"A solution to a worrisome problem": the rhetoric of scientific discourse in a public policy dispute about the environment

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“A solution to a worrisome problem”: The rhetoric of scientific discourse in a public policy dispute about the environment

by

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Abstract

The goal of this study is to demonstrate how rhetorical analyses of public discourse artifacts and practices reveal science as a civic discourse—with highly epideictic and deliberative purposes—that guides public policy decisions made by non-expert, civic leaders. Though typically recognized for its forensic function, little is written about how the epideictic function of scientific discourse politically performs in public policy debates about the environment. Nor is much written about the connection between the epideictic and deliberative functions of scientific discourse and the resolution of public controversies. To demonstrate the intersection of the political and scientific, I present a case study in which two opposing scientists attempted to shape public policy using scientific reports. These reports contained conflicting evidence and claims concerning the suspected emission and deposition of dioxin from a Midwestern power plant to the food sources of the Inuit who reside in the Arctic Circle. Specifically, I analyze what rhetorical moves these scientists used to construct scientifically based arguments in both the initiation and resolution of the environmental conflict, and I speculate how expectations appropriate for scientific discourse complicated (and possibly conflicted with) understanding about what was suitable for discourse surrounding the controversy. Using the analytic categories of genre and delivery, frames and values, ethos and identity/image, I locate three rhetorical actions that may be helpful to professional communicators, civic scientists, environmental advocates, public officials, and general citizens when reading and responding to the discourse that is created to initiate and resolve an environmental controversy: (1) the use of warrants to express non-scientific values, (2) the difference in rhetorical situations and generic conventions that surround scientific and environmental discourses, and (3) the creation of a “web of discourse and activity” by scientists seeking change in public policy.
Chapter 1

The Civic Discourse of Science and Its Epideictic and Deliberative Functions in Public Policy Debates about the Environment

Alan Gross begins Chapter 1 of his book The Rhetoric of Science with this statement: “We readily concede that the law courts and the political forum are special cases of our everyday world, a world in which social reality is uncontroversially the product of persuasion” (3). His purpose for making this statement, for writing his book, is that the laboratory—science as a “special case”—is, contrary to Aristotle, also a location where social reality is equally the product of persuasion. As Gross argues, “Only through persuasion are importance and meaning established. As rhetoricians, we study the world as meant by science” (4).

Rhetoricians have studied intensively how the discourse of scientists constructs meaning within and beyond its specialized culture—the laboratory—because the knowledge generated by scientists shapes non-scientists’ relationship with and understanding of the world (e.g., Gross; Bazerman, Shaping; Miller, “Novelty”). Rhetoricians look at the discourse of scientists to understand how it shapes popular culture’s understanding of the world. More recently, though, rhetoricians have begun to study what science means to non-scientists and how that meaning influences and impacts civic leaders’ decision-making process when determining public policy within the law courts and political forums that Gross was writing about (e.g., Katz and Miller; Waddell, “Saving”). When the study of discourse in scientific cultures and genres such as scientific journals, essays, and conversations, shifts
to public forums and genres, such as newspapers, Websites, and city council meetings, rhetoricians track, among other things, the transition and conversion of language as used in the laboratory to that of the public forum (e.g., Fahnestock, “Accommodating Science”; Sullivan, “Exclusionary”). In effect, scholars who study this shift in the rhetorical situation of scientific discourse are actually studying the world as meant by the intersection of three “special cases” of situated discourse—the judicial, the political, and the scientific. Of all the possible areas of everyday life that are affected by scientific discovery and knowledge, scientific discourse related to that ultimate and all-encompassing context of all people—the “environment”—provides rhetoricians with perhaps the ideal opportunity to locate the intersection of the judicial, the political, and the scientific.

**Identifying Forensic, Epideictic, and Deliberative Elements in the Civic Discourse of Science**

Scientific discourse, however, is not best expressed as a category separate from the judicial and the political, especially on public matters in public contexts such as the environment. Using Aristotle’s three species of rhetoric—forensic, epideictic, and deliberative—scientific discourse is commonly identified, like judicial discourse, as primarily forensic because its purpose is to inform its audience about the results, or facts, of past events (Thompson; Fahnestock, “Accommodating Science”). Popular representations, such as the television show *CSI: Crime Scene Investigation*, depict forensic scientists using evidence, logic, and cutting-edge technology to recreate crime scenes and find guilty perpetrators. But, as Dale Sullivan argues, within the community of scientists, science has a profoundly epideictic function: educating and initiating new members, validating and celebrating traditional knowledge, and defending the culture’s orthodoxy from heretical
claims against its tradition and knowledge (Sullivan, “Epideictic”). Jeanne Fahnestock also locates the epideictic qualities of scientific discourse as it functions outside of the culture of scientists. She argues that journalists (non-scientists) who write articles about scientific experiments remove some of the conventions, such as hedges and other contextual elements, that limit the force and certainty of conclusions drawn from the results. This “accommodation” of science—from the scientific journal to the popular magazine, from the laboratory to the global community—creates and reinforces the prevailing mainstream belief in the powers of science; it not only validates and celebrates the ability of science to seemingly uncover the secrets of nature but also shapes our knowledge of, and relationship to, the world. There is not much written, however, about how the epideictic function of scientific discourse politically performs in public policy debates about the environment. Nor is there much written about the connection between the epideictic and deliberative functions of scientific discourse and the resolution of public controversies.

Although the deliberative element of scientific discourse is not as well understood or explored in the literature of rhetoric and professional communication (Czubaroff; Thacker and Stratman), the knowledge gained from scientific inquiry clearly influences and directs individuals’ daily actions—from choosing a diet to lose ten pounds to scheduling an outdoors event in the summer without the threat of rain. Generally speaking, the deliberative function of scientific discourse, often appearing in the report genre, usually directs areas for continued research and study and sometimes points to possible application of the results to other scientific activity. Such a focused and specific deliberative function of scientific discourse can be attributed primarily to the rhetorical situation in which such discourse is created. Within the highly conventionalized and specialized community of scientists, scientific
reports usually do not explicitly make recommendations to change policies that govern the behavior and practices of its members.

It could be argued, however, that the epideictic and deliberative functions of scientific discourse have been reified within the genres of scientific discourse itself, namely the scientific report. Although much of the existing scholarship on scientific discourse focuses on the rhetorical conventions and strategies employed within the scientific community, Charles Bazerman provides us with a historical perspective of how the diminished (or encoded) epideictic and deliberative functions of scientific discourse developed by locating the genesis of the experimental report genre in the earliest scientific periodical dedicated to publishing accounts of scientific activity within the scientific community.

Bazerman’s research on the *Philosophic Transactions of the Royal Society of London* traces how early scientific epistemology developed through discourse to achieve its modern identity. As previously mentioned, he focuses on the genre of the scientific report (or experimental article), demonstrating how it became the “favored way of formulating and discussing science” (Bazerman, *Shaping* 72). Scientific discourse, particularly when expressed through the genre of the scientific report, brings certain expectations to those within the scientific community. Those expectations then provide the expert audience criteria in which the scientific report (and the scientist) will be judged.

In a similar manner, those outside of the scientific community have grown to expect (or assume) that any publicly made scientific claim can be validated by the requisite scientific report that records the experiment from which the results originated. In the form of the scientific report, a public audience may assume that scientific discourse “is built on accountability to empirical fact” (62). However, accommodated results of scientific activity
from a scientist’s report may be enough for non-expert audiences to initially accept a scientist’s claim as credible, certain, and conclusive, especially if those claims match the reader’s knowledge, values, practices, worldview, etc. Unlike the scientists who read scientific reports within their community of practice, public audiences who “read” scientific discourse from this perspective typically lack sophisticated and critical criteria to evaluate not only the veracity of scientific claims but the application and implications of those claims as well. When these claims impact the formation of public policy, the need for a critical lens is even more important. Citizens’ ability to democratically participate in their community is severely diminished without a critical understanding of science.

**The Shape of Science: Popular Representations of Scientific Activity and Their Potential Impact on Reading Civic Discourse in the Public Sphere**

Culturally, Americans consistently witness uncritical representations of science in which scientific activity and reasoning produces certain and sufficient knowledge to solve problems and make decisions. This claim may be best evidenced by the popularity of television shows that deal with scientific issues, particularly in regards to forensic science, criminology, and medical diagnoses and treatments. According to Nielsen ratings during the week of January 23-29, 2006, nine of the top twenty most-viewed shows were one-hour dramas featuring characters’ implementation of scientific knowledge, evidence, or method to catch a criminal, cure a patient, or solve a problem: *CSI, Without a Trace, CSI: Miami, Grey’s Anatomy, NCIS* (Naval Criminal Investigative Service), *Cold Case, CSI: NY, CSI Special, Numb3rs* (“Nielsen”). This list doesn’t include other popular and long-running series, such as *Crossing Jordan* and *Bones*, the multitude of reality-based shows appearing
on both broadcast and cable television (e.g., *48 Hours: Mystery*, *Mythbusters*, and CourtTV programs *Forensic Files* and *Body of Evidence*), or other real-time news events, such as the OJ Simpson and Scott Peterson trials, in which television journalists report on DNA testing and other forensic evidence.

Perhaps part of the appeal of these shows is the black-and-white, systematic nature of the search-and-discover process. Viewers constantly see what a good investigator can do: by ethically using a scientific approach to objectively find unbiased evidence, trained scientists will arrive at logical, and usually indisputable, conclusions—solving problems that restore order and protect our idealized values (e.g., justice should be served). Characters like Gil Grissom, lead investigator of the Las Vegas Field Service Office in the show *CSI*, recite lines of dialogue that construct and reinforce such belief: “Concentrate on what cannot lie—the evidence” (“Pilot Episode”). In addition to the message that there is much power in finding truth through forensic evidence, such comments also seem to have an epideictic purpose—a celebration of our ability to use logical faculties and technology to overcome those who attempt to violate our idea of how the world ought to be. Is, however, a deliberative function of science constructed in such shows or, better yet, in the message that viewers receive in regards to how they understand and react to science when they are engaged in real-life contexts and events?

It would be an over-generalization to state that the majority of Americans have formed their understanding of science from television shows, particularly those that are fictional. It would be equally unreflexive to assume that those who do have such an understanding of science would apply it to any and all real-world instances in which scientific knowledge shows that a problem or a solution exists and a particular public policy
should be enacted because the “evidence says so.” However, when actual prosecutors believe that jurors are failing to convict defendants because the tests performed on fictional television shows were not conducted during the case in which jurors were serving—a phenomenon referred to as “The CSI Effect” (Roane)—it becomes unclear what most Americans know and think about science and its use in real-world applications and deliberations.

This evidence from American popular culture is supported by recent research conducted on adult levels of scientific literacy in the United States. According to Jon D. Miller, Director and Professor of the Center for Biomedical Communication in the Northwestern University Medical School and Professor in the Medill School of Journalism at Northwestern University, the ability “to understand important public policy disputes involving science or technology,” which he refers to as "civic scientific literacy," has risen over the past twenty years but remains far too low for the leading industrial nation in the world (Jon Miller, “Civic” 3). Miller’s national survey of adults (age eighteen and over) in the United States found that, as of 1999, about thirty-four million American citizens (seventeen percent of the total population) were scientifically literate compared to approximately twenty million a decade earlier (4). However, surveys conducted twenty years ago by the American Association for the Advancement of Science reveal less promising numbers for civic scientific literacy in the United States. According to Jane 

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1 Miller’s criteria for assessing civic scientific literacy is as follows: “In practical terms, the level of concept vocabulary and process understanding required reflects the level of skill required to read most of the articles in the Tuesday science section of the New York Times, watch and understand most episodes of Nova, or read and understand many of the popular science books sold in bookstores today” (4). Using similar criteria, adults in the United States possessed a higher degree of civic scientific literacy than those residing in Canada, the European Union, or Japan (4).
Gregory and Steve Miller, the American Association for the Advancement of Science found in 1985 that the vast majority of Americans are ignorant of basic scientific facts and even more so of basic principles and methodologies. Of those surveyed, only five percent qualified as scientifically literate, which was down from fourteen percent in 1979 (Gregory and Miller 5).²

Although I am not studying public understanding of science, mass media portrayals of scientific activity, or civic scientific literacy levels, these examples of popular representations and applications of scientific investigation do suggest a need for rhetoricians to study how real-world scientific discourse is presented to the general public. Citizens need to realize that scientific investigations provide only a portion of the knowledge needed for non-expert decision-making. This realization is especially important in debates regarding public policy meant to preserve personal autonomy while protecting what we commonly and broadly share, namely the environment. The purpose of this study, then, is to demonstrate how rhetorical analyses of public discourse artifacts and practices reveal science itself as a civic discourse with highly epideictic and deliberative purposes.

**Situating the Research Site**

On October 3, 2000, nationally renowned scientist and ecologist Dr. Barry Commoner released the results of a study that used a computer-modeling program to identify the top-ten facilities depositing dioxin in the Canadian territory of Nunavut. Previous studies had confirmed that high amounts of the carcinogen, produced during (among other things)

² For a critical assessment concerning the reliability of the survey methodology used by the American Association for the Advancement of Science, see Alan Irwin and Mike Michael’s *Science, Social Theory, and Public Knowledge*. 
the incineration of refuse, were present in the caribou that the indigenous Inuit population hunted as well as Inuit mothers’ milk. The findings received national attention in the press and created a panic in the towns in which the two worst polluting facilities were located: Harrisburg, Pennsylvania, and Ames, Iowa.

As a doctoral student at Iowa State University in Ames, I first learned about the accusation against the Ames Municipal Power Plant in *The Ames Tribune*, the city’s only local newspaper. A week after holding a hurried press conference when Commoner’s report was released, the Ames City Council formed an ad hoc committee to investigate Commoner’s call for suspected facilities to confirm his findings by testing their emissions and, if dioxins were present in the effluents, to take remedial action in order to prevent further emission and deposition of dioxins. It took the ad hoc committee six months to commission Dr. Robert Brown, a distinguished Iowa State University engineering professor, to investigate the veracity of Commoner’s report and an additional two months for Brown to deliver his report to the Ames City Council. Because he found Commoner’s study severely flawed, Brown recommended that the city not test the plant. On June 26, 2001, the council followed Brown’s advice, voting to deny Commoner’s request that emissions from the plant be tested.

Besides fear for my own safety, as well as my concern (and potential culpability) for what was happening to the Inuit, I was especially interested in the Nunavut-Ames controversy because of my previous experience working in a non-profit laboratory to prepare

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3 This was not the first significant environmental controversy occurring in Ames. During my research in rhetoric and professional communication literature, I found a study about the discourse surrounding buried radioactive waste discovered many years later during the construction of an Ames city park (Trumbo), which does not include contamination from the Manhattan Project that occurred on the Iowa State University campus during World War II.
environmental samples so they could be tested for the presence of dioxins and other potentially harmful chemical pollutants. Educated from the four years I worked as a laboratory technician, I read with great interest the stories from *The Ames Tribune* that contained quotations from both disputing scientists—Commoner and Brown—who explained why the plant was or was not responsible for emitting and depositing the amount of dioxin that Commoner claimed.

In each successive newspaper article, the drama surrounding the debate heightened, culminating with each scientist taking pot shots about the other’s practice and overall understanding of science. By the last *Tribune* article in July 2001, each scientist had resorted to name-calling, leaving scientific reasoning, evidence, and fact, it seemed, by the wayside. The degradation of the debate demonstrated the high stakes, spurring my curiosity about how the Nunavut-Ames controversy unfolded through discourse.

As a citizen of a local and a global community, I readily recognized what was at stake for the people on both sides of the Nunavut-Ames controversy: the health of those affected by the effluents that may be emitted by the Ames Municipal Power Plant, the viability of the accusing scientist’s computer model to influence incineration practices of other (and future) suspected polluters, and the continuing operation of a power plant providing affordable electricity to city residents and reducing landfill waste. However, the question initially driving my interest in this as a research site for my dissertation was why the emissions from the Ames Municipal Power Plant were not tested for the presence of dioxins. Although costly and potentially risky if the results proved unfavorable, up-to-date scientific testing that

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4 Naming this the “Nunavut-Ames controversy” is a rhetorical choice on my part to highlight the two locations, cultures, and groups of people who are directly affected by the discourse events studied in this investigation.
generated empirical evidence seemed to be the best way to protect local and global citizens from a potential danger emanating from city-sanctioned practice. However, if the tests revealed negligible dioxins emissions, it would scientifically confirm what city and university officials had adamantly argued from the day that Commoner publicly released the results of his study: the Ames Municipal Power Plant does not emit dangerous levels of dioxins.

As of February 2006, the plant still burns a 90:10 mixture of coal and refuse-derived fuel to provide cheap electricity to Ames citizens while the Inuit continue negotiations with foreign governments to protect their climate and ecosystem. Dr. Brown’s report remains the only formal explanation of why the plant was not tested and the only reminder that a controversy even occurred in Ames. After returning to Commoner’s report, supplemental North American Commission for Environmental Cooperation (NACEC) documents, articles from *The Ames Tribune*, transcripts from both Ames’ initial press conference and final city council meeting that ended the controversy, as well as other discourse surrounding the conflict, I was struck by how the points of contention within the argument changed during the eight-month event. Because of my interest in the discourse of the two scientists—and how that discourse may have impacted the final outcome—I developed the following research question for my dissertation: *Considering the conflicting scientific evidence and testimony presented in their respective reports, why did Commoner’s initiative fail while Brown’s achieved its intended purpose?* To answer this question, I looked at how scientific knowledge, entwined with three categories of rhetorical elements—genre and delivery, frames and values, ethos and identity/image—established, altered, and eventually ended the Nunavut-Ames controversy.
Significance of Investigating the Discourse of the Nunavut-Ames Controversy

During the heyday of research in environmental discourse, rhetoricians showed much interest in the scientific-civic-legislative hybrid of environmental discourse surrounding public policy debates. Previous case studies on the discourse of environmental controversies included, among other things, comparisons between the discourse of authoritative bodies with that of the general public in determining dumping sites for nuclear waste (Katz and Miller), public participation in resolving water quality issues in international waters (Waddell, “Saving”), campaign strategies used by Canadian indigenous groups to recruit allies in order to influence corporate enterprise (Cooren and Taylor), the use of metaphors in regulatory discourse to silence activist opposition to damming rivers (Patterson and Lee), the genre of and strategy created through scientific reports written by an advocacy group to change national energy policy (Rude, “Environmental Policy,” “Toward”), and the rhetorical strategies used by consortiums of scientists opposing or supporting further research on a scientifically incommensurable position (Miller, “Novelty”).

The research site for my investigation exemplifies how both transformative and dominant organizations use scientific knowledge (and perhaps the authority commanded by science and the scientists that present that knowledge) in discourse released to the general public within the struggle to either cease or maintain civic practices that may (not) threaten the environment. In other words, even in the midst of incommensurable scientific evidence and testimony, the formation (genre) and presentation (delivery) of environmental discourse within a popular forum not only provides factual information (forensic function) to its audience but also frames understanding of an issue by invoking values and creating identities.
and images (epideictic functions) that contribute to public policy outcomes (deliberative function).

Such study of environment controversies is important for a variety of reasons. First, the Nunavut-Ames case serves as an example of how “reading” past civic discourse aids our understanding of future discourse—to show how scientists and advocates use rhetoric to construct arguments in the resolution of environmental conflicts. It is not just the scientific evidence itself but also the rhetorical moves scientists make in presenting that evidence through discourse to address a controversial situation (within a particular history and for a particular purpose) that makes a convincing argument. A rhetorical perspective toward the use of scientific knowledge in environmental discourse has potentially profound implications for campaigns of social change. Second, more sophisticated readings of environmental discourse could lead to more productive and constructive discourse between advocates and decision-makers, replacing adversarial relations with negotiation and mediation for the common good. For instance, Spangle and Knapp offer four general principles to guide public discourse that promotes empowerment for all parties involved in the resolution of environmental controversies: reducing moral positioning, focusing on common ground, downplaying dramatic approaches, and creating a new model for data disputes (20). Case studies provide specific, contextual examples to not only test the validity of such theories for improved communication but to pedagogically illustrate the problems these approaches address as well. Locating the problems of communicating the scientific in previous environmental discourse reveals solutions to curb “Science” and, instead, promote “science” in the public policy debates so that citizens are better able to participate in the political
Third, understanding the epideictic and deliberative functions of scientific recommendation reports, such as those written by Commoner and Brown, in the inquiry and address of an environmental exigency can help instructors teach students how to better plan, write, and deliver such discourse to achieve their intended social action.

Finally, this study is important because a rhetorical perspective of language and science better prepares citizens to understand and act in a civically responsible manner in the moment rather than well after decisions are made. In particular, education in reading a controversy and its accompanying discourse helps citizens see (a) how their identity is expressed through their immediate environment, practices, and knowledge base and (b) how that identity is influenced by discourse (and vice versa). Answering questions about a situation that occurred in their own community allows citizens to locate the relationships between the familiar players in a controversy and trace their motives as expressed in public discourse without being intimidated by the presence of science and scientists in the discussion. An alternative view of the “scientist” and her method may assist them in recognizing the rhetorical elements that transmit the value of science in scientific reports written to influence public policy as well as television shows about scientific activity. Although Gil Grissom may be correct in his statement that evidence does not lie, it presumes that the scientist will find all available evidence, which allows her to always “read” the one

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5 I make a distinction between upper-case “Science” and lower-case “science” similar to postmodern differences between “Truth” and “truth.” “Science,” as I am using it in the sentence above, is a monolithic, absolute, immutable and arhetorical understanding of science. When using the term “science,” I am referring to the general practice of science as one branch of many types of knowledge; this understanding of science considers science a rhetorical activity. In Chapter 2, I elaborate on the importance of the distinction between these two understandings of science.
true story that evidence supposedly tells. Rhetorically analyzing the discourse within case studies of environmental controversies removes the magic from the scientific process, demonstrating how scientists make partial recommendations with partial evidence. A rhetorical perspective also reveals that data are always subject to interpretation and that the presentation of that data is just as important as the data itself. In the end, rhetoric, at its best, educates citizens in how to democratically participate in local affairs, promoting a world in which meaning is collectively engineered from many types of knowledge, not just science. Such an approach serves as a step toward providing students with a contemporary “rhetorical education” instead of an “education in rhetoric,” in which rhetoric is seen as merely a tool of persuasion (Clark and Halloran; Fleming).

Chapter Forecast

The core artifacts studied in this dissertation are the recommendation reports that the two scientists involved in the Nunavut-Ames controversy wrote, reports in which each cited scientific practice, theory, and facts to argue for or against testing exhaust from the Ames Municipal Power Plant for the presence of dioxins. To reveal the epideictic and deliberative functions of scientific evidence in environmental discourse, I rhetorically analyzed these two reports to determine how delivery, genre, and argument establish identities and images to match each scientist’s values with those held by the readers of the reports—the decision-makers (citizens and city leaders) who determine public policy in the resolution of environmental conflicts.

Chapter 2 presents a literature review of the field of environmental discourse followed by a description of three categories of rhetorical elements—genre and delivery,
frames and values, ethos and identity/image—used in the analysis of the two scientists’ reports. A discussion of the relationship between the rhetoric of science and environmental discourse justifies the three categories of rhetorical elements as analytic tools that enable me to illuminate how scientists’ discourse make epideictic and deliberative appeals in public policy events.

Chapter 3 begins my artifact analysis in which I trace how a “web of discourse” managed by the NACEC—the advocacy agency that commissioned Commoner’s study—formally linked the Nunavut territory to Ames, Iowa, and thus ignited the controversy in question. The delivery and genre of the artifacts, including the “Commoner Report,” that NACEC used to disseminate the results of Commoner’s scientific investigation are analyzed. I show how scientific reports that seek social change in the status quo strategically use forensic evidence to elicit epideictic and deliberative functions that are often muted in traditional scientific discourse. Through word choice and argumentative strategy, Commoner develops for his readers frames that explain what is happening in both Nunavut as well as the ten sites accused of dioxin deposition. Additionally, Commoner expresses values of ethical obligation, environmental advocacy, and responsibility in his discourse, values that he anticipates his readers will also share. If these values are indeed shared between scientist-writer and advocate-readers, the Commoner Report stands a better chance to encourage grassroots organizations to campaign for remedial action against the targeted communities identified as the worst depositors of dioxin in Nunavut.

In Chapter 4, I focus on the first-response discourse of Ames city officials and how that discourse initiated what proved to be a successful campaign to counter Barry Commoner’s allegations against the Ames Municipal Power Plant. Comments made by city
officials and local experts during the city’s October 2000 press conference challenged public perception regarding what counted as responsible behavior to resolve the controversy. A rhetorical analysis of the discourse produced by Ames city leaders to successfully counter claims leveled against its municipal power plant reveals the presence of four closely related warrants that support the reclamation of the city’s public image as environmentally friendly and responsible. Collectively, these warrants reframe the issue of “responsibility” within the Nunavut-Ames controversy. By contrasting both contextual and image-based differences between the Ames facility and the one located in Harrisburg, PA—the number-two offender on Commoner’s top-ten dioxin deposition list—I show the power that Ames possessed (and Harrisburg lacked) to control its public image after the release of the Commoner Report.

Chapter 5 focuses on the discourse strategy employed by the city to formally respond to Commoner’s allegations, silence the public controversy, and restore the status quo. Evaluating the final report delivered by Dr. Robert Brown—the scientist commissioned by the city to investigate the veracity of Commoner’s report—shows how Brown’s inquiry incorporates the four warrants originally presented by officials during the city’s October 2000 press conference. These warrants, connected to four damaging claims and mostly supported with forensic evidence, present familiar knowledge, beliefs, and values to the non-expert audience. Brown’s argument discredits not only the results and methodology of Commoner’s study but Commoner’s status as a scientist as well. In some ways, the “Brown Report” achieves a limited deliberative purpose—the Ames City Council should (and did) not vote for testing the plant. But I argue that the Brown Report successfully convinced the council to vote against testing because it fulfilled its epideictic, and political, function. I end the chapter with an answer to my research question. Despite being an example of
environmental discourse, I suggest that the Commoner Report failed to achieve its goal, in part, because it was unable to meet the conventions of specialized scientific discourse. Without adhering to these conventions, the Commoner Report could not provide enough “rhetorical energy” to convince Ames decision-makers that he was anything more than an advocate for the Inuit.

Chapter 6 concludes with an application of the results of the case study to pedagogical issues. I argue that understanding how social values are framed and reframed through the recommendation report genre and the strategies implemented to deliver that report to influence decision-makers to resolve an environmental controversy has implications for how environmental advocates use discourse to conduct public policy campaigns, how instructors teach genre and delivery of recommendation reports as a process of inquiry toward the implementation or prohibition of social change, and how citizens understand the role of science and rhetoric in discourse and their role in challenging or maintaining the status quo.
Chapter 2

Science in Text and Context: Exploring the Relationships between Science and Rhetoric within Environmental Discourse

As suggested in Chapter 1, a chronic difficulty in analyzing discourse about the environment resides in the assumptions, beliefs, and values that writers and readers hold toward science and nature. In times of both stasis and controversy, these assumptions are often embedded and unstated within the community’s discourse and routine practices. If this discourse occurs within a free society, critical awareness of the warrants underlying such discourse is paramount to citizens’ ability to participate in the democratic process governing civic practices. Unfortunately, it is sometimes difficult for individuals to locate the underlying values communicated within civic discourse when the status quo is firmly established, uncontested, and comfortable. However, in moments of conflict—when existing policy, practice, knowledge, thoughts, and values of the status quo are challenged—community members may consider whether or not routine behavior and beliefs should change. Applying a rhetorical perspective to arguments originating within the context of controversy helps us better understand how discourse promotes or discourages social change through public policy decisions. As Carolyn Miller writes, “Argumentation is complexly socio-cognitive . . . [therefore a] rhetorical description of [a] debate accounts for more of its multiple features, its twists and turns, its partisan strategies, its contested forums” (“Novelty” 502).
This chapter begins, then, with a rhetorical description of one of the primary warrants embedded in environmental discourse—the function and value of science to tell us about the natural world. To better understand what the term “science” means in environmental debates, I problematize popular and generalized conceptions of scientific inquiry and evidence. Revealing unrealistic public perceptions of science as a purely objective pursuit of discovering the “truth” helps us locate how scientists may use these perceptions to their advantage when producing discourse for non-expert audiences.

With a clear idea of what “science” is in rhetorical terms, I then trace similarities and differences between studies in the rhetoric of science and environmental discourse to situate my study within the discipline of English Studies. Due to substantial differences within the rhetorical situation, I show that the research sites and artifacts of environmental discourse are not only distinct from those in the rhetoric of science but also an important and developing sub-discipline for continued study. By mapping the relationships between conflicting scientific knowledge and the rhetorical situation in which environmental discourse is often produced, I demonstrate the rhetorical richness of environmental discourse artifacts.

Connecting discourse and knowledge shows what we know about “public science,” revealing a unique and influential relationship between the presentation of scientific knowledge in environmental discourse and its application to developing public policy. Therefore, I explore the rhetorical value of this relationship by identifying a significant research niche: an expanded understanding of the epideictic and deliberative functions of science within environmental discourse. I then conclude this chapter with the tripartite rhetorical lens I have chosen to study the epideictic and deliberative functions of science in
the reports written by both Barry Commoner and Robert Brown during the Nunavut-Ames controversy—genre and delivery, frames and values, ethos and identity/image.

**Separating “science” from “Science” in Environmental Discourse**

Generally, questions that ask whether or not certain information is “scientific” seek to reveal the manner in which that information was generated and how it was processed. Answers to inquiries such as who gathered the information, what methods and equipment were used in data collection, and how the data was analyzed and interpreted—information typically provided in a scientific report—serve as evaluation criteria in identifying work as scientific or not. When non-expert public audiences learn that trained scientists obtained the information by performing an experiment (or other research activity) using the scientific method, such audiences may readily accept the information as “scientific.” And in most cases—particularly those in which the gathered information and its application are confined mainly to on-going scientific investigation within the specialized community of practicing scientists—non-expert audiences would generally be accurate in such an assessment.

However, when scientific information involves the investigation of public matters for the purpose of making recommendations in public policy, knowing who gathered the information and how it was analyzed is not enough. It is vital that non-expert audiences be able to critically assess how the scientific rationale for policy recommendations apply to other areas of knowledge that are equally important in maintaining a healthy and productive society. For instance, scientific knowledge may explain what happens during a procedure, but it does not tell us whether it is economically feasible to invest money toward conducting that procedure. Likewise, science cannot determine whether or not it is morally or ethically
best to pursue a course of action that includes conducting a scientific procedure. The necessity of this assessment, unfortunately, does not guarantee that it will be performed.

My distinction here between “science” and “Science” is similar to postmodern differences between “truth” and I use the capitalized term “Science” to indicate an understanding of science as monolithic, absolute, immutable and arhetorical. Conversely, when using the term “science,” I am referring to the general practice of science as one branch of many types of knowledge; “science” recognizes itself as a rhetorical activity. There is, however, a greater connection than capitalization and postmodern parallelisms that is intended between my comparison of “S/science” and “T/truth.” For many in the public sphere, the word “Science” connotes “Truth.” Although scholars may easily recognize the simple but duplicitous association between these words, general public audiences may not. Dale Sullivan summarizes the conflict between popular perceptions of Science and those held by most rhetoricians:

In popular thought, scientists discover truth rather than construct it, and the truth discovered is readily apparent to the unbiased reader if she or he is intelligent enough to understand scientific language. It is by now obvious to those who have followed studies in the sociology and rhetoric of science that this popular image is inaccurate. (“Keeping” 127)

Recognizing the popular image of the scientist as “truth-finder” helps rhetoricians identify one of the warrants that non-expert audiences typically apply to understanding the discourse of scientists. It also reveals an assumption that scientists and civic leaders may use to their advantage when creating discourse that appeals to the general public. Consequently, as citizens, we should be just as concerned about “matters of value” (epideictic discourse) as we are about “matters of fact” (forensic discourse). In other words, as well trained as scientists are to objectively study the environment, we should recognize that science is value-laden
knowledge; scientific discourse does not report “just the facts.” Furthermore, we should be mindful that, as previously mentioned, science is only one type of civic knowledge that tells us what we know about the world and how we should treat it (as well as each other); scientific discourse does not replace all other social knowledge and discourses.

Failure to recognize the distinction between Science and science may cause problems in our social networks. Common epistemologies and attitudes that regard Science as an all-purpose source of answers to societal problems may promote a passive acceptance of scientific testimony that, in effect, excises public participation from the political process. In addition, societal perspectives that interpret “science” as “Science” create divisions between non-expert and expert audiences. Gregory Clark and S. Michael Halloran write that the rise of professional cultures has reduced the public’s ability to participate in civic discourse by creating boundaries between public and private knowledge.

[W]hen not only knowledge but rationality itself are at least partly constituted by the specific and specialized interests of a professional community, the discussion of common problems that cross the boundaries of those communities—problems of public policy, for example . . . [results in] conflicts of public consequence [that] may never be fully confronted [in popular public discourse]. Instead they are dismantled and their elements appropriated by the various specialists who claim authority to address them. (23)

Working from this premise, it seems reasonable to assume that the privileging of Science, or any other branch of expert knowledge, in the course of deliberations on civic controversies threatens democracy by diminishing and de-emphasizing shared public knowledge. According to this line of reasoning, without knowledge that possesses any currency or relevance, citizens have no authority to speak against or question specialists’ arguments. In the case of environmental discourse, Science has the potential to silence the voice of public dissent by monopolizing public discourse on the contested issue. Consequently, because
Science usually excludes other values and knowledge, it also usually fails to persuade (Waddell, “Saving”; Katz and Miller).

If the culturally dominant construction of Science in environmental discourse is unchallenged, it has the potential to become, if it has not become so already, a powerful and persuasive force in the arguments advanced by scientists to direct public policy decisions. Like Charles Bazerman’s statement that scientific discourse appears to be “built on accountability to empirical fact” (Shaping 62), popular public perceptions of Science are accompanied by a rational set of rules, a natural calculus and truth-finding method, to deliver judgment beyond the fickle nature of human opinion and emotion. Similarly, Craig Waddell argues that the image of scientists, cast in the role of “experts,” is persuasive because scientists appear objective or disinterested in outcomes. Within such a mindset, scientists are perceived to care only about delivering the “truth.” Waddell points out, however, that scientists are engaged in a value-laden discipline, biased by, among other things, professional and political affiliations (“Role” 390).

Accordingly, popular public assumptions that scientists’ pursuit of knowledge is enveloped in a shroud of objectivity may foster conditions that restrict participation in public policy decisions. Sullivan states that, when delivering discourse to the general public, scientists may not objectively present information for the betterment of society; rather, their intentions may be to control the forum in which discussion of scientific issues is taking place. “In some cases, it may actually be a politically motivated enterprise that seeks to maintain power for any number of reasons” (“Keeping” 127). In public contexts, the core of this power resides in scientists’ ability to reinforce an understanding of Science to communicate social values of “objectivity” and “truth.” Recent issues in the media involving scientific
knowledge and explanations—such as teaching Intelligent Design in schools, using genetically modified organisms in agriculture, buying international beef amid allegations of mad cow disease—reveal how political motivations can interfere with the unambiguous answers that Science is commonly perceived to provide.

An additional perspective on Science as unbiased and objective is offered by Alvin Weinberg, who demonstrates how the science that influences policy decisions is itself influenced by values and beliefs that transcend the knowledge-base of the scientific community, which he considers examples of “trans-science.” Issues of trans-science are actually questions about what should be done, thus they are political. Although usually stated in scientific language, trans-science questions are unanswerable in purely scientific terms (209). Weinberg offers as an example of trans-science civic debates concerning the safety of nuclear power plants. Though science may provide indications that nuclear reactors are relatively safe facilities to produce electricity, science cannot sufficiently answer citizens’ question of whether or not a city or county should allow the construction of a nuclear plant within city limits or the county line. The process for answering these seemingly scientific questions is culturally determined, and the answers must be found in contexts and concerns that extend beyond only the laboratory, which would include, among other things, economic costs and benefits for interested parties due to changes (or lack of changes) prescribed by the creation (or absolution) of regulatory standards.

In these cases, when science cannot provide unambiguous answers, scientists who recommend public policy are taking on a role different than “scientist” (209). Weinberg holds that it is the responsibility of scientists to establish for the public “what the limits of scientific fact really are [as well as] where science ends and trans-science begins” (216).
Furthermore, Weinberg states that scientists ought to encourage the “uninitiated” public to participate in debates on trans-scientific issues. “Scientists have no monopoly on wisdom where this kind of trans-science is involved: they will have to accommodate to the will of the public and its representatives” (222). By distinguishing the limits of science as well as the process by which democratic societies ideally function, Weinberg offers us a place in which to better understand the role of scientists to provide scientific knowledge about an issue without exaggerating its importance and eclipsing other areas of knowledge or the political process. Recognizing the role of scientists and science, rather than Science in answering questions of what should be done about public problems helps experts and non-experts avoid invoking the unbalanced performance of Science in public policy deliberations.

In summary, if science is indeed a socially constructed branch of knowledge, bound by culturally determined practices of legitimation and protection, then scientists’ discourse on public policy deserves special, rhetorical attention. Science expressed or received as a set of “value-free facts” is rendered suspect when viewed from a rhetorical and social perspective. However, without the benefit of a rhetorical lens, environmental discourse becomes a practice restricted to only experts whose testimony tells the public “what it all means.”

In the case of the Nunavut-Ames controversy, it is telling to see how the public received the reports written by Commoner and Brown. Although uncritical reception of environmental discourse will always serve as an invitation for “science” to be perceived as “Science,” it is evident that each of these scientists’ reports was publicly scrutinized. The degree of that scrutiny, however, was clearly disproportionate, which opened the door for Scientific reasoning to occur in the Brown Report. This Scientific discourse reduced the
opportunity for oppositional voices, originally included in the conversation, to continue participating in the discussion on what to do about the Ames Municipal Power Plant; removing the public presence from the discussion effectively excised the expression of alternative community values and visions. This subtle form of social censorship has the potential to cause public alienation from the issue by encouraging an attitude of “letting the experts take care of it.” And this was, to some extent, the attitude that the Brown Report, and its quick acceptance by the Ames City Council. Ultimately, the absence of full citizen contributions in civic deliberations resulted in the continuation of policy that may prove not to be in the best interests of the citizens of Nunavut, the citizen of Ames, or the environment.

The Evolving Field of Environmental Discourse and Its Connections to Rhetoric of Science Studies

Within the discipline of rhetoric and professional communication, environmental discourse is a relatively new area of interest. Nancy Coppola and Bill Karis mark the introduction of the Environmental Impact Statement—a technical report mandated of government agencies and federally funded projects—as the “impetus” of rhetoric and professional communication involvement in environmental discourse (xv). However, it wasn’t until the 1992 release of M. Jimmie Killingsworth and Jacqueline S. Palmer’s Ecospeak: Rhetoric and Environmental Politics in America—the first book-length investigation of environmental rhetoric—that the study of environmental discourse began to take shape. In 1996 four more books were published on environmental discourse: Myerson

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However, since 2000, there have been no books and few articles (Dayton; Bazerman, Little, and Chavkin; Rude “Toward”) in rhetoric and professional communication journals dedicated to environmental discourse or environmental issues.8 On the surface, this diminished output may suggest a waning interest or sense of importance in studying environmental discourse; however, it may actually be evidence of the proverbial “growing pains” of an emerging field of study that has yet to define itself in relation to other issues and

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7 Due to a lack of space to accommodate all of its contributors, *Technical Communication Quarterly* published Plevin’s article in the subsequent issue (Spring 1997), a positive sign that researchers were interested in environmental discourse and producing a good amount of quality scholarship in the area.

8 This observation is based on a convenience sample of journals surveyed in February 2005 and may not accurately represent the corpus of rhetoric and professional communication journals. Specifically, the journals I reviewed — *Technical Communication Quarterly, Written Communication*, and *Journal of Business and Technical Communication*—were those in which environmental discourse essays had previously appeared.
types of discourse currently being studied in the rhetoric and professional communication discipline.

Although separate from standard investigations of the rhetoric of science, environmental discourse often features a scientific component, which renders rhetoric of science research particularly valuable to studies about the rhetoric employed in discourse about the environment. In the introduction of his 1997 book *Landmark Essays on Rhetoric of Science: Case Studies*, Randy Harris outlines four categories that organize the essays of the book. “Giants in Science,” the first major section of Harris’s book, features essays about Darwin, Newton, and Watson and Crick and their use of rhetoric to create scientific knowledge and cultural realities. The second section, “Conflict in Science,” focuses on cases where scientists and scientific evidence clash and how the resulting rhetoric creates personae of the disputants. Similarly, the essays contained in the “Public Science” section revolve around the rhetorical appeals, such as pathos, used in scientific discourse to influence public policy and perception. Finally, the “Writing Science” section traces the evolution of scientists’ writing from the laboratory to the scientific journal and the multiple changes such discourse undergoes in order to be accepted by a larger, scrutinizing audience. As the list below demonstrates, Harris’s categories are still germane to classifying the types of scientific discourse that rhetoric and professional communication scholars are writing about today.

- **Giants of Science**: Davida Charney (“Lone Geniuses”) analyzes how modern authors depict the discoveries of eighteenth-century scientists.
- **Conflict in Science**: Harris (*Rhetoric and Incommensurability*) compiled a separate book of essays dedicated to the relationship between rhetoric and the concept of scientific incommensurability.
• *Public Science:* In the Winter 2000 issue of *Technical Communication Quarterly* dedicated to public policy, Catherine Smith presents “a discourse analytic perspective on rhetorical action in the institutional settings of policy” (77) to develop effective pedagogy for public policy writing courses.

• *Writing Science:* A “special symposium issue” on the rhetoric of popular science appeared in *Written Communication*, featuring an article from Fahnestock (“Preserving the Figure”) and an introduction from Charney as guest editor.

What is significant about these examples of recent scholarship within the rhetoric of science and how they fit Harris’s categories? If we accept Richard McKeon’s premise that applications of rhetoric are focused on particulars (“The Uses of Rhetoric”), environmental discourse is perhaps a prime site to discover the Giants, Conflicts, Publics, and Writings of Science. In other words, environmental discourse offers both the content and context of reputable scientists making scientific arguments for a certain reality, controversies where scientists and scientific evidence are in conflict, debates that utilize scientific testimony and experiments to determine public policy, and representations of scientific information that have been accommodated for non-expert audiences. More specifically, studies of environmental discourse provide RPC scholars the opportunity to analyze all four of these categories in a singular research site: the rhetoric of significant modern scientists engaged in scientific debates about civic policy in the sphere of the general public for the purpose of persuading public audiences.⁹ Within particular, situated, and contested contexts, case

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⁹ There are older journal articles that look at occasions when debate within the community of practice enters the larger public sphere, such as the cold fusion controversy (e.g., Sullivan “Keeping”; Thacker and Stratman; Taylor; Pinch; Lewenstein). One of the primary distinctions between the study of public policy controversy in environmental discourse and
The Context of Scientific Conflict: Mapping the Rhetorical Situation of Environmental Discourse

Much of the literature that explores the rhetorical dimensions of environmental discourse begins by focusing on how conflicting parties’ discourse reflects their conception of the “environment.” In the “Introduction” of their book *Ecospeak: Rhetoric and Environmental Politics in America*, Killingsworth and Palmer map how various groups and institutions groups write or talk about the environment—nature as spirit, nature as resource, and nature as object—and how holding a particular view of nature politically impacts the manner in which groups interact with each other (14). In Figure 2-1, Carl Herndl and Stuart Brown build upon this model, super-imposing Killingsworth and Palmer’s three perceptions of nature with both the Aristotelian triangle of rhetorical appeals (pathos, ethos, logos) as well as the type of discourse each camp tends to produce, namely (and respectively) poetic, regulatory, and scientific discourses (5).\(^\text{10}\)

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\(^{10}\) Herndl and Brown state an obvious but necessary caveat for these types of discourse: “These discourses are not pure” (12).
According to Herndl and Brown, scientific discourse—discourse associated with logical appeals made by those who represent nature as an object—is “constructed through careful scientific methodology. . . . The immense cultural power of this discourse comes from our rationalist faith in science and in the productivity of the scientific method” (11). As discussed in the previous section, the value of the scientific method—an inquiry to discover facts concerning actions, behaviors, and relationships within the “natural” world—as an objective pursuit of “truth” is pervasive among not only the general public but both scientists as well (Bauer 40-1).

When nature is considered an object, it is science that constructs the physical world as we experience it, demonstrating the power of science to give meaning, to do; science does this.\(^\text{11}\) If science can indeed do things, perhaps it is possible to consider science as a

\(^{11}\) According to Bernadette Longo in her book *The Spurious Coin: A History of Science, Management, and Technical Writing*, it is discourse (rhetoric) that delivers the message of Science. Accordingly, a primary assumption in my analysis of the Nunavut-Ames controversy is that it is discourse that grants science (and Science) its power.
performance in much the same way that Judith Butler writes about gender as a performance (Excitable Speech). In a similar manner, Sullivan, in his redefinition of epideictic rhetoric, states that “demonstration” is one of the functions of scientific discourse (“Epideictic”). To “do” something in science is to present oneself as credible both within and outside the culture, though there are different standards to assess one as a “good” or “bad” scientist.

Likewise, Michel Foucault argues that it is discourse that creates objects and the authority to discuss those objects (Archaeology). As a consequence of sustained debate within the larger public sphere, a populace ideally knows what the subject of debate is (how it is defined) and the speakers’ credibility to speak on the subject (what job does the speaker have, what are her credentials). There is more at play, and at stake, however, to the general public’s understanding about a conflict than being able to identify the location of the dispute and the name and rank of those doing the disputing. What are non-expert audiences to believe when the conflict includes scientists (experts) who disagree on the science defining the debate?

The Rhetorical Value of “Incommensurability”

As previously mentioned, a rhetorical perspective of science enables audiences to answer questions about conflicting scientific testimonies that appear in environmental discourse. It is beneficial for public audiences to see conflict between contending scientists as likely a disagreement in their ideologies as their methodologies. In other words, though scientists may differ in their interpretations of data, at the core of their ensuing debate may be differences in the meaning or value of people, things, or situations associated with the controversy. Although differences in methodology may create problems in negotiations regarding the facts of the matter, differences in ideology may create an impasse to resolution.
of the conflict. And though incongruent ideologies may fuel disagreements regarding technical procedures, applications, and conclusions, the mere presence of scientists and scientific evidence may distract the general public from recognizing a more probable source of the conflict.

Within the greater rhetorical and scientific community, the term *incommensurability* is used to define long-standing impasses that occur between scientists (or branches of science) who hold conflicting paradigms (Kuhn; Harris, *Rhetoric*). Carolyn Miller, however, represents an emerging group of scholars who declare that the term “incommensurability” does not productively describe the role discourse plays in constructing scientific knowledge:

> Within the relevant scientific community, the divergent understandings of . . . [differing scientific] results fit Kuhn’s characterization of a paradigm debate: they present different problems to be solved, different solutions or standards for obtaining solutions, and most importantly different visions of the scientific future. To attribute these conceptual differences to scientific incommensurability would imply that the specific nature of the ideas themselves is responsible for the “gulf” between . . . scientists . . . and that the apparent mutual incomprehension that results makes argumentation difficult if not impossible. Incommensurability as an explanation leaves both the rhetorical actor and the rhetorical analyst with little to say. (“Novelty” 501)

Miller’s statement reinforces the idea suggested in the previous paragraph: though it may not be readily apparent at first glance, many heated conflicts between scientists may have as much to do with conflicting representations of scientific identity and expressions of social values as it does differing paradigms and evaluations of methods or data. Using a rhetorical perspective to locate “socio-cognitive” dimensions of disagreement allows the rhetorical analyst to find scientists’ subjective (and social) ideologies and motives within their scientific testimony. The tension between scientists within a particular controversy is itself evidence of
the larger argument that has been unpacked thus far in the chapter—that scientific testimony meant for mainstream public consumption routinely communicates the value of Science.

As is typical in struggles over human practices that are potentially detrimental to the health and equilibrium of nature and its inhabitants, the opposing sides in an environmental controversy are often represented in public discourse as polarized extremists—such as the greedy, conservative corporate entity (tree-logging company) versus the overly earnest, liberal environmentalist (tree-hugging groups). Using the terms in Herndl and Brown’s model, depictions of such environmental contests may pit those who view “nature as resource” against those who view “nature as spirit.” These conceptions of the “players” of the drama through environmental discourse, as presented by the players themselves and the media reporting on them, are usually stereotypical and reductive, potentially limiting the public’s incentive to understand alternative perspectives while concurrently inhibiting the opportunities for negotiation between the leaders of the opposing sides.

Popular public conceptions of the differing sides of an environmental controversy—usually presented by the news media—frame situations prior to their occurrence. Essentially, these frames prepare audiences to “read” such situations in a certain way so that they recognize what is happening in the conflict and who is involved. In other words, frames provide individuals with preconceived notions and values that define the purpose of the environment, the function of science, the expectations of civic response during controversy, and even the proper protocol for participating in public conflict. To help understand how

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12 David Easter’s “Activism in a Moderate World: Media Portrayals and Audience Interpretations of Environmental Activism” in Earthtalk provides one interesting presentation of such stereotypes.
these frames may be constructed, replicated, and reinforced, it is beneficial to reveal the rhetorical situation in which environmental controversies and their discourses often occur.

**The Rhetorical Situation of Environmental Discourse**

Environmental discourse addresses a recurrent rhetorical situation—exigency, audience, and constraints (Bitzer 64-5)—that is considerably different from that of traditional scientific discourse. As Miller writes, exigence is a set of particular social patterns and expectations that provides a socially objectified motive for addressing danger, ignorance, separateness. It is an understanding of social need in which I know how to take an interest, in which one can intend to participate. By “defining” a material circumstance as a particular situation type, I find a way to engage my intentions in it in a socially recognizable and interpretable way. (“Genre” 158)

The primary exigency—the social motive—of environmental discourse is to resolve an existing social problem concerning the environment, usually through the creation, maintenance, revision, or repeal of public policy. Instead of writing exclusively to a specialized audience of fellow experts, scientists are likely to create scientific discourse that will be equally consumed by the non-expert citizenry (including decision-makers) affected by the environmental problem. If they choose (or, in some cases, are forced) to engage in the emerging conversation, the addressed non-expert audience will use scientists’ discourse to understand an environmental controversy, identify with one (or more) of the multiple stakeholders involved, take a position, and act accordingly.

To be successful in challenging or maintaining the status quo, scientists must appeal to general audience expectations that (1) science provides knowledge about how nature works, including how the earth and its inhabitants are affected by human activity, and (2) public policy—recognized as guidelines, laws, rules, and regulations for human conduct—
should protect the health and safety of human beings and the environment itself. The ethos of the scientist-writer, along with the logos (as well as the ethos) of scientific explanation and evidence, defines “the material circumstance” of ecological problems (the recurring event) as “a particular situation type,” which is, again, the creation, maintenance, revision, or repeal of public policy to rectify these crises—a deliberative action. A range of constraints, though, impacts the successful expression of the desired action.

Using Aristotelian terms, Bitzer defines “constraints” as inartistic and artistic “proofs” that limit or contain discourse. Examples of constraints include “beliefs, attitudes, documents, facts, traditions, images, interests, motives” that are imposed onto, as well as by, the writer in any given situation (Bitzer 64). Differences in exigence and audience from traditional scientific discourse change the constraints imposed upon environmental discourse written by scientists. However, the context of public disagreement between experts plays a significant factor in how non-expert audiences read expert discourse and, eventually, reach conclusions regarding what will be done to satisfy the exigency that gave rise to that discourse. Of primary interest to this study is how scientists’ use these constraints to shape not only their discourse but also the conditions in which the public policy decision will be made. Consequently, I seek to understand how scientists create public discourse evaluating the status quo to achieve their deliberative purpose of regulating civic activity.

**Investigating the Epideictic and Deliberative Functions of Science in Environmental Discourse**

Because it is situated in public contexts and connected to issues of public policy, environmental discourse expresses the judicial and the political through what is scientific and civic. Based on the existing literature, there are few rhetoricians studying environmental
discourse to discover both the *epideictic* and the *deliberative* elements of scientific knowledge as it functions outside of the laboratory. Whereas previous scholarship in the rhetoric and sociology of science (e.g., Bazerman’s *Shaping* and Latour’s *Laboratory Life*, respectively) has generally focused on the development of discourse, knowledge, and identity of science within its specialized community, the field of environmental discourse offers a broader context in which to study the effects of popularized scientific testimony in the (re)mediation of environmental concerns through public policy. Revising Herndl and Brown’s rhetorical triangle to focus on the function of scientific testimony in environmental discourse, Figure 2-2 demonstrates the rhetorical appeals made in the public discourse of scientists within the context of environmental controversy.

![Figure 2-2: Revised Rhetorical Triangle Focusing on Function of Scientific Testimony in Environmental Discourse](image)

Although the conceptual paradigm for investigating environmental discourse is still developing its parameters, within contexts of contention, Figure 2-2 provides a new perspective for researchers to explore how science is rhetorically used to make public policy.
decisions about the environment. However, one feature that is not revealed about the functions and appeals of scientists’ discourse created to influence public policy during environmental conflict is how it capitalizes on the constraints that exist not only in popular public contexts but also those that occur within the specialized scientific community. In such a scenario, it is possible that scientific testimony shared with the general public in environmental discourse carries with it the “beliefs, attitudes, documents, facts, traditions, images, interests, motives” that typically accompany the specialized discourse of science created by and for scientists. In other words, as evidenced in the Nunavut-Ames controversy, a scientist may accommodate his discourse for non-expert audiences while simultaneously holding his scientist-adversary to discourse standards as if it were intended for expert audiences. Without critical awareness, most non-expert audience members may not recognize the confluence of these two contexts and the problems that could result from using standards in one situation and applying them to another.

When I first studied the reports written by Commoner and Brown, I was immediately struck by their choice of genre and the rhetorical situation in which their discourse was published. I was puzzled by the “social action” each scientist was trying to achieve through his use of the scientific report genre within a civic context and a non-expert audience rather than a professional context and expert audience. My initial analysis of genre created more questions about the value of scientific knowledge to resolving the conflict; focusing on genre alone did not explain how one report succeeded where the other failed. I recognized that analysis of the context surrounding these scientific reports would reveal greater perspicuity concerning the relationships among the scientists, their scientific testimony, the accusation, the two regions implicated in the controversy, the non-expert audience, etc.
Therefore, to answer my research question, I have focused my study on understanding how “scientific” elements work within and between the constraints of professional and civic contexts. Accordingly, I have chosen to look at three categories of rhetorical elements employed in scientists’ discourse: (1) choices in genre and delivery, (2) frames built with scientific information to communicate non-scientific, societal values, and (3) the power to construct the identity and image of authors, audiences, and other players. Together, these rhetorical elements will allow us to better understand how both the epideictic and deliberative functions of the scientific in environmental discourse enable or prevent social action from occurring within a particular rhetorical situation.

**Rhetorical Science: Managing the Message of Environmental Discourse to Shape Public Policy**

At the core of this study is the warrant that science (like any other system of knowledge) has a rhetorical effect on its audience; science itself is a civic discourse. Whether it is spoken or written, scientific utterances influence cultural thought and behavior. The context in which those utterances are made, however, greatly affects what the speaker/writer can say and how she will say or write it.

Readers of environmental discourse have assumptions and expectations not only of the scientific information that they encounter but also of the writers, particularly scientists, who report that information. Though these scientist-writers may not consciously adopt effective genres, purposely construct convincing frames, or strategically redirect the argument from the issue at hand toward the character of the opposition, they are equal members of the shared, larger public forum who employ common rhetorical practices in their discourse. Being a scientist does not make one’s discourse arhetorical; though we may
assume that her scientific activity was conducted objectively according to some sort of scientific method, it is naive to apply that same assumption to her discourse. This is especially true when the results and interpretations of that scientific activity, communicated in her discourse for a general audience, will impact public policy outcomes.

I have chosen to use these rhetorical elements of discourse—genre, delivery, frames, values, ethos, identity/image—in my analysis because of the striking similarities and differences found between the two primary artifacts (scientific reports) written during the controversy surrounding the research site. The reports in this case study bookend the conflict—one opened the debate while the other ended it. Analyzing the use of these rhetorical elements in the two reports provided some insight into how discourse participates in the creation and resolution of an environmental controversy. Although all of the elements are interconnected in the construction and reception of these two reports, I paired terms that shared a direct and dynamic expression of a significant rhetorical effect: genre and delivery, frames and values, ethos and identity/image. As demonstrated in the sections below, the scholarship in rhetoric and public discourse confirm the strong relationship between each paired term. In the subsequent chapters, I show how a paired rhetorical element relates and interacts with other pairs.

**Genre and Delivery**

As previously stated, the ultimate goal of environmental discourse is to initiate, maintain, revise, or repeal public policy that regulates civic and private practice in regards to its impact upon the environment. Empirical research and scientific testimony used in a scientist’s discourse must demonstrate both the presence of a problem (either in the status
quo or in the opposition’s position against the status quo) and a recommendation for specific action regarding public policy in relation to the problem. Likewise, the presentation of this information must appear “scientific” for its public audience. More than a stylistic preference, this purposeful structuring of discourse through the use of the proper genre—in this case, a scientific report—is a crucial element for the scientists’ intended pragmatic social actions to occur through their policy recommendations (Miller, “Rhetorical Community” 72). Using the appropriate genre in an effective manner, then, completes multiple tasks. For instance, using a scientific report enabled Commoner to critique the current policy and practice of the top-ten polluters as well as to recommend new policy for the near future.

It would seem to follow that the ability of a report to advocate, or resist, social change is, in part, contingent upon the author’s use of rhetoric. “Social order, continuity, and significance,” Miller writes, “are effects of structuration. . . . Rhetoric provides powerful structurational resources [such as metaphor, narrative, and genre] for maintaining (or shoring up) social order, continuity and significance” (75). She explains, however, that metaphors and narrative are strictly structural devices that require a focus and purpose for their use; on their own, they lack a pragmatic application. Because of its “pragmatic power as social action” (75), genre provides an additional structural capacity that metaphor and narrative cannot, namely a “conventionalized and highly intricate” application appropriate for these devices to be used in the particular situation in which the genre will be presented (75).

The report genre advocating social change, then, tells the public audience that the author is working within the bounds of appropriate action—maintaining the expected social order—through the use of a recognized structure for scientific discourse. However, the genre achieves pragmatic social action beyond its presentation of “scientific” claims (supported
with evidence derived from scientific activity) by logically linking those claims (and its accompanying evidence) to a specific course of action that will enable civic leaders and citizens to resolve the exigency addressed in the report. Thus, any public policy advocated in a scientific report within an environmental controversy is partially contingent upon the evidence gathered from scientific activity, which guards against claims that the advocated action is itself an indicator of the writer’s bias toward a certain result. Expert discourse from scientific reports informs and enables public action—continued dialogue and evidence gathering on the issue at hand—but it does not guarantee that the desired outcome will occur. Without such discourse, however, any action to promote change is unlikely. Thus, scientific reports advocating policy are not subordinate to scientific evidence; rather, they are logically reasoned from knowledge gathered from both scientific and social (or civic) spheres.

Perhaps the most important consideration of whether or not a scientific report will be successful in promoting or resisting social change rests in how authors deliver their report to the public. In this sense of the term, delivery, as a rhetorical device, extends past the simple conception that the presentation or publication of the report is a fixed and finite, one-time event. Rather, delivery is conceived as a fluid occasion, linked to other discourse events that collectively work toward enacting or denying change.

Within the area of environmental discourse, Carolyn Rude writes that the scientific report, in its relation to helping decision makers determine policy, functions not as a solitary juggernaut of transformative information that forces, or buries efforts toward, change but as a component that inspires incremental action and perpetuates momentum toward it. The report genre is important to the achievement of change, but its value in attaining its desired, deliberative social action transcends its content; the report is not the end product that makes
change occur but a catalyst that influences and supports an ongoing effort. “The formal qualities of the genres [of technical communication documents] are less an end in themselves than a means of enabling and encouraging their use. This is the social action concept of genre that Carolyn Miller articulated” (Rude, “Toward” 284). Therefore, the forensic requirement of a scientific report must be present for the deliberative strategy to have an effect; without the deliberative quality, however, the report would not achieve its advocacy goal for its target audience.

An expanded definition of delivery that takes the focus off the report exclusively and situates the document within a context that includes a host of discourse events linked across time denies the privileging of not only the scientific report but its scientific content as well. By adopting this notion of delivery, we recognize the other players and powers that operate in the mediation of public policy disputes. Likewise, contextualizing the report within a larger, cooperative mission allow us to better locate the socio-cognitive elements at work within the arguments created within the report genre itself as well as between the report artifacts created in a particular conflict. Additionally, such a perspective permits the researcher to speculate on how these reports achieve, or fail to reach, their goal—their desired social action of aiding or obstructing change to take place.

Viewed in this context, we see how the genre of the scientific report and the manner in which it is delivered to public audiences creates a “rhetorical science” in which scientific knowledge, through discourse, develops a broad cultural significance for, and application toward, resolving global issues. If we assume that environmental controversies are basically publicly expressed problems concerning our relationship with the physical world, we will require scientific knowledge—knowledge about what the physical world is and how it
works—to help us understand what we should do to resolve those controversies, what policies we could adopt or maintain to promote a healthier relationship with the environment. The rise in environmental awareness in public discourse over the past forty years demonstrates that this conversation is quite extensive and that similar artifacts exist in a multitude of areas and locations. Using a rhetorical lens that focuses on how that information is structured and presented allows us to discover what these public audiences, particularly non-expert decision-makers, find persuasive and valuable.

**Framing and Values**

In the introduction of his book on *Frame Analysis*, Erving Goffman begins with a fundamental question that every cultural observer faces when trying to understand an event. “‘What is it that’s going on here?’ Whether asked explicitly, as in times of confusion and doubt, or tacitly, during occasions of usual certitude, the question is put and the answer to it is presumed by the way the individuals then proceed to get on with the affairs at hand” (8, emphasis mine). Whether asked informally by the concerned citizen who reads in the newspaper about the latest local controversy, or in a more formal situation by an inquisitive academic investigator who studies the controversy well past its resolution, our answers to this common question are indeed presumptions, based upon our relationship to and understanding of how the world works. Linguists and rhetoricians commonly refer to one’s worldview—an individual’s answer that explains, “What it is that’s going on here”—as a frame.

Although the concept of “framing” an issue or event has been well known in academic circles for many years, it has recently received a fair amount of public attention in terms of motivating the citizenry to support progressive political candidates and public policy
reforms. One scholar who has written extensively about the power of framing when discussing issues within a debate or controversy is the linguist George Lakoff. Building from Goffman’s description of them as a “presumed answer,” Lakoff defines frames as mental structures that shape the way we see the world. As a result, they shape the goals we seek, the plans we make, the way we act, and what counts as a good or bad outcome of our actions. In politics our frames shape our social policies and the institutions we form to carry out policies. To change our frames is to change all of this. Reframing is social change. (Don’t Think xv)

A central tenet to Lakoff’s argument that frames are important for progressives engaged in struggles of social and public policy is that conservative politicians and supporters have dedicated themselves over the past 40 years to studying and successfully implementing new frames into their public discourse.

Lakoff explains that frames are mental structures within the brain that are expressed unconsciously but purposefully in two ways. First, we experience the presence of frames through our reaction to outcomes and consequences to everyday events. Recognizing outcomes as being “good” or “bad” is an outcome itself of a mental framework. The second manifestation of frames is through language. “All words are defined relative to conceptual frames. When you hear a word, its frame (or collection of frames) is activated in your brain” (xv). One of the most effective techniques to establish a frame is through the careful use of metaphors and “concrete” words because they quickly elicit particular visual images in the mind.

However, though language is required for a frame to be expressed, frames are not language themselves. Drawing from a rhetorical understanding of the function of language, Lakoff states “Framing is about getting language that fits your worldview. It is not just language. The ideas are primary—and the language carries those ideas, evokes those ideas”
(4). Expressed more succinctly, “Framing is about moral values and systems of ideas primarily, and secondarily about the language used to express those values and ideas” (“Framing”).

Both the report genre and the manner in which it is delivered within an environmental conflict are closely tied to establishing frames and communicating values. Rude writes, “Reports are necessary for framing the issues and presenting the information that persuade decision makers. They also confirm that one excellent argument well presented may be just a piece of a strategy” (“Toward” 272). In this study, I investigate how frames are created through the genre, delivery, and argumentation strategies used in scientists’ discourse in order to express certain values that structure thought and evoke ideas of identity and image of science and scientists as much as they do scientific knowledge and reasoning.

Essentially, for Commoner and other environmental activists and advocates who challenge the status quo to bring about social change, they must be skilled, as Lakoff states above, at reframing the issue they want reformed. Conversely, for Brown and other city officials to maintain the status quo, they must both restore original frames about what counts as community knowledge as well as create new frames that call into question Commoner’s explanation of what is going on in Ames and at its power plant by critiquing his scientific practice and political behavior during the controversy.

**Ethos and Identity/Image**

Kenneth Burke writes that rhetoric gains much of its power by uniting people through the process of identification, but he acknowledges that rhetoric also has the power to separate people through a process of division. A rhetoric of division is not necessarily a negative
outcome of discourse. We are able to distinguish between similar people, objects, and ideas based on their differences. Locating and isolating differing features and characteristics provides individuals and groups with conscious (and sometime unconscious) definitions or understanding of what those people, objects, and ideas are. Such definitions, when formed for (and often by) the “self,” are said to be an identity—the persona individuals or organizations have of themselves. Conversely, image is how others perceive those individuals or organizations. Brent Faber associates the ability to control how others perceive one’s self or organization as power.

Power can be seen . . . as the self-reflexive ability to control an image. . . . [P]ower resides in people’s ability to control the ways in which they, and others, are perceived across social structures and times. Thus, a powerful organization is able to shape the identities of consumers, clients, and competitors in ways that are beneficial to itself. (142)

Faber argues that conflict between those that seek change and those that resist it are engaged in strategic campaigns to wrest power from one another. “The concept of image-power reemphasizes the political nature of social change. It argues that issues of change and resistance should not be seen as natural or normal phenomena but rather as strategic movements of power, social interest, and control” (142, emphasis mine). One of the crucial features in environmental discourse, then, is the ability of both challengers and defenders of the status quo to control the identity/image of their adversary and the adversary’s message.

When a culture faces claims discordant with its established epistemology, policy, and practice, the status quo—or orthodoxy—defends itself against the perceived threat. Sullivan argues that one way a scientific culture protects itself from counterclaims is by restricting or silencing the speech of those who advocate new knowledge, policy, and practices for the culture by practicing “forum control,” which is a “process of authorizing or de-authorizing
speakers, writers, texts, or speeches” (“Keeping” 128). Sullivan identifies two activities that are publicly performed. These two public acts—correction and ridicule—“attempt to forestall future unauthorized speech” (128). Studying how scientists employ correction and ridicule in their public discourse provides a better understanding of how the genre of a scientifically informed report for influencing public policy frames not only the key issues involved in contests of image-power but the credibility and public persona of people, places, and things as well. Sullivan states that the correction of an opposing scientist usually appears in two forms: reprimand and censure. Whereas “reprimand is a mild form of correction, the formal censure of a colleague is far more severe . . . [serving as] an attempt to silence deviant insiders” (135-6). The practice of censure is a veiled type of ad hominem attack—shrouded or cloaked in a sanctioned or specialized vernacular, casting the impression of fair, scientifically objective, and justified criticism, especially when communicated through the “objective” genre of scientific reports.

Within the context of public policy debates, scientists are required to modify forum control techniques such as reprimand and censure when delivering discourse to the embedded, observing, non-expert audience. In cases where there is disagreement about scientific data and interpretations regarding an environmental concern, scientists’ discourse must make firm distinctions between what is science and what is not in order to be successful. Consequently, if the supposedly scientific activities—methods, process, data, interpretations, or recommendations—documented in a report are evaluated as not science, the writer’s identity, or ethos, is significantly damaged. It logically follows, then, that if the practice is not scientific, the writer isn’t a scientist. From a Scientific perspective, the implication for discourse not being scientific (and not written by a scientist) is that the
discourse is not “true.” Therefore, if a scientist is able to create a negative identity for the rival scientist that decision-makers can see, she may be able to establish the absence of value in an opposing scientist’s report to making a claim for, or against, social change.

**Rhetorically Achieving Epideictic and Deliberative Functions in Environmental Discourse by Establishing Agency as Identity**

Attacking both the legitimacy of a claim as well as the integrity of the person making that claim demonstrates a separation—a boundary—between what appears to be true and false. Thomas Gieryn states that the need for competing scientists to create this sort of separation—an act which he calls “boundary-work”—comes from “the ‘problem of demarcation’: how to identify unique and essential characteristics of science that distinguish it from other kinds of intellectual activities” (“Boundary-Work” 781). This definition contextually presumes that a contrary scientific claim which threatens the status quo is not the result of scientific pursuit but, rather, from spurious activity. The argument shifts from the merits of the challenging claim to a determination of whether the activity from which the claim was borne was based in science, or, rather Science. The act of demarcation—drawing boundaries—is a way of creating contrast, highlighting differences between activities that are legitimate and sanctioned and those that are not.

There is inherently a value judgment implied in branding an activity as being “other”—as not being science. Such a negative representation, when done for the purpose of persuading decision-maker audiences to disregard recommendations from opposing scientist, then, is a calculated and rhetorical act. As Gieryn writes, “boundary-work is analyzed as a rhetorical style common in ‘public science’ . . . in which scientists describe science for the public and its political authorities” (782). When the discourse of Science is targeted to a
mass audience, scientists censure their peers by employing different rhetorical strategies than they would in, say, a scientific journal because the rhetorical situation has changed. As will be demonstrated in this dissertation, the boundary-work of a scientist defending a city’s current policy is meant to discredit the challenging scientist’s practice and knowledge of science with the intention of defending not professional autonomy (which may be the case in a journal article) but, rather, the civic entity’s autonomy to make the decision. In other words, boundary-work re-establishes the city’s image-power.

Consequently, boundary-work is attractive to the general public because it establishes a familiar and fundamental “logic” that has more to do with recognizing the image of the challenging scientist than an understanding of his scientific claim. Like Sullivan’s definitions of censure and reprimand, boundary-work may feature a personal, ad hominem-style attack that undermines the challenger’s right to call himself a “scientist.” Merely questioning the nature of what the status-quo challenger does casts doubt on the veracity of his work, shifting the focus from an evaluation of the claim to a definition of the work itself. That is, for a scientist to discredit a scientific claim, she only has to question whether the activity that gave rise to the claim is even scientific. The attack culturally reinforces the authority of Science to speak against, and lay judgment upon, contrary claims made through scientific inquiry. Such an approach, Miller writes, shows that boundary-work is often not scientific but rhetorical,

address[ing] the authority and legitimacy of those who make heretical statements, by calling into question their motives or competence. These strategies usually appear in non-technical forums and often depart from scientific decorum—the tone is more clearly adversarial and sometimes quite personal. Notably, in these more public forums the boundary being defended is not that of a particular scientific discipline but that of science itself. (“Novelty” 490)
For example, the scientist advocating a change in public policy may be depicted as a misguided individual engaged in folly, functioning, according to Gieryn, as a sort of literary foil whose purpose is to contrast what science is and what it is not (“Boundary-Work” 791). Taken further, the unreasonable advocate could be equated as the “villain” who began the controversy, the “enemy” of the community, the status quo, and Science itself. In this sense, the scientist defending the status quo conducts boundary-work that silences the challenging scientist, casting him as an individual who not only lacks credibility but also means to harm the audience’s community. The public recognizes this good guy/bad guy dichotomy and identifies with whomever they associate with “goodness,” which fulfills the epideictic function of boundary-work.

As is often the case, the image of the disparaged scientist constructs an unfavorable frame for the audience, making it less likely for the general public to value not only the scientist but his science and recommendations as well. This frame guides the audience to a particular understanding of what’s going on: an advocate is acting in the role of a scientist, using suspect evidence to support spurious claims for changing the status quo. The deliberative function of boundary-work, then, is to end the debate by ending inquiry on the contested subject. Using this new, unfavorable identity of the advocating scientist as evidence to reject the heretic, the audience is offered as a new and familiar narrative structure—a new frame—about what counts as the truth. But boundary-work does not explain how non-expert decision-makers in an environmental controversy ultimately satisfy the exigency that gave rise to the situation. If we recognize from a scientist’s boundary-work that an adversary is not a practicing scientist, what is it that eventually influences the non-scientist to act?
By identifying the presence of individual identity at the intersection of knowledge and power, Carolan and Bell help fill in gaps between Faber’s image-power, Sullivan’s forum control, and Gieryn’s boundary-work. Identity constructed through the social affiliation of knowledge, they argue, is the impetus that causes change to occur.

Knowledge creates social affiliation, as well as social disaffiliations. The relations of knowledge identities constitute us as we constitute them. Thus, who we are depends on what we know, and who we know depends on what we are. Knowledge and identity therefore connect as knowledge/identity just as power and knowledge connect as power/knowledge.

What is missing is agency, of course—but not agency in the sense of final cause. . . . Rather, we mean agency as identity—as movers who are simultaneously constituted by that which they move and constitute. . . . All social action is dependent, contextual, recursive. (229, emphasis mine)

Carolan and Bell introduce a sociological perspective on the influence of expert knowledge on non-experts. However, what they lack is a discussion of how expert discourse rhetorically functions to create social affiliation and disaffiliation and, eventually, build agency as identity.

One explanation that my study of the Nunavut-Ames controversy investigates is how frames manufacture knowledge and identity—communicating worldviews and understanding through ideas that appear “true” to the non-expert audience. Lakoff’s discussion of values helps flesh out the concept of agency as identity. “People don’t necessarily vote in their self-interest. They vote their identity. They vote their values. They vote for who they identify with” (Don’t Think 19). Values expressed through epideictic discourse, then, precede the deliberative discourse of policy. The values embedded within a scientist’s argument give meaning to the evidence he provides in the forensic discourse of his scientific report; both
values and facts then support the claims, or recommendations, made by the scientist for a particular public policy.

However, to provide the impetus for a reader to pursue one recommended policy—to convince decision-makers to believe one recommendation over another—a scientist must establish a shared identity between himself and his audience. As previously discussed, Burke states that discourse establishing shared identity also establishes division. Therefore, in environmental debates where there are conflicting recommendations with discordant scientific evidence, the successful scientist-writer will exercise power both to create a positive identity that links himself to his audience and to project a negative image repelling his audience from accepting recommendations made, and evidence provided, by his adversary. If we believe those with whom we identify, we will doubt those that are perceived as “other.” And where there is identification, there is trust. Because we recognize common values and worldviews with people we trust, we accept as the truth their explanation of “what it is that’s going on here.” With this frame rhetorically established through discourse, we then know how to act in the resolution of environmental controversy.

It is my contention that, working from a local and specifically situated context, Robert Brown was better able to construct this agency of identity for the city council of Ames than Barry Commoner whose position was global and generalized. Using the three groups of paired rhetorical elements previously mentioned, Chapters 3 and 5 analyze how each scientist attempted to create an agency as identity—which I refer to later as rhetorical energy—that would persuade the ACC to act accordingly to the facts and values presented through the discourse of their respective scientific reports. Chapter 4 will establish both the context of Brown’s response as well as the probable source of the values he employed in his
report that would provide him with the necessary rhetorical energy that eventually convinced the Council to vote against testing their municipal power plant.
Chapter 3

Webs of Activity and Discourse: Delivering Values about Science, Ethics, and Advocacy in the Commoner Report

In the previous chapter, I defined “environmental discourse” through its unique rhetorical situation: environmental discourse addresses an exigency to resolve an environmental problem usually through public policy, is written by experts for a non-expert audience of decision-makers and citizens, and operates and creates constraints related to the scientific community as well as the general public. As a particular and situated discursive practice aimed at solving a specific problem in a complex, public-knowledge network, environmental discourse has, perhaps, more pronounced differences in its immediate social impact than traditional scientific discourse confined to, and within, the scientific community. Using the three categories of rhetorical elements introduced in Chapter 2—genre and delivery, frames and values, and identity and image construction—I demonstrate how both the epideictic and deliberative functions of the “scientific” in environmental discourse invite social action within a particular rhetorical situation.

Accordingly, as the goal of Chapter 3, I situate the report written by Dr. Barry Commoner (along with its accompanying documents) as an example of environmental discourse that rhetorically performs epideictic and deliberative functions for the purpose of influencing public policy in the ten locations accused of depositing dioxin in Nunavut, Canada. My thesis is that it takes more than just scientific evidence, contained in a scientific report, to persuade a non-expert audience to change public policy. On the contrary, as I will show through the artifacts produced during the campaign against the top-ten suspected
facilities, scientific reports that seek social change in the status quo strategically use forensic evidence to elicit epideictic and deliberative functions that are often muted in traditional scientific discourse. The epideictic and deliberative functions of Commoner’s report establishes exigency, communicates advocacy values, and presents viable and logical courses of action for non-expert audiences to take for policy change to occur. Drawing from the work of Carolyn Rude, I will show that a scientific report written to change environmental policy differs from traditional scientific reports by inviting others to build upon its results and recommendations, adding to a “web of discourse” that is intended to propagate a wave of continued advocacy action.

To set the scene, I begin this chapter by introducing and coordinating the three primary artifacts beginning the controversy that guide, but do not determine, Commoner’s campaign to influence national and local policy throughout the North American continent in regards to the dioxin being deposited in Nunavut, Canada. Next, I investigate the effects of shifting, in general, the context and audience of scientific reports from expert to non-expert situations and how such a shift complicates the epideictic and deliberative functions of such discourse. To illustrate how these two functions of environmental discourse were exhibited in Commoner’s discourse during the Nunavut-Ames controversy, I adapt Rude’s six characteristics of scientific reports for policy-making as a heuristic.\textsuperscript{13} Locating the presence or absence of the six characteristics in the report written by Commoner concretely differentiates it (and other types of environmental discourse for that matter) from traditional

\textsuperscript{13} I recognize that this is a somewhat mechanical analysis that potentially privileges a “universal” type of discourse. To avoid a rigid application of Rude’s six characteristics to the Commoner Report, I demonstrate that, though there are important similarities, the reports that Rude uses to compile these characteristics have small but significant differences compared to the Commoner Report.
scientific reports. Additionally, while these six characteristics identify the pronounced epideictic and deliberative qualities of environmental discourse, they also demonstrate how such discourse contextualizes forensic evidence to make sense of problems and offer solutions that its targeted audience cares about.

Working from a delivery-centered perspective that shifts the analytic focus from the scientific report to the context of the controversy in which it was created, I concentrate on the two separate but related rhetorical situations of the Nunavut-Ames controversy: a specific and local rhetorical situation for the Inuit as well as a general and global rhetorical situation for the ten facilities implicated in Commoner’s study. Using a delivery-centered perspective positions the report written by Commoner as a civic discourse that invites others to take action and create discourse—creating an “advocacy web”—that will cause one of the recommended strategies to eventually become public policy.

The chapter concludes with George Lakoff’s work on the use of conceptual frames to communicate values embedded in the arguments, policies, and actions advocated in civic discourse. Using epideictic rhetoric to construct “advocacy frames,” Commoner cements the link between forensic evidence from his study to a particular deliberative policy by (1) establishing a simple concept of agency from a causal relationship between the scientifically identified problem and his proposed public policy solution, and (2) developing an identity for his audience using a value-based definition of advocacy as well as ethical warrants meant to influence citizen participation in the policy process. Taken together, Commoner’s construction of an agency as identity is intended to satisfy both of the exigencies—occurring in both distant as well as local contexts—previously developed in Commoner’s coordinated artifacts.
Coordinating Artifacts: The Commoner Report and Its Linked Documents

Written by well-known biologist and ecologist Barry Commoner and his research staff, the one-hundred-page “Commoner Report” looks like a traditional scientific report typically written to present the results from scientific activity or experiment. As co-founder of the Center for the Biology of Natural Systems and the lead scientist commissioned by the North American Commission on Environmental Cooperation (NACEC) to conduct the study, Commoner is a central figure within my investigation. First, he is the spokesperson for both the Center for the Biology of Natural Systems and the study itself, formally presenting the results of the dioxin project to the public during the press conference sponsored by NACEC on October 3, 2000. Second, he informally serves (perhaps by default) as spokesperson and advocate for the Inuit, demonstrated by, among other things, his lecture in Ames on November 15, 2000. Finally, known as the “Paul Revere of Ecology,” he is a nationally recognized and reputable scientist in matters concerning the environment. Identified by the media as the expert scientist accusing Ames as being one of the top sources of dioxin deposition, he serves as the foil to Dr. Robert Brown—the scientist who wrote a report on behalf of the city of Ames that refuted Commoner’s claims.

The official title of this document is “Long-range Air Transport of Dioxin from North American Sources to Ecologically Vulnerable Receptors in Nunavut, Arctic Canada” and authorship is credited to three other writers in addition to Commoner. Though I use the formal title and the entire list of authors to identify this document and in the Works Cited, I will use “Commoner Report” in both text and parenthetical citations. Similarly, I will use “Executive Summary” to refer to the independently published and joint-authored executive summary. For brevity, I refer to the document primarily authored by Paul Miller as the “Backgrounder,” which is the term that NACEC Publications Manager Jeffery Stoub used.
At the time of its release by NACEC on October 3, 2000, the Commoner Report was accompanied by two separate yet connected documents.\footnote{As of February 2006, each of these documents was still available for download from the NACEC Website as PDF files.} The first related document was the eight-page “Executive Summary”—a nearly exact version of the executive summary section included in the Commoner Report but “laid out to make it easier to digest for some,” including visuals from the body of the report (Stoub). The second accompanying document, entitled “Tracking Dioxins: NACEC Study Tracks Dioxins from Canada, Mexico and the United States to the Arctic,” was “intended to pull together highlights from the report in a four-page, folded hand-out destined mainly for journalists” (Stoub). Although it does not use any of the same phrasing as the Commoner Report or the Executive Summary—and is clearly written for a non-expert audience—the basic language, message, organization, and purpose of the “Backgrounder” appear consistent with the other two documents.\footnote{The “Backgrounder” was also published on the NACEC Website in the inaugural issue of its online magazine \textit{Trio}. The online publication included biographical information about Commoner and Paul Miller, the author of the article, as well as a list of “Related Web Sources,” featuring links to other NACEC articles, publications, committee home pages, and Websites for Center for the Biology of Natural Systems, National Oceanic & Atmospheric Administration, and the United States Environmental Protection Agency.}

Literal authorship of the Report and the Executive Summary is officially attributed to the staff at the Center for the Biology of Natural Systems —Commoner, Paul Woods Bartlett, Holger Eisl, and Kimberly Couchot; the Backgrounder was written by Dr. Paul Miller for NACEC’s Department of Publications.\footnote{According to the \textit{Trio} Webpage featuring his article, Dr. Miller earned a Ph.D. in chemical physics and a J.D. in law. Dr. Miller’s training as a scientist may explain why the language and organization of the Backgrounder are similar to the language and organization used in the Executive Summary.} When analyzing these artifacts, the Commoner Report, Executive Summary, and the Backgrounder will be treated as separate but linked
documents. To set the scene for the Commoner Report, the next section provides background history concerning the identity of NACEC and the impetus for Commoner’s study of dioxin deposition in Nunavut.

A Brief History of NACEC and the Exigency for Commissioning the Commoner Study

Formed with its sister committee—the Border Environmental Cooperation Committee—as part of the North American Agreement on Environmental Cooperation, the Montreal-based Commission on Environmental Cooperation is an international organization created by Canada, Mexico and the United States... established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law. The Agreement complements the environmental provisions of the North American Free Trade Agreement (NAFTA). (Switzer and Bryner 204)

According to Jacqueline Vaughn Switzer and Gary Bryner, the ultimate purpose of these committees is to “monitor the environmental conditions affected by increased trade” through NAFTA (204). Despite their intended missions to focus on environmental concerns, the major shortcoming of these committees, as well as North American Agreement on Environmental Cooperation itself, is the lack of authority its committees have in mandating policy changes, let alone altering the national ideology of the three North American countries in regards to the environment. “[T]here is little recognition of the importance of internalizing environmental costs... without further compromising environmental quality and natural resources” (204). Regardless of its lack of authority to direct national policy, NACEC turned its sights toward Canada to investigate the effects of continental pollution.

Prior to Commoner’s study, the Commission endorsed a yearlong study (1996-97) of dioxin levels in the animals hunted by the indigenous Inuit at sixteen locations within
Nunavut, Canada—an area inhabited primarily by the Inuit that eventually became an officially recognized Canadian territory in April 1999. These sixteen receptor sites included both marine and land locations where the Inuit catch a variety of fish and hunt seal and caribou as their primary sources of food. Analysis of Inuit food sources, including mothers’ breast milk, revealed dioxin levels twice as high as those found in southern Canada. This finding was especially troubling because Inuit people engage in very few practices that produce dioxins. One possible explanation for these high levels was that incineration practices conducted south of Nunavut throughout the North American continent were responsible. According to this hypothesis, the mechanism by which these pollutants traveled from combustion sources to food supply receptor sites was via the “grasshopper effect,” which, according to Commoner, is a phenomenon that occurs “when dioxins settle into the ground, only to rise again [due to wind currents] and drift farther north—until, in the Arctic, they have nowhere else to go” (Grebe, “Dioxin Researcher” A4). Although it was important to confirm that the dioxins found in Nunavut originated outside of its territorial borders, in order to prevent continued deposition, the Inuit would have to know what and who was responsible for causing their food to become deadly.

**Building Strategy: The Presentation of Scientific Knowledge in the Commoner Report and Its Linked Documents**

Acting as a “response to the evidence” from the food-supply study (Executive Summary 1), NACEC authorized a study in 1999 to identify the top sources responsible for emitting and depositing these dioxins in Nunavut. Using meteorological data from the National Oceanic & Atmospheric Administration recorded over a one-year period (July 1996-July 1997), Barry Commoner and his Center for the Biology of Natural Systems staff
adapted the HYSPLIT (Hybrid Single-particle Lagrangian Integrated Trajectory) air transport model to trace the movement of dioxin across the North American continent. The NACEC project was designed to test the efficacy of the HYSPLIT computer-modeling program “as a means of ranking North American sources of airborne dioxin with respect to their contribution to the amount of airborne dioxin deposited on Nunavut receptors” (Executive Summary 1). The following figure, included in both the Commoner Report (4) and the Executive Summary (2), graphically demonstrates how the grasshopper effect works within the HYSPLIT air transport and deposition model.

Figure 3-1: HYSPLIT Air Transport and Deposition Model Taken from Executive Summary

18 The National Oceanic & Atmospheric Administration originally designed the HYSPLIT during the 1980s to track radioactive material released into the atmosphere from sites such as Chernobyl.
To test the ability of the model to rank the primary sources of dioxin deposition, the Center for the Biology of Natural Systems created an emissions inventory of 44,091 waste-burning sites on the North American continent coinciding with the same one-year period of the food-supply study. This inventory information included, among other things, the source class (e.g., municipal waste incinerator, cement kiln, etc.) and the amount of material burned at each facility. Although the research team used emissions data from the United States Environmental Protection Agency (USEPA) to compile the inventory for sites in the United States, actual, empirically determined emissions data from each individual facility were not available. Therefore, the majority of data comprising the inventory was based upon categorical estimations—that is, average emissions rates were assumed for “105 standard (hypothetical) source points” (Commoner Report 3) and source class, using data derived from a limited amount of experimental research conducted at actual facilities.

One of the results of Commoner’s study was the confirmation of the previous assumption made in the first NACEC study about where the dioxin found in Inuit food sources came from. “The data generated by this project directly support the conclusion that the known occurrence of dioxin in Nunavut . . . is due to the deposition of airborne dioxin transported from distant sources” (Executive Summary 1). Using both the estimated emission rates from the inventory as well as the known amounts of dioxin deposited at receptor sites across the Nunavut territory from the food-source study, Commoner was able to recreate the journey of dioxins from emission to deposition (influenced by the wind and other climatological conditions as demonstrated in the HYSPLIT model) and determine from where the dioxins in the Arctic Circle had originated.
According to the coordinated documents used in the NACEC policy campaign, the scientific knowledge derived from the HYSPLIT model revealed not only the major contributors of dioxin to the Arctic ecosystem but it also informed two separate courses of action that the Inuit could choose from to protect their indigenous diet—a diet which, the reader is told, is transcendentally tied to their culture (Executive Summary 7). The first strategy was based on an analysis in which data from the model was collectively organized to determine the extent to which each country (Canada, the United States, Mexico) and source class (municipal waste incinerator, backyard burning, cement kiln, etc.) contributed toward total deposition amounts in Nunavut. Organizing and ranking deposition amounts in this matter enabled Commoner to recommend widespread remedial action as one strategy that the Inuit could pursue. A course of action based on unilateral remediation would seek to eliminate emissions from the worst source classes through policy enacted at an international level (treaties, accords, and agreements between countries) or at a national level (laws administered and enforced within a country). Although perhaps the most common strategy used to solve problems involving dangerous emissions from outside one’s borders because it promises the most significant reductions, the major drawback to the “regulatory approach” is that achieving projected reductions requires all facilities in a country defined as one of the

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19 Nationally, the greatest amount of dioxin deposited in Nunavut originated from the United States—between 70 to 82 percent (Executive Summary 4). Categorically, three source classes accounted for over 65 percent of the total dioxin emissions at the 16 receptor sites: municipal waste sites, backyard trash burning, and cement kilns that incinerate hazardous waste (Executive Summary 5). At the time of Commoner’s NACEC study, the Inuit had already proposed, with other countries, the United Nations Treaty on Persistent Organic Pollutants. The results from Commoner’s study were considered to be “relevant” to supporting the Treaty as well as to “provide a useful methodological infrastructure suitable to the international policies that the Treaty negotiations seek to develop” (Executive Summary 8).
targeted source classes to unilaterally adhere to the conditions outlined in an international treaty or national law. Additionally, it takes a great deal of time to negotiate the conditions of international or national policy; enforcement of such policy at either level is also a concern.

However, because of the power of the HYSPLIT model to rank deposition amounts from each individual source represented in the inventory, Commoner was able to offer the Inuit a second, alternative course of action that avoided the problems typically encountered in global remediation measures. Rather than advocate for a particular policy that would require involving committees and legislative bodies, this second strategy recommended an approach in which the Inuit dealt directly with “the operators of a particular facility and/or the people of the local community” (Executive Summary 8). Due to its exclusivity, an individualized approach would hopefully produce more certain results for the Inuit in less time than a strategy focused on establishing a blanket remedial policy.

Of the top-ten worst individual contributors of dioxin to the Nunavut territory identified in the Commoner study, the first six were located in the eastern United States, three of which were defined as municipal waste incinerators. Classified in the study (but not by the USEPA) as an incinerator source type, the Commoner Report ranked the Ames Municipal Power Plant, located in the Midwestern town of Ames, IA, as contributing the largest amount of dioxin deposited in the Nunavut territory by an individual source.20

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20 The “municipal waste incinerator” source type is also known as a “municipal solid waste incinerator” or a “municipal waste combustor.” Ames, however, resisted all of these terms to describe their power plant. Rather, city officials declared that the Ames Municipal Power Plant was officially classified by the USEPA as a “co-fired” facility. In Chapters 4 and 5, I investigate the classification of the plant as a site of contention and how both the city and Dr.
Although one of the general advantages of the second strategy recommended by Commoner was that it as assumed that accused facilities were privately owned, thus avoiding the bureaucracy involved in changing public policy. However, this would not be the case with the power plant in Ames (or the other two waste incinerators, for that matter). Because it is a municipally owned and operated facility, any decision to close, alter, or even test the Ames Municipal Power Plant would require deliberations by the city’s council members, administrators, and electrical facility officials.

Prior to making an official response to Commoner’s claims against its power plant, the city of Ames received a collection of documents from the city of Harrisburg, PA—home of the municipal waste incinerator ranked as the second worst dioxin depositing facility on the North American continent. Although most of these documents appear to be created by NACEC with the intention of strategically introducing the Commoner Report and its linked documents, this material does not appear to be primarily intended for those facilities implicated in Commoner’s study. Rather, they seem to be geared toward media outlets in which these facilities are located. These documents are described in the following section to contextualize both the coordinated NACEC artifacts as well as Ames’ initial response to Commoner’s allegations.

**Ancillary Documents Created Prior to the Release of the Commoner Report and Its Linked Documents**

Early Wednesday morning, October 4, 2000, before the city of Ames scheduled its press conference addressing the allegations made by NACEC and Barry Commoner against Brown used this conflict in definition to make one of four counterclaims against Commoner’s accusation.
its power plant, Ames’ City Manager Bob Kindred received several phone calls from media sources asking “how he felt having the worst dioxin polluting facility in the nation” (Kindred, Personal interview). On the previous night, the Office of the Mayor had received a sixteen-page collection of faxed documents (which, during the press conference, Kindred referred to as a “press release”) from the city of Harrisburg. After reviewing the faxed material with electrical facility officials and consultants from Iowa State University (documents which augmented the two articles published that morning in *The Des Moines Register* revealing Ames as the top source of dioxin deposited in Nunavut, Canada), the city scheduled its press conference for later that afternoon (Beeman, “Ames Dioxin” and “Pollution”).

Although the specific contents of the “press release” were not revealed during the city’s press conference, the information they contained were important factors conditioning the city’s response. These documents included

- a one-page “media advisory” (dated September 26, 2000) issued by NACEC announcing that a press conference would be held October 3, 2000, featuring Barry Commoner, Inuit leader Shelia Watt Cloutier, and dioxin expert Dr. Michael McCally
- a six-page version of the Backgrounder, which was also published in the inaugural issue of the online magazine *Trio* on the NACEC Website (October 2000)
- a two-page press release from the city of Harrisburg, PA (who, again, was accused of being the second worst polluting facility), that boldly denied Commoner’s accusations, attacking both the validity of his data-gathering instrument and the probity of his motives for making such claims
• a seven-page “news release” (dated October 3, 2000) summarizing the findings of Commoner’s study, including a detailed data table ranking the Ames Municipal Power Plant at the top of the list of the ten worst dioxin depositors

According to the “news release” included in these faxed documents, the entire Commoner Report, along with the separately published Executive Summary and Backgrounder, were to be published on the NACEC Website on October 3, 2000. Ames city officials, however, were unable to retrieve the Commoner Report before their press conference. Kindred stated, “We’ve contacted them, and asked for a copy of their report that we could study. They referred us to the Website; we were unable to find that on the Website. So we’re still basically gathering ourselves” (“City of Ames Press Conference”). Without access to the Commoner Report, Ames officials appeared justifiably unprepared to adequately assess the validity of the accusation. It is unclear when city officials eventually collected the Commoner Report and its related documents, but it is more than likely that it occurred sometime before Commoner’s arrival in Ames on November 15, 2000, for his lecture at ISU about the impact of globalization on the environment. However, the inability to access these artifacts did not prevent Kindred from announcing during the October news conference that Commoner’s claim was merely a “rumor” and that his data were founded on “incorrect information” (“City of Ames Press Conference”).

Although these “press release” documents were important in NACEC’s transmittal of Commoner’s findings, as well as how the city of Ames initially addressed Commoner’s allegations against its power plant during their October press conference, I have not included these documents for close analysis. With the exception of the Trio news article, I am assuming that most of these NACEC documents were primarily written for, and released to,
the press. Therefore, as semi-public artifacts, the NACEC documents are included here as a small but important part of the web of discourse and activity connected to the Commoner Report. Primarily, these documents aid in understanding how the controversy unfolded and, thus, will not be analyzed in this study. Instead, the focus of this chapter is to look at the publicly released discourse created by Commoner that directly associated the results of the study with the policy that he and NACEC advocated.

The Epideictic Function of Scientific Knowledge in Discourse Written for Public Forums and Non-Expert Audiences

The Commoner Report and its coordinated publications represent authoritative and specialized discourse, founded upon scientific principles and methods, to make specific, scientifically sanctioned claims that the Ames Municipal Power Plant (and the other top-nine facilities) are likely to be responsible for depositing dioxin in the Arctic. However, because the conditions surrounding the publication of the Commoner Report seem to differ significantly from those of traditional scientific reports, a brief review of how such documents rhetorically function in a forum intended for a general public, rather than a specialized, audience follows.

Jeanne Fahnestock investigated how science magazine journalists present scientific results to public audiences, which differs significantly with scientific discourse written by scientists for specialized, private scientific audiences. Using Aristotle’s three species of rhetoric—forensic, epideictic, and deliberative functions—she categorizes scientific reports and journal articles as forensic discourse. Acknowledging its minor epideictic and

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21 However, in Chapter 4, I do contrast the Harrisburg press release condemning Commoner and his study to Ames’ response, namely Dr. Robert Brown’s report, which was released June 2001.
deliberative elements, Fahnestock casts the reports and journal articles written by scientists, for other scientists to read, as primarily forensic because they are “largely concerned with establishing the validity of the observations they report. . . . [M]uch of the relevance of scientific articles is . . . not spelled out in the discourse but supplied by context, by the assumed inferences the intended audience will make” (“Accommodating Science” 278). The two goals of these documents are to argue for a particular account of an event—that an experiment was performed and rendered the results as reported—and make a knowledge-claim about the subject under investigation. The meaning, or significance, of the document is “largely understood” by its audience—fellow experts in the scientific community (278). Though the report may announce the “facts” of the event, the interpretation of those facts—how the findings apply to the field in general—are not universally recognized until other scientists can verify them.

In contrast, Fahnestock identifies articles written by scientific journalists as epideictic because their primary purpose is to accommodate the findings announced in reports written by scientists using terms that non-experts can easily comprehend. When scientific reports are translated into laymen’s terms, public audiences are able to both appreciate the latest scientific activity as well as imagine its value and impact on their own lives. Rather than an invitation to other scientists to validate the results, these “scientific accommodations” read as a testament or celebration of the power of Science to uncover the mysteries of nature. Fahnestock states that these scientific accommodations

must usually be explicit in their claims about the value of the scientific discoveries they pass along. They cannot rely on the audience to recognize the significance of information. Thus the work of epideictic rhetoric in science journalism requires the adjustment of new information to an audience’s already held values and assumptions. (279, emphasis mine)
Fahnestock does not, however, consider the difference between journalistic accounts of current scientific activity and those depicted in standard science textbooks.

Whereas the information contained in, say, a recent edition of a high school chemistry textbook is long-established and recognized as reliable scientific knowledge, publicized accounts of recently performed scientific experiments reflect the process of forming new knowledge. A serious problem occurs, however, when this cutting-edge, yet-to-be validated “frontier science” is considered to possess the time-tested reliability of “textbook science” (Bauer 103). In other words, where scientists accept a published study as a process toward establishing disciplinary knowledge, public readers may be more likely to assume that publication of a study’s results confirms its reliability, objectivity, and certainty. The likelihood of the public audience jumping to this sort of conclusion is increased if they hold the assumption that results gathered by scientists, conducted through scientific experimentation, are absolute. As with any “translation” from specialized journal to mass medium, the public audience may be able to comprehend the reported topic and activity though they may receive less information about the significance or future uses of the topic in “real life”; in some cases, the scientific news account may lack discussion about how such knowledge will be used in society and what implications may result from its application. Potentially more detrimental are reports that purposefully delay discussions on societal implications by declaring that further study is needed.22

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22 This seems to be a popular tactic of the George W. Bush administration—most notably on the subject of global warming and greenhouse gases—when US officials present arguments that contradict the general consensus of international scientists as well as American experts. For instance, President Bush refused to sign the Kyoto Accord in 2001, stating a lack of scientific evidence to causally connect industrial emissions to global warming. Even though
Fahnestock’s portrayal of scientific accommodation is particularly relevant to what may occur in discourse in the general public sphere where scientific testimony is involved in contests over public policy. If journalists must, as Fahnestock claims, adjust “new information to an audience’s already held values and assumptions” (“Accommodating Science” 279), then we may conclude that the forensic function of scientific information originally derived and reported by a scientist to other scientists has changed because the rhetorical situation, particularly the targeted audience, has changed. Accordingly, if scientific knowledge is indeed accommodated by journalists through the incorporation of explicit, epideictic claims regarding the value of a scientific issue or event in order to appeal to or engage their interested but non-technical audience, is it possible that scientists writing for a public audience must likewise produce similarly epideictic discourse regarding the value of science? In the case of scientific reports that advocate change in environmental policy, such as the Commoner Report, what values do scientists epideictically accommodate for their non-expert audience and how do they “deliberatively” accomplish this accommodation in order to bring about that desired change?

It seems reasonable to assume that to successfully change public policy regarding environmental matters, scientists must interpret, or accommodate, for their non-expert audience the procedures they performed and the evidence they scientifically gathered regarding the subject in question by appealing to the audience’s already held values and assumptions. In such reports, the act of accommodation is a translation that establishes what science means to our daily lives.

the administration, through the USEPA, recognized in 2002 that industrial emissions were responsible for causing global warming, Bush still refused to sign the Accord because doing so would hurt American business interests (“Humans”).
Much like Fahnestock’s analysis of the work done by science journalists, Carolyn Rude writes that scientists from the Union of Concerned Scientists practiced a similar accommodation process when writing reports for non-expert audiences to support changes in national energy policy. “The factual material, gathered scientifically, is interpreted in terms of people and a way of life” (Rude, “Environmental Policy” 86). This statement complements Craig Waddell’s analysis of the role of pathos in the formation of scientific policy informed by the discourse of scientists. According to Waddell, the force of scientific knowledge (logos) on its own is not enough to bring about policy change; to achieve an intended purpose, a scientist must incorporate, among other things, appropriate emotional appeals (pathos) that make policy seem concrete, applicable, real (“Role” 382). In other words, scientists wishing to change current policy within a public forum must ultimately ascribe value to the action they endorse with something more than scientific results.

Reproducing “Patterned Notions of Others”: The Social Action of Science in the Scientific Report Genre

An obvious though significant characteristic of these reports used for policy-making is that they are recognized as scientific reports. Although Rude clearly demonstrates the distinct epideictic and deliberative functions of reports advocating a change in environmental policy, they are primarily recognized as documents that report scientific information gathered through a scientific process—that is, they still give the impression that this is a genre of only forensic discourse. For the general public, the content of such a document is an important and distinguishing feature, representing specialized, expert knowledge gathered from Scientific experiments. Just as important as the content, however, is the genre scientists use to present their findings. It follows, then, that the report genre defines the
relationship between the scientist and his audience as much as it establishes the relationship between the scientist and the documented activity and data surrounding the investigated situation. Again, to command this level of credibility, the document must project the image of Science.

Although the public may not understand all of the information, or the processes used to gather that information, they can relate to the activity of science and what a scientist’s role is in society by recognizing the genre he uses to communicate that information to his audience and the condition in which that genre is written and shared—a record of past scientific activity. Thus, in the environmental controversy over who is responsible for the dioxin deposited in Nunavut, the non-expert public audience recognizes and expects the expert author Commoner to produce appropriate documentation to communicate and support the conclusions of his scientific study. Miller writes that it is the need for the audience and writer to relate to each other that provides a specific mechanism by which individual communicative action and social system structure each other and interact with each other. The individual must reproduce patterned notions of others, institutional or social others, and the institution or society or culture must provide structures by which individuals can do this. The mutual, cultural knowledge that enables individual actors to communicate as competent participants includes structures of interaction, of exigence, or participant roles, and of other rules and resources. Genres... help do our rhetorical thinking for us. (“Rhetorical Community” 72, emphasis mine)

23 It is important to remember that the audience for the Commoner Report is an international, or “global,” audience, not just an audience located at (or near) one of the particular locations or facilities on the top-ten list. The Commoner Report does not focus on or single out Ames. As home to the worst dioxin depositing facility, Ames is only one of ten communities specifically targeted for remedial action policy directed at an individual (rather than an international or national) level. As will be demonstrated in Chapter 4, the differences in global and local audiences between the Commoner and Brown Reports have a profound effect on their efficacy to influence.
Although he was probably only implicitly aware of its rhetorical importance for the public, Commoner’s use of the scientific report genre contributed to his ability to engage his audience and draw attention to the issue at hand by replicating “patterned notions of others” that they would find familiar and convincing.

Even if most of the public audience does not read his report, Commoner gains credibility because there is a scientific report to be read; it exists. Commoner recognizes that even within this public forum, he would be unable to relate to either his peers or the non-expert decision-makers without a scientific report. In other words, the form of the scientific report itself signifies a substantive message to the reader about “our cultural life” (Miller, “Genre” 163). For some that message may be that we rely on Science to make informed decisions for us. However, Rude shows us in her study of reports written by the Union of Concerned Scientists that, unlike the traditional, academic, scientific report, a primary feature of the report for policy-making is its focus on stimulating communal activity as opposed to stifling it by demanding immediate policy now. It is the advocacy element of a scientific report (addressing a public exigency and promoting communal action), though, that may cause difficulty for some of its readers.

Whereas a public audience may not draw exception to an orientation to future action, Commoner’s expert-peers are likely to resist its presence, considering it a violation of both the participant’s role as a scientist as well as the private scientific community’s expectations of what a scientific report should do.\(^\text{24}\) Regardless of this resistance, the point of contention

\(^\text{24}\) I argue in Chapter 5 that part of Brown’s defense strategy is to claim that Commoner violates the scientific community’s expectations of what a scientific report should contain. It could be argued that, implicitly, Brown objects to the use of the scientific report genre to promote the social action of advocacy, regarding it as an unorthodox use of the genre, which,
that the public witnessed from the release and reaction to the Commoner Report (which Commoner’s adversarial, expert peers were forced to address) was that action had taken place (orthodox knowledge about the plant had been challenged and, thus, the plant’s image had changed) and that a call for future action was pending (orthodox practice of monitoring the plant was in danger of changing with the request for stack testing).

As previously explained, Commoner’s use of the traditional format from an academic scientific report was appropriate and necessary for presenting the results of his computer model. His document was an “experimental” report, which required Commoner to validate the model and defend its results; a traditional scientific report allowed him to perform those actions. The most considerable and recognizable difference between the reports written by Commoner and the Union of Concerned Scientists is that Commoner relates the experience (or episode) of testing the model to the exigency that it was meant to address. Validating the computer model is an important contextual element in the Commoner Report. Because the “project was designed to assess the efficacy of the HYSPLIT air transport model as a means of ranking North American sources of airborne dioxin” (Executive Summary 1), the validation process partially informs the impetus for Commoner to create a report.

However, neither the testing of the computer model nor the presentation of its results in a scientific report produces a full impetus to stimulate social change. To convince community advocates and area officials to overcome social inertia of the status quo and actively confront potentially problematic local activities and their global impacts, Commoner must establish the value of taking action. By linking social values and scientific evidence

ironically, Brown uses in an unorthodox manner himself to counteract Commoner’s accusation against the Ames Municipal Power Plant.
with common-sense public policy, Commoner will establish a logic course of responsible social action that satisfies the exigencies in both Nunavut and the specific sites suspected of dioxin deposition.25

**Accommodating Scientific Knowledge from Scientific Reports for Policy-Making through a Coordinated Delivery Strategy**

One way that scientists demonstrate value through scientific discourse is by articulating how their report relates to a desired outcome that will benefit society, namely the particular reader of a scientific report. Scientific knowledge makes sense to the general public when it is contextualized, telling us something about the world we (want to) live in. Rude claims scientists instill value in the advocated action toward corrective environmental policy by *not* casting their reports (or themselves) as the final word (or authority) on the matter at hand. Such reports are meant to encourage, stimulate, and support further action in order to achieve the policy change they advocate. “Although the scientific report as a genre records events of the past, the reports produced by the Union of Concerned Scientists are strategic instruments of future action and function in concert with other advocacy strategies. The reports are developed not only in the interest of sound science but also with an

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25 It is important to note here what may already be obvious: The Nunavut-Ames controversy is not a prima facie case. In addition to linking public policy action to social values, Commoner must present sufficient scientific evidence that a “real” problem exists. Richard Whately refers to this rhetorical condition as the “burden of proof” that a rhetor must offer to an audience before arguments about social change may be heard. “There is a Presumption in favour of every *existing* institution. Many of these (we will suppose, the majority) may be susceptible of alteration for the better; but still the “Burden of proof” [*onus probandi*] lies with him who proposes an alteration; simply, on the ground that since a change is not a good in itself, he who demands a change should show cause for it” (847). It could be reasoned that the benefit of the doubt “favoured to every existing institution” that Whately refers to is the primary source for the social inertia described above.
orientation to this future action” (Rude, “Environmental Policy” 79-80). This would suggest that some scientists advocating social change consciously recognize that the report itself only provides some of the evidence necessary to support that change; they understand that the scientific knowledge communicated in a report is never sufficient to understanding an environmental issue, let alone determine the public policy that society should adopt.

Idealized as it may be, from this perspective, Rude’s description casts scientific reports for policy-making as an example of productive civic discourse communicating a responsible and democratic deliberative purpose—promoting participation from other communities of knowledge rather than silencing them by making the contested issue, and its resolution, a matter of, using Weinberg’s term, “trans-science.”

As discussed in Chapter 2, any claim of what we “ought” or “must” do to resolve a public controversy involving scientific issues is inherently defined as trans-scientific. Although the answer to a social problem may be publicly presented as residing in the application of scientific knowledge, no suitable resolution exists from a purely scientific approach. Such expressions privilege scientific discourse and knowledge over all other discourse and knowledge in the public sphere; they are expressions of an absolute Science rather than a negotiated science. Henry Bauer writes that trans-scientific claims are detrimental to civic discourse because they contradict the very purpose of scientific knowledge—to explain the operation of natural and physical phenomena. This view of science precludes the use of its knowledge as the ultimate and solitary source for answering questions of social significance.

Any question of “ought” or “should” is by definition trans-scientific and has no answer within science, no matter how many technicalities happen to be entangled in it . . . [N]o bit of scientific knowledge by itself can force the adoption of any specific
social policy . . . it is . . . a misconception to imagine that science can answer a question just because it happens to be posed in technical terms. (Bauer 123-4)

It is possible, even likely, that most scientific reports for policy-making contain trans-scientific claims. Consequently, it seems reasonable to assume that scientists addressing trans-scientific issues using only scientific evidence will write reports that are entirely based on Science. Although highly appealing because of the extrinsic and cultural ethos of Science to discover Truth about the world, the policy answers these scientists provide are specious. To avoid the allure of these specialized arguments, it is important for public audiences to understand how democratically advocated action differentiates itself from authoritative trans-scientific claims for policy.26

One issue to consider in the analysis of the Commoner documents, then, is whether a delivery system of linked discourses is capable of de-privileging the scientific report and its scientific knowledge in order to situate its deliberative function outside of trans-science. In other words, does Commoner’s recommendation simply serve as an example of science going beyond its means to say what society ought to do? Or does Commoner recognize the limitations of his study and report to represent a partial but significant portion of information

26 Bauer writes that scientists’ expertise in a certain branch of science grants them authority in neither other branches of science nor other social knowledge (e.g., politics, economics). When creating trans-scientific discourse, scientists may use their “disciplinary ethos” as a “cultural ethos,” relying on the audience to transfer scientists’ authority in their scientific niche to areas in which they lack formal training or specialized knowledge. Despite the dangers of producing trans-scientific discourse, scientists should not be discouraged from writing about how scientific knowledge should inform public policy. In the role of “civic scientist,” an individual would create discourse for the purpose of engaging “the public in a dialogue about science and society. In that exchange, the scientist offers a perspective of the contributions and value of science in society to a public interested but not very literate about science issues” (Lane). For the most part, Commoner fulfills the role of “civic scientist” in his discourse surrounding the Nunavut-Ames controversy.
that local decision-makers will consider along with other sources and types of knowledge (e.g., economic, political, etc.) to resolving the dioxin problem in Nunavut?

A broader rhetorical understanding of delivery demonstrates that the exigency precipitating a scientific investigation is not thoroughly addressed with the publication of a scientific report advocating changes in environmental policy; rather, exigency begins or intensifies because of the report.27 Again, in an idealized world, encouraging civic participation (a democratic value) through activity and discourse is as much a part of the deliberative function of the report as is the adoption of the policy the scientific report seeks. Indeed, the citizen-scientist-writer would understand that policy directed at changing the status quo is more likely to occur when other knowledge and discourses are added to inquiries and deliberations about the issue, particularly when those knowledge and discourses are unified by common values.

When scientific reports are not written to be the authoritative word and final action regarding the adoption (or rejection) of policy to resolve a controversy, they can be used as a part of a larger, coordinated effort or strategy, spread across a period of time, to achieve change. The deliberative purpose that scientific reports serve in public policy initiatives, then, is to introduce factual information and contextually defined values to its audience.

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27 Because I have invoked Bitzer’s notion of rhetorical situation in Chapter 2, it seems appropriate to mention that the concept of exigency invoked here differs to a degree from Bitzer’s description. Rather than attributing the situation itself as the sole exigence for discourse (agency) to occur, this concept of agency identifies the power of discourse to define the “reality” of the situation and become the source for (further) rhetorical action (Campbell and Jamieson 412). Because an expanded notion of delivery is highly contextual, it does not deny the necessity of the situation to call forth rhetorical action. However, this expanded notion of delivery accommodates space for discourse to precipitate further action within the social sphere rather than merely stand as the final action to the situational exigency that prompted the discourse.
“Reports are necessary for framing the issues and presenting the information that persuade decision makers. They also confirm that one excellent argument well presented may be just a piece of a strategy” (Rude, “Toward” 272). After gaining a scientific perspective from reading the report, the non-expert reader may be encouraged to learn more about the situation in question or to work with those who advocate or oppose the policy in question. When viewed as a springboard toward further action, scientific reports written to address a public exigency for a general public audience demonstrate a discourse with a definitive, deliberative purpose that is clearly absent in the primarily forensic discourse of traditional scientific reports written within and for the scientific community.\footnote{On the contrary, Rude states that the report genre, in general, may actually seek to “stifle inquiry” rather than foster it (“Environmental Policy” 78).}

However, as important as they are to working toward changes in values and policy, Rude warns that, on their own, scientific reports may not reveal the “strategies of change” employed in a campaign to resolve an environmental controversy (273). Thus, any analysis of environmental discourse that only focuses on the publication of scientific reports limits our understanding of how the exigency of the rhetorical situation, and the values of the community, are eventually satisfied (274). Again, the textual report is not the focus of a campaign for change or the solitary source of reasons to support action; it represents \textit{one} action that is tied to other actions that both precede and follow its publication.

Accordingly, the rhetorical concept of delivery, Rude writes, must be expanded to include contextual elements, namely the community’s reaction to the scientific report through other activity and discourse. “Delivery is outreach after publication and interconnections of the report with other documents and activities” (276). I argue here, however, in the case of
the NACEC policy campaign, that the delivery of a scientific report may be interconnected by concurrent activity taken, and discourse published, by the report writer and his affiliates. In other words, part of the strategy of change may include, among other things, publishing supplemental documents that do epideictic and deliberative work not typically performed by (or expected from) a scientific report. Such a strategy could preserve the targeted audience’s expectations for the scientific report genre. While the report frames the controversy for the general public as Scientific, other documents accommodate factual information and values from the report, delivering the deliberative message in an accessible manner to a non-expert audience.

Therefore, following Rude’s assessment of the function and delivery of scientific reports for the purpose of influencing environmental policy, the analysis of the Commoner Report conducted in this chapter includes analysis of its supplemental artifacts—the Executive Summary and Backgrounder. The coordination of these three documents allows Commoner and NACEC to accommodate scientific information for the purpose of developing epideictic and deliberative arguments appropriate to the rhetorical situation that could not be achieved if the discourse were limited to only the Commoner Report.

Assessing the Coordinated NACEC Artifacts Using Rude’s Characteristics of Scientific Reports for Policy-Making

To build an argument that will persuade a public audience to take action, a scientist must supply evidence that there is something wrong with the status quo. This may be achieved by establishing a sound exigency that convinced the scientist to conduct the scientific activity and, thus, publish the resulting report. For the public to even consider taking action, the exigency that compelled the scientist to investigate this environmental
issue must equally disturb the audience’s values and compel them to take action, too. As previously discussed, the expression of praise and blame over the current state of things is associated with epideictic rhetoric, and it is a crucial (though not a sufficient means for) discourse to motivate readers to pursue a line of inquiry toward eventual change.

Essentially, it is the balance of forensic, epideictic, and deliberative rhetorics that make the form and content of reports for environmental policy different from traditional scientific reports. Rude summarizes the features of the report used in policy making as possessing “[s]ound science, support of strategic action, and social and ethical metaphors” (“Environmental Policy” 80). More specifically, she writes that scientific reports advocating policy possess six distinctive traits in the expression of these three rhetorics, which are detailed in Table 3-1 below.

<table>
<thead>
<tr>
<th>Scientific Reports Advocating Public Policy Tend to . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Organize information according to “issues and options rather than methods and results of research”</td>
</tr>
<tr>
<td>2 Function as a “strategic tool” to motivate others to begin, or continue, action</td>
</tr>
<tr>
<td>3 Possess a “strong orientation toward the future” expressed through scenarios that visualize a possible future-to-come if the advocated action occurs compared to what can be expected if change is not implemented</td>
</tr>
<tr>
<td>4 Advocate specific, “forward-looking planning for policy and technological change”</td>
</tr>
<tr>
<td>5 Utilize science as “a foundation for policy decisions”</td>
</tr>
<tr>
<td>6 Interpret scientific knowledge “through the lens of social responsibility” and “in terms of social welfare”</td>
</tr>
</tbody>
</table>

Table 3-1: Six Characteristics of Scientific Reports Used in Making Public Policy (Rude, “Environmental Policy” 88)
These six characteristics seem to be generally helpful points for recognizing policy-making reports and locating the presence of forensic, epideictic, and deliberative elements in such discourse. The qualities that Rude identifies in her analysis clearly distinguish the action-inspiring agenda of policy-making reports from a more formal (and perhaps passive) presentation of factual information found in traditional scientific reports.

Accordingly, in the following analysis, I complement Rude’s six characteristics of reports written for policy-making with her emphasis on the importance of delivery, exigency, and context in understanding the discourse created in public policy debates. Such an emphasis rhetorically situates the role of scientific reports in controversies without privileging them or the knowledge that they communicate. Therefore, I assume that these six characteristics are not less genre-specific but, rather, more exigency-specific. Using the six criteria listed in Table 3-1 to locate the expression of forensic information to achieve epideictic and deliberative functions, I assess the Commoner Report, Executive Summary, and Backgrounder as examples of environmental discourse working together toward the establishment of new public policy.

Working from the perspective that these coordinated artifacts collectively work to present a compelling exigency for enacting public policy to regulate the activity of the worst dioxin depositors, I do not locate all instances of these criteria in all three documents. Instead, I present the best representations of the criteria to test Rude’s characteristics according to a delivery-based representation of policy-change strategy. In some cases, Rude’s characteristics do not fit the artifacts; these significant discrepancies will provide points for further analysis later in this chapter.
**Characteristic 1: Organizes Information toward Issues and Action**

The first of Rude’s characteristics of policy reports articulated in Table 3-1 focuses on the arrangement of information in regards to the action needed to satisfy the exigency that motivated the creation of the scientific report. Without the benefit of reviewing the artifacts from Rude’s study, I assume the reports written by scientists representing the Union of Concerned Scientists that she analyzed did not involve any laboratory-based experiments; therefore, these scientists were not obligated (or expected) to use the format and organization routinely employed in traditional scientific reports. As will be demonstrated later, to be recognized as a scientific endeavor, Commoner’s presentation of the computer model as a predictive instrument required that the model be validated and defended for its results—and its subsequent use in future applications—to be accepted by critics and community activists alike. The audience expects, and the context demands, a familiar genre to structure and deliver the requisite information. Therefore, the Commoner Report adopts the organizational sections in Table 3-2 commonly employed in traditional scientific reports.

<table>
<thead>
<tr>
<th>1</th>
<th>Executive Summary</th>
<th>5</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Introduction</td>
<td>6</td>
<td>Policy Implications</td>
</tr>
<tr>
<td>3</td>
<td>Procedures</td>
<td>7</td>
<td>References</td>
</tr>
<tr>
<td>4</td>
<td>Results</td>
<td>8</td>
<td>Appendices</td>
</tr>
</tbody>
</table>

Table 3-2: Organizational Sections Used in the Commoner Report

With the exception of the “Policy Implications” section, these vague, non-descriptive headings do little to supplement the readers’ understanding about (a) the issues surrounding
the situation in Nunavut or (b) the recommended action that activists may take to prevent the top-ten worst facilities from continuing to deposit dioxins in the Arctic.

However, because the Commoner Report documents the initial trial of the model to both accurately trace and rank the sources of deposition, the format and organization of the Report seems appropriate to addressing the exigency of the situation and Commoner’s approach to adding scientific knowledge to understanding the source of the problem. Adhering to a traditional format and organization conveys a more scientific appearance and feel to both the document and its findings. To its public audience (including fellow scientists), the Commoner Report “looks” like Science. Furthermore, this purposeful structuring of forensic information is a crucial element for its intended pragmatic social actions (present and future) to occur (Miller, “Rhetorical Community” 72). Reproducing the structure of the report is a social action itself that allows further action to take place: enabling the critique of current policy to occur in the present time as well as the recommendation for new policy to occur in the near future because the computer model Commoner has developed is scientifically sound. Using the appropriate genre in an effective manner, then, completes multiple tasks in the present (test or close accused facilities) while enabling further change to occur in the future (using the model to identify other polluters).

Much like the Commoner Report, the two coordinated documents are also not organized according to issues and action. A brief summary of these documents, including their section titles and content, follows.

**Executive Summary.** As previously explained, with the exception of visuals depicting some of the results described in its text, the separately published Executive Summary is closely organized and phrased as its counterpart in the Commoner Report.
Naming the document “Executive Summary” frames it as formal, professional, and scientific. As a genre (or sub-genre) itself, the reader expects an executive summary to use a less technical language to communicate “bottom-line” information contained in the formal report that it summarizes—a sort of scientific accommodation itself—which is what this particular document delivers.

- **Introduction.** Reverses presumptions that the Arctic is pollution-free. Establishes impetus as well as parameters for study by citing regulatory statistics. Declares the need for both conducting the study and adapting the computer model for dioxin tracking.

- **Methodology.** Briefly introduces the identity, history, and operation of the model.

- **Findings.** Scientifically defines dioxins and locates the source of deposition as being outside of Nunavut. Provides quantified results from the model to reveal a variety of information regarding the deposition sources (e.g., classification of facility, regional and specific locations, ranking of sources, etc.). Describes application of data and its meaning for receptor sites.

- **Policy Considerations.** States that only new policy can improve situation. Connects computer model data to its value in policy formation. Introduces two courses of action and the advantages and disadvantages of each strategy. Speculates the reduction in deposition for each option.

- **Conclusion.** Speculates on the power and utility of the model to continue efforts toward reducing dioxin deposition. Presents report findings confirming that both the dioxin deposition mechanism and dioxin deposition itself are global problems.
Although the Executive Summary would have been improved as a separately published document had it contained more descriptive headings regarding issues and actions, its readability is greatly enhanced through the inclusion of visual aids that did not appear in the executive summary section of the Commoner Report.

**Backgrounder.** More than the Commoner Report or the Executive Summary, the Backgrounder comes closest to organizing its discourse according to the issues and actions of the situation. Originally written for journalists and later published as the first article in online magazine *Trio* hosted on the NACEC Website, this document appeals to a public audience that knows little or nothing about either dioxins or Nunavut.

- **Health Effects of Dioxins.** Presents authoritative studies and sources that declare dioxins as a problem affecting both the Inuit and the reader. Puts reader in the mindset that all people should care about dioxin exposure.

- **Application and Results of the Dioxin Transport Model.** Instead of a formal presentation of data, creates an argument for the ability of the model to produce accurate information and contribute to future policy. Contains hedges and qualifications that address potential counterarguments against the model.

- **Future Directions.** Announces that the computer model is capable of accurately revealing the facilities most responsible for deposition. Declares value of the model to assist in policy formation and recommends further applications of the model using more current inventory data, which would require stack testing of plants. Claims that inventory data based on empirical research would strengthen the power and accuracy of the model to locate the worst dioxin polluters and promote remedial action.
Though the Backgrounder curiously does not feature a more reader-friendly organization with additional headings that are more descriptive (traits which would most likely assist the non-technical audience in understanding the issues and desired course of action), its content is largely issue and action-based. The limited, generic organization is possibly due to a replication of the more traditional scientific report format employed by both the Commoner Report and the Executive Summary, allowing the attributed author of the Backgrounder (Dr. Paul Miller) to more easily accommodate the results and recommendations from the study.

**Characteristic 2: Functions as Strategic Tool for Stimulating Action**

Rude’s second characteristic of policy reports (Table 3-1) addresses how such discourse is oriented toward encouraging the reader to take action on the issue at hand. Although both Commoner and the Union of Concerned Scientists are writing, at some level, about theoretical projections concerning combustion practices that create pollution, Commoner is presenting the results of an adapted computer model and its ability to accurately track the sources of dioxin deposition, including the relative contribution of each source toward total deposition amounts. Accordingly, Commoner must “complete” the study, reporting evidence of both the results (the sources and rankings of deposition facility sources) and validating the model’s ability to accurately and effectively produce those results in the *present* study as well as studies that may be conducted in the *future*.

This validated model described in the Commoner Report produces scientifically based data, informing the two recommended strategies that the Inuit may consider taking. The first strategy would require the Inuit to directly pursue remedial action at an international
or national level based upon the source classification and nation-of-origin of the suspected facilities.²⁹

As already indicated, most of the dioxin deposition at the receptors is due to a very small proportion of the total number of sources. Beyond that strategic generalization, the data can be organized to address two alternative policy strategies. One strategy is based on the regulatory approach common to most countries’ environmental agencies: standards of allowable emissions are set for different source classes, such as municipal waste incinerators or cement kilns burning hazardous waste. In this case, the Inuit community at Coral Harbour, for example, can learn from Table 5.2 that by addressing their need for relief from exposure to the annual dioxin deposition (on land) of 19.24 pg TEQ [Toxic Equivalency]/m² only to the United States, and calling for more rigorous emission standards for only five classes of U.S. sources (municipal and medical waste incinerators, cement kilns burning hazardous waste, iron sintering plants, and backyard trash burners), their exposure to dioxin might be reduced by 67 percent, provided that the standard virtually eliminated emissions. By adding to their strategic aim improved regulation of municipal solid waste incinerators in Canada, and of informal trash burning in Mexico, the Coral Harbour community would be addressing 73 percent of their dioxin exposure, which, if eliminated, would reduce it to 5.2 pg TEQ/m². That would bring the level of exposure at the Coral Harbour land receptor to about the lowest level among all the Nunavut land receptors, which occurs at Arctic Bay and Ikaluktutiak. In sum, such data could be used by Inuit communities to target their remedial policy toward those source class/country categories that might offer the best potential return in reduced exposure to dioxin for their effort to accomplish it. (Commoner Report 79)

The second alternative strategy is meant to encourage activists to take action against the implicated facilities in their locality.

An alternative approach to policy is directed toward specific individual sources rather than categories of sources subject to national regulations. This policy depends more on direct appeal for action to the operators of a particular facility and/or the people of the local community than to the national environmental agency. Such a direct appeal has the advantage of immediacy, avoiding the intricacies and delays inherent in international, and even national, administrative actions. It has the disadvantage of dealing with the sources one by one. Thus, in the example

²⁹ Unless otherwise stated, any bolding that appears within an excerpt from a primary artifact should be regarded as emphasis that I have provided to help the reader locate the analytically relevant data within the “textual context” from which it originated. Excerpts from primary artifacts that lack bolding should be regarded as evidence that I consider entirely relevant data for supporting my claims.
cited earlier in section 3.3, if the community of Coral Harbour adopted this approach, total exposure to dioxin could be reduced by 35 percent if 19 individual sources, again, most of them in the United States, could be induced to virtually eliminate their dioxin emissions. To go beyond that target sharply increases the overall effort needed; 680 sources must be targeted to reach a 75 percent reduction, and 3,031 sources to reach a 90 percent reduction. On the other hand, as shown by experience in the United States, public appeals for action on a particular source can often succeed by stimulating the necessary administrative response.

In this connection, it may be useful initially to direct such policy toward a small number of individual sources that appear to be responsible for the largest impact on the receptor, i.e. the sources that contribute most to the deposition of airborne dioxin on Nunavut. For this purpose, we have identified the 10 highest-ranked sources with respect to their average contribution to annual dioxin deposition at the eight Nunavut land receptors. (Commoner Report 79-80)

The list of the top-ten worst depositors allows local activists to target facilities in their own communities and pressure them to prevent future dioxin deposition in Nunavut.

**Characteristic 3: Possesses Strong Orientation toward the Future**

The third characteristic in Table 3-1 considers the perspective of the report written for forming public policy. As the excerpts in the previous section demonstrate, the Commoner Report presents two quantifiable reductions of dioxin deposition, depending upon which of the recommended strategies the Inuit pursue. Although the Commoner Report clearly advocates a change in policy and practice for communities that possess one of the accused facilities (and the quantitative benefits such policy would create), it does not directly use qualitative scenarios to depict a world for the better (or for the worse) if the recommended actions of testing and remediation are (not) followed. The absence of such scenarios may be due to the scientific (and political) scope of the report. In other words, as speculation or idealization, scenarios would not be accepted as scientific evidence; however, projections of reduction derived from the use of the model allow us to extrapolate a visual image of the
improvement that would follow. Providing quantifiable data instead of scenarios provides readers with evidence that appears to be more logical than emotional—an indirect inference as opposed to direct idealization.

There are subtle references, however, to present problems in Nunavut that suggest a bleak future for the Inuit unless immediate action is taken. At the beginning of the Executive Summary, the reader learns that the purpose of the Commoner Report is to identify and rank the suspected sources responsible for depositing dioxin in Nunavut, not to speculate on the health risks facing the Inuit due to the high amount of dioxins they have been exposed to. A footnote in the Executive Summary clearly expresses this limitation.

This report does not seek to address the question of whether past or current dioxin exposure rates in Nunavut constitute a threat to human health or the environment. (Executive Summary 1) However, the footnote continues by citing a regulatory authority regarding the “acceptable” dioxin exposure levels for humans, implicitly contextualizing the bleak situation that the Inuit face.

It is worth noting, however, that the body burden of dioxin in the general populations of the United States and Canada reflects an average level of exposure associated with a lifetime cancer risk several hundred times greater than the generally “acceptable” one-in-a-million level generally adopted by the US EPA. (Executive Summary 1) The footnote suggests that there is something wrong with the status quo when the standards held by the US and Canada for the general population are currently violated. Those standards are violated to an even greater degree when applied to the indigenous Inuit. Rhetorically, the footnote—a type of aside that typically supplements the main body of the text with related but non-essential material—addresses the issue by declaring that it will not be addressed. However, toward the end of the Executive Summary, in the “Policy
Considerations” section, Commoner explicitly states the warrant that informs his proposal for deliberative action through public policy based on the foundation of scientific evidence gathered from the HYSPLIT computer model.

The foregoing observations and conclusions are relevant to several current policy issues. If the levels of dioxin exposure are judged to be a threat to human health and environmental quality, then the basic goal of environmental policy is to remedy this hazard by reducing or, preferably, eliminating exposure. (Executive Summary 7, emphasis mine)

At this point of the document, the reader has already learned that the dioxin levels have been affirmatively judged to be dangerous after reading the footnote on the first page, thus establishing the exigency. Therefore, the purpose of environmental policy seems to apply to the exigency of the situation—a remedy is needed and policy is the appropriate action. In this case, the footnote provides readers forensic evidence so that, when they arrive at the discussion about policy, they already understand both the need for the study as well as the “lifetime” fate for the Inuit—whose breast milk, the text tells us, possesses twice the dioxin concentration levels as their neighbors in Quebec who are already exposure to levels “several hundred times greater” than what is acceptable. Knowing the seriousness of the problem justifies not only Commoner’s study but the recommended policy it informs as well. The footnote, then, does contain essential information for the reader; however, presenting it as an item “separate” from the main text seems to de-emphasize its importance.

**Characteristic 4: Advocates Forward-looking Planning for Policy**

As stated in Table 3-1, the fourth characteristic Rude located in scientific reports written to influence environmental policy is the manner in which the discourse provides a near-future solution through policy to address current problems. As the “alternative policies”
example above demonstrates, the Commoner Report clearly defines two lines of policy that, if either were adopted, would immediately reduce the amount of dioxin deposited in Nunavut. Additionally, Commoner recognizes and expects that the inventory data used in emission estimates will be improved as the model is used in future projects.

Finally, at this stage of our knowledge it is appropriate to regard a dioxin emission inventory as work in progress, to be improved for each successive project to which it is applied. As a corollary, it is useful at each stage in an inventory’s development to make an effort to estimate the major emissions, in order to at least provide a basis for further improvements, for example, in inventories and emission factors. (Commoner Report 10)

These improvements, the Backgrounder states, are expected to come from facilities (including those making the top ten list according to Commoner’s study) that collect empirical data from stack tests to confirm (or deny) the model’s estimates.

In the context of Nunavut, the modeling tool suggests a set of sources whose control could significantly reduce the deposition of dioxins in the Arctic. Although a number of the major source groups have already reduced, or are already under obligation to reduce, their dioxin emissions, additional studies should be conducted with updated inventories to assess current source-receptor relationships affecting the Arctic and other regions in North America. (Backgrounder 4, emphasis mine)

Without admitting to any weakness or shortcomings in Commoner’s methodology, the Backgrounder identifies the importance of ongoing scientific investigation, through the accumulation of additional empirical evidence, to strengthen both the model’s capacity to locate sources of dioxin emissions as well as to inform policy that eliminates emissions from those sources accurately revealed by the model.

The language of this excerpt from the Backgrounder is equally careful regarding the forcefulness of its claims about what the model can do. Using words such as “suggests” and “could” function as hedges to how its data is to be used. Similarly, the use of the word “should” doesn’t directly link the model to policy; rather, the plan for future action regarding
the model is tied to gathering more scientific data from empirical tests to improve the model’s efficacy. In this context, it would appear that the Backgrounder avoids making a trans-scientific claim because further assessment of source-receptor relationships is a matter that can only be answered through practice that generates scientific knowledge.

**Characteristic 5: Uses Scientific Knowledge to Inform Policy**

Rude lists the connection that the scientist-writer makes between forensic evidence (scientific information) and deliberative action (proposed public policy) as the fifth characteristic of scientific reports used in policy formation (Table 3-1). Prior to stating that “the data [gathered from the model] can be organized to address two alternative policy strategies” (Commoner Report 79), Commoner reveals that the results of the computer model have created new, foundational, scientific knowledge that directly informs these policy strategies.

The results generated by the air transport model support a series of conclusions that specify the locations, classes, and individual identities of the sources; that assess the relative exposure of the various Nunavut receptors to airborne dioxin transported from these sources; that evaluate the meteorological factors that influence these source/receptor relationships; and that identify the relatively few sources that, if targeted for remedial action, could significantly reduce dioxin exposures in Nunavut. (Commoner Report 76)

Once Commoner established the scientific validity of the model, the reader may intuitively accept the model as a credible scientific instrument and source of new knowledge; any conclusions made in the Commoner Report about source-receptor relationships (it could be reasoned) can be trusted.

Using the traditional scientific report genre demands that, to be validated, a computer model must be scrutinized for accuracy; it must consistently produce “robust” results—
revealing source/receptor relationships (Commoner Report 10). The resulting warrant, then, is that validated models are capable of producing scientifically informed policy and are therefore valuable information sources for guiding the formation of public policy. The reader makes the inference—the connection—between the evidence gathered from the model and the appropriate policy that addresses the exigency. As with the Backgrounder, the Commoner Report uses hedges ("could") that prevent direct connections—trans-scientific claims—between the scientific evidence and the resulting policy that "should" follow.

**Characteristic 6: Interprets Scientific Knowledge through the Lens of Social Responsibility**

Rude’s sixth and final characteristic of scientific reports written to influence non-experts to take action through public policy (Table 3-1) deals with the manner in which scientific information is presented as knowledge that empowers individuals to take responsible action. As it is used here, the term "social responsibility" begins with the concept that local actions have global effects. By implication, then, a "dual exigency" is revealed to the readers of the report—a "here" and "there" linked by cause and effect. That is, a problem originating in their community has become a problem in a distant community. If the effects are shown to be negative and can indeed be traced to their source, the culpable entities would have a social, or moral, obligation to ameliorate or eliminate those effects by not performing those actions. Claims of "social responsibility," then, would warrant the cessation of such behavior: A civic practice that benefits one community should not be pursued if it threatens the welfare of another. As the excerpt below demonstrates, Commoner places a premium upon efforts to eliminate the deleterious effects of one’s own (local) action in order to promote the maintenance of others’ way of life.
Human exposure to dioxin is almost entirely (98 percent) through animal foods, especially those that are rich in fat. Dioxin is known to enter the food chain from the air. In temperate climates, it is taken up by animal food crops and hence appears in milk and beef, which in the United States account for about two-thirds of the diet-mediated exposure. In the Arctic, dioxin enters the major terrestrial (caribou) food chain chiefly through lichen, mosses and shrubs; dioxin enters the marine (seal, walrus) food chain chiefly through algae. Since these avenues of entry into the food chains cannot be protected from airborne pollutants, remedial measures must be directed at the sources that emit dioxin into the air. Hence, the need for relating dioxin emissions from the sources to the amounts deposited on such ecologically vulnerable receptors. (Executive Summary 1, italics mine)

Scientific knowledge of how humans are exposed to dioxin enables the reader to understand that this is an environmental issue that directly impacts the lifeworld of the Inuit; only the aggressive policy of remediation will resolve the issue. The use of the word “must” suggests that the reader will agree with the logic of this causal relationship and will thus accept the “need” for remedial action at either a national or local level to satisfy the exigency. Stopping pollution at its source is presented as a “common sense” solution to the reader; the agency of remedial measures to protect food chains, Commoner hopes, will be presumed. It is, however, a trans-scientific statement. As will be demonstrated later in this analysis, the assumption that this is a logical connection is a crucial warrant (or value) that Commoner strongly holds, which shapes his study, his discourse, and his recommended policy.

To support this “common sense” solution, the Commoner Report expresses the vulnerability of the Arctic food system to dioxin deposition, directly articulating the Inuit to the impact that contaminated biota has upon their food cycle.

In sum, deposition flux is an estimate of the amount of dioxin that enters a marine or land receptor area and is potentially available to ecological uptake processes, initially by plant life. Since plant life is the entry point to both terrestrial and marine food chains, deposition is the dominant process that results in the exposure of the local food system—and hence on the Inuit who depend on it—to dioxin. (Commoner Report 30-1)
To ensure the reader that the deposition of dioxin into the food system is not caused by local entities, Commoner includes in his model the combustion practices of the Inuit that may create dioxin. The results from the model—located in multiple sections of the Commoner Report—demonstrate that the Inuit are not responsible for the presence of dioxins in either terrestrial or marine food chains.

This project has been concerned with long-range transport of dioxin, which necessarily involves emission and deposition in places under different jurisdictions. This gives rise to policy issues that do not occur when both the sources and receptors are in the same country. It is pertinent to ask, therefore, to what extent the sources of dioxin emissions within Nunavut (primarily trash burning) contribute to the deposition at the Nunavut receptors. To this end, for the receptors at Broughton Island we modeled close-range dioxin transport from additional Nunavut source points. We found that only 0.01 picograms TEQ per square meter or 0.11 percent originated from Nunavut sources. We conclude, therefore, that the contribution of Nunavut sources to the deposition of airborne dioxin at Nunavut receptors is negligible and that, in practice, the policy issues relate to emissions and depositions in widely separated jurisdictions. (Commoner Report 77)

Due to the model’s quantifiable prediction that Nunavut-based sources are responsible for a negligible amount of dioxin deposited at its local receptors, the onus for action to prevent continued deposition is shifted from the recipient of dioxin to those responsible for producing it. If the Inuit are not creating the dioxin, and dioxin is a problem, the audience is led to believe, logically, that the responsibility and obligation to change belongs to the facilities implicated in Commoner’s top-ten list. In order to enact that change, however, a concerted effort will have to occur beyond the Commoner Report and its coordinated documents.

Validating the Need to Act: Warrants Link Scientific Evidence to Public Policy Claims in the Coordinated NACEC Artifacts

To address the dual exigencies in Nunavut and the United States, Commoner’s second recommended course of action targeting individual sources to reduce dioxin
deposition requires only *one* action—suspend incineration activity at the suspected facilities, or at least test their emissions for the presence of dioxin. Starting from this claim for policy, it appears that the act of confirming the efficacy of the HYSPLIT computer model would concurrently validate the exigencies of both the problem in Nunavut and the recommended action culpable individuals and communities should take to solve the problem. In this sense, the process of “validation” recorded in the Report may be considered a means to providing not only scientific but rhetorical evidence as well—substantiating claims regarding both the current, problematic public policy and behavior as well as recommendations for resolving the dual exigencies.

As an example of scientific testimony, the validation of Commoner’s computer model performs a forensic function; we believe that the model has the power to accurately reveal, now and in the future, sources responsible for dioxin deposition. Validation of the model also has an epideictic function, demonstrating that the status quo of North American operations is dangerous and irresponsible. Together, the forensic and epideictic elements of the Commoner’s scientific report must be present for the deliberative strategy intended by the coordinated documents to work. However, the presence of forensic and epideictic elements are not enough to motivate individual facility operators and community members to act.

Just as the Executive Summary and Backgrounder are coordinated to the Report, the forensic and epideictic elements of the NACEC documents must also be coordinated to their deliberative features. Within the Nunavut controversy, the coordination of Aristotelian elements of discourse begins, ironically, with the ability of the Commoner Report to establish a framework for the public audience that contextualizes both the controversy as well as their role as advocates for the environment by appealing to their values. It is at the core—the
center of a web—from which all other discourse activity will arise. Such a framework, it is
expected, will eventually lead the audience to the appropriate action by understanding “what
it is that’s going on.”

As George Lakoff argues, values are invoked in discourse through frames. Once a
scientist has appealed to the community’s values through the use of the appropriate genre and
legitimately entered the forum, the discourse of the genre must employ effective rhetorical
structures to sustain a critique of how the orthodox knowledge or practice under
consideration conflicts with the community’s values. In order to demonstrate the disparity
between the world that a community wants versus the one it has, the advocating scientist uses
emotional appeals to create frames that match reader values with those of the report’s desired
policy. In a scientific report for policy-making, scientists give meaning to science (or
Science) in order to persuade the audience that the policy advocated in the report has value;
the audience should now take action that advocates that policy, too. In other words, scientists
advocating public policy must craft persuasive epideictic arguments in preparation for
deliberative ones.

Just as the scientific report genre confirms the community’s value of scientific
knowledge to reveal the truth about natural phenomena, in the context of public controversy,
it also attempts to match the readers’ values about what actions or conditions are “good” or
“right” with those communicated by the scientist and the policy his report advocates.
However, to avoid being trans-scientific (i.e., portrayals of Science), the advocated policy
must recruit communal action (including the creation of further discourse on the issue)
without making scientific knowledge the sole reason (or value) to change (or protect) the
existing paradigm through policy.
As previously discussed in Chapter 2, science alone cannot answer what actions we should take to address social or ethical problems. But with the support of scientific evidence, the scientist can demonstrate that status quo activity violates the reader’s social and ethical values; likewise, the scientist can use scientific evidence to show that taking the recommended grassroots action—making “public appeals for action on a particular source to stimulate the necessary administrative response” (Commoner Report 80)—will restore those values. Participating as an advocate in the democratic process through grassroots efforts, then, is the primary course of action recommended for the audience to take. Equilibrium, it is suggested, will return to the community’s values if the necessary policies are put into place; community members have the power to help those policies come to fruition.

However, as previously revealed in the analysis of the coordinated NACEC documents using Rude’s sixth characteristic of scientific public policy discourse, Commoner does make a Scientific presentation to address a trans-scientific issue. Revisiting the excerpt from above, Commoner links forensic evidence to a deliberative claim by explicitly stating the value that warrants such action.

Since these avenues of entry into the food chains cannot be protected from airborne pollutants, remedial measures must be directed at the sources that emit dioxin into the air. Hence, the need for relating dioxin emissions from the sources to the amounts deposited on such ecologically vulnerable receptors. (Executive Summary 1, emphasis mine)

The use of “must” identifies what is not scientific but, rather, Scientific. Additionally, this passage reveals the heart of Commoner’s values and beliefs behind his entire study. Essentially, the warrant behind Commoner’s claims for social action are based upon an ethical standard: Remedial measures should be taken when food chains cannot be protected.
Neither this warrant nor the “need” to use models to determine sources would be true, though, if the food chain lacked value.

Those familiar with Commoner and his beliefs should not be surprised by the presence of such trans-scientific evidence in the midst of his scientific report for policy-making. To demonstrate both the presence and strength of the web of discourse to epideictically establish and maintain a value-based argument to achieve a deliberative aim in what is supposedly a forensically based endeavor, it is helpful to recognize how Commoner understands “what it is that’s going on.”

Drawing from the basic principles of ecology that are often attributed to Commoner reveals the frame that he and other environmentally minded readers use when dealing any issue of environmental insult. The original Four Laws of Ecology are (1) Everything is connected to everything else, (2) Everything must go somewhere, (3) Nature knows best, and (4) There’s no such thing as a free lunch (Commoner, The Closing Circle). However, during his lecture at ISU in November 2000, Commoner added one more fundamental law that makes the connection between remedial measures and food chains even more apparent: “There’s a fifth one: If you don’t put something into the environment, it’s not there” (Commoner Lecture). It is this fifth law that most closely matches the warrant Commoner employed in his report to justify the pursuit of remedial action. The audience need not recognize this law or any of the other as the “Four Laws of Ecology” (let alone attribute them to Commoner) in order to recognize their value.

As warrants, these laws appear general, universal, logical, common-sensical, and timeless. In addition to the warrant itself, arousing the image of consuming dangerous food punctuates the need for us to “protect” the Inuit. The word “protection” triggers the image
and the value associated with food, which then invokes the frame. Because we recognize contaminated food as having low value, our frame points toward what constitutes socially responsible and ethical behavior in the situation: advocate remedial action for those suspected of contaminating the food.

**Weaving the Web: The Commoner Report as a Functional Framework for Promoting Advocacy**

When presenting to the Inuit the second strategy in the “Conclusion” section of the Report, which targets individual facilities on the top-ten list of dioxin depositors to suspend (or at least test) operations, Commoner directly links the success of this course of action to the grassroots involvement of environmental advocacy groups. “[A]s shown by experience in the United States, public appeals for action on a particular source can often succeed by stimulating the necessary administrative response” (Commoner Report 80). Although by no means a clarion call for action, Commoner’s statement does cast activists in a vital role if the Inuit choose to pursue this strategy. Likewise, in the Executive Summary, the “people of the local community” in which suspected dioxin sources operate are identified as a target audience to whom the Inuit could make “direct appeals” for action toward a reduction in dioxin exposure (Executive Summary 8). When a scientist presents scientific evidence to support a change in policy or practice that citizens recognize as a threat to the environment, non-expert advocates may be more likely to act, not because they read the report or its linked documents but because they recognize their role in participating in the environmental
advocacy process, which is to persuade non-technical decision makers to change (or preserve) public policy.  

The Commoner Report and its linked documents, then, signify a substantive message to the reader that the distant problem in Nunavut is actually an exigency that resides in their own “cultural life,” and that its resolution requires appropriate action of their own at a local level. But appealing to an environmentally aware and active audience is only a part of the public swell that Commoner and NACEC are trying to build. Besides preaching to the choir, casual environmentalists and decision-makers need to be influenced to at least consider the problem and plan of action Commoner and NACEC are advocating through the web of discourse.

Although public advocates are counted on to locally spread the word for other community members to act, the coordinated artifacts in the NACEC policy campaign must contextualize its message to fashion an effective web of activity and discourse related to the exigencies at hand. A mediated message in concert with other discourses may be a more effective approach to reaching the unconverted. Because it is not presented as a completed study but as a stage of continued activity (Rude, “Toward” 284), the Commoner Report is one component of a scientific discourse delivery strategy. The deliberative strategy scientifically framed and presented to the non-technical audience in the Executive Summary

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This description is similar to what occurred in Ames. Although there is no evidence that they combed through the Commoner Report, the “Ames Quality of Life Network, a local environmental group that is often at odds with the city government” (Carolan and Bell 234), had stood in opposition to the operation of the power plant for years. They welcomed the release of the Commoner Report and saw it as an opportunity (kairos) to pressure city officials to pursue the testing and remediation policy that Commoner advocated. It is interesting to note that, during the eight-month controversy, this group was never mentioned in any of the Tribune articles or recognized through public discourse as legitimate entity in opposition to the plant.
(and perhaps the Report) is continuously repeated in additional discourse, transmitted in different modes and media, delivered at different times during the campaign. To cast the wide web of advocacy necessary for recruiting public audiences to the Nunavut cause, the following are some strands of discourse woven from where the Report ended:

- A news conference, featuring Commoner, Inuit leader Shelia Watt-Cloutier, NACEC Director of Programs Greg Block, and dioxin expert Dr. Michael McCally, was held October 3, 2000, to present the findings of the study and announce the publication of the documents.

- At least fifteen newspaper articles or letters about the results of Commoner’s study were published on (or within a week of) October 3, 2000, across the United States and Canada (including four articles in newspapers from the state of Iowa outside of the Ames and Des Moines area); of these articles, ten mentioned the remedial action endorsed by Commoner and NACEC. Two articles and a letter to the editor also appeared locally in the ISU newspaper the Iowa State Daily. At least three additional articles were nationally published within two months of the announced results.

- The Backgrounder, published in the inaugural issue of the online NACEC-sponsored magazine Trio, provided the public with another opportunity and medium in which to access the news of Commoner’s study and read about the adaptation of the HYSPLIT computer model as “a cost-effective tool to aid local communities in identifying the pollution sources most affecting them” (Backgrounder 2).

- An account of the NACEC October 2000 news conference was posted on the Inuit Circumpolar Website, calling the US government to follow a three-point plan of action, which included designing and implementing a monitoring program in Alaska;
ratifying the 1998 Persistent Organic Pollutants (POPs) protocol to the 1979 United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution; and supporting the Inuit’s request for tighter global conventions at the December 2000 Intergovernmental Negotiating Committee in South Africa (Inuit Circumpolar Conference).

- An article was written and released by the Reuters Daily World Environment News (October 4, 2000) quoted NACEC Director of Programs Greg Block as saying that Commoner’s study “‘demonstrates that we should revise our concept of neighbours’” (McCool); the article was reprinted in several magazines and posted (or available as a link) on many Websites.
- Commoner delivered a lecture at Iowa State University on November 15, 2000, in which he specifically stated that the city of Ames ought to test its power plant.
- Three articles written during a three-year period (2000 to 2003) by scholar Bruce Johansen addressing the significance of the study’s results—and the hardships that the Inuit face—were published in *The Progressive, Native Americas, American Indian Quarterly*, and later reprinted or posted as links on several Websites. A fourth article (“Trashing the Arctic”) appeared online at an environmental advocacy Website two weeks after the Commoner Report was released. He also wrote a book (*The Dirty Dozen*) that mentions Commoners’ work.
- The Executive Summary was reprinted in 2003 as chapter in a book of collected reports and essays supporting the implementation of the Inuit-led Stockholm Convention agreement on Persistent Organic Pollutants (Downie and Fenge’s *Northern Lights Against POPs: Combating Toxic Threats in the Arctic*).
As of February 2006, over five years since the Commoner Report was released, several of these articles (and the Report itself) could still be found online. This web of activity and discourses over a period of time continually reinforces the message of the Commoner Report, which supports a claim previously made in this chapter—that issues of environmental policy formation often require scientific evidence (in the form of scientific reports) to direct action but it is never sufficient itself to invoke changes in the status quo. Ultimately, the genre of the scientific report for policy making structures the web of activity and discourses, establishing exigency and setting the general framework for advocacy; however, the genre leaves the pattern, breadth, and number of strands in the web to those who accept the invitation to act.

As demonstrated in the previously excerpted portions of the coordinated artifacts, endorsing advocacy as an appropriate, deliberative action requires that the public audience understand that such a call comes from scientific evidence. Because the report genre satisfied the audience’s expectation for forensic knowledge, Commoner was able to critique the status quo, demonstrating that something wrong was happening in Nunavut as well as the ten facilities across the North American continent. Just as Rude’s six characteristics (Table 3-1) helped demonstrate in the Commoner Report and its related documents, the forensic discourse of scientific evidence performs an epideictic function in scientific reports for policy-making; science is contextualized for readers in both a physical environment (e.g., Nunavut, Canada) as well as their own mental landscape. In other words, such themes in environmental discourse shape science to match values and emotions strongly felt by its audience. Epideictic claims, buttressed with scientific evidence, point to the need for change.
Thus, the call for action made in the coordinated documents directed toward those concerned about the environment and the Inuit appears scientifically and morally justified.

However, locating Commoner’s use of ethical warrants reveals the use of non-scientific values as evidence to resolve a trans-scientific issue. Essentially, Commoner’s ethical warrants reframe for the reader a new explanation for what is it that is going on in Nunavut and Ames, which also influences how the general public understands the appropriate action they should take to remedy the situation. The new frame for status quo operations creates the controversy, providing the audience a new understanding of what qualifies as social responsibility: advocacy. This “definition” of advocacy constructed through Commoner’s written discourse seems to match the words he spoken when concluding his November 2000 lecture:

In other words, in some sense, the flap over Ames and Nunavut, the relationship between what happens in a very local place with a local plant and somewhere at a distance has to teach us, I think, that we’ve got to take the step toward fundamentally solving these problems by creating national policies that say we will produce the goods that we need in ways that are required for the health of the environment and the people who live in it. (Commoner Lecture)

Although there is no guarantee that readers will adopt or even accept the call to action, Commoner improves the likelihood that they will at least be receptive to the message by delivering (and encouraging) a strong civic discourse mostly balanced in its presentation of forensic, epideictic, and deliberative elements.

At this point, it would seem that Commoner and NACEC employed a rather sound rhetorical discourse strategy in their campaign to reduce the amount of dioxin deposited in the Nunavut province. However, as we already know, the strategy failed to convince the Ames City Council to test the municipally owned power plant in Ames. To begin answering
my research question—why did Commoner’s Report fail while Brown’s seemed to succeed—I turn to a detailed study of the other side of the web of discourse and activity: the response by Ames officials and media to the Commoner Report. Besides tracing some of the strategic rhetorical moves made in officials’ discourse to reframe the controversy and disabuse Commoner’s claims, I begin to complicate the concept of what makes an environmental policy campaign a success or failure through the Ames’ response.
Chapter 4

“Finding Out the Truth”: Using Warrants to Reframe Public Policy Issues in Environmental Discourse

The focus of this chapter is on the first-response discourse of Ames city officials and how that discourse initiated what proved to be a successful campaign to counter Barry Commoner’s allegations against the Ames Municipal Power Plant. Prior to the Commoner Report, the plant had a positive community profile. Locally recognized as an efficient producer of affordable electricity, the power plant served as a source of civic pride and contributed to the city’s positive public image. City leaders were truly taken aback when they learned that their power plant was listed as the worst depositor of dioxin to the Nunavut territory.

Rather than contacting the facilities directly, Commoner released his findings through the press, garnering the element of surprise. Revealing the sources of dioxin determined by his computer model was crucial to Commoner’s discourse strategy. Using a warrant of ethics to reframe what constitutes environmentally responsible action by global citizens, Commoner was able to challenge the image of the accused facilities by putting them on the defensive. Without the benefit of early warning, accused facilities were forced to publicly deal with both the results of Commoner’s study as well as the requisite remedial policy that followed from the study’s results. The city of Ames was no exception.

Although it was the Brown Report—the final major, public document released during this environmental conflict—that effectively broke the controversial link Commoner made between Nunavut and Ames and, thus, restored the status quo, comments made by city
officials and local experts during the city’s October 2000 press conference challenged public perception regarding what counted as responsible behavior to resolve the controversy. A rhetorical analysis of the discourse produced by Ames city leaders to successfully counter claims leveled against its municipal power plant reveals the presence of the following four closely related warrants that support the reclamation of Ames’ public image as environmentally friendly and responsible.

- **Local, empirical knowledge is better than global, speculative knowledge.** City leaders and area experts cite a wide-range of evidence about the design and operation of the Ames Municipal Power Plant — from previous stack tests that showed no dioxin emissions to Commoner’s failure to identify the Ames Municipal Power Plant as a co-fired plant— which allows them to claim that the accusation against the city made in the Commoner Report is unfounded and uncertain. This warrant shows that the city values local knowledge, especially that which is derived from scientific study.

- **Poor scientific practice produces poor policy recommendations.** Pointing to errors in plant classification and throughput used in the computer model to calculate dioxin emissions, city officials were able to support claims that Commoner made many mistakes in his study, which prevents him from making either accusations against or recommendations for the Ames Municipal Power Plant. This warrant is a contextually defined version of “garbage in, garbage out” that borrows from the value of practicing proper scientific activity.

- **Only authorized agencies may set standards and authorize proper policy.** When city officials declared that they had never heard of the North American Commission for Environmental Cooperation (NACEC) prior to the release of the Commoner
Report, they made an implicit claim that the agency’s lack of notoriety was evidence that it did not have the proper authority to make accusation against or demands upon the city. Additionally, all references made to the city’s compliance with standards set by the US Environmental Protection Agency (USEPA) and the Iowa Department of Natural Resources (DNR) explicitly claim what entities have the proper authority to challenge and guide operations at the Ames Municipal Power Plant. This warrant is predicated on the value of authority.

- **Individuals who use poor science to promote poor policy are motivated by a political agenda, not the truth.** There are several instances during the city’s first response to accusations against its plant in which Ames officials and its expert testify that Commoner’s behavior indicates the pursuit of policy based on political biases rather than scientific evidence. From claims that Commoner was creating emotional responses through his word choice to the unorthodox and unfriendly manner in which he released his findings, Ames officials presented to the public an image of the city as a victim of an unscientific, unfair, and unwarranted attack.

Collectively, these warrants reframe the issue of “responsibility” within the Nunavut-Ames controversy. Initially presented by Commoner as a matter of ethical obligation, Ames city leaders and its agents challenge what constitutes exigent action by redirecting the focus of the discussion toward the concept of authority, namely that Ames has always acted in a responsible and compliant manner regarding all facets of its power plant. The city, its plant, and its representatives are the responsible agents who have (already) taken proper action in the situation, not Commoner or NACEC.
To demonstrate how the city reframed the issue of responsibility in the Nunavut-Ames controversy, Chapter 4 begins with a brief discussion of George Lakoff’s theory of how frames work through discourse in the midst of debate about the “truth” of a public policy concern. Part of what complicates the reception of the truth, however, is the trustworthiness of the source of information. More than just the appeal of authority or expertise, sociologists Michael Carolan and Michael Bell argue that the belief in, or acceptance of, knowledge stems from an individual’s social relation to the information source. Accordingly, we tend to recognize information as being “true” from sources that we already trust; likewise, we trust those who we regard as sources of truthful knowledge. When people both trust the source of information as well as accept the truthfulness of that source’s knowledge, an entity like the city of Ames is more likely to have greater control over public perception of its municipal image. By contrasting both contextual and image-based differences between the Ames facility and the one located in Harrisburg, PA—the number-two offender on Commoner’s top-ten dioxin deposition list—I show the presence of power that Ames possessed (and Harrisburg lacked) to control its public image after the release of the Commoner Report.

The remainder of Chapter 4, then, looks at how Ames officials used its October 2000 press conference to begin its image restoration campaign. By employing the previously identified warrants, the city was able to reframe for the general public what constituted responsible and exigent action regarding the controversy. I conclude the chapter with a brief explanation of how the rhetorical examination of warrants in controversies such as this one benefits non-expert audiences. In the simplest of terms, I argue that understanding the
warrants used by experts helps reveal some of the “non-technical” values that inform the exigent actions that experts recommend in public policy conflicts.

**Framing Truth and Trust: Tracing Social Relations of Knowledge within a Local Community to the Ability to Control Its Public Image**

Linguist George Lakoff explains that a contrasting notion of what is “true” is actually a product of conflicting frames. According to Lakoff, frames are mental structures in the brain that allow us to recognize information in a certain way. These mental structures—or worldviews—create recognition by making information fit the frame. Fitting the frame means that information makes sense to us; it has meaning or resonance. When something has “meaning,” it has “value.” Making meaning or sense is not an issue, however, of strict facticity, reason, or logic. Frames, rather, derive their power from the emotion felt from (dis)agreement between the message and its audience. Frames are cut to both fit and transmit values; when a framed message matches our internal frame, we recognize the message as being valuable, meaningful, and *true*. When we experience this sense of agreement, we feel a positive emotion, a connection between the speaker and ourselves. Therefore, the presentation of a message determines whether or not we recognize it as being congruent or resonant with our values.

Lakoff writes that language is the primary tool used by a speaker to frame a message. Word choice, tone, argumentative strategies, and genre, among other things, are methods that seek to match the values embedded within the message with the values held by its intended audience. However, when a speaker fails to frame meaning in a manner that is significant

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31 I use this simplified presentation of information transfer for both the sake of brevity and that it coincides with Lakoff’s presentation of frames. I do not mean to perpetuate a
for us—that is, when the value communicated in a message fails to match the values of the audience—the statement will appear incongruent to our worldview, eliciting a negative or neutral emotion. We disagree with the message and resist it. Even if the conveyed information logically makes sense, the contrast between the framed message and our internal frame is likely to cause us not to accept the uttered statement as being “true.” “To be accepted, the truth must fit people’s frames. If the facts do not fit a frame, the frame stays and the facts bounce off. . . . Concepts are not things that can be changed just by someone telling us a fact” (Lakoff, Don’t Think 17). And it is this explanation of how knowledge relates to an individual’s identity—whose science do we believe and why do we believe it—that is valuable to the present study.

Carolan and Bell provide some insight on the matter of “knowledge-identity” in their description of the reciprocal nature of “truth” and “trust” as it regards “social relations of knowledge.” They write

[that truth comes from trust, and that trust in turn comes from truth . . . a position that we base in part on the notion of the social relations of knowledge . . . [in which] truth depends essentially upon social relations—relations that involve power and knowledge, to be sure, but also identity—and that challenges to what constitutes the “truth” is embedded. (226)

form/content binary here, reducing word choice, tone, genre, and other linguistic and stylistic features of language as only being signifiers (form) of lexical meaning (content). I (and Lakoff, too, I presume) subscribe to a postmodern understanding of language recognizing that the use of traditional “form” elements of language conveys meaning that is both separate and in concert with the lexicon (as well as other rhetorical features, such as context, audience, and purpose).

Carolan and Bell are former professors of sociology at Iowa State University. Their article “In Truth We Trust: Discourse, Phenomenology, and the Social Relations of Knowledge in an Environmental Dispute” uses the Nunavut-Ames controversy as a case study in which to explore the relationships between power, knowledge, and identity as expressed through truth and trust. In this chapter, I draw from their study of discourse using a rhetorical perspective and nomenclature.
In other words, for someone to accept a statement as being “true,” the source of information is just as important as the information itself. Authority is established through existing social standing, participation, credentials, and relationship. Though they do not use the term, Carolan and Bell are essentially arguing that the audience accepts the logos of an argument by identifying with the speaker’s (or writer’s) ethos. Frames, then, include contextual (i.e., rhetorical) information that influences the audience’s evaluation of the argument as “good” or “bad,” which is ultimately an expression of values. These values—also known as warrants—are often embedded within arguments about the truth of the specific topic at hand. As unstated assumptions or rules that connect evidence of the matter to particular truth-claims, warrants provide audiences with a general understanding of truth. If an adversary who challenges the orthodoxy can show that present conditions or practices violate the general truths, or values, typically held by the community, the speaker’s ethos may be strengthened. A positive image of the speaker, in turn, may result in the acceptance of evidence, claims, and values brought to challenge the status quo.

Carolan and Bell describe conflict in the status quo, as a “phenomenological challenge—discursive moments that confront the existing social relations of knowledge and their dialogue of trust and truth” (225-6). Discourse produces these social relations of knowledge and vice versa. In the case of Commoner and Brown, the city relied upon its local source of expertise in matters scientific and technological—Iowa State University—to discover the truth of the matter. More specifically, Carolan and Bell write that Commoner’s claim against the power plant threatens not only what Ames leaders believe to be the facts that constitute the truth concerning the power plant but also the leaders’ relationship with the source of that knowledge.
The social relations of knowledge in Ames, a college town economically dependent on its land-grant ‘science and technology’ university, are sewn through with a rather strong culture of trust toward science and technology—particularly toward the science and technology ‘produced’ within the university. Thus, to discursively challenge that science and technology is to contest the social relations within which it is embedded, and the actors which discursively constitute, and are constituted by, those relations. Consequently, “whose” knowledge becomes as important as “what” knowledge: is it the knowledge of Iowa State University scientists, of other scientists, of environmentalists, or some other group? “Whose” knowledge one trusts will therefore greatly influence “what” knowledge is accepted as the truth. (237)

The city’s relationship with both the power plant and the University itself are lived realities—truths—that are valued because those relationships represent a component of the city’s identity. Attacking the power plant is, essentially, attacking a strand of the social fabric that gives Ames meaning, definition, and identity. Once Brown completed his study of the Commoner Report and found it lacking, his defense of the power plant used the four warrants (or values) previously established by city leaders to link the facts of the controversy to his claims against Commoner and Commoner’s study. As will be shown in Chapter 5, these warrants align Brown’s evidence so that it has a particular meaning for the Ames City Council: The city has acted responsibly, but Commoner has not. If Ames citizens trust Brown and Iowa State University as reputable, local sources of knowledge about science and the environment, they are more likely to believe that the evidence Brown has provided in his report as being the truth about the Ames Municipal Power Plant, Commoner, and Commoner’s study.

Ultimately, the four warrants reframe the controversy, allowing non-experts to understand the controversy in terms quite different than those presented by Commoner in his report. If the non-expert audience accepts the warrants underlying the Brown Report, they are accepting both the values that those warrants express as well as the appropriate action
that is explicitly expressed as argumentative claims. The new frame presented in the city’s discourse provides its non-expert audience an understanding of what constitutes responsible action that differs from Commoner’s frame, which Commoner has presented through ethical warrants and values.

However, for Brown to successfully establish this framework of warrants in his report, which would increase the likelihood of non-experts to accept this new frame, it helped that the city had a positive reputation prior to the release of the Commoner Report. Essentially, those who possess a positive reputation have a positive image; they are more likely to be seen as a trusting source of the truth. Accordingly, possessing a positive reputation affords an entity or individual a greater degree of what Faber calls “image-power.”

I argue that one of the most important reasons why the city resented Commoner’s conduct in making his accusations is because its officials experienced a loss of control in their ability to control the city’s image. Faber associates the ability to control how others perceive one’s organization as power.

Power can be seen . . . as the self-reflexive ability to control an image. . . . [P]ower resides in people’s ability to control the ways in which they, and others, are perceived across social structures and times. Thus, a powerful organization is able to shape the identities of consumers, clients, and competitors in ways that are beneficial to itself. (142)

Faber argues that conflict between those that seek change and those that resist are engaged in strategic campaigns to wrest power from one another. If indeed a city’s image-power is determined by its ability to shape the identities and images of others, it seems reasonable to say that the city has that power because its audience trusts the city’s discourse. Therefore, cities that possess trust possess truth and vice versa. However, as the example of Harrisburg will demonstrate in the following section, a city that has a negative image possesses a limited
amount of image-power and trust. Thus, such an entity stands to have a more difficult time defending itself from those who advocate a change in status quo behavior, even when the evidence used against that city is not empirically derived or possibly flawed. The degree of image-power and trust that a city such as Harrisburg possesses prior to the controversial incident, then, will influence the rhetorical choices and strategies it is able to effectively use in its discourse to declare the “truth” about the matter, which, in this case, could only be achieved by reversing its previous negative image.

**Tales from Two Cities: Contextualizing the Response of Ames City Leaders to the Harrisburg Press Release**

Differences in the official proclamations issued by city leaders in Ames, IA, and Harrisburg, PA, to counter Commoner’s allegations revolve around core issues relating to the history and purpose of the two facilities, which translates into a significant difference in the identity and image of each facility and municipality. Whereas the power plant in Ames benefited from a long-standing positive relationship with both regulatory agencies and the public, the same cannot be said about the Harrisburg incinerator. Harrisburg officials brought closure to its controversy by eventually closing its plant. Comparing the context as well as the discourse between the two cities helps demonstrate how Ames city officials were able to successfully manage its image in the controversy whereas Harrisburg officials were not.

**Background on the Ames Municipal Power Plant and Its Connection to Dioxin**

The city-owned and operated Ames Municipal Power Plant was established in 1896, residing today at the same location in which it was originally built—at the end of Main
Street, near the intersection of Lincoln Way and Duff Avenue, the city’s two major thoroughfares. In late 1975, the Resource Recovery Plant was completed to provide a “refuse derived fuel” to supplement the Utilities’ standard fuel source: low sulfur, subbituminous C coal. The only one in Iowa, the Ames Municipal Power Plant is defined in industry terms as a “co-fired” plant, burning a mixture of coal and garbage—between 90:10 and 80:20 composites—as its energy source.

Often referred to as municipal solid waste, garbage serves as a free (yet frequently maligned) energy source. Additionally, with the exception of assigning a redemption value on drinking vessels (aluminum cans, glass and plastic bottles), a traditional recycling program is rendered unnecessary, saving the city additional money. The result of this unique operation is a reduction in landfill content and electricity prices that haven’t increased since 1979—benefiting both the environment and its inhabitants (Ames, “Electric Services Explores”).

Shortly after the environmental disasters involving dioxin at Love Canal, New York (1978), and Jacksonville, Arkansas (1979), scientists at Ames Laboratory—“a government-owned, contractor-operated research facility of the U.S. Department of Energy that is run by

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33 Eileen B. Berenyi and Marc J. Rogoff offer a comprehensive history of the burning of municipal solid waste (“Is the Waste-to-Energy Industry Dead?”).  
34 Privately operated garbage services deliver trash to the Resource Recovery Plant located near the power plant. At the Resource Recovery Plant, glass, metal, and other dense materials are removed and the remainder of the garbage (including paper and plastics) is shredded and sent to the Ames Municipal Power Plant for further processing. Seventy-five percent of the sorted garbage is burned as fuel; the remaining twenty-five percent of refuse-derived fuel is taken to nearby Boone County for landfill disposal (Ames, Resource Recovery). The fly ash byproduct of burning the garbage (representing approximately ten percent of the volume of sorted trash originally processed for incineration) is also taken to the Boone County landfill, which has “saved more than 80 acres of Iowa farmland from becoming a landfill” (Ames, Waste-to-Energy).
Iowa State University” (Ames Laboratory)—conducted empirical tests on one of the plant’s stacks and concluded that it did not emit dioxins because the boiler operated at a temperature above the range at which dioxins form. The USEPA, via the Kansas City-based Midwest Research Institute, conducted a second test for common emission pollutants other than dioxins (e.g., mercury, nitrates) during this same time on the second boiler; once again, the plant passed federal emissions standards. With this empirical evidence, city leaders, and, it is assumed, all regulatory agencies (including the USEPA and the Iowa DNR) considered the Ames Municipal Power Plant environmentally safe until NACEC released the Commoner Report and its linked documents in October 2000.

Of the ten sites targeted in the Commoner Report as the worst depositors of dioxin in Nunavut, only four are classified as “municipal waste incinerators.” Three of these municipal waste incinerators are located in the United States; of these three, two are municipally owned and operated—the one in Ames, IA, and a second located in Harrisburg, PA. Compared to their private sector counterparts, these two cities seemed to have much more at stake by the bad press: a reputation of being a polluter and bad “global citizen” could dissuade companies and people to locate to it, interfere in existing and future local partnerships, and, potentially, result in city leaders losing their positions in the next election. So it seems to follow that city leaders’ responses to Commoner’s claims would have to be swift and certain if these two municipalities were to clear their names and avoid irreparable

35 Perhaps the second most infamous of all dioxin tragedies occurred at Times Beach, Missouri, in November 1982, one year after the Ames plant was tested. Using funds from the Federal Emergency Management Agency in February 1983, the State of Missouri purchased all homes and business in Times Beach and relocated its residents.
damage to their public image. And, based upon the public discourse surrounding the release of the Commoner Report, this is indeed what happened.36

**History of the Harrisburg Plant—The Development of a Negative Civic Image**

To better understand the nature of Harrisburg’s defense against the Commoner Report, and how it contrasts Ames’s response, it is helpful to understand the history of its much-maligned facility. Built in 1969, the Harrisburg incinerator—also known as the Harrisburg Materials, Energy, Recycling, and Recovery Facility—was intended to burn up to 720 tons of refuse per day (CBLL Internet). Although burning trash eliminated the use of fossil fuels to provide heat through the city district heating system and reduced the volume of garbage deposited in area landfills, the Harrisburg facility was supposedly expensive to operate; it consistently lost money despite any savings resulting from not purchasing fossil

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36 An online review of articles published in major newspapers at or near the location of the eight privately owned targeted sites revealed only two companies making public comment on the accusations.

- Ranked ninth, Ash Grove Cement Company, Louisville, NE: “Bruce Breitkreutz, office manager at the Louisville plant, said the company had not seen the report and did not have any comment other than to note that the data appeared to be out of date. ‘I don’t know how accurate or appropriate this information is at this point,’ he said” (Anderson 22).
- Ranked fifth, US Steel, Gary, IN: “US Steel officials denounced a key assumption in the study. . . . [Commoner] used data from iron sintering plants in Germany and applied them to their computer model. US Steel spokesman Mike Dixon attacked that assumption. ‘We don’t operate our sintering plant like the Germans, he said. ‘We have done testing, and we have not found any dioxins emitted.’ Officials at Bethlehem Steel [iron sintering plant in Chesterton, IN, ranked eighth] could not be reached for comment” (Orrick A1).

In contrast, at least four newspapers on the East coast featured articles that included statements from public officials associated with the city of Harrisburg. It is quite possible, however, that more public comments exist for Harrisburg as well as the privately owned facilities implicated in Commoner’s study. While the nearby Des Moines Register featured a few articles on the Nunavut-Ames controversy, the majority of articles used in this investigation came from The Ames Tribune, which did not appear as a source in the online newspaper search engine I used.
fuels for heating city offices. Additionally problematic, the incinerator had gained a national reputation as a “dirty” plant. This fact was confirmed in 1996 when emission measurements conducted by the USEPA showed that the Harrisburg incinerator was the largest producer of dioxin in the country, releasing 148 grams into the atmosphere; as a result, in 1997, lower, temporary emission limits were set for the plant. After the Clean Air Act was established in 1999, the Harrisburg incinerator was required to “upgrade its equipment to meet tougher emission standards for dioxin and heavy metals, acid gases and particulate matter by Dec. 19, 2000. The facility had the choice of either [sic] fitting the incinerator with newer, more efficient control equipment, downsizing to operate as a smaller facility, or shutting down” (Capozza). Rather than immediately outfit the plant with expensive retrofits, the city chose to downsize the amount of refuse it burned to qualify as a smaller facility. This was its operational status at the time the Commoner Report was released.

**Defensive Discourse: The Harrisburg Press Release**

Listed as the second worst contributor of dioxin to the Nunavut receptor sites, city officials governing the municipal waste incinerator in Harrisburg, PA, faced a similar challenge as leaders in Ames. In his October 3, 2000, press release, which is included below, Harrisburg Mayor Stephen R. Reed adamantly denied Commoner’s allegations in an eleven-

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37 Though Commoner used this number in his study, Fred Osman, “vice president of Evergreen Environmental Inc. of Harrisburg who was hired by the city to assist with the incinerator” contested its accuracy (“Harrisburg Incinerator Is Called a Top Polluter”). According to Osman, the plant was actually responsible for emitting 85.1 grams of dioxin that year; that number had supposedly dropped to 12.6 grams by 1999 after Harrisburg entered its agreement with the USEPA that the incinerator would not produce more than 28.3 grams. Besides the need to respond immediately, it is not clear why this data was not specifically included in the Mayor’s press release—the city’s official rejection of Commoner’s claim. If Osman’s data is correct and the incinerator was operating below the federal limit, it begs the question of why, then, the plant was closed in December 2000.
point, bulleted list of problems inherent in the Commoner Report. Of these eleven points, six made direct reference to Commoner, seriously questioning Commoner’s bias against municipal waste incinerators, the gross inaccuracies and faulty assumptions Commoner made within his study, and the contradictory actions Commoner has taken over the years that have been harmful to the environment.  

Though Ames would eventually commission Brown to both scientifically evaluate the Commoner Report and draft a report discussing Brown’s scientific findings, first-response discourse from city officials featured a similar story with similar warrants to initially counter Commoner’s allegations. Both Harrisburg and Ames use discourse to recreate their public image as environmentally responsible and compliant, using evidence that presents themselves as being wrongfully accused by someone who, instead of getting the proper facts, used faulty and exaggerated data to make specious claims that supported the outcome he desired.

A draft copy of the Barry Commoner news release was received by Harrisburg on Monday, Oct. 2. The very brief time available to review it has indicated at the least the following:

- Barry Commoner has a 20 year history of actively opposing any type of municipal solid waste burning facility, so the report’s conclusions are of no surprise from the standpoint of preconceived bias;

- Harrisburg’s plant is operating entirely within the emission parameters set forth by the EPA and that will not change;

- We are reminded of the John Stossel report on ABC News on the subject of dioxin entitled “Junk Science” when reviewing the Commoner Report; Mr. Commoner used an airflow model of his own creation which, to no one’s surprise produced the result he has been espousing for years; the model is based on faulty assumptions, clearly geared to a predisposed outcome;

38 I have bolded text within the Harrisburg press release to highlight these issues.
this model is unlikely to withstand independent and objective scientific review;

• The mathematical model, on which the study was based, claims they can trace dioxin emissions in the Arctic back to Harrisburg; it is an exaggerated claim to say the least; the report actually admits its ability to pinpoint sources of emissions are limited, that the source data is “estimated” and, moreover, the validity of the study model is entirely untested by anyone but Mr. Commoner;

• The emissions inventory on which the study was partially based was developed in 1995, based on estimates of what some thought were actual emission rates; the 1995 estimates were subsequently proven to be untrue in the case of Harrisburg, but it was the basis for which the EPA came to Harrisburg in 1997 to request more comprehensive stack testing at the Harrisburg plant; the testing was done and Harrisburg voluntarily entered into a consent decree, publicly announced at the time, to reduce emissions at the plant, which was then done with the result being a tenfold reduction in emissions;

• The Harrisburg plant is also slated for a major additional retrofit, which will even further reduce any and all types of emissions and the retrofit plan for such shall soon go before Harrisburg’s City Council for final approval;

• The Commoner Report does state that major emission reduction changes have occurred at municipal solid waste incineration plants, but does not account for such changes when forming its conclusions, which may be its most serious lapse between accuracy and conclusions;

• The irony in all of this is that municipal waste combustion facilities are the most tightly controlled combustion facilities in the nation, far more so than any other type of public or private sector plant that has emissions; it is overly convenient to therefore pick out facilities that measure-up to the EPA standards, while ignoring the thousands of facilities that have far less standards to meet; would not all facilities have a role we must ask?

• The Commoner Report notes that the author “estimated” dioxin emissions based on the size or “throughput” of the facility, which further underscores the lack of accuracy in the report;

• Some of the principal author’s bias is appropriately disclosed; when New York City once proposed to build resource recovery facilities to deal with that city’s mammoth solid waste disposal issue, he organized against it; the result was that NYC never built any facilities and, instead, created the Freshkills Landfill, arguably the most offensive landfill in the nation; that landfill is now
being closed and, as a direct result, the NYC trash is now being shipped to Pennsylvania and other states; we have Mr. Commoner to thank for this circumstance, which has made Pennsylvania the largest dumping grounds for out-of-state trash in the country; he now wishes to expand the use of landfills in this state by attacking any resource recovery facility;

- Harrisburg would not compromise the health and safety of its own residents nor that of anyone else. We remain committed to meeting all environmental standards, which we do today and will continue to do in the future.

Of the four warrants that were presented by Ames officials during their October 4, 2000, press conference, three of them—poor scientific practice produces poor policy recommendations; only authorized agencies set standards and authorize proper policy; and individuals who use poor science to promote poor policy are motivated by a political agenda, not the truth—can be found underlying Reed’s statement. Of particular interest is Reed’s association of Commoner’s study with “junk science,” particularly because the label is emotionally and intellectually charged.39

Labeling a study as “junk science” is potentially damaging (and, thus, a rhetorically effective counterclaim) to a study such as Commoner’s. However, without substantiation in the form of evidence, such a claim is itself as problematic as the specious “scientific” claim one is trying to counter. As Reed’s press release demonstrates, there may be difficulty in providing such evidence against a study that is potentially founded upon “junk science.”

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39 Another reason making this reference interesting is that Reed would even mention ABC reporter John Stossel in October 2000 to defend the Harrisburg incinerator. On August 11, 2000, ABC had Stossel issue an on-air apology regarding faulty scientific test results conducted during his investigation that misrepresented his claim that organically grown food was unhealthy. Although some rallied to the aid of Stossel (to the point of creating a Website called “Save John Stossel”), many in the scientific and environmental advocacy fields have seriously questioned both Stossel’s objectivity and his own use of scientific data to rebuke claims against scientific research about threats to human health, turning the claim of “junk science” back on Stossel.
these cases, claims such as Reed’s may be considered an *accusation* of junk science in that it is “devoid of gestures at any sort of legitimate science” and its effectiveness to establish a defense against leveled allegations rests in the claim’s ability to undercut the ethos of the scientist and his report (Haas and Kleine 280). Reed’s accusation of “junk science” is highly suspect, relying on ad hominem language and an agonistic tone instead of scientific evidence (i.e., alternative theories or analyses of data) that contradict Commoner’s claims against the Harrisburg incinerator.

The purpose of Reed’s accusations seems to be to cast possible doubt upon the conclusions and recommendations Commoner arrived at in his study. In this case, it may be that Reed’s conjuring of the junk science specter is meant to discredit Commoner by distilling the existing public distrust of a “liberal, environmentalist” agenda. In other words, *associating* Commoner’s study with “junk science” allows Reed to invoke strong, negative connotations in the general public’s mind without actually making a direct and explicit claim that it is junk science, which would require some sort of evidence to substantiate. In essence, then, Reed’s use of the term “junk science” functions as unsubstantiated support for the warrant “Individuals who use poor science to promote poor policy are motivated by a political agenda, not the truth.” Ultimately, by using a publicly recognized term with negative connotations, Reed attempts to control Harrisburg’s image by disparaging Commoner’s.

Mayor Reed, however, was not alone in his attack on Commoner’s public image. Maria Zannes, spokeswoman for the Washington, DC-based Integrated Waste Services Association, “a trade association for companies that operate energy-producing garbage incinerators,” stated that Commoner’s accusations against Harrisburg and the other sources was merely an “out of date” revival of earlier protestations he made against waste burning
facilities: “‘Some people pick a song and keep singing it, even if it has nothing to [do] with the facts today’” (Fagin). The mayor’s office followed up on Zannes’s comments with a similar attack, stating, “the report was alarmist and that it raised fears needlessly” (“Dioxins in Arctic Linked to Industry”). Daniel Lispi, assistant to Mayor Reed and the city official in charge of environmental concerns at the Harrisburg incinerator, took exception to the fact that the Commoner Report “names names, and is implying that these named facilities are causing health problems from dioxin for the people in the Arctic. That’s very misleading” (“Dioxins in Arctic Linked to Industry”). In response, Commoner stated that “the numbers were as accurate as could be found at the time the work was done” and that “it was important to name sources because identifying them could bring about change” (“Dioxins in Arctic Linked to Industry”). His comments, however, do little to counter Harrisburg’s implication that work such as Commoner’s is motivated by subjective politics rather than objective scientific inquiry.

**The Harrisburg Incinerator in a Post-Commoner-Report Era**

Despite the Mayor’s probable intentions in his press release, the Harrisburg incinerator would never operate within its normal parameters again. On December 18, 2000, two-and-a-half months after the release of the Commoner Report, the incinerator was closed. But the shut down was only temporary.

In January 2001, the city entered into legal agreements with EPA and DEP [Pennsylvania Department of Environmental Protection] that allowed it to restart and operate the facility at a reduced burning capacity while the proposal [written by Harrisburg officials to keep the plant open] and operating permit applications were reviewed by DEP. Smaller fans and electronic controls were added to reduce the plant’s combustion capacity. (Pennsylvania DEP, “DEP Reviewing Results”)
As Mayor Reed had stated in the Harrisburg press release, the plant had experienced a “tenfold reduction in emissions.” What he failed to reveal in the press release, however, was that, even with the tenfold reduction in emissions, the plant was still emitting high levels of dioxins. According to the agreements the city made with the USEPA and the DEP in December 2000, interim throughput at the facility was readjusted to 250 tons per day—the combustion capacity of smaller municipal waste incinerators. The city also agreed that if it did not pass its upcoming inspection, the plant would be permanently closed.

After re-opening in January 2001, the plant was tested for dioxin emissions in May 2001. One of its units had a concentration of dioxin of 1,775 nanograms per dry standard cubic meter, which is significantly above the 1,500 standard (Pennsylvania DEP, “Harrisburg Incinerator Must Take Corrective Action”). Along with paying a $10,000 fine, city officials agreed to modify the source of the problem—the plant’s electrostatic precipitators (ESPs, an air pollution control device)—in order to lower emissions to the acceptable limit. The agreement stated that the city had until June 18, 2003, to meet the emission standard or else Harrisburg would be required to “permanently close the derated, or modified, incinerator” (Pennsylvania DEP, “Harrisburg Incinerator Must Take Corrective Action”).

Despite all its legal and environmental problems—as well as protests by the Clean Air Council, a statewide non-profit citizen's organization dedicated to protecting the environment in Pennsylvania—on November 5, 2003, the Harrisburg City Council approved funding for a $72 million overhaul to the furnaces of the city-operated incinerator, enabling it to burn up to 266 tons of refuse derived fuel per day for the primary purpose of producing energy (CBLL Internet). This new electrical power plant was planned to begin operations in January 2006.
Contextual and Image-Based Differences between the Ames and Harrisburg Facilities

Unlike Mayor Reed’s bold counter-attack against the Commoner Report, city officials in Ames took a different approach in defending the reputation of their plant, their city, and themselves as individuals. Their discourse strategy, though, may have differed because of four substantial differences in both the function and image of the two cities’ facilities.

Type and Classification. Because the Harrisburg facility burned one-hundred-percent refuse, it was classified by the USEPA as a large-scale, municipal waste incinerator. When its throughput was reduced to 250 tons per day, it qualified as a small-scale incinerator. All municipal waste incinerators are subject to stringent monitoring requirements and emissions standards for a wide range of pollutants, including dioxins. The Ames facility, on the other hand, is defined by the USEPA as a co-fired plant because no more than twenty percent of its fuel source consists of refuse derived fuel, the remaining eighty percent being coal. Although both state and federal agencies have monitoring and emissions requirements for the Ames plant, there are no USEPA regulations for dioxin emission from co-fired plants. By law, local authorities are responsible for establishing appropriate emission levels.

Primary Function. The purpose of the Harrisburg incinerator was to reduce the amount of refuse deposited in the area landfill that was generated by residents in Dauphin County. Unlike the plans for the new municipal waste incinerator in Harrisburg, the use of heat generated by incinerating garbage for energy purposes was a secondary concern. In contrast, the Ames Municipal Power Plant was specifically constructed to produce energy. Accordingly, electrical plants have their own standards and emissions limits. However,
facilities such as the Ames Municipal Power Plant that burn garbage as a fuel source to primarily produce electricity are referred to as “waste-to-energy” plants. Waste-to-energy plants are often classified as incinerators because they usually burn one-hundred-percent refuse derived fuel rather than a mixture of refuse and coal. Because it only partially qualifies as both an electrical plant as well as an incinerator, the Ames facility received the specialized designation as a co-fired plant, which better fits its purpose and operation. The lack of regulations assigned to co-fired plants—and perhaps the reason why there is much confusion as to its official classification—is due to the small number of them operating across the nation.

**Performance Image.** As mentioned earlier, the Harrisburg incinerator was both locally and nationally regarded as a notorious source of pollution prior to the release of the Commoner Report. Many considered it a “trash burner.” Mandatory dioxin testing resulting from the establishment of the Clean Air Act helped reveal the extent to which the facility had polluted the environment during the past thirty years. In comparison, despite concerns held by a small minority of local environmental advocates (and the occasional roving band of activists aware of its semi-waste-to-energy operation), the Ames plant has a positive image, regarded by most as a clean and compliant facility. Constructed in the early 1970s under the auspices of the USEPA when the nation was looking for ways to reduce fossil fuel consumption in energy production, the Ames Municipal Power Plant was considered a state-of-the-art facility. Associating the combustion of garbage with the dual purpose of producing cheaper electricity by minimizing the amount of coal used framed “trash burning” as a more noble pursuit. Some local citizens, particularly city officials, regard the incineration of
garbage as “refuse derived fuel” in this manner, which informs their identity as being environmentally aware and responsible people.

**Financial image.** Detractors of the Harrisburg incinerator publicly cast it as a money pit. An audit by KPMG, Inc., confirmed their beliefs. “The Resource Recovery Fund [the line of money that finances the operation of the Harrisburg incinerator] has experienced significant operating loses and has an accumulated deficit of $13,494,792 at December 31, 1999” (Coalition Against the Incinerator, “Independent Audit”). In addition to expenses associated with maintaining regular operations, the city had been fined for emissions violations. It also had to borrow money to pay for plant modification that allowed the facility to burn smaller volumes of garbage. Combining the image of a financially inefficient facility with that of a dangerous source of pollution in turn casts a dark image on the city of Harrisburg as fiscally and environmentally irresponsible. Conversely, the city power plant in Ames had the image as being a stable and efficient provider of electricity to residents. By charging the same rate for electricity over the past fifteen years, the Ames Municipal Power Plant projects the image of Ames as a progressive and effective municipality, saving residents money in both taxes and electricity bills.

**Image Advantage**

With such a negative image already constructed in the public mind, it is not surprising that Harrisburg officials would be defensive to the point of issuing an immediate, ad hominem attack against Commoner and his study. The existing historical and scientific evidence against the incinerator presented Mayor Reed with a significant obstacle in defending his city. Additionally, the Mayor would have known at the time of his statements
against Commoner that the plant was destined for closure in December 2000. It is highly likely that at that point the city had nothing to lose from attacking Barry Commoner’s image as a scientist.

Though it is unclear the degree in which the Commoner Report caused operation of the Harrisburg incinerator to change, it is reasonable to assume that it did not help the city’s case to keep it open. Due to the plant’s historical and material conditions, it also seems reasonable to assume that there was little the city could do to prevent its inevitable closing. Despite the use of similar warrants in their argument against Commoner, Harrisburg lacked the advantage of image-power. Accordingly, they lacked paths of recourse in which to continue the defense of their incinerator. And even if they had, like the city of Ames, hired a local scientist to study the Commoner Report, waited eight months to release the results in the form of a scientific report, and used the media to propagate a series of themes that continued to disparage both the reputation of Barry Commoner and the results from his study, it seems unlikely that the original plant would remain open today. Unlike the Ames power plant, the image of the Harrisburg incinerator as a problematic and dangerous facility was too much to overcome. The Commoner Report only seemed to reify this image in the generic form of scientific knowledge.

**First Response: The City of Ames Press Conference**

On October 4, 2000, the day *The Des Moines Register* published Commoner’s accusation, it didn’t look good for Ames. Shelia Watt-Cloutier, Chief of the Inuit, said, “It is not just about contamination on our plate. This is a whole cultural heritage. Our connection to the land still exists very strongly. The last thing we need at this time is to have to worry
about the very food we rely on to nurture us spiritually and emotionally to be contaminated” (Beeman, “Ames Dioxin”). Ames city leaders, caught off guard, held a press conference, maintaining its innocence and criticizing the manner in which NACEC released its findings.\textsuperscript{40}

To intensify the iniquity of Commoner’s allegations, Kindred makes it clear that Ames has addressed, or at least values and respects, the exigencies of the controversy—established through the ethical warrants of Commoner’s argument in his coordinated artifacts—in both Nunavut and Ames.\textsuperscript{41}

We are here today to respond to allegations of dioxin pollution leveled against the city’s Resource Recovery and Electric Services operations by the North American Commission for Environmental Cooperation, or NACEC. In the city of Ames, we are certainly concerned with the reported effects of dioxin pollution in Canada’s Nunavut province, as well as elsewhere. Protecting the quality of air for our citizens and for those outside our community is a major concern to the city of Ames.

To the best of our knowledge, NACEC has no legitimate basis for including Ames in their report since our co-fired generation plant does not produce dioxins. This group’s press release attributes dioxin pollution in the northern Nunavut province in Canada to our electric generation plant under a false premise. Ames has a co-fired, electric generation facility. Shredded municipal solid waste, from which metals and other recyclables have already been removed, is mixed with coal and burned—with high BTU-value coal—producing high temperatures, which burn up and eliminate dioxins. Since our plant does not produce dioxins, we have no idea why Ames was included in NACEC’s widely publicized list of polluters. Prior to

\textsuperscript{40} Although Ames Assistant City Manager Bob Kindred began the press conference by only referring to the Nunavut territory by name twice, it was the only time he (or any other city official) mentioned the affected area. The remainder of his prepared opening statement countered Commoner’s allegations by questioning his methods and motives responsible for irreparably “maligning” the reputation of Ames, its plant, and its citizens.

\textsuperscript{41} In this particular excerpt, italicized text highlights Kindred’s recognition of exigencies defined by Commoner’s ethical warrants. Bolding in excerpts from all transcribed accounts of this press conference should be regarded as emphasis that I have provided to help the reader locate the analytically relevant information within the “textual context” from which it originated. More specifically, bolding marks evidence used and claims made by city leaders and experts that point toward one of the four embedded warrants/values introduced at the beginning of the chapter. Excerpts that lack bolding should be regarded as discourse examples that I consider entirely relevant.
releasing their information, they never contacted us to learn the nature of our facility. At least one other affected community has questioned Dr. Commoner’s scientific methods and motives.

While we take no issue with researchers drawing attention to valid public health risks, we feel that NACEC owes Ames’ citizens a huge apology for unfairly maligning our reputation across the entire nation. We intend to contact NACEC and ask them to retract their allegations based upon accurate information; however, damage to our community’s reputation has already been done. The city of Ames has a long history of environmentally responsible initiatives in serving our citizens, including the establishment of our Resource Recovery and Electric Services partnership twenty-five years ago in 1975. We would never knowingly take actions which jeopardize the health of our citizens or of others. (“City of Ames Press Conference”)

Making statements that the city is concerned with the “effects” of dioxin production (but not the deposition itself) and using language such as “protecting air quality” for “citizens and others,” allows Kindred to associate Ames with environmental values and concerns—confirming officials’ and citizens’ identity while projecting a positive civic image for other local audiences. Though Kindred aligns Ames with Commoner’s values of ethical and responsible behavior, he draws a clear line between Commoner and researchers who bring up “valid health concerns.” According to Kindred, Commoner has clearly contradicted what city officials, experts, and authorities already know: the Ames plant does not produce dioxins. Therefore, the city believes that its plant should not be included in the Commoner Report. Its appearance in the top-ten list of worst dioxin polluters, Kindred reasons, is due to misunderstanding and suspect scientific activity. In reading this prepared statement, Kindred has taken the first steps towards reframing the controversy and reclaiming the city’s image as “environmentally responsible” by establishing the four key warrants presented at the beginning of this chapter: local and empirical knowledge is best, poor scientific practice
yields poor policy, only governmental agencies authorize standards and policy, and using poor science to promote poor policy shows political motivations.

Merlin Hove, Director of Electrical Utilities at the Ames Municipal Power Plant, followed Kindred during the press conference and continued the argument that both the power plant and the city are victims of misperception. Hove stressed that nothing sinister or covert happens at the power plant, that it has been, and still is, open for public and administrative observation.

One of the things that happens at Ames occasionally is that we’re misunderstood. Our plant is very unique and different from many, many other plants. And I will tell you that we’re having an open house on October 14 to help explain how our plant works to our people in the community. Because this is a frequent question: How does our plant work? Is it environmentally responsible? Bob said it very well; we believe we are extremely responsible. We have nothing to hide.

Just one testament to what’s going on here, when we dedicated this plant in 1975, Russell Train, the head of the EPA [during the Nixon/Ford administrations], was here to speed us on to this project. And they as well have looked over our shoulder all along as to what we’re doing. And so we are very open to what we’re doing here, and we believe it is very responsible. (“City of Ames Press Conference”)

Hove’s description of Ames and its plant as being “misunderstood,” “unique,” and “different” demonstrate a conflict between the city’s identity as “extremely responsible” and the negative image of being a “polluter” resulting from press coverage of the Commoner Report. The clash between identity and image that Hove highlights here indicates that there is a clash in what stands as the “truth” in this situation. And, as Lakoff stated, contrasting truths signal conflicting frames. In this case, the disagreement in frames between Commoner and the city revolves around what counts as responsible civic behavior regarding what is (or is not) happening in Ames. Nunavut is not included in this conversation.
To help the city re-claim its “extremely responsible” image, Hove has provided the audience at the press conference evidence—facts about the Ames Municipal Power Plant that represent the “truth” about its operation—that supports its counter-attack and establishes the warrant of regulatory authority. By describing the role of the USEPA during the construction of the plant as “speeding” Ames along, actively monitoring the city’s activity over the years by “looking over its shoulder,” Hove provides an example—“testament” he calls it—that concretely portrays the Ames Municipal Power Plant as a facility that, from its beginning, has had nothing to hide. If the USEPA has endorsed the Ames Municipal Power Plant from the start, the image of Ames as a city conducting “responsible” electricity producing practices, it would reason, is justified. Furthermore, mentioning Russell Train by name aligns or associates Ames with its own famous and influential environmentalist and scientist, thus countering Commoner’s own expert-image. Russell Train’s endorsement of the Ames Municipal Power Plant, then, stands in direct contrast to Commoner’s accusations. By dropping a reputable name, Hove suggests that there is “good reason” to doubt Commoner’s authority.

Hove continued to take questions regarding another recent activist group that questioned the safety of the emissions from the Ames Municipal Power Plant and the scientific validity of Commoner’s claim that dioxin formed at the Ames power plant once effluents left its stack and cooled in the exhaust plume.  

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42 From the comments made during the press conference, it seems that dioxin was not a compound that this activist group worried about. Unfortunately, no information about this group or the nature of their debate was found in The Ames Tribune archives. This group’s protest, however, appears to be an important detail in this story, especially its proximity in time to the release of the Commoner Report. Both the protest and the Commoner Report led
I believe your question is, you understand that people are saying, or Mr. Commoner is saying, that, on cooling the exhaust from burning municipal solid waste, that the dioxins would condense and reappear. And that is something that he feels that we are not recognizing. And the response to that is, that is a concern on low temperature burning plants, which most of the plants that are talked about in the report are lower temperature burning plants. And that is a concern that would mostly accrue to that type of plant. Our belief is that there are no dioxins to recondense after the very hot burning takes place. (“City of Ames Press Conference”)

Evidence of local, community knowledge about the proper classification of the Ames Municipal Power Plant (a co-fired plant) allows the audience to differentiate it from Commoner’s mistaken definition as “that type of plant” (an incinerator). Because it is presented as inaccurate information, non-experts will recognize both Commoner’s evidence and his resulting claim against the power plant as possessing low value. Knowing that a co-fired plant operates differently undercuts Commoner’s claim that dioxins condense and reappear in cooler parts of incinerators regardless of the temperature at which the boilers burned. The warrant that local and empirical knowledge has high value permits the audience to connect the proper definition as evidence supporting the city’s declaration that Commoner knows nothing about this particular facility.

Eventually, Al Joensen, retired Professor of Mechanical Engineering at Iowa State University, was invited to discuss the science behind the technology of power plants fueled by refuse derived fuel. He began his explanation through storytelling, recounting his expert credentials to speak about the current situation by telling the story of his involvement in the creation of the Ames Municipal Power Plant. He worked for consulting firms investigating co-fired plants, such as the one in Ames, when they were a new technology in the production of electricity. When asked to comment on Commoner’s allegations, Joensen was adamant in me as a researcher to question whether testing would provide empirical data to prevent future activist groups from “misunderstanding the uniqueness” of the Ames Municipal Power Plant.
his opinion that Commoner’s claim that the Ames Municipal Power Plant created dioxins was not only false, but the scientific methods and motives behind those claims were, at the very least, misguided and flawed, particularly in the way Commoner defined crucial terms associated with the controversy.

I was asked to look at this press release and see what comments I may have. . . . The first thing to recognize is as soon as they mention the word “incinerator,” that indicates to me, what are we really talking about here, because “incinerator” is really where you take a furnace and you just burn municipal waste in it. And this is 1950 technology where there was a large emission of dioxins. The technology was improved, and the proper technology now is three-fold. That is what is known as mass-burn waste energy systems, we have co-firing such as we have at Ames, and then we have 100-percent processed refuse. So it’s not shredded refuse but that refuse quality has been cleaned by a series of processing steps.

Now in those particular units, municipal waste or 100-percent refuse-derived-fuel, the energy content of the refuse is only about 4,000 BTU; therefore, you cannot reach the high temperatures in the furnace, and that’s conducive with other conditions—small furnace, the presence of chlorine—for the formation of chlorinated dioxins. So that’s what makes the Ames plant unique, in that the environment of the burning process precludes even the formation in most, most cases of dioxins.

I have no idea [why Ames was on the list of the top ten polluters]. Without reading Barry Commoner’s report, without reading what amounts of concentrations he used in his model, I’m highly suspect [of his claim]. Because when you read some of the other descriptions, he defines a dioxin to also include polychlorinated biphenyls, which is transformer oil. That’s not a dioxin. So he’s using these terms together says, “Hey, wait a minute. They really haven’t defined a problem.” And they’re potentially creating an emotional response. (“City of Ames Press Conference”)

By critiquing Commoner’s use of the terms “incinerator” (to categorize the Ames Municipal Power Plant) and “dioxins” (to include polychlorinated biphenyls, which are commonly referred to as “PCBs”), Joensen implicitly claims that Commoner is both engaging in poor scientific practice as well as working from a political basis. From a technical perspective, Joensen understands the powerful images that come to mind when an individual hears these terms. He correctly identifies each word as having an emotionally influential message for its
audience. Likewise, Joensen carefully uses words that positively refer to improved technology as “mass-burn waste energy systems” that use “cleaned, quality refuse.” These terms convey positive (or neutral) emotional images commonly projected by technical jargon. Additionally, Joensen’s careful choice of words supports the value of local, community knowledge, which in turn supports the “environmentally responsible” image of the city and its power plant.

Later in the press conference, Joensen denies the need for testing by changing the warrant of Commoner’s argument, relying on a straightforward logic that appeals to authority. Citing Electrical Service officials’ current compliance with existing regulations, as well as the absence of a request for testing from either the DNR or the USEPA, Joensen builds the city’s new frame of exigency that, if fulfilled, would legitimately warrant re-testing as an appropriate action. However, because these two agencies are the only ones authorized to demand a stack test, and neither has made such a request, Commoner’s call for action is out of place and illogical. Stated another way, in Joensen’s estimation, re-testing should not even be an option for the Ames City Council to consider because the request for testing did not originate from these authorized agencies.

I would like to respond to this question about “Should the plant be tested now.” As part of the 1990 Clean Air Act, there is an amendment to that that is known as Title-V. Title-V requires the operators of the Ames plant to file what their emissions levels are with the state DNR. They review that, and if they have any questions about that, they can require a stack test, as we say.

So, because Ames has submitted the Title-V report saying these are all our emissions, it has never been questioned by DNR. They are comfortable with it. That’s why, personally, based on earlier work, and the Title-V, they’re not questioning it. Therefore, I don’t feel it’s necessary. DNR has to initiate that. They’re comfortable with our emissions; all of our previous test data was submitted to them. And, therefore, they feel no testing is required. That’s my
answer as an individual to that. So the Title-V covers that phenomena. Maybe something has changed? It has not. ("City of Ames Press Conference")

By changing the requirements for conducting stack testing to satisfy the exigency of investigating suspected dioxin production from a facility, Joensen reinforces the image of the Ames Municipal Power Plant and city officials as responsible and worthy of trust. If we accept the warrant that only governmental agencies authorize standards and policy, we should then accept the absence of a request from either of the two authoritative agencies as evidence that testing is not responsible action because it is unnecessary, which is Joensen’s primary claim. Likewise, in light of the lack of evidence from the two authoritative agencies, the presence of Commoner’s request for testing indicates to the public something about Commoner. If only an institutional or regulatory code and the subsequent authority granted to agencies that enforce that code warrant testing is true—if it is a value that we accept—then Commoner image is diminished. Without affiliation or association with the USEPA or the Iowa DNR, Commoner is cast as an irreputable authority to demand a facility to perform stack testing let alone make an accusation against it. Essentially, Joensen is telling the non-expert audience we cannot, and are not obligated to, serve two masters.

When asked what legal activity city officials planned to take against NACEC, Kindred chose to express how disturbed Ames officials became after learning about Commoner’s allegations rather than concretely elaborate on what would happen next. Despite the clear intentions expressed at the beginning of the press conference that Ames would indeed contact NACEC and ask for a retraction, Kindred would not commit to any action, request, or intention. However, in his response, he consistently repeated how “upset”
the city was at Commoner and the allegations he made against the power plant, language that reveals the warrant that those who are scientifically irresponsible are politically motivated.

The question was “Whether the city intended to take legal action against this research group for the report.” And it’s premature, really, to respond to that. You know, I had not personally ever heard of this group before yesterday. And yet, today, across the country, we’re listed as a top polluter in the nation. I know that our mayor and members of our city council are very upset that someone, without even consulting us and verifying the facts behind their allegations, would treat us that way. That’s very upsetting. As far as what actions the city will take, I’m not prepared to say at this time.

[Taking legal action] is a possibility. The unfortunate thing about rumor and incorrect information is that it can be cast freely into the wind and never recovered. That’s what’s important here—is what this group has done to our reputation and to the trust which our citizens and others around this country put in the city council and those who run this city. And that will never be recovered. That’s really what is most upsetting. (Ames City Press Conference)

As Kindred reveals in this excerpt, what the city values most in this controversy is the image projected to both local and national citizens that its officials are unworthy of trust. However, he is only able to express this as the most important matter because Kindred trusts community knowledge that the Ames Municipal Power Plant does not produce dioxin and, thus, the city is neither responsible for the dioxin deposited in Nunavut nor the negative health effects that the Inuit may suffer. It is possible that Kindred resents Commoner because his allegations against the power plant have damaged both the city’s image and image-power, which he claims “will never be recovered.”

Although Kindred declares the city’s reputation as unrecoverable, describing the claims against the Ames Municipal Power Plant originating from the Commoner Report as “rumor and incorrect information” demonstrates that city officials are indeed using the press conference as a means to restore their image by labeling for audiences the true nature of what Commoner and his “upsetting” allegations are. The implied value of poor scientific practice
yields poor public policy, warrants city officials and non-expert citizens to feel negative emotions regarding Commoner’s claims. Any activity possessing such low value, the logic seems to follow, cannot reflect the truth of the matter and, therefore, does not merit the public’s trust. If the audience doubts Commoner’s recommended policy because his study is not based on accurate historical and scientific information, and Ames officials have presented them the truth about the power plant, the city will have successfully implemented the first phase of reclaiming its image as “environmentally responsible” by reframing the controversy. With these four warrants tacitly embedded in the public’s mind, the city is prepared for the second and final phase of its campaign to counter Commoner’s claim: A critical and scientific examination of the Commoner Report conducted and presented by Brown.

The Value of Identifying Warrants in Environmental Discourse

Identifying how new warrants are introduced to civic discourse about the Nunavut-Ames controversy demonstrates not only differences between Commoner and the city in defining exigency but also the similarities about the role of science each side holds in the debate. As evidenced by his 100-page report and long career as a scientist, Commoner values the practice and application of science to tell us about the physical world as we know it. Likewise, the experts chosen by Ames city leaders to discuss and study the operation of the Ames Municipal Power Plant and its relation to dioxins (namely Joensen and Brown) are dedicated and distinguished scientists who believe that science has the power to explain something about the unseen. Therefore, it is reasonable to say that each side of the debate values science. Although they differ in their knowledge and practice of science regarding dioxin formation and deposition from burning garbage as an energy source, they share in the
belief—in the warrant—that science is the process that will provide us answers about what happens when refuse is burned at a facility such as the Ames Municipal Power Plant. In other words, both Commoner and the city share the “warrant of science.”

In contrast, what the previous excerpts from Kindred, Hove, and Joensen show us are differences in the warrants—the values—used by each side to explain their positions. Whereas Commoner draws upon a warrant of ethics as a frame for responsibility, Joensen presents a warrant based upon authority to reframe the issue of responsibility. However, by following the web of discourse surrounding conflict such as the Nunavut-Ames controversy, we may see where reasonable values and warrants are distorted by questionable evidence. For example, when news of Commoner’s accusations against the Ames Municipal Power Plant was released the Iowa DNR showed concern. Brian Button, DNR spokesperson, wasn’t surprised “that emissions from Iowa have an impact in Canada or elsewhere in the US, especially for these chemicals. They are persistent. They can travel great distances, even around the world. We are very concerned about these” (Beeman, “Ames Dioxin” 1B, 7B). When asked in a separate interview about the levels of dioxin documented in Title-V emissions reports that the city of Ames had submitted to the DNR on behalf of the Ames Municipal Power Plant, Buttons stated that Iowa lacks a state dioxin-monitoring program, which he labeled as “deficiency” in its testing requirements (“Ames Officials” B6). This “deficiency” means that the DNR never questioned Ames’ emission reports because dioxin levels aren’t included in those reports. Because there is no data to assess, the DNR would not have a reason to request the Ames plant to test for dioxin.

Based on Button’s comments, Joensen’s statement during the press conference that “because Ames has submitted the Title-V report saying these are all our emissions, it has
never been questioned by DNR” is inaccurate, leading the audience to believe that the DNR knows from Title-V reports that the Ames Municipal Power Plant does not emit dioxins. Therefore, Joensen’s claim that the city’s power plant should not be tested because the DNR had not requested a stack test is specious, even though it is built upon a reasonable premise that the DNR is a proper authority to propose standards and regulate policy. The problem with the warrant lies with Joensen’s understanding that most of his audience will attribute a high degree of recognized authority to the DNR. Such attribution presumes that the authority’s judgment reflects an objective reality. Again, Joensen has shifted the authority for recognizing exigency (and demanding action) away from the warrant of ethics framed by Commoner and NACEC and pushed it toward mainstream regulatory procedures (Title-V emission reports), policies (The 1990 Clean Air Act), and agencies (the Iowa DNR and the USEPA) by introducing a new warrant of authority. Such analysis leads us to see how blind adherence to reasonable values, rules, and warrants can possibly cause us to accept seemingly logical but specious claims.

Furthermore, recognizing both the similarities and differences in argumentative warrants supports Miller’s statement about conflicting scientific evidence in environmental discourse: incommensurability is not a productive rhetorical term to explain why scientists cannot agree on an issue. Though Commoner and Brown will disagree on the facts surrounding the Ames Municipal Power Plant, the two scientists are equally separated by different values that warrant action to occur. Therefore, the Nunavut-Ames controversy is not exclusively an issue of answering the question of “whose science is better” but, rather, a case of resolving the dilemma of “what’s the best thing to do.”
If, indeed, the Nunavut-Ames controversy is a contest between the two sides in convincing non-expert decision-makers about what should be done about this environmental crisis, we see that this is not a purely scientific issue. It is, as Bauer describes, a trans-scientific issue—a controversy framed in scientific terms that cannot be answered by science alone. Consequently, if non-experts are not aware of the use of warrants in argument—the ability to rhetorically analyze the discourse of scientists in an environmental controversy—they may misrecognize a trans-scientific issue as a Scientific issue, which emphasizes the presentation of extraneous and misleading values over applicable warrants that provide a logical relation between claims and the scientific evidence that supports it. Such a perspective prevents non-expert participants and observers from consciously distinguishing arguments based on scientific evidence from those based on Scientific evidence.
Chapter 5

“Political Science”: The Epideictic Performance of Forensic Evidence and Scientific Discourse Conventions to Resolve the Nunavut-Ames Controversy

Science is always linked to social, political, and economic concerns. In struggles over public policy on the environment—when the scientific evidence offered to the public by experts on opposing sides of an issue is conflicting and there is no regulating agency to resolve the controversy—what influences those in power to act? This question drives Chapter 5.

Typically, scientists write articles and reports about experiments they have conducted, the data they collected from those experiments, and the meaning of that data in regards to confirming or denying the hypothesis that initiated their inquiry. As discussed in Chapter 3, discourse that focuses on reporting the factual occurrence of past events is said to primarily perform a forensic function. However, whenever scientists (or anyone else, for that matter) use forensic evidence to create discourse that critiques current conditions or practices, they engage in an epideictic endeavor, employing a “rhetoric that builds and sustains cultures, [which makes it] political by definition” (Sullivan, “Exclusionary” 285).

But as Rude demonstrated through her expanded notion of delivery, discourse events (including those that address environmental controversies) are not isolated incidents; rather, they are connected to other actions and utterances. These connections result in a “web of discourse” that informs and shapes the story that the public receives about the culture being built or sustained. By studying the final, scientific discourse regarding the Nunavut-Ames
controversy, I demonstrate how the appeal of community values established in first-response
discourse of city leaders was supported with local and contextualized scientific knowledge,
resulting in an effective criticism of the practice and persona of Barry Commoner as a
scientist. I argue that this critique contributed to the persuasion of decision makers on the
Ames City Council to vote against testing the Ames Municipal Power Plant.

Essentially, the Brown Report stands as the second phase of discourse activity
conducted by the city of Ames to counter the accusations made in the Commoner Report
against its municipal power plant. As presented in Chapter 4, Ames held a press conference
in which its officials and local experts presented new arguments that challenged the values
presented by Commoner regarding what warranted remedial action and empirical testing for
the top-ten worst facilities suspected of depositing dioxins in the Nunavut territory. These
new values presented during the Ames press conference focused on the specificity and
uniqueness of the city’s power plant, the relation between poor scientific practice and the
policy that it informs, the proper authority to both evaluate plant performance and
recommend change, and the political motivations behind using poor science to promote
policy.

The significance of introducing these new values to public discourse about the
controversy had two major effects. First, presenting counter-arguments centered on the
uniqueness of the Ames Municipal Power Plant problematized both Commoner’s study as
well as his abilities as a scientist. Placing reasonable doubt in the minds of the general public
allowed city leaders to delay taking Commoner’s recommended action of testing the plant.
The four values, or warrants, embedded in the city’s defense against Commoner effectively
contributed to the reframing of the Nunavut-Ames controversy in regards to what was going
on in Ames and what action would best resolve it. Second, the four new warrants established
during the press conference provided an argumentative framework for the ensuing report
conducted by local scientist and ISU professor Robert Brown. Six months after forming an
ad hoc committee in October 2000 to investigate what the city should do about its power
plant, Brown was commissioned to further study the Commoner Report and recommend
whether or not the city should test the Ames Municipal Power Plant for dioxins. In June 26,
provided the council forensic evidence—gathered from the results of past empirical studies
as well as related, up-to-date scientific literature—that supported not only his claim against
testing but also the warrants underlying that claim.

As stated in the Brown Report, the first objective of Brown’s study was to “review
the Commoner study to understand its claims as well as its underlying assumptions” (Brown
Report 2). On the surface, a written “review” suggests that Brown will indeed create forensic
discourse, studying the Commoner Report, assessing what Commoner did in his study, and
explaining Commoner’s conclusions. In actuality, the Brown Report contains a scientifically
informed critique of Commoner’s study that directly counters Commoner’s call for stack
testing at the Ames Municipal Power Plant. Essentially, Brown’s demonstration that
Commoner’s study was full of errors, miscalculations, and improper protocol provides
audiences a new perspective in which to view Commoner’s Hybrid Single-particle
Lagrangian Integrated Trajectory (HYSPLIT) computer model. In some ways, the Brown
Report achieves a limited deliberative purpose—the Ames City Council should (and did) not
vote for testing the plant. But I argue that the Brown Report successfully convinced the
council to vote against testing because it successfully fulfilled its epideictic function.
In a manner similar to the Commoner Report, the Brown Report is an example of how the genre of scientific reports written for non-experts in public policy matters differs from those scientific reports published in scientific journals for the purpose of disseminating the results of scientific inquiry to other scientists. Although it is an example of environmental discourse, the Brown Report differs from the Commoner Report in that it does not advocate social change; rather, it seeks to silence further discussion on the issue. Recognizing the audiences, contexts, and purposes associated with these two reports allows us to rhetorically understand how the scientists use discourse to influence the outcome of controversy. The importance of recognizing the differences in audiences, contexts, and purposes allows us to read these reports in a more informed and critical manner that reveals what is scientific and what is not.

To demonstrate how the Brown Report used local scientific evidence and values to both critique Commoner as well as re-establish Ames’ positive community identity/image, this chapter begins with a brief contextual analysis that situates the social and professional relationship between Brown and the city. Because of his affiliations with Iowa State University and the city of Ames itself, Brown entered the controversy with a high level of trust (ethos) within the Ames community prior to his investigation. The force of this trust is compounded by Brown’s support of, and identification with, the values and beliefs presented in the warrants embedded in the arguments city leaders’ presented in previous discourse.

After establishing Brown’s relation to the city and the evidence he provides its decision-makers to support his recommendation to not test the plant, I trace the rhetorical action performed by the four major claims Brown makes in his report. Brown’s four claims are supported by both scientific evidence of previous empirical data and current academic
research as well as the community values previously established by city leaders during their October 2000 press conference. I argue that Brown’s presentation of scientific evidence in his scientific report is not for forensic purposes alone but, rather, also activates the epideictic and political nature of environmental discourse—giving facts meaning by tracing their connection to the identity (which reinforces the image outsiders have) of the city, its plant, its citizens, its knowledge, and its way of life. I follow my examination of Brown’s presentation of forensic evidence with a summary of how the Nunavut-Ames controversy ended.

Based on comments made by Commoner and Brown, I end the chapter by speculating on alternative factors that contributed to the failure of the Commoner Report. Contrasted with other examples of environmental discourse aimed at influencing social change, I suggest that the Commoner Report failed to achieve its goal because it was unable to meet the conventions of specialized scientific discourse. Without adhering to these conventions, the Commoner Report could not provide enough “rhetorical energy” to convince Ames decision-makers that he was anything more than an advocate for the Inuit.

**A Scientist in Their Midst: A Brief Introduction to Robert Brown, His Report, and His Affiliation with the City of Ames**

When the city of Ames commissioned Brown to study the Commoner Report in April 2001, Bob Kindred announced that its “‘only objective was finding out the truth’” (Grebe, “Council Takes on Dioxin Dispute” A8). More specifically, the official and primary purpose of Brown’s study was to determine whether “comprehensive and periodic testing for dioxin” at the Ames Municipal Power Plant was indeed necessary. Commoner had presented one view of truth in his report, which was that Ames’ power plant was responsible for a significant amount of dioxin deposited in Nunavut, Canada. Kindred’s statement, however,
indicates that Commoner’s understanding of the truth about the power plant, regardless of the scientific evidence Commoner offered in his report, did not match the truth as known by Ames’ city leaders. It is true that Commoner’s scientific evidence did not convince the Council to immediately test because they were threatened and offended by his allegations against the Ames Municipal Power Plant. But another reason they were not motivated to act on Commoner’s accusation was because it did not make sense to them. It conflicted with what city leaders knew and believed about their hometown facility.

When Brown was commissioned in April 2001, it was clear that he, too, doubted the accuracy of the information contained in the Commoner Report (Grebe, “Council to Discuss Dioxin Report” B8). It is equally clear that, although the scientific and regulatory issues concerning dioxin emissions were outside of his immediate area of expertise, Brown conducted a thorough study of the existing scholarship and regulatory guidelines on the matter.43 A trained scientist and distinguished professor, it is reasonable to assume that Brown approached his commission with a high degree of objectivity. On the other hand, it is impossible to ignore Brown’s affiliation with Iowa State University as well as his status as an Ames citizen and what influence, if any, these relationships may have had on his review of the Commoner Report.

Although the purpose of this study is not to guess at the specific motivations and potential biases that Brown may have experienced while conducting his review of the

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43 According to his biography posted on the Ames Municipal Power Plant Website, Brown is a professor of chemical engineering and sits as the Bergles Professor of Thermal Sciences. He received a Ph.D. in mechanical engineering from Michigan State University in 1980. Though his research interests do not mention dioxins or other pollutants emitted from power plants, he does work with renewable and alternative energy sources, which loosely includes refuse-derived fuels.
Commoner Report, it does suggest that such affiliations are important in terms of how individuals not only create discourse but how they receive it as well. It is the relationship others perceive between knowledge and its source that underlies the analysis conducted here. As discussed in the previous chapter, Carolan and Bell argue that social relations with information sources mediate the connection between “truth” and “trust.” In rhetorical terms, this connection between truth and trust is an expression of ethos. In common sense terms, Carolan and Bell remind us that we tend to believe those with whom we identify. Furthermore, when the warrants underlying an expert’s argument match those previously expressed by non-experts, there is greater potential for stronger identification between audience and information source. When both the facts and values of discourse from a trusted source are in agreement with the facts and values held by an audience, it logically follows that such discourse is more likely to be accepted as the truth.

Before Brown presented his results to the Council on June 26, 2001, The Ames Tribune had already reported that Brown would recommend that the city not immediately pursue invasive and comprehensive testing of the Ames Municipal Power Plant boilers because Commoner’s estimates were “‘grossly inaccurate’” (Grebe, “Report” A8). Both the Council and the public were subsequently primed to hear exactly how Brown came to his conclusion. At the council meeting, Brown began his presentation by specifically defining the four-part purpose of his study and ensuing report.

The purpose of the study commissioned by the city of Ames is several-fold. First, it is to understand the Commoner study. There have been a lot of statements about what the Commoner study says. I don’t think at that point no one had gone beyond the Executive Summary that was released. I wanted to get in and look at the details of his study.
Second, I wanted to determine the regulatory limits and monitoring requirements for dioxin. I did not know this before I started the study. And I wanted to know what these were in the United States.

Third, I wanted to identify factors that influence dioxin emissions and their relevance to the Ames Municipal Power Plant. I had some ideas about this before I started the study. I wanted to get into a complete examination of literature on this topic.

And, finally, I wanted to estimate dioxin emissions for the Ames Power Plant and compare them with the numbers reported by Commoner. (“Ames City Council Meeting”)

With these four purposes in place, Brown was able to gather sufficient evidence related to dioxin emissions as it specifically applied to the city’s power plant. Relying on local knowledge of the Ames Municipal Power Plant — namely the history of its beginnings as well as the results from empirical tests conducted in 1981 — Brown was able to develop a defense that negatively critiqued Commoner’s study and practice as well as praised city leaders, plant officials, and, by implication, citizens in the responsible operation of their hometown power plant.

Throughout his presentation to the Ames City Council about the inherent problems with Commoner’s study, Brown uses language that identifies himself with members of the Council and the Ames community. In the following example, Brown differentiates between the two models Commoner employed in his study to make claims against the Ames Municipal Power Plant. The flaws Brown finds in Commoner’s computer model reside not in the HYSPLIT weather tracking program developed by the National Oceanic and Atmospheric Administration but in the element that provides numbers concerning the amount of pollution generated from North American sources, which Commoner called the “dioxin emission inventory” in his report. Though Brown uses powerful words such as “stereotype” to characterize Commoner and his study as unfair, unaware, and irresponsible, he also uses
words like “we” and “our” (marked with italics in the expert below) five times in his characterization. The excerpt also shows Commoner’s use of the word “fact” twice (also marked with italics) as a contrast to Commoner’s “errors.” Accordingly, the language Brown used to present his analysis of the Commoner Report demonstrates his identity during the controversy as both expert and citizen. In each of these roles, Brown positions himself as knowing the Truth, through Science, about the Ames Municipal Power Plant.

[T]his is where I had my greatest concern and disagreement with what Commoner had done. This inventory consists of 44,000 sources in the North American continent that are stereotyped in terms of their emissions. In other words, Ames is considered one of 44,000 sites that are considered emitters of dioxins, both large and small.

The question isn’t whether we are putting out the most dioxins, the question is whether the dioxin that is emitted ends up being an important contributor in other places in the North American continent. I use the word stereotype, because what I determined are errors that he made in terms of characterizing what the emissions are from our facility. And this is understandable; we were one of 44,000 sources.

Also in terms of understanding [this stereotype], I want to talk about this dioxin inventory a little bit more. The source of his information was the USEPA. I have no problem with that in the Commoner estimates; in fact Commoner’s estimates did not apply to us. In fact, what I discovered is his estimates of dioxin emissions for Ames was based on simply averaging all of the data in the USEPA inventory, which I don’t think is a fair characterization for us. . . . And the facility throughput again is a number that I’m not sure where Commoner got his information; I went directly to the city to get mine. (“Ames City Council Meeting”)

The repeated use of “we” and “our” that occur above, as well as throughout Brown’s presentation, suggest that Brown associates himself (and rightfully so) as a citizen of Ames, taking some ownership or allegiance to the city and its power plant. His language reflects someone who, in Mayor Tedesco’s words, considers Commoner’s study a “mark on our credibility” (“City of Ames Press Conference”).
Furthermore, in contrast to Commoner’s discourse during his November 2000 lecture, Brown works to break the connection between Ames and Nunavut by keeping the focus on Ames and its plant. In the excerpt above, for example, he does not mention the Inuit in regards to the allegations against the Ames Municipal Power Plant, opting instead for the less specific phrase “in other places in the North American continent.” Breaking this link alters the exigency—and thus the frame that defines what is going on in this situation—as it applies to Ames, not Nunavut. As Brown states in the first sentence of the second paragraph in the excerpt above, Commoner must demonstrate that dioxin which may be emitted from Ames is indeed “an important contributor” in Nunavut. Brown builds a case against the likelihood of Ames’ culpability by questioning “where Commoner got his information.” Essentially, Brown implies that Commoner is unable to satisfy the requisite burden of scientific proof confirming that Ames Municipal Power Plant emissions harm the Inuit. The last statement in the excerpt begins Brown’s portrayal of Commoner as a poor scientist.

The majority of the remaining chapter unpacks the discourse of Dr. Brown to show how the scientist offered his version of truth about the city’s power plant. The following sections organize the scientific evidence Brown cites in his report according to the following four, major rhetorical actions:

- Reclaiming Community Knowledge About the Ames Municipal Power Plant as a Particular and Unique Facility
- Identifying Scientific Inaccuracies in the Commoner Report
- Establishing the Ames Municipal Power Plant as Both an Autonomous and Regulations-Compliant Entity
- Revealing the Political Agenda of Barry Commoner, Advocate
Each of these actions is based upon the four values, or warrants, previously presented by city leaders and are intended to collectively and simultaneously restore the image of the Ames Municipal Power Plant while damaging the image of Commoner as both a legitimate scientist and trustworthy recommender of public policy.

Reclaiming Community Knowledge about the Ames Municipal Power Plant as a Particular and Unique Facility

Ames’ Director of Electrical Utilities Merlin Hove perhaps best expressed the image he believes outsiders have of the city’s power plant.

One of the things that happens at Ames occasionally is that we’re misunderstood. Our plant is very unique and different from many, many other plants. And I will tell you that we’re having an open house on October 14 to help explain how our plant works to our people in the community . . . [and whether it is] environmentally responsible. We believe we are extremely responsible. We have nothing to hide. (“Ames City Press Conference”)

Although Brown represents the uniqueness of the Ames Municipal Power Plant in his report, he does not use language that directly describes the plant as an entity easily misunderstood. Instead, Brown introduces the concept of misunderstanding the Ames plant through the presentation of Commoner’s use of a suspect experimental design. Specifically, Brown states that Commoner’s misunderstanding about the nature of the Ames plant was due to the number of facilities examined in the study: “[I]t was not practical for [Commoner’s] research team to individually classify each of the MWC [municipal waste combustor] included in the study” (Brown Report 17). Without individual classification, Commoner had to generalize his inventory information for each type of site tracked by the model. These “assumptions,” Brown points out, resulted in many “overestimations” and “errors.” In
particular, Brown presents three significant and egregious errors Commoner made in his assumption that the Ames plant was like all other facilities that burn garbage:

- Incorrectly defines the Ames Municipal Power Plant as an incinerator instead of a co-fired power plant
- Ignores operational conditions and parameters in place at the Ames Municipal Power Plant
- Unaware of previous empirical tests confirming that the Ames Municipal Power Plant does not produce dioxins

Brown provides several examples in each of the above instances demonstrating that Commoner failed to understand the Ames facility as a particular and unique entity and that these errors subsequently led him to make crucial errors in his calculations.

**Definition: The Ames Municipal Power Plant Is a Co-fired Power Plant, Not a Trash-burning Incinerator**

Commoner mentioned during his November 2000 lecture that he did not find the Ames Municipal Power Plant listed in the USEPA inventory of active incinerators, claiming that its absence was merely an oversight on the part of the USEPA. Brown, however, stresses that the absence of the city’s power plant from the USEPA inventory of incinerators is a significant exclusion because it is not an incinerator. Despite the fact that the Ames Municipal Power Plant burns municipal solid waste as “refuse derived fuel,” the USEPA officially defines the facility as a “co-fired” plant because its fuel source is a mixture of refused derived fuel (ten- to twenty-percent total mass) and coal (eighty- to ninety-percent) for the purpose of producing electricity. Conversely, regardless of its intended purpose for burning municipal solid waste, to qualify as a municipal waste combustor (MWC), a facility
must burn one-hundred-percent refuse derived fuel. To help the reader see this distinction, Brown presents USEPA emissions standards for MWC facilities and contrasts them with the particular operating parameters of the power plant in Ames. As the following excerpt demonstrates, we see that even if the Ames Municipal Power Plant were categorized with MWCs, it would fall well below acceptable limits for dioxin emissions.44

The U.S. EPA has tabulated dioxin emission factors (DEF) for several categories of MWC, including three varieties of mass burn units, two varieties of modular units, dedicated RDF[refuse derived fuel] units, and fluidized beds, in combination with various pollution control devices (EPA, 2000). A representative sample of this information is summarized in Table 3. **None of these units resemble the Ames facility, which is a pulverized coal boiler with hot electrostatic precipitators (H-ESP).** Commoner employed a DEF of 31.57 ng TEQ/kg, which appears to be an average value for total MWC capacity in the United States derived from U.S. EPA data (EPA, 2000). However, **MWC facilities that employ good combustion practice and perform continuous emission monitoring of the process variables** listed in Table 2 can achieve dioxin emissions averaging 0.13 ng TEQ/dscm, which is equivalent to a DEF at the Ames facility of only 1.0 ng TEQ [toxic equivalent]/kg (Kilgro, 1996). **Clearly, the DEF value employed by Commoner overestimates dioxin emissions from the Ames facility even if it is classified as an MWC.** (Brown Report 14)

The issue of definition or classification is integral to both the data Commoner uses to represent emissions from the Ames Municipal Power Plant with his computer model as well as his analytical expectations of it as an MWC. The major problem with Commoner’s classification of the Ames Municipal Power Plant as an MWC is that it assumes that all material burned is derived from refuse, providing a large amount of chlorine to facilitate dioxin formation, which is not the case. Therefore, emissions data used to represent the

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44 Most of the formatting was not included when I downloaded the Brown Report from the city of Ames Website as a Microsoft Word document. When restoring formatting, the pagination of the Report was altered. As a result, excerpted text I use here to reference the Brown Report may differ from online versions. I have added additional formatting to the excerpts appearing in this chapter: Bolded text emphasizes the analytically data for the category being examined; italicized text shows analytically relevant data that overlaps with one of the other two categories also discussed in this section.
Ames Municipal Power Plant does not reflect the amount of coal it burns as fuel (up to ninety percent of the throughput). This error, Brown argues, becomes the primary source for Commoner’s overestimation regarding the amount of dioxin supposedly emitted by the Ames Municipal Power Plant.

As demonstrated in the next section, incorrectly categorizing the Ames Municipal Power Plant leads Commoner to make mistakes regarding how the facility operates as well as what federal standards are meant to regulate its emissions.

**Operation: The Ames Municipal Power Plant Employs Good Combustion Practice and, Thus, Meets Stringent Industry Standards**

If a combustion facility operates within certain time, temperature, and turbulence parameters, it may be considered to achieve “Good Combustion Practice.” To qualify for this distinction, the material burned must reside in the combustion chamber for a certain amount of time, above a certain temperature, and experience a certain degree of agitation. Although not a federal requirement, Good Combustion Practice is a strict industry standard that “is important to reducing dioxin formation by completely oxidizing the organic compounds and carbonaceous solids that are precursors to dioxin formation” (Brown Report 3-4). Meeting the Good Combustion Practice standard signifies that a plant is “well operated.”

[Commoner’s research team] assumed an average DEF [dioxin emission factor] of 31.57 ng TEQ/kg for all MWC. In fact, dioxin emissions vary several orders of magnitude for different kinds of MWC. *Although the U.S. EPA does not classify the pulverized coal-fired boiler in Ames as a MWC, its achievement of good combustion practice, including combustion temperatures exceeding 980 C and operating conditions specified in Table 2, suggests that its DEF is closer to the average DEF of 0.13 ng TEQ/dscm reported by Kilgro 1996 for well-operated MWC than is the industry-averaged value employed by Commoner.* Accordingly, *if the Ames facility were classified as an MWC, likely emissions of dioxin would be*
around 0.24 g TEQ/yr (the fact that one of the two Ames boilers employs a hot ESP [electrostatic precipitator] rather than a cold ESP or fabric filter adds some uncertainty to this conclusion). (17)

According to Brown, operating parameters at the Ames Municipal Power Plant significantly contribute to the negligible amount of dioxin it produces, even if it were classified as a trash-burning incinerator. Good Combustion Practice, then, is presented as a responsible action or behavior that insures safe emissions. Failure to recognize this condition at the Ames Municipal Power Plant causes Commoner to misrepresent the plant as being like all others, which results in his miscalculation of the dioxin emission factor from the Ames power plant.

Confirmation: Empirical Tests Show the Ames Municipal Power Plant Does not Produce Dioxins

An additional and particularly important fact that Commoner would have discovered had he considered the Ames Municipal Power Plant as a particular and unique facility is that stack tests had already been performed on both of the plant’s boilers. The data from these experiments demonstrated that the Ames Municipal Power Plant produces a negligible amount of dioxin.

The [Commoner] report received wide publicity in Iowa because of its claim that the Ames Municipal Power Plant is among the top one or two sources of dioxin polluting several locations in Nunavut, Arctic Canada (bordering Hudson Bay). This claim, based on computer modeling, is contrary to measurements made almost two decades ago on the Ames Municipal Power Plant, which revealed undetectable levels of dioxin in the flue. Although Ames mixes MSW [municipal solid waste] with the coal it burns, it was concluded that good combustion practice at the facility destroyed organic compounds thought to be precursors to dioxin formation. (5-6)

This value [of 0.14 g TEQ/yr] is consistent with dioxin measurements made on the Ames facility in 1981. Junk and Richard (1981) of the Ames National Laboratory reported no measurable levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin, which is by far the most toxic of the dioxin and furan compounds (TEF = 1.0). The detection limit in these tests was 0.5 ng TEQ/dscm, which translates to less than 0.9 g TEQ/yr of dioxin emitted from the Ames plant. (17)
Although Commoner was critical of the amount of time that had passed since the plant was last tested—commenting during his November 2000 lecture that the Junk and Richard study was “inadequate” because it employed “primitive” methods—Brown portrays the elapsed twenty-year period as unimportant. Whereas Commoner interprets the Junk and Richard study as being out of date, Brown presents the findings as standing the test of time—a fact that has been true for twenty years. The truth of the results from the Junk and Richard study derives from it being an empirical study. Contrasted with Commoner’s results—which are speculative, originating from a computer model using data based on assumptions and generalizations—the twenty-year-old study is presented as being more valid and certain because its data came directly from the plant itself. The 1981 study is particular and specific knowledge not included in the Commoner Report. Therefore, the data by Junk and Richard is “hard” compared to Commoner’s, which is “soft.” The audience reads that local and empirical science trumps global and hypothetical science. Accordingly, it is implied that the Junk and Richard findings have more value than the results published in the Commoner Report. Because Commoner cannot produce empirical data on the Ames Municipal Power Plant that contradicts what was found in 1981, his request for stack testing is, at the very least, rendered suspect.

Consequently, when Brown replaces Commoner’s incorrect information with accurate inventory data to calculate probable emission levels from the Ames Municipal Power Plant, Brown demonstrates that the subsequent predictions he has made support the levels empirically determined by Junk and Richard. The impression given is that Brown’s corrective scenarios of Commoner’s calculations confirm the validity, accuracy, and veracity
of the 1981 study. The researchers’ data and their conclusions, Brown suggests, stand the test of time, and, therefore, Brown is not required to provide empirically derived data to reject Commoner’s call for testing. Junk and Richard already provided it twenty years ago. As I will demonstrate in the next section, Brown will cast Commoner’s failure to provide empirical data as evidence of poor scientific practice.

Identifying Scientific Inaccuracies in the Commoner Report

When a culture faces claims discordant with its established epistemology, policy, and practice, the status quo—or orthodoxy—defends itself against the perceived threat. Dale Sullivan argues that one way a scientific culture protects itself from counterclaims is by restricting or silencing the speech of those who advocate new knowledge, policy, and practices of the culture. Sullivan refers to this act of silencing as “forum control,” which is a “process of authorizing or de-authorizing speakers, writers, texts, or speeches” (“Keeping” 128). Sullivan identifies two types of forum control that occur publicly—correction and ridicule—which “attempt to forestall future unauthorized speech” (128). These types of forum control could be described as specific ways that scientists achieve what Faber calls “image-power”—the ability to shape others’ identities and perceptions. In an effort to better understand how Brown exercises his ability to control Commoner’s image, providing evidence that portrays him as an incompetent scientist, this section focuses on the varieties of correction and ridicule employed by scientists in their public discourse.

Sullivan states that the correction of an opposing scientist usually appears in two forms: reprimand and censure. Whereas “reprimand is a mild form of correction, the formal censure of a colleague is far more severe . . . an attempt to silence deviant insiders” (135-6).
The practice of censure is a veiled type of ad hominem attack—shrouded or cloaked in a sanctioned or specialized vernacular, casting the impression of fair, scientifically objective, and justified criticism, especially when communicated through the “objective” genre of scientific reports. It follows, then, that when the public reads Brown’s comments (whether in his report or in the local newspaper) that Commoner has breached Scientific practice in challenging the status quo, Commoner’s authority to speak credibly is reduced. Conversely, Brown’s authority as a scientist is increased when he reveals the errors Commoner committed in his scientific practice.

To better understand how Brown strengthens his own ethos and image as a scientist while debilitating Commoner’s, the next two sections describe two pervasive themes related to the scientific inaccuracies contained in the Commoner Report: “Errors and overestimation” and “Poor scientific practice.”

**Locating Errors and Overestimations**

Brown primarily attacks Commoner’s ethos through censure, using a variety of negative words to establish a negative image of Commoner as a scientist. For instance, in the excerpt below taken from the Brown Report, Brown critiques Commoner’s derivation of the amount of fuel burned at Ames Municipal Power Plant. That number, which Brown claims was too high, produced an exaggerated calculation of dioxin emitted from the plant. By not differentiating between total fuel burned at the plant and the fraction of that fuel composed of refuse derived fuel—a distinction that is recognized by the USEPA in classifying facilities but not represented in its emissions data tables—Brown declares Commoner’s inventory data
as based on “assumptions,” being “far from correct,” “not simply proportional,” which then yields incorrect projections “solely from errors.”

Furthermore, on page 13 of his report, Commoner reveals that “emission factors for conventional sources, such as incinerators, are based on fuel throughput, not the amount combusted.” In other words, Commoner assumes that everything entering the Ames plant is combustible, highly chlorinated MSW [municipal solid waste], which is far from correct. Less than 20% of the total tonnage burned in Ames is MSW, the balance being coal, which is thought to be an insignificant source of dioxin, as subsequently described. In 2000, the plant burned only 10%-wt MSW in the fuel blend (Titus, 2000). Assuming that dioxin emission is proportional to the amount of highly chlorinated fuel burned, the upper bound on average dioxin emissions from Ames is further reduced to only 0.75 g TEQ/yr. However, dioxin emissions are not simply proportional to the chlorine throughput for a plant. As subsequently explained, even sharper reductions are expected for high sulfur fuels.

This eight to eighty fold reduction in the estimated dioxin emissions from Ames arises solely from errors Commoner made in estimating the throughput of highly chlorinated MSW at Ames. As will be demonstrated in Section 4 and 5, additional factors overlooked by Commoner overestimates the dioxin emission factor in Eq. 2, which further reduces the amount of dioxin emitted from the Ames Municipal Power Plant. (Brown Report 13)

The use of nine negative descriptors reinforces the claim that Commoner’s calculations are flawed. The implied value, or warrant, expressed through his censure is that Science does not substantiate claims based on poor scientific practice. While such statements inform the reader that Commoner’s claim is logically damaged because he did not use accurate inventory data, it concurrently translates as an inability to create a Scientifically sound study. Censuring the data de-authorizes the dissenting scientific discourse, rendering it, and thus Commoner as a scientist, un-credible and un-Scientific. The intent of doing this, as Sullivan states, is to silence (or cripple) a report’s claims for policy change and the need for further research.

The context of public policy debates requires scientists to modify their forum control techniques to the embedded, observing, non-expert audience. To successfully diffuse the
Nunavut-Ames controversy, Brown employs the logos of Science to make firm distinctions between his “good” science and Commoner’s “poor” science. As a result, the Commoner Report is seen to lack value, which implies that Commoner’s model is a poor tool, incapable of providing guidance to decision-makers in forming new environmental public policy regarding dioxin emissions.

**Grading Commoner’s Scientific Practice as Poor**

Perhaps the best examples of censure in the Brown Report occur in the following excerpts in which Brown critiques (1) Commoner’s questionable and overly ambitious use of a computer model and (2) his inability to validate that model with the expected use of empirically collected data.

> **Whether emission of dioxin from 44,091 actual source points scattered over 9.1 million square miles of the North America continent can be accurately modeled by only 105 standard source points is unclear** and can only be resolved by evaluating various discretizations of the computational domain and/or explicitly validating the model by comparing its predictions against experimental data, a point further discussed below. (7)

Brown pulls no punches in this passage, directly employing a rhetoric of exaggeration to present his disbelief that dioxin emissions from a large number of suspected sources scattered across a vast amount of territory could be accurately computed using only a few standard sources. In addition to hyperbole, Brown further diminishes the value of Commoner’s practice by continuing the line of argument that Commoner cannot validate the predictions of his model against experimental data, which Brown presents as an egregious violation of what Science expects.

To finalize his critique of the Commoner Report and its relevance to deliberations on public policy, Brown returns to the exaggerated scope of Commoner’s study and his lack of
hard scientific evidence to support the predictions generated from the HYSPLIT. Brown explicitly devalues Commoner’s computer model to predict dioxin emissions in local situations, which Commoner claims in his report will have significant value to decision-making audiences. “Finally, the [Commoner] study has a shortcoming in research philosophy that diminishes its value as a decision making tool for the community of Ames” (8). As mentioned in the previous paragraph, the source of Brown’s critique emanates from what he perceives to be Commoner’s inability to validate the HYSPLIT computer model using one of two traditional methods. In assessing Commoner’s ability to employ the first validation method, Brown returns to the rhetoric of hyperbole to chastise Commoner’s attempt to study so many sources over such a large land expanse without providing any substantial evaluation.

The first involves exercising the computer model for different consolidations of point sources, different spatial mesh sizes, and different time steps to see if model results converge to the same solution. Page 6 of the Commoner study acknowledges the sensitivity of the model to these various parameters but only the effect of different time steps appears to have been explicitly evaluated. The omission of other parametric evaluations is particularly distressing considering that only 105 standard source points were used to represent 44,091 actual source points spread over 9.1 million miles. (8)

The second validation method returns to the concept that concrete data derived from experimentation is essential to the practice of science. Without experimental data to compare to the predictions from the model, Brown likens the application of the HYSPLIT in predicting dioxin emissions to a valueless theory that cannot be substantiated by real world evidence.

The second method for validating computer models is to compare model predictions to a set of experimental data. Granted, this task can be daunting for a model approaching the global scope of Commoner’s dioxin study of the North American continent. Nevertheless, a computer model, like a scientific theory,
of little value until it has been tested against experiment. The most logical data to collect for validating the model is total deposition rates at selected receptors in the Canadian Arctic. Commoner recognizes the importance of validating models, but he offers very little in the way of experimental data to support his predictions. In the absence of data on receptor deposition rates, he turns to a mere three measurements of dioxin concentration in the tissue of Caribou herds as a proxy. He can make no quantitative comparisons and only the barest of qualitative judgments: both predicted dioxin deposition rates and dioxin concentrations in tissue of Caribou herds increase in moving geographically from west to east. 

What is most significant about Commoner’s violation of standard scientific practice is the message it sends to the decision-making audience—present as a warrant—regarding the utility of Commoner’s model to guide and influence the Council to consider testing the plant: Poor science yields poor policy recommendations.

Like any other standard discourse, a scientific report brings with it certain expectations and features that make it identifiable as a genre. It appears from the excerpts above that Brown holds generic expectations for a scientific study that should be included in a report, namely that Commoner failed to test his model against hard scientific data. For Brown, the presence of empirical data is a key component for a scientific report, especially if the conclusions he draws are derived from a predictive model. The presence of empirical data fixes the identity of a scientific report and the veracity of its conclusions and recommendations. Accordingly, when those elements are present, the report and its recommendations have value—the values are embedded in the expectations. However, Brown implies that when discourse cannot meet generic expectations—when models cannot be validated because empirical data is absent—both the report and the model may be judged as lacking value and, therefore, cannot (or should not) be allowed to fulfill its desired social action. In the case of the Commoner Report, the desired social action is a change in the targeted policy governing the environmental issue under debate. However, Brown’s analysis
informs the Council and Ames’ citizens that they should not feel obligated to be informed by
Scientifically flawed devices; Commoner’s model is not a valuable information source to
determine policy issues concerning the environment because it is overly ambitious and lacks
quantitative data to validate its findings.

**Establishing the Ames Municipal Power Plant as Both an Autonomous and Regulation-Compliant Entity**

One of the primary warrants behind Brown’s refutation is that only legitimate
agencies and entities may set standards for emissions compliance, assess that level of
compliance, and recommend remedial action. By making consistent reference to the legal
requirements set by the USEPA that the Ames Municipal Power Plant is not bound to meet
but still does, Brown marks the plant as both autonomous and compliant. Furthermore,
rather than explicitly declaring Commoner as a deficient arbiter to direct public policy in
Ames, Brown’s identification of authorities that the audience will recognize as legitimate
sources to set emission limits and demand testing acts as an implicit claim against
Commoner’s authority. Though city leaders are not legally bound to meet emission
standards set by the USEPA—and the Iowa DNR has not set state limits for dioxin
emissions—Brown presents plant operation as being in compliance.

Although PCDD/PCDF [polychlorinated dibenzo-p-dioxins/polychlorinated dibenzo-
p-furans] emissions cannot be continuously monitored at MWCs, the U.S. EPA
requires operating and emission parameters that correlate with PCDD/PCDF
emissions to be monitored: CO, boiler steam load, particulate matter (PM) control
device inlet temperature; opacity and SO2 are monitored to guarantee proper
operation of the flue gas cleaning equipment. Each MWC is also subject to annual
PCDD/PCDF compliance testing. **The Ames facility, although not subject to these limits, is meeting those associated with good combustion practice.** (3)
Accordingly, the Ames plant emits about four hundred times less dioxin than assumed by Commoner and meets the dioxin emission standards set by the U.S. EPA. (17)

Identifying the agencies that may legitimately set standards and require corrective action allows Brown to direct the argument in the controversy away from concepts of ethical responsibility toward the Inuit, as Commoner does, and shift it toward those of authority and legitimacy. Essentially, the introduction of these alternative concepts allows Brown to reframe the issue of exigent action for Ames. By showing the audience that the Ames Municipal Power Plant is far below emission limits that it is not bound to follow, the audience is likely to perceive this information as proof that the power plant exceeds expectations and therefore cannot be guilty of emitting high levels of dioxin. As a result of this evidence, Commoner’s request appears inappropriate and unnecessary. If the dioxin emissions from the Ames Municipal Power Plant are good enough to meet the standards set by governmental agencies, such reasoning goes, they should be good enough for Commoner and other critics of the plant.

**Revealing the Political Agenda of Barry Commoner, Advocate**

To better understand the discourse of competing scientists in a public policy controversy, it is helpful to examine how they differentiate themselves from one another. Thomas Gieryn states that the need for boundary work between competing scientists comes from “the ‘problem of demarcation’: how to identify unique and essential characteristics of science that distinguish it from other kinds of intellectual activities” (‘Boundary-Work’ 781). This definition contextually presumes that contrary scientific claims are not entirely the result of scientific pursuit but rather “other” activities. The difference between the two activities
comes to a determination of what is science and what is not science, even if the “other” activity purports itself as being scientific. The act of demarcation—or creating boundaries—is a way of creating contrast, difference between activities. Depending on the context, there is inherently a value-judgment implied here—the activity that is branded “other,” as not being science—is inferior or unfit for creating what is fact, what is reality, and, as a result, what we should value, believe, and do. In an environmental policy debate, the discussion of “what to do” centers on whether a current public practice should or should not continue. Determining the proper action, then, depends on how one understands what is going on, which is a product of how the situation has been framed for the reader of public discourse.

Although perhaps not a conscious decision in drafting a scientific report, creating clear distinctions between one’s own scientific practice and that of an adversary’s is crucial in public policy discourse. “Boundary-work,” Gieryn writes, “is analyzed as a rhetorical style common in ‘public science’ . . . in which scientists describe science for the public and its political authorities” (782). How scientists enlist others, namely the public, in policy debates is different (as Sullivan writes about forum control) to what a scientist would do in a journal arguing against a peer’s controversial scientific result. Both the forum of the debate as well as its purpose will impact the rhetorical strategies available for scientists to employ. The next two subsections depict two rhetorical approaches Brown followed in his report contrasting the public’s perception of Brown’s image as a scientist to that of Commoner’s.

**Presenting the Heretic as Exhibiting Unorthodox Style and Behavior**

Unlike the boundary work that may take place between scientists within the scientific community, in the public policy dispute of the Nunavut-Ames controversy, Brown discredits
both Commoner’s activity and image as a scientist with the intention of defending not professional autonomy and membership to the scientific community (as Gieryn writes about) but the image of the Ames Municipal Power Plant and the autonomy of city leaders to make its own decision regarding plant operations.

To re-establish Ames’ image and autonomy, Brown effectively establishes clear distinctions between his work and Commoner’s, which increases the persuasiveness of his report to discredit advocacy action (791). Brown’s ability to provide concrete evidence allows him to conduct the rhetorical actions addressed in the previous three sections—reclaiming community knowledge of the Ames Municipal Power Plant as a particular and unique facility, revealing the scientific inaccuracies in the Commoner Report, and establishing the Ames Municipal Power Plant as an autonomous yet compliant facility. Building a foundation of claims directly linked to forensic evidence enables Brown to address distinct and fundamental differences between the two scientists based on appeals to credibility. His assessments of credibility, namely the lack of value in Commoner and his study, amount to epideictic arguments. The final and logical distinction between Commoner and Brown that this credibility argument attempts to establish, however, has one remaining rhetorical move. If Brown can show the audience that Commoner’s style and behavior exhibited during the controversy do not project an image of Commoner as a legitimate scientist and recommender of public policy, Commoner’s accusation against the Ames Municipal Power Plant can be dismissed, which would effectively re-establish the status quo in Ames. With the charlatan revealed and silenced, the public may reason, the previous problem is solved and normalcy will return.
Public censure, I argue, is the rhetorical tool that finalizes Brown’s boundary work. By establishing himself as an informed local scientist, Brown simultaneously recasts the image of Commoner as a politically motivated outsider whose activity violates the expectations of what is scientific. The result of such work positions Commoner, the advocate, as a misguided individual engaged in folly, or, as Gieryn writes, a sort of literary foil whose purpose is to contrast what Brown has done in the report he wrote for city leaders (791). Even if he continues to speak, Commoner the advocate is “silenced” because the audience won’t listen to someone who lacks authority to speak as a scientist on what has been reduced to a scientific issue. This lack of authority is recognized as a quality that the Ames community does not value. By separating all other issues, concerns, and interests from the controversy and labeling them as “other,” Brown has recast the controversy as being Scientific rather than scientific. As a result of this reduction—the false parsing of the scientific from the political—Commoner is denied any opportunity to serve as a civic scientist (Lane). Consequently, the debate is closed to Commoner and becomes a private affair for the Ames community (primarily the Ames City Council) to resolve.

To complete for his non-expert audience the boundary between himself and Commoner, Brown reinforces the image of Commoner as more of an advocate than a scientist by focusing on Commoner’s unorthodox style, primarily expressed through his

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45 Former Director of the National Science Foundation defined the “civic scientist” as having the following qualities: “In short, this means a scientist who engages the public in a dialogue about science and society. In that exchange, the scientist offers a perspective of the contributions and value of science in society to a public interested but not very literate about science issues. At the same time, the scientist gains a grassroots understanding of the public's perception of societal problems and its expectations of how science can contribute to solutions. This is not a formula or equation, but rather a description of desired outcomes” (Lane).
irresponsible behavior of constructing a calculated and flawed counter-argument after the release of his report.

Manufacturing Evidence to Counter the “Phantom Menace” of de Novo Synthesis

Brown attacks Commoner’s conduct during the controversy primarily by portraying Commoner’s advocacy as a sort of bloodlust or vigilantism. He creates this image by promoting Commoner’s supposed belief in the scientific concept of de Novo synthesis—the idea that dioxin can form “anew,” away from the source of combustion. Brown depicts Commoner’s blind and misguided reliance on this concept as a trick to manipulate the city to continuously test the plant until dioxin is found.

In terms of the Nunavut-Ames controversy, the concept of de Novo synthesis of dioxins seems to have unwittingly originated in the public forum during the city’s October 2000 press conference when Director of Electrical Services Merlin Hove read from a Website printout containing information about the temperatures at which dioxins will not form. ISU Professor Emeritus Al Joensen clarified the point for Hove and the reporter who questioned Hove about the reality of de Novo synthesis. “[A]bout reformation of dioxins, what was found during testing of incinerators, and not co-fired units, there was dioxins formed at 1800 degrees. Again, we don’t have that in our boilers. . . . Since we get complete combustion, we’re not having the dioxins” (“Ames City Press Conference”). However, because the existing scientific literature supported the notion that dioxins can form in cooler parts of a stack after incineration, the issue of de Novo synthesis was unsettled and would require a new defense to counteract its logical power.
In November 2000, when Commoner presented his lecture at the Iowa State campus, he debunked the theory of “complete combustion” defense (one of the three conditions that constitute “good combustion practice” mentioned in the Brown Report) that Joensen had offered a month earlier at the press conference. Commoner stated that the question of destroying dioxin in the furnace is irrelevant. We now know that dioxin is literally synthesized in the cooler parts of the incinerator. What happens is, when you’re burning something, it’s got carbon in it. And there is some residue of carbonaceous material that gets out into the furnace—the gases—and so does the chlorine. And it’s now known, that at a temperature of about 300 to 400 degrees Centigrade, the chlorine attaches to various particles and forms dioxin. Put it this way: every time you turn on an incinerator, the world has more dioxin in it than it had before.

How do you control it? Well, you try to trap it after it has been made. Although, now that we know just where it’s formed, the new control systems try to regulate this 300 to 400 degree temperature in such a way by quickly cooling it so that you pass through that temperature so quickly that there’s not much time to make the dioxin. So the point is this: when you hear, “this is such a good, hot furnace. It destroys dioxin . . . ” that’s irrelevant. The question is what does it make in the cooler parts. And the Ames incinerator has got to be doing it. (Commoner Lecture)

Later in the lecture, Commoner explicitly declared that the city should approve an updated, comprehensive stack test to verify the nearly twenty-year-old test results. Additionally, he clearly presented his position on the possibility that stack tests could confirm the low emission numbers gathered from the 1981 Junk and Richard study.

What [the estimated dioxin emission data] tells you, if you’re Bob Kindred or the Council, is maybe we better find out. That’s the way to do it. In fact, we wrote a little bit at the back of our report, thinking how the Inuit could use our data and what we said was, here are various ways of approaching the sources, and perhaps the first thing to do is check it out. Get measurements made.

So that’s what we did. And that’s what needs to be done. And it’ll be fine. If it turns out it’s very low, that’s great. Then we’ll change our inventory. But don’t forget to tell us. (Commoner Lecture)
Although Commoner was confident in the estimated deposition totals his model predicted for the Ames Municipal Power Plant, he recognized the power of empirical testing, if conducted by a reputable third-party outfit, to produce a definitive answer to the question of how much dioxin the Ames Municipal Power Plant emits into the atmosphere.

There is no public record of Commoner making any statements regarding the locations within, above, or near the plant that he expected to be included in any testing. Neither is there any evidence that Commoner was only interested in test results that proved that the level of dioxins emitted by the Ames Municipal Power Plant matched those predicted by his computer model. Nevertheless, *The Ames Tribune* reported on April 25, 2001, that Brown had already represented the “plant’s critics” as a group who would not be convinced by empirical evidence that exonerated the plant.

Brown cited an additional unresolved question if comprehensive testing were adopted—it would be expensive, if not impossible, to thoroughly satisfy the plant's critics.

The city could test for dioxins in the furnace, the plant's cooler, the stack and even perform plume studies to see if dioxin is formed in the atmosphere after smoke leaves the plant.

"Plume studies could cost $1 million," Brown said. "And where do you test?" (Grebe, “Council Takes” A8)

Brown begins attacking the argument of *de Novo synthesis* in the excerpted newspaper article cited above. It is reasonable to assume that before analyzing the Commoner Report Brown recognized *de Novo synthesis* as a scientifically valid counterclaim against plant supporters’ claim that “complete combustion” prevents dioxin formation. Consequently, the city’s defense required an unequivocal, value-laden sort of antilogos approach that would both establish *de Novo* as an illegitimate counterclaim and expose Commoner as an unreasonable,
vigilante activist. Without offering any evidence to support Brown’s claims that critics would resist a potential “all clear” conclusion as a result of stack testing, the April 25 *Ames Tribune* article reconceptualizes for the public the image of those who challenge the civic authority and scientific knowledge that originally and currently legitimize its operation: They are unreasonable.

The character of Commoner and other activists is primed for a final and fatal attack through what Sullivan calls “ridicule,” a form of forum control that “holds heretics up to public scorn in displays of derision, attacking heretical belief and usually denying opportunity for rejoinder in the same forum” (“Keeping” 137). It could be argued that the Brown Report is a scientifically informed exposé that implicitly identifies Commoner and his charges against Ames Municipal Power Plant as a sort of “junk science.” However, unlike the explicit claim of “junk science” made by the city of Harrisburg, the city of Ames seems resolute on creating, and delivering, what seems to be a reasonable and scientific response conducted with care over an eight-month period.

Brown continues his attack on the *de Novo* synthesis defense by presenting Commoner’s reaction to facts he had neglected to gather when compiling his October 2000 report.

When confronted with . . . information [regarding both the negligible amounts of dioxin discovered from the 1981 study and that the plant burns a coal/RDF [refuse derived fuel] mixture at high temperatures], Commoner’s response was two-fold. First, analytical instrumentation to detect dioxin has vastly improved in the two decades since testing was last performed at the Ames Municipal Power Plant. He implied that the original measurements were incapable of measuring dangerous levels of dioxin emitted from the plant. Second, he noted that recent research demonstrates that dioxin can form at much lower temperatures than was previously suspected. Just because the Ames furnace operates at very high combustion temperatures does not assure that dioxin will not form in gas cooling sections of the boiler. Commoner suggested that, if dioxin is not detected within the boiler, it is very likely forming
somewhere in the exhaust plume outside the power plant. Commoner called for comprehensive and periodic testing for dioxin from the Ames Municipal Power Plant. (Brown Report 1)

Later in his report, Brown reviews the empirically determined facts of *de Novo* synthesis from two reputable sources in order to establish the parameters a facility must operate at in order for *de Novo* synthesis to occur.

Clearly, the amount of dioxin formed by the *de Novo* mechanism depends upon the length of time flue gas spends in the temperature range of 250° C - 450° C, a fact confirmed by laboratory studies (Fangmark et al., 1994). This temperature range is most typically encountered in economizers, air heaters, and PM [particulate matter] control devices. PM control devices, because they concentrate fly ash and operate at temperatures favorable for *de Novo* synthesis, can function as chemical reactors that generate and emit PCDD/PCDF (Kilgroe, 1990). Limiting the temperature at which PM control devices are operated is important in controlling the formation and emission of PCDD/PCDF (914-16). Lowering PM control device operating temperatures to less than 250° C results in a major reduction in PCDD/PCDF formation rates and alters the partitioning of vapor- and solid-phase PCDD/PCDF (EPA, 1989). In general, APCDs [air pollution control devices] based on fabric filters is preferred to cold ESP, which is preferred to hot ESP. (14)

With the conditions necessary for *de Novo* synthesis established by Fangmark, et al, and the USEPA, Brown prepares the reader to logically see that, because it is a power plant and not an incinerator (issues of the plant’s definition, function, and physical construction), the Ames facility cannot possibly enable dioxin formation by this process. However, before delivering facts concerning the temperature at which the flue gas of power plants is emitted into the atmosphere, Brown calls into question Commoner’s supposed use of *de Novo* synthesis during the controversy by conjuring a “junk science” metaphor, declaring Commoner’s counterclaim is a “specter”—an empty and unscientific claim meant to scare the public into falling for Commoner’s demand that the plant be tested again.

As a final point of concern, Commoner raised the specter of dioxin forming in the gas plume leaving the exhaust stack, downwind of the plant. This possibility was presented as a counterargument to the contention that no dioxin was detected in the
Ames facility twenty years ago. Commoner’s suggestion is based on the fact that *de Novo* synthesis of dioxin can occur at much lower temperatures than was expected several years ago.

In a refractory walled incinerator with no heat recovery, post-stack synthesis of dioxin is a credible possibility since the temperature of exhaust gases can be several hundred degrees Centigrade. However, in a power plant, flue gas is cooled to less than 250° C before it is emitted from the plant, which is below the range for significant *de Novo* synthesis of dioxin. (17)

Brown punctuates the dismantling of Commoner’s authority to speak as a scientist by portraying Commoner as having un-scientific qualities.

Although Commoner’s argument for post-stack synthesis of dioxin is flawed, it illustrates the difficulties of attempting to respond to the charges he has made against the Ames facility. If Ames undertook in-plant testing demanded by Commoner and dioxin emissions were found to be negligible, the controversy would not be at an end. Instead, Commoner could turn to his post-stack theory of dioxin synthesis and suggest plume sampling as the only way to resolve definitively the controversy. It is unlikely that such difficult measurements have ever been undertaken. However, the cost would undoubtedly be several fold more expensive than the $80,000 in-plant testing currently being contemplated by the community of Ames. (18)

Even in the presence of empirical evidence, Brown argues that Commoner is the type of person who would use the scientific concept of *de Novo* synthesis unscientifically in order to achieve his desired outcome—evidence that the Ames Municipal Power Plant should be shut down. Someone this unreasonable, Brown implies, is acting as an advocate, not a scientist. Such a person should not be allowed to influence public policy for the city of Ames.

**Discourse Degradation: Final Article in The Ames Tribune Brings Closure to the Nunavut-Ames Controversy**

To no one’s surprise, Commoner reacted unfavorably to the council’s decision not to test the Ames Municipal Power Plant. In response to the Brown Report, the Center for the Biology of Natural Systems—which was provided a copy of the report by *The Ames*
Commoner himself was quoted to have said that it was “a pity for the City Council to be presented with a very distorted picture. . . . I was amazed at the assumption that [Brown] made. It was puerile” (A1). Defending his calculations from Brown’s accusations of overestimation, Commoner stated that he received plant throughput data from the Ames city staff via telephone interviews. He countered Brown’s claims that his study was flawed by revealing one of Brown’s errors in reading his report, a faulty calculation that Commoner called an “assumption,” “unethical,” “foolish.” “[Brown’s calculation] makes no sense at all. He did what I think would be mathematically unacceptable, which is to use (an) equation to back-calculate a missing assumption” (A4).

Continuing his critique of the Brown Report, Commoner defended his categorization of the Ames Municipal Power Plant due to one of its operating components: a hot-sided electrostatic precipitator (ESP), which removes particulate matter from boiler exhaust. He maintained that

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46 In fact, the forwarding of the Brown Report by the Tribune prompted the Center for the Biology of Natural Systems to issue a formal response attacking the veracity of Brown’s analysis and, most likely, served as the exigency and fodder for Grebe’s 14 July 2001 article. According to Commoner and his staff, “Apart from the annual rate of dioxin emissions from the Ames plant (0.0066g TEQ/hour, or 58g/year)—numbers that were not assumed by CBNS [Center for the Biology of Natural Systems] but computed from data—every single assertion in the foregoing Brown statement is false. The manner in which these factual errors led to the Brown report’s equally erroneous conclusion is described in what follows, together with an account of other significant errors in the report” (“Response” 1, italics mine). Although a very interesting artifact, I did not rhetorically analyze it as a core artifact because, much like the press release materials described in Chapter 3, it did not appear to be a response released to the general public.

47 As previously stated, the city confirmed that the Center for the Biology of Natural Systems staff had contacted power plant officials several times over the past few years, the last occurring in April 2000.
“The hot-sided ESP is notorious (for inducing the creation of dioxin). That was confirmed years ago, and is now a standard theory . . . first proposed in one of our papers. What we always do is use the EPA tables of emissions factors to match whatever type of source material we’re talking about.” (A4)

Commoner asserted that Brown’s assertion that the city’s power plant is not an incinerator was an inappropriate categorization. “‘It’s ridiculous. It’s meaningless to suggest we’ll define this as a coal-burning plant. It’s irrational’” (A4). His report’s categorization of Ames Municipal Power Plant as an incinerator, Commoner added, was not a stereotype or assumption that yielded a mass emissions figure; rather, the model produced likely emission data particular to each combustion source (A4).

More importantly, Commoner accused Brown of misinterpreting Commoner’s position regarding his lack of satisfaction if a comprehensive stack test were conducted and dioxins weren’t found. He contested Brown’s assertion that he had said if “there wasn’t dioxin in the stack, it may be created in the plume.” Likewise, Commoner disagreed with Brown’s statement that NACEC would continue asking for more expensive and exotic testing until a positive test for dioxin emissions was found. Though in his rebuttal Commoner admitted that it is his Center’s position, that “trash-burning incinerators likely create dioxins that are synthesized in the cooling areas of the plant” (A4), he denied that this position would demand that the Ames Municipal Power Plant be subjected to unorthodox and unique testing procedures. Stack testing, Commoner argued, would include gathering samples in the cooling areas that he suspected were the source of the plant’s dioxin production. Results from such testing would provide the evidence necessary to confirm or deny the findings from his study (Commoner Lecture).
When pressed on the issue, Brown admitted that he lacked evidence that Commoner made statements about dioxin forming in the stack’s plume. If Brown’s statement were indeed untrue, it would negate his assertion that Commoner would demand additional stack tests if initial tests yielded low dioxin emissions. Whether or not it was a truthful claim, irreparable damage to Commoner’s image as a reputable ecologist and environmentalist had already been done. Casting considerable doubt upon Commoner’s status as a scientist opened the door for Brown to apply a new label to describe Commoner’s role in the controversy.

In his response to Commoner’s other comments, Brown held firm to his position against testing. First, Brown admitted to making a mistake in his analysis of Commoner’s study, but he retorted that his error was “irrelevant” because the calculation had little to do with the purpose of his report, which was to evaluate how Commoner performed his study and to review the literature on dioxin emissions for similar facilities.

Again, he accused Commoner of wrongly defining the Ames Municipal Power Plant as a waste incinerator, stating that Commoner’s motive for doing so was to gather USEPA data that would yield inaccurately damning results. “He found the worst type of combustor and used it for Ames. . . . [I]t was the absolute worst. It in no way represents the facility in Ames” (Grebe “Commoner Says” A4). Two reasons Brown disagreed with Commoner’s classification of the Ames Municipal Power Plant were (a) the use of emissions data for an “incinerator” with an ESP and (b) the presence of other pollution prevention equipment associated with the ESP.

He further faulted Commoner on his interpretation of data, stating only a dioxin toxicity measurement of 16 grams/year (as opposed to Commoner’s 58 grams) is possible at
the power plant. Additionally, Brown believed, based on Commoner’s experimental data, that the 16 grams/year estimated emission rate is higher than what the Ames Municipal Power Plant actually produces. Unlike Commoner, Brown restated the warrant of empirical and local data as being more valuable than data from a model: Brown’s claims were based on “experimental data” gathered from the Junk and Richard study (A4). Brown stuck to his assertion, supported by data in peer-reviewed literature, that coal in the fuel stream reduces dioxin formation.

Brown concluded his defense by focusing on how Commoner completed his study and publicly represented the results. First, Brown stated that Commoner’s study was not done using USEPA standards. Second, Brown claimed that, even after learning the truth about the Ames Municipal Power Plant, Commoner would not want to write a retraction because of the bad press it would generate for him and his Center. For his final point, Brown accused Commoner of not having his report peer-reviewed, a process that would have corrected the errors Brown caught before it was published.

“[Commoner’s study] was not done using the EPA standards, but that is not sacrosanct. He doesn’t want to write a retraction on a report that he’s sent all over the US and has gotten into all the papers. It would call into question all of his other calculations (admitting he was wrong about the dioxin toxicity measurements).” (A4)

Commoner denied Brown’s accusation that his report was not peer-reviewed.

“The technical staff of (the North American Council for Environmental Cooperation) reviewed it. We knew this would get far more scrutiny than any peer-reviewed paper would normally get. Every report that we put out we know will get scrutinized. (But) we’re not prepared for this foolishness.” (A4)

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48 The data that Brown claims Commoner misinterpreted was generated, strangely enough, in 1981 by the USEPA—the same year that the first boiler was tested—using the “ancient theory” Commoner was critical of. It seems that Commoner criticizes the veracity of the source of information that he also draws evidence from to support his position.
Commoner’s response of having technical staff review his report is not an equitable substitute to the double-blind review process that Brown references, which typically accompanies submission of an article to an academic journal. This discrepancy between the two scientists’ notions of what qualifies as a proper review process in a scientific report written to address a particular environmental issue highlights one of the problems of environmental discourse, particularly discourse aimed at influencing social change. *Whose conventions and standards apply?*

**Turn and Face the Strange: Problems with the Commoner Report and Its Ability to Influence Social Change in Ames, IA**

To successfully challenge the status quo, campaign discourse requires considerable rhetorical energy to overcome social inertia toward change. The choices individuals and organizations have when crafting and presenting their arguments must be carefully made for the intended message to be received, understood, and considered. However, for some environmental campaigns even to be noticed by the general public, status quo challengers must sometimes use unorthodox means to deliver their message. Kevin DeLuca writes that many environmental advocacy groups employ “image messages” to first capture public attention and then communicate a disturbing message regarding an environmental problem or its solution (*Image Politics*). Although these groups draw rhetorical energy by producing the recognition they desire from staging their discourse as a media event, they do not always garner a high degree of ethos. As a result, the general public may perceive such groups and their messages as weird, on the fringe, and highly suspect.

On the other hand, though conventional language and delivery methods may inhibit some in the general public from recognizing calls for social reform regarding environmental
problems, the presence of legitimate scientific inquiry, experiment, and analysis, lends a
great deal of rhetorical energy by generating authority and evidential support to the logic of
such messages. A scientific approach to dealing with environmental issues may be “over the
heads” of the general public, but it will command their respect. Likewise, employing a
scientific solution to environmental problems will appeal to other scientists and experts as a
valuable and logical approach. But to be accepted by other experts as legitimate and
trustworthy scientific inquiry, such discourse must adhere to most (if not all) of the
conventions and standards typically followed in the scientific community.

So, in the case of environmental discourse, the question proposed at the end of the
previous section about whose conventions or standards apply in public policy debates serves
as only a partial inquiry regarding the problem of building trust and ethos to achieve desired
social change. Perhaps a better line of inquiry would focus on whether or not it is possible
for environmental discourse to effectively use the conventions and standards of science while
effectively stimulating the web of discourse activity to produce change. In other words, if
changes in public policy are indeed its primary goal, can environmental discourse create the
rhetorical energy necessary to overcome social inertia by combining the language, look, and
logic of science with the “traditional” unorthodox delivery methods of environmental
advocates? Though only one example, the performance of the Commoner Report during the
Nunavut-Ames controversy demonstrates that this approach has much potential but is
difficult to successfully achieve its intended social action because of the contextual tensions
between expert and non-expert expectations that such discourse must ameliorate.

As discussed in Chapter 3, the deliberative aim of the Commoner Report—to
encourage grassroots organizations to pressure decision-makers to create public policy that
would prevent the top-ten accused facilities from continued dioxin production and deposition—does not completely fit the genre of traditional scientific reports published in an academic journal. This fact was re-emphasized during the final exchange between Commoner and Brown, which was captured in the July 14, 2001, *Ames Tribune* article addressed in the previous section. Brown suggested that the Commoner Report was not reputable because it was not submitted for independent review. Most non-expert audience members would not recognize the failure to send a scientific report through the double-blind review process as a problematic occurrence. Therefore, as the city’s commissioned expert, Brown’s review of the Commoner Report serves the public well, allowing him to catch the violation of this crucial procedure that is typically conducted within (and by other members of) the scientific community. It could be argued that Brown’s assessment of the Commoner’s study stands as a sort of publicly conducted review. However, the absence of the “blind” component, as well as Brown’s affiliation with Iowa State and the Ames community, shows that Brown’s review is less than objective.

Regardless, the Commoner Report would have clearly benefited in many ways from a double-blind review. First, peer review would ideally improve the report, ensuring that other experts would catch errors and recommend ways to strengthen the presentation of the study before its release to the general public. Second, peer review would be yet another validation of the study and its findings. The support of fellow scientists could have lent credence to the results and, perhaps, the policy recommendations. Third, peer review would have given the Commoner Report the appearance of “following the rules” of the scientific community. The process of creating a scientific report to establish the problem and present a solution would have been finalized had the peer review phase been completed. Finally, peer review would
have removed one of Brown’s criticisms against Commoner. Permitting a double-blind review shows Commoner not only follows the rules of science but also that he has, as the city of Ames claimed for itself during its press conference, nothing to hide. Thus, Commoner’s image as a scientist may have improved or at least remained stable in the face of Brown’s critique. Commoner’s failure to submit to the peer review process, however, opens himself up to criticism and speculation that his study is not on the level.

In retrospect, considering all of these potential benefits, it is difficult to guess as to why the Commoner Report was not peer reviewed. As suggested earlier, it is possible that the intended deliberative function of his report and its coordinated documents would not have been well received during the peer review process. The policy recommendations could have interfered with some individuals’ ability to objectively evaluate the soundness of Commoner’s methods, computer model, and conclusions. Because of the situated exigency it addresses, recommendations are usually a significant component of environmental discourse absent in traditional scientific articles and reports. It is equally possible that the peer review process could have interfered with the delivery strategy of the Commoner Report, diminishing the element of surprise—the source of rhetorical energy for traditional environmental advocacy discourse—that NACEC had obviously worked to achieve. An additional problem in having the Commoner Report peer reviewed is choosing a body of peers to conduct the review. Scientific journals have their own reviewers who assess the veracity and value of submitted articles to be published for both the journal as well as the scientific community. The journal article review process is a fixed and established context with standards, protocols, and procedures. Unless they had chosen a more traditional
academic route of disseminating information, Commoner and NACEC do not have as certain of a context with its available and requisite resources.

It is more difficult for experts to follow the “proper channels” when creating environmental discourse, especially considering the young tradition from which such discourse originates. For example, Rachel Carson’s *Silent Spring* dealt with scientific realities of the effects of pollution on the environment yet was not peer reviewed. Its rhetorical energy was derived, it can be argued, through its use of narrative and description, which are commonly (though mistakenly) perceived as qualities absent in scientific discourse. Though a different genre, the deliberative function of both the Commoner Report and *Silent Spring* is similar. Furthermore, image events, such as the roll of black garbage bags draped down the Hoover Dam to simulate a crack in its structure, conducted by groups like Greenpeace and the Sierra Club, may have little to do with science but they make a definite epideictic and deliberative statement by surprising their audiences with unorthodox and unexpected discourse delivery strategies (DeLuca, “Constituting Nature”).

Because the Commoner Report draws from the traditions of discourse written in both environmental advocacy and academic contexts, the best means of presenting and delivering its message to the general public is muddled. Despite a clear deliberative purpose and well-articulated exigency to justify protection of the Inuit, a lack of generic clarity diminishes its ability to achieve its intended social action and, ultimately, damages Commoner’s image as a scientist. Without a positive image as a scientist, Commoner is unable to elicit trust in either the general public or the decision-makers on the ACC. Combined with ample evidence from the Brown Report that he did not understand the particulars of the Ames Municipal Power Plant, Commoner had little chance of convincing most citizens in Ames that the results from
his computer model provided enough truth to warrant testing. In the end, it would seem that Commoner was doomed to appear to the ACC, in Brown’s words, as “more of an advocate than a scientist” (Grebe “Commoner Says” A4).
Chapter 6

“Case Closed”: The Pedagogical Implications of the Nunavut-Ames Controversy

“Ames has a tremendous amount of local expertise. [The Brown Report] was an excellent example of a community working together to find a solution to a worrisome situation. We are satisfied with Professor Brown’s conclusions, and consider the case closed.”

(Merlin Hove, CitySide 3)

As stated in Chapter 1, the goal of this study was to demonstrate how rhetorical analyses of public discourse artifacts and practices reveal science as a civic discourse with highly epideictic and deliberative purposes. The significance for conducting such an investigation is that it rhetorically contextualizes scientific testimony about the environment within the public sphere and, thus, adds to existing scholarship that shows science is not the only branch of knowledge that should guide public policy decisions made by non-expert civic leaders. More specifically, studying the Nunavut-Ames controversy demonstrates

- what rhetorical moves scientists, advocates, and public officials may use to construct scientifically based arguments in both the initiation and resolution of environmental conflicts
- how certain rhetorical strategies allow scientists to present trans-scientific claims and use non-scientific evidence to influence non-experts in making public policy decisions
- how expectations appropriate for scientific discourse complicate, and sometimes conflict with, understanding what is suitable for discourse surrounding an environmental controversy
Collectively, these three points help answer my primary research question by providing a rhetorical understanding of how Commoner’s discourse seemed to fail while Brown’s seemed to achieve its intended purpose.

Despite the fact that both scientists publicly offered evidence and testimony to non-expert decision makers in Ames within their respective reports, Brown had a more effective discourse strategy than Commoner to generate sufficient rhetorical energy for convincing his audience that a change in public policy was unnecessary. Arguing against Commoner’s allegation that the Ames Municipal Power Plant was responsible for contributing the largest share of dioxin in Nunavut, Brown benefited as much from his presentation of a well-supported scientific rationale as he did having “home-field advantage” and an extrinsic ethos that Commoner lacked as an individual with no substantial ties to the Ames community.

Working from a local and specialized situation—a situation with a compelling history regarding the creation and ongoing operation of the city’s esteemed power plant—Brown was better able to construct an “agency as identity” for the Ames City Council than Barry Commoner. In his report, Commoner tried to constitute for his audience an identity “as movers who are simultaneously constituted by that which they move” (Carolan and Bell 229). The identity he crafted was foundationally defined by the actions of remediation that should be taken by the “advocate for the environment.” Unfortunately for Commoner, the identity, and thus the actions, that members of the ACC adopted was that of “civic advocate.” Delivering a generalized message to the public from New York City, the Ames City Council could not relate to actions that would satisfy a global exigency. Due to both the physical and social distances associated with the Commoner Report, Brown was able to distinguish himself (and his analysis of the NACEC sponsored study) from Commoner by fashioning the
image of being an “insider,” possessing, among other things, local knowledge about the city and the power plant that Commoner lacked. The Ames City Council could identify with actions that sought to defend the image of both its power plant and the city itself.

But it was Brown’s portrayal of Commoner’s lack of this specific knowledge about the Ames Municipal Power Plant that made Commoner appear more negligent than ignorant. Brown’s “boundary-work” re-established the city’s *image-power* by rearticulating the following argumentative warrants, embedded within his scientific report, that were previous expressed by civic leaders in their initial response to the allegations against the Ames Municipal Power Plant made in the Commoner Report:

- Local, empirical knowledge is better than global, speculative knowledge.
- Poor scientific practice produces poor policy recommendations.
- Only authorized agencies may set standards and authorize proper policy.
- Individuals who use poor science to promote poor policy are motivated by a political agenda, not the truth.

The expression of civic warrants supported by scientific testimony further separates Commoner not only from the “truth” about the Ames Municipal Power Plant but his distinction as a reputable scientist as well. The Brown Report provides the Ames City Council a scientifically endorsed account of what they had already known about their facility—it does not produce dioxins. Brown’s testimony sanctioned the council members’ vote against testing the Ames Municipal Power Plant for dioxins, enabling city leaders to reframe for the public “what was going on” in Ames. The end result of connecting local scientific testimony to support community values and knowledge was the reclamation of the city’s previous public image as “environmentally friendly” and “responsible.”
Though Commoner presented remedial action as a matter of ethical obligation, the four warrants previously mentioned collectively reframe the issue of “responsibility” within the Nunavut-Ames controversy. The Brown Report redirected the focus of the public discussion toward the concept of authority, namely that Ames has always acted in a responsible and compliant manner regarding all facets of its power plant. The city, its plant, and its representatives are the responsible agents who have (already) taken proper action in the situation, not Commoner or NACEC. The rhetorical analysis that I conducted on the city’s discourse reveals how frames manufacture knowledge and identity—communicating worldviews and understanding through ideas that appear “true” to the non-expert audience—that are related to but separate from the scientific facts themselves.

Applying a rhetorical perspective on the arguments originating within the context of the Nunavut-Ames controversy helped me better understand how discourse promotes or discourages social change through public policy decisions, supporting Carolyn Miller’s claim that a “rhetorical description of [a] debate accounts for more of its multiple features, its twists and turns, its partisan strategies, its contested forums” (“Novelty” 502). Accordingly, after studying how “scientific” elements work within and between the constraints of professional and popular contexts through the use of three categories of rhetorical elements employed in scientists’ discourse—genre and delivery, frames and values, ethos and identity/image—there are three rhetorical actions that may be helpful to professional communicators, civic scientists, environmental advocates, public officials, and general citizens when reading and responding to the discourse that is (or will be) created to resolve an environmental controversy:
• Tracing warrants as expressed values that underlie trans-scientific claims in the discourse of scientists
• Distinguishing between the rhetorical situations that surround scientific and environmental discourses to understand the purposes each is meant to achieve and the generic conventions each is assumed to follow
• Manufacturing a “web of discourse and activity” through the strategic use of scientific reports

Though these activities are presumed to be helpful to teachers and students in the field of professional communication because they deal with the analysis or production of environmental discourse from a rhetorical perspective, the activities are equally valuable to any one in any discipline attempting to better understand the discourse employed by scientists and public officials to tell us about “the world as meant by science” (Gross 4). The remainder of this chapter briefly speculates on how these three rhetorical actions may be useful in rhetoric and professional communication courses.

**Tracing Warrants as Values Underlying Trans-scientific Claims**

As stated in Chapter 5, it is possible, even likely, that most scientific reports for policy-making contain trans-scientific claims. Consequently, it seems reasonable to assume that scientists addressing trans-scientific issues using only scientific evidence will write reports that are entirely based on Science. Although highly appealing because of the extrinsic and cultural ethos of Science to discover Truth about the world, the scientists’ policy-answers provide only a partial explanation of what is happening and what should be done regarding a public controversy regarding the environment. To avoid the allure of these
specialized arguments, it is important for public audiences to understand how democratically advocated action differentiates itself from authoritative trans-scientific claims for policy. One way for students to recognize the presence of trans-scientific claims is to identify warrants underlying both the claim as well as the scientific knowledge offered as supporting evidence.

As demonstrated in Chapter 3, Carolyn Rude’s sixth and final characteristic of scientific reports written to influence non-experts to take action through public policy (Table 3-1) deals with the manner in which scientific information is presented as knowledge that empowers individuals to take responsible action. Students may be unaware that arguments endorsing actions predicated on “social responsibility” only warrant the cessation of problematic behavior when the audience is convinced that a civic practice benefiting one community should not be pursued if it threatens the welfare of another. Scientific knowledge of the deleterious effects of public practices helps the reader understand how an environmental issue directly impacts their own lifeworld as well as the lifeworld of others. Although stopping a problematic practice at its source may be presented to the reader as a “common sense” logical solution, the agency as identity regarding the efficacy of remedial measures to protect human health and ecological equilibrium is often presumed. Accepting the claim that an aggressive policy of remediation will resolve the issue requires scientists to contextualize this warrant of social responsibility so that it fits the scientific evidence they offer to support the existence of the problem.

Likewise, as Brown’s adoption of four common civic warrants in his report demonstrates, an ability to discover warrants in environmental discourse will enable students to recognize that those who oppose advocacy initiatives rely on common sense connections
similar to those of environmental advocates and ecologists who promote social change.

Defending status quo knowledge and practices requires that counter claims and reasons redefine the exigency of the situation by establishing a common framework of community values. Such frameworks, the writer expects, will eventually lead the audience to accept the “appropriate” action by understanding “what it is that’s going on” during the debate over what should be done. When students are able to both locate and understand warrants that manufacture this logical connection, they will become more critical readers of both scientific discourse as well as the policy recommended by such discourse.

**Distinguishing the Rhetorical Situations and Generic Conventions between Scientific and Environmental Discourses**

Throughout this study, one of my goals has been to demonstrate how both the epideictic and deliberative functions of the scientific in environmental discourse rhetorically enable or prevent social action from occurring within a particular rhetorical situation. As discussed in Chapter 2, like any other standard discourse, a scientific report brings with it certain expectations and features that make it identifiable as a genre. The presence of empirical data fixes both the identity of a scientific report as well as the veracity of its conclusions and recommendations. Accordingly, when those elements are present, the report and its recommendations have value—the values are embedded in the expectations. However, as Brown implied in his report, when discourse cannot meet generic expectations—when models cannot be validated because empirical data is absent—both the report and the model may be judged as lacking value and, therefore, cannot (or should not) be allowed to fulfill its desired social action. Though the desired social action of a report for policy making is a change in the targeted policy governing the environmental issue under
debate, the report’s deliberative function can be impaired if the opposition can demonstrate that it defies expectations set by Science. In other words, environmental discourse created by scientists to influence public policy can be discredited if it is shown that it differs generically from scientific discourse typically written to build knowledge in the scientific community.

As shown in Chapters 3 and 5, the reports written by both Commoner and Brown are examples of how the genre of scientific reports written for non-experts in public policy matters differ from those scientific reports published in scientific journals for the purpose of disseminating the results of scientific inquiry to other scientists. Although they both are examples of environmental discourse, the Brown Report differs from the Commoner Report in that it does not advocate social change; rather, it seeks to close further debate on the issue. Recognizing the audiences, contexts, and purposes associated with these two reports allows us to rhetorically understand how the scientists use discourse to influence the outcome of controversy. Thus, the importance of recognizing the differences in audiences, contexts, and purposes may enhance students’ ability to read reports and other discourse created by scientists in a more informed and critical manner that reveals what is “scientific” about their arguments and what is not.

The Nunavut-Ames controversy demonstrates how difficult it is for environmental discourse to effectively use the conventions and standards of science while effectively stimulating the web of discourse activity to produce change. Because of the content of a scientific report and the training scientists receive within their culture to build and share new knowledge, it is especially difficult for scientists to create the rhetorical energy necessary in environmental discourse to overcome social inertia because they must combine the language, look, and logic of science with the “traditional” unorthodox delivery methods of
environmental advocates. As the analysis of the Commoner Report suggests, it is difficult to successfully achieve the intended social action of reports for policy making because of the contextual tensions between expert and non-expert expectations that such discourse must ameliorate. Presenting a rhetorical perspective that investigates the forensic, epideictic, and deliberative functions of the report genre within a particular context and forum will help students completing coursework in policy writing or technical communication to not only write more effective reports but to evaluate them in a fair manner as well.

**Manufacturing a “Web of Discourse and Activity”**

As demonstrated in the analysis of the Commoner Report in Chapter 3, scientific reports that seek social change in the status quo benefit from the strategic use of forensic evidence to elicit epideictic and deliberative functions, which are often muted in traditional scientific discourse. Students who understand the epideictic and deliberative functions of a report for policy making—establishing exigency, communicating advocacy values, and presenting viable and logical courses of action for non-expert audiences to take for policy change to occur—will be able to produce more influential and persuasive discourse. However, it seems appropriate that a report advocating scientifically informed policy that promotes social responsibility would be written in a manner that responsibly encourages democratic participation in the political process. Thus, a scientific report written to change environmental policy also differs from a traditional scientific report by inviting others to build upon its results and recommendations, promoting (or discouraging) the formation of a web of discourse and activity intended to propagate a wave of continued advocacy action.
Analyzing the delivery of a scientific report in an environmental controversy, and how it is linked to other discourses and activities, may signal the level of privilege bestowed upon the report’s scientific knowledge to achieve its deliberative function. Though issues of environmental policy formation often require scientific evidence to direct action, it is never sufficient itself to invoke changes in the status quo. Students who recognize delivery as a contextualized strategy may be better able to identify scientific testimony as a partial but significant portion of information that local decision-makers will consider along with other sources and types of knowledge (e.g., economic, political, etc.) to resolving the problem under consideration. Indeed, it would benefit both civic-scientists and environmental advocates to understand that policy directed at changing the status quo is more likely to occur when other knowledges and discourses are added to inquiries and deliberations about the issue, particularly when those knowledges and discourses are unified by common values.

As the epigraph of Merlin Hove’s comments presented at the beginning of this chapter suggests, local knowledge and values have considerable power in formulating a “solution to a worrisome situation” concerning civic practices suspected of harming the environment. Under the right conditions, the management of argumentative warrants supported with scientific testimony by credible sources can effectively protect not only the practices and physical structures of a community but its knowledge, identity, and reputation as well. And there are many times that a community must defend itself from activity that threatens local culture. But I would like to think that the same power invoked through the employment of local knowledge and values can both encourage ongoing discussion of the
need for social change as well initiate that conversation, including a representative cross-
section of that community’s citizens and their varying opinions and knowledges.

It is impossible at this time to know whether the outcome of the Nunavut-Ames
controversy was best for all involved parties. However, it is clear that the discourse
produced by both Ames city officials and their agents, including Dr. Robert Brown, was less
than accommodating to the challenging voice of NACEC and Dr. Barry Commoner. From
the moment of their first response to the Commoner Report, there appears to be little attempt
to conduct a comprehensive and inclusive investigation into the matter that linked Nunavut
and Ames. Rather, city officials kept the focus of their discourse on its knowledge of
science; science, they demonstrated, would vindicate their plant and resurrect their reputation
as a socially responsible entity. Besides a public recognition that testing the power plant
would be expensive, there is no evidence that the city tapped “local expertise” in areas
besides science and engineering outside of the Iowa State University community. In this
case, it could be argued that the approach and resources used to “find a solution” were geared
toward producing a favorable and desired outcome for Ames leaders.

In a similar manner, the strategy of NACEC and Commoner to publicly deliver their
report was ineffective and sensational. The preemptive release of Commoner’s findings
against the top ten worst suspected depositors of dioxin counteracted the “scientific”
approach used by Brown that would ultimately benefit Ames in restoring its image. A
blanket accusation that did not consider the local specifics of the ten suspected facilities
diffused any gains from the surprise announcement. Similarly, it crippled the potential
effectiveness of both its endorsed policy to target the facilities as well as any attempts to
energize a grassroots base to campaign for remedial action. The lack of care in projecting a
more scientific persona for its report begs the question as to the report’s intended purpose. Was the manner in which the Commoner Report was released a tactic to catch the accused off-guard and force their hand to respond in a socially responsible way, or was it merely a maneuver to publicize the conditions of the Inuit and gather American support in ratifying the POPs (persistent organic pollutants) treaty earlier proposed to the United Nations? Again, there is no definite answer to this question as it applies to Nunavut; however, there is a clue to answering it in a more general sense. Rhetorically speaking, NACEC’s discourse delivery strategy suggests that media coverage of the report about the danger caused by incineration practices across the North American continent was just as important as actually ending operations by the suspected facilities, if not more so.

Although no campaign to initiate or counter social change will be simple and clean because of the motives and interests of the many stakeholders involved, the actions we take in producing and receiving discourse can always be more efficient and effective. The analysis of the Nunavut-Ames controversy demonstrates not only what helped or hindered the reports in achieving their respective goals but also the power of rhetoric to critically read the situation in which such discourse is produced. Continued study of the use of rhetoric in discourse about public policy decisions regarding environmental conflicts will hopefully guide teachers in helping future scientists responsibly communicate scientific information to the general public as well as prepare citizens to democratically participate in promoting a world in which meaning is collectively engineered from many types of knowledge, not just science.


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