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Asbestos-laden soil: a case study analysis of Swift Creek

Rebekah J. Hook
Western Washington University

Asbestos-Laden Soil:
A Case Study Analysis of Swift Creek

By

Rebekah J. Hook

Accepted in Partial Completion
Of the Requirements for the Degree
Master of Arts

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Moheb A. Ghali, Dean of the Graduate School

ADVISORY COMMITTEE

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Chair, Dr. Sara J. Weir

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MASTER'S THESIS

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Rebekah J. Hook
June 12, 2011

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A Case Study Analysis of Swift Creek

A Thesis
Presented to
The Faculty of
Western Washington University

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts

By
Rebekah J. Hook
June, 2011

Abstract

In the rural area of Whatcom County, Washington there is a naturally occurring asbestos site on the west side of Sumas Mountain. The asbestos laden-soil became airborne after a landslide occurred on the mountain causing asbestos-laden sediment to become loose and every year, one-hundred thousand cubic yards flows into the nearby Swift Creek. There are many stakeholders who are involved in developing mitigation policies. These include agency officials and elected representatives from a variety of levels of government and private property owners.

This case study expands on the relationship between "less pressing" environmental issues and the types conditions that must be in place in order for solutions to be created by regulatory bodies. The case of Swift Creek is an example of a relatively rare environmental event that has huge potential for causing serious contamination for many people. Though this case is unique, these types of definitional debates are not.

Acknowledgements

This is one of my greatest life goals accomplished and I must give a great deal of gratitude to the three brilliant women scholars of my thesis committee. Without your considerable contributions and inspiration I would not have been able to finish.

I would like to express my deepest appreciation to those closest to me. Thank you for being a much needed voice of reason during this challenging journey. Your unwavering belief in me is remarkable.

I cannot complete this without acknowledging all four of my parents for their love, support and encouragement. You are all incredible role models and I am proud to be your daughter; look at what I have accomplished because of you.

Thank you for listening Ruth.

This thesis is meant to spark the debate and probe those in positions of power to breakthrough the clogged pipe that is the policy formation process and find a common place to constructively create practical policy solutions for this environmental and public problem.

No need to thank me; best of luck to you all.

Table of Contents

List of Figures and Tables

List of Acronyms and Abbreviations

ACM	Asbestos-Containing Material
ACP	Asbestos-Containing Products
AHERA	Asbestos Hazard Emergency Response Act of 1986
BEACON	Be Active Community Outreach Network
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CORPS	Army Corps of Engineers
DHHS	U.S. Department of Health and Human Services
EPA	U.S. Environmental Protection Agency
F/CC	Fiber per Cubic Centimeter
HRS	Hazard Ranking System
MM	Malignant Mesothelioma
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOA	Naturally Occurring Asbestos
NOE	Non-Occupational Exposure
NPL	EPA's National Priorities List
OSHA	Occupational Safety and Health Act
RCRA	Resource Conservation and Recovery Act
SCS	Soil Conservation Service (predecessor to the Natural Resources Conservation Service)
TCRA	Time-Critical Removal Action
TSCA	Toxic Substances Control Act
USGS	U.S. Geological Survey
WHO	World Health Organization

INTRODUCTION:

In the rural area of Whatcom County, Washington there is a naturally occurring asbestos site on the west side of Sumas Mountain[1]. The asbestos laden-soil became airborne after a landslide occurred on the mountain causing the soil to become loose and flow into the nearby Swift Creek. Due to the amount of soil spewing into the creek, alleviation of flooding conditions and to prevent future flooding from occurring, dredging of the creek took place along a one mile section until 2005.[2] The dredged material was then placed on the sides of the creek in order to help prevent flooding even further. The Environmental Protection Agency (EPA) has conducted several activity-based samplings and found that there is indeed airborne asbestos.[3] There are numerous implications surrounding this case: inhalation of asbestos is known to cause cancer and mesothelioma[4], dredging of the creek has caused the intensification of the airborne asbestos, no particular party is responsible for the occurrence of the asbestos, there is no established regulation framework outside of the threat of liability for naturally occurring asbestos sites, project managers are at an impasse as to move forward with protection policy, and the concentration of asbestos is continuing to increase[5].

Many stakeholders are involved in the issue of Swift Creek. These include agency officials and elected representatives from a variety of levels of government and private

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[1] The geographic coordinates of the Sumas Mountain area is located at 48.908° latitude, -122.242° longitude. Google Maps. "Position Finder". Sumas Mountain. http://www.google.com/maps/mm.

[2] U.S. Department of Health and Humans Services: Public Health Service. Agency for Toxic Substances and Disease Registry: Division of Health Assessment and Consultation. "Health Consultation: Evaluation of Health Statistics and Public Health Data Gaps Related to Exposure to Naturally Occurring Asbestos from Swift Creek". Everson, Whatcom County, Washington. (February, 22, 2008). pp. 4.

[3] U.S. Environmental Protection Agency: Office of Environmental Assessment, Region 10. "Soil, Sediment and Surface Water Sampling: Sumas Mountain Naturally-Occurring Asbestos Site, Whatcom County, Washington". (October 13, 2009).

[4] U.S. Department of Health and Humans Services: Public Health Service. Agency for Toxic Substances and Disease Registry. "Division of Toxicology ToxFAQs". CAS# 1332-21-4. (September 2001).

[5] U.S. Environmental Protection Agency: Office of Environmental Assessment, Region 10. "Soil, Sediment and Surface Water Sampling: Sumas Mountain Naturally-Occurring Asbestos Site, Whatcom County, Washington". (October 13, 2009).

property owners. Documentation and stakeholder interviews of Swift Creek demonstrates that it has been a challenge for Whatcom County officials, the EPA, Whatcom Health Department, the Northwest Clean Air Agency, the Army Corps of Engineers, Washington State Department of Ecology, private property owners, and other varying officials to develop a cohesive and cooperate policy process. The mitigation policy itself is also a highly disputed topic, due to the differing views on the urgency to take action to protect the public's health, the way in which clearing the area of asbestos will be most effective, whether to make the project cost effective or to spare no cost for the health of the population.

This thesis probes four questions: first, in the absence of a dominant focusing event[6], is the major reason for a stalemate in the policy process surrounding Swift Creek due to competing problem definitions? Second, how do definitional debates between stakeholders affect the ability of key actors to address long term policy solutions? Third, if there is an absence of some level of agreement on the problem(s) involved with Swift Creek, what actions(s), if any, are possible? Finally, are there indicators that could lead to a type of focusing event that would overcome these definitional debates?

This case study expands on the relationship between "less pressing" environmental issues and the types conditions that must be in place in order for solutions to be created by regulatory bodies. The case of Swift Creek is an example of a relatively rare environmental event that has huge potential for causing serious contamination for many people. Though this case is unique, these types of definitional debates are not.

Policy, asbestos and stakeholder literature will be applied to highlight the current situation and to take all views into account. Interviewing stakeholders revealed their

[6] For this thesis, and the case study of Swift Creek, I define a dominant focusing event as the diagnosis or death from an asbestos causing illness of resident(s) within the radius of Swift Creek or an extreme flooding event of Swift Creek which causes the loss of life.

perspectives on the case and their goals for the project. These findings are supplemented by the compiled history of Swift Creek, as well as literature on other naturally occurring asbestos sites. These interviews also revealed a lack of consensus on the problem definition and the actions, if any, that should be taken on these “less pressing” and expensive environmental issues to prevent future harm.

CHAPTER ONE:

Literature Review and Methods:

Problem definition[7] is centered on what stakeholders identify as public issues and how they think and talk about those concerns. Understanding the dynamics of problem definition is essential to understanding the basics of public policy-making. "At the nexus of politics and policy development lies persistent conflict over where problems come from and, based on the answer to this question, what kinds of solutions should be attempted."[8] Policy literature supports the notion that within policy formulation, any kind of competing problem definitions and definitional debates between stakeholders has the potential to cause a stalemate in the policy process, thus affecting the ability of stakeholders to address possible policy solutions. Scholars have written extensively on the terminology and methods of analysis that can be adapted to the study of problem definition within policy contexts. This thesis uses these principles and applies them in the evaluation of the policy process surrounding Swift Creek. In this chapter, public policy, problem definition and stakeholder involvement is defined and expanded using literature from leading policy scholars to demonstrate how these concepts can be applied to the case of Swift Creek. An explanation of the research methods used to gather and analyze data and why these particular methods were chosen concludes the chapter.

Public Policy and Problem Definition Literature

Understanding the policy process, the way policy is developed, changed and is executed, requires a theoretical framework. Within the field of public policy there are a

[7] Problem definition is a statement of a goals and the discrepancy between it and the status quo; also defined as the strategic representations of situations. Stone, Deborah. *Policy Paradox: The Art of Political Decision Making.* New York: Norton. (2002): pp. 133.
[8] Rochefort, David A. and Roger W. Cobb. *The Politics of Problem Definition: Shaping the Policy Agenda.* Lawrence: University Press of Kansas. (1994): pp. 3.

number of theoretical perspectives and models, but there is not one universally accepted theoretical approach.[9] A variety of competing theories have been developed to explain the dynamics and evolution of the policy process and among the dominant schools of thought,[10] John Kingdon's multiple streams model "attempts to explain both the dynamics of how issues enter the agenda, and how policy is made within American politics."[11]

To discover if there is definitional debate affecting Swift Creek policy formulation, the application of analysis stems from John Kingdon's Process Streams Model. This model suggests that there are three separate "loosely coupled" streams: policies, politics, and problems, which flow steadily through society affecting each other none the less.[12] "When these streams are not in line, they serve as a constraint rather than impetus for policy development."[13] Kingdon asserts that policy tends to occur more than be made, and policies that can gain the necessary level of political support, not necessarily the more rational policies, are the ones that win.[14] These occurrences of policy are what Kingdon described as "policy windows" which open and close as a result of the evolving convergence among these three streams. "Such windows are opened either by the nature of a problem or by politics. The windows provide an opening for policy actors to attempt to push through certain policy solutions over others."[15]

[9] Theodoulou, Stella Z. and Chris Kofinis. *The Art of the Game: Understanding American Public Policy Making.* Belmont, C.A: Wadsworth. (2004): pp. 80.
[10] Other important theories include: Stages-heuristic (policy cycle) approach, Rational choice approaches, Advocacy coalition framework approach, Incrementalism and Punctuated equilibrium model. Ibid. pp. 80-98.
[11] Ibid. pp. 91.
[12] Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009): pp. 69.
[13]Ibid. pp. 70.
[14] Kingdon, John W. *Agendas, Alternatives, and Public Policies*. New York: HarperCollins. (1984).
[15] Theodoulou, Stella Z. and Chris Kofinis. *The Art of the Game: Understanding American Public Policy Making.* Belmont, C.A: Wadsworth. (2004): pp. 91.

According to Kingdon's model, in the policy proposal stream, policies either float or sink depending on their technical feasibility, cost, and the amount of political support or opposition they face.[16] This makes it very difficult to get stakeholders to commit to proposed policies because there are so many different variables that must be precisely determined in order for success to occur. In the absence of clear sources of funding or public support, it becomes problematic to work around the aspects of the policy proposal stream.

The politics stream considers the capacity of our political system's policy institutions to place an issue in the formal agenda.[17] The forces that alter the direction of this stream are perceived changes in opportunities and political mandates.[18] Agenda setting is defined as "the process by which problems and alternative solutions gain or lose public and elite attention"[19]. Strategic agenda setting has the potential to influence stakeholders in what is placed at the top of their agendas based on particular political factors such as public pressure, the current political climate and the ability to gain political favorability.

In the problem stream, how a stakeholder becomes aware of a certain issue (policy evaluation reports, budget renewals, disasters crisis and other focusing or "triggering" events[20]) and how and by whom these conditions or events are defined as "problems" influence how the policy process proceeds. In some cases where a focusing event is absent,

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[16] Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009): pp. 70.

[17] An agenda is a collection of problems, understandings or causes, symbols, solutions, and other elements of public problems that come to the attention of members of the public and their governmental officials. Birkland, Thomas A. *An Introduction to the Policy Process*: *Theories, Concepts, and Models of Policy Making*. Armonk, New York: M.E. Sharpe, Inc. (2001). pp. 106.

[18] Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009): pp. 70.

[19] Birkland, Thomas A. *An Introduction to the Policy Process*: *Theories, Concepts, and Models of Policy Making*. Armonk, New York: M.E. Sharpe, Inc. (2001): pp 106.

[20] A focusing or triggering event is defined as "an event [which] occur[s] in the political system [which] that focuses attention on an issue that may or may not require governmental action". Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009): pp.325.

stakeholders have the ability to define the problem as "less significant" and are able to justify prioritizing other issues in front of it.

According to Theodoulou and Kofinis, "the theoretical importance of the multiple streams model stems from the emphasis on the interrelationship between political and policy dynamics evident in the beginning phases of the policy-making process."[21] The theory explains why some problems and certain policy solutions are not recognized politically as important issues or relevant solutions. When examining the Swift Creek case using Kingdon's model, issues and break-downs arise in each of the streams. Though all of the streams within Kingdon's model are of importance, analysis for this case will be focused within the "problem stream," [22] centered on trying to determine (1) if there is a definitional debate of the problem between stakeholders, and (2) if this essential policy concept of a common problem definition is absent, what actions(s), if any, are possible.

In Kingdon's model, when creating policy, the order of formulation does not matter as much as the political and policy dynamics which are present. However, prior to Kingdon's time, author Edward S. Quade wrote on the importance of a common problem definition and on the sequence of events necessary for comprehensive policy to be constructed. According to Quade for policymakers in search of the "best" alternative -what is done first and what is done next- depends on the problem and the context in which it is being investigated. He emphasizes that "in inquires, one should try to look at the problem as a whole, not just its separate parts…[and] we should at least think about the entire problem and deliberately decide what aspects we are going to tackle or include and what to leave out. It is also

[21] Theodoulou, Stella Z. and Chris Kofinis. *The Art of the Game: Understanding American Public Policy Making.* Belmont, C.A: Wadsworth. (2004): pp. 91.

[22] By not going into extreme detail on Kingdon's entire model, this thesis does not infer that the other streams are not as important as the problem stream; simply, for the purposes of this project applying and analyzing all of the three streams to the Swift Creek case is outside the scope.

important for the analyst not to pretend that he has treated the whole problem."[23] The step of formulation encompasses an attempt to identify the issues involved, define the problems that are present, clarify objectives, identify stakeholders and get a feel for the relationship between the actors. "In a sense, formulation is the most important stage, for the effort spent restating the problem in different ways, or redefining it, clarifies whether or not it is spurious to trivial and points the way toward a solution."[24] This leads to the conclusion that if there is a major flaw in defining the problem(s) involved, the rest of the policy making process will be fractured from the very beginning.

Not only is it important that problem(s) are defined, but it is also important how problems are characterized. A problem can be identified as either public or private. A public problem is defined as "an issues of public concern that entails some kind of social or individual obstacle or difficulty, with great consequence for the parties affected, that cannot be easily addressed or should not be ignored by individuals or society."[25] In contrast, a private problem is "a class of problems that are seen as more sanguine [and] are perceived to be the responsibility of the parties affected."[26] This distinction between public and private problems is important for the development of the policy process because "it raises important questions as to the scope of the government action that may be necessary."[27] This is not to say that all public problems will remain public problems and that private problems will reciprocate. As beliefs and perceptions change over time, issues will be defined or redefined as either public or private.

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[23] Quade, Edward S. *Analysis for Public Decisions.* New York: Elsevier Science Publishing. (1982): pp. 48.
[24]Ibid. pp. 50.
[25] Theodoulou, Stella Z. and Chris Kofinis. *The Art of the Game: Understanding American Public Policy Making.* Belmont, C.A: Wadsworth. (2004): pp. 100.
[26] Ibid. pp. 100.
[27] Ibid. pp. 100-101.

Scholars David A. Rochefort and Roger W. Cobb contribute to the importance of an agreed upon problem definition identification and identify two different senses in which problem definition has come to be important in policy analysis literature: technical and non-technical. The technical approach "comes out of the tradition of policy analysis as an applied profession; policy analysis consists of a set of logical steps for diagnosing problems and devising cost-effective solutions, typically in the service of some policymaking authority." They are quick to point out, however, that problem definition can never be purely a technical exercise; "stakeholders have their own assumptions and interests that lead to particular favored definitions, not all of which are compatible."[28] Depending on where stakeholders sit at the table or which public arena they represent, (congressional legislature, federal, state/local bureaucracies or state/county governments) different "selection principles" come into effect in defining problems. "How an issue is defined or redefined, as the case may be, influences: (1) The type of politicking which will ensue around it; (2) Its chances of reaching the agenda of a particular political institution; (3) The probability of a policy outcome favorable to advocates of the issue."[29]

Along a similar train of thought as Cobb and Rochefort, Deborah Stone writes that the principle concept that definitions of policy problems usually have a narrative structure; these stories illustrate heroes, villains and innocent victims. "Often what appears as conflict over the details is really disagreement about the fundamental story."[30] She states that "problem definition is a matter of representation because every description of a situation is a portrayal from only one of many points of view and that problem definition is strategic

[28] Rochefort, David A. and Roger W. Cobb. *The Politics of Problem Definition: Shaping the Policy Agenda.* Lawrence: University Press of Kansas. (1994): pp. 8.
[29] Ibid. pp. 8-9.
[30] Stone, Deborah. *Policy Paradox: The Art of Political Decision Making.* New York: Norton. (2002): pp. 138.

because groups, individuals and government agencies deliberately and consciously fashion portrayals so as to promote their favored course of action."[31] Rochefort and Cobb add to this notion by asserting that problem definition is not centered on finding someone or something to blame; instead, "disputes can surround a situation's perceived social significance, meaning, implications, and urgency. By dramatizing or downplaying the problem and by declaring what is at stake, these descriptions help to push an issue onto the front burner of policymaking or result in officials' stubborn inaction or neglect."[32]

Stakeholder Literature:

The issues Stone, Rochefort and Cobb highlight are important distinctions within the public policy literature of problem definition because the issues of stakeholder selection and cooperation are intertwined in the policy making formula. Scholar R. Edward Freeman defines a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives"[33]. There is some variation between scholars within different disciplines on how inclusive the definition of a stakeholder should be; for example Eden and Ackerman state that stakeholders can only be people or groups who have the power to directly affect the organization's future and absent that power, they are not stakeholders.[34] "The literature in political science highlights interests, publics, constituencies, citizens and formal office holders, among other possible stakeholders."[35] While specific stakeholder definitions vary, the literature concurs the need for stakeholder support to create

[31] Stone, Deborah. *Policy Paradox: The Art of Political Decision Making.* New York: Norton. (2002): pp. 133.
[32] Rochefort, David A. and Roger W. Cobb. *The Politics of Problem Definition: Shaping the Policy Agenda.* Lawrence: University Press of Kansas. (1994): pp. 3.
[33] Freeman, R. Edward. *Strategic Management: A Stakeholder Approach.* Marshfield, MA: Pitman Publishing, Inc. (1984): pp. 46.
[34] Bryson, John M. "What to do When Stakeholders Matter: Stakeholder Identification and Analysis Techniques" *Public Management Review*. Vol. 6, No. 1 (2004): pp. 22.
[35] Ibid. pp. 48.

and sustain winning coalitions, and to ensure long-term viability of policies, plans and programs.[36]

In most, if not all, public problems, the "problem" involves or affects numerous people or groups and these actors have some responsibility to act. "Stakeholder analysis is in one sense recognition that the policy process is political… that there are actors whose cooperation, or at least willingness not to obstruct, is necessary for policy success… [and] that difference in values, role, perceptions and interests are portable."[37] This kind of analysis is used to inventory, rank and assess the positions of the individuals, groups, and organizations affected by or interested in the proposed policy. The question arises as to who should be involved in a particular policy problem and whether there can be too much or too little participation. Though there may be many different people, groups and organizations who wish to have a seat at the table, not all are going to get that chance, which makes this process even more important.

In the case of Swift Creek, data from the documentation and interviews indicates there are two informal groups of stakeholders. The first is the "main group", which involves the EPA, Washington State Department of Ecology and Whatcom County Public Works Department. The "secondary group", involves a variety of other government officials such as Congressional representatives, Whatcom County Health Department, private stakeholders and Whatcom County representatives. "Figuring out what the problem is and what solutions might work are actually part of the problem, and taking stakeholders into account is a critical

[36] Bryson, John M. "What to do When Stakeholders Matter: Stakeholder Identification and Analysis Techniques" *Public Management Review*. Vol. 6, No. 1 (2004): pp. 23.
[37] Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009): pp. 27-28.

aspect of problem solving."[38] The importance of a stakeholder analysis is greatly widened if it becomes clear that there is a definitional debate between stakeholders. If there is a fundamental disagreement between the numerous parties involved as to what the problem they are trying to solve is, the likelihood of a policy agreement is slim. The bottom line is that "key stakeholders must be stratified, at least minimally, or public policies, organizations, communities or even countries and civilizations will fail."[39] This raises the question in the Swift Creek case as to which stakeholders' definition(s) of the problem(s) is the "correct" one to formulate policy in an effort to rectify the issue(s) present.

Research Methods:

As a research method, the case study is used in many situations to contribute to the knowledge of individual, group, organizational, social, political, and related phenomena. Case studies have the unique ability to examine a full variety of relevant evidence such as documents, artifacts, interviews of those involved, and observations of the events being studied.[40] By definition, "a case study is an empirical inquiry that (1) investigates a contemporary phenomenon in depth and within its real-life context especially when (2) the boundaries between phenomenon and context are not clearly evident."[41]

This case study of Swift Creek employs two different types of data collection methods. Stakeholder interviews and secondary evidence (through documentation) were used to analyze the actions and policies which have taken place thus far, the current policy situation, and the involvement of stakeholders. The documentation has strengthened the

[38] Bryson, John M. "What to do When Stakeholders Matter: Stakeholder Identification and Analysis Techniques" *Public Management Review*. Vol. 6, No. 1 (2004): pp. 24.
[39] Ibid. pp. 23
[40] Yin, Robert K. *Case Study Research: Design and Methods*. Thousand Oaks, C.A.: Sage Publications. (2009): pp. 11.
[41] Ibid. pp. 18.

backbone of this thesis and the conducted interviews and analysis is what binds the critique of this case study together. All of this evidence is used in determining if there is a definitional debate and what hindrance, if any, that debate is having on formulating policy solutions in the case.

In this case study, structured interviewing was conducted in order to get more knowledge of how each of the stakeholders identified the problem(s) surrounding Swift Creek. "One of the most important sources of case study information is the interview."[42] In an attempt to have a comprehensive understanding of this case, sixteen stakeholders were identified (including key elected public officials, agency employees, project managers, and private property owners) and were interviewed in a random order. Each of these stakeholders was chosen because they have been involved with the saga of Swift Creek. All of these stakeholders represent different levels of government and/or governmental agencies in hopes this diversity would add to the quality of the data.

The interviews included five open-ended questions intended to document what each survey participant identified as the problem(s) involved with Swift Creek and their desired outcome for this case:

Interview Questions:

1. When and how did you first learn there was asbestos in Swift Creek?
2. Do you think the asbestos in Swift Creek is a problem? And if not asbestos, are there other problems associated with Swift Creek?
    a. If yes (asbestos is a problem) what kind of problem?
    b. Who/ what has caused them?
3. What do you think should be done concerning Swift Creek?
4. Have you taken any action in pursuit of this?
5. Where do you foresee the issue of asbestos in Swift Creek in the future?

[42] Yin, Robert K. *Case Study Research: Design and Methods*. Thousand Oaks, C.A.: Sage Publications. (2009): pp. 106.

Each interview varied in length, from fifteen to fifty minutes, and upon the completion of the interviews, each interview was transcribed. Interviewees consented to having their interviews recorded on the understanding that their answers would be confidentially.[43] By providing the interviewees a blanket of confidentiality throughout the process, each of them was granted a space to answer openly and honestly in their reflections of this case. If these interviews were not done in confidence, there was concern that their answers would not accurately reflect their true opinions on the issues of this case in fear of offending or hindering the dynamics between the other stakeholders. The relationships between each of these stakeholders must remain on good terms if any progress is to be made. Answers were used in determining if a definitional debate was present or not, and also aided in gathering individual perspectives on the policy history, clarification surrounding asbestos regulation, stakeholder relations and political issues concerning the Swift Creek case.

The second method of data collection was review of documentation of administrative documents (proposals, progress reports, and other internal documents) and formal studies or evaluations that have been complied on Swift Creek. Conducting text analysis of the reports published by the Washington State Department of Health and Human Services, the Environmental Protection Agency, and the Whatcom County Health Department provided data to use in the analysis of policies that have been created up to the present.[44] Their reports were critical in providing a better understanding of the history of action taken surrounding Swift Creek and the amount of asbestos within Swift Creek and the surrounding creek banks. Literature on the history and facts of asbestos use in the U.S. was also reviewed to provide a background and understanding of asbestos and the harms it causes. Finally, drawing from

[43] For the purpose of this thesis, each interview is identified by number, for example: Interviewee #4.
[44] All of the titles and expansion of these reports can be found throughout Chapter Three.

other asbestos case studies and articles[45] aided the analysis of the severity in health risks and what should be done to mitigate further effects.

For case studies, the most important use of documents is to corroborate and supplement evidence from other sources. In connection with the interviews which were conducted, a timeline of events, policies, and general understandings of the Swift Creek case became evident. This platform is necessary to build from and properly apply the policy-making analysis which this thesis is designed to do. The data collected is analyzed in an attempt to identify if there is a definitional debate and how that is affecting the policy process.

[45] This includes, but is not limited to: Pan, Xue-lei, Howard W. Day, Wei Wang, Laurel A. Beckett, and Marc B. Schenker. "Residential Proximity to Naturally Occurring Asbestos and Mesothelioma Risk in California". *American Journal of Respiratory and Critical Care Medicine.* Vol. 172 (June 19, 2005).

CHAPTER TWO:

The Tale of Asbestos in Swift Creek

Sumas Mountain, located east of the town of Everson in Whatcom County, Washington hosts a rock formation which contains naturally formed asbestos.[46] After being covered for decades, a landslide occurred due to "natural forces"[47] on the west flank of Sumas Mountain in the late 1930s or early 1940s due to several record rainfalls which took place in the 1930s. This ongoing, massive and slow-moving landslide has continued moving downhill for the past seventy years. [Figure 2]

As water flows down Sumas Mountain it naturally channels into Swift Creek, which starts on Sumas Mountain, picking up asbestos-laden rock and soil and continuing to carry it downstream.[48] "The landslide mass is estimated at sixty-eight million cubic yards in volume and it delivers an estimated one-hundred and twenty thousand cubic yards of sediment per year into the creek system;"[49] it is also estimated that there is three hundred years of deposition at that rate.[50] Swift Creek travels west approximately four miles through agricultural land and directly along the backside of several private properties. It runs into the Sumas River which meanders along the eastern border of the town of Nooksack, and then continues to wind its way fifteen miles northeast to the Canadian border where it eventually

[46] U.S. Environmental Protection Agency. "Frequently Asked Questions about Sumas Mountain Asbestos, Swift Creek and Sumas River".
[47] Though logging has taken place near the landslide area, it is not considered to be the main cause for the landslide occurrence.
[48] U.S. Environmental Protection Agency. "Frequently Asked Questions about Sumas Mountain Asbestos, Swift Creek and Sumas River".
[49] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 1-1.
[50] Confidential Thesis Interviewee #5. February 2011.

flows into British Columbia's Fraser River located ten miles north of the border.[51]

The sediment issues surrounding Swift Creek do not independently surround the amount of soil that is transported from the landslide area and into the creek. These flooding issues are exasperated by the sediment itself which contains "an elevated amount of naturally occurring asbestos (NOA) and above-normal concentrations of magnesium, cobalt, and nickel. The mineral composition inhibits growth of vegetation and is potentially detrimental to fish habitat in Swift Creek and further downstream."[52] Asbestos is designated as a hazardous substance[53] and management strategies of the sediment material containing asbestos in Swift Creek must be reflective of current regulatory procedures set in place.

Swift Creek- From the 1940's to the 1990's:

Due to the amount of soil which flows off of Sumas Mountain, it was not long after the landslide occurred that Swift Creek began becoming clogged with sediment. Dredging, historically, has occurred throughout the whole water system of Swift Creek and the Sumas River since the 1950's, where sediment was routinely dredged out of the creek bed as flood mitigation strategy.[54] Though sediment removal has occurred since this time period, "systematic records of removal volumes have not been kept."[55]

Severe flooding in 1971 caused by a rain-on-snow storm, in combination with a dam outbreak flood at the Narrows, resulted in a single event of a debris flow estimated between

[51] U.S. Department of Health and Humans Services. Public Health Service. Agency for Toxic Substances and Disease Registry: Division of Health Assessment and Consultation. "Health Consultation: Evaluation of Health Statistics and Public Health Data Gaps Related to Exposure to Naturally Occurring Asbestos from Swift Creek". (February, 22, 2008). pp. 4.
[52] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 1-1.
[53] 40 C.F.R. § 302.4.
[54]Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 2-3.
[55] Ibid. pp. 2-7.

one-hundred thousand and one-hundred and fifty thousand cubic yards of sediment[56], quickly focusing attention on the Creek and its sediments. In response, the Army Corps of Engineers (CORPS) implemented Emergency Management actions which included removing seventy-thousand cubic yards of material from the channel.[57] The Army Corps of Engineers also conducted a report in 1971 which investigated possible management strategies for the sedimentation of Swift Creek; they determined the most feasible and preferred option was to construct a large debris basin which would have a capacity of one-million cubic yards of sediment. However, after a cost analysis for this proposal, it was concluded that the construction of the debris basin was not economically justified.[58]

As a result of another intense flooding event in 1975, the geotechnical consulting firm Converse David Dixon Associates, Inc, was contracted by the Soil Conservation Service[59] (SCS) to conduct a geotechnical assessment of the landslide. They concluded that a single sediment basin (B), which was located further downstream than basin A, near the crossing at Goodwin Road, was the most feasible option. Though they noted that the disposal of the sediment was a significant portion of the annual and operation costs and appropriate disposal sites for that amount of volume were not within an immediate vicinity of Swift Creek.[60] In addition, Converse David Dixon Associates, Inc found in their analysis of the landslide debris in Swift Creek, that the sediment "indicate(d) serpentinite, till, and conglomerate boulders in a sheared, weak matrix of clay, glacial till, weathered serpentinite, rock flour, and

[56] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 2-8.
[57] Ibid. pp. 2-8.
[58] Ibid. pp. 2-10.
[59] The SCS is the predecessor to the Natural Resources Conservation Service.
[60] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 2-11.

fault gouge; the presence of serpentinite[61] [which] explains the source of asbestos fibres in the water"[62] of Swift Creek.

After the report was released by Converse David Dixon Associates, in 1976 the Environmental Protection Agency (EPA) conducted its own study and reported abnormally high levels of asbestos fibers in the Sumas River. Coinciding, in November 1977, the Washington State Department of Ecology took water samples at several points along Whatcom County rivers; the samples from Swift Creek and from the Sumas River downstream of Swift Creek contained asbestos, while samples from the Sumas River above Swift Creek and from another creek, which were unaffected by the Sumas Mountain landslide, did not contain asbestos.[63]

Swift Creek- From the 1990's to the Present:

Though the first government sponsored dredging was done by the Army Corps of Engineers and the SCS, Whatcom County assumed the primary role of sediment management in the 1980s, when the Whatcom County Public Works Department began dredging to maintain flow capacity and to prevent flooding.[64] In 1998, the River and Flood Division of the Public Works Department took over creek management through contracting GeoEngineers to develop management alternatives to minimize aggradation of Swift Creek

[61] Chrysotile, which is the majority of asbestos found in Swift Creek, is the single asbestiform within the serpentine group.
[62] State of Washington Department of Ecology. "Sumas River, Swift Creek, Drainage Asbestos Fibre Source Investigation". *Memorandum from Darrel Anderson to Dick Cunningham.* (February 11, 1977): pp. 1.
[63] State of Washington Department of Ecology. "Asbestos Fibre Source Sumas River". *Memorandum from Dick Cunningham to Shirley Prescott*. (December. 7, 1977): pp: 1-2
[64] U.S. Department of Health and Humans Services. Public Health Service. Agency for Toxic Substances and Disease Registry: Division of Health Assessment and Consultation. "Health Consultation: Evaluation of Health Statistics and Public Health Data Gaps Related to Exposure to Naturally Occurring Asbestos from Swift Creek". Everson, Whatcom County, Washington. (February, 22, 2008). pp. 4.

to reduce the potential of over-bank flooding.[65] Three different management plans were created by GeoEngineers, and Whatcom County recommended the third alternative as the most feasible. The third plan contained three phases, including dredging the one-mile long channel and removing the sediment stockpiled material between Goodwin Road and Oat Coles Road, constructing four sediment traps upstream, and relocating the confluence of Swift Creek approximately thirteen-hundred feet downstream to reduce the amount of water moving through the sediment traps. The estimated construction costs for this management plan was one-and-half million dollars plus haul costs.[66]

Whatcom County began implementation of Phase 1[67] in 1998, and the dredged material was stockpiled on the creek banks, which was private property, as a form of temporary storage. This dredge sediment was often removed from the site by the public and contractors who used it for fill in their construction projects. "Roughly two million cubic yards [of the dredged material] has been used at building sites all over the County, including under state roads… and used in places where you would think that it should not".[68] This removal practice allowed in order for the County's "dredging strategy to work; it would get dredged, roughly on an annual basis, and by the next year that pile was gone."[69]

Problems started to occur when the deposition amount (seventy thousand cubic yards) greatly exceeded the removal volume of approximately twenty-two thousand cubic yards.[70] Monitoring data started to indicate that the sediment deposition in the upstream end of this one mile section consisted primarily of gravel and transitioned to sand and silt size sediment

[65] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 2-11.
[66] Ibid. 2-12.
[67] Channel Dredging and the removal of stockpiled material below Goodwin Road.
[68] Confidential Thesis Interviewee #11. February, 2011.
[69] Ibid.
[70] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): pp. 3-6.

near Oat Coles Road.[71] This high deposition resulted in annual aggradation of two to three feet; a survey conducted in 2004 "indicated that the base elevation of the creek is higher than the surrounding floodplain in some sections."[72]

There is Asbestos in the Soil:

The bank stabilization and excavation activities in Swift Creek involved dredging of sediment and the discharge of fill material, actions that required a Department of the Army Permit. Prior to issuing a permit in 2005, during the evaluation of the project, the Seattle District Regulatory Program received comments from the EPA indicating that "the dredged material represents a significant threat to public health based on the presence of asbestos fibers".[73] The EPA recommended to the CORPS and Whatcom County that no dredged material from Swift Creek be removed from the site.[74]

Due to the levels of asbestos which were detected in the sediment in 2005, the EPA and the CORPS actively worked to stop the removal of soil from the site for any use by fencing off direct access to the sediment berms, [Figure 3] "placing warning signs to notify the public that Swift Creek sediments contain asbestos [Figure 4] and that removing material from the site is prohibited."[75] [Figure 5] These stockpiles have reached as tall as ten to fifteen feet high in some areas[76] and currently, the stockpiles contain approximately two-hundred thousand cubic yards of sediment.[77]

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[71] Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008): 3-6.
[72] Ibid. pp. 3-6.
[73] U.S. Army Corps of Engineers. Seattle District Regulatory Branch. "Swift Creek Permitting Issues". *Information Paper*. pp. 1.
[74] Ecology and Environment, Inc. "Swift Creek Asbestos Site Time-Critical Removal Action Report". *Report prepared for U.S. Environmental Protection Agency Region 10.* (April 2008).: pp. 2-2.
[75] Ibid. pp: 2-2.
[76] U.S. Environmental Protection Agency. "Sumas Mountain Asbestos - Maps & Photos". Region 10: The Pacific Northwest. (2005-2009). http://yosemite.epa.gov/r10/cleanup.nsf/sites/swiftcreekimg.
[77] Confidential Thesis Interviewee #11. February, 2011.

In order to better determine the amount levels of asbestos contained in the soil and sediment from Swift Creek, the EPA has done a series of sample testing. The EPA considers "material containing one percent or more of asbestos by weight to be a hazardous substance, although levels of less than one percent in soil can release significant levels of asbestos fibers to the air when disturbed."[78] In March and May of 2006, the EPA conducted two Integrated Assessments (IA) which involved sampling and analysis of the sediment and the dredged material in Swift Creek. In the second IA, they collected samples at locations along the one-mile of dredged material piles and found that "the average asbestos concentration of the composite dredged material samples collected during the IA was approximately 1.6 %, with maximum concentrations of 4.4%."[79]

Results from activity-based sampling done in August 2006 [Figure 6] indicated a cancer risk greater than $1x\ 10^{-4}$ and prompted the EPA to pursue a time-critical removal action (TCRA).[80] In November 2007, the EPA followed through and implemented a TCRA; these emergency response resources were mobilized based upon the findings of the IA conducted in May 2006, activity-based sampling conducted in August 2006 and the requests of the Whatcom County government. This action "was intended to reduce the potential for an uncontrolled release of asbestos from the dredged materials presently stockpiled along Swift Creek".[81] The stockpiles were re-graded along Swift Creek to prevent erosion and further release. As a final point of action, a substance called a soil tackifier was placed on the dredged sediment piles to bind together the soil and reduce the amount of windblown dust

[78] U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". Naturally Occurring Asbestos in California. http://www.epa.gov/region9/toxic/noa/addressnoa.html.
[79] Ecology and Environment, Inc. "Swift Creek Asbestos Site Time-Critical Removal Action Report". *Report prepared for U.S. Environmental Protection Agency Region 10.* (April 2008): pp. 2-2 and 2-3.
[80] This analysis was based on fibers and air quality, not a direct measurement of human health.
[81] Ecology and Environment, Inc. "Swift Creek Asbestos Site Time-Critical Removal Action Report". *Report prepared for U.S. Environmental Protection Agency Region 10.* (April 2008): pp. 2-3.

released from the piles.[82] The EPA currently has not placed the tackifier on any of the other sediments (banks along the Sumas River, flood deposits, etc) which were not dredged in this area.

In July 2008, the EPA collected additional samples to determine the levels of asbestos in residential soils on Swift Creek properties where dredged material may have been used for fill. They found that "concentrations ranged from 0.25% to 6.5% at the four sampled properties adjacent to Swift Creek".[83] In early 2009 a great deal of flooding occurred in much of Western Washington due to heavy rains. In May 2009, the EPA, concerned that those flood events deposited asbestos-laden sediments along the banks, conducted testing at fifteen different locations, of surface water samples, upland soil, and bank sediment. The EPA stated the intent of the study was to determine how asbestos concentration in bank sediment and upland soils are impacted by flood events and to determine if concentrations decrease with increasing distance from the Sumas Mountain landslide.[84] They detected asbestos in upland soil, bank sediment and surface water samples and that the concentration levels were much higher than observed in earlier samplings conducted by the EPA. "Concentrations ranged up to 27% in upland soil samples and up to 22.75% in bank sediment samples collected along the Sumas River downstream from Swift Creek". [85] These sample results indicated that asbestos is present in the Sumas River and flooding has contributed to distribution of asbestos-containing material beyond the rivers banks.

[82] U.S. Environmental Protection Agency. "Frequently Asked Questions about Sumas Mountain Asbestos, Swift Creek and Sumas River".
[83] U.S. Environmental Protection Agency: Office of Environmental Assessment, Region 10. "Soil, Sediment and Surface Water Sampling: Sumas Mountain Naturally-Occurring Asbestos Site, Whatcom County, Washington". (October 13, 2009): pp. 2.
[84] Ibid. pp. 3.
[85] Ibid. pp. 7.

As a result of the landslide on Sumas Mountain and the dredging of the asbestos-laden soil in Swift Creek, the asbestos rock and soil became disturbed and airborne. Removal of the dredged materials has been restricted since 2005 and active dredging done by Whatcom County has been very limited. Since 2006, the only dredging which has occurred along the one-mile long section between Goodwin and Oat Coles Road was done in the fall of 2010 in an attempt to prevent flooding and further dispersion of the contaminated material. The dredged material was placed on a piece of property [Figure 7] at the corner of Goodwin and Oat Coals Road which was recently purchased by Whatcom County due to its proximity to the site and lack of wetlands area designation.

Beyond this property acquisition and preventative dredging, there is no evidence that there is any major policy movement underway. Studies are being conducted to get a better idea of the landslide itself, the amount of deposition and the distance it is traveling from the slide, through Swift Creek and up the Sumas River. According to a state interviewee, stakeholders from the EPA, the Washington State Department of Ecology and Whatcom County Public Works Department are in contact with each other, sometimes twice a month, to discuss new developments,[86] and quarterly, or due to a major event, these core stakeholders facilitate a meeting of all the agencies to update them on the current situation surrounding Swift Creek.

[86] Confidential Interviewee #2. February, 2011.

CHAPTER THREE:

Non-Occupational Asbestos- Exposure and Regulation

The word asbestos comes from a Greek word meaning "inextinguishable" or "indestructible".[87] Asbestos fibers have been used in many different societies for a multitude of functions including flame retardant clothing, pottery, armor and cloth for cremation and building materials. Archeological studies in Finland have revealed that asbestos fibers were being incorporated in pottery by 2,500 B.C.[88]. The most common exposure to high levels of asbestos is classified as "occupational exposure", which occurs when people work in industries which make or use asbestos products or are involved in asbestos mining. Non-occupational exposure (NOE), on the other hand, occurs when people are exposed to asbestos through other means: through the materials in a home or building which are made with asbestos, living near asbestos mines or factories (both active and inactive), and/or living near naturally occurring asbestos (NOA) sites. In the 1980's scholars hypothesized that one-third of all mesothelioma cases in the U.S. may have been caused by non-occupational exposure. This is linked to domestic and neighborhood exposures to asbestos or environmental exposure to NOA sites.[89]

This chapter presents a background of asbestos, expands on the ways in which people are exposed to asbestos through those three NOE sources, and discusses the regulations surrounding them. In order to critically analyze the case of Swift Creek, it is important to understand these types of non-occupational exposure and the regulations pertaining to them.

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[87] Barbalace, Roberta C. "A Brief History of Asbestos Use and Associated Health Risks". (October 2004). http://environmentalchemistry.com/yogi/environmental/asbestoshistory2004.html.
[88] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978). pp. 3.
[89] Maule, Milena Maria, et al. "Modeling Mesothelioma Risk Associated with Environmental Asbestos Exposure". .*Environmental Health Perspectives*. Vol. 115, No 7 (July, 2007): pp. 1066.

Asbestos Background:

Asbestos is the name given to a group of six different fibers which belong to two mineral groups: serpentines and amphiboles.[90] Chrysotile, which is the majority of asbestos found in Swift Creek[91], is the single asbestiform within the serpentine group [Figure 1]; the other five asbestiform varieties within the amphiboles group are: amosite, crocidolite, tremolite, actinolite and anthophyllite.[92] These asbestos fibers occur naturally in the environment and are composed of "hydrated aluminum-magnesium silicates with varying metal composition".[93] Though the use of asbestos dates back to 2,500 B.C., it was not until the 1850's that commercial production was attempted. This was sparked by the rediscovery and development of very large deposits of asbestos in Canada and South Africa.[94] The earliest discovery of asbestos in the U.S. was in Vermont through the U.S. Geological Survey (USGS) in 1861[95]; deposits were then discovered and mined all over the U.S., including in Arizona, California, North Carolina, Georgia and Maryland. Presently, at least thirty-five states in consultation with the USGS have reported NOA sites.[96]

The industrial revolution sparked the widespread use of asbestos in the manufacturing of more than 3000 products including textiles, building materials, insulation and brake

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[90] Virta, Robert. "Asbestos: Geology, Mineralogy, Mining and Uses." *U.S. Geological Survey Open File Report. (*2002). pp. 4. http://pubs.usgs.gov/of/2002/of02-149/of02-149.pdf.

[91] Chrysotile is the primary form of asbestos in the serpentine group and is made up of flexible and curved fibers.

[92] U.S. Department of Health and Humans Services: Public Health Service. Agency for Toxic Substances and Disease Registry. "Division of Toxicology ToxFAQs". CAS# 1332-21-4. (September 2001).

[93] Osinubi, Omowunmi Y. O., Micheal Gochfel, and Howard M. Kipen. "Health Effects of Asbestos and Nonasbestos Fibers". .*Environmental Health Perspectives.* Vol. 108, Supplement 4: Occupational and Environmental Lung Diseases (August, 2000): pp. 665.

[94] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978). pp. 8.

[95] Ibid. pp. 15.

[96] U.S. Environmental Department Agency. "Naturally Occurring Asbestos: Approaches for Reducing Exposure". pp. 1.

linings.[97] By 1903 production of asbestos cement in the U.S. was also under way. World War II increased the demand for asbestos and "multiplied the uses in spectacular fashion"[98]. For example, asbestos was used in the manufacturing of protective clothing for uniforms, gas mask filters, sandbags, and sprayed onto deck-heads and bulk-heads of British naval ships.[99]

Asbestos is an attractive material to industry because of its resistance to heat and chemicals, high tensile strengthen and low cost compared to similar man-made materials.[100] Asbestos fibers do not evaporate into air or dissolve in water. People are most commonly exposed to asbestos through inhalation. "Inhalation of asbestos fibers has been associated in humans with asbestosis, respiratory cancer, and mesothelioma[101] (a rare cancer of the pleural and abdominal lining)."[102] The current U.S. Occupational Safety and Health Administration (OSHA) states that employee exposure to asbestos must not exceed 0.1 fiber per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift and short-term exposure must also be limited to not more than 1 f/cc, averaged over thirty minutes. The Department of Health and Human Services (DHHS), the World Health Organization (WHO), and the EPA have all determined that asbestos is a human carcinogen. DHHS states, "breathing in high levels of asbestos fibers for an extended period of time may result in the disease of asbestosis which forms a scare-like tissue in the lungs and in the pleural membrane (lining) that

[97] Virta, Robert. "Asbestos: Geology, Mineralogy, Mining and Uses." *U.S. Geological Survey Open File Report.* (2002). pp. 4. http://pubs.usgs.gov/of/2002/of02-149/of02-149.pdf.
[98] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978). pp. 16.
[99] Ibid. pp. 18-19.
[100] Virta, Robert. "Asbestos: Geology, Mineralogy, Mining and Uses." *U.S. Geological Survey Open File Report.* (2002). pp. 8-9. http://pubs.usgs.gov/of/2002/of02-149/of02-149.pdf.
[101] Among the asbestos diseases, mesothelioma is the most sensitive and specific indicator of the disease burden in the population. Weill H, J M Huges, and A M Churg. "Changing Trends in US Mesothelioma Incidence". *Occupational Environmental Medicine.* Vol. 61 (2004): pp. 438-441.
[102] Blake, David. "Risk Analysis of Agricultural Exposure to Airborne Asbestos in Whatcom County, Washington State". Master's Thesis, Western Washington University (1991). pp. 1.

surrounds the lungs."[103] The American Cancer Society estimates that between 2,000 and 3,000 people will be diagnosed with mesothelioma every year; which is a slow developing and serious disease. Most fully develop the disease between ten and forty years following the extended exposure; the average survival time for people with mesothelioma is found to be between four and eighteen months.[104]

Non-Occupational Asbestos Exposure:

All asbestos is "naturally occurring", and is designated as "minerals described as asbestos that are found in-place in their natural state, such as in bedrock or soils, which may be exposed by man's excavations or by natural weathering."[105] The term naturally occurring asbestos "is typically used where the asbestos minerals are found in such low quantities that mining and commercial exploitation are not feasible."[106] Asbestos mines do not fall under this NOA classification because the asbestos was not left in its natural state; it was disturbed and mined by humans for manufactured use. This thesis focuses on the Swift Creek NOA site, but in order to comprehend the complexities that surround the Sift Creek case and the issues present, it is important to have a background on all three different types of non-occupational exposure to asbestoses: exposure to the materials in a home or building which are made with asbestos, living near asbestos mines or factories and living near a naturally occurring asbestos site.

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[103] U.S. Department of Health and Humans Services: Public Health Service. Agency for Toxic Substances and Disease Registry. "Division of Toxicology ToxFAQs". CAS# 1332-21-4. (September 2001).
[104] American Cancer Society. "Malignant Mesothelioma: Survival Rates". Cancer Resource Information. (April, 2009). http://www.cancer.org/docroot/CRI/CRI_0.asp.
[105] Van Gosen, Bradely. "Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Natural Asbestos Occurrences in the Rocky Mountain States of the United States (Colorado, Idaho, Montana, New Mexico, and Wyoming)." *U.S. Geological Survey Open File Report.* (2007). http://pubs.usgs.gov/of/2007/1182/pdf/Plate.pdf.
[106] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials*. Vol. 153 (2008): pp. 2.

Asbestos exposure rates have historically been studied by means of occupational exposure, but in the last sixty years more comprehensive data on exposure through these non-occupational means has been generated. "NOA has existed in the environment for millions of years. However asbestos, whether it exists naturally in the ground or in manufactured products, is still asbestos and poses a serious potential health hazard if released into the air."[107] Non-occupational exposure tends to occur through a lower concentration amount of asbestos than occupational exposure. However, there are many complicating aspects surrounding non-occupational exposure, such as the combination of the concentration levels of the asbestos and the duration of exposure coupled with the level of the public's awareness of the exposure and the risks associated to that exposure.[108]

Exposure from Domestic Products Made with Asbestos

The first form of non-occupational asbestos exposure occurs through domestic products which were manufactured using asbestos. Asbestos has been used in manufacturing a variety of products, including: mattresses, draperies, blankets, rugs, medical equipment, iron board covers, stove linings, baking sheets, ovens, ceilings, siding, wall board, cabinets, insulation, and cement pipes for carrying water.[109] In 1988 the EPA, in a report to Congress, estimated that 20% of buildings, such as hospitals, schools and other public and private

[107] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials.* Vol. 153 (2008): pp. 17.

[108] This thesis does not attempt to address or provide a detailed review of the continuing political and scientific debate and widespread miscommunication over perceived versus actual health risks of asbestos exposure and the associated validity of various analytical sampling and testing methods that have been done on non-occupational exposure. The U.S. Environmental Protection Agency classifies asbestos as a hazardous substance, and this thesis does not contest the validity of that designation. What is addressed in this thesis is what is known about non-occupational exposure to asbestos, the regulations surround that exposure and the way the case if Swift Creek intertwines with those factors.

[109] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978). pp. 19.

structures, contained asbestos-containing material (ACM).[110] Damage or construction demolition of materials containing asbestos only intensifies the airborne exposure.

It is extremely difficult to implement long term studies of this particular type of non-occupational asbestos exposure to detect relationships between direct exposure and disease because humans are mobile beings who are constantly moving throughout the environment. This creates gaps in data when conducting studies on asbestos exposure because there are too many outlying factors which are present and cannot be eliminated.[111] Due to these complexities, regulation of domestic products made with asbestos is difficult to construct because it is not clear how much and for how long people must interact with these materials before they will become ill.

Exposure from Nearby Asbestos Mines or Factories

The second form of non-occupational exposure is from living near asbestos mines or factories, both active and inactive. Asbestos mining was first done through open-pit mining; the asbestos ore is removed by power shovels or bulldozers. Where the ore deposits are deeper in the ground, underground mining practices such as blasting, shoveling, and hauling are used to recover the ore. The rock and soil is then sorted and screened to get rid of the unwanted rock. All of these ore extraction processes generate airborne dust containing asbestos fibers.[112] Once the ore is mined, it then requires milling to "release the fiber, to dry

[110] U.S. Environmental Protection Agency. Report to Congress, *Study of Asbestos-Containing Materials in Public Buildings*. (1988): pp. 5.
[111] It has been estimated that up to 1,000 premature deaths from lung cancer or mesothelioma will occur in the future among school children from schools where asbestos was used in the walls.
Landrigan PJ. "A Population of Children at Risk of Exposure to Asbestos in Place". Annals of the New York Academy of Sciences. Vol. 643 (1991): pp. 283-286.
[112] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978). pp. 51.

but not dehydrate it, to remove impurities and foreign matter, to eliminate fine grit and dust, and to separate the fiber into classified lengths"[113].

The amount of dust which escapes from the milling process depends on how much the various operations are carried out in enclosed spaces. "Points at which dust can escape [causing] exposure include any hand selection processes, dumping on ore piles, wind erosion of ore and slag piles, exposed conveyers (and their return belts) or grading screens…"[114] This causes a concern for the health and welfare of the surrounding public because they are being subjected to asbestos exposure through no fault of their own.

Because asbestos fibers are extremely light and are able to disperse several kilometers from a mine, cases of mesothelioma have been found in areas surrounding asbestos mines and factories. A study done in London by Muriel L. Newhouse and Hilda Thompson found that people who live near these mining or industry areas are exposed to high levels of asbestos in the air. The study discovered an increase in malignant mesothelioma (MM) risk for people living within 800m of an asbestos factory.[115] A case study done in Quebec, Canada found that in towns near asbestos mines, "the lungs of residents who have never worked in the mines have a fiber concentration which is ten times higher than that of the average Canadian".[116] A study done in Casale, Italy found that living close to the asbestos cement factory has a relative risk for mesothelioma[117]; "risk decreases rapidly with

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[113] Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978).pp. 52.
[114] Ibid. pp. 52.
[115] Newhouse, Muriel L. and Hilda Thompson. "Mesothelioma of Pleura and Peritoneum Following Exposure to Asbestos in the London Area". *Britain Journal of Industrial Medicine*. Vol. 50 (1965): pp. 769-778.
[116] Hillerdal, Gunnar. "Mesothelioma: Cases Associated with Non-occupational and Low Dose Exposures". *Occupational and Environmental Medicine*. Vol. 56, No. 8 (August, 1999): pp. 508.
[117] This is adjusted for occupational and domestic exposures. (95% CI, 3.5-50.1) Maule, Milena Maria, et al. "Modeling Mesothelioma Risk Associated with Environmental Asbestos Exposure". *Environmental Health Perspectives*. Vol. 115, No 7 (July, 2007): pp. 1069.

increasing distance from the factory, but at 10km distance the risk was still 60% of its value at the source".[118]

Exposure from Naturally Occurring Asbestos Sites

Naturally occurring asbestos is not unique to Sumas Mountain and Swift Creek; all over the world, humans are exposed to NOA sites. In the U.S. hundreds of NOA deposit sites have been documented and mapped by federal agencies; El Dorado County, California for example, is host to deposits of asbestos associated with ultramafic serpentine rock formations along the West Bear Mountains Fault, which runs north to south within El Dorado County.[119] NOA was first identified in El Dorado County in 1986 along serpentine-rich dirt roads. In 1998, it was determined that asbestos concentrations in air samples taken near the Golden Sierra High School in El Dorado County exceeded state air quality limits for asbestos.[120] This prompted the California Air Resource Board to increase sampling in the air.

In 2002, grading for soccer fields at Oak Ridge High School disturbed a vein of amphibole asbestos. Lack of irrigation water prevented the school district from covering the new fields immediately with sod, leading to concerns about exposure of the campus community to asbestos.[121] Initially, air samples were conducted by a contractor hired by the El Dorado Union High School District; one sampling in particular done in July of 2003 "demonstrated the potential for significant exposure to airborne asbestos from activities such as outdoor athletics and construction and maintenance."[122] As a result, the school district,

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[118] Maule, Milena Maria, et al. "Modeling Mesothelioma Risk Associated with Environmental Asbestos Exposure". *Environmental Health Perspectives*. Vol. 115, No 7 (July, 2007): pp.1069.
[119] Ladd, Karen. "El Dorado Hills Naturally Occurring Asbestos Multimedia Exposure Assessment El Dorado Hills, California." *Report prepared for U.S. EPA Region 10.* (2005). pp. 2-1.
[120] Ziarkowski, Dan. "Garden Valley Asbestos Monitoring Program." *Report prepared for U.S. EPA Region 9.* (2000). pp. 7.
[121] U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". *Naturally Occurring Asbestos in California.* http://www.epa.gov/region9/toxic/noa/addressnoa.html.
[122] Ibid.

under State and County oversight, took further mitigation actions, including covering certain areas of the campus with clean fill and cleaning classrooms.

The EPA's involvement in the spring and summer of 2003 at Oak Ridge High School was to provide technical assistance to the County's Environmental Management Department, the lead regulatory agency overseeing the school district's asbestos cleanup efforts. That changed in October 2003, when the EPA, in response to citizen's concerns, requested that El Dorado Union High School District sample soils in previously untested outdoor areas of the campus for asbestos. When the school district declined U.S. EPA's request, U.S. EPA decided to conduct the sampling.

The EPA's 2003 sampling studies found "asbestos fibers in almost all of the air samples collected…and indicated that personal exposure levels were significantly higher during most sports and play activities."[123] In the summer of 2004, the El Dorado Union High School District, under the supervision of the EPA, conducted soil mitigation to complete the asbestos removal action at Oak Ridge High School in El Dorado Hills. This involved landscaping exposed soil areas next to classrooms, paving access roads throughout the campus, and covering dirt areas within the central quad area of the campus with concrete.[124] This action provided protection and was "necessary to cut the risks associated with naturally occurring asbestos in the soil around the school"[125] The school district became responsible for operation and maintenance of the landscaped areas after the clean up was completed.

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[123] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". Journal of Hazardous Materials. Vol. 153 (2008): pp. 14.
[124] U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". *Naturally Occurring Asbestos in California.* http://www.epa.gov/region9/toxic/noa/addressnoa.html.
[125] U.S. Environmental Protection Agency. "Asbestos Cleanup at High School in El Dorado Hills Complete". (August 18, 2004). http://yosemite.epa.gov/opa/admpress.nsf/9e50770d29adb32685257018004d06fd/46294bd345458a30852570d8005e167e!OpenDocument&Highlight=0,Eldorado.

Health risks from NOA sites are based on exposure to airborne asbestos fibers. NOA, if left covered and undisturbed is able to remain indolent in negatively effecting human health. However, where NOA is uncovered and the asbestos containing soil is disturbed by some sort of human activity (building, farming, driving off-road vehicles, bicycling walking or riding horses) which kicks up dust, asbestos fibers are able to be released into the air. Once airborne, asbestos may be inhaled and is considered a health risk.

In several locations including Cyprus, Greece, China, and California, resent studies have allowed researchers to find an association with environmental exposure to NOA sites and an increased risk of mesothelioma.[126] In the case study done by Xue-lei Pan, et al, they found that residential proximity of naturally occurring asbestos is significantly[127] associated with increased risk of malignant mesothelioma in California.[128] This study found that the odds of having mesothelioma fell by 6.3% for every 10km a person lived from the nearest NOA source.[129] Though studies have demonstrated the connection between exposure to non-occupation asbestos and the increase risk of developing diseases, it is important to note that a recent study which was conducted in February 2010 by the Washington Department of Health, found "no indication that naturally occurring asbestos in the study of the Swift Creek/Sumas River drainage area has contributed to an increase in the occurrence of lung and bronchial cancer or mesothelioma among the potentially exposed populations".[130]

[126] Pan, Xue-lei, et al. "Residential Proximity to Naturally Occurring Asbestos and Mesothelioma Risk in California". *American Journal of Respiratory and Critical Care Medicine.* Vol. 172 (June 19, 2005): pp: 1019.
[127] The association was observed in both men and women, although at the 95% confidence interval, only the association was statistically significant in men. Ibid. 1019.
[128] Ibid. pp. 1022.
[129] Ibid. pp. 1022.
[130] West, Nancy and Glen Patrick. "Sumas Mountain/Swift Creek Asbestos Cluster Investigation". Washington Department of Health. Division of Environmental Health: Environmental Epidemiology. (February 2010):pp. 4.

Asbestos Exposure Regulation:

Due to the fact that diseases associated with asbestos exposure (asbestosis, respiratory cancer, and mesothelioma) are all slow developing diseases, even at "occupational exposure" concentrations, regulation to prevent disease is difficult to develop and promote. The EPA has reported there are four factors that increase the risk of developing an asbestos related disease: (1) the concentration of asbestos fibers in the air; (2) the frequency of exposure; (3) the duration of exposure; and (4) the time that elapses after exposure.[131] It was not until the mid-1980's that focusing events[132] of asbestos related diseases started occurring world-wide, which promoted countries to start banning the use of asbestos and in 1983 Iceland became the first country to ban asbestos.[133] By 1999, asbestos use was banned in Sweden, Norway, Denmark, the Netherlands, Finland, Germany, Italy, Belgium, France, Austria, Poland, and Saudi Arabia.[134]

There are several main issues which arise with non-occupational asbestos exposure regulation. The first is that asbestos rock formations are spread throughout the natural environment, with variations of concentrations in different areas and all with unique situations, resulting in variable rates of exposure and associated health risks. Also, as stressed previously, asbestos has been manufactured in thousands of items, making it difficult to place umbrella regulations on products, due to the political pressures from industry lobbyists, the

[131] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials.* Vol. 153 (2008): pp. 7.
[132] A focusing event is defined as a "certain event [which] occur[s] in the political system [which] lead to policy implementation or change". Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. 2nd Edition. 2009. New Jersey: Prentice Hall. Pg. 174.
[133] Nishikawa, Kunihito, et al. "Recent Mortality from Pleural Mesothelioma, Historical Patters of Asbestos Use, and Adoption of Bans: A Global Assessment". *Environmental Health Perspectives.* Vol. 116, No 12 (December, 2008): pp. 1675.
[134] Osinubi, Omowunmi Y. O., Micheal Gochfel, and Howard M. Kipen. "Health Effects of Asbestos and Nonasbestos Fibers". *Environmental Health Perspectives.* Vol. 108, Supplement 4: Occupational and Environmental Lung Diseases (August, 2000): pp. 672.

accountability of already in use products, and the cost of the replacement of these materials. Finally, in comparison to occupational exposure rates, concentration levels of asbestos are "relatively low" through non-occupational exposure, causing some to question the cost-benefit analysis of an overall ban of asbestos use. These factors and the complexities which surround them all must be taken into account when evaluating the regulations in place.

In the U.S., asbestos regulations stem from a national command and control approach. These regulations are applied to three different types of non-occupational exposure: through the materials in a home or building which are made with asbestos, living near asbestos mines or factories and living near a NOA site. Regulation of these different types of non-occupational asbestos exposure is established through the Toxic Substances Control Act (TSCA), Resource Conservation and Recovery Act (RCRA), Clean Air Act (CAA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).[135]

Regulation of Asbestos in Manufactured Products

The EPA's authority to regulate asbestos use in manufactured products falls under two different federal laws: the Clean Air Act and the Toxic Substances Control Act. However, unlike most other countries, particularly those in Europe which have stringent requirements for regulation of asbestos, the U.S. regulations do not differentiate between the six different asbestos fibers and does not have set standards for man-made mineral fibers which are used in place of asbestos.

[135] The Occupational Safety and Health Act (OSHA) is not included in this list because it is "occupational regulation" but must be recognized because it established asbestos worker protection standards,(29 C.F.R. § 1910), permissible exposure limits, personal protective equipment regulations, training requirements and medical surveillance for workers exposed to asbestos materials. 29 U.S.C. § 651 et seq.

The CAA regulates air pollutants based upon contaminants or their source and under the CAA asbestos is regulated based on its "hazardous air pollutant" designation.[136] Under the National Emission Standards for Hazardous Air Pollutants (NESHAP) rule in the CAA, there is a ban on "the spray-on application of materials containing more than 1% asbestos to building, structures, pipes, and conduits unless the material is encapsulated with bituminous or resinous binder during spraying and the materials are not friable after drying."[137] Wet-applied and pre-formed asbestos pipe insulation and pre-formed asbestos block insulation on boilers and hot water tanks are also banned under the CAA.[138] Along with those materials, NESHAP also regulates the processes of building demolition or renovation of buildings containing asbestos-containing products (ACP). "Depending upon the type of operation, owners and/or operators may be required to notify the appropriate state or local air program authority, conduct a thorough self-inspection and use renovation and/or demolition techniques that do not cause visible emissions"[139]

The Asbestos Hazard Emergency Response Act of 1986 (AHERA) requires the EPA to conduct inspections of the nation's public and private schools for asbestos and develop management plans if it is present. AHERA regulates asbestos as toxic substance, even if still in use and sets a standard for air inside school buildings after asbestos abatement is conducted. It has been estimated that by 1995 "more than 50 to 100 billion dollars has been

[136] 42 U.S.C. § 7412(b).
[137] U.S. Environmental Protection Agency. "EPA Asbestos Materials Bans: Clarification". (May, 1999): pp. 3.
[138] Ibid. pp. 3.
[139] U.S. Environmental Protection Agency. "National Emission Standards for Hazardous Air Pollutants: 40 CFR 61 Subpart M- National Emission Standard for Asbestos". *§61.145 Standard for Demolition and Renovation.* (1999): pp. 11-19. http://www.epa.gov/asbestos/pubs/40cfr61subpartm.pdf.

spent on the removal of asbestos-containing materials from schools, universities, public and commercial buildings, and private homes"[140].

In 1989, under the TSCA, the EPA banned the U.S. manufacture, importation, processing or distribution of many ACP. However, "much of the original rule was vacated and remanded by the U.S. Fifth Circuit Court of Appeals in 1991."[141] Thus, the original 1989 EPA ban in the U.S. of many asbestos-containing product categories was set aside and did not remain in effect. Currently, under the TSCA, "corrugated paper, roll board, commercial paper, specialty paper, flooring felt and new uses of asbestos are banned."[142] Today in the U.S., asbestos in products remains legal for most uses and the EPA has no other existing bans on most ACP or uses and does not track the manufacturing, processing, or distributing of asbestos containing products.[143]

Regulation of Asbestos Exposure from Mines or Factories

In the U.S., though there are no longer any active asbestos mining operations underway, the regulation of these inactive asbestos mines has the potential to qualify under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[144] of 1980 if it is determined there is a public health risk. CERCLA created a tax on particular industries and "provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances[145] that may endanger public health or the environment."[146] CERCLA focuses primarily on liability and contains only one regulatory provision, which

[140] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials*. Vol. 153 (2008): pp. 4.
[141] U.S. Environmental Protection Agency. "EPA Asbestos Materials Bans: Clarification". (May, 1999): pp. 2.
[142] Ibid. pp. 3.
[143] Ibid. pp. 3.
[144] CERCLA is commonly known as Superfund.
[145] Under 40 C.F.R. § 302.4 asbestos is listed as a hazardous substance.
[146] U.S. Environmental Protection Agency. "Superfund: Laws, Policy and Guidance". *CERCLA Overview.* http://www.epa.gov/superfund/policy/cercla.htm.

requires any person "in charge" of a "facility" to report any "release" of hazardous substances from the facility.[147]

CERCLA authorizes two kinds of response actions once the releases or threat of releases of hazardous materials is established: short-term removals and long-term remedial response actions. Short-term removals are for when actions may be taken to address releases or threatened releases requiring prompt response. Long-term remedial response actions are used to "permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening."[148] However, these actions can be conducted only at sites listed on EPA's National Priorities List (NPL); "section 105(a)(8)(B) of CERCLA as amended, requires that the statutory criteria provided by the Hazard Ranking System (HRS) be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States."[149]

Inactive asbestos mines and factories have the potential to be subjected to CERCLA if they rank high enough on the HRS to be eligible for the NPL.

> This HRS score is generated by evaluating four pathways: (1) ground water migration; (2) surface water migration (composed of the three threats — drinking water, human food chain, and environmental); (3) soil exposure (composed of two threats — resident population and nearby population); and (4) air migration. The scoring system for each pathway is based on a number of individual factors grouped into three factor categories: (1) likelihood of release (or, for the soil exposure pathway, likelihood of exposure); (2) waste characteristics; and (3) targets. Individual factors are evaluated and the factor values are combined mathematically to produce factor category values. The

[147] 42 U.S.C. § 9603(a).
[148] U.S. Environmental Protection Agency. "Superfund: Laws, Policy and Guidance". *CERCLA Overview.* http://www.epa.gov/superfund/policy/cercla.htm.
[149] U.S. Environmental Protection Agency. "Superfund: Site". *National Priorities List: Overview.* http://www.epa.gov/superfund/sites/npl/npl_hrs.htm.

> HRS site score, which ranges from 0 to 100, is obtained by combining the four pathway scores. Any site scoring 28.50 or greater is eligible for the NPL.[150]

It is important to note that according to the EPA, "this score does not represent a specified level of risk, but is a cutoff point that serves as a screening-level indicator of the highest priority releases or threatened releases. Sites that score below 28.50 may be addressed under other Federal and state response authorities. Some sites that score above 28.50 may be addressed by other Federal programs."[151]

A case study example of the application of CERCLA concerning asbestos exposure from a nearby mining site is the Vermont Asbestos Group mine; between the 1900's and 1993, asbestos ore was mined from three locations on Belvidere Mountain, Vermont. The mining process produced 2-3% chrysotile asbestos from open cuts leaving behind many million tons of waste rock and tailings.[152] In 2004, the Vermont Agency of Natural Resources began investigating the site when it became apparent that the mine tailings were migrating off-site via surface water flow. In 2006, State officials conducted assessments of eleven locations within two affected watersheds. "Their summary report stated that the preliminary data provided evidence linking the tailings piles within the Hutchins Brook and Burgess Branch watersheds both directly and indirectly to chemical and physical biological stressors identified during the assessment."[153]

In 2007, the Secretary of the Agency of Natural Resources requested EPA assistance and in September 2007, EPA's Office of Emergency Management concurred with the request

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[150] U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. "Superfund: Hazardous Ranking System Guidance Manual". *Introduction*. (November, 1992): pp. 1-2.
[151] Ibid. pp. 2.
[152] U.S. Environmental Protection Agency. "Waste Site Cleanup and Reuse in New England". *Vermont Asbestos Group Mine: Description*. http://yosemite.epa.gov/r1/npl_pad.nsf/8b160ae5c647980585256bba0066f907/cdc20741d29da4b18525762b0072e07c!OpenDocument.
[153] Ibid.

to conduct a removal action, under the response authority of CERCLA. This concurrence was necessary because the action memorandum was "considered nationally significant or precedent setting because the action mitigates asbestos as the principle contaminate of concern."[154] Since 2007, several different clean up actions have taken place in order to keep asbestos laden runoff water from leaving the property and final demobilization occurred on August 28, 2008.[155] The Vermont Asbestos Group mine is just one example of many inactive mines which have been scored, placed on the NPL and was subject to a CERCLA response action to mitigate continued asbestos exposure to the surrounding communities.

Factories which are involved in the manufacturing of asbestos made products, as compared to abandoned asbestos mining sites, are subjected to the NESHAP rule in the CAA that establishes a number of different compliances from businesses to monitor and limit the emissions of asbestos outside of that facility.[156] Under the Clean Air Act's General Duty Clause, enforcement process and authorities may be used to assure that stationary sources or facilities are in compliance with the accidental release prevention requirements as follows:

> The EPA may pursue enforcement actions to require and/or improve accidental release prevention and mitigation programs by seeking penalties and/or injunctive relief for violations of the general duty clause. Pursuant to Section 113(d) of the Clean Air Act, EPA may issue an administrative penalty order or pursuant to Section 113(a)(3) of the Clean Air Act, EPA may issue an administrative compliance order requiring an owner/operator to comply with the general duty clause. The EPA may also bring a civil judicial action pursuant to Section 113(b) of the Act for violations of the general duty clause or request that the Attorney General commence a criminal action in

[154] U.S. Environmental Protection Agency. "Memorandum: Region 1 Request for Concurrence on Proposed Nationally Significant or Precedent Setting Removal Action at the Vermont Asbestos Group Mine Site". Office of Solid Waste and Emergency Response. (2007): pp. 2.
[155] U.S. Environmental Protection Agency. "Waste Site Cleanup and Reuse in New England". *Vermont Asbestos Group Mine: Description*. http://yosemite.epa.gov/r1/npl_pad.nsf/8b160ae5c647980585256bba0066f907/cdc20741d29da4b18525762b0072e07c!OpenDocument.
[156] U.S. Environmental Protection Agency. "National Emission Standards for Hazardous Air Pollutants: 40 CFR 61 Subpart M- National Emission Standard for Asbestos". *§61.144 Standard for Manufacturing.* (1999): pp 9-10. http://www.epa.gov/asbestos/pubs/40cfr61subpartm.pdf.

accordance with Section 113(c) of the Clean Air Act against owner/operators for knowing violations.[157]

Exposure standards for factories and abandoned mines containing asbestos have been derived from a number of federal regulations in attempts to protect the health of the public who live near those sites due to the fact that asbestos is classified as a hazardous air pollutant. A major component of CERCLA regulations, however, is that they create the threat of liability if there is any wrongdoing in the form of releasing hazardous materials. In cases withstanding an emergency response actions, the reactive strike of CERCLA is only able to be applied once the threshold of the HRS is met; the quality of the ground water drastically effects this score and often asbestos is not viewed as a hazard unless it is dry and airborne.

Regulation of Naturally Occurring Asbestos Sites

Federal, state, and local governments all have some types of authority that they may be able to use to address NOA, but the minimum standard for when and how agencies must act to address NOA concerns generally comes from the federal level. In the federal regulations established to address asbestos containing materials, some do not extend as far as addressing NOA sites.

CERCLA is the foundation of federal regulation that has the ability to address NOA sites. Much like regulation of abandon asbestos mines, under CERCLA, asbestos is classified as a hazardous substance[158] and is only able to be applied under strict and specific circumstances. CERCLA's primary approach is to impose liability for "releases" of hazardous substances and is only generally able to be implemented if the established

[157] U.S. Environmental Protection Agency. "General Duty Clause Enforcement Process and Authorities". *Clean Air Act.* http://www.epa.gov/oecaerth/civil/caa/gdcenfprocess.html.
[158] 40 C.F.R. § 302.4.

threshold is met. Within CERCLA, section 9604 gives authorization to the EPA to perform removal or remedial actions where "any hazardous substance is released or there is a substantial threat of such a release into the environment".[159] Removal actions are generally limited in time and cost and remedial actions require listing on the national priorities list using the Hazard Ranking System to determine if it meets a level which require placement as a Superfund site.

Though this protocol of CERCLA, as explained previously, applies to abandoned asbestos mines that are leaching hazardous waste, it too can apply to NOA sites under the right circumstances. Section 9604(3)(A) specifically limits the EPA's response authority for NOA, stating that "the President shall not provide for a removal or remedial action under this section in response to a release or threat of release…of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found."[160] Since the definition of NOA is "minerals described as asbestos that are found in-place in their natural state, such as in bedrock or soils, which may be exposed by man's excavations or by natural weathering"[161], the EPA authority in most cases of NOA exposure is limited by definition.

In the case of El Dorado, once soil studies had been conducted at Oak Ridge High School in 2003, and the EPA found "asbestos fibers in almost all of the air samples collected…and indicated that personal exposure levels were significantly higher during most

[159] 42 U.S.C. § 9604(1)(A)
[160] 42 U.S.C. § 9604(3)(A)
[161] Van Gosen, Bradely. "Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Natural Asbestos Occurrences in the Rocky Mountain States of the United States (Colorado, Idaho, Montana, New Mexico, and Wyoming)." *U.S. Geological Survey Open File Report.* (2007). http://pubs.usgs.gov/of/2007/1182/pdf/Plate.pdf.

sports and play activities";[162] the EPA notified the El Dorado Union High School District of its concerns about the asbestos levels at the high school and provided the school district with notice of potential liability under CERCLA.[163] The EPA was able to initiate its CERCLA authority for a removal action in this case because the El Dorado Union High School District was responsible for the uncovering of the vein of amphibole asbestos in 2002, which then resulted in an extended area of contamination of asbestos fibers. This removal action was able to be implemented because the action provided protection and was able to contain exposure to airborne asbestos. By implementing a series of mitigation measures at Oak Ridge High School (landscaping, paving access roads, and covering dirt areas with concrete), the threat of airborne asbestos was semi-permanently alleviated.

In the case of Swift Creek, a landslide on the face of Sumas Mountain occurred due to "natural forces" which caused the exposure of an asbestos rock, which is then picked up and carried down the mountain by rain water, naturally channeling into Swift Creek; the natural flow of the creek deposits asbestos laden sediment throughout the creek bed and adjacent banks[164]. All of these natural processes have resulted in approximately one hundred-thousand cubic yards of asbestos laden sediment to channel into Swift Creek each year. This series of steps occur naturally, which would limit the EPA's authority under section 9604(3)(A) of CERCLA.

Once the asbestos laden material in the creek beds of Swift Creek was altered from its natural state by being dredged, that dredged material, which was moved from the creek onto

[162] Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials.* Vol. 153 (2008): pp. 14.
[163] U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". *Naturally Occurring Asbestos in California.* http://www.epa.gov/region9/toxic/noa/addressnoa.html.
[164] Natural flood can cause this sediment to spread outside of the creek bed and banks, though this transportation of sediment still falls under the "naturally found" limitation in CERCLA. 42 U.S.C. § 9604(3)(A)

nearby banks on private property, no longer falls under the limitations of removal authority in 9604(3)(A) of CERCLA. Once the asbestos containing material is no longer in the location it is naturally found, the EPA's regulatory scope is the same as asbestos from other sources.

In November 2007, the EPA implemented its CERCLA authority in Swift Creek through approving a time-sensitive removal action "that authorized the re-grading and stabilization of asbestos-containing dredged piles" which "was intended to reduce the potential for an uncontrolled release of asbestos from the dredged materials presently stock piled along Swift Creek".[165] The stockpiles were re-graded along Swift Creek to prevent erosion and further release. As a final point of action, use of a dust suppressant was applied on the stockpiles to minimize the level of asbestos release through wind-blown dispersion. The EPA determined that due to the amount of contaminated sediment in the stockpiles, removal and transporting to another location was not an option due to the extreme costs that would be involved.

Unlike El Dorado, it is unclear who the EPA might find potentially liable under CERCLA, which makes the issue of cost come into account. In the case of El Dorado, the removal action that the EPA completed limited the exposure of airborne asbestos semi-permanently, which is not the situation for Swift Creek. Even if the EPA had removed the Swift Creek stockpiles, one hundred-thousand cubic yards of asbestos containing material would still continue to flow down the Swift Creek every year. Although removing the sediment from the creek bed did not fix the problem of the source of asbestos-laden sediment, EPA's removal action plan was intended to provide protection in response to the immediate situation at hand.

[165] Ecology and Environment, Inc. "Swift Creek Asbestos Site Time-Critical Removal Action Report". *Report prepared for U.S. Environmental Protection Agency Region 10.* (April 2008): pp. 2-3.

Critiques of Current Asbestos Regulation for Non-Occupational Exposure:

There are several factors which have contributed to the contemporary system of command and control[166] that characterizes most environmental protection, management and compliance in the U.S. First, there are institutional structures which greatly define management and compliance legislation and jurisdiction. The separation of powers greatly influences the type of environmental legislation which gets implemented. The power of judiciary review "laid the groundwork for the federal courts to play an active role in public policy making"[167]. Secondly, due to institutional structures, historical regulation practices have greatly relied on legal compliance of those firms involved. By forcing firms and industries to comply with a set formula, regulators have moved away from working with firms for the greater good and into a role of government command. Finally, environmental regulation in the U.S. is broadly prescriptive, rather than specific to particular rsituations. Environmental management legislation passed in Washington D.C. or policies created by environmental regulatory agencies (Environmental Protection Agency, etc.) are broad and in most cases, non specific. It is not one, but the combination of these factors which play a large role currently in the less than effective management approach of NOA.

Due to regulatory policies of command and control, regulation has historically been developed as "one size fits all"; broad NOA policy is the same in Vermont as it is in Washington. In situations that do not fit clearly into the regulated paradigm, this creates inefficient and ineffective system that can hinder policies which are designed to protect to public. This type of approach ignores the different variables that come into play when

[166] A command and control management approach is authoritative in nature and uses a top-down approach, which fits well in bureaucratic organizations in which privilege and power are vested in senior management.
[167] Fiorino, Daniel. *The New Environmental Regulation.* Cambridge, Massachusetts: The MIT Press. (2006): pp. 33.

dealing with NOA policy, such as the type of asbestos which populations are being exposed to and the way in which the asbestos becomes airborne (stationary exposure of the El Dorado case versus continual exposure of the Swift Creek case).

There is a great deal of evidence which supports the relationship between non-occupational asbestos exposure and asbestos related diseases. It is also well established that between the 1900's and the 1980's, asbestos was used in the manufacturing of thousands of products, many of which were placed in public and commercial buildings as well as people's homes. For as much evidence as there is supporting the findings of an asbestos exposure-disease relationship, there is a remarkable lack in regulation surrounding asbestos in the U.S.

There are two failures which arise when examining non-occupational asbestos regulation. First, thirty years after the effort by the EPA in 1980 to ban all products made with asbestos,[168] many products manufactured with asbestos remain legal in the U.S. As mentioned, asbestos exposure diseases are slow developing and deadly. One of the main issues surrounding tougher asbestos non-occupational exposure regulation is science behind to correlation between exposure and disease. This raises the question as to how it is determined how much time and at what concentration is required before a threshold has been meant to trigger regulatory action. This is a major limitation for the government in protecting the health, safety and welfare of the public.

The second failure is two pronged: first, there are gaps in the federal regulation of asbestos. When cases occur that fall into those gaps, stakeholders do not know how to proceed. In this absence of wide-spread regulation, the second failure arises. The minimum standards for asbestos are set at the federal level and because there are gaps, the asbestos regulation which does exist is developed and implemented at a broad national level. The

[168] This ban was later overturned by the Federal Court of Appeals.

institutional structures and features of the U.S. constitutional system have "laid the foundation for fragmented environmental policy"[169] For non-occupational exposures, such as NOA sites and communities affected by asbestos mines or factories, concentrations of asbestos vary and because all situations are different an all-encompassing regulation cannot anticipate some of the complexities that are within a case.

Swift Creek is a case study example of asbestos containing material continually transported via a natural water channel into communities. This soil not only creates a health risk from the asbestos but also increases the potential for flooding in the area due to the enormous amount of sediment. As Fiorino highlights, historically "environmental regulation in the U.S. tends to focus much more on legal compliance;"[170] by setting specific concentration amounts of "appropriate" asbestos exposure, it does not take into consideration other environmental factors which may come into play: wind speeds in the area, location of the NOA site, and the means of exposure to asbestos. Being focused on legal compliance also sets up agencies and stakeholders to divert efforts to "pointless and dispiriting legal routine and conflicts."[171] This leads stakeholders to resent regulation instead of embrace it and strive to participate in management solutions that not only meet the legal requirements but also implement a longer-tem management plan for limiting asbestos exposure.

In the case of El Dorado, there has been an "adaptive governance"[172] response to provide a better regulatory framework by the state of California and El Dorado County.

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[169] Fiorino, Daniel. *The New Environmental Regulation.* Cambridge, Massachusetts: The MIT Press. (2006): pp. 38.
[170] Ibid. pp. 28.
[171] Ibid. pp. 29.
[172] Adaptive governance "highlights the interdependence of innovative practices in science, policy and decision-making structures. In particular, adaptive governance integrates scientific and other types of knowledge into policies to advance the common interest in particular contexts through open-decision-making structures." Brunner, Ronald D., et al. *Adaptive Governance: Integrating Science, Policy, and Decision Making.* New York: Columbia University Press. (2005): pp. vii.

These measures included passing the Naturally Occurring Asbestos and Dust Protection Ordinance in El Dorado County in June 2003, which instituted specific regulation addressing the use or sale of serpentine containing rock material in El Dorado County.[173] Additionally, grading construction and excavation are limited in areas known to harbor asbestos containing rock. The ordinance includes enforcement provisions, establishing monetary penalties for violation of the ordinance.

Corresponding with this ordinance aimed at limited specific NOA exposure, a community outreach program named the "Be Active Community Outreach Network" (BEACON) was created by El Dorado County. BEACON has two primary objectives: (1) "to marshal and focus the collective resources of the county toward enforcement of dust protection law and prevention of so-called "fugitive dust" emissions and (2) to equip and empower the people of El Dorado County with good, accurate information about NOA, specific proactive and preventative measures they can take to reduce any risk, and ways they can partner with the County to help reduce dust emissions."[174] These measures are taken above the minimum environmental regulation set by the EPA and should be viewed as an example for adaptive environmental governance.

In order to overcome some of the main hurdles which inhibit comprehensive asbestos exposure regulation and protection from asbestos exposure, regulatory and policy development will rely on the collaborative efforts of experts in various disciplines such as economics, risk assessment, social and political science, and geology. New regulation will need to consider the limitations which current regulations have for non-occupation exposure, including developing similar local regulatory systems similar to El Dorado County.

[173] El Dorado County Ordinance 8.44.
[174] El Dorado County. "BEACON Dust Enforcement Program".

CHAPTER FOUR:

Problem Definition

Competing problem definitions between stakeholders has the potential to cause a stalemate in the policy process. As new information is discovered or assumptions change, the problem may need to be redefined. Further policy analysis may be required by stakeholders to help determine how to proceed. Verification that a problem does indeed exist, redefinition of vaguely stated problems and establishing an agreed upon definition(s) of the problem(s), are all critical steps in the policy formation process. This definitional debate occurs in a highly political environment. If a definitional debate is present in the policy process, stakeholders then craft a variety of solutions, depending on what they see as the problem.

Findings:

From the information presented in the previous chapters, it is evident there are four fundamental issues in the case of Swift Creek. (1) The public is being exposed to concentrations above the accepted level of asbestos[175] from the sediment in Swift Creek and there are health risks associated with that exposure; (2) there is a gap in the federal regulation of naturally occurring asbestos; (3) the asbestos is naturally forming and no party is at fault for its occurrence in the sediment, making the burden of liability and mitigation costs undetermined; and (4) due to the one-hundred thousand cubic yards of sediment which flows down and settles in the creek bed each year, nearby residential properties and farmlands are under a constant threat of flooding. As in many cases, there is not one clear definition of the problems or the solutions; this is evident by the findings in the sixteen interviews conducted.

[175] The EPA considers "material containing one percent or more of asbestos by weight to be a hazardous substance, although levels of less than one percent in soil can release significant levels of asbestos fibers to the air when disturbed." U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". Naturally Occurring Asbestos in California. http://www.epa.gov/region9/toxic/noa/addressnoa.html.

In the interviews, the stakeholders discussed many problems[176], but there were three reoccurring identifications. In no particular order, problems concerning the asbestos-laden soil in Swift Creek included (1) sediment and flooding; (2) human health risk; and (3) regulatory and management concerns.

Besides these three problems, there were many other problems that were identified during each individual interview. For example, several stakeholders questioned the degree of the health risks associated with the current rates of exposure.[177] There was also expressed concern for the wetlands surrounding the creek[178], what will be the source of funding for the project[179], the decrease in property values[180] and the vegetation dead zone caused by the presence of other metals in the water.[181] As described by a State Official, "one of the things that we were looking at is the metals in the sediments, not because it would be considered a problem on the mountain side or as they came down the creek, but when we started to explore this idea that the material could be taken somewhere else or whether it might cause other problems, let's say leaching into the ground water".[182] A couple of stakeholders identified problems that other stakeholders had not also identified including the public panic and fear from the community outreach done by the stakeholders[183] and other health risks associated with the stress of processing the presence of asbestos.[184]

[176] See Appendix 2; the table provides a concentrated summary of the data gathered in each interview.
[177] Confidential Interviewee #4, #1 and #5. February 2011.
[178] Confidential Interviewees #2, #10 and #11. February 2011.
[179] Confidential Interviewee #1. February 2011.
[180] Confidential Interviewee #7. February 2011.
[181] Confidential Interviewee #13. February 2011.
[182] Confidential Interviewee #2. February 2011.
[183] Confidential Interviewee #12. February 2011.
[184] Confidential Interviewee #10. February 2011.

A Sediment and Flooding Problem

According to the data gathered through the stakeholder interviews, thirteen of the sixteen stakeholders identified the amount of sediment flowing into Swift Creek from the landslide, and the flooding that is a result, as one of the problems. As expanded on by a Whatcom County official,

> The deposition of sediment [even] without with the existence of asbestos is a problem. One of the principle problems that we as a community are struggling with is how do we manage with the sheer volume of sediment that is now moving off our uplands… or out of the mountains and down into the river valleys. Of course we have [become] exasperated over the course of time and we have stopped managing cause of other environmental concerns and the result has just been this built up of material; we see it all over the place, the result is lots of lowland flooding that did not exist before.[185]

It was also expressed in several other interviews that the presence of asbestos complicates flood management strategies which can be pursued by the flood control agencies. As articulated by one federal interviewee, "anything you are going to do about this project has to be both a balance of flooding issue and health issue, and unfortunately usually helping the one hurts the other sometimes."[186] Flooding events intensify the spreading of the asbestos-laden soil outside of the creek banks, which has the potential to cause a greater intensification of airborne asbestos once the flood water recede and leave dried asbestos-laden sediment. [Figure 8]

A Human Health Problem

Asbestos was also defined by thirteen of sixteen stakeholders as a human health problem to a certain extent. Within the individual definitions, there was variation as to what that definition was and a great deal of emphasis was placed on the calculated risk associated with asbestos exposure. For example one stakeholder said, "The science is such that you

[185] Confidential Interviewee # 4. February 2011.
[186] Confidential Interviewee # 13. February 2011.

cannot take a concentration of asbestos in soil, a measurement of asbestos in soil and have a real understanding of what is going to be in the air and [how much] people breathe."[187] Another stakeholder explained that the health problems associated with asbestos exposure depends on under "what conditions is it a risk to public health; [which] has yet to be adequately determined and that has a lot do with people's perception, what kind of management alternatives are available and ultimately how much people what to spend to implement those managements."[188] As illustrated in Appendix 2, the evidence from the interviews indicates that there is some level of agreement that asbestos is a health problem, but there is a large disparity between the stakeholders as to by whose definition risk should be evaluated.

Even though a majority of the stakeholders identified the asbestos in Swift Creek as a health problem, two did not mention it in their interviews when defining problems and one stakeholder adamantly stated it was not a health problem.

> Do I believe that the asbestos in Swift Creek poses a serious health risk for people? No I do not. I believe there was some evaluation from an epidemiological stand point and there were no statistically notable increases in mesothelioma in Whatcom County or in the areas. I believe that if you look hard enough and long enough at anything you find something wrong.[189]

Such stark differences in the characterization of the danger associated with asbestos exposure may indeed be a major road block in the formulation of policy solutions. Depending on where this particular stakeholder sits at the tables, a great deal of influence may be placed on doing nothing because according to them, there is no health risk for the surrounding population.

[187] Confidential Interviewee # 1. February 2011.
[188] Confidential Interviewee # 4. February 2011.
[189] Confidential Interviewee # 9. February 2011.

A Regulatory and Management Problem

The third problem which was defined throughout a majority of the interviews is the presence of a regulatory and management problem. "It unfortunately fits in between any number of programs; for example like if you look at CERCLA, the issue is that it is almost specifically stated in CERCLA that asbestos does not get to be part of CERCLA."[190] To some stakeholders, the regulatory issue is much more specific than just falling between the regulatory cracks; "the problem of Swift Creek is the reaction of the federal government [declaring] there is a hazard here, we cannot address that hazard, we have to go in and say no more dredging, no more taking the spoils of the dredging and allowing folks to use that in various applications."[191] In one particular interview, the stakeholder explained how the constraints of the regulatory framework, which are also described and critiqued in Chapter Three, are felt by the stakeholders of Swift Creek;

> The regulatory laws were written to control the release or to prevent the transport of the controlled management of asbestos [and] it penalizes the handlers and the operators. Here is a situation where you are acting against something in law that you call a common enemy and in this case it is nature and gravity and there is a flooding problem and you address the common enemy by managing the sediment but because of regulatory framework that penalizes you for doing that. [As a consequence], there is prevention in anybody stepping forward to take these risks.[192]

Analysis of Swift Creek

The interviews demonstrated that there are many problems surrounding Swift Creek and it is unclear to some of the stakeholders how to proceed. Even without the presence of asbestos, there still is an enormous amount of sediment that demands mitigation to prevent flooding. Stakeholders believe that management strategies for asbestos-free sediment would

[190] Confidential Interviewee # 13. February 2011.
[191] Confidential Interviewee # 9. February 2011.
[192] Confidential Interviewee # 11. February 2011.

require a combination of a sediment catchment basin, annual dredging and a sediment removal operation. [See Appendix 2] These actions would need to be in effect for an extensive period of time to manage volume from the three-hundred year life of the landslide. However, the flood-control policies and efforts are affected by the presence of asbestos. This creates a regulatory problem in how to dredge, store and remove the asbestos-laden soil which is now defined as a hazardous material; thus causing Swift Creek to become an extremely costly project.

Policies do not simply materialize to address unidentified issues; the formation of a policy action is a direct response to an issue that some stakeholders have identified and defined as a problem. "Disagreements among policy actors over what are public problems helps explain why the political process does not immediately and dramatically react to address issues of seemingly obvious concern."[193] In fact, there are very few issues that inspire widespread unanimity and consensus. However, problem definition is essential to formulating "good" policy. If this brick of the policy wall is missing or is ill constructed, the rest of the wall will be susceptible to falling.

It was determined there is no consistency among the stakeholders in how the three most common problems they identified were discussed; simply naming the same problems does not indicate there are not differences in their explanations. The interviews also show there is not even common meaning between the stakeholders with regards to the characterization within those defined problems. For example, Appendix 2 illustrates there are stark differences in how asbestos and the risk associated with exposure are defined. It is evident that each stakeholder within their agency is working semi-independently on the

[193] Theodoulou, Stella Z. and Chris Kofinis. *The Art of the Game: Understanding American Public Policy Making.* Belmont, C.A: Wadsworth. (2004): pp. 100.

project and that there is a lack of collaborative brainstorming with each other throughout the policy formulation process. It can be argued that the stakeholders are operating this way due to the scope and role of their specific offices. However, in reality the policy process would be splintered without a high level of group input and problem solving. By not focusing on one consistent step-by-step list of projects, it is possible efforts are being conducted out of order, causing the policy process to be dysfunctional and not executed in an efficient manner.

Conclusion:

The case of Swift Creek encompasses a web of different public problems, all of which have their own complexities and requirements for action. This thesis probed the questions of whether the major reason for a stalemate in the policy process surrounding Swift Creek was due to completing problem definitions, and how these definitional debates between stakeholders affects the ability of these key actors to address possible long-term policy solutions. Documentation and stakeholder interviews resulted in three major findings in this case study. First, there is a definitional, even though there are commonly identified problems. For example, stakeholders use the same language, but they have different ideas about what that language implies. Second, even if there was a focusing event or an open policy window, it is unlikely to be in the form of major change. Finally, given the convoluted nature of the problems, significant change will require a structured process. Without structure, it will be extremely difficult to work through the regulatory and institutional barriers which the stakeholders are facing.

If there is to be any positive progress in limiting the public exposure to asbestos and implementing long-term flooding mitigation, stakeholders should collectively craft an organized and realistic plan of action. This strategy will give guidance and clarity as to how

each stakeholder should move forward in order to achieve the collective goal which they have established. By approaching the policy process in their fashion, policy formulation and implementation becomes strategic, reflecting and appropriate planning.

REFERENCES CITED:

American Cancer Society. "Malignant Mesothelioma: Survival Rates". Cancer Resource Information. (April, 2009). http://www.cancer.org/docroot/CRI/CRI_0.asp.

Barbalace, Roberta C. "A Brief History of Asbestos Use and Associated Health Risks". (October 2004). http://environmentalchemistry.com/yogi/environmental/asbestoshistory2004.html.

Birkland, Thomas A. *An Introduction to the Policy Process*: *Theories, Concepts, and Models of Policy Making*. Armonk, N.Y.: M.E. Sharpe, Inc. (2001).

Blake, David. "Risk Analysis of Agricultural Exposure to Airborne Asbestos in Whatcom County, Washington State". Master's Thesis, Western Washington University (1991).

Brunner, Ronald D., Toddi A. Steelman, Lindy Coe-Juell, Christina M. Cromley, Christine M. Edwards, and Donna W. Tucker. *Adaptive Governance: Integrating Science, Policy, and Decision Making.* New York: Columbia University Press. (2005).

Bryson, John M. "What to do When Stakeholders Matter: Stakeholder Identification and Analysis Techniques" *Public Management Review*. Vol. 6, No. 1 (2004): pp. 21-53.

Clemons, Randall S. and Mark K. McBeth. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New Jersey: Prentice Hall. (2009).

Confidential Interviews #1- #16. Conducted by Rebekah Hook on sixteen different Swift Creek stakeholders. Whatcom County, Washington. February 2011.

Ecology and Environment, Inc. "Swift Creek Asbestos Site Time-Critical Removal Action Report". *Report prepared for U.S. Environmental Protection Agency Region 10.* (April 2008).

Google Maps. "Position Finder". Sumas Mountain. http://www.google.com/maps/mm.)

Hillerdal, Gunnar. "Mesothelioma: Cases Associated with Non-occupational and Low Dose Exposures". *Occupational and Environmental Medicine*. Vol. 56, No. 8 (August, 1999): pp. 505-513.

Kerr Wood Lidel Associates LTD.. "Final Report: Swift Creek Background and Management Alternatives." *Report to Whatcom County Flood Control Zone District.* (January 2008).

Kingdon, John W. *Agendas, Alternatives, and Public Policies*. New York: HarperCollins. (1984).

Landrigan PJ. "A Population of Children at Risk of Exposure to Asbestos in Place". *Annals of the New York Academy of Sciences*. Vol. 643, (1991): pp. 283-286.

Lee, R.J., B.R. Strohmeire, K.L. Bunker, and D.R. Van Orden. "Naturally Occurring Asbestos- A Recurring Public Policy Challenge". *Journal of Hazardous Materials*. Vol. 153 (2008): pp. 1-21.

Maule, Milena Maria, Corrado Magnani, Paola Dalmasso, Dario Mirabelli, Franco Merletti, and Annibale Biggeri. "Modeling Mesothelioma Risk Associated with Environmental Asbestos Exposure". *Environmental Health Perspectives*. Vol. 115, No 7 (July, 2007): pp.1066-1071.

Newhouse, Muriel L. & Hilda Thompson. "Mesothelioma of Pleura and Peritoneum Following Exposure to Asbestos in the London Area". *Britain Journal of Industrial Medicine*. Vol. 50 (1965): pp. 769-778.

Nishikawa, Kunihito, Ken Takahashi, Antti Karjalainen, Chi-Pang Wen, Sugio Furuya, Tsutomu Hoshuyama, Miwako Todoroki, Yoshifumi Kiyomoto, Donald Wilson, Toshiak Higashi, Megu Ohtaki, Guowei Pan, and Gregory Wagner. "Recent Mortality from Pleural Mesothelioma, Historical Patters of Asbestos Use, and Adoption of Bans: A Global Assessment". *Environmental Health Perspectives.* Vol. 116, No 12 (December, 2008): pp. 1675-1679.

Osinubi, Omowunmi Y. O., Micheal Gochfel, and Howard M. Kipen. "Health Effects of Asbestos and Nonasbestos Fibers". *Environmental Health Perspectives.* Vol. 108, Supplement 4: Occupational and Environmental Lung Diseases (August, 2000): pp. 665-674.

Pan, Xue-lei, Howard W. Day, Wei Wang, Laurel A. Beckett, and Marc B. Schenker. "Residential Proximity to Naturally Occurring Asbestos and Mesothelioma Risk in California". *American Journal of Respiratory and Critical Care Medicine.* Vol. 172 (June 19, 2005): pp: 1019-1025.

Selikoff, Irving J. and Douglas H. K. Lee. *Asbestos and Disease*; *Environmental Sciences: An Interdisciplinary Monograph Series.* New York: Academic Press, Inc. (1978).

State of Washington Department of Ecology. "Asbestos Fibre Source Sumas River". *Memorandum from Dick Cunningham to Shirley Prescott*. (December. 7, 1977).

State of Washington Department of Ecology. "Sumas River, Swift Creek, Drainage Asbestos Fibre Source Investigation". *Memorandum from Darrel Anderson to Dick Cunningham.* (February 11, 1977).

Stone, Deborah. Policy Paradox: The Art of Political Decision Making. New York: Norton. (2002).

U.S. Army Corps of Engineers. Seattle District Regulatory Branch. "Swift Creek Permitting Issues". *Information Paper*. pp. 1.

U.S. Department of Health and Humans Services. Public Health Service. Agency for Toxic Substances and Disease Registry. "Division of Toxicology ToxFAQs". : CAS# 1332-21-4. (September 2001).

U.S. Department of Health and Humans Services. Public Health Service. Agency for Toxic Substances and Disease Registry: Division of Health Assessment and Consultation. "Health Consultation: Evaluation of Health Statistics and Public Health Data Gaps Related to Exposure to Naturally Occurring Asbestos from Swift Creek". Everson, Whatcom County, Washington. (February, 22, 2008).

U.S. Environmental Protection Agency. "Addressing NOA at Oak Ridge High School in El Dorado County". Naturally Occurring Asbestos in California. http://www.epa.gov/region9/toxic/noa/addressnoa.html.

U.S. Environmental Protection Agency. "EPA Asbestos Materials Bans: Clarification". (May, 1999).

U.S. Environmental Protection Agency. "Frequently Asked Questions about Sumas Mountain Asbestos, Swift Creek and Sumas River".

U.S. Environmental Protection Agency. "Naturally Occurring Asbestos: Approaches for Reducing Exposure".

U.S. Environmental Protection Agency. "Sumas Mountain Asbestos - Maps & Photos". Region 10: The Pacific Northwest. (2005-2009). http://yosemite.epa.gov/r10/cleanup.nsf/sites/swiftcreekimg.

U.S. Environmental Protection Agency: Office of Environmental Assessment, Region 10. "Soil, Sediment and Surface Water Sampling: Sumas Mountain Naturally-Occurring Asbestos Site, Whatcom County, Washington". (October 13, 2009).

Virta, Robert. "Asbestos: Geology, Mineralogy, Mining and Uses". *U.S. Geological Survey Open File Report.* (2002). http://pubs.usgs.gov/of/2002/of02-149/of02-149.pdf.

Washington State Department of Health. "Advisory for Swift Creek Naturally Occurring Asbestos". *Division of Environmental Health. Office of Environmental Health Assessments.* Publication No. 334-162. (September 2008).

Weill H, J M Huges, and A M Churg. "Changing Trends in US Mesothelioma Incidence". *Occupational Environmental Medicine.* Vol. 61 (2004): pp. 438-441.

West, Nancy and Glen Patrick. "Sumas Mountain/Swift Creek Asbestos Cluster Investigation". *Washington Department of Health. Division of Environmental Health: Environmental Epidemiology.* (February 2010).

APPENDIX 1:

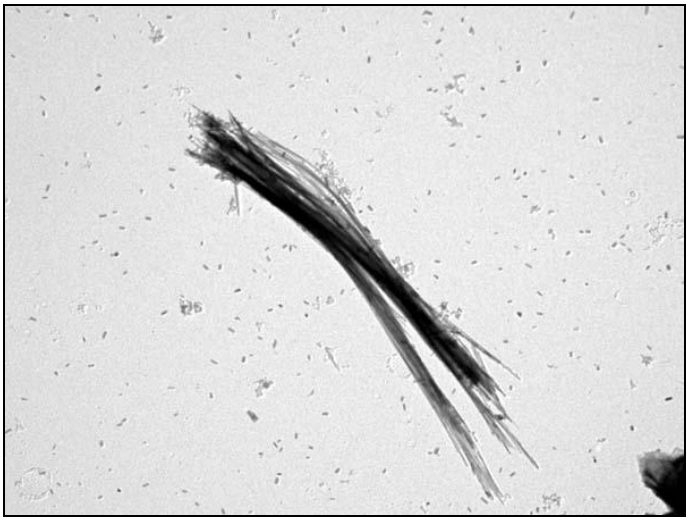

Figure 1: Swift Creek Chrysotile Asbestos Fiber 600x450.
Source: U.S. Environmental Protection Agency.
"Sumas Mountain Asbestos - Maps & Photos".

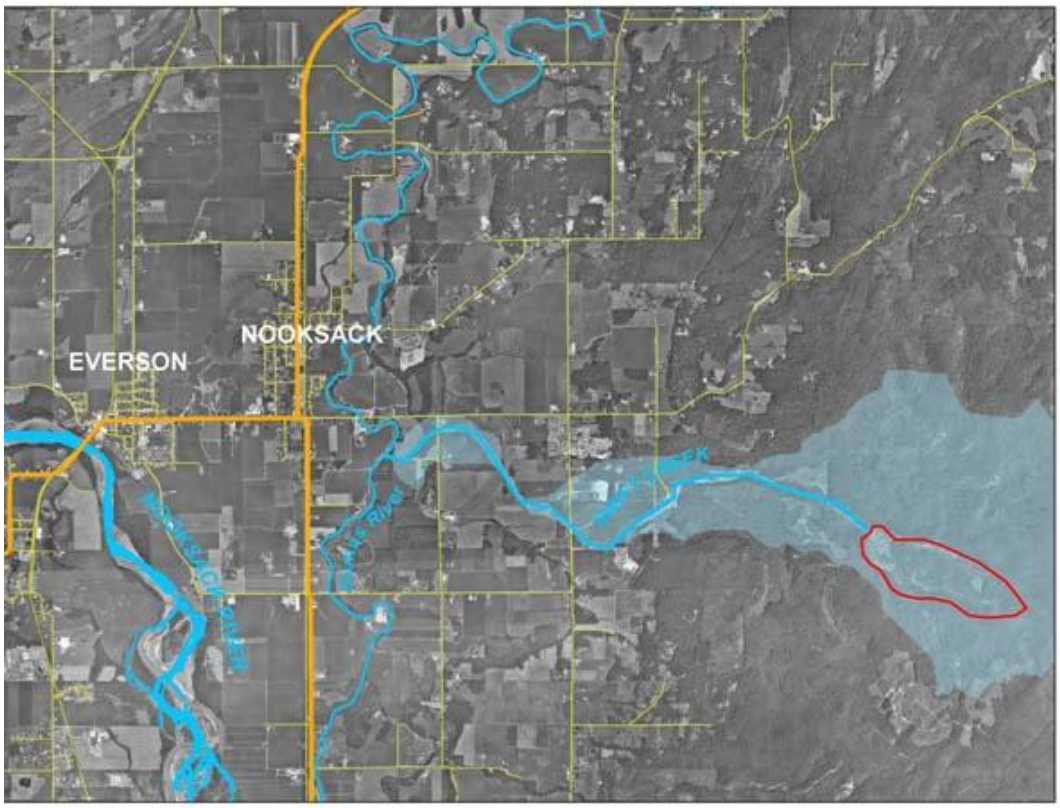

Figure 2: Aerial of the Swift Creek Landslide and Water Flow.
Source: U.S. Environmental Protection Agency.
"Sumas Mountain Asbestos - Maps & Photos".

Figure 3: View from Oat Coals Road of posted gate and signs restricting public access to the stock piles of the dredged material from Swift Creek.
Source: Rebekah Hook, July 12, 2010

Figure 4: Warning sign notifying the public that Swift Creek sediments contain asbestos and breathing asbestos may cause disease.
Source: Rebekah Hook, July 12, 2010

Figure 5: The Dredge Piles along Swift Creek. 2005.
Source: U.S. Environmental Protection Agency.
"Sumas Mountain Asbestos - Maps & Photos".

Figure 6: Activity based sampling of Swift Creek. August 2006.
Source: U.S. Environmental Protection Agency.
"Sumas Mountain Asbestos - Maps & Photos".

Figure 7: View from Goodwin Road of most recent dredged material piles on Whatcom County property.
Source: Rebekah Hook, February 8, 2011

Figure 8: Residential property along Sumas with flood deposits from January 2009.
Source: U.S. Environmental Protection Agency.
"Sumas Mountain Asbestos - Maps & Photos".

APPENDIX 2: Summary of Definitional Differences of Stakeholders

Interviewee Identification #	Level of Government	Definition of Problem(s) surrounding Swift Creek	Suggested Solutions for Swift Creek
#1	Federal Agency	▪ Asbestos is a human health problem o Certain risk associate with exposure ▪ Sediment problem ▪ Funding problem ▪ Regulatory problem	▪ "Multi-prong approach: ▪ Flood prevention ▪ Engineering controls ▪ Institutional controls ▪ Risk Communication"
#2	State Agency	▪ Regulatory problem ▪ Other metals in the water ▪ Wetlands concern ▪ Sediment problem ▪ Health issues associated with asbestos ▪ Liability issues	▪ "Very very long term project." ▪ "Preliminary studies" o Slide/ creek sediment flow ▪ "Allow the creek to naturally meander" ▪ Have creek move through a series of settling ponds
#3	Federal Agency	▪ Concern for public health & the transparency of that asbestos exposure ▪ Heavy metals effect the creek quality	▪ "County needs to come up with a plan to dispose the material." o "Dredging required for flood prevention"
#4	County Agency	▪ Asbestos in Swift Creek is absolutely a problem. o Character of that problem isn't quite so clear o Perceived to be a problem ▪ Asbestos it is a health risk o But it has yet to be adequately determined under what conditions it is a risk to public health o Has a lot do with people's perception ▪ Sediment: with or without asbestos ▪ Other metals and minerals in the water	▪ "The health risks need to be characterized" o Decision makers need to know what is the most cost effective actions are ▪ "Need to understand the physical characteristics of the sediment"

Interviewee Identification #	Level of Government	Definition of Problem(s) surrounding Swift Creek	Suggested Solutions for Swift Creek
#5	County Agency	▪ Risk does exist with asbestos exposure ▪ Sediment/ flooding problem o Devastation of a large area of the county	▪ "Engineering solutions for the slide which come from the Army Corps of Engineers" ▪ Take dredged "sediment and place it somewhere minimize the risk of flooding and asbestos related disease"
#6	County Government	▪ One "that can't be ignored" ▪ Asbestos is a health problem ▪ Regulatory problem ▪ Flood problem ▪ International problem	▪ "A better job of managing the accumulation of contaminated material" o "We are obligated to protect public infrastructure and public health"
#7	County Government	▪ Asbestos is a health risk o Risk overblown by EPA ▪ Landslide and sediment ▪ Flooding ▪ Heavy metals in the water ▪ Decrease in property values	▪ County has come up with a "reasonable plan" ▪ "Acquire property" ▪ "Create a significant detention pond o capture the asbestos either through sedimentation or flocculation or filtration"
#8	County Government	▪ Asbestos causes human health impacts ▪ Flooding problems even without asbestos	▪ "Some kind of containment system" to "direct the flow and collect the sediments" and "put a non-asbestos bearing topping over it to contain it."
#9	County Government	▪ Flooding problem ▪ Dredging problem o Dredged sentiment containment problem	▪ Continue dredging ▪ "Catchment basin perhaps above Great Western Lumber"
#10	County Agency	▪ Health risk from exposure to asbestos ▪ Wetlands ▪ Economic impact ▪ Planning problem o Stress health risks	▪ "Proactive planning" ▪ Possibly buying out surrounding property owners

Interviewee Identification #	Level of Government	Definition of Problem(s) surrounding Swift Creek	Suggested Solutions for Swift Creek
#11	Private Sector	▪ Environmental degradation from metals ▪ Sediment management problem ▪ Asbestos causes concern: o public health o liability ▪ Regulatory problem ▪ Funding problem ▪ Wetlands problem	▪ "Strategy which provides some qualified insurances that the handlers/facility operators can never be held liable or liable-less" o Protected in a safe harbor type of agreement ▪ "A multiple agency endorsed solution"
#12	State Government	▪ Asbestos is an environmental problem ▪ Flooding problem ▪ Property concerns ▪ Water quality issues	▪ "Got to have all the health facts" ▪ Possibly governmental paid relocation
#13	Federal Government	▪ Regulatory problem ▪ Balance of flood issue and health issue ▪ Vegetation dead zone	▪ If money was not an issue: ▪ Build a containment pond to sift the material out. o Purchase up all the land around there o Take all the material and basically put it under the soil ▪ Cap it and then grow crops on top of it.
#14	Private Sector	▪ Flooding hazard caused by the slide ▪ Health concern ▪ Liability ▪ Regulatory	▪ Need to create a management solution for the material. o Sell gravel
#15	Private Sector	▪ Potential health risks from asbestos ▪ Property value issues	o An engineering solution to get rid of the material.
#16	State Agency	▪ Flooding problem ▪ Health Risks ▪ Regulatory ▪ Property rights issues	▪ Educate the public ▪ Open minded brainstorming by stakeholders ▪ Management process is how to address this. o No quick fix ▪ Only treatable alternatives