterns of Child Care Use Among Low-Income Families." Abt Associates Inc. (August).

Wrobel, Marian V., and Kevin E. Cahill. 2001. "An Evaluation of the Choosing Health Program." Abt Associates Inc. (April).

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Quinn, Joseph F., Richard V. Burkhauser, Kevin E. Cahill, and Robert Weathers. 1998. "Microeconomic Analysis of the Retirement Decision: United States." The OECD Economics Department Working Paper No. 203, Paris.

Professional Activities, Honors and Awards

2011 Lawrence R. Klein Award for best *Monthly Labor Review* article by joint BLS and non-BLS authors.

Ad hoc referee, *The Gerontologist*, *Journal of Gerontology: Social Sciences*, *Journal of Applied Gerontology*, *Industrial and Labor Relations Review*, *Population Research and Policy Review*, *Journal of Population Economics*, *Research on Aging*, *Applied Health Economics and Health Policy*, *Sociology Quarterly*, *Journal of Aging and Social Policy*, *Ageing & Society*, *Atlantic Economic Journal*, *Social Problems*, *The Journal of Forensic Economics*, *Alfred P. Sloan Foundation*, *Oxford University Press*

Member, Founding Editorial Board of *Work, Aging, and Retirement*, 2014 – present.

At-Large Vice President, Board of Directors, National Association of Forensic Economics, 2013 – present.

American Economics Association, member, 2002 – present.

Gerontological Society of America, member, 2012 – present.

Western Economics Association, member, 2004 – 2008, 2012 – present.
National Association of Forensic Economics, member, 2004 – present.
Eastern Economics Association, member, 2005 – 2010, 2014
Reviewer of grant proposals, Sandell Grant Program, 2002 – 2003.
Doctoral Fellowship, Social Security Administration, Center for Retirement Research, 1999.
Teaching Excellence Award, Boston College Graduate School of Arts and Sciences, 1998.
Michael Mann Summer Dissertation Award, Boston College Department of Economics, 1997.
Graduate Student Fellowship, Boston College Department of Economics, 1995 – 1998.
Henry Rutgers Scholar, Rutgers College, Department of Economics, 1993.

Presentations and Conferences Attended

“Boomers and the Future of Oregon’s Economy.” Speaker at a jointly-sponsored ECONorthwest–AARP event on leveraging Oregon’s 50-plus population, Portland, OR, March 17, 2015.

“The Impact of a Randomly-Assigned Time & Place Management Initiative on Work and Retirement Expectations.” Presentation at the 2015 Annual Meeting of the Allied Social Science Associations, Boston, MA, January 4, 2015.

“A Balanced Look at Self-Employment Transitions Later in Life.” Presentation at the 67th Annual Scientific Meeting of the Gerontological Society of America (GSA), Policy Series: Self-Employment and Entrepreneurship: The Aging Workforce’s ‘Encore’?, Washington, DC, November 8, 2014.

“How Might the Affordable Care Act Impact Retirement Transitions?” Presentation at the 89th Annual Conference of the Western Economic Association International, Denver, CO, June 28, 2014.

“Hours Flexibility Preferences and Work/Retirement Decisions.” Presentation at the Work and Family Researchers Network (WFRN) 2014 Conference, New York, NY, June 19, 2014.

“Bridge Jobs and the New Era of Retirement.” Invited speaker at the Sloan Foundation’s Workshop on Measuring, Modeling, and Modifying Late in Life Workplace Dynamics, New York, NY, June 5, 2014.

“The Impact of Hours Flexibility on Retirement Transitions.” Presentation at the Pacific Northwest Regional Economics Conference (PNREC) 2014, Portland, OR, May 8, 2014.

“Job Transitions among Today’s Older Americans: Challenges and Opportunities.” Keynote speaker at AARP’s Finding Work at 50+ Event, Beaverton, OR, April 22, 2014.

“Retirement Communities – the Golden Age of Real Estate.” Invited panelist at a forum sponsored by the Idaho Business Review, Boise, ID, April 1, 2014.

“Transitions into Self-Employment at Older Ages: 1992 to 2012.” Presentation at the 40th Annual Conference of the Eastern Economics Association, Boston, MA, March 8, 2014.

“What Forensic Economists Need to Know about Societal Aging.” Presentation at the NAFE Sessions of the 40th Annual Conference of the Eastern Economics Association, Boston, MA, March 8, 2014.

“Preparing for the Aging Boom: Best Practices for Employers.” Invited panelist at a forum sponsored by the Vision Action Network and the Washington County Chamber of Commerce Partnership, Portland, OR, January 29, 2014.

“The New Era of Retirement.” Presentation at the Osher Lifelong Learning Institute at Boise State University, Boise, ID, January 9, 2014.

“The Impact of Hours Flexibility on Career Employment, Bridge Jobs, and the Timing of Retirement.” Presentation at the 2014 Annual Meeting of the Allied Social Science Associations, Philadelphia, PA, January 4, 2014.

“Schedule Matches and Work-life Fit among Older Healthcare Workers.” Presentation at the 66th Annual Scientific Meeting of the Gerontological Society of America (GSA), New Orleans, LA, November 21, 2013.

“Self-Employment Transitions among Older Americans.” Invited speaker at the AARP Public Policy Institute Roundtable on Crafting a Workforce Development System that Better Meets the Needs of Older Jobseekers and Workers, Washington, DC, November 7, 2013.

“The Uncertainty of Planning for Retirement.” Invited guest on Chicago Public Radio, WBEZ’s “Morning Shift,” Chicago, IL, November 4, 2013.

“The Role of Gender in the Retirement Patterns of Older Americans.” Invited speaker at the U.S. Department of Labor’s Older Women Workers Roundtable, Washington, DC, September 27, 2013.

“Are Gender Differences Emerging in the Retirement Patterns of the Early Boomers?” Presentation at the 88th Annual Conference of the Western Economic Association International, Seattle, WA, June 30, 2013.

“Getting Older, Getting Hired.” Invited guest on WGBH’s “Boston Public Radio,” Boston, MA, January 22, 2013.

“Employment Experiences of Older Workers in the Context of Shifts in the National Economy.” Presentation at the 65th Annual Scientific Meeting of the Gerontological Society of America (GSA), San Diego, CA, November 17, 2012.

“Retirement Patterns and the Macroeconomy, 1992 to 2010: The Prevalence and Determinants of Bridge Jobs, Phased Retirement, and Reentry among Different Cohorts of Older Americans.” Presentation at the 2012 Fall Research Conference of the Association for Public Policy Analysis and Management (APPAM), Baltimore, MD, November 9, 2012.

“New Evidence on Self-Employment Transitions among Older Americans with Career Jobs.” Presentation at the 87th Annual Conference of the Western Economic Association International, San Francisco, CA, June 30, 2012.

“Work after Retirement: Lessons for Employers and Policymakers from the United States.” Invited speaker at Eurofound’s “Income from Work after Retirement” Expert Workshop, European Foundation for the Improvement of Living and Work Conditions, Brussels, Belgium, June 15, 2012.

“The Relationship between Work Decisions and Location Later in Life.” Presentation at the 2012 Annual Meeting of the Allied Social Science Associations, Chicago, IL, January 7, 2012.

“Building Your Bridge to Retirement?” Invited guest on AARP’s “Inside E Street” for Public Television, Washington, DC, December 7, 2011.

“How Does Occupational Status Impact Bridge Job Prevalence.” Presentation at the 2011 Annual Meeting of the Allied Social Science Associations, Denver, CO, January 8, 2011.

“Stepping Stones and Bridge Jobs: Determinants and Outcomes.” Presentation at the 2010 Annual Meeting of the Allied Social Science Associations, Atlanta, GA, January 4, 2010.

“Adapting U.S. Retirement Behavior.” Discussant at the 2009 Annual Meeting of the Eastern Economic Association, New York, NY, February 27, 2009.

“Retirement Patterns and Determinants among Individuals with a History of Short-Duration Jobs.” Presentation at the 2009 Annual Meeting of the Allied Social Science Associations, San Francisco, CA, January 4, 2009.

“The Role of Bridge Jobs in the Retirement Process.” Presentation at The Ann Richards Invitational Roundtable on Gender and the Media, Older Workers: Benefits and Obstacles for Women’s and Men’s Continued Employment, Brandeis University, Waltham, MA, October 24, 2008.

“The Role of Re-entry in the Retirement Process.” Presentation at the 2008 Annual Meeting of the Allied Social Science Associations, New Orleans, LA, January 4, 2008.

“A Micro-level Analysis of Recent Increases in Labor Force Participation among Older Workers.” Presentation at the Korea Labor Institute Conference on Panel Data, Seoul, Korea, October 25, 2007.

“Bridge Jobs and Retiree Well-being.” Presentation at the 2007 Annual Meeting of the Western Economic Association, Seattle, WA, July 2, 2007.

“Self Employment Transitions among Older Workers with Career Jobs,” Presentation at the 2007 Annual Meeting of the Eastern Economic Association, New York, NY, February 24, 2007.

“A Micro-level Analysis of Recent Increases in Labor Force Participation among Older Workers.” Presentation at the 2006 Annual Meeting of the Western Economic Association, San Diego, CA, July 2, 2006.

“Retirement Patterns and Bridge Jobs among the HRS War Babies.” Presentation at the 2005 Annual Meeting of the Western Economic Association, San Francisco, CA, July 7, 2005.

SEAK Annual National Expert Witness Conference, Hyannis, MA, June 16-17, 2005.

“The Social Security Debate: Why Should I Care about Reforms?” Invited guest for a panel discussion on Social Security Personal Accounts, Drew University Economics Department, Madison, NJ, April 12, 2005.

“The Role of the Economist in Assessing Damages for Defendants.” Presentation at Liberty Mutual Group, Marlton, NJ, March 18, 2005.

“Was the 9/11 Victim Compensation Fund a Success? A Forensic Economist’s View.” Presentation at the 2005 Annual Meeting of the Eastern Economic Association, New York, NY, March 5, 2005.

“Recent Evidence on Retirement Patterns and Bridge Jobs.” Presentation at the 2005 Annual Meeting of the Eastern Economic Association, New York, NY, March 4, 2005.

“A Retrospective Examination of the 9/11 Victim Compensation Fund Awards: Calculated vs. Actual Economic Loss Awards.” Presentation at the 2005 Annual Meeting of the Allied Social Science Associations: Expanding the Frontiers of Economics, Philadelphia, PA, January 8, 2005.

“Are Traditional Retirements a Thing of the Past?” Presentation at the U.S. Bureau of Labor Statistics, Washington, DC, December 16, 2004.

“How Well Prepared Are Massachusetts Families for Retirement?” Presentation at the New England Study Group, Federal Reserve Bank of Boston, Boston, MA, October 12, 2004.

Annual Meeting of the Allied Social Science Associations, San Diego, CA, January 3-5, 2004.

“Securing Retirement Income for Tomorrow’s Retirees.” Session Chair for the Sandell Grant Program Presentations at the Fifth Annual Conference of the Social Security Retirement Research Consortium, Washington, DC, May 15-16, 2003.

“Retirees Back at Work.” Invited guest for “On Point,” *National Public Radio*, Boston, MA, March 12, 2003.

“The Changing Retirement Income Landscape.” Presentation at the Ethics and Aging Seminar Series at Boston College, Chestnut Hill, MA, February 3, 2003.

“Social Security Reform: The Relationship between Today’s Program and Tomorrow’s.” Discussant at the 55th Annual Scientific Meeting of the Gerontological Society of America, Boston, MA, November 26th, 2002.

“Patterns of Child Care Use among Low-Income Families.” Presentation at the National Association for Welfare Research and Statistics (NAWRS) 42nd Annual Workshop: Research, Reauthorization, and Beyond, Albuquerque, NM, August 25-28, 2002.

Annual Meeting of the Allied Social Science Associations, Boston, MA, January 7-9, 2000.

“The Outlook for Retirement Income.” Second Annual Conference of the Social Security Retirement Research Consortium, Washington, DC, May 17-18, 2000.

“New Developments in Retirement Research.” First Annual Joint Conference of the Social Security Retirement Research Consortium, Washington, DC, May 20-21, 1999.

“AHEAD (Asset and Health Dynamics Among the Oldest Old) Summer Workshop.” Survey Research Center, The University of Michigan, Ann Arbor, MI, Summer 1997.

“GSOEP-PSID Summer Workshop.” Center for Policy Research, Syracuse University, Syracuse, NY, Summer 1997.

Conference Posters

Cahill KE, James JB, Pitt-Catsouphes M, “How Do Older Healthcare Workers’ Preferences for Flexibility Affect Work and Retirement Decisions?” Gerontological Society of America (GSA) 66th Annual Scientific Meeting, November 20-24, 2013.

Wu E, Cahill KE, Bieri C, Ben-Hamadi R, Yu AP, Erder MH, “Comparison of Hospitalization Use and Health Care Costs of Elderly Major Depressive Disorder (MDD) Patients Treated with Escitalopram, Generic SSRIs, and SNRIs,” International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 14th Annual International Meeting, May 16-20, 2009.

Cahill, KE, Giandrea MD, Quinn JF, “Retirement Behavior among Individuals with Erratic Work Histories,” Gerontological Society of America (GSA) 61st Annual Scientific Meeting, November 21-25, 2008.

Jaff MR, Engelhart L, Rosen E, Yu AP, Cahill KE, “Clinical and Economic Outcomes among U.S. Medicare Beneficiaries with Lower Extremity Peripheral Arterial Disease (PAD),” International Symposium on Endovascular Therapy (ISET), January 20-24, 2008.

Giandrea MD, Cahill KE, Quinn JF, “Self Employment Transitions among Older Workers with Career Jobs,” Gerontological Society of America (GSA) 60th Annual Scientific Meeting, November 16-20, 2007.

Lee LJ, Yu AP, Cahill KE, Birnbaum HG, Oglesby AK, Tang J, Qiu Y, “Direct and Indirect Costs among Employees with Diabetic Retinopathy,” American Diabetes Association (ADA) 67th Scientific Sessions, June 22-26, 2007.

Yu AP, Cahill KE, Birnbaum HG, Lee LJ, Oglesby AK, Tang J, Qiu, Y, “Direct and Indirect Costs Associated with Photocoagulation and Vitrectomy among Employees with Diabetic Retinopathy,” International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 12th International Meeting, May 19-23, 2007.

Wu E, Patel P, Krishnan E, Yu AP, Cahill KE, Tang J, Mody R, “Healthcare Cost of Gout in an Elderly Population: A Claims Database Analysis,” American Geriatrics Society (AGS) 2007 Annual Scientific Meeting, May 2-6, 2007.

Wu E, Mody R, Krishnan E, Yu AP, Cahill KE, Tang J, Patel P, "Tighter Control of Serum Uric Acid in Gout is Associated with Lower Morbidity and Health Care Costs," American College of Rheumatology (ACR) Annual Scientific Meeting, November 10-15, 2006.

Expert Reports, Trial and Deposition Testimony

Multnomah County vs. Conway Construction Company, et al., bridge construction damages proceeding, Multnomah County Circuit Court, Oregon, opinion as to plaintiff's economic damages due to the installation of defective bridge decking, testimony taken in trial, February 25, 2015.

KForce vs. Brett Oxenhandler, et al., business damages proceeding, United States District Court, Western District of Washington at Seattle, opinion as to plaintiff's calculation of economic damages, testimony taken in deposition, February 5, 2015.

State of Oregon, ex rel. John Kroger, Attorney General vs. AU Optronics Corporation, et al., TFT-LCD antitrust litigation, United States District Court, Northern District of California at San Francisco, opinion as to the apportionment of damages across purchaser and product groups, testimony taken in deposition, August 11, 2014.

David Sawyer and Joan Sawyer vs. Metropolitan Life Insurance Company, et al., personal injury proceeding, Middlesex County Superior Court, Massachusetts, opinion as to plaintiff's lost earning capacity, testimony taken in deposition, April 16, 2013.

Expert Economic Assessment of the USAF Socioeconomic Impact Analysis for Boise AGS, report submitted to the United States Air Force, March 3, 2012.

Council on American Islamic Relations – New Jersey, Inc., et al. vs. Bergman Real Estate Group, et al., business damages proceeding, Essex County Superior Court, New Jersey, opinion as to plaintiff's lost fundraising revenue, testimony taken in deposition, September 21, 2005.

Garfinkel vs. Morristown Obstetrics and Gynecology Associates, et al., Hon. Stephen F. Smith, Morris County Superior Court, New Jersey, opinion as to defendants' lost profits, testimony taken in trial, June 23, 2005.

Edwards vs. City of New York, wrongful termination proceeding, Hon. Fernando Tapia, New York City Civil Court, Bronx County, New York, opinion as to the loss of earnings, fringe benefits, and pension benefits, testimony taken in trial, June 1, 2005.

Allen vs. Euromarket Designs, Inc., wrongful termination proceeding, Hon. Stephen J. Burnstein, Essex County Superior Court, New Jersey, opinion as to the loss of earnings, testimony taken in trial, April 20, 2005.

Ali vs. Cervelli, personal injury proceeding, Hon. Robert P. Contillo, Bergen County Superior Court, New Jersey, opinion as to the loss of income from the family business and the loss of household services, testimony taken in trial, April 13-14, 2005.

Peskin vs. AT&T Corporation, wrongful termination proceeding, Somerset County Superior Court, New Jersey, opinion as to the loss of earnings, testimony taken in deposition, April 8, 2005.

Garfinkel vs. Morristown Obstetrics and Gynecology Associates, et al., wrongful termination proceeding, Morris County Superior Court, New Jersey, opinion as to defendants' lost profits, testimony taken in deposition, March 16, 2005.

Packard vs. The Bessemer Group, wrongful termination proceeding, Middlesex County Superior Court, New Jersey, opinion as to the loss of earnings and pension benefits, testimony taken in deposition, February 17, 2005.

Durant vs. The Associates, business damages proceeding, Hon. Nicholas J. Stroumtsos, Jr., Middlesex County Superior Court, New Jersey, opinion as to the loss of incremental profit, testimony taken in trial, December 15, 2004.

Durant vs. The Associates, business damages proceeding, Middlesex County Superior Court, New Jersey, opinion as to the loss of incremental profit, testimony taken in deposition, November 22, 2004.

Luisi vs. Luisi, divorce proceeding, Hon. Rachel A. Adams, Richmond County Supreme Court, New York, opinion as to the value of enhanced earning capacity, testimony taken in trial, November 11, 2004.

Newspaper, Periodicals, Blogs and Other Publications

Cahill, Kevin E. 2014. "A New Perspective on Older Workers." *Idaho Business Review* (June).

Cahill, Kevin E., John Tapogna, and Jay Bloom. 2014. "Societal Aging Need Not Mean Slower Growth for Oregon." *The Oregonian* (May).

Cahill, Kevin E., Michael D. Giandrea, and Gene J. Kovacs. 2014. "Self-Employment: The Answer for an Aging Workforce and a Sluggish Economy?" Sloan Center on Aging & Work, *AGenda* (March).

Cahill, Kevin E., and Jacquelyn B. James. 2013. "A Cost/Benefit View of Occasional Flexibility." Sloan Center on Aging & Work, *AGenda* (December).

Cahill, Kevin E. and Jacquelyn B. James. 2013. "Small Request, Big Impact: The Importance of Occasional Flexibility in a Healthcare Setting." Sloan Center on Aging & Work at Boston College *Issue Brief* (November).

Cahill, Kevin E., John Tapogna, Rod Gramer, and Diana Lachiondo. 2013. "To What Extent Will Demographic Changes Help Idaho Reach Its Educational Attainment Goals for 2020?" *ECONorthwest Issue Brief* (October).

Cahill, Kevin E., and Gene J. Kovacs. 2013. "Santa Claus, the Easter Bunny, and Traditional Retirement." Sloan Center on Aging & Work, *AGenda* (May).

Cahill, Kevin E., Jacquelyn James, Marcie Pitt-Catsoupes, and Maureen O'Keeffe. 2012. "Late-Career Flexibility: Beyond Phased Retirement." *HR Pulse Magazine* (December).

Cahill, Kevin E. and Paul Thoma. 2012. "What Does the Aging of Idaho Mean for its Citizens, Employers, and Policymakers?" *ECONorthwest Issue Brief* (September).

Cahill, Kevin E., and Gene J. Kovacs. 2012. "Should You Be Counting on the Social Security Trust Fund?" Sloan Center on Aging & Work, *AGenda* (September).

Cahill, Kevin E., John Tapogna, Paul Thoma, and Bryce Ward. 2012. "Is Boise Over- or Underperforming Economically?" *ECONorthwest Issue Brief* (August).

Cahill, Kevin E. 2012. "What Ichiro's Departure Says About Loyalty and the Employer-Employee Relationship." *The Seattle Times* (July).

Cahill, Kevin E. 2012. "Thinking about Phased Retirement?" Sloan Center on Aging & Work, *AGenda* (June).

Sweet, Stephen and Kevin E. Cahill. 2012. "How the Health Care Sector Can Prepare for the Aging of Its Workforce?" Sloan Center on Aging & Work, *AGenda* (April).

Cahill, Kevin E. and Stephen Sweet. 2012. "Should Older Americans Feel Gloomy About Their Job Prospects?" Sloan Center on Aging & Work, *AGenda* (March).

Cahill, Kevin E. 2012. "F-35 Opponent Questions Air Force Report." *The Boise Guardian* (February).

Cahill, Kevin E. 2012. "Five Reasons Why Flexible Work Options Are Good Business in a Bad Economy." Sloan Center on Aging & Work, *AGenda* (February).

Cahill, Kevin E. 2011. "Should Older Workers Step Aside?" *Huffington Post Blog* (featured article) (August) and Sloan Center on Aging & Work, *AGEnda* (December).

Letters to the Editor, *The Wall Street Journal*, 2014 (March), 2013 (November), 2012 (May), 2011 (March), 2006 (November), 2005 (May); *The Idaho Statesman*, 2012 (April).

Quoted and/or cited by: *The Wall Street Journal*, *The New York Times*, *U.S. News and World Report*, *Time*, *National Public Radio*, *Reuters*, *NBC News*, *The Washington Post*, *Business Week*, *Bloomberg*, *AARP*, *Investor's Business Daily*, *The Boston Globe*, *WBEZ*, *WRKO Radio*, *The Seattle Times*, *Business Insider*, *The Idaho Statesman*, *The Boise Guardian*, *Arbiter Online*.

XI. APPENDIX B: Materials Considered

All Risk No Reward Coalition. Undated. The Keystone XL Tar Sands Pipeline: All Risk and No Reward. www.allrisknoreward.com

Amended Final Decision and Order, Notice of Entry. In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project before the Public Utilities Commission of the State of South Dakota, HP09-001, June 29, 2010.

ConocoPhillips and TransCanada. 2008. Keystone XL Project – Construction, Mitigation, and Reclamation Plan, Rev. 1 (November).

Direct Testimony of Daniel Flo on Behalf of the Staff of the South Dakota Public Utilities Commission. 2015. Before the South Dakota Public Utilities Commission, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket 14-001 (April).

Direct Testimony of Heidi Tillquist. 2015. Before the Public Utilities Commission of the State of South Dakota, In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project, Docket 14-001 (March).

Ellison, G. 2014. “New price tag for Kalamazoo River oil spill cleanup: Enbridge says \$1.21 billion.” *The Grand Rapids Press*.

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Letter from James E. Moore to Patricia Van Gerpen, Executive Director, South Dakota Public Utilities Commission Re: TransCanada Keystone Pipeline LP, dated September 15, 2014.

Letter from John Smith to Commissioners Johnson, Kolbeck, and Hanson re Draft Permit Conditions dated February 17, 2010.

McSweeney, T.I., Leis, B.N., Mawalkar, S., Harley, M.C., Rine, K.R., & Sanzone, D.M. 2013. Risk Analysis of the Proposed XL Pipeline Route. Battelle Project No. 100007967, Columbus, OH: Battelle Memorial Institute.

Oxford Economics. Not dated. *Potential Impact of the Gulf Oil Spill on Tourism*. p.2 <
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Petition for Order Accepting Certification under SDCL §49-41B-27. In re: The Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project before the Public Utilities Commission of the State of South Dakota, September 15, 2014 (TransCanada Keystone Oil Pipeline Petition).

Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September).

Pre-filed Testimony of Brian Walsh on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification of Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

Pre-filed Testimony of Darren Kearney on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2009. Before the Public Utilities Commission, State of South Dakota, Keystone XL Project, Docket HP09-001 (September).

Pre-filed Testimony of Kimberly Lorrene McIntosh on Behalf of the Commission Staff. 2015. Before the Public Utilities Commission, State of South Dakota, In the Matter of the Petition of TransCanada Keystone Pipeline, LP for Order Accepting Certification of Permit Issued in Docket HP09-001 to Construct the Keystone XL Pipeline, Docket HP14-001 (April).

South Dakota Codified Law §49-41B-27(Source: South Dakota Legislature, Legislative Research Council, http://legis.sd.gov/Statutes/Codified_Laws/DisplayStatute.aspx?Type=Statute&Statute=49-41B-27, accessed April 13, 2015.)

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Stansbury, J. Undated. Analysis of Frequency, Magnitude, and Consequence of Worst-Case Spills from the Proposed Keystone XL Pipeline. Research Report. Lincoln, Nebraska.

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Certificate of Service

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