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Who participates and why? What do they expect and what do they accomplish? An Evaluation of the Superfund Technical Assistance Grant (TAG) Program

Lance R. Cooper
Syracuse University

Abstract

This research was performed to investigate public participation in highly technical policy scenarios and the outcomes of this participation. A detailed evaluation of community involvement at Superfund sites (via the Technical Assistance Grant, or TAG, Program) was performed by researching a specific type of complex, highly-technical policy problem, using a mixed methods approach, incorporating a quantitative econometric evaluation and qualitative multiple case study of selected Superfund sites.

The existing literature on public participation argues that citizen involvement is central to democratic decision-making and is an important part of the policy process. This study was rooted in a series of research questions about public participation in technical settings. These questions addressed the attributes of successful participation, the characteristics of technical policy issues that could lead to gaps in successful participation, the expected impact of the Superfund TAG program in addressing these gaps, and questions about the specific impacts of the TAG program at Superfund sites on outcomes (schedule, remedy selected, and community perceptions and satisfaction with the outcomes).

The Superfund program has the hallmark characteristics of a highly technical, complex policy situation – it is characterized by technical complexity, solutions to the problems are expensive, public involvement is expensive, the process is slow, and the technical parties typically have better access to information than does the public. The quantitative research herein identified several drivers for obtaining a TAG and demonstrated the impact of a TAG on schedule and remedy. The case studies provided support for the expectations about barriers to public participation in complex, technical settings, and expectations about the ability of the TAG program to address some of the participation gaps. The research also identified areas for public participation improvement, through providing independent technical advisors, support for establishment of community networks, support for citizen advocates, and agency support for capacity building.

Who participates and why? What do they expect and what do they accomplish?
An Evaluation of the Superfund Technical Assistance Grant (TAG) Program

By

Lance R. Cooper, P.E.

B.S. Engineering. Arkansas State University, 1985
M.S. Vanderbilt University, 1987

DISSERTATION

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Chapter 1 - Introduction

This research was performed to investigate the impact of public participation in highly technical policy settings. In twenty-five years of environmental engineering consulting, I have had the opportunity to directly observe (and participate in) public participation in action in highly technical settings. Through this experience, I have witnessed citizen involvement in many technical programs and seen the apparent frustration on the part of all parties. This frustration was partially the result of a sense of exclusion (on the part of the public) and not understanding how to address community concerns (on the part of public administrators). My interest in understanding, and providing ideas for potential improvement, arise from this experience in technical programs.

Previous studies have suggested that the involvement of the public in policy decisions, in the Superfund program and elsewhere, results in more desirable outcomes, where desirable is sometimes defined differently by scholars and practitioners and may vary by program. Identification of the drivers and impact for public participation and the areas to improve the process, therefore, should yield valuable information to be used to improve community involvement programs. This study examines the driving factors and outcomes for a specific and underutilized type of formal public involvement – the Technical Assistance Grant (TAG) program at Superfund, a specific type of complex, highly-technical policy problem. The research was performed utilizing a mixed methods approach to evaluation of the program – a quantitative component that utilized a nationwide database of information on Superfund sites and a qualitative, multiple case study that provided in depth research at six Superfund sites in Central New York.

The existing literature on public participation argues that citizen involvement is central to democratic decision-making and is an important part of the policy process. This study was rooted in a series of research questions about public participation in technical settings. These questions addressed the attributes of successful participation, the characteristics of technical policy issues and how these characteristics could lead to gaps in successful participation, the expected impact of the Superfund TAG program in addressing these gaps, and questions about the specific impacts of the TAG program at Superfund sites on outcomes (schedule, remedy selected, and community perceptions and satisfaction with the outcomes). The specific research questions (RQ) are:

Research Question 1: What are the hallmarks or attributes of successful public participation?

Research Question 2: What are the characteristics of highly technical and complex policy decisions that could impact successful public participation and how do they impact participation?

Research Question 3: What are the characteristics of the Superfund Technical Assistance Grant (TAG) program that could address participation gaps resulting in this highly technical setting?

Research Question 4: Is the Superfund TAG program successful in addressing these gaps?

Research Question 5: What factors determine the rate of utilization of TAGs at Superfund sites?

Research Question 6: Does the presence of a TAG at a Superfund site have an impact on the schedule for completion of remediation for Superfund sites?

Research Question 7: Does the presence of a TAG have an impact on the remedy selected to address environmental issues at a Superfund site?

Research Question 8: Are there findings from the research that can be applied to improve the TAG program implementation, and more broadly improve participation in other highly technical policy settings?

This document is organized as follows; Chapter 2 discusses the Superfund program, which was established to address the toxic and hazardous waste sites in the U.S. with the greatest potential risk to human health and the environment. The chapter includes a history of the Superfund program, an overview of the process for identifying, addressing and remediating Superfund sites, and a discussion of the evolution of public participation within Superfund.

Chapter 3 presents a review of the literature on public participation. It begins with a detailed look at theories regarding public participation from the perspectives of the governmental agencies and citizens in the process and includes a discussion of the theories that address the design and performance of public participation programs. The chapter also discusses the existing literature on the history of participation in governmental decisions, the goals and drivers for public participation, and the cost, benefits, and barriers to public participation. The chapter concludes with a discussion of the requirements of successful participation and a review of public participation in environmental policy decisions.

Chapter 4 brings together the concepts of Superfund and participation and provides the foundation for my research. It defines highly technical and complex policy issues, identifies the desirable attributes of public participation in these settings, and discusses the expected impact public participation. The chapter also discusses the attributes of the TAG program and the anticipated impacts of the TAG program components on specific participation criteria.

Chapters 5 presents my research questions and outlines the framework of the research. In addition to the questions related to the qualitative case study that flow from the previous chapter, Chapter 5 presents my hypotheses on public participation that were addressed in the quantitative study. These hypotheses address the expected characteristics of communities that will obtain a

TAG as well as the anticipated outcomes related to schedule and decisions about solutions at Superfund sites with a TAG.

Chapter 6 then presents the details of the methods used in the quantitative and qualitative pieces of the study. The quantitative research utilizes data from individual Superfund sites and the U.S Census in a series of econometric studies to assess TAG utilization, schedule impacts of TAGs and remedy decision impacts at TAG sites.

Chapters 7 and 8 present the findings of the quantitative and qualitative research, respectively. The quantitative evaluation provides answers to environmental outcome based questions with measurable results, such as the attributes of communities that obtain TAGs, and the schedule and remedy impacts of a TAG. The qualitative assessment provides more detailed understanding of the "why and how questions" and addresses topics of process outcomes and community satisfaction and gains beyond the environmental outcomes. The case studies added significant insight into the reasons for and results of TAG awards based on factors that were not measurable in the quantitative data set (such as trust, experience and relationships of community advocates, desires to change the remedy, and previous activity of the community at the site). The case studies also added knowledge about outcomes: capacity building within the community, credibility gains for EPA and the community, and increased acceptance of the agency decisions.

Chapter 9 presents a synthesis of findings across the quantitative and qualitative studies, identifies results that can improve participation in technical policy settings, and identifies areas for future research. The findings of the quantitative study – the importance of wealth and tenure in the community, the complexity and perceived risk of a site, and the presence of powerful potential adversaries in the process – were supported in the qualitative study. The case studies

also revealed a number of factors that were not observable in the quantitative dataset; the importance of trust, communication, credibility and the presence of a strong community leader.

The importance of this study is underscored by two points. First, if public participation in policy decisions yields better outcomes, as many public administration scholars have posited, then efforts to improve the participatory process will facilitate improved outcomes. Second, this study yields significant information regarding the factors that are important in determining whether a community will choose to pursue participation programs. These factors shed light on efforts that policy makers and their agents can take to improve the community involvement process.

While this research focuses on the Superfund program, there are policy implications for many complex and highly-technical policy areas, including environmental and energy policy areas, such as brownfield redevelopment activities, community revitalization programs and decisions regarding the location of energy infrastructure. The findings of the study identify numerous areas for improvement of the public participation process, including capacity building within communities and public agencies, support for and investment in developing community advocates, and policies to support the growth and reach of community networks.

Chapter 2 – Superfund

This section provides background information on the Environmental Protection Agency's (EPA's) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also referred to as Superfund, with a focus on elements that are important to my evaluation of public participation at Superfund sites. Superfund was established to provide solutions to environmental concerns at what were referred to as the nation's worst hazardous waste sites.

2.1 A brief history of Superfund

The late 1960s and the 1970s were a time of growing awareness of environmental and health and safety issues and increased Congressional response to threats to human health and the environment. A flurry of major Federal laws was passed to address the impacts of major projects on the environment - National Environmental Policy Act (NEPA) of 1969; air pollution - Clean Air Act (CAA) of 1970, water pollution - Safe Drinking Water Act (SDWA) of 1974 and Clean Water Act (CWA) of 1977, worker health and safety - Occupational Health and Safety Act (OSHA) of 1970, among numerous other laws aimed at environmental improvement.

In 1976, Congress passed legislation to address the environmental impacts of production of potentially dangerous chemicals - the Toxic Substances Control Act (TSCA) and the environmental impacts resulting from the management of hazardous wastes - the Resource Conservation and Recovery Act (RCRA). By the late 1970s, it was obvious to Congress and the EPA that RCRA and TSCA had not addressed a major area of environmental and human health risk – inactive former industrial facilities that, although no longer operational, were ongoing sources of potential environmental impacts.

In response to this regulatory gap, and as a response to the damages at high-profile waste sites such as Love Canal in Niagara Falls, New York, Congress passed CERCLA (or Superfund) legislation in 1980 to address these inactive former industrial operations. Superfund was promulgated to address the most dangerous, abandoned hazardous waste sites in the US. The name Superfund refers to the funds, primarily sourced from a tax on chemical producers as part of the legislation, that are used for EPA expenditures. In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA) to address many concerns that were apparent in the original legislation, including public involvement (Barnett, 1994). As of 2007, over 12,000 sites had been identified by EPA for initial assessment to determine whether they should be included in the Superfund program. A summary of the major milestones in the Superfund program are presented in Table 2-1[1].

1976	Congress passes RCRA and TSCA laws
1978	State of Emergency, Love Canal in NY
1980	Congress passes CERCLA (Superfund) into law
1982	EPA establishes Hazard Ranking Score (HRS) process to prioritize sites
1982	EPA develops regulations for implementing Superfund
1983	EPA publishes first National Priorities List (NPL), formally identifying Superfund sites
1986	First site deleted from NPL
1986	Congress passes SARA, which includes the Technical Assistance Grant (TAG) Program

Table 2-1. History of EPA's Superfund Program.

[1] Information from EPA website, EPA.gov/Superfund.

2.2 The Superfund Process

CERCLA, and its implementing regulations, provides a detailed and prescriptive process for addressing inactive hazardous waste sites. A simplified schematic of the Superfund process is presented in Figure 2-1, with the number of sites that had reached the critical stages in January 2008 shown in parentheses.

Note: lighter shading and bold text indicates steps incorporated into this study.

Figure 2-1. Schematic of the Superfund Process

The first step in the Superfund process is *site discovery*. A site can be nominated for assessment (or discovered) by EPA, by state or local officials, or by members of the public. When a site is identified, EPA (or its contractor) performs a *Preliminary Assessment/Site Inspection (PA/SI)*. The PA/SI includes review of operational information for the site, a site visit to preliminarily assess hazards, and calculation of a *Hazard Ranking Score* (HRS) used to prioritize sites based on severity and type of environmental hazard and the potential (or actual)

impact on human health and the environment. The HRS is a screening measure and considers aspects such as population within a certain distance of the site, potential (or documented) releases of hazardous chemicals to air, soil, surface water or groundwater, the toxicity and quantity of hazardous chemicals presents at the site, the presence of sensitive populations (such as the elderly or the very young), and other factors to estimate the overall risk associated with the site. A site with an HRS of greater than 28.5 is proposed for the National Priorities List (NPL). This proposal is published in the Federal Register and a public comment period is initiated. If EPA deems that the NPL designation is appropriate after reviewing public comments, the NPL designation is finalized. Of the more than 12,000 sites identified as potential Superfund sites, 1564 had been placed on the NPL as of January 2008.

Once a site is placed on the NPL, a *Remedial Investigation/Feasibility Study (RI/FS)* is completed to determine the nature and extent of contamination and to evaluate potential site remediation alternatives. The RI/FS is typically a multi-year investigation, engineering evaluation and human health and ecological risk assessment effort that can be performed by private entities that were deemed responsible, in some manner, for previous site activities and environmental impact or by EPA, if no such viable parties are identified.

Utilizing the data and results of evaluation from the RI/FS, EPA prepares a Proposed Plan of Action presenting the evaluation of potential remediation alternatives and the details of the selected remediation measures to address site risks, followed by another public comment period. EPA evaluates the public comments, revises the proposed remedy, if warranted, and issues a *Record of Decision* or ROD. Two components of the ROD are important to the public participation (and information) process; the Administrative Record and the Responsiveness Summary. The Administrative Record is a listing of all available documents pertaining to the

site. The documents generated through the Superfund process are made available at a central local location (typically a public library or government building), referred to as the records repository. The Responsiveness Summary provides all comments received on decision documents and EPA responses to the comments.

The next step in the process is the *Remedial Design/Remedial Action*. During the RD/RA process, detailed engineering design is performed, remediation contractors are selected and site cleanup is performed. In some instances, changed site conditions are encountered during the RD/RA that warrant changes to the selected remedy. If the changes are major, a ROD Amendment may be issued by EPA. For lesser changes, the modifications are documented through an Explanation of Significant Differences (ESD).

Construction Completion marks the point where the remediation activities are fully implemented. Depending on the type of remedy chosen, there may post-closure activities to be implemented. It is common for long-term groundwater treatment or monitoring to demonstrate the effectiveness of remediation to continue for several years (sometimes a decade or more) after completion of remediation. These activities are considered *Post-Construction Completion* actions.

Once EPA is convinced that the remedy is complete and no unacceptable risks remain for the site, the site is *Deleted from the NPL*, and site activities under Superfund are complete. Of 1564 sites on the NPL in January 2008, 315 had progressed successfully through the process of remediation and been deleted from the NPL.

For the purposes of my quantitative study (see Chapters 5 and 6), the important phases in the process are *1) discovery, 2) inclusion on the NPL; 3) issuance of the ROD; 4) construction completion; and 5) deletion from the NPL*.

In addition to the Superfund laws and regulations, EPA has produced technical guidance documents that specify the procedures to be utilized in accomplishing the steps in the Superfund process. Some of these guidance documents detail the requirements of the RI/FS, human health and ecological risk assessment, laboratory analytical procedures, and data validation procedures and identification of "presumptive remedies" based on general site characteristics.

It is common for EPA to identify several operable units (OUs), or discrete areas of concern, at a Superfund site. EPA may divide the site into OUs based on differences in contaminants present (solvents or metals), physical properties (an impoundment or landfill), contaminated media (soil or groundwater), or remediation approach or schedule. EPA may divide a site into an OU consisting of site soils and an OU that includes site groundwater. The processes can proceed independently and on different schedules for the two OUs. In this manner, lower complexity problems can be investigated and remediated separate from more complex problems that may take a much longer time to address. A simplified depiction of a site with three operable units is presented Figure 2-2.

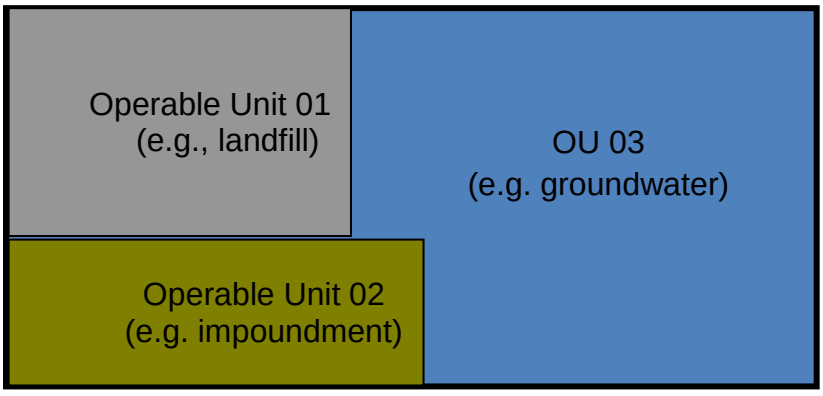


Figure 2-2. Depiction of Operable Units (OUs) at a Superfund site.

It is also possible for there to be multiple RODs issued for a complex site. This can occur when there are multiple OUs as discussed above. In addition, multiple RODs may be issued for a single OU if there is the discovery of new data regarding the severity or type of contamination after the issuance of the first ROD. For instance, EPA may revise a remedy decision based on the availability or newly discovered viability of new remediation technology, or based on valid input from the public, industry, or State regulators after issuance of the initial ROD.

Responsibility for investigation, evaluation and cleanup at an NPL site can reside with one of three parties; *private companies* (or potentially responsible parties , PRPs) can perform the investigation and cleanup under the direction of EPA, *EPA* can perform the work if viable private parties are not located or are not willing to accept responsibility, and *other governmental agencies* (such as the Department of Energy or Department of Defense) may perform the work under the direction of the EPA. Data regarding activities that are performed at Superfund sites, and the approximately 12,000 sites that are identified for evaluation but are not added to the NPL, are compiled by the EPA and maintained in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database. This database is periodically updated by EPA and publicly available. Information from the CERCLIS database was utilized in this study.

2.3 Public Participation and Superfund

The Superfund program, through the original CERCLA legislation in 1980, incorporated community involvement requirements that included public notice and comment periods at various stages of the process, as well as informal communication between EPA site managers and members of the community. In 1986, with the passage of SARA, Congress expand the

citizen involvement process of the Superfund program, including the addition of two mechanisms for formal community involvement. SARA expanded the public participation aspect of the Superfund program by encouraging and recognizing Community Advisory Groups (CAGs) and providing Technical Assistance Grants (TAGs) to successful applicants to encourage community involvement in decisions related to Superfund sites.

Per Applegate (1998, pp. 911-913), Congress made the "deliberate choice to focus cleanup decisions on technical issues and limit delay in implementation by limiting public participation" and placed public comment in a "narrow time frame after the remedial decision was made". The adoption of SARA added the Proposed Plan of Action (essentially a draft ROD), increased public comment (written and oral), and added the TAG program to the Superfund public participation process. EPA awards up to $50,000 to a community group to hire technical advisors to assist citizens with technical issues at the site. To receive a TAG, the community group must be incorporated or willing to incorporate, submit a proposal, represent the community near the site, not be a municipality, and provide funds (or services) to cost share in the process. Some of these requirements, as well as the administrative burden of accounting and reporting, can make eligibility and compliance significant barriers to the TAG program (see Chapter 8 for additional discussion of this topic).

An Office of Inspector General Report on the performance of the TAG program (OIG, 1996) found that program was “in general compliance with … regulatory requirements”, but a low number of TAGs were awarded and the program was not successful in “affording local community groups access to technical advisors”. This failure was attributed to poor definition of program needs, poor dissemination of information to the public and inconsistent implementation. There are two primary sources of this inconsistency; regional differences and individual

leadership. The TAG program is implemented by EPA regional personnel in EPA ten different geographical regions; it is essentially a federal policy that is implemented ten different ways. In addition, like many policy initiatives, the program depends on agency managers to drive and focus implementation. The strength of the leader is expected to impact the success of the participation program.

The TAG program is the focal point of my evaluation of public participation under Superfund. Public participation in the Superfund process is an important topic, as approximately 26% of the U.S. population lives within 4 miles of an NPL site (Golden, Yetman, & Chai-Onn, 2008). I investigate the reasons that citizens pursue a TAG and the impact of TAGs on outcomes at Superfund sites, in the form of schedule impacts and remedy selection.

Chapter 3 – Literature Review

This chapter presents a review of the literature on public participation with a focus on citizen involvement in policy setting and implementation in the environmental policy arena. It is important to understand the previous research that has been performed on public participation to properly formulate this research and build on the previous work. I identified the following questions as important to this understanding and the literature review provides a summary of the previous work in the field:

- What is the theoretical basis for public participation from the perspective of the agency or public official? What is the theoretical basis for the citizenry to engage in policy decisions? What are the theoretical bases for performance (success and failure) of public participation processes?
- What is the history of public participation and how has the involvement of citizens in public decisions evolved with time?
- What does the literature say about the goals and drivers for public participation?
- What benefits are realized by agencies and the public from citizen involvement in policy processes?
- What are the barriers that keep the public from becoming involved in the policy process?
- What are some of the costs associated with increased public participation in policy decisions?
- What is required for "good" public participation processes?
- What methods of public participation are available and used in public decision-making processes?
- What are the outcomes of public participation in policy decisions?

- What has evaluation of public participation efforts revealed about the impacts in specific policy settings?
- How is public participation evolving and what are the recent advances, especially collaborative governance and deliberative democracy?
- How has public participation been implemented in environmental policy decision making, especially in the federal Superfund program, brownfields and community development programs, and facility siting programs (specifically waste disposal facilities and energy infrastructure)?

3.1 Theories of public participation

Citizen participation in the development of public policy and its implementation is explained by theories rooted in public administration, law, economics, management, behavioral psychology, sociology and organizational theory. I examine citizen participation in public administration and policy decisions and summarize the theoretical literature to address three questions. Specifically, (1) why are government agencies and administrators prone (or reluctant) to use participatory processes in policy and public administration settings? (2) Why do individual citizens and groups of citizens choose to participate in policy and administration decisions? (3) How does public participation impact performance in policy decisions (and as an extension how does it impact the individual or group participating)?

3.1.1 Theories from the Agency Perspective

This section presents the theoretical basis for public participation from the perspective of the agency or the public administrator. There are drivers that speak positively to the occurrence

of participatory processes – administrative law theory, democracy (and deliberative democracy) theory, managerial theories, and diffusion of innovation theory – as well as theories (primarily organizational and behavioral) that predict a reluctance or negative likelihood of engaging the public in the policy process – institutional theory, transaction cost economics, and scientific management. While the research questions in this study focus on the reasons that community groups decide to engage in public participation, understanding the theoretical underpinnings of involving the community provides useful information for understanding the acceptance and barriers to such participation.

Figure 3-1 depicts the theories applicable to agency decisions related to public participation processes. It should be noted that there is overlap in the theoretical constructs described in the following sections. As an example, the concept of procedural justice could be characterized as a subset of administrative law or democracy theories.

Administrative Law Theory

Administrative law is "the body of rules and procedures that organizes government and provides mechanisms for redress of grievances as a result of decisions or actions of government" (Stewart, 2006). Administrative law theory explains the legal and administrative requirements that govern the inclusion of citizens and the methodology to perform such inclusion.

Most rulemaking and program implementation policies include some manner of direct public involvement. These may take many forms: public notice and comment on rulemaking or implementing policy, public meetings to inform or garner information input from the public, regulatory negotiation procedures, the formation and use of citizen advisory boards, and more

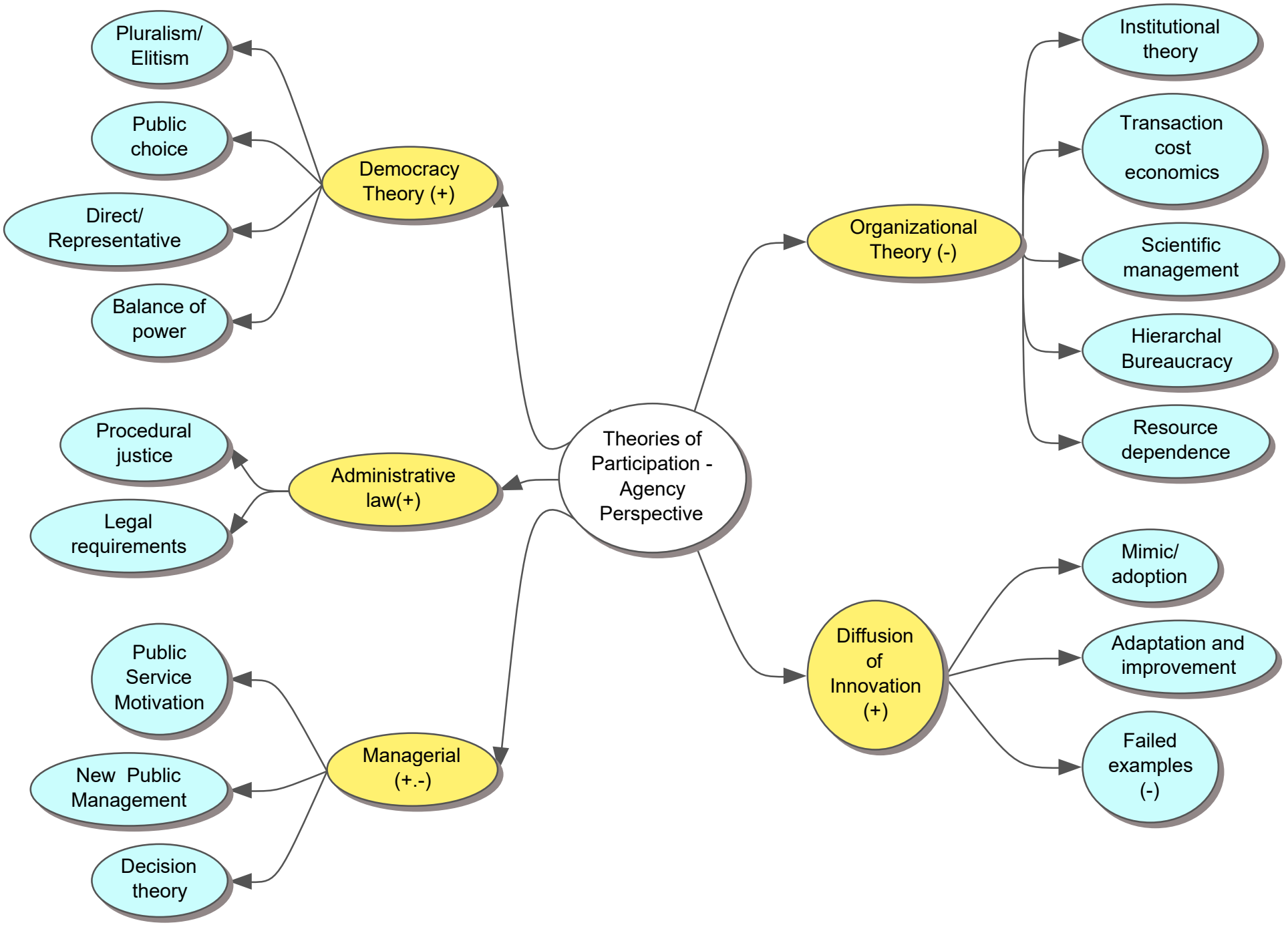


Figure 3-1. Theories of Participation - Agency Perspective

direct and inclusive deliberative processes (Applegate, 1998; L. Bingham, Nabatchi, & O'Leary, 2005; Charnley & Engelbert, 2005; O'Faircheallaigh, 2010).

Administrative law theory also incorporates the concept of procedural justice, or fairness of the process. The direct (as opposed to representative) participation of citizens in policy and implementation processes "complies with the administrative law concept of the 'right to be heard'" (Ellis & Disinger, 1981). According to some, procedural justice has more of an impact on the inclusion of participants and their satisfaction with the process than with measurable environmental outcomes (Beierle, 1998). Efforts to more substantially involve the community in environmental decisions can increase the citizens' perception of justice and fairness in the process (L. Bingham, Nabatchi, et al., 2005; Rowe & Frewer, 2000), result in consensus building (Nabatchi & Amsler, 2014), and increase the public's acceptance of the final decision (Herian, Hamm, Tomkins, & Zillig, 2012; Hourdequin, Landres, Hanson, & Craig, 2012).

Administrative law theory, in summary, predicts that the agency and agency officials will pursue and support public participation, at least to the degree required by law or policy, or to design and implement a process that meets the mandates of fairness.

Democracy Theory

Public participation in policy setting and implementation has long been recognized in the public administration literature as an important democratic principle (Frederickson, 1982). The ability of the citizenry to voice its collective and individual opinions on governmental decisions that affect them is a valuable part of the policy process (Depoe & Delicath, 2004) and is core to democracy.

Democracy theory presents three power distribution scenarios in the democratic state; pluralistic (with multiple groups expressing their desires for governmental actions), elitist (where a more powerful group controls decisions of the governing body at the expense of other less powerful groups) and hyper-pluralistic (where multiple groups exert extreme power with differing ends in mind which can lead to decision gridlock). In the first two instances, the need for the agency to design, oversee and implement a participatory process is paramount to assess the input from the public and ensure that the ultimate decision incorporates the preferences of the public. In the latter scenario, pressures from multiple powerful influencers may lead to gridlock in the decision-making process. Schumaker presents a more granular modeling of community power including orthodox pluralism, elitism, representative democracy, populism, activism-dominance, hyperpluralism and democratic rule (Schumaker, 1993).

Democracy theory, and its application in public participation, is normative in nature. It is seen as a fundamental right of citizens in a democracy to express their opinions and concerns and weigh in on decisions that directly impact them (Beierle, 1998; Folk, 1991; Frederickson, 1982; Innes & Booher, 2004; Nabatchi, 2012a; Renn, Webler, Rakel, Dienel, & Johnson, 1993). The primary question then is to what degree and in what form public participation occurs or should occur. Direct democracy, and the specialized form deliberative democracy, hold that impactful and meaningful involvement by citizens in decisions of the government agencies and administrators is the desirable manifestation of democracy (Delli Carpini, Cook, & Jacobs, 2004; Nabatchi, 2010). This contrasts with strict representative democracy in which the agency (via the power given by elected officials) makes the decisions with less (or no) direct public input. Delli Carpini and colleagues contend that participatory democracy is not an alternative to

representative democracy, but rather an expansion of it. A more detailed discussion of deliberative democracy is presented in Section 3.4.

Democracy theory holds that public participation is an "ideal of democracy" (Folk, 1991) and results in a more active citizenry (Barnes, Newman, Knops, & Sullivan, 2003). Furthermore, public participation can address power imbalances (Barnes et al., 2003; Beierle, 1998; Schroeter, Scheel, Renn, & Schweizer, 2016), expand the scope of democracy (L. Bingham, Nabatchi, et al., 2005; Cooper, Bryer, & Meek, 2006; Delli Carpini et al., 2004; Fung, 2006; Petts & Leach, 2000), and restores and strengthens democracy (L. Bingham, Nabatchi, et al., 2005; Halvorsen, 2003; Lowndes, Pratchett, & Stoker, 2001; Moynihan, 2003; Tuler & Webler, 2010). It is also viewed as the administrator's obligation under democracy (L. Bingham, Nabatchi, et al., 2005), and is considered a basic human right in a democracy (Rowe & Frewer, 2000). Citizen involvement in government decision-making also provides an opportunity to address issues of environmental justice (Beierle, 1998; Brulle, 2010; Ferris, 1994; Probst, 2006; Schweitzer & Stephenson, 2007; Tuler & Webler, 2010) and results in capacity building among individual citizens and communities (Nalbandian, 1999). Citizen participation is a normative ideal under democracy theory and "is an accepted foundation of democracy" and fosters legitimacy, transparency and accountability (Nabatchi, 2012a). Democracy theory predicts that public officials will support public involvement measures out of sense of inclusion and fairness, and to address power imbalances.

Managerial Theory

Managerial theory addresses the performance of the public official's job and the and the efficient and effective performance of activities to achieve agency goals and objectives.

Different aspects of the theoretical perspectives can predict increased motivation for the manager to include the public in decision making as well as built in barriers to citizen involvement. Managerial theory concepts of new public management (NPM), public service motivation (PSM) of the administrator, and decision theory are discussed in the following sections.

New Public Management (NPM) is a broad spectrum of initiatives based on the "Reinventing Government" movement of the 1980s and 1990s. NPM called for "fixing a broken government by running it like a business" (J. V. Denhardt & Denhardt, 2015). NPM includes goals to reduce or reverse governmental growth, privatize as many functions of government, increase entrepreneurial actions of public officials, automate government service delivery through the increased use of technology, and institutionalizing government processes with a focus on globalization of methods (R. B. Denhardt & Denhardt, 2000; Hood, 1991). Specific components of NPM include performance measurement and allocation of resources based on this evaluation, disaggregation of service delivery, competition within the agencies of government, management styles that are like those of private organizations (including performance incentives), and a focus on discipline (Dunleavy, Margetts, Bastow, & Tinkler, 2006; Hood, 1991). The concept presented in the seminal work Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector is one of "steering rather than rowing the boat" (Osborne & Gaebler, 1992). The concept is that an administrator can help an agency more effectively reach the desired endpoint by controlling the destination rather than the day-to-day means of production. According to Denhardt and Denhardt, what is lost in this scenario is "who owns the boat?" and they suggest serving versus steering. The focus on efficiency, production, performance evaluation and allocation clouds the picture of public involvement. Citizens tend to make the business of governing a messy one. The alternative approach is one

that includes service to the citizen as a key component of public administration (J. V. Denhardt & Denhardt, 2015; R. B. Denhardt & Denhardt, 2000). Denhardt and Denhardt (2000, pp. 553-556) propose that NPM be modified to include the following approaches:

1. *"Serve, rather than steer …*
2. *The public interest is the aim, not the by-product …*
3. *Think strategically, act democratically …*
4. *Serve citizens, not customers …*
5. *Accountability isn't simple.* (e.g. Performance evaluation must include more than a market analysis of service production) …
6. *Value people, not just productivity …*
7. *Value citizenship and public service above entrepreneurship …"*

New Public Management theory predicts that the agency would be less likely to involve the public in decision making, but the concepts of Denhardt and Denhardt, and like-minded public administration scholars that followed, provide a powerful counterbalance to that approach.

Public Service Motivation (PSM) theory addresses the role of the individual manager in delivery of public services. PSM incorporates the "public values, altruism and prosocial behavior" (Andrews, 2016) to predict and describe the methods used by administrators in delivering government services. The underlying concepts are that public servants are, at their core, predisposed to "serve" and the efficient running of government becomes less important than ensuring that services provided meet the needs of citizens. PSM theorizes that administrators who are selected, trained and incentivized to incorporate citizen preferences into the decision making and policy implementation processes will be even more likely to support or even champion enhanced forms of public participation (Coursey, Yang, & Pandey, 2012; Huang & Feeney, 2016). A nuanced view of this theory, from the perspective of the citizen, is presented by Vigoda (2002), who claims that "neomanagerialism and NPM encourage a passivity among the citizenry" (p. 533).

Decision theory is an economics-based schema that addresses the manner in which rational players will determine the optimum behavior in making choices (Zaccour, 2013). The rational participant, in this case the agency or the agency manager, will make decisions based on the established goals and objectives of a program, the information available to them and their own assessment of the best outcome in each situation. The degree to which the managers chooses to incorporate public participation in the process is dependent on the complexity of the question or issue, the value that the public organization places on such involvement and their own assessment of whether public participation will lead to a better outcome. The view on public participation leading to a better outcome is especially salient for complex or highly-technical decisions, where many managers and some citizens feel that the difficult decisions are best left to experts (Folk, 1991).

Overall, the managerial theories are a bit of a mixed bag when it comes to predicting agency desires and actions when it comes to public participation. Classic managerial theories predict lower incidence or less energy to the participatory efforts, while public service and public values predict a higher likelihood that the manager or agency will diligently pursue public input.

Diffusion of Innovation Theory

Diffusion of innovation theory (Abrahamson, 2013), for the most part, is a positive predictor for an agency to include public participation efforts into policy implementation decision. The manager (or agency) sees the efforts and outcomes for similar undertakings and implements similar methods in their own projects. The manager (or agency) is part of a community of practitioners (or organizations) that provide services (similar or not) to the public. Through communication and direct observation within their work sphere, the methods employed

by others or are part of an information distribution system that acknowledges and publicizes the successful efforts to involve the public in the decision-making process. They then mimic and adopt procedures or adapt the procedures to fit their circumstance. Similarly, a manager (or agency) can feel the pressure to keep up with other agencies with which they are compared for evaluation purposes. This diffusion can occur horizontally - from locality to locality or state to state - or vertically - from federal agencies to states or states to municipalities (Daley, 2008). Diffusion of innovation can have a positive effect on the growth of participatory processes as well, when advancements are made with each iteration of the involvement process. This concept of learning by seeing and improving by doing can be a mechanism for continual improvement. Innovation includes adoption by others, advanced rates of adoption with time, development and adoption of improved methods, and the adoption of methods by unexpected participants in the process. This adoption can be increased if the agency (or others) put in place mechanisms or incentives in place to induce innovation (Popp, Newell, & Jaffe, 2010) or increase the range or rate of diffusion.

There is a potential deterrent within this theory; if the original public participation effort was deemed a failure, there is a likelihood that the observing manager or agency will eschew efforts to more actively engage the public. In whole, the diffusion of innovation theory predicts an increased use of participatory methods and continual improvement of the methods employed.

Organizational Theories

Classic organizational theory speaks to public participation in policy decisions and implementation through the lenses of hierarchal bureaucracy theory, scientific management, institutional theory, resource dependence theory, and transaction cost economics. Most, but not

all, of the theoretical concepts of organizational theory would predict a lower likelihood of involving the public; it is “messy”, inefficient and potentially unproductive (Roberts, 2008).

Hierarchal bureaucracy theory dates to the beginnings of public administration scholarship and is founded on the concepts of professional administration of government where the administrator is the expert in implementing policy decisions and implements policy through discretion (Frederickson, 1982; O'Leary, 2010). Specialization, departmentalization of decisions and roles, and compliance to established rules and regulations govern the performance of the administrators duties (L. Bingham, Nabatchi, et al., 2005; Hood, 1991; Nabatchi, 2010; Vigoda, 2002). With the many uncertainties that come from citizen participation in decision-making, the security of organizational procedure will reduce the propensity for the administrator to actively involve the public in more than a cursory manner.

Scientific management theory, which dates to the late 19th and early 20th centuries, outlines the “optimal” relationship between workers and management, presents a methodology for division of labor and specialization, proposes the use of science as opposed to “rules of thumb” for achieving efficiency in management (Taylor, 1911). The concepts presented were ground breaking at their time, proposing that more efficient processes could result from more cooperative, although structured and prescriptive, relations between management and workers, rather than the harsh approaches normally invoked during that time period. The methods presented would be considered Draconian by today’s standards, but were revolutionary when presented. While Taylor’s audience was primarily the private firm, the principles were adopted by many early public officials and scholars for the performance of public administration (Hood, 1991; Nabatchi, 2010). Modern organizational theory has modified or even rejected many of the principles of scientific management; nonetheless some foundation principles of scientific

management have been incorporated into business practice such as management by objective (MBO), total quality management (TQM) and even some of public administration's New Performance Management (NPM) movement (Wagner-Tsukamato, 2013). While scientific management theory does not preclude the inclusion of public preferences, the focus on efficiency and a well-defined bureaucracy and a mechanistic division of labor would predict less involvement in decision making.

Institutional theory attempts to explain organization behavior based on concepts that are sometimes contrary to conventional economic theory. Institutional theory predicts organizational actions that will result in organizational stability and survival (Suddaby, 2013). Underlying concepts of institutional theory (and its successor neo-institutional theory) that inform actions related to public participation are those of organizational values, formal structure and the concomitant rules and norms of behavior, "rational myths" that bely activities as opposed to reasoning behind organizational behavior, maintenance of organization legitimacy, ceremonial activities that are rooted in previous behavior without proper context in the moment, and "isomorphism" or conformity of action and structures (Meyer & Rowan, 1977; Tolbert & Zucker, 2013).

A prime[2] example of institutional theory is the "institutional pot-roast". A newlywed couple was preparing their first Sunday lunch together when the husband proceeded to cut both ends off the roast and set them aside. When his bride asked why he did this, he replied "I'm not sure, but that's the way my mother always did it." Upon asking his mother the next time he spoke about the rationale behind it, she stated "I don't know, but that's the way my mother

[2] Pun intended.

always did it." The next time he spoke with his grandmother, he asked her too about the origins of the practice. She couldn't recall having done this before and after a while recalled "Oh yes, when we were first married the only roasting pan we had was too small for the roast that the butcher always sold and I had to cut off the ends to fit it in the pan." This is too often how organizational behaviors are passed down to subsequent managers.

While institutional theory has continually evolved to better explain organizational adaptation and change (Suddaby, 2010), the core concepts of institutional theory point to an organization that is slow to change, slow to give up accumulated power and less likely to involve outsiders (i.e., the public) in problem definition and solving and decision making.

All organizations interact in some manner with other organizations to achieve their goals and objectives. *Resource dependence theory* describes the way organizations and individuals will modify or adapt their behavior to gain resources from outside sources for effective achievement of goals, or even for survival. Resources include legitimacy, funding, inputs for production, and distribution systems (Pfeffer, 2013). In the context of public participation, the most important resources are legitimacy and information. By involving citizens in decision-making, the agency can increase its legitimacy with the public and thereby increase the chances for public support of the decision. In many instances, information from the public (either technical information or community preferences) may be a key component to crafting a successful solution. Additionally, outside resources (funding or organizational support) may depend on the agency incorporating public preferences in a meaningful way. This dependence can be subverted by powerful agents with an agenda for excluding the public. While there are usually procedures in place to counteract these methods, it is possible that one party in a process can provide disincentives to public involvement in exchange for their continued participation in

the process. Resource dependence theory predicts a higher likelihood that the agency will adopt an inclusive attitude to the public in decision making.

Transaction cost economics (TCE) addresses the methods by which an organization goes about the business of performing its work in an efficient manner. The founding principles of TCE lie in a firm's decision to produce their own goods and services or to outsource them, considering the cost of entering transactions (Williamson, 2010). The absolute, or perfect, application of TCE can predict whether governance (not to be confused with governing or government) of the organization and the production of goods and services will occur through either hierarchy (internal production) or markets (transactions). There are numerous hybrids that exist between markets and hierarchies, especially in public organizations. The application of TCE to public organizations applies different analytical lenses because of the nature of the public bureaucracy, the existence of different incentives in public bureaucracies, different goals for public entities, the presence of "probity" (or loyalty to the cause), and the fact that outsourcing may not be an option for some outputs (Williamson, 1999). In the context of public participation, the fundamental TCE question is whether the cost of public involvement (in terms of process efficiency and a potentially suboptimal decision) is greater than the increased benefit from public participation in the process. The costs incurred by the manager or agency in public participation can be real dollars, time, inefficiency or the stress or uncertainty introduced into the process.

Since many of the costs and benefits of participatory programs are difficult (if not impossible) to quantify, managers have difficulty in assessing the value of the added interaction. TCE predicts that agencies and managers will be less likely to accept and promote public involvement into decision-making processes.

3.1.2 Theories from the Citizens' Perspective (Internal)

This section presents the theoretical bases for public participation from the viewpoint of the community or citizenry. There are theoretical concepts that predict an increased willingness of citizens to pursue participatory processes – democracy (and deliberative democracy) theory, certain economic and organizational theories (rational choice theory, and contingency theory), certain sociological theories (social movement and legitimacy theories), and diffusion of innovation theory. There are also theories that predict a reluctance or negative likelihood of the public to engage in the policy process – economic theories (transaction cost economics and principal/agent theory). In addition, some theories include concepts that positively predict citizen action as well as concepts that predict a reluctance to participate – resource dependence theory, social capital theory and network theory.

Figure 3-2 depicts the theories applicable to citizen group or community decisions related to public participation processes. As with theories that are applicable to the agency side of the decision, there is overlap in the theoretical constructs described in the following sections, such as social capital and network theory. Several of these theories were described in Section 3.1.1 and the discussion in this section focuses on the aspects that apply to the citizenry.

Democracy Theory

Democracy Theory from the perspective of the agency was discussed in Section 3.1.1. From the citizens' perspective, democracy theory addresses imbalances of power between the citizenry and private interests or between groups within the public that are presenting different preferences (Barnes et al., 2003; Beierle, 1998; Schroeter et al., 2016), allows the public to

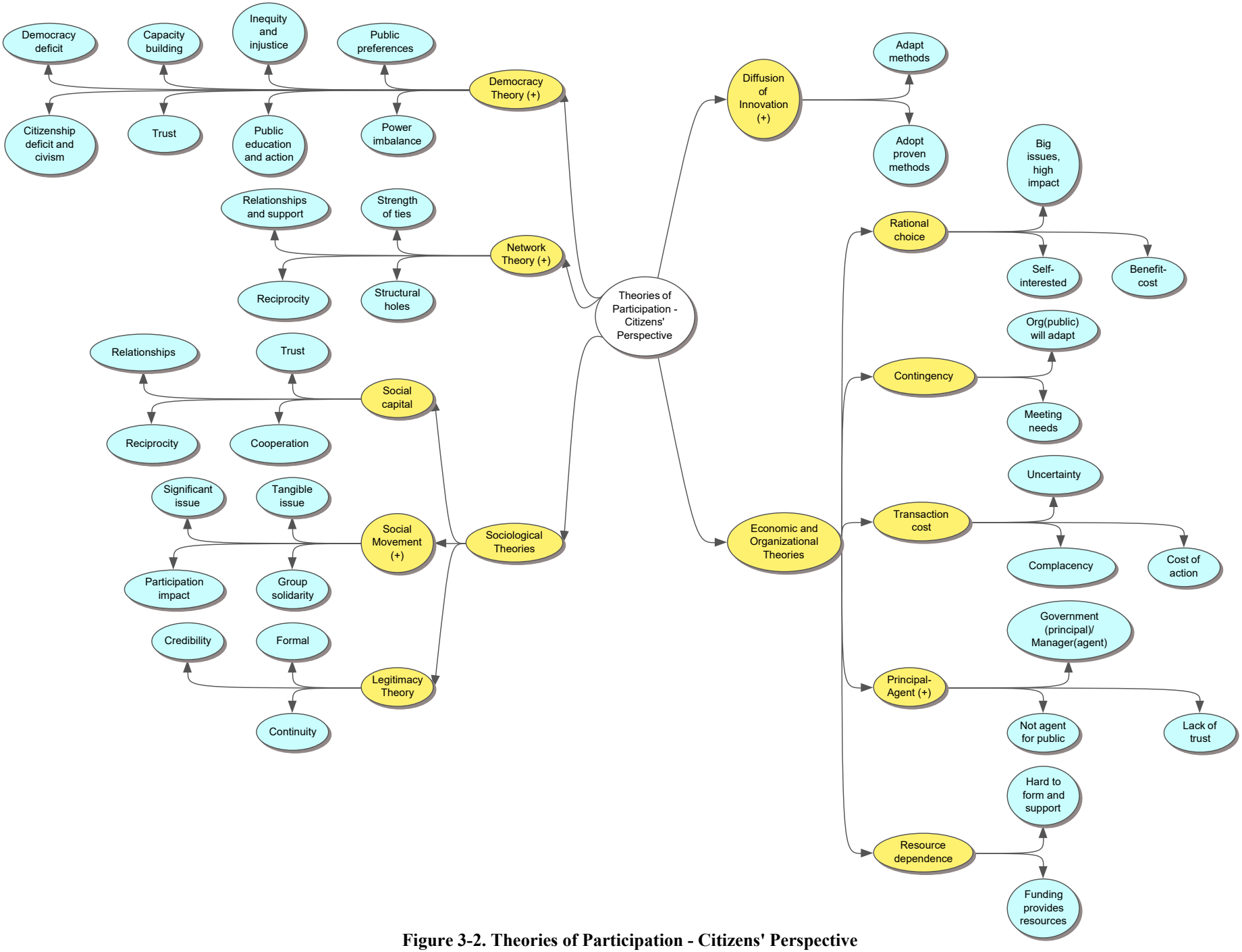


Figure 3-2. Theories of Participation - Citizens' Perspective

express their preferences in a policy setting (Nabatchi & Amsler, 2014), can result in a better educated and more active public (Hourdequin et al., 2012), increase civism (Frederickson, 1982), address issues of inequity and injustice (Schweitzer & Stephenson, 2007), and build the capacity of citizens to participate in democratic decisions (Nalbandian, 1999). It can also build trust in the government where trust is fragile or non-existent (Halvorsen, 2003) as well relieve the frustration that have with bureaucratic agencies and managers (Moynihan, 2003).

Nabatchi (2010) identifies two fundamental concerns with the future of democracy, public administration and citizen faith in government – the citizenship deficit and the democracy deficit - that can be addressed through a diligent development and inclusion of deliberative democracy. Deliberative democracy is a specialized form of public participation and the ways that public participation can address democracy and citizenship deficits are discussed in detail in Section 3.4. The citizenship deficit is "an erosion of civil society and civic engagement and more specifically to an erosion of civic skills and dispositions among the general public" (p.378). Public participation also addresses issues such as the citizenship deficit and the democracy deficit. The democracy deficit is "a situation where democratic organizations, institutions, and governments, are seen as falling short of fulfilling the principles of democracy in their practices or operation" (p.378).

Frederickson (1982) identified the concepts of "high citizenship" and low "citizenship" (p.503). In high citizenship "citizens are free, equal, and engaged with one another in pursuing matters of high and distinctive import". Low citizenship is a setting that fails to achieve these ideals, and he states that many scholars propose that high citizenship is an unattainable ideal. He surmises that the growth of direct democracy (public participation) is needed to move citizenry toward high citizenship.

Economic and Organizational Theories

Transaction Cost Economics with respect to the agency is discussed in Section 3.1.1. Transaction cost economics, from the public's perspective, predicts a lower likelihood of participation in policy decisions as there are sometimes significant costs to participate. First, there is typically a large gap in the information needed to participate and the information available to the public (Laurian, 2003). Obtaining this information requires an investment on the part of the citizen. Second, the participatory process can be time consuming and citizens may be reluctant to invest in the process. Third, the outcomes of the process are typically unknown and the lack of trust in government to utilize public input in a meaningful way will present a barrier to participation that many citizens are not willing to overcome.

Resource dependence theory is discussed in Section 3.1.1. Community groups often lack the resources to come together and present preferences on policy issues and, in this way, can be a negative predictor of public participation when communities lack the necessary resources (Mitchell, O'Leary, & Gerard, 2015). This lack of resources can include time, funds, expertize, or even basic information on the issue. Participatory programs (such as the TAG addressed in this study) can provide many of these resources and increase the likelihood of public participation. The lack of such a support and incentive program, or significant co-funding requirements (as with the TAG program), can present resource barriers to participation.

Principal agent theory in public administration is focused on the relationship between elected officials (the principal) and the implementing body or individual (the agent) (Worsham, 2011). The agent acts on behalf of the principle to carry out the work of government. Issues arise when the agent is either unable (because of poor selection, training or goal communication)

or unwilling (based on a conflict between the agent's self-interest and the principal's objectives or information asymmetry). The problem with public participation is that the citizen does not overtly appear in either side of the principal-agent paradigm. Therefore, it is unlikely that the citizen or community group has faith that the agency (or manager) will act on their behalf and will be more likely to participate in policy decisions.

Contingency theory is based on the central theme that an organization (in this case the public or a community group) will adapt in such a way that its needs are met or goals can be achieved (Lorsch, 2013). In this case of public participation, this means that if a policy decision is important enough to the public then the group will participate in the policy process. Contingency theory not only predicts that citizens will participate if the stakes are high enough, but can also predict the way they will choose to participate. Contingency theory contends that there is no best way to organize or operate and is used to describe organizational adaptations to environment, including the policy type, governmental actions, opposing viewpoints in the process and degree of severity of the issue.

Rational choice theory governs the ways that actors and organizations will behave and make choices in given situations. Rational choice theory states that an actor (in this case the public or an individual) will act in a self-interested manner (within the constraints of information and options available) and will choose to act to derive the highest benefit to cost ratio for themselves (Jin Lee & Sang Yoo, 2012). Many times there is there is a conflict between the interest of the individual and the interest of the community at large (Delli Carpini et al., 2004). If such an individual is altruistic, then the choice will be made to increase the overall benefit to the organization or community. For the organization, rational choice theory suggests that the organization will take resource inputs (information, rules, materials) and convert them into

outputs (goods, services, policies) in as efficient a manner as possible (Suchman, 1995). According to Nabatchi (2012), "deliberation is seldom so neat and structured because of emotional, values-based, and other non-technical reactions" (p.8) presenting a barrier to rational decision making. Rational choice theory for the public or potentially impacted community predicts that, as long as the issue is big enough and the benefit high enough, then citizens will choose to invest in the decision process, voice their preferences and be a part of crafting solutions. As a counterpoint to rational choice, Koontz and Thomas (2006) state that individuals tend to exaggerate the positives of participation to rationalize their participatory efforts.

Sociological Theories

Social movement theory describes the drivers and impact of group mobilization to act to challenge the status quo, take on more powerful adversaries, or affect change in their environment. In addition, it presents the settings in which social movements will be impactful (B. G. King & McDonnel, 2013). Social movement theory also incorporates the concepts of collective behavior, issue framing, mobilization of resources, rational choice and actions to address real or perceived injustices. Social movements consist of committed citizens to "identify problems, develop solutions and pressure governments" and allow citizens to take actions in line with public preferences (Brulle, 2010). Social movement theory predicts that citizens will participate in policy decisions if three conditions are met; 1) the issues are hand are concrete and defined in manner that is clear, 2) the issues are significant and will have a direct impact on the citizens, and 3) the citizens feel that their voice will be heard and they can make a difference (Webler, 1999).

Social capital theory speaks to relationship issues that apply to growth and involvement of groups in common endeavors. It includes concepts of reciprocity, trust and cooperation. Social capital theory can speak to precedent; if you have existing relationships, credibility, a history of successful relations and trust then you are more likely to engage in a participatory process (Ansell & Gash, 2007). Similarly, low social capital (trust or previous experiences) reduces the ability to resolve conflicts (Beierle, 1998). Social capital theory can speak to outcomes; participation in citizen engagement helps to build social capital, which in turn strengthens democracy (Cooper et al., 2006). More inclusive, discursive, and frequent forms of participation help to build social capital (relationships and trust) and improve the participatory process (Barnes et al., 2003; Nabatchi & Leighninger, 2015).

Legitimacy theory addresses the concept of an organization (in this case the group desiring to represent the community) performing in a manner that is acceptable and recognized within its operating environment (Bhattacharyya, 2015). Suchman (1995) defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values and definitions" (p. 574). With legitimacy, community groups have credibility and continuity and will be more impactful in policy decisions if they are recognized by the larger community and government agencies to make valid claims on policy or implementation strategies. A single individual, in the absence of legitimation, can be seen as "a troublemaker" or a "rebel" and have little to no impact on agency decisions. A group of citizens, organized for action and with more legitimacy, can have significant impact on policy decisions.

Diffusion of Innovation

Diffusion of innovation theory (discussed in Section 3.1.1 for the government agency) predicts that a community group will adopt the mechanisms that have been positively utilized by groups in a similar setting. Knowledge of these prior practices can come from other community groups or through information provided by the public agency. This is a factor that is mentioned in almost every case investigated in this research as discussed in detail in Chapter 8. Communities learn not only about methods to address problems but also about issues in which they should be interested in through diffusive means.

Network Theory

Network Theory addresses the interactions of individuals within groups and interactions between groups in the performance of activities to do the work of the organization to achieve goals and objectives of the organization. Core to social network theory is that "relationships matter and structure matters" (DeJordy, 2013). The relationships provide the avenues for interaction and structure provides the opportunity for impactful work to be performed. Network theory describes the linkages (formal and informal) between groups and builds on the concepts of social capital, diffusion of innovation, and resource dependence. Social capital (relationships, trust) can be the building of networks and work to build networks where none exist or are in their infancy (Innes & Booher, 2004).

Some of the concepts of network theory that are important to public participation are reciprocity, the "strength" of ties, and structural holes (Lee & Kim, 2011). Reciprocity is presented as an extension of self-interested behavior. For instance, individuals and groups may perform actions that have no immediate benefit for the issue at hand. This can be done to build a relationship and strengthen the network. The continued performance of such actions builds a

relationship and enhances trust between actors that can provide the basis for long-term and positive interaction.

The strength of ties (or connections between network members) is based on frequency and quality of interaction, emotional bonds, and "reciprocity" between the members (Granovetter, 1973). It was initially proposed that strong ties were more influential within networks but later work identified the "strength of weak ties", or the concept that higher volume of members with less frequent interaction can provide even more network influence. Further to this is that too many strong ties result in a necessary reduction in weak ties (after all time and emotional energy are scarce resources) and a heterogeneity of ideas within strong ties. Many weak ties can lead to numerous "introductions" and a contagion-like spread of networks for the motivated community advocate.

The concept of structural holes refers to the density of a network and the number of connections between members of the network. A sparse network with many structural holes will have a few non-substitutable members who are at the core of interactions between the members. A dense network with few structural holes will have multiple connections between members and less reliance on central members (Lee & Kim, 2011). Two ideas are important here; 1) a network with few structural holes will increase the likelihood of diffusion of information and ideas throughout the network, resulting in a more effective network and 2) a structure with many structural holes will result in members striving to "fill the gaps" and make connections to meet the needs of the organization (as predicted by contingency and resource dependency theories). In summary, vibrant and growing networks can elicit community support, provide opportunities for resource sharing, enhancement of power, and sharing of information and ideas.

3.1.3 Theories of Process and Performance

This section presents the theoretical bases for the process of public participation, looking at both the process design and process performance perspectives. These theories surmise how participation should be performed and how successful the participatory programs will be. As discussed in Section 3.9, the concept of success is not value-neutral and most of the evaluation of public participation has focused on normative success and not policy outcome success and theory follows this pattern. Figure 3-3 depicts the theories applicable to design and implementation of participatory programs.

The concepts of *deliberative democracy* outline the need for and drivers for success of citizen engagement processes. Deliberative democracy has been defined (p. 384) as the process of “infusing the government decision-making process with reasoned discussion and the collective judgements of citizens; it connects public participation in public decision making to the practice of deliberation” (Nabatchi, 2010). Deliberative democracy, whose implementation is discussed in more detail in Section 3.8, expands upon indirect democracy (i.e. voting) and other forms of direct democracy, such as public hearings, public comment hearings, and advisory committees (Delli Carpini et al., 2004). It includes a more discursive and communicative process that is characterized by two-way communication and reasoned processing of information, values and preferences. Deliberative democracy presents the basis for the most inclusive and powerful forms of public participation.

Communicative action theory outlines the requirements for attaining the "ideal speech situation" or ISS (Palerm, 2000; Webler, 1999). The core concepts of the ISS incorporate the concepts of inclusiveness, equality and validity of input from participants, valid challenges to inputs from other participants and equal opportunity to participate in final decisions.

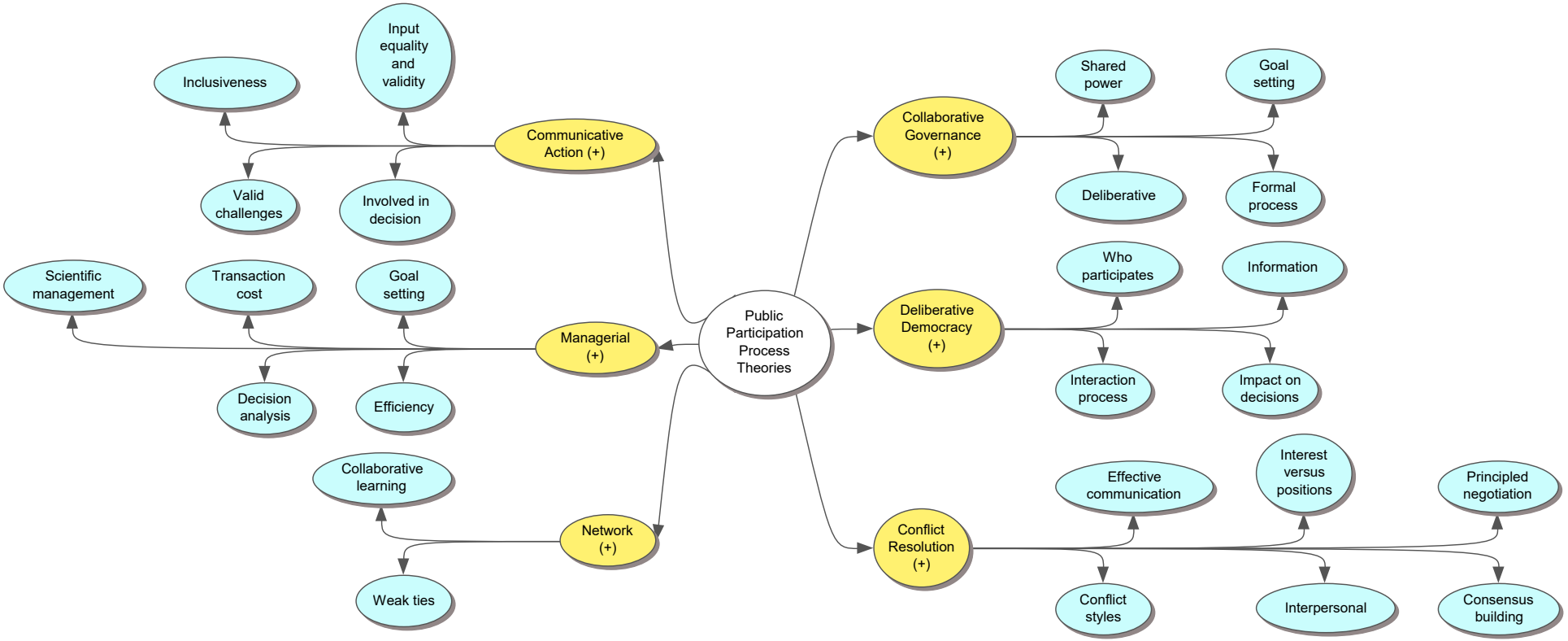


Figure 3-3. Theories of Participation - Process Perspective

Implementation of the ISS for public participation is discussed further in Section 3.4. Communicative action theory identifies the design features for useful, inclusive and complete participation.

Conflict resolution theory presents the framework for successful deliberation and solution of issues in an adversarial situation or one in which different groups have different desired outcomes. Conflict resolution theory is premised in effective communication, identifies different conflict styles, is based upon development of interpersonal skills, builds upon the concepts of identifying interest to be attained instead of focusing on positional statements, based in consensus building, and incorporates ideas presented in deliberative democracy (Beierle, 1998; L. Bingham, Nabatchi, et al., 2005; O'Leary, 2010). Another concept within conflict resolution theory is that the process itself leads to process improvements – the more you are engaged in conflict resolution the better the you get at it (O'Leary & Pizzarella, 2008). This is consistent with the deliberative democracy of thick participation, where more frequent and meaningful interactions result in a better foundation for future deliberative encounters (Nabatchi & Leighninger, 2015).

Collaborative governance theory defines collaborative governance as a "governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets" (Ansell & Gash, 2007, p. 544). While only the most inclusive public participation processes are truly collaborative governance, the concept of direct engagement and inclusion (not just consultation or informing), building consensus, and including the public in the information gathering, synthesis and evaluation process are all applicable to enhance the quantity and quality of public

participation (L. Bingham, Nabatchi, et al., 2005). A collaborative governance approach to citizen engagement is presented as the pinnacle of the civic engagement spectrum, which ranges from adversarial and electoral to informative to deliberative to a "citizen-centered collaborative public management" (Cooper et al., 2006).

Network theory relative to formation of community groups is discussed in Section 3.1.2. The important concepts of network theory relative to process design and performance are says that the concepts of collaborative learning (Ackerlund, 2011; McKinney & Harmon, 2002; Webler & Tuler, 2006), the importance of weak ties (Granovetter, 1973; Lee & Kim, 2011) and the ability to learn about processes from those in your network (a form of diffusion of innovation). The presence and health of a network community enhance the chance of success of public participation.

Managerial theories relative to agency decisions to adopt participatory methods are discussed in Section 3.1.1. Scientific management theory, transaction cost economics and decision analysis theory all play important roles in the development and implementation of participatory programs. Typical bureaucratic agencies (especially technical agencies like the Environmental Protection Agency) will be more receptive and respond better to well-designed programs with clear goals and objectives, clear communication with links to action (Fung, 2004), efficient implementation procedures that enhance rather than hinder the problem-solving process, and processes that are formulated in a manner that articulates the benefits to the decision making.

3.2 History of public participation

The public having a strong and direct voice in the decisions that government makes goes by a variety of names – direct democracy; public, resident or citizen participation; community,

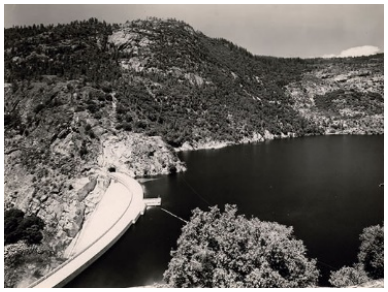
citizen or stakeholder involvement; citizen, public, community or civic engagement; public deliberation; participatory governance; “democracy in action”, “getting democracy”, “the heart of democracy”, and deliberative democracy (Nabatchi & Amsler, 2014; O'Faircheallaigh, 2010). This section presents a concise history of the progression of public participation efforts in the U.S.

The idea that citizens should have an active role in these policy decisions dates to the founding of the country. Eighteenth century New England town hall meetings, while limited in access, provided the opportunity for citizens to make many of the governing decisions of the community (Nabatchi & Leighninger, 2015). Nineteenth century advances included the formation of numerous special interest associations to address governance issues surrounding farming businesses (the Farmer’s Alliance), urban economic, health and environmental issues (Hull House and the first workers’ unions), cultural division (populism and the Populist Party), governmental accountability and reform (the Progressive reforms) and environmental conservation, including popular literature (Thoreau and Emerson), naturist art (the Hudson River School), and the activist movements of John Muir and the Sierra Club (Merchant, 2007; Nabatchi & Leighninger, 2015).

One of the early social environmental movements was the battle over Hetch Hetchy from the 1890s through the 1910s. Hetch Hetchy was a natural valley within the confines of Yosemite Park and very similar to the area of El Capitan within the same park. Officials of San Francisco proposed to dam the valley to create a much-needed water supply reservoir for the City. The effort was opposed by preservationists and conservationists and was a catalyst to the formation of the Sierra Club under the direction of John Muir. A decades-long battle ensued and the damming of the valley and construction of the reservoir was approved by Congress. While many

considered the efforts a losing battle, the community and capacity building that took place resulted in a formation of a movement that was cohesive and powerful enough to successfully oppose similar National Park dam proposals in the 20th century, including the proposed construction of a similar reservoir in the Grand Canyon's Colorado River valley.

Muir's (left) and San Francisco's (right)
Hetch Hetchy Valley.



Progress in the area of public participation has typically coincided with other major political movements in the United States (Nabatchi & Leighninger, 2015; Roberts, 2008; Thomas, 1995), including the aforementioned Progressive Movement of the late 1800s. Citizen involvement in government advanced with the passage of the New Deal in the 1930s (Roberts, 2008). Urban renewal efforts of the 1940s incorporated "blue ribbon commissions", a more elitist form of participation, in lieu of meaningful public input by the affected populace on community development decisions.

The Administrative Procedures Act of 1946 incorporated public notice and comment into the rulemaking process (Nabatchi & Leighninger, 2015). Significant changes in the role of the citizenry were also found in the social changes that accompanied the Great Society and Civil Rights movements of the 1960s (Nabatchi & Leighninger, 2015; Roberts, 2008; Thomas, 1995).

The most significant leap forward, especially in the area of environmental policy, was during the 1970s following the passage of the National Environmental Policy Act (NEPA) of

1969 and the wave of administrative responses and environmental activism that ensued (Depoe & Delicath, 2004; Graham, 2004; Smith, 2013). The NEPA process impacted the role of public participation on two fronts. First, it formalized the process for public involvement for most governmental agencies and provided direction for those citizens who had an active interest in influencing political decision-making. Second, it provided a set of rules with which administrators were required to comply in seeking out and incorporating public opinion. These rules prescribed a method that was more of the notice, inform, and convince variety and, while not deliberative in nature, were an advancement of the process of inclusion (Applegate, 1998).

The 1990s presented a time of change for public involvement as the pendulum swung from encouraging participatory efforts to a focus on administrative efficiency and back again as public administration and public management struggle to "find itself". With the New Public Management (NPM) movement in the 1990s, administrators were held to higher standard of accountability to the citizen and the citizen took on the role of client instead of subject of the governing body (Thomas, 1995). Citizen input then took the form of New Public Involvement (NPI) with a focal change from policy implementation to policy decision-making (ibid, pp. 3-4). New forms of citizen groups began to emerge and the role and potential impact of the citizen was enhanced. Within the NPM movement, there was change from citizen inclusion to a focus on efficient service delivery, outsourcing of government functions to private organizations, and an impersonal nature to the administrative function (Osborne & Gaebler, 1992).

The 1980s and 1990s also saw the growth of community action in opposition to environmental pollution and development of infrastructure (landfills, power plants, incinerators, etc.) in their neighborhoods. This Not In My Back Yard or NIMBY movement, signaled a rebirth of community activism in land use decisions (Nabatchi & Leighninger, 2015).

The New Public Service movement of the late 1990s and 2000s again focused on the enhanced the role of citizen by acknowledging that the citizen was not a consumer or client of government, but the owner of government (J. V. Denhardt & Denhardt, 2015; R. B. Denhardt & Denhardt, 2000). The move to greater citizen involvement includes concepts of collaborative public governance that defined the citizen as one of the collaborators, deliberative democracy, and involvement of citizens in ever-increasing roles in the decision making process (Cooper et al., 2006; Delli Carpini et al., 2004; Fung, 2015; Nabatchi, Ertinger, & Leighninger, 2015; Nabatchi & Leighninger, 2015).

The current decade has seen an increase in the use of technology – the dissemination of information through internet resources, the use of the internet for preference gathering and community building, and the growth of social media for participation (J. V. Denhardt & Denhardt, 2015; Fung, 2015; Huang & Feeney, 2016; Nabatchi, 2012a, 2012b; Nabatchi & Amsler, 2014; Nabatchi et al., 2015). In addition, public administration and citizen engagement scholars have developed advanced strategies for involvement and encouraged the move from theory to action (Delli Carpini et al., 2004; Nabatchi & Leighninger, 2015). More detail on these recent developments is presented in Section 3.4.

3.3 Goals and drivers for public participation

The drivers, goals and objectives for public involvement in policy setting and implementation are numerous. As stated in Section 2.1, they date back to the founding of the country and rest on the "desire for a strong democracy" (Thomas 1995, p. 3) in which the citizen not only had the right to influence governmental decisions but the responsibility to do so. Beierle and Cayford (2002) state that "(t)he purpose of participation has shifted from merely

providing accountability to developing the substance of policy" (p.5) and that in highly-technical policy settings "(o)ne reason that participation has become more central to environmental decision making is an expectation that it can temper the confrontational politics that typify environmental policy" (p.5).

Beierle (1998) and Beierle and Cayford (2002) identify the following “social goals” of public participation:

- “To incorporate public values into decisions;
- To improve the substantive quality of decisions;
- To resolve conflict among competing interests;
- To build trust in institutions;
- To educate and inform the public; and
- To achieve cost-effectiveness.”

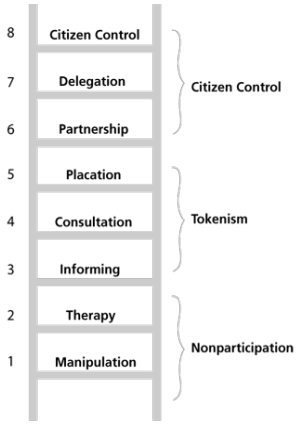
Innes and Booher (2004, p.422) identify the following purposes of public participation; 1) to understand and incorporate public preferences into decisions, 2) to obtain information from the public that can be used to improve decision-making, 3) to address inequities in the policy determination, 4) to provide the agency with legitimacy in decision-making, 5) because it is legally required, 6) to build community capacity for continued participation in the work of government, and 7) to create an “adaptive, self-organizing polity” to address more difficult future problems.

Addition goals of public participation are to attain fairness and completeness, “getting democracy” (C. S. King, Feltey, & Susel, 1998), to obtain justice (Fung, 2004), even if “justice is an elusive goal” (Fung, 2015), and to get to better technically and socially acceptable decisions (Folk, 1991). Recent advances in participatory methods (such as deliberative democracy) and the additional expectations of these more inclusive forms of public are presented in Section 3.10.

3.4 Typologies and methods of public participation

The decision *to* enhance public participation in a policy setting may be the easy part; one then must determine *how* to implement. Once the decision is made (or mandated), the design and selection of participatory methods can make or break the process. Successful outcomes from public participation processes - regardless of how success is defined - hinge on this selection, the decision by administrators to fully embrace public participation, and the details of the implementation phase.

Public participation can take many forms – public hearings, public comment on proposed rulemaking, citizen advisory committees and more recently public involvement in regulatory negotiations, mediations, and collaborative and deliberative efforts to engage and involve the public in policy decisions (Beierle, 1998; Koontz, 2005; Richardson, 2003). The understanding of participatory methods begins with Arnsein's "ladder of participation" (Arnstein, 1971).



Arnstein's Ladder (1969)
Degrees of Citizen Participation

The ladder of participation, presented here,[3] presents a typology of participation methods ranging from "nonparticipation" (manipulation and therapy) to "tokenism" (informing, consulting, and placating), to "citizen control" (partnership, delegation, and ultimately citizen control). This early summary of methods has been utilized by recent scholars as the starting point for discussions on the level of involvement and control that is afforded the public in the decision-making process. In this vein, Applegate (1998) characterizes participation as basic review and comment, enhanced review and comment (which typically adds the dimension of "live" discussion and response to comments), regulatory negotiation (which includes all

[3] The image of Arnstein's Ladder was reproduced from Vancouver, British Columbia's "The Citizen's Handbook" website (http://www.vcn.bc.ca/citizens-handbook/arnsteinsladder.html).

impacted parties), and includes citizen advisory boards (CABs) at the most inclusive end of the spectrum. Applegate does not address more inclusive deliberative processes, as his study was a legal-centric evaluation of CABs.

Nabatchi and Leighninger (2015) identify the various forms of citizen participation as conventional, thin or thick. Conventional participation includes activities such as public meetings with preset agendas and structured presentation and question and answer components. Thin participation includes many online participatory efforts as well as two-way communication methods in which citizens can quickly provide information and indicate preferences for action. By contrast, thick participation includes deliberative dialogue between agencies and citizens (often "large numbers of people, working in small groups") and includes recruitment of individuals to construct a large, diverse group of actors; allows individuals to "tell their stories," hear and understand the motivations of other citizens, learn about the details of the issue, and frame the issues in ways that matter to them; and helps the assembled group to develop a consensus on a decision strategy. "Generally, it (thick participation) is the most meaningful and powerful of the three forms of direct participation, but also the most intensive and time-consuming and the least common" (ibid, p. 14).

Webler and Tuler (2006) identify the following categories of participatory methods for complex scientific policy issues:

- Science-centered stakeholder consultation, which is action oriented and conforms to Arnstein's "informing" activity;
- Egalitarian deliberation, "empowering participants and is a reaction against dominance of the agency" (p. 711) and conforms to Arnstein's "placation" mode;

- Efficient cooperation, which increases citizen involvement, allowing recommendations on action from the public conforming to Arnstein's "partnership"; and
- Informed democratic collaboration, which results in higher levels of partnership and engenders additional trust and legitimacy in the agency decision.

None of Webler and Tuler's methods of engagement result in any form of full citizen control of the decision process.

The choice of method also informs the form of resultant democracy. The ensuing form of democracy can be adversarial, such as that found in social movements; electoral or representative democracy, with choices flowing indirectly through voting and supporting causes; democracy in the form of administrative information exchange, including standard public hearing approaches, civil encouragement and growth that results in capacity building of the citizenry; or deliberative democracy, resulting in true dialogue and collaboration between the agency and the public (Cooper et al., 2006; Delli Carpini et al., 2004; Nabatchi & Leighninger, 2015). The further along the inclusion spectrum the method moves, the more the process moves from "hierarchy, specialization and impersonality" toward the ideals of "equality, participation and individualism" (Vigoda, 2002). In the absence of deliberative processes, the form of "participation" may be more akin to convincing citizens that the announced agency decision announced is the best decision with no true citizen input.

Methodological perspectives for public participation address both macro level (or conceptual) and micro level (or detailed implementation) aspects. At the macro level, the key aspects of public participation are the decision of *who participates*, how much *power and information* is shared, how the *relational* component of the process will be nurtured, the role of

consensus building in the process, how *education* of the public will take place, and how the *implementation* phase will unfold (Cooper et al., 2006; Thomas, 1995; Weeks, 2000). At the micro level, one key criterion is the choice of a specific method of public involvement. For example, will the process include public notice, community advisory groups, open public meetings, citizen panels or deliberative methodologies?

Cooper et al (2006), identify five dimensions for consideration in the design of civic engagement (pp 84-85):

- Who is involved? The "right public" must be identified and chosen, addressing issues of trust, efficiency and competence as well as the cost of the participation process;
- Who initiates the civic engagement? If the governing agency initiates (top down), citizens themselves initiate (bottom up), or interested associations initiate (external forces) the resultant form of the engagement process will vary;
- Why are citizens involved? Do they want to influence the creation of policy or drive the methods of implementation;
- Where, in the government landscape, does engagement take place? Participatory efforts for local decisions are different for local, state and federal agency decision-making bodies;
- How are citizens involved? Different methods must be employed to process questions and comments from those to encourage deliberation to understand community preferences and gather valuable information from the community.

The quality of the communication process is also important to the participation process. An incorporation of Habermas' theory of communicative action and "ideal speech situation", or ISS, is presented by Webler and modified by Palerm (2000, p. 586-587). The ISS for meaningful

and discursive participation necessary to afford fair and competent decisions includes the following elements:

> "1. Anyone person or group who considers themselves to be potentially affected by the results of a discourse must have an equal opportunity to attend the discourse and participate.
> 2. Every discourse participant must have an equal opportunity to make validity claims to comprehensibility, truth, fairness, normative rightness, and sincerity.
> 3. Every discourse participant must have an equal opportunity to challenge the validity claims to comprehensibility, truth, rightness or sincerity made by others.
> 4. Every discourse participant must have an equal opportunity to influence the choice of how the final determination of validity will be made and to determine discourse closure (i.e. to decide when there is no consensus."

The vantage point of the observer is also important. The key questions for public participation look very different from the viewpoint of the administrator as opposed to the viewpoint of the citizen. Thomas (1995) outlines the process of public participation from the viewpoint of the administrator and identifies three relevant approaches to public involvement. The public decision-making approach is a deliberative and collaborative effort and is the most open form of public participation he considers. This approach can be employed if there is relatively low risk to the quality of the decision by involving the public. If, however, the public does not share the goals of the agency, he posits that a "unitary consultation approach" may be more desirable. In this case, the public is informed and consulted, but the agency is not bound to abide by public wishes. In the event where there exist differing views of the path forward among groups of the citizenry, a "segmented consensus-building approach" is appropriate. Thomas' view on selection of who participates is also organizational-centric. He claims that the choice is usually made based on what the public can add to the process. The choice typically is between including those who can provide additional information and including those who can assist in the implementation of the process. Decisions regarding the role of the public in the participatory process are also based on the agency's interest. The choices include involving the public for

informing them only, to engender approval for the decision, or to build strong relationships for the benefit of future interactions.

Other scholars take a very different view of the selection processes, with a focus on the benefit to the public not the organization (Fung, 2006). The decision of who participates (to provide representative makeup), how communication is performed, and how the communication is turned into decisions are at the core of the selection process and the selection criteria are evaluated based on benefit to the public. Still others (Wang, 2001) advocate a "genuine" process that puts the decision-making impetus squarely on the citizens, with the agency serving in a role to "set goals, provide incentives, monitor processes, and provide information" (p. 402).

Petts and Leach (2000) identify the variety of public participation methods available to policy makers, discuss the features of a good public participation process and present a model for evaluating the effectiveness of the public involvement methods.

One of the themes of public participation that runs through the literature is that the makeup of the community has significant influence on the public input process. This can be the result of the size and activist tendencies of the community (Koontz, 2005), the preferences of the community (Greenberg & Lewis, 2000), the unequal share of cost (in dollars or other impact) to be borne by the local community to address a larger social issue (Richardson, 2003; Upreti & van der Horst, 2004), or whether the community has the resources or skill set to successfully participate.

From a micro perspective, Bartsh (2003) has written a primer on public participation in brownfields programs that is designed to guide all stakeholders (the public, developers, investors, city and state officials) through a successful public involvement process. The basic steps include developing a shared community vision, encouraging community involvement

(including defining the representatives of the community and developing the participatory process), and overcoming barriers to accomplish the stated vision. Bartsh goes on to identify common success factors for public participation processes to include proper identification of all stakeholders (i.e., making sure that the broad community is involved), developing knowledge of and thereby a trust of actors in the process ("leaders"), clear, effective and honest communication, developing an understanding of resource difficulties, and building on small wins to "promote successes."

3.5 Benefits of public participation

The determination of the benefits gained from public participation in policy setting and implementation depends somewhat on the lens through which one views the participation process. Some scholars believe that participation is an end unto itself in striving for greater democracy (Delli Carpini et al., 2004; Folk, 1991; Frederickson, 1982; Hourdequin et al., 2012; Nabatchi, 2012b; Vigoda-Gadot, Eldor, & Schohat, 2013). Other scholars propose that participation (maybe additionally) is a means to an end; and that end is a more informed process, a public that has been included to optimize the decision-making, and improved outcomes. The benefits of public participation can include the incorporation of technical and community knowledge from the public that may have been overlooked or not available to public officials prior to the participation process (Petts & Leach, 2000), the identification and selection of better solutions through the decision-making process, and the addition of diverse viewpoints and problem solving perspectives that can improve the creativity and generate solutions that may not have been considered in an agency-only process (Petts & Leach, 2000).

Additional benefits include increased capacity of the public to address technical issues and participate in a democracy (Roberts, 2008), fostering a sense of community and inclusion that can result in building relationships and understanding fellow community member views (Nabatchi & Leighninger, 2015; Roberts, 1997), understanding of public preferences for issues to be addressed by the process, and tapping into resources that are only available from members of the community making citizens active solvers of problems (Nabatchi & Leighninger, 2015). Public participation can also build trust among citizens and between citizens and the community and public officials, energize the community to action, help communities to identify "resources and allies" (Nabatchi & Leighninger, 2015), and tap into public "passion" for the issues (Petts & Leach, 2000). Public participation can also increase community legitimacy to the agency and allow citizens to become trusted partners in the process (Barnes et al., 2003), increase the legitimacy of decisions that are made by public officials can be legitimized with the public (Roberts, 2008), and transfer power from the regulator to the regulated resulting in a sense of ownership that enhances the potential for later success (Roberts, 2008), and create civility that can increase citizens' ability to hear and understanding alternate viewpoints and present their own in structured and beneficial conversations (Nabatchi & Leighninger, 2015).

Public participation can also achieve justice for marginalized groups (Fung, 2006), build a citizenry that is knowledgeable of public issues and the constraints that exist in the policy process (Nabatchi & Leighninger, 2015), support democratic decision-making and address citizenship and democracy deficits (Nabatchi, 2010), streamline the decision-making process (Petts & Leach, 2000); and develop leaders within the community (Nabatchi & Leighninger, 2015). Participants will grow to trust and understand the members of the community that are passionate about the community and the issues that affect the community. They will identify

members who are action oriented and move decision forward and push implementation. Likewise, individuals will gain an understanding of their own passion for the issues and put forth the effort to gain positive solutions.

3.6 Costs of public participation

Fostering an environment that is conducive to public participation is not without its costs to the process and the public. The balance between the democratic principle of responsiveness and the administrative pressures for efficiency while involving the citizenry in policy decisions and implementation is a tenuous line. It has been stated that democracy was designed to "reflect and engender an active citizenry" (C. S. King et al., 1998), while the political system in the United States also "protects the political and administrative process from a too active citizenry" (ibid, p. 384). Those who promote more public participation and more inclusive techniques must do so with the recognition that there can be significant barriers (See Section 3.7) and costs to such changes.

The potential costs associated with increased public participation or poorly implemented participation include a loss in cost efficiency in the decision-making process because of increased transaction costs as the number of decision makers increases (Roberts, 2008), schedule delays associated with increased deliberation and citizen engagement (Roberts, 2008), creation of unnecessary conflicts (Barnett, 1994; Roberts, 2008), diversion of agency resources from other issues (Roberts, 2008), and time and financial costs of participation to the public (Nabatchi, 2012a). Community involvement can also increase the risk of poor technical decisions with incorporation of uninformed citizen input or a participating public that doesn't understand the technical aspects and risks of the possible solutions. Furthermore, there can be potential negative impacts on community members if active participants support a decision that ultimate fails to

achieve goals or is co-opted by unpopular interests. Other potential negative consequences include loss of credibility of the agency if the process fails or is seen as a formality as opposed to meaningful involvement (Petts & Leach, 2000), loss of credibility of the public if the citizen involvement is not serious, sincere and positive to the process, poor decision-making based on self-interested behavior of participants instead of community-interested behavior (Roberts, 2008), the selection of the "wrong public" for inclusion in the process, such as a vocal minority that dominates the process (Petts & Leach, 2000); the potential exclusion of "counter publics" who do not fit into the mold of the established public (Barnes et al., 2003), potential instability in the policy process caused by erratic citizen involvement (Roberts, 2008), and the selection of a popular solution that is not in the larger public interest.

Many of these costs of participation are issues that can be addressed to a degree with proper design and implementation of the participatory process. According to Roberts (1997, p. 130) – public participation is "not a constraint on effectiveness but an aspect of the job (of administration) itself."

3.7 Barriers to public participation

The barriers to public participation and the issues to be overcome through the public involvement process are often the same. These include difficulty in the general public understanding highly technical matters; lack of public trust in governmental officials and the regulated community; the divergent interests of stakeholders; differing tolerances for risk for members of the community, agencies and other stakeholders; divergent beliefs about what constitutes "good" public participation; and potential disconnects between the bearers of costs and receivers of benefits for policy implementation (Beierle, 1998; Green, 1997; Greenberg &

Lewis, 2000; Petts & Leach, 2000; Richardson, 2003; Thomas, 1995; Upreti & van der Horst, 2004; Webler, Tuler, & Krueger, 2001).

Accordingly, there exist barriers to public participation and direct citizen involvement. Some of these barriers impeded the public from pursuing participation and others provide a disincentive for administrators to seek out or incorporate public wishes in decision-making and implementation of policies. Roberts (2008, pp. 12-13) identifies several reasons that public participation is opposed by administrators and politicians, including a perceived inefficiency of processes that include citizen participation, the "naïve" and under-educated nature of the populace, and the unrealistic expectations of the process. She also highlights several dilemmas that come along with public involvement, including problems associated with the size of a decision-making entity (efficiency), the lack of ability to participate for low-power groups (equity), the lack of agency accountability if solutions selected by the community fail, the lack of technical expertise of the public in many policy arenas, the fact that some policy decisions require quick action and thus preclude meaningful participatory efforts, and the potential for a citizen group to put their interests ahead of the "public good."76

One of the significant set of constraints placed on public participation is the emphasis that is placed on agency professionalism and expertise. The rise of the expert in policy-making has often led to an exclusion of the citizenry in this area (Benveniste, 1977). Benveniste portrays the average citizen, or "beneficiary", in the following passage (p.7):

> "These are the people for whom the plans are made in the first place, the people who may support or fight planners and who may be peaceful or violent depending on the way the play unfolds. In this book, we call them beneficiaries. At times they are victims, in the sense that the recommendations of experts run contrary to their interests. But whatever the outcome, the experts rarely know them. In most policy situations the experts do not have the time, the resources or the know-how to communicate with their beneficiaries."

The increasing dependence of governmental leaders on expert input in the policy-making and implementation phases has resulted in a wall between the citizen and the process. Who can question an "expert"? Why would we go against the recommendations of "experts" in whom we have invested so much time and money? Unfortunately, as uncertainty increases, the need for experts increases and the wall gets built a little higher and a little stronger. The conflict between organizational goals and citizen needs is often exacerbated by experts and their involvement in the process.

The professionalism of administrators also presents a barrier to public participation. As society (and government) become increasingly technical and complex, the dilemma of keeping the public educated and involved falls to the administrator (Ventriss & Pecorella, 1984). This is sometimes in direct conflict with the perception that as a professional, the administrator should not be questioned (by a less informed public) on the decisions that are made. Furthermore, the incorporation of public preferences into the decision-making process presents time constraints on the manager, adds unpredictability to what may be a well-defined process, can be emotionally draining to the administrator and, above all, can present a threat to overall quality of the decision (Thomas, 1995).

The public involvement process itself can provide a barrier to public participation. The language of policy and the discourse in which the issues are addressed often seem designed to keep the public at bay (Toker, 2004). The bureaucratic response to mandated public participation sometimes results in a process that hinders any meaningful citizen involvement. Examples include a process filled with technical language with little or no technical support from the lead agency, scheduling of meetings that are long and infrequently held and scheduled at

times when public attendance is difficult, and selection of poor agency leadership for the public participation process (Depoe & Delicath, 2004; C. S. King et al., 1998).

Additional barriers to public participation and quality discourse on policy matters include the lack of resources for citizens that may be consumed with the "realities of daily life" (C. S. King et al., 1998), bureaucratic procedures of citizen engagement that may discourage public involvement (C. S. King et al., 1998), and agency managers and the regulated community who may be reluctant to increase the involvement of citizens because of the potential loss of agency and cost-bearers control. There may also be a lack of consensus within the community on the preferred solution (Bartsch, 2003), community apathy toward agency decisions or a particular issue (Bartsch, 2003), the lack of an established regulatory framework for the participation process (Petts & Leach, 2000), the lack of public experience, or the lack of access to information or technical support to digest available information (Petts & Leach, 2000; Roberts, 2008).

Identification of these barriers provides an opportunity for the resourceful agency or manager committed to meaningful community engagement to design participatory programs that incorporate measures to remove or ameliorate the impediments to direct citizen participation in policy decisions.

3.8 Requirements for "good" public participation

To capitalize on the potential benefits and to mitigate barriers to participation, the design and implementation of the participatory process should incorporate aspects that are core to "good" public participation. A core set of characteristics of meaningful participation are presented by Nabatchi and Leighninger (2015, p. 25-28). These components include:

- The process should be based on “adult-adult” relationships and not adult (agency)-child (public) relationships;
- Make sure that the participants have as much information as they want in advance of meetings;
- Develop the interaction around “sound group processes”;
- Provide a forum and the time for people to “tell their stories”. Understanding why others are interested and what their concerns are cultivates an atmosphere of listening, learning and growing to solutions;
- Do not try to sell a pre-established solution. Allow participants to develop or choose from several alternative decision outcomes;
- Make sure that participants know they are being heard to establish legitimacy of the process;
- Allow multiple avenues for participation that consider individual interest and commitment to the process;
- “Make participation enjoyable”;
- Remove barriers to participation by recognizing schedule constraints and incorporating technology as much as possible;

Ansell and Gash (2007) identify elements that often result in successful collaboration, including a history of conflict resolution or cooperation between participants, the provision of incentives to participate, and recognizing and addressing power or resource imbalances that exist within the policy process. The active presence of a leader (or champion) of the process within the governmental body, the design of a process that promotes interaction between participants and addresses personality and power differences, recognizing the importance of “face-to-face

dialogue" and incorporating this into the process, and utilizing small wins to build trust in participants can also encourage successful collaboration. Furthermore, establishing the goals and basis for the decision-making process upfront and developing a "shared understanding and commitment" to the process is important to the success of collaborative efforts.

Depoe and Delicath (2004, p.3) add that "early and ongoing, informed and empowered public participation is the hallmark of sound public policy" and further state that the citizenry often provides necessary information that is not available elsewhere. Thomas (1995, p.36) claims that the core theory of public participation is that "the desirability of public involvement depends primarily on the relative need for quality versus the need for acceptability in an eventual decision." Additionally, effectively answering the question of "who participates?" is important to good participatory programs (Barnes et al., 2003). Often the participation program excludes groups that are considered marginal or "counter publics," agency managers decide who should participate, or legitimation of the community impedes the inclusion of needed parties in the process. The decision-making will suffer if the "right" public is not party to the process. Greenberg and Lewis (2000) further define a desirable public participation process as one in which the public opinion reflects the full participation of the community, not just the active or more vocal powerful subset.

Webler, Tuler and Krueger (2001) define "good" public participation (p. 447) as processes that are representative and democratic, encourage dialogue among central actors, are fair to all actors, allow a power struggle to determine the outcome, and depend on leadership to gather, assimilate and utilize varying viewpoints and information. Some of these characteristics are synergistic (such as representative nature, fairness and dialogue) and some are clearly at odds

(such as democratic process and power plays), highlighting a dichotomy that often appears in public participation in policy making.

Deliberation and democratic principles provide the foundation of good participation. Fung (2006) presents the "democracy cube", which can be used to assess and characterize participation methods. The cube is a three-dimensional model that includes measures of "participant selection, communication and decision method, and authority and power". Good participation includes a broad base of participants, deliberative communication processes, in which real decision-making power rests in the citizenry. Renn (1999) identifies the ideal of "analytic-deliberative decision-making" for technical processes (e.g. risk management). The process requires understanding the values of the affected community, expert evaluation of options, and evaluation/selection by citizens.

3.9 Evaluation of public participation

As outlined earlier, there are benefits and costs of public participation and barriers to citizens and public officials fully utilizing the processes. Therefore, the evaluation of citizen involvement programs and efforts is important to understand the balance between the benefits and costs and to provide information to design and implement successful participation processes. Evaluation of public policy can include studies of the implementation of the process, the impact of the specific process, or an overall evaluation of the policy itself (R. D. Bingham & Felbinger, 2001).

The evaluation of outcomes from the public participation process depends on the goals of citizen involvement (Rosener, 1978). Some scholars view the process as an end to a means, where the success of the program results in an improvement in the delivery of services. Others posit that the process is an end unto itself (J. D. Hamilton, 2004; Nabatchi, 2012b; Senecah,

2004). In this instance, it is important that the public be engaged and involved in a manner that promotes equity, democracy, and transparency. Rosener (1983) states that "(t)he participation concept is value-laden; there is no widely held criteria for judging success and failure; there are no agreed-upon evaluation methods; and there are few reliable measurement tools". Additionally, Beierle (1998) finds that inconsistent (or non-existent) evaluations of public participation are primarily the result of differing views of what public participation is supposed to accomplish and differing views of democracy. The managerial view holds that the agency gathers information from the public and decides, while the pluralist view holds that the manager is the mediator in a deliberative process, and the populist view contends that the policy process should consist of direct participation and decision-making by citizens. The different perspectives suggest different participatory methods and expected outcomes which are difficult to evaluate based on common criteria.

Chess presents a discussion of many of the approaches and obstacles to evaluation studies of public participation. She reviews the various methods of evaluating participation and the benefits and drawbacks of these approaches (Caron Chess, 2000), which vary by timeframe, focus, evaluating party, and performance measures. Regarding timing of evaluations – precursor studies estimate the impact of a program, concurrent studies attempt to measure the ongoing effect, and studies after implementation address long-term and lasting effects of the programs. The focus of public participation evaluations can be on processes (does the public participation enhance the democratic nature of the overall process and is the public given a voice) or on outcomes (does the public participation process result in “better” results for the program). The actors that perform the study can greatly influence the focus, with internal participants likely to focus on process and external auditors more

likely to focus on achievement of stated goals. There is a predominance of qualitative studies, resulting from the fact that many of the measurement parameters are difficult to identify, measure or concurrence on the key parameters is a stumbling block.

Bixler and colleagues (2016) establish a performance matrix and utilize social network analysis to evaluate the performance of collaborative networks. The study focuses on measurement of network improvements such as the addition of new members, improved exchange/transfer between members, and increased connections within the network. The evaluation utilizes a process-oriented evaluation of success instead of the "traditional approaches to evaluation in public administration apply a rather linear logic, where program inputs produce (or fail to produce) measurable outcomes."

Charnley and Englebert (2005) present an 8-year evaluation of EPA's superfund community involvement program (CIP), with a focus on democracy of public participation programs and success in achieving "broad social goals" (p.167), and whether public participation is meeting specific goals of the groups engaged in the process. The study measured "citizen satisfaction with EPA-provided information, citizen understanding of risks, citizen satisfaction with EPA-provided chances to participate, and citizen satisfaction with EPA response to input (p. 165). The study found that (1) the public prefers to get information from EPA but more citizens get information from media outlets; (2) more than half of the respondents were satisfied with the quality and quantity of information that they received from EPA; (3) citizens who felt that they were well-informed also had a positive view of EPA's effectiveness (and vice versa); (4) citizens feel that EPA is average to below average in "understanding community concerns, using input, explaining its decision and earning trust"; and (5) citizens that chose not to participate were unaware of the site, lacked geographic connection to the site in question, were satisfied with the

job EPA was doing, felt inadequate to provide meaningful input or felt that EPA would do what it wanted regardless of input from the community.

This last finding is germane to my study as it speaks to the reasons that citizens will not invest in public participation efforts.

Koontz (2005) finds in his research that community heterogeneity often results in theoretical formulations that end up with almost as many independent variables as cases in the study. Therefore, attempts to formulate quantitative analysis of public participation processes prove to be difficult and lead the researcher to a multiple case study approach. Koontz approached the problem of heterogeneity of community by categorizing public groups according to a number of other characteristic parameters to perform such a multiple case study.

Bierle and Cayford (2002) perform such a multiple case study evaluation of public participation programs in environmental decision-making. The study looks at 239 cases that vary *by context* - policy setting versus site specific, positive and negative pre-existing relationships, level of government, and lead agency; *by process* – participant selection, type of output, use of consensus, and measures of agency responsiveness, participant motivation, deliberation; and *by results* – with a focus on relationship and capacity building. In identifying the key attributes of successful programs, they suggest a process for successful participatory efforts, including needs analysis, goal identification, process design (participant selection and type of engagement), selection and evaluation and modification.

There is not general agreement on whether public participation results in better outcomes when looking at the effectiveness of policy outcomes. Some scholars claim that the research on public participation in policy decisions has generally found that greater public interest and involvement significantly improves policy outcomes, specifically in environmental policy

(Beierle, 1998). Others (Koontz & Thomas, 2006) claim that there has been no demonstration that collaborative public participation improves the quality of outcomes.

3.10 Recent advances in public participation – collaboration and deliberative democracy

Early public participation processes, implemented to meet the legal requirements of governmental mandates, have been described as the "decide, announce, and defend" approach to citizen involvement (Depoe & Delicath, 2004). In this approach, administrators made decisions and used the public participation phase to inform citizens what they were going to do and why it was the right approach. This is consistent with the professionalism and expertise model discussed earlier. This one-way dialogue resulted in what has been referred to as the "participation gap" (J. D. Hamilton, 2004) (p. 61). In addition, Nabatchi (2010) identified democracy and citizenship deficits that can be addressed via improved participatory methods (see Section 3.1.2 for a discussion).

Participatory advances in the last two decades have transformed an adversarial process under the administrative state to a deliberative and collaborative process (Cooper et al., 2006). The transformation began with the New Public Involvement (NPI) initiatives of the 1990s (Thomas, 1995), which focused on better addressing citizen interests and promoted the view of the citizen as a client of the state.

King, Feltey, and Susel (1998) have also noted the change in public participation methods over the past two decades. They note four aspects of the public participation model – the issue, the administrative process, the administrators and the public. Historically, public participation included the issue at the core of the debate and the process revolved around the

administrator with the public as a peripheral actor. The new public participation process still includes the issue at the core, but the citizen is now the central actor with the process moving to the periphery. This change in focus (public not process) results in more deliberative and collaborative efforts. Hourdequin, et al (2012, p.40) adds that deliberative democracy is to "get people to think beyond self-interest and take into account the good of others".

Vigoda (2002) also notes that public participation processes have gone through a life cycle that began with coerciveness on the part of administrators (the decide, announce and defend approach), then a transformation to a process that included delegation of some responsibility to the public, and then to a process that is more responsive to public concerns, and calls for a process that is collaborative, not just responsive. The difference between these two modes is best represented by viewing the roles of the actors in the process. In a responsive process, the administrator is a manager and the citizen is the client. In the collaborative process, citizens and administrators are true partners in the process (Vigoda, 2002). Collaboration in public participation is characterized by openness of the process and transparency in decision-making, methods that use innovative tools to educate and increase capacity of the citizenry, and involve the citizenry at earlier phases of the policy process.

Nabatchi and Leighninger (2015) identify citizen engagement through deliberative democracy as the driver for changes in how democracy is manifest and the public is empowered to be a part of the policy process. They identify information sharing, participatory budgeting measures and the equity in cultural differences as key components to advancement of the democracy that citizens want.

3.11 Public participation in environmental policy

In highly technical situations, such as environmental policy decisions, there are additional challenges to the participatory process. The technical matters are much more complex and the role of experts sometimes overwhelms the average citizen. Citizen involvement in these situations can result in a better understanding of the issues by the public and a legitimation of the decision made by the experts.

Three environmental programs are of particular interest in developing, framing, and answering my research questions. These programs – the Federal Superfund program, the brownfields and community redevelopment program, and facility siting arena - each present a unique set of challenges the administrator and the citizen.

Research on public participation in environmental policy decisions has generally found that greater public interest and involvement results in positive normative outcomes, although the data on improved environmental outcomes is thin at best (Beierle, 1998). Evaluation of public participation processes presents the classic public administration and economic balance of achieving desired goals within a set of given economic and value constraints.

Public participation studies for environmental issues includes discussions on public opinion regarding hazardous waste facilities (J. T. Hamilton, 1993), studies of the effectiveness of sharing federal responsibilities with local stakeholders in the Superfund and brownfields programs (Wernstedt, 2001), identification of lessons from Superfund that can be applied to brownfields sites (Wernstedt & Hersh, 1998), the role of community preferences on brownfields policy decisions (Greenberg & Lewis, 2000), and the effectiveness of the Environmental Impact Assessment process (O'Faircheallaigh, 2010).

Hamilton (1993) studied the impact of public opinion on firms' decisions regarding the expansion of hazardous waste facilities. He found that firms incorporated the potential for public collective action into their decision-making regarding waste siting. The analysis of plant expansions indicated that firms were less likely to expand a hazardous waste facility in areas where the likelihood of public participation was greater, as measured by voter turnout.

Furuseth (1989) performed a survey study to determine local awareness of and attitudes towards an existing hazardous waste treatment facility. Not surprisingly, he found that residents were significantly opposed to the presence of the facility in their neighborhood. More germane to my research questions, he also found that proximity to the site and level of education were accurate predictors of community knowledge of waste management operations and that such knowledge was a precursor to negative attitudes regarding the site.

In his study of public participation in brownfields redevelopment, Bartsh (1993) identifies barriers – differing end-use visions, outcomes uncertainties, community apathy, and mistrust – and success factors – a broad base of stakeholder selection, knowledge and trust among actors, clear and honest communication, acknowledgment of resource limitations, and building on "small wins" - for public participation processes. The guiding legislation for the TAG program does not formally incorporate these steps into the process. The case study findings presented in Chapter 8, however, demonstrate that effective incorporation of these steps is central to a process that is viewed as successful by the participants.

The Superfund public participation program is highly rationalized and prescriptive in terms of methodology and required activities. In addition, the program is very confusing to the lay public and even to environmental professionals who do not deal with the program daily. The

process is long, tedious and frustrating to all parties involved. There are opportunities for public involvement that are not often utilized.

A recent study evaluated the impact of public participation on remedy selection at Superfund sites (Daley, 2007). The study found that community involvement, the presence of either a Community Advisory Group (CAG) or the award of a Technical Assistance Grant, has a positive and significant impact on the degree of remediation undertaken at Superfund sites. The data also showed that formal public participation (award of a TAG) was only undertaken at 15% of the sites, even though a grant program exists for technical assistance. This finding of underutilization of the available participation program is core to one of the central questions addressed in this research. If the community benefits so directly from the award of a TAG, as Daley finds, why are there so few communities that take advantage of the program? Furthermore, Daley's study does not address schedule impacts of the award of a TAG, another of my research questions. I also revisit the impact of TAGs on the remedy selection process and outcome.

The brownfields and community development program presents some similar issues as Superfund relative to technical complexity. While Superfund is driven by a goal of reducing risks to human health and the environment, Brownfields programs target the redevelopment of blighted or environmentally impaired property. A Brownfields program attempts to balance environmental concerns, with community desires for neighborhood redevelopment and the economic drivers for a private developer to cleanup and redevelop a property. This provides the opportunity for collaborative efforts between private parties, environmental regulators, local economic development officials and the public.

The siting of infrastructure, such as renewable energy facilities or power transmission lines, presents yet another opportunity to understand the public participation process. This can

be viewed as the Not in My Back Yard (NIMBY) problem. The concerns of the local community are often at odds with what may be perceived as the public good. The role of collaborative public participation in this arena can provide valuable insights into this dilemma.

3.12 Synthesizing the Literature

The focus of my research is on a particular form of public participation in a highly technical and complex decision-making process – the TAG program at Superfund sites. The findings of this literature review as they pertain to public participation in highly technical settings are presented in the next chapter, which discusses the characteristics of these technical policy scenarios and identifies the expected impact on the participation process. It also identifies the attributes of the TAG program and their anticipated impact of the participation barriers or hurdles in complex, technical decision-making.

Chapter 4 – Superfund, Public Participation, and Theoretical Connections

This research investigates how the TAG program aligns with the ideals of public participation as discussed in Chapter 2 and what impacts are observed in outcomes in the decision-making process at Superfund sites as a result of the TAG program. This chapter presents a synthesis of the theoretical discussions as they pertain to public participation in highly technical and complex policy settings.

The first part of this chapter identifies the characteristics of highly technical and complex policy issues that are expected to impact citizen involvement in either negative or positive ways. The next section identifies the desirable attributes of public participation in these settings as informed by the public participation theory discussed in detail in Chapter 3. This is followed by a discussion of the specific impact of each characteristic of the highly-technical issues on the desired participation criteria.

The next part of the chapter discusses the attributes of the TAG program that are designed to address these gaps in the public participation process, followed by a discussion of the anticipated impacts of the TAG program components on specific participation criteria. This chapter concludes with a synthesis of the expected impact of the TAG program and provides the foundation for the theoretical frame for the qualitative studies presented in Chapters 6 through 9.

The decision about how to deal with contaminated sites in the Superfund program is but one example of a complex, technical problem whose solution is expected to benefit from meaningful and impactful participation from affected citizens. Other examples include policies about climate change; local, state and national energy policy; the need for and location of critical infrastructure (e.g. bridge replacement, water supply systems, pipelines, or highways); scientific

and medical research programs; land use planning; and Brownfields programs that determine the future of environmentally impacted properties. As discussed in Chapter 3 and later in this chapter, public participation in these decisions is important and often difficult to accomplish.

4.1 Characteristics of complex, technical problems

To examine public participation in highly technical policy settings, we must first understand what is meant by these policy situations. Technically complex policies have several characteristics that are likely to impact the success of citizen involvement programs; they address a problem that (1) is characterized by technical complexity, (2) is expensive to evaluate and resolve, (3) results in public participatory efforts that are also expensive to undertake and/or require intensive involvement, (4) takes a long time to resolve, and (5) is characterized by significant differences in information available to various parties. In addition to these unique elements, highly technical policies also are characterized by features that are representative of many policy decision scenarios; namely, (6) there are multiple stakeholders with competing interests, (7) public participants involved in the evaluation of and decision-making for the problems typically lack experience in collaboration and conflict resolution, and (8) the problem and, therefore its solution, has a significant potential impact on the community.

The technical complexity of these problems is difficult for the average citizen, without specialized technical education and years of experience in the field, to fully comprehend and evaluate. In some instances, even the experts in the field disagree on the degree of the problem and the range of potential solutions. For Superfund sites, the evaluation of site problems is primarily performed by professionals with training in environmental science, geology, engineering, human health assessment and toxicology. In many instances, the technical

personnel evaluating, assessing, and solving environmental problems have advanced degrees in these specialty fields. Community members without specialized training can be intimidated when trying to understand the technical complexity and state their concerns about such problems.

Highly technical problems require very expensive solutions. These complex situations often require significant investments to investigate and evaluate the problems. The solutions to resolve these problems often require capital from multiple funding sources, and can require consensus-building among numerous potentially affected groups. Because the solutions are expensive to implement and the impact of the solutions are far-reaching, these are high stakes and high-profile situations. For example, the average cost for the investigation, design and remediation of a Superfund site can exceed $25 million (Superfund Fact Book).

In addition, it is expensive for the community to participate during the evaluation, decision, and implementation process. Understanding and evaluating problems can overwhelm the average citizen and can require a significant investment of time and resources. The average citizen may not have the background or capacity for involvement at the level these situations demand. The nature of the problems require that citizens invest significant chunks of time to understand and impact decisions. In addition, the policy decisions may require that citizens commit to and engage in the process for a very long time. Specifically, in the Superfund process, citizens must access, read, and comprehend thousands of pages of technical documents and determine how these technical studies affect them and which solutions may address the problem.

Evaluating technical problems, determining and designing a solution, and implementing a technical solution is a slow process, often without much visible progress. In the Superfund process, for example, it can take from 15 to 20 years for a site to move from discovery to

ultimate closure. This can be disheartening for citizens and other stakeholders impacted by a Superfund site.

Asymmetric availability of information is also a characteristic of technically complex problems. The quantity and timing of information availability to technical participants and the public varies. At a Superfund site, government personnel and PRPs may have access to more information and earlier access to most information regarding the site assessment and remedy decision. Furthermore, the ability of the public to process the technical documents is often significantly less than the government agency and private company participants. There are also numerous guidance documents and technical procedures that are intimately understood and incorporated into the daily work of technical representatives.

Most, if not all, policy decisions involve competing stakeholders, often with different goals for the solution of the problem. In the Superfund program, private companies that are responsible for the cleanup may desire a less costly remedy than the community members that live near a Superfund site. Local officials may side with industrial representatives to maintain good relations and protect jobs or they may side with the citizens who desire more aggressive (and expensive) solutions. Since state officials need to balance response actions at numerous sites across the state, they may have a differing agenda for an individual site than the other parties involved.

Public participation in policy decisions often involves inexperienced collaborators. The evaluation and selection of solutions to problems requires the successful negotiation of competing interests and this collaboration is enhanced when the participants have a specific skillset or have established trust in surrogates that have the requisite skills. Community representatives are often not trained or experienced in these areas.

Policy decisions, including highly technical problems, have some degree of impact on the community. The higher the real or perceived impact on the community, the more important it is that public participation be impactful. In the Superfund program, the presence of contaminated soil, water, and air presents a health hazard to community members. The stigma associated with Superfund sites also results in reduced property values in the neighborhood and the sites are often characterized as physical blights.

4.2 Attributes of Meaningful Public Participation in Technical Problems

Chapter 3 provided a discussion of the literature review on theory of public participation in policy and decision making. This section draws upon that review to identify the core components of successful public participation in technical policy decisions. For public participation to be successful, it should engender trust. The public is more likely to engage in a meaningful way and assist in problem solving if they trust the other parties in the decision process. Principal-agent theory predicts that the public will not view government officials as acting on their behalf (or as their agent) without first building a relationship through meaningful interaction. Credibility is also important to the participatory process; credibility of the agency with the public and other stakeholders and credibility of the citizen participants with the agency as well as other members of the affected community. This credibility is important in establishing the parties as legitimate to the decision-making process. Several scholars point to the importance of trust, legitimacy and transparency in the process to create a positive and successful participatory programs (Bhattacharyya, 2015; Nabatchi, 2012a; Nabatchi & Leighninger, 2015; Worsham, 2011).

Quality communication, through transparency, the open flow of information between the parties, and clear communication, results in improvement in the participation process. Transparency ensures that all participants in the decision-making process are accountable to one another and there are no "side deals" or private discussions and negotiations that could compromise trust in the process. Transparency will engender trust among the participants, foster open dialog on important topics, and can result in conciliatory attitudes. The open flow of information encompasses the full and timely transmittal of data, decision criteria and potential solutions to the problem to the public and the willing acceptance of information provided by the public. Clear communication is attained by presenting technical information in manner that the non-technical public can understand it. It also encompasses the communication of concerns, without rhetoric or hyperbole, from the public to agency representatives. The participation process should incorporate clear communication between participants with varying levels of technical knowledge, knowledge of the "rules of negotiation" and potentially opposing views of the desirable policy outcome.

Satisfaction of the participants is also a hallmark of good participation. This includes satisfaction with the process – through access to information and other participants, acknowledgement and serious consideration of input, and meaningful impact on the decision – and the outcome itself. Participants see the benefit of their investment in the process and are more likely to maintain meaningful involvement. The lack of satisfaction can lead to participants dropping out of the process, or worse, becoming a roadblock to the solution.

In many participatory ventures, there is a natural imbalance of power between participants. Those with higher levels of knowledge, money, influence, access to information or decision makers often have a higher level of influence on decision-making. Good participatory

process will result in an even balance of power, ensuring that those participants with less natural influence are afforded a legitimate opportunity to be involved in a meaningful way and enhancing equal participation in the process.

The decision-making process is also often characterized by inherently unequal participation. Public administrators and technical stakeholders have different access to information and differing abilities to influence the decisions. In some cases, all of the participants in a policy discussion, except for the community members, are technically trained and possibly engaged in in the discussion on a professional basis. There also exists a knowledge gap between the stakeholders, that further reinforces this unequal participation.

A low cost of participation also characterizes high quality participation. This can be attained by assisting communities and removing resource impediments to the process and other potential barriers to participation. Participation should also be representative, ensuring that the participants mirror the affected community. The question of who participates is an important one; the voice of the community should be from the whole community, not just a vocal minority (Barnes et al., 2003; Cooper et al., 2006). Participation should be impactful, not just perfunctory; public input should be incorporated in a manner that the process, the decision and outcomes are improved. This type of engagement can result in growth among community members and increase the capacity for future public participation (Frederickson, 1982). Properly designed and implemented participatory processes will also provide education of citizens. Community participants should be provided information and resources to understand, use and evaluate information to make informed input. This education can include training on the process as well as technical resources to understand the technical policy issue at hand.

The participatory process should not be limited to experts. The process should allow for inclusion of stakeholders with varying degrees of technical capacity. Community members are not typically experts in the topic of the policy decision and efforts should be made to present information and engage in dialog that allows the public to understand the issue and weigh in on the matters that impact without feeling intimidated by the process or other participants. It is beneficial to have a government agent with a strong public service motivation (PSM) or competence in public participation process (J. V. Denhardt & Denhardt, 2015) to assist and guide the process and the participants in the successful completion of the participatory process. However, a strong public participation process will have measures in place that do not rely on this service motivated manager for success.

4.3 The impact on public participation

Understanding and evaluating technically complex problems can be a process that is at odds with the premise of high-quality public participation. This section presents a discussion of the impact and potential barriers that each of the policy characteristics has on the various attributes of a quality participation process. An evaluation of the areas of intersection of the characteristics of highly technical problems and desirable attributes of participatory processes is depicted in Table 4-1. Areas where the technical policy problem negatively affects the participation process are indicated by red dots, while areas where the technical problem can enhance or encourage participation are shown with green dots. The resulting set of participation criteria present the participation gap that exists (or potentially exists) in these policy settings – the participation ideals that are not attained.

Table 4-1
Issues with public participation in
highly technical policy settings

Red dot: Tension between characteristic and goal
Green Dot: Enhances goal achievement

Characteristic of Policy Issue	Description	Trust	Credibility	Transparency/ Open Information/ Clear Communication	Satisfaction	Even Balance of Power/ Equal participation	Low Cost of Participation	Representative Participation	Impactful Participation	Education	Not Limited to Experts	Agency Competence (PSM)
		Participation Criteria										
Unique to Technical Policies												
Technical Complexity	Problems are difficult to understand; evaluation of potential soultions requires specialized knowledge.		●	●						●	●	
Expensive solutions	Studies and solutions are high cost efforts.				●						●	
Expensive involvement	Participation often requires intense and/or long-term involvement. Participation requires resources		●				●	●	●			
Slow process	Gathering data, formulating options, identifying and evaluating soultions, and implementing remedies takes a long time				●		●					
Asymmetric Information	Technical participants better understand problem than effected community, less information provided to public.	●	●	●		●			●			
Common to Public Participation Settings												
Competing stakeholders	Private parties and citizens (and often citizen sub-groups) have different objectives.	●		●		●					●	
Inexperienced Collaborators	Lack of common basis (information, goals) results in unprincipled negotiation. Community preferences missed.			●		●			●			●
Impact on Community	The policy issue has a significant (real or perceived) impact on the community so that they are invested in the outcome.							●	●	●		

The technical complexity of these policy decisions can present a number of barriers to quality public participation. First, it can result in a lack of credibility for the community as the members of the public are viewed as not having the background, knowledge, and experience to understand and provide meaningful input to the process. Second, it can hamper the quality of communication and flow of information since the government agency representative may be reluctant to engage in information transfer with the public. The information flow is likely to be characterized by a low signal to noise ratio – the signal being meaningful information to the decision-making process and the noise being information that may provide no useful input for solving the problem. Technical complexity also impedes the education process because the gap between the knowledge base of the typical citizen and the knowledge needed to participate is large enough that it would require an inordinate investment of time for the government agent and the citizen. Similarly, the technical complexity overwhelms the average citizen and creates a situation that discourages non-experts from participating.

The expensive nature of solutions can result in public dissatisfaction with the process since the selection and implementation of solutions will typically take a long-time and, in general, the community members do not care about the cost of the solution, only that the solution be right and be quick. The high stakes and high profile nature can also be a deterrent to non-expert participation, both from the perspective of the participant and the government agent.

It is also expensive for the public to engage in the process; other participants are typically involved in the process in a professional manner – it is a part of their career - while participation by community members is usually an activity that is extracurricular to their full-time endeavors. This can threaten the credibility of the public, who are perceived to be ill-informed and not fully involved, and can also raise the cost of participation. The requirement of significant personal

investment to participate can also detract from representative participation in the community and impactful participation. In the Superfund process, the high cost of participation includes a commitment of time and resources on the part of the community to obtain and review highly technical documents that are filled with analytical data, complex environmental modeling, human health and ecological risk assessments, engineering analysis, evaluation of complicated remedies and detailed cost estimates for remediation. Furthermore, meaningful involvement also includes preparing for and attending numerous public meetings and providing comments on various documents through the process.

The decision-making process for complex, technical problems is a slow process; it is necessary to gather extensive data to evaluate these high stakes issues and the process of formulating options, evaluating remedy alternatives and garnering the needed support to implement remedies is time consuming. This often results in frustration (or a lack of satisfaction) in the community since much of the work and progress toward solutions are not seen by the community members who are participating at the fringe of the process. The requirement for constant and long-term involvement requires a significant commitment of time and other resources raising the cost of participation.

The different avenues by which the professional, technical participants and the general public participate in highly technical policy matters results in an asymmetry of information. This can result in an erosion of trust since the public does not have the same information as other more technical participants, a reduction in credibility of the agency since the public may feel that they are being excluded from important parts of the process, and an overall degradation in open communication and transparency. The lack of information transfer can be rooted in the

administrator's lack of competence in the process, since they may not have the time, resources, or knowledge to present the technical information in a way that the community can readily understand. This apparent lack of full disclosure of information severely restricts the community's ability to have an impact on the process.

Several characteristics of the policy process are not unique to technically complex problems, but are nonetheless important to overall success of the participation process. As discussed in Section 4.1, policy decisions often engage competing stakeholders, with different ideas of success of the process and success of the solution. The inherent conflict between these competing values can result in a lack of trust and transparency, can maintain, or increase the unequal balance of power, and can present a further deterrent for non-expert participation.

Most participation processes in technical arenas include a public contingent that is inexperienced in collaboration. In the Superfund process, there are often several different solutions to address environmental concerns and a strong collaborative process is required to understand the interests of all parties to build a solution that meets the needs of the most parties. This type of consensus building requires extensive conflict management and collaboration skills. The lack of collaboration experience, by the public and members of the technical community, can result in lack of transparency (the participants don't always understand what they can reveal regarding information and preferences), barriers to even balance of power and equal participation by all parties, and is often confounded by the inexperience or lack of PSM on the part of the administrator.

A policy decision process, by its nature, will result in an impact on the community. In highly technical policy processes, and Superfund decision particularly, the high level and personal nature of the potential impact can encourage a representative group of community

members to participate, can increase the commitment of the community members to educate themselves on the process and the potential solutions, and result in a more impactful participation. The high stakes for the community can provide the catalyst to meaningful action.

In summary, highly technical policy decisions can present numerous barriers to high quality, successful public participation. The most important barriers identified in Table 4-1 are centered on aspects of information flow and understanding, meaningful and balanced involvement in the process, and a trust in and credibility of the process and participants. These are the result of the technical nature of the problems, the slow pace of the process, the expense of participating and the uneven availability of information to public participants. This is especially true in Superfund, where the decisions about site cleanup unfold over a decade or more and are based on a high quantity of scientific data, complex environmental modeling and risk assessments, and knowledge about the ability of treatment technologies to address site risks and address the health concerns and stigma of a Superfund site.

4.4 Attributes of the TAG program

Congress identified numerous problems with the Superfund Program after its inception in 1980. Progress toward identification and cleanup was slow, the cost of study and response was even higher than anticipated, the program was fraught with conflict between regulators and the regulated community, and citizen involvement was not achieving the goals of consensus building, support and education that were desired. Congress realized the problems with participation and information exchange and included the TAG program in the 1986 Superfund Amendments to encourage and improve public participation in these highly technical settings. Congress realized that Superfund sites are complicated, expensive to address and controversial

(expensive, slow, technical complexity, multiple and conflicting stakeholders) and that it was difficult to please all stakeholders in the process. Congress and EPA designed the TAG program to improve the community involvement process.

The program includes a formalized process that outlines the requirements for the EPA project manager (PM) and the community that chooses to participate. The TAG program identifies key points and methods for including the public in the process. Public meetings and review of key documents in the remedy selection and implementation process provide specific points of input. The TAG program also provides for establishment of a separate community involvement coordinator (CIC) function to assist the EPA project manager (PM) with citizen engagement activities.

The TAG program also provides funding (a $50,000 grant) to allow the community to hire an independent technical representative to assist in understanding the complex nature of the Superfund process and the technical issues related to solving the environmental problems. There is also a fund matching requirement of twenty percent for the community group, which can be a monetary contribution or can be provided through the provision of in-kind services. The TAG program also includes administrative requirements for the community group to incorporate, to perform specified accounting and recordkeeping activities, and the dissemination of information to the entire community.

The TAG program, through its funding mechanism and ability to hire an outside consultant, provides technical resources that can help in navigating the Superfund process. The community group selects their own representative as an independent technical advisor, providing an added level of influence and autonomy for the community.

4.5 Expected Impact of the TAG Program on Public Participation

The TAG program was designed to and is expected to address some of the participation gaps in technical, complex policy situations that were presented in Table 4-1. This section presents a discussion of the specific impact that each attribute is expected to have on these participation gaps. The details of the expected impact of the TAG attributes on the participation process are summarized in Table 4-2.

The formalized process established in the TAG program is expected to enhance the decision-making process so that it includes a representative cross section of the community, instill trust among parties through continued and regular and transparent dialog, bring credibility to community members and to the regulatory agency, and result in meaningful and impactful participation. The regular and transparent communication is expected to also result in a balance of power in the process and result in a more equitable participation program.

As the community members become regular participants in meetings and decision-making, they are likely to gain a level of respect and credibility that makes them an integral part of the process. The community involvement coordinator (CIC) adds a level of competence within the agency to specifically address community issues, reducing the reliance on the public service motivation of the PM for meaningful public involvement, and provides a balance to the technical bias that may be presented by the expert at the agency. The regular interaction of the community representatives with the regulatory and technical members should enhance the overall communication quality and flow of information.

Through the funding mechanism, the cost of participation is lowered and the potential impact of participation is increased by providing the resources needed to allow the group to hire an independent technical consultant. This reduces the burden of the group having to “learn

Table 4-2
Attributes of TAG Program and impact on public participation

Green dot: Positive impact
Red dot: Negative impact

Attribute of TAG Program	Description	Participation Criteria										
		Trust	Credibility	Transparency/ Open Information/ Clear Communication	Satisfaction	Even Balance of Power/ Equal participation	Low Cost of Participation	Representative Participation	Impactful Participation	Education	Not Limited to Experts	Agency Competence (PSM)
Formalized process	Information exchange and goal communication occurs frequently; CIC provides assistance to PM	●	●	●		●		●	●		●	●
Funding	Provides $50K to hire technical advisor to assist group						●		●			
Fund matching	Requires 20% match in money or in-kind services		●				●					
Administrative requirements	Requires detailed and cumbersome reporting of activities and expenditures	●		●	●		●	●		●		
Provision of technical resources	Technical advisor assists group in understanding issues and formulating input in a meaningful way	●	●	●	●	●				●	●	
Select own representative	Allows the community to select and hire their own technical advisor (agent)	●		●	●	●			●			

Superfund" before ever starting to consume the site-specific data. The group can then have a more impactful contribution in the site evaluation process. The fund matching requirement can be an impediment to participation if the community has difficulty in raising the needed capital or identifying the in-kind services that they can provide. This matching can also provide a strong positive signal to the agency and the remainder of the community regarding the seriousness and credibility of the group. Since the community must identify the technical expert to hire to provide assistance, this can also present a barrier to participation.

The administrative requirements of the TAG program can be burdensome to communities that do not have the resources, expertise or experience in dealing with such matters. It can erode trust, since it can appear that the agency is more concerned with "checking off" administrative boxes than with gaining meaningful input on the site. The community can become discouraged, lowering the satisfaction with the process. However, some of the administrative requirements can also improve the participation process. The group is required to demonstrate that it is representative of the community as a whole, provide information and educate other members of the community, and hold regular community meetings to make sure that information is provided to the entire community.

The ability to hire a technical consultant with a strong background in Superfund, and to pick this representative on their own, to review data and distill the information for presentation to the community allows the community group to better understand the process, the environmental data presented and the technical issues related to remediating the Superfund site. Communication and education are improved as the technical advisor provides a mechanism for distilling information into usable chunks for the community and translating issues to the public and the community desires to the agency. As the community members gain a greater understanding of

the technical issues, they are better able to formulate and communicate the community goals for site response actions, and the negotiation process can become more principled and effective, resulting in more representative, impactful and principled participation. Through education, free exchange of information, constructive engagement, and transparent communications better input into the process can be achieved. This technical representative can also serve as an intermediary (and translator) to communicate with EPA and PRP technical representatives, in a role similar to that of an attorney in a legal matter. They serve as an advocate for the community within the framework of the accepted process, communicating with other technical parties in a way that increases the signal to noise ratio dramatically. In this case, the signal is informational input that improves the technical remedy decision-making process and is presented in the manner that the other technical participants can use and understand. The noise is information that the technical participants determine not to be germane to the technical issue at hand or is presented in a manner that does not allow the other stakeholders to incorporate the information into the decision-making.

The TAG program, while not without drawbacks, appears to have been designed and implemented in a way to alleviate many of the participation gaps that exist in the Superfund public participation process. The TAG program is expected to reduce the burden on the EPA PM of educating the community by introducing an intermediary to assist in this role. In addition to technical education, the technical consultant can also serve as intermediary between the technical members (EPA and PRPs) and the public. Technical consultants know the unwritten rules of engagement – how to present information to the EPA, not trying to negotiate technical issues that cannot be changed, reducing the role of emotion in the process – improve the communication process and trust and transparency among all parties, and streamline the

technical decision-making process. The TAG program is also expected to address problems with information asymmetry by incorporating a community representative with the technical knowledge to comprehend the data and perform a detailed analysis.

4.6 Implications and Plan for Research

Congress and EPA introduced the TAG program to improve citizen involvement at Superfund sites, build consensus around the remedy selection process, improve community acceptance of remediation decisions, and improve public education about Superfund sites. The primary mechanism for attaining these goals was to provide Technical Assistance Grants for communities to hire technical advisors to guide them through the process and provide an avenue for public to engage in the remedy selection process in a meaningful way. The program has the potential to successfully accomplish many of these goals.

I have evaluated the TAG program relative to the ideals of quality public participation presented in Chapter 3. The potential gaps in the public participation process in highly technical and complex policy settings, such as the Superfund TAG program, are presented in Table 4-1 and the expected ability of the TAG program to address these participation gaps is presented in Table 4-2.

The TAG program is expected to result in improved trust and credibility, result in more open and meaningful communication, improve community satisfaction with the process, and address power imbalances in the decision-making process. However, all of these benefits arise only if a community actual obtains a TAG. If a TAG is not obtained, the community cannot hire a technical advisor, and the process improvements cannot be realized. The low uptake rate of

TAGs (approximately 15 % of Superfund sites get a TAG) indicates that the costs and barriers of the program outweigh the perceived benefits for a large group of communities.

To more fully investigate these findings, I have designed and implemented a qualitative study of six Superfund sites. The primary component of this qualitative study is a series of semi-structured interviews to address topics of the rationale behind obtaining a TAG, the benefits and improvements from the TAG process, the drawbacks of the TAG process and the impact of the TAG program on the Superfund evaluation process. I attempted to interview EPA project managers (PM), community representatives and technical consultants for each of the sites (only one EPA PM was not willing to be interviewed). The design and results of this qualitative evaluation are presented in Chapters 6 and 8.

This research also includes a quantitative study that investigates what happens when a community gets a TAG – investigating measures related to schedule, take up rates, and remedy selection. This quantitative portion of the study is presented in Chapters 5, 6, and 7. Some of the questions that are addressed in the qualitative part of the research arose from the results of the quantitative assessment (e.g. why is the uptake for TAG programs so low – approximately 15%).

Chapter 5 – Research Questions and Study Framework

This research evaluates both the process and outcomes of public participation in the Superfund TAG program. The first part of the study utilizes theoretical understanding of public participation from Chapters 3 and 4, along with site-specific data from Superfund sites across the United States, and demographic data for the communities near Superfund sites to evaluate behaviors and outcomes associated with the TAG program. The second part of the study utilizes a multiple case study approach to gain additional insight into the Superfund TAG program in central New York.

This study addresses the research questions identified in Chapter 1 regarding formal public participation at Superfund sites, as implemented through the TAG program. These questions are:

Research Question 1: What are the hallmarks or attributes of successful public participation?

Research Question 2: What are the characteristics of highly technical and complex policy decisions that could impact successful public participation and how do they impact participation?

Research Question 3: What are the characteristics of the Superfund Technical Assistance Grant (TAG) program that could address participation gaps resulting in this highly technical setting?

Research Question 4: Is the Superfund TAG program successful in addressing these gaps?

Research Question 5: What factors determine the rate of utilization of TAGs at Superfund sites?

Research Question 6: Does the presence of a TAG at a Superfund site have an impact on the schedule for completion of remediation for Superfund sites?

Research Question 7: Does the presence of a TAG have an impact on the remedy selected to address environmental issues at a Superfund site?

Research Question 8: Are there findings from the research that can be applied to improve the TAG program implementation, and more broadly improve participation in other highly technical policy settings?

The first four questions were partially addressed in Chapter 4 and will be more fully addressed in the qualitative study discussed in Chapter 8. The remaining research questions, were used to formulate the working hypotheses for the quantitative research. The first set of hypotheses pertains to the factors that are anticipated to influence the involvement of community groups in Superfund decision-making through the TAG program. The second set of hypotheses relates to the effect that public participation has on outcomes at Superfund sites, specifically the schedule for cleanup and closure of sites.

5.1 Hypotheses of TAG Application and Award

The selection of a site for inclusion on the NPL is based on the potential for unacceptable risk to human health and the environment as described in Chapter 2. Once a site is placed on the NPL, several site characteristics and demographic measures should have an impact on the decision of community to apply for a TAG and the subsequent award of a TAG. The TAG program is not competitive or resource limited; if the community meets the requirements of the TAG program as discussed in Section 2.3, a TAG award is made by EPA. The decision to obtain a TAG is, therefore, made by the community.

It is expected that *Community Characteristics*, such as community resources and social capital, will influence a community's decision to participate in the remedy-selection process. Consequently, a higher relative wealth, stability and education of the neighborhood near a Superfund should result in an increased interest in the site by the community and an increased ability of the community to maintain and improve the quality of their neighborhood. This

combination of knowledge, interest and capacity should, therefore, result in an increased likelihood of citizen involvement and TAG award. Some of these factors will be based on preferences of the citizens (education and stability), some will be rooted in constraints of the citizens (education and wealth) and some will have components of both.

Hypothesis 1 (H1): As the relative wealth, stability, and education of the citizens near a Superfund site increase, the likelihood that a TAG will be applied for and awarded increases.

Site Characteristics will also affect the likelihood that a community will be actively involved, apply for and be awarded a TAG. An increase in site complexity should result in a greater need of the community to enlist outside technical assistance and may be an indicator of greater potential environmental impact or environmental risk. Therefore, increased site complexity is predicted to increase the likelihood of application for and award of a TAG.

Hypothesis 2 (H2): As the complexity and perceived hazards of a Superfund site increase, the likelihood that a TAG will be applied for and awarded increases.

The *party responsible* for cleanup of the Superfund site should also have an impact on the involvement of the community and the decision to apply for a TAG. Private parties (and Federal agencies in the case of Federal sites) were found to be responsible, either directly or indirectly, for creating the environmental impacts at the site, while EPA is typically viewed as the party responsible for ensuring proper cleanup of the environmental problems. Thus, the involvement of parties in addition to EPA at a site is likely to result in a decreased trust in the process by the

community, based on real or perceived power imbalances. Because of this decrease in trust of private companies and other Federal Agencies and an increased desire to engage technical support to navigate the Superfund process, performance of site cleanup by any party other than EPA is predicted to increase in the likelihood of a TAG award.

<u>Hypothesis 3 (H3)</u>: Sites where study or remediation is performed by a party other than EPA (either Federal Agency or private party) will be more likely to have a TAG awarded.

5.2 Hypotheses of Schedule Impacts

The Superfund process has a well-established process roadmap as discussed in Chapter 2 and shown in Figure 2-1. In the context of this study of the TAG program, the three important milestones are the discovery of the site, the initial selection of the remedy (which occurs when a Record-of-Decision, or ROD, is issued), and site closure. The *discovery of the site* is the time at which EPA becomes aware of potential environmental concerns at the site. A preliminary identification has been made and the site has been acknowledged as problematic.

The *issuance of the ROD* is the time when a policy-level decision has been made regarding the future response activities to be undertaken at the site. Public involvement prior to the ROD can influence this decision-making process. The announcement of a remedy decision may also influence the decision by the community to pursue a TAG. For instance, if the decision-making process is moving too slowly the community may choose to become more involved to accelerate response. Additionally, if the community is unsatisfied with the chosen remedy, they may choose to apply for a TAG and enlist technical support to obtain a more satisfactory remediation approach.

The third event of importance is site closure at the end of the Superfund process. Two options were considered for this event; the date of the final closure report and the date that the

site is delisted from the NPL. Remediation is deemed to be essentially complete at the time a closure report is finalized. However, there are numerous instances where a long period elapses between the completion of the remedy and the delisting of the site from the NPL - such as sites with groundwater contamination that require a long period for cleanup or demonstration of the performance of the remedy. In these cases, the site is cleaned up although not removed from the NPL. For this reason, the *closure report date* is used as the "end of the process" in this study. This is consistent with the methodology used in previous studies of Superfund site closures, including the previously mentioned study by Daley.

For the purposes of this evaluation, the process is divided into two phases; Phase I is defined as the period from discovery through issuance of the ROD, and Phase II as the period from issuance of the ROD through site closure. The impact of TAG award on the schedule of the site is expected to be different based on the phase of the program and the timing of the TAG award. For example, complexity theory predicts that a TAG award before the ROD will increase the time required to complete the ROD because of the addition of another party (the public) in the decision-making and negotiation process. However, the award of a TAG before the ROD is expected to result in a schedule decrease for the period from ROD to closure, since potential conflicts that may arise are likely to have been addressed among the parties prior to the issuance of the ROD. A simplified schematic of the Superfund process indicating the various points in the process where a TAG might be awarded is presented in Figure 5-1.

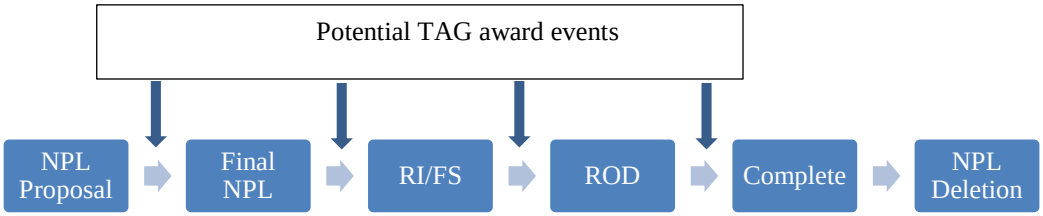


Figure 5-1. Superfund Process and TAG award points

Three scenarios for TAG award are considered in estimating the impact of the TAG on Superfund process schedule. All scenarios compare the schedule impacts of TAGs relative to the baseline condition of no TAG awarded. The *first scenario* addresses the award of a TAG during the Superfund process, regardless of the timing of such an award. In this scenario, complexity theory suggests that the overall schedule (from discovery through site closure) will be increased, although without specifying the timing of TAG award, the impact on the specific phase is not estimable.

The *second scenario* addresses TAG award before the ROD is issued at a Superfund Site. This is predicted to result in an increased duration of Phase I and a decreased duration of Phase II. The net effect is predicted to increase the total project duration, with the organizational complexity of an added party driving the schedule increase.

The *third scenario* addresses the award of a TAG after the ROD has been issued. In this instance, there is no impact on the schedule since this is still the baseline condition (no TAG). It is predicted that the duration of Phase II would be appreciably increased in this scenario for two reasons; first, complexity theory suggests that adding a negotiating party will increase the time for decision-making. Second, the award of the TAG after the ROD suggests that the community

was in some way dissatisfied with the progress made on the site or the remedy selected. This increases the chance of conflict in Phase II and the potential to revisit many decisions that were made during Phase I. Like the previous scenario, it is theorized that the overall project duration will increase because of the inclusion of another party in the deliberations and the potential for renegotiating previous decisions. Table 5-1 presents a summary of the predicted impacts on schedule based on TAG award at these various points in the Superfund process.

Hypothesis 4 (H4): The impact of the award of a TAG award at any time in the process will result in an increase in the time required to progress from NPL listing to site closure.

Hypothesis 5 (H5): A TAG award before the ROD at a Superfund will result in an increased time to issue the ROD and a shorter duration from the ROD to site closure. The overall schedule from NPL listing to site closure will be increased.

Hypothesis 6 (H6): A TAG award after the ROD will have no impact on the time to issue a ROD and will increase the time from ROD to site closure. The overall schedule from PL listing to site closure will be increased.

5.3 Hypotheses of Remedy Selection

There are conflicting factors at play when evaluating remediation choices when a TAG is awarded. Some of this predict no impact on the remedy chosen at sites with a TAG, while others suggest that the TAG will have an impact on the remediation method.

Democracy theory suggests that the remedy would be influenced and a more complicated or "bigger" remedy would result. If the TAG was awarded because of power imbalance or lack of trust in agency, then the presence of the community group should influence agency decisions in a manner that would result in a more protective (i.e. bigger remedy).

Table 5-1
Theoretical Framework
Schedule Models

Timing of TAG Formation	Phase I	Phase II	Phase I and II	Discussion
Baseline Condition (no TAG)	0	0	0	No TAG, baseline schedule
TAG any Time	?	?	+	Predicted to increase overall schedule due to multi-party complexity
TAG before ROD	+	-	+	Predicted to increase time to ROD (complexity) but decrease the ROD to closure time (reduced conflict) and increase overall schedule
TAG after ROD	0	+	+	No impact before ROD, and increase ROD to closure (complexity and conflict) and increase overall schedule

NOTES:

Schedule impact is defined as the expected variation from the baseline schedule with no TAG
0 indicates no expected change
- indicates that the schedule is expected to be shorter
+ indicates that the schedule is expected to be longer
? Indicates that the expected schedule impact is unknown
Phase I defined as the time from site discovery to completion of the first ROD for a site
Phase II defined as the time from the first ROD to site closure
Phase I and II combined is the time from site discovery to site closure

Management and professionalism of the agency, however, suggests no impact on the remedy selection. The agency will perform its duty in the same way with or without public input. The primary function of the process resulting from a TAG, per this theoretical perspective, is to inform the public and make them more comfortable and accepting of the remedy chosen.

There is likely a combination of impacts from the TAG on the remedy selected, but I predict that the overall influence of TAG on the remedy selected will be insignificant.

Hypothesis 7 (H7): ***A TAG award will have no significant impact on the remedy chosen to address environmental impacts at a Superfund site.***

The seven hypotheses in this study are investigated using a combination of techniques: (1) empirical quantitative modeling using site and community level data, and (2) a qualitative, multiple case study for six Superfund sites in central New York. The next chapter presents the methodologies of these studies.

Chapter 6 – Study Methodology

This section presents the research methodology for the quantitative and multiple case study (quantitative) components of this evaluation. This mixed methods approach allows for broad based analysis of nationwide data to address the hypotheses presented in Chapter 4 and a deep dive into specific cases to examine aspects of the TAG program that are not fully captured in the quantitative dataset. Details of the evaluation methodologies are presented in the following sections.

6.1 Quantitative Study

6.1.1 Data Utilized

The primary data used in this analysis was obtained from two sources; EPA's CERCLIS database and the United States Bureau of the Census data for the 2000 Census. Information regarding site-specific characteristics and process duration was obtained from EPA's CERCLIS database. The data utilized cover the period from the Superfund program's inception in 1980 through December 2007. The CERCLIS database includes a broad range of data including information on site characteristics - location, setting type (urban, rural, suburban), number of OUs, types of chemical contaminants, types of contaminated media, EPA region, HRS for the site, whether PRPs or Federal agencies were involved). In addition, it includes data on numerous activities at the site and the date of occurrence – discovery, NPL proposal and listing, RI/FS completion, ROD issuance, remediation start and completion, TAG award, and many others.

Census tract level demographic data were obtained from the 2000 Census (US Bureau of the Census). The census tract data were merged with the CERCLIS data utilizing GIS to provide a master database of site and demographic data. A summary of these site and demographic factors and the anticipated impacts, as well as the rationale, is presented in Table 6-1.

Table 6-1
Theoretical Framework
TAG Formation

Variable	Direction of Change	Expected Impact on TAG Formation	Rationale
Demographics			
Home Value	+	+	Residents will get involved to maintain neighborhood home values
Income	+	+	Higher income residents more likely to become involved
Population Density	+	-	Higher density areas less likely to view Superfund site negatively
Percent Minority	+	-	Minority groups less likely to become engaged
Level of Education	+	+	Higher education level necessary to navigate TAG program and predicts involvement
Percent Owner Occupied	+	+	Home owners will be more interested in maintaining property values
Tenure	+	+	Long-term residents are more invested in community
Site Characteristics			
Complexity	+	+	Complex sites more likely to pose hazard and require technical assitance
Private Party Resposibility	+	+	Less trust in private party to address community needs
Federal Facility	+	+	Less trust in non-EPA governmental body to protect health and environment

6.1.2 Likelihood of TAG Application and Award

The likelihood of TAG award should increase as the capacity, interest and knowledge of the community increases. Neighborhood capacity measures include demographic wealth and education indicators, such as home value, income, proportion of non-minorities and education level in the community. As these measures increase, community capacity increases and the likelihood of TAG award is predicted to increase. Neighborhood characteristics that are potential measures of interest in the community include population density, home values, percentage of owner occupied units and average tenure in the neighborhood. As home values, owner-occupation and tenure increase interest in maintaining the quality of the community should also increase. As population density increases, it is hypothesized that community interest in an NPL site will decrease, since the overall impact of such a site in a dense (urban) neighborhood may be less likely to be viewed negatively. The level of community knowledge about the Superfund process and TAG program should increase with the education level in the community, resulting in a greater likelihood of TAG application and award. The theoretical causal chain for the decision to apply for a TAG and subsequent TAG award is depicted in Figure 6-1.

As presented in hypotheses one through three (H1, H2, H3), it is expected that the likelihood of TAG application and award is influenced by site characteristics and the demographic makeup of the area near the Superfund site. A logistic probability model is used to estimate the impact of each these variables on the likelihood of TAG application and award. The logistic probability model (or logit) is used to identify the relationship between independent

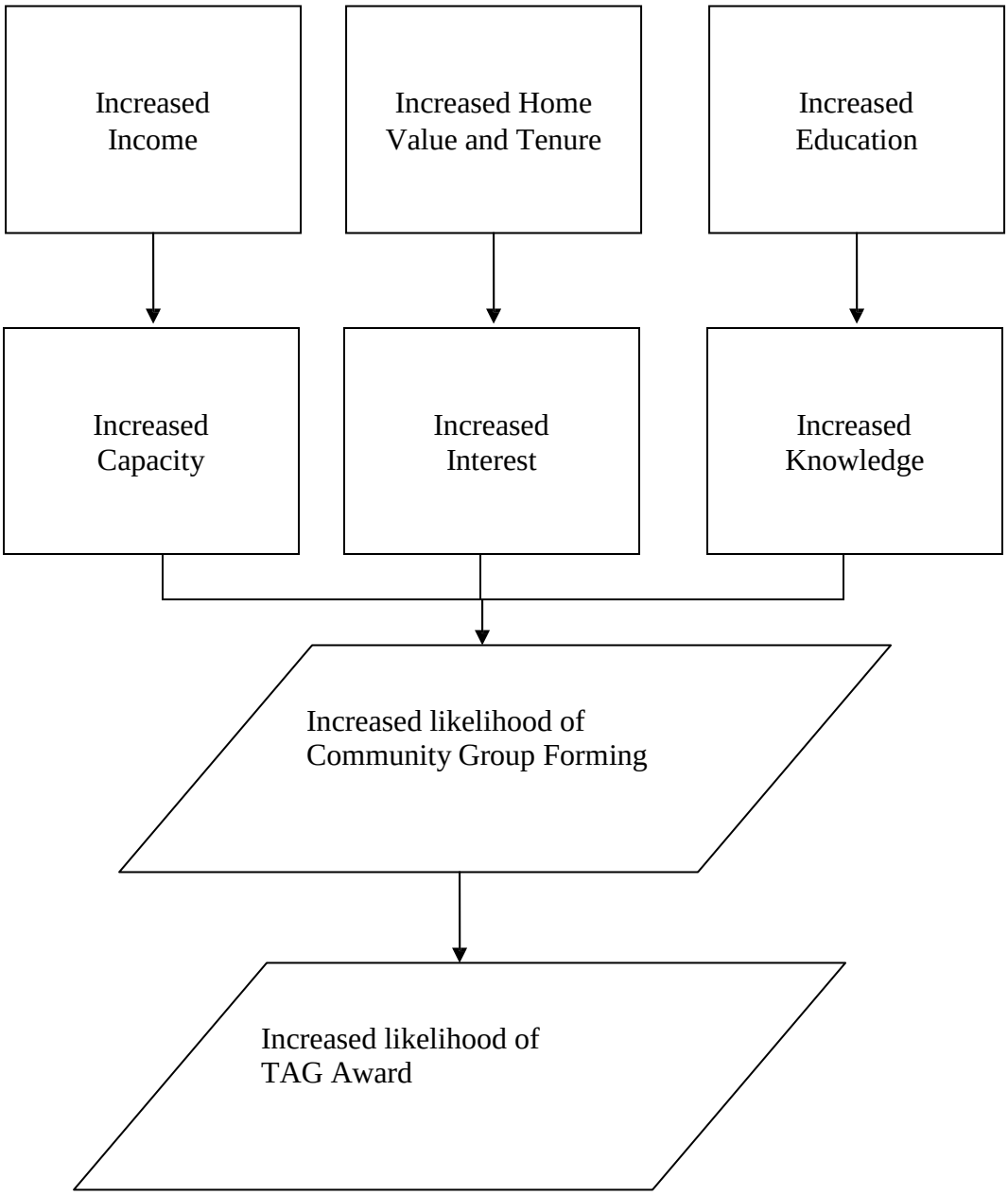


Figure 6-1. Schematic of Causal Chain for TAG Award.

variables and the likelihood of the dependent variable being 1 (true) or 0 (false) (Long & Freese, 2014). The dependent variable in this model is a dichotomous variable, "tagdum", indicating whether a TAG was awarded at a site.

The logistic model provides estimates of the incremental impact of a unit change in each independent variable on the probability of a TAG award. The following describes the general relationship used in the analysis:

$$\Pr(TAG) = f(DC, SC) \qquad \textit{(Equation 1)}$$

Where

Pr*(TAG)* = probability of TAG Award

DC = set of demographic characteristics (normalized home value, normalized income, population density, percentage of minorities, percent of high school graduates, percentage of owner-occupied homes, percentage of residents with tenure greater than five years)

SC = set of site characteristics (OU count, HRS score, PRP (or private party dummy, Federal Facility dummy).

Fixed effects were included in models to control for EPA Region to address the considerable variation in the award of TAGs across EPA regions. This fixed effect is needed since the program is decentralized and much discretion is left to the individual EPA regions. Controls for year of discovery (to address any year fixed effects such as funding differential or political climate) were also included.

A summary of the key independent, dependent and control variables is presented in Table 6-2. Model specifications for evaluating the likelihood of TAG award are presented in Table 6-3.

Table 6-2
Summary of key dependent, control and independent variables
TAG Study Models

Variable	Description	Included in Models	Source
Dependent Variables			
Tagdum	Dichotmous; 0 if no TAG, 1 if TAG	Logits	CERCLIS, constructed
Duration (Discovery to ROD)	Calculated time in days	OLS, Survival	CERCLIS, constructed
Duration (Discovery to Closure)	Calculated time in days	OLS, Survival	CERCLIS, constructed
Duration (ROD to Closure)	Calculated time in days	OLS, Survival	CERCLIS, constructed
Control Variables			
US EPA Region	Dichotmous; indicating USEPA Region	Logits, OLS, Survival	CERCLIS, constructed
Year of Discovery	Dichotmous; indicating start year	Logits, OLS, Survival	CERCLIS, constructed
Independent Variables			
Home Value (Normalized)	Median value of home, normalized	Logits, OLS, Survival	2000 Census, calculated
Income (Normalized)	Median income, normalized.	Logits, OLS, Survival	2000 Census, calculated
Population Density	Measure of population per square mile	Logits, OLS, Survival	2000 Census, calculated
% Minority	Non-white population	Logits, OLS, Survival	2000 Census, calculated
% Less than Assoc. Degree	Measure of education	Logits, OLS, Survival	2000 Census, calculated
% Owner Occupied	Measure of social capital, stability	Logits, OLS, Survival	2000 Census, calculated
% > 5 year tenure	Measure of social capital, stability	Logits, OLS, Survival	2000 Census, calculated
OU count	Number of Operable Units; measures complexity	Logits, OLS, Survival	CERCLIS, calculated
HRS Score	EPA ranking score, measure of perceived risk	Logits, OLS, Survival	CERCLIS, calculated
PRP Site	Dichotomous - 1 for private company lead	Logits, OLS, Survival	CERCLIS, constructed
Federal Facility	Dichotomous - 1 for non-EPA federal agency	Logits, OLS, Survival	CERCLIS, constructed
Nearby TAG Award	Dichotomous - 1 for TAG w/in 50 miles	Logits	CERCLIS, constructed
Number of RODs	Number of RODS, measure of complexity	OLS, Survival	CERCLIS, calculated
Number of TAGs	Number of TAGs awarded	OLS, Survival	CERCLIS, calculated
Tagdum	Dichotomous; 0 if no TAG, 1 if TAG awarded	OLS, Survival	CERCLIS, constructed
TAG Before ROD	Dichotomous; 1 if TAG before ROD, 0 if no TAG or TAG after ROD	OLS, Survival	CERCLIS, constructed
TAG After ROD	Dichotomous; 1 if TAG after ROD is signed	OLS, Survival	CERCLIS, constructed

NOTES:

Logit models are the likelihood models used to predict occurrence of a TAG or remedy effect

OLS is ordinary least squares regression used to predict effect of variables on duration of schedule

Survival is Cox-distribution survival analysis used to incorporate right-censoring of data for event that had not reached completion

Table 6-3
TAG Study Model Specifications

Model Designation	Research Question	Specification Parameters
Logit 1	Probability of TAG	Site and Community Characteristics
Logit 2	Probability of TAG	Logit1 plus region effects
Logit 3	Probability of TAG	Logit1 plus region and year
Logit 4	Probability of TAG	Logit 3 plus nearby previous TAG variable
OLS 1	Duration (DS to ROD)	Site and Community Characteristics, no TAG variable
OLS 2	Duration (DS to ROD)	OLS 1 plus TAG before ROD
OLS 3	Duration (DS to ROD)	OLS 2 plus regional fixed effects
OLS 4	Duration (DS to ROD)	OLS 3 plus year fixed effects
OLS 5	Duration (ROD to Closure)	OLS 4 plus TAG after ROD
OLS 6	Duration (DS to Closure)	OLS 5 for full process period
Cox 1a	Duration (DS to Closure)	Site/Community Characteristics, fixed effects, no TAG variable
Cox 1b	Duration (DS to Closure)	Cox 1a with no year effects
Cox 1c	Duration (DS to Closure)	Cox 1b plus OU^2, removal action (new base model)
Cox 1d	Duration (DS to Closure)	Cox 1c plus tagdum
Cox 1e	Duration (DS to Closure)	Cox 1b plus TAG before ROD, TAG after ROD
Cox 1f	Duration (DS to Closure)	Cox 1d plus probability of TAG (to address possible endogeneity)
Cox 1g	Duration (DS to Closure)	Cox 1e plus probability of TAG (to address possible endogeneity)
Cox 2a	Duration (DS to ROD)	Base model (w/ OU^2, removal action), tagdum
Cox 2b	Duration (DS to ROD)	Cox 2a plus probability of TAG
Cox2c	Duration (DS to ROD)	Cox 2a plus TAG before ROD instead of tagdum
Cox 2d	Duration (DS to ROD)	Cox 2c plus probability of TAG
Cox 3a	Duration (ROD to Closure)	Base model (w/ OU^2, removal action), tagdum
Cox 3b	Duration (ROD to Closure)	Cox 3a plus probability of TAG
Cox 3c	Duration (ROD to Closure)	Cox3a plus TAG before ROD and TAG after ROD instead of tagdum
Cox 3d	Duration (ROD to Closure)	Cox 3c plus probability of TAG
Cox 4a	Duration (DS to Closure)	Annual analysis, hasTAG, probability of TAG
Cox 4b	Duration (DS to ROD)	Annual analysis, hasTAG, probability of TAG
Cox 4c	Duration (ROD to Closure)	Annual analysis, hasTAG, probability of TAG

6.1.3 Process Duration Modeling

As presented in hypotheses four through 6 (H4, H5, H6), and detailed in Table 5-1, the impact of TAG award is a complex relationship that was modeled for several scenarios. The following general equation was used to model the relationships:

$$Duration_{phase} = f(DC, SC, TAG) \qquad \textit{(Equation 2)}$$

Where

$Duration_{phase}$ = the duration of a given phase. Value calculated based on the dates of the two events (obtained from the CERCLIS database) defining the beginning and end of the phase;

DC = set of demographic characteristics (normalized home value, normalized income, population density, percentage of minorities, percent of high school graduates, percentage of owner-occupied homes, percentage of residents with tenure greater than five years);

SC = set of site characteristics (OU count, HRS score, PRP dummy, Federal Facility dummy); and

TAG = A dichotomous variable indicating the award of a TAG. Depending on the estimation question, this was specified as Tagdum (i.e. was a TAG awarded at any time in the process), $TAG_{beforeROD}$ (i.e. was a TAG awarded before the ROD), or as $TAG_{afterROD}$ (i.e. was a TAG awarded after the ROD).

As with the TAG award model (Equation 1), fixed effects were included in all duration models to control for EPA Region and year of discovery.

Several versions of the duration model were developed to estimate the impact of TAG award on the project schedule. Variations are as follows:

- Methodological approaches. Two different methodologies were used to estimate the impact of independent variables on project durations. Duration modeling was performed using both ordinary least squares (OLS) and survival analysis methodologies as discussed below.

- Schedule impacts on three distinct phases of the Superfund process were evaluated by including different left hand side variables; 1) the duration of the overall project from Discovery to Closure, 2) the duration of Phase I (Discovery to ROD), and 3) the duration of Phase II (ROD to Closure).
- The effect of the presence and timing TAG award on durations was modeled by including either a dichotomous variable for TAG award regardless of timing (Tagdum) or a pair of dichotomous variables to indicate whether a TAG was awarded before or after the issuance of the ROD ($TAG_{beforeROD}$ or $TAG_{afterROD}$).

Duration modeling was performed using two different methods: standard ordinary least squares (OLS) regression and survival analysis (by Cox methodology) following the methods identified in *An Introduction to Survival Analysis Using STATA* (Cleves, Gould, & Gutierrez, 2004). OLS methodology has the advantage of returning estimates of schedule impact in standard time units (in this case days) making interpretation of the results more intuitive. This method does have a major drawback, however, and is an incomplete approach, since a large percentage of the sites has not yet reached closure. This results in a right censoring of the data, or dropping all observations from statistical calculations where the end of a phase has not been reached. Survival analysis methodology (or Cox modeling) is used to address this characteristic of the data set. By setting up the data in survival analysis format, all the data, including observations that have not reached the end of a phase (or failure), are included. Model specifications for Superfund process duration are summarized in Table 6-3. Descriptive statistics for the duration of various Superfund phases for the data set are presented in Table 6-4.

Table 6-4
Descriptive Statistics
Duration Modeling

Duration Period (1)	Units	Filter Applied	Number of Observations	Median Value	Standard Deviation	Minimum Value	Maximum Value
TAG to ROD	days	TAG before ROD	89	1097	921	17	4776
ROD to TAG	days	ROD before TAG	129	1804	1454	1	6203
Discovery to ROD	days	None (2)	1396	3770	1827	26	10164
Discovery to ROD	days	TAG awarded	220	3712	1758	196	8854
Discovery to ROD	days	No TAG awarded	1175	3781	1840	26	10164
Discovery to ROD	days	TAG before ROD	89	4971	1482	1932	8854
ROD to Closure	days	None (3)	279	2276	1771	0	8022
ROD to Closure	days	TAG awarded anytime	36	3457	1970	0	8022
ROD to Closure	days	No TAG awarded	243	2101	1674	0	8003
ROD to Closure	days	TAG before ROD	15	2411	1325	0	4908
ROD to Closure	days	TAG after ROD	21	4204	2038	611	8022
Discovery to Closure	days	None (3)	285	5376	1863	764	10116
Discovery to Closure	days	TAG awarded	36	6753	1785	3637	10116
Discovery to Closure	days	No TAG awarded	249	5177	1792	764	9986
Discovery to Closure	days	TAG before ROD	15	6657	1852	3637	9410
Discovery to Closure	days	TAG after ROD	21	6821	1778	4237	10116

Notes
(1) TAG - Technical Assistance Grant
ROD - Record of Decision
(2) Only includes sites with a ROD issued
(3) Only includes sites where closure has been achieved

6.1.4 Remedy Selection Modeling

As presented in hypothesis 7 (H7) the impact of TAG award on the remedy chosen at a Superfund is predicted to be insignificant. The following general model was used to model the relationships:

$$RS = f(DC, SC, TAG) \qquad \textit{(Equation 3)}$$

Where
RS = Remedy Score, a constructed variable depicting the type of remedy selected for the site. The value calculated based on whether the remediation included treatment, containment, or institutional controls;
DC = set of demographic characteristics (normalized home value, normalized income, population density, percentage of minorities, percent of high school graduates, percentage of owner-occupied homes, percentage of residents with tenure greater than five years);
SC = set of site characteristics (OU count, HRS score, PRP dummy, Federal Facility dummy); and
TAG = A dichotomous variable indicating the award of a TAG.

An ordered multinomial logistic model approach was used to estimate the impact of TAG award on remedy selection (Long & Freese, 2014). Institutional controls, or IC, (such as deed restrictions or fencing) are used when site conditions are such that unrestricted use are not achieved. Containment (C) remedies include the construction of an engineered cap or other containment structures to isolate materials that left onsite. Treatment (T) remedies are utilized to reduce the mobility, toxicity or volume of waste at a Superfund site. The remedy codes, and ordered outcomes is as follows:

- Remedy Code = 7; Treatment only, maximum remedy since site risks are addressed via treatment without the need for institutional controls or containment;

- Remedy Code = 6; Treatment with containment, with no need for institutional controls. In this case, treatment performed but constituent levels are such that risk targets cannot be achieved without the addition of containment;
- Remedy Code = 5; Treatment, containment and institutional controls, which required the use of controls for protection;
- Remedy Code = 4; Treatment with institutional controls and no containment;
- Remedy Code = 3; Institutional controls and containment with no treatment;
- Remedy Code = 2; Containment only; and
- Remedy Code = 1; Institutional controls only.

The ordered logistic model is like the logistic model except that multiple outcomes (the different remedy codes) are possible instead of the dichotomous left hand (or dependent) variable. By ordering the outcomes as listed above, more protective remedies receive a higher ranking and less protective remedies receive a lower ranking. The ordered multinomial logit model is then used to estimate the effect of TAG award (and other independent variables) on the remedy score.

6.2 Qualitative Case Studies

The qualitative study was performed at a select number of Superfund sites that received a TAG. The purpose of the case study to obtain more in-depth information to questions about the TAG program than the EPA CERCLIS database provided – (1) why did communities decided to pursue a TAG; (2) what relationships and participatory capacity existed within the community;

(3) what were the benefits and drawbacks of the TAG program; and (4) what difference did the TAG make in the process?

The case study approach is designed to answer just such questions, especially when other methodologies cannot be used to fully explain the phenomena of interest (Yin, 2009). Furthermore, the multiple case study improves the credibility, transferability, dependability, and confirmability (Trochim, 2001) of the research since multiple data observations are made to support or refute the findings that may result from a single case study.

The important research design factors include case selection and identification of case study methods to be employed. The selection of cases for this research was designed to provide a range of site settings (urban, rural and suburban), a range of site complexities (from a landfill to a barge terminal with many different types of operations), a variety of EPA project managers, variation in the remediation outcomes (consolidation and capping, incineration, offsite disposal), and TAGs that were awarded at different times in the process. Six cases were selected in central New York, three near Binghamton and three near Syracuse that met these criteria. Table 6-5 presents a summary of case study site characteristics.

The methodology employed included a review of the EPA files and news coverage related to the sites, followed by semi-structured interviews with relevant site representatives. Interviews were conducted with one or more community representatives, one or more EPA project managers (PMs), and the technical advisor that was hired for each site, except that for one site the EPA PM did not agree to be interviewed.

Table 6-5
Descriptive Statistics
Case Study Sites (Central New York)

Site ID	Site F	Site A	Site C	Site D	Site E	Site B
Site Setting	Rural	Rural	Rural	Suburban	Urban	Suburban
HRS	34.48	34.78	29.36	34.86	36.5	51.35
TAG Awarded?	Yes	Yes	Yes	Yes	Yes	Yes
Number of RODs	1	1	1	1	1	1
Discovery Date	01/01/80	06/01/80	05/01/79	05/18/82	05/01/82	05/29/84
TAG Award	03/24/89	09/26/91	10/01/95	10/01/95	09/30/88	09/30/90
Discovery to NPL (days)	2352	1194	3622	1891	495	1767
Discovery to NPL Deletion (days)	5882	N/A	N/A	N/A	N/A	N/A
Discovery to ROD (days)	3284	3771	5994	5614	2708	5046
Discovery to ROD (years)	9.0	10.3	16.4	15.4	7.4	13.8
Discovery to NPL Proposal (days)	1749	942	3342	1484	243	1487
Discovery to Close (days)	5111	N/A	N/A	N/A	N/A	N/A
Discovery to Close (years)	14.0	N/A	N/A	N/A	N/A	N/A
Discovery to TAG (days)	3370	4134	5997	4884	2344	2315
NPL to ROD (days)	932	2577	2372	3723	2213	3279
Number of Operable Units	2	2	3	2	3	2
PRP Site?	Yes	Yes	Yes	Yes	Yes	Yes
TAG before ROD?	No	No	No	Yes	Yes	Yes
TAG after ROD?	Yes	Yes	Yes	No	No	No
Minority (%)	2.87	5.09	3.13	1.83	1.39	5.56
Tenure > 5 years (%)	57.04	57.45	56.51	61.95	63.70	34.78
Less than College Degree (%)	82.20	83.75	75.97	84.11	75.41	72.63
Normalized Income	-1.93	-3.44	-3.07	-2.84	-0.90	-3.30
Normalized Home Value	-4.08	-6.39	-5.20	-4.65	-3.96	-4.62
Owner Occupied (%)	75.32	55.84	57.92	52.63	80.84	25.49
Population Density (#/sq mile)	155.90	22.72	121.37	21.45	126.07	5808.53
Removal Action Performed?	Yes	Yes	No	Yes	Yes	Yes

Because the case study process involved the use of human subjects, approval of the methodology was requested and received from the Institutional Review Board (IRB) at Syracuse University. One of the conditions of the IRB approval was that anonymity of the participants be maintained. For that reason, the cases are referred to as Case A through Case F, and the labels "Community Representative", "EPA Project Manager" and "Technical Consultant" are used to identify the participants.

The interviews were semi-structured; an interview script and list of questions was established, but the responses to the questions were open-ended and participants could answer as they chose. Follow-up questions were asked as needed for clarification. Community representative interviews were performed in-person, except for one interview which was performed via phone. All EPA and technical consultant interviews were performed via phone. The interview questionnaires are included in Appendix A and covered the following topics: background of the individuals with community involvement and Superfund; the application and grant process in general; details of the timing and use of the TAG; benefits of being awarded a TAG; drawbacks of the TAG program; satisfaction with the TAG program; and the perceived impacts of the TAG on process, schedule and remedy.

The answers to the questions were accumulated and data collected relative to the key research questions of why get a TAG, what did the TAG add or detract, and what was the impact of the TAG, as well as general observations that were offered by interviewees. These results are presented and discussed in Chapter 8.

Chapter 7 - Quantitative Findings

7.1 Data Descriptive Statistics

Descriptive statistics for Superfund sites, including EPA regional breakdowns and the mean duration of various phases, are shown in Table 7-1. The average time from discovery to closure for NPL sites is 14.7 years (14.2 years for sites without a TAG and 18.4 years for sites with a TAG). This is consistent with Hypothesis 4 and is investigated further in Section 7.3.

Figure 7-1 depicts the number of Superfund sites at each stage of the process as of January 2008. Approximately 93% of sites proposed for the NPL were placed on the final NPL. Of the sites that are on the final NPL, a ROD had been issued at approximately 89% of the sites and approximately 20% of the NPL sites had been remediated and deleted from the NPL.

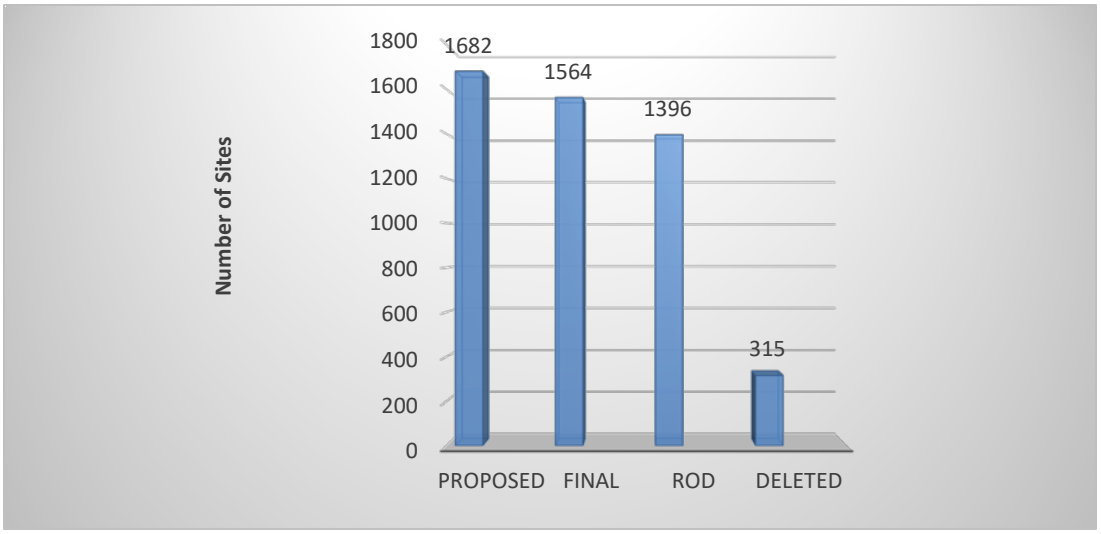


Figure 7-1. Superfund sites by stage of process (January 2008).

Figure 7-2 shows the breakdown of TAG awards by the stage of the Superfund process in which they were awarded. Approximately 15.6% of all NPL sites have been awarded TAGs. Slightly less than half of the TAGs were awarded before the ROD (46.3%), and slightly more than half (53.7%) after the ROD.

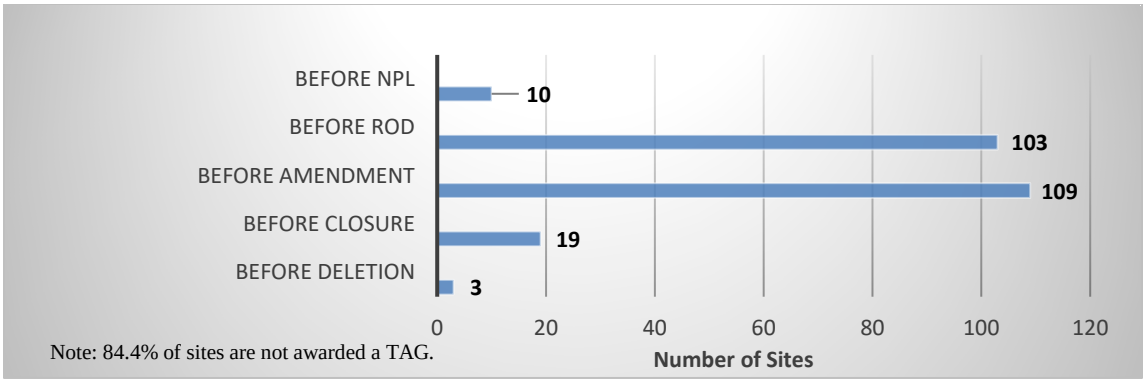


Figure 7-2. TAG award by stage of process.

There is considerable variation in the percentage of NPL sites with a TAG award by EPA region (as shown in Table 7-1 and Figures 7-3 and 7-4). This fraction of sites with a TAG ranges from less than 10% for Regions 5 (upper Midwest with headquarters in Chicago) and 7 (Great Plains with headquarters in Kansas City) to greater than thirty percent in Regions 1 (New England with headquarters in Boston), 6 (Southwest/Gulf of Mexico with headquarters in Dallas) and 8 (Rocky Mountain region with headquarters in Denver). There a number of factors that may influence this, including a potential mistrust of the agency in certain regions, a propensity for some EPA regions to support or present barriers to public participation, and regional differences in the public view of the role of government. For example, the results in Regions 1 and 8 (New England and the Rocky Mountains) may reflect the individual responsibility

Table 7-1
Descriptive Statistics
Superfund Sites (as of January 2008)

Category	All NPL Sites	NPL Sites w/ TAG	NPL Sites w/o TAG	Percentage of Sites with TAG
EPA Region				
Region 1 (New England)	112	41	71	36.6%
Region 2 (Northeast)	265	37	228	14.0%
Region 3 (MidAtlantic)	208	22	186	10.6%
Region 4 (Southeast)	211	29	182	13.7%
Region 5 (Midwest)	287	16	271	5.6%
Region 6 (Gulf Coast)	116	37	79	31.9%
Region 7 (Plains)	82	5	77	6.1%
Region 8 (Rocky Mountains)	61	26	35	42.6%
Region 9 (Southwest)	125	21	104	16.8%
Region 10 (Northwest)	97	10	87	10.3%
Total All Regions	1564	244	1320	15.6%
Sites w/ ROD	1396	220	1176	15.8%
Sites to reach closure	286	37	249	12.9%
Sites w/ TAG(s)	244	---	---	
Sites w/ PRPs	924	156	768	16.9%
Sites w/ Federal Facilty	191	43	148	22.5%
Sites w/ EPA lead	449	45	244	10.0%
Average Duration (years)				
Discovery to Closure	14.7	18.4	14.2	N/A
Discovery to ROD	10.3	10.2	10.3	N/A
ROD to Closure	6.2	9.0	5.8	N/A
TAG Award Timing				
TAG before ROD	N/A	113	N/A	N/A
TAG after ROD	N/A	131	N/A	N/A

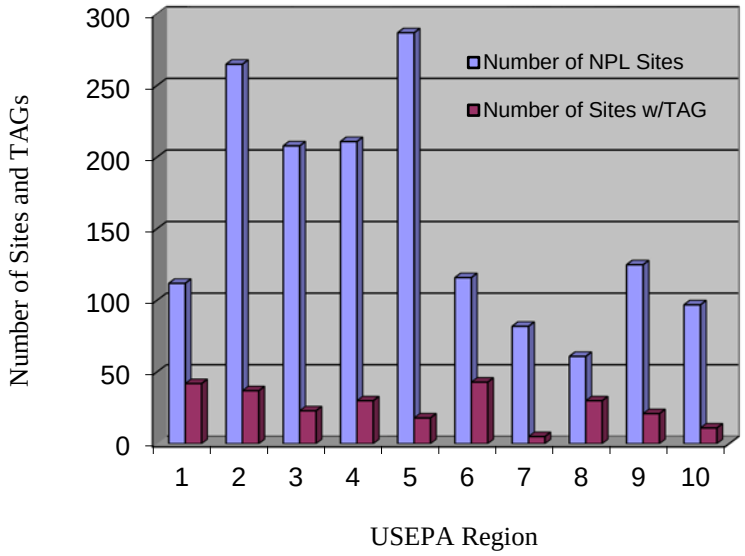


Figure 7-3. NPL sites and TAG award by USEPA Region.

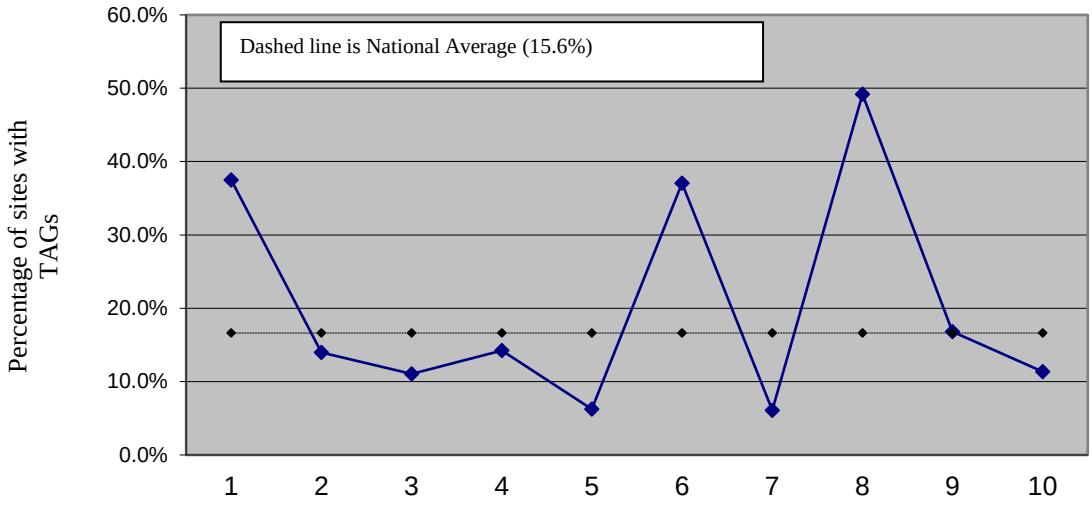


Figure 7-4. Percentage of TAG awards by USEPA Region.

characteristics, while Region 6 (Southwest/Gulf of Mexico) are decidedly distrustful of industry and government-industry relations. The average duration from discovery to closure for an NPL site is approximately 15 years and increases to approximately 18 years for NPL sites where a TAG is awarded. The average duration of Phase I (discovery to ROD issuance) is about the same for each category of site at slightly over ten years. The average time from ROD issuance to site closure is approximately six years for all sites and increases to approximately nine years for sites where a TAG is awarded. This implies a dissatisfaction with the remedy selected, the remedy process, or both. This a key component to the multiple case study evaluation presented in Chapter 8.

Table 7-2 presents a summary of the descriptive statistics for the explanatory variables in the study, including number of observations, mean values, standard deviations, and minimum and maximum values.

7.2 Determinants of TAG Formation

The results of the logistic modeling for estimation of the effect of factors on the likelihood of TAG award are presented in Table 7-3. The model "Logit1" includes demographic and site characteristic independent variables only. "Logit2" incorporates EPA regional fixed effects while "Logit3" incorporates year of discovery fixed effects as well.

An additional analysis was performed based on information obtained from the completion of the multiple cases studies. One of the findings of the case study was the importance of a network of experience or mentor to guide a community through the TAG process. To model this effect quantitatively, I constructed a dichotomous variable to indicate whether the sites had a previously awarded nearby TAG from which to draw experiences and

Table 7-2
Descriptive Statistics - Study Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
tagdum	1555	0.156	0.363	0	1
OU Count	1555	3.64	4.33	1	86
OU^2	1555	32.0	217.5	1	7,396
PRP site	1555	0.59	0.49	0	1
Federal Facility	1555	0.12	0.33	0	1
Normalized Home Value	1511	0.00	6.97	-10	70.2
Normalized Income	1511	0.00	3.99	-10	26.2
Population Density	1510	1,184	1,967	0	23,976
Minority (%)	1507	19.7	22.1	-15	100
< college degree (%)	1506	72.6	14.9	0	100
> 5-year tenure (%)	1507	51.2	14.5	0	100
Owner occupied (%)	1504	62.8	22.0	0	99.2
HRS Score	1555	41.2	12.06	0	84.9
Probability of TAG	1478	16.1	15.5	0	91.0
Remedy Code	1418	4.97	2.08	0	7
Nearby TAG Dummy	1555	0.41	0.49	0	1

Table 7-3 Logit Models
Odds Ratios Reported

	Logit1 No fixed effects	Logit2 Region effects	Logit3 Region and year effects	Logit4 Nearby TAG
Nearby TAG dummy				**1.511***
				(0.269)
Normalized Home Value	**1.054****	**1.048***	**1.041***	**1.040***
	(0.0175)	(0.0197)	(0.0201)	(0.0200)
Normalized Income	**0.908***	0.941	0.955	0.947
	(0.0378)	(0.0434)	(0.0459)	(0.0456)
Population Density	1.000	1.000	1.000	1.000
	(0.0000431)	(0.0000437)	(0.0000476)	(0.0000482)
Minority %	1.007	1.003	1.002	1.001
	(0.00372)	(0.00436)	(0.00450)	(0.00456)
Less than college degree	**0.983***	0.990	0.992	0.991
	(0.00796)	(0.00841)	(0.00870)	(0.00872)
Owner Occupied %	0.994	0.994	0.993	0.994
	(0.00589)	(0.00634)	(0.00659)	(0.00662)
Tenure > 5 years	**1.025****	**1.022***	**1.023***	**1.024****
	(0.00810)	(0.00893)	(0.00922)	(0.00931)
OU Count	**1.283*****	**1.300*****	**1.314*****	**1.319*****
	(0.0653)	(0.0683)	(0.0694)	(0.0707)
OU Squared	**0.995****	**0.995****	**0.995*****	**0.994*****
	(0.00163)	(0.00160)	(0.00155)	(0.00160)
Removal Action	**2.107*****	**1.846*****	**1.888*****	**1.897*****
	(0.336)	(0.308)	(0.322)	(0.325)
HRS Score	1.007	1.007	1.007	1.007
	(0.00621)	(0.00639)	(0.00666)	(0.00668)
PRP Site Dummy	**1.528***	**1.659***	**1.745****	**1.758****
	(0.287)	(0.328)	(0.374)	(0.377)
Federal Facility Dummy	0.874	1.002	1.109	1.072
	(0.292)	(0.351)	(0.404)	(0.392)
Constant	0.0421***	0.0273***	0.0540*	0.0455*
	(0.0291)	(0.0212)	(0.0761)	(0.0647)
Observations	1506	1506	1480	1480

Exponentiated coefficients; Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
Logit 1 – No regional or year effects
Logit 2 – Regional effects
Logit 3 – Regional and year effects
Logit 4 – Nearby TAG dummy

resources. The results of the logistic regression to evaluate the impact of the nearby TAG award are shown in Table 7-3 as "Logit 4".

Logistic model results are presented as odds ratios for each of the variables. Larger odds ratios indicate a greater impact of the independent variable on the likelihood of TAG award. An odds ratio greater than one demonstrates an *increase in the likelihood of a TAG award* as the variable value increases, while an odds ratio of less than one indicates that as the variable value increases *the likelihood of TAG award decreases*.

The results show that increasing home values and increasing percentage of occupants with tenure of greater than five years significantly increase the likelihood of TAG award (at the 0.05 level) both with and without regional and year of discovery fixed effects. None of the other demographic parameters (income, population density, percentage of minorities or education) are significant influences on the likelihood of TAG award in the fixed effects model. These findings are supportive of the wealth and stability assumptions of Hypothesis 1, but do not support the concept that increased education results in increased TAG award.

Of the site characteristic measurements, an increase in the number of operable units at a site (a measure of site complexity), the performance of site work by a private party significantly, and the performance of a removal action significantly increase the likelihood of TAG application and award (at the 0.05 level), consistent with Hypotheses 2 and 3. None of the other site characteristic variables have a significant impact on TAG award. The fixed effects modeling demonstrated that TAGs were more likely to awarded (and the results were statistically significant) in Regions 1, 6, and 8 and were significantly less likely to occur in Regions 5 and 7, consistent with the summary presented in Table 7-1.

The evaluation of the impact of a nearby previous TAG (Logit 4) indicates that the proximity of a previous TAG does impact the formation of a group and award of TAG. The odds ratio indicates that the odds of awarding a TAG is 1.5 times greater than not getting a TAG; an impact that is greater than all variables except for private entity (PRP) involvement at a site and the performance of a removal action (an indication of potential eminent health or environmental threat). This underscores the importance of network connection and strong leadership and information sharing from EPA to the public.

7.3 Impact of TAGs on Superfund Schedule

7.3.1 Duration t-tests

As a preliminary estimate of the impact of TAG award, statistical t-testing was performed for three TAG variables (tagdum, TAG before ROD, and TAG after ROD) and three process phases (discovery-to-closure, discovery-to-ROD, and ROD-to-closure). The results of these t-tests are summarized in Table 7-4 and show the following:

- The award of a TAG (tagdum) results in significantly different average durations in the discovery-to-closure (1573 days or 30%) and ROD-to-closure (1340 days or 63%) intervals;
- The award of TAG before the ROD results in significantly different average durations in the discovery-to-closure (1347 days or 25%) and the discovery-to-ROD (1290 days or 35%) intervals; and

Table 7-4
Results of t-tests
Durations and TAG Award

Variable	Discovery to Close	Discovery to ROD	ROD to Close
tagdum	1573.2***	-70.13	1340.6***
	(4.9)	(-0.52)	(4.38)
constant	5179.5***	3776.0***	2116.4***
	(44.97)	(70.38)	(19.07)
TAG before ROD	1347.0**	1289.6***	125.1
	(2.74)	(6.54)	(0.27)
constant	5309.6***	3681.6***	2285.7***
	(46.71)	(73.41)	(20.76)
TAG after ROD	1556.3***	-1035.1***	2070.4***
	(3.75)	(-6.19)	(5.42)
constant	5265.1***	3861.2***	2133.9***
	(46.31)	(75.70)	(20.16)
Number of observations	280	1377	274

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

- The award of a TAG after the ROD results in significantly different average durations in the discovery-to-closure (1556 days or 30%) and discovery-to-closure (2070 days or 97%) intervals.

These results raise some interesting questions, especially regarding the impact of TAG award in the post-ROD period. The overall schedule impact is greater for TAGs awarded later in the process (i.e., after the ROD), with average time from discovery to closure increasing by approximately 165 days. Sites that are awarded a TAG after the ROD, achieve the ROD issuance almost 3 years sooner, but that schedule gain is more than lost in the post-ROD phase. It may be that a rush through the process yields a remedy that is not acceptable to the community resulting in group formation and TAG award. The process does not meet the needs of the community, the TAG is a method for restoring trust and efficacy to process, and the resulting conflict results in re-work of the earlier stages and corresponding delay. Statistical t-tests were not performed for the TAG after ROD dichotomous variable in the discovery-to-ROD phase since the TAG award occurs after the endpoint of interest.

7.3.2 Duration Ordinary Least Squares (OLS) Modeling

OLS modeling was performed as another preliminary and illustrative evaluation method. It includes only those sites that have completed the given phase (i.e., it is right censored). Interpretation is relatively simple, but the right-censoring introduces error into the analysis that I address using survival analysis (Section 7.3.3).

The results of the *OLS modeling* for estimation of the effect of TAG award on the schedule at Superfund sites are summarized in Table 7-5. Models OLS1 (no TAG variable), OLS2 (with a TAG before ROD dichotomous variable), OLS3 (adding EPA Region fixed

Table 7-5. OLS Duration Models
Duration in days

	OLS1 DS to ROD	OLS2 DS to ROD	OLS3 DS to ROD Region Effects	OLS4 DS to ROD Region/year	OLS5 ROD-Close Region/year	OLS6 DS-Close Region/year
TAG before ROD		**1,270.7*****	**1,341.7*****	**1,302.0*****	184.5	**1,145.3***
		(197.1)	(199.8)	(194.1)	(480.1)	(501.9)
TAG after ROD					**1,142.8***	**1,003.5***
					(452.6)	(473.7)
Normalized Home Value	-9.183	-13.95	-14.19	-13.59	72.29	50.71
	(11.48)	(11.33)	(12.35)	(12.03)	(43.69)	(44.70)
Normalized Income	44.05	**56.77***	48.92	42.06	**-190.8***	-87.54
	(27.97)	(27.62)	(29.62)	(28.86)	(83.56)	(87.17)
Population Density	-0.0222	-0.0214	-0.0276	-0.00511	**-0.170***	-0.113
	(0.0277)	(0.0273)	(0.0277)	(0.0270)	(0.0719)	(0.0747)
Minority (%)	1.076	1.017	3.828	3.517	1.942	5.044
	(2.617)	(2.578)	(2.811)	(2.730)	(6.028)	(6.262)
< College Degree	7.738	9.707	10.47	6.407	**-37.75***	-2.609
	(5.630)	(5.554)	(5.594)	(5.468)	(15.97)	(16.42)
Owner Occupied	-7.912*	-8.262*	-5.725	-7.244	4.012	5.338
	(4.031)	(3.972)	(4.088)	(3.984)	(11.20)	(11.66)
Tenure > 5 years	1.168	-0.276	-2.947	-0.906	18.77	4.478
	(5.198)	(5.126)	(5.461)	(5.313)	(13.64)	(14.28)
OU count	**-45.93**	**-51.18***	**-56.15***	**-75.03****	**561.4*****	**436.5****
	(23.75)	(23.41)	(23.92)	(23.26)	(154.1)	(159.5)
OU Squared	0.126	0.233	0.363	0.665	**-15.18****	-10.82
	(0.401)	(0.395)	(0.400)	(0.387)	(5.432)	(5.630)
Removal Action	**-225.8***	**-260.0****	**-272.6****	-116.2	**556.8***	-27.04
	(99.40)	(98.07)	(99.58)	(97.60)	(223.1)	(232.3)
HRS Score	**21.46*****	**21.25*****	**22.41*****	**22.10*****	2.327	14.27
	(4.140)	(4.079)	(4.072)	(3.994)	(8.376)	(8.364)
PRP Site Dummy	12.21	7.496	-6.651	**-238.3***	249.5	**610.4***
	(114.0)	(112.3)	(113.9)	(114.8)	(228.5)	(236.9)
Fed Facility	**1,040.2*****	**973.2*****	**845.5*****	**818.6*****	-182.0	181.4
	(213.3)	(210.4)	(211.3)	(207.5)	(565.5)	(588.3)
Constant	2,925.4***	2,849.7***	2,818.5***	2,751.0***	825.2	1,400.4
	(459.4)	(452.7)	(491.5)	(656.2)	(1683.6)	(1761.4)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
OLS3 includes regional effects; OLS4-OLS6 includes regional and year effects

effects), and OLS4 (adding year of discovery fixed effects) model the duration of the phase from discovery (DS) through the issuance of the ROD (Phase I).

The average duration of Phase I is approximately 10.3 years (Table 7-1). The OLS modeling demonstrates the award of a TAG before the ROD is issued has a significant impact on the schedule and results in an increase in duration for Phase I (discovery to ROD) of approximately 1300 days (3.7 years) including year ad region effects. The award of a TAG increased the duration of Phase I by over 30 percent, supporting Hypothesis 5. The results also demonstrate the impact of including EPA region and year of discovery fixed effects.

The average duration of Phase II (ROD to closure) is approximately 6.2 years (Table 7-1). The results of OLS5 (ROD to Closure Phase) show that a TAG awarded after the ROD increases the duration of this Phase by 1,142 days (3.1 years or 50%), consistent with Hypothesis 6. The award of a TAG before the ROD has a small but statistically insignificant effect of the duration of Phase II.

The average duration of the discovery to closure period is approximately 14.7 years (Table 7-1). The results of OLS6 (Discovery to Closure) shows that a TAG awarded before the ROD has a significant impact and results in an increased duration of 1145 days (approximately 3.1 years or 21%). Similarly, a TAG awarded after the ROD has a significant impact and results in increased duration of 1003 days (2.7 years or 19%). These findings support Hypotheses 5 and 6.

7.3.3 Survival Analysis Modeling

The results of survival analysis modeling (using Cox analysis methods) are presented in Table 7-6 (Discovery to ROD), Table 7-7 (for ROD to Closure), and Table 7-8 (Discovery to Closure), for a dataset including one entry for each Superfund site. Each of these models are

Table 7-6. Survival Analysis - Discovery to ROD
(Hazard ratios reported)

	Cox2a	Cox2b	Cox2c	Cox2d
TAG Dummy	0.989	1.039		
	(0.0791)	(0.0837)		
TAG before ROD			**0.508*****	**0.530*****
			(0.0583)	(0.0610)
Probability of TAG		**0.979*****		**0.982*****
		(0.00489)		(0.00497)
Normalized Home Value	**1.015**	**1.027****	**1.019***	**1.028*****
	(0.00803)	(0.00879)	(0.00791)	(0.00866)
Normalized Income	0.977	0.968	0.969	**0.963***
	(0.0183)	(0.0186)	(0.0180)	(0.0183)
Population Density	1.000	1.000	1.000	1.000
	(0.0000162)	(0.0000167)	(0.0000161)	(0.0000166)
Minority (%)	0.998	0.999	0.998	0.998
	(0.00166)	(0.00167)	(0.00166)	(0.00168)
Less than College Degree (%)	1.001	0.999	1.000	0.998
	(0.00341)	(0.00348)	(0.00340)	(0.00346)
Owner Occupied (%)	1.004	1.003	1.004	1.003
	(0.00244)	(0.00249)	(0.00244)	(0.00249)
Tenure > 5 years	0.998	1.003	0.998	1.003
	(0.00324)	(0.00353)	(0.00326)	(0.00356)
OU count	**1.060*****	**1.142*****	**1.066*****	**1.144*****
	(0.0163)	(0.0316)	(0.0181)	(0.0347)
OU Squared	1.000	0.998*	0.999	0.998*
	(0.000388)	(0.000693)	(0.000479)	(0.000791)
Removal Action	**1.183****	**1.352*****	**1.203****	**1.346*****
	(0.0682)	(0.0906)	(0.0693)	(0.0906)
HRS Score	**0.983*****	**0.985*****	**0.982*****	**0.984*****
	(0.00224)	(0.00228)	(0.00227)	(0.00232)
PRP Site Dummy	**1.196****	**1.327*****	**1.214****	**1.325*****
	(0.0783)	(0.0932)	(0.0794)	(0.0931)
Fed Facility Dummy	**0.743***	**0.703****	**0.758***	**0.711****
	(0.0934)	(0.0903)	(0.0963)	(0.0934)

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
All models include EPA region controls

Table 7-7. Survival Analysis - ROD to Closure
(Hazard ratios reported)

	Cox3a	Cox3b	Cox3c	Cox3d
TAG Dummy	1.181	1.200		
	(0.237)	(0.248)		
TAG before ROD			1.314	1.345
			(0.379)	(0.398)
TAG after ROD			1.103	1.120
			(0.272)	(0.279)
Probability of TAG		0.996		0.995
		(0.0131)		(0.0131)
Normalized Home Value	**0.932****	**0.934***	**0.932****	**0.934***
	(0.0250)	(0.0258)	(0.0250)	(0.0259)
Normalized Income	1.036	1.032	1.038	1.034
	(0.0521)	(0.0531)	(0.0525)	(0.0534)
Population Density	1.000	1.000	1.000	1.000
	(0.0000409)	(0.0000416)	(0.0000410)	(0.0000416)
Minority (%)	1.002	1.002	1.002	1.002
	(0.00363)	(0.00372)	(0.00362)	(0.00371)
Less than College Degree	0.996	0.996	0.996	0.996
	(0.00838)	(0.00856)	(0.00839)	(0.00857)
Pct Owner Occupied (%)	1.007	1.007	1.007	1.007
	(0.00634)	(0.00643)	(0.00635)	(0.00644)
Tenure > 5 years (%)	1.002	1.003	1.002	1.003
	(0.00758)	(0.00836)	(0.00758)	(0.00836)
OU count	**0.672*****	**0.681*****	**0.674*****	**0.684*****
	(0.0510)	(0.0569)	(0.0512)	(0.0572)
OU Squared	**1.004*****	**1.004*****	**1.004*****	**1.004*****
	(0.000961)	(0.00105)	(0.000961)	(0.00105)
Removal Action	1.082	1.110	1.084	1.116
	(0.149)	(0.175)	(0.150)	(0.177)
HRS Score	**0.987***	**0.987***	**0.987***	**0.987***
	(0.00521)	(0.00534)	(0.00523)	(0.00536)
PRP Site Dummy	**0.542*****	**0.554*****	**0.544*****	**0.557*****
	(0.0797)	(0.0907)	(0.0799)	(0.0914)
Fed Facility Dummy	0.816	0.812	0.812	0.808
	(0.259)	(0.258)	(0.257)	(0.257)

Exponentiated coefficients; Standard errors in parentheses
* ***p* < 0.05**, ** ***p* < 0.01**, *** ***p* < 0.001**
All models include EPA region controls

Table 7-8. Survival Analysis - Discovery to Closure
(Hazard ratios reported)

	Cox1a	Cox1b	Cox1c	Cox1d	Cox1e	Cox1f	Cox1g
TAG Dummy				1.004		1.028	
				(0.196)		(0.204)	
TAG before ROD					0.805		0.826
					(0.222)		(0.231)
TAG after ROD					1.235		1.252
					(0.303)		(0.309)
Prob. of TAG						0.991	0.992
						(0.0125)	(0.0126)
Normalized Home Value	**0.939***	**0.940***	**0.940***	**0.940***	**0.940***	**0.941***	**0.941***
	(0.0256)	(0.0254)	(0.0254)	(0.0254)	(0.0254)	(0.0264)	(0.0263)
Normalized Income	1.014	1.022	1.023	1.023	1.020	1.023	1.021
	(0.0514)	(0.0509)	(0.0512)	(0.0513)	(0.0510)	(0.0522)	(0.0520)
Pop. Density	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	(0.0000390)	(0.0000380)	(0.0000381)	(0.0000381)	(0.0000381)	(0.0000388)	(0.0000388)
Minority %	1.002	1.001	1.001	1.001	1.001	1.002	1.002
	(0.00349)	(0.00347)	(0.00348)	(0.00348)	(0.00350)	(0.00356)	(0.00357)
Less than College Degree %	0.998	1.000	1.000	1.000	1.000	1.000	0.999
	(0.00874)	(0.00842)	(0.00847)	(0.00849)	(0.00848)	(0.00862)	(0.00862)
Owner Occupied	**1.012***	1.012	1.012	1.012	1.012	1.011	1.011
	(0.00621)	(0.00611)	(0.00613)	(0.00613)	(0.00612)	(0.00621)	(0.00620)
Tenure > 5 years	0.999	0.998	0.998	0.998	0.998	1.000	1.000
	(0.00737)	(0.00733)	(0.00733)	(0.00733)	(0.00734)	(0.00797)	(0.00799)
OU count	**0.782*****	**0.780*****	**0.735*****	**0.735*****	**0.727*****	**0.755*****	**0.746*****
	(0.0447)	(0.0444)	(0.0481)	(0.0489)	(0.0491)	(0.0568)	(0.0570)
OU Squared			**1.003*****	**1.003*****	**1.004*****	**1.003****	**1.003*****
			(0.000869)	(0.000881)	(0.000889)	(0.000974)	(0.000986)
Removal Action			0.974	0.973	0.969	1.018	1.008
			(0.125)	(0.126)	(0.125)	(0.152)	(0.151)
HRS Score	**0.977*****	**0.976*****	**0.976*****	**0.976*****	**0.976*****	**0.978*****	**0.978*****
	(0.00483)	(0.00468)	(0.00471)	(0.00472)	(0.00470)	(0.00489)	(0.00488)
PRP Site Dummy	**0.586*****	**0.608*****	**0.615*****	**0.615*****	**0.610*****	**0.641****	**0.634****
	(0.0803)	(0.0816)	(0.0827)	(0.0829)	(0.0824)	(0.0946)	(0.0938)

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
All models include EPA region controls

based on a dataset that includes one entry for each site, along with start and end dates for each process milestone. In addition, I constructed a panel dataset to include site information for each year after discovery, to perform a more granular analysis of the data. This set included an entry for each site and each year to evaluate the impact of TAG (approximately 45,000 observations instead of approximately 1500 for the one-entry per site data set). Each observation in the constructed panel included measures for whether a site had a TAG during that year and whether the site completed the ROD or closure milestone. The results of this annual survival modeling are included in Table 7-9.

The Cox survival models report hazard ratios for each of the independent variables. Survival analysis is a failure model, with failure defined as achieving the milestone being modeled (ROD or closure). A hazard ratio of *greater than one* signifies an increased probability of completion at any given time, or a faster completion of that phase of the process. The larger the hazard ratio the faster the phase is expected to be completed. A hazard ratio of *less than one* indicates a slowing of the schedule and increase in completion time.

For Phase I (Discovery to ROD, Table 7-6), several Cox survival model runs are performed with different model specifications; Cox 2a with the variable tagdum (gets a TAG without regard to timing), Cox 2b which incorporates the predicted probability of TAG to address possible endogeneity in the schedule and drivers for TAG award, Cox 2c which utilizes a time dependent variable of TAG before ROD instead of tagdum, and Cox 2d which incorporates the TAG probability with TAG before ROD. The time independent TAG variable (tagdum) is not found to be statistically significant relative to the discovery to ROD schedule. When the timing of the TAG is evaluated (Cox 2c and Cox 2d), the TAG before ROD is significant and found to slow down the ROD issuance schedule, consistent with Hypothesis 5. The award of a

Table 7-9. Survival Models (Annualized Data Set)
(Hazard ratios reported)

	Cox4a DS to Closure	Cox4b DS to ROD	Cox4c ROD to Closure
hasTAG	0.705 (0.248)	**1.621**** (0.242)	0.892 (0.336)
Probability of TAG	0.989 (0.0124)	**0.980***** (0.00477)	0.989 (0.0132)
Years from TAG	**1.141***** (0.0440)	0.997 (0.0374)	1.070 (0.0431)
Normalized Home Value	**0.942*** (0.0263)	**1.024**** (0.00875)	**0.937*** (0.0264)
Normalized Income	1.018 (0.0519)	0.971 (0.0186)	1.033 (0.0542)
Population Density	1.000 (0.0000391)	1.000 (0.0000167)	1.000 (0.0000439)
Minority (%)	1.003 (0.00356)	0.999 (0.00167)	1.003 (0.00371)
Less than College Degree	0.999 (0.00860)	0.999 (0.00345)	0.995 (0.00884)
Pct Owner Occupied (%)	1.012 (0.00624)	1.003 (0.00248)	1.006 (0.00658)
Tenure > 5 years (%)	0.999 (0.00805)	1.002 (0.00351)	1.006 (0.00858)
OU count	**0.740***** (0.0562)	**1.127***** (0.0269)	**0.708***** (0.0588)
OU Count Squared	**1.003***** (0.000979)	**0.999*** (0.000534)	**1.004***** (0.00104)
Removal Action	0.981 (0.147)	**1.321***** (0.0882)	1.182 (0.191)
HRS Score	**0.980***** (0.00487)	**0.987***** (0.00229)	**0.988*** (0.00541)
PRP Site Dummy	**0.637**** (0.0939)	**1.311***** (0.0923)	**0.622**** (0.105)
Fed Facility Dummy	0.712 (0.213)	**0.724*** (0.0913)	0.907 (0.291)
Observations	33,426	16,560	16,952

Exponentiated coefficients; Standard errors in parentheses
* ***p* < 0.05,** ** ***p* < 0.01,** *** ***p* < 0.001**
All models include EPA regional controls

TAG before ROD also has a greater impact on survival (duration) than any of the other variables, increasing the schedule duration. Other factors that are significant (at the 0.05 level) relative to the duration of Phase I are increased home value, increase in site complexity (HRS, OU count and performance of a removal action) and the presence of a private party at the site. Since Phase I is defined as the time from Discovery to the first ROD issued at a site; if multiple RODs are issued (as is often the case with complex and private party sites) then the duration of Phase I can be expected to be decreased. Future research to examine the schedule impact of defining a site with multiple RODs in a more detailed manner is recommended.

For Phase II (ROD to closure, Table 7-7), several Cox survival model runs are performed with different model specifications; Cox 3a with the variable tagdum (gets a TAG without regard to timing), Cox 3b which incorporates the predicted probability of TAG to address possible endogeneity in the schedule and drivers for TAG award, Cox 3c which utilizes a time dependent variables of TAG before ROD and TAG after ROD instead of tagdum, and Cox 2d which incorporates the TAG probability with TAG before/after ROD. The award of a TAG, either before or after the ROD, was not found to be significant (at the 0.05 level) for Phase II survival analysis. The only factors shown to significantly impact the expected duration were increased home value, increased site complexity and the presence of a private party. Each of the factors resulted in a significant increase in the expected duration of the ROD to closure phase. These results indicate that site characteristics (complexity, risk and private party involvement) have a bigger impact on schedule than does the community characteristic (home value).

The results of survival analysis modeling for the overall Superfund process (Discovery to Closure) are shown in Table 7-8. Model specifications were Cox 1a (no TAG variable, regional effects, year of discovery effects), Cox1b (no TAG variable, regional effects, no year effects),

Cox 1c (additional of OU-squared term to account for non-linearity of that variable), Cox 1d (tagdum variable), Cox 1e (TAG before ROD and TAG after ROD instead of tagdum), Cox 1f (Cox 1d plus probability of TAG award to address possible endogeneity), and Cox 1g (Cox 1e with probability of TAG award). Results show that the TAG award variables do not have a significant impact on the schedule, contrary to Hypotheses 4, 5 and 6. While not significant, the hazard ratios in Cox1f and Cox1g indicate a direction of impact for TAG awarded without regard to timing (tagdum) and TAG after ROD to be consistent with the findings of the OLS predictions (Table 7-4) and Hypotheses 4 and 6. The direction of impact for TAG before ROD (again not significant) suggests a faster process for site closure, contrary to OLS predictions and Hypothesis 5. The only factors that significantly impact the schedule are increasing home value, increasing site complexity and the presence of a private party, with each of these factors increasing the duration.

For the annualized data set survival analysis (Table 7-9), one survival model was performed for each duration interval; Cox 4a (discovery to closure), Cox 4b (discovery to ROD), and Cox 4c (ROD to closure). The models included an entry for each site for every year after discovery and the following variables were defined and calculated; hasTAG (a measure of whether the site has a TAG award at the start of the year), probability of TAG (constant for each year), years from TAG (a measure of the time the TAG was in effect), as well as similar end-point variables (hasROD, hasClose) indicating whether the event of interest occurred. The results of the annual survival models indicate that "Years from TAG" is significant and speeds up the process from discovery to closure, which makes sense in that it predicts that the more mature a TAG group is the more they positively affect the process. The variable "hasTAG" is also significant and speeds up the process from discovery to ROD issuance. This is somewhat

counterintuitive, but may support the premise that a TAG awarded earlier in the process may help to avoid pitfalls and schedule delays associated with conflicts over remedy selection. The same site and community variables as previous modeling are significant in the annualized duration/survival modeling (home value, site complexity, risk, and private party involvement).

7.4 Impact of TAG Award on Remedy

Ordered Logit statistical modeling was performed as outlined in Section 6.1.4. The model estimates the impact of the independent variables on the classification of the remedy selection. The remedy selection variable is ordered from 0 (no action taken) to 7 (greatest remedy) with increasing remedy/risk reduction for each category. The ordered logit reports the odds ratio, or the odds of being in a higher group divided by the odds of being in lower group with a value of greater than 1 indicating a variable that results in higher (more protective remedy). The results of the remedy evaluation are shown in Table 7-10. Ologit1 includes the probability of TAG variable to address potential endogeneity while Ologit2 includes only the tagdum variable for the presence of TAG. As shown in Table 7-10, the award of a TAG does not significantly impact the selection of remedy for the sites, consistent with Hypothesis 7. This finding is further investigated in the multiple case study.

Table 7-10 Remedy Selection-Ordered Logits
Odds Ratios Reported for Remedy Code Change

	Ologit 1	Ologit 2
TAG Dummy	0.954	0.903
	(0.130)	(0.121)
Probability of TAG	**0.978****	
	(0.00761)	
Normalized Home Value	1.019	1.005
	(0.0134)	(0.0122)
Normalized Income	0.991	1.004
	(0.0293)	(0.0288)
Population Density	**1.000****	**1.000*****
	(0.0000316)	(0.0000305)
Minority (%)	1.001	1.000
	(0.00292)	(0.00288)
Less than College Degree (%)	0.994	0.996
	(0.00553)	(0.00548)
Pct Owner Occupied (%)	1.000	1.002
	(0.00429)	(0.00420)
Tenure > 5 years (%)	1.005	0.998
	(0.00616)	(0.00566)
OU count	1.052	0.988
	(0.0337)	(0.0223)
OU Count Squared	0.999	1.000
	(0.000467)	(0.000360)
Removal Action	**1.474*****	**1.260***
	(0.172)	(0.128)
HRS Score	1.002	0.999
	(0.00406)	(0.00397)
PRP Site Dummy	1.186	1.051
	(0.154)	(0.128)
Fed Facility Dummy	0.857	0.848
	(0.181)	(0.178)
cut1 - Constant	0.139***	0.105***
	(0.0674)	(0.0504)
cut2 - Constant	0.151***	0.115***
	(0.0736)	(0.0550)
cut3 - Constant	0.216**	0.163***
	(0.104)	(0.0778)
cut4 - Constant	0.257**	0.194***
	(0.124)	(0.0922)
cut5 - Constant	0.382*	0.291**
	(0.184)	(0.138)
cut6 - Constant	1.285	0.970
	(0.619)	(0.459)
cut7 - Constant	5.700***	4.231**
	(2.758)	(2.010)

Exponentiated coefficients; Standard errors in parentheses
* ***p* < 0.05**, ** ***p* < 0.01**, *** ***p* < 0.001**

Note: chi-squared test indicates that tagdum=1 is significant at the 0.001 level for both Ologit models.

Chapter 8 - Case Study Findings

This section presents a summary of the findings from the multiple case study, or qualitative, portion of the study. Interviews were conducted with community representatives, EPA project managers and TAG technical consultants for each of six Superfund cases selected. The sites are all located in central New York and were awarded a TAG; three were awarded before the ROD was issued and three were awarded after the ROD was issued. Two sites (Sites C and D) had the same TAG group, community representative and EPA project manager since they were nearby properties with many shared community and technical issues.

Four EPA project managers were interviewed; one manager chose not to participate in the interview and one manager covered two sites. Each of the EPA managers had been with EPA and working on Superfund sites for fifteen years or more (in two cases more than 30 years), managed multiple Superfund sites, and managed projects with and without TAG group involvement.

Seven community representatives were interviewed including three representatives for Site F. The community representatives were all female; some were employed and some were retired; one was a tenured professor at a state university; and three were previously very active in community advocacy projects, including a clean drinking water campaign, community recycling efforts, organic farming, peace activities, planning and zoning, and at a nearby State Superfund site.

Through the interview process, it was learned that one of the community members was involved in some fashion at three of the other five sites. Prior to the interviews, I was only aware of her involvement as the community representative for Site E. In my interview with her, she spoke very briefly about other sites, but took much less credit for work on other sites than the

primary community representatives gave her. The background of this advocate is quite impressive. She was actively involved in ensuring that safe drinking water was provided for her community before becoming involved at Site E. She was also heavily involved in NY State Superfund programs and assisted in providing support to numerous communities on environmental issues. Her experience and connection resulted in her becoming a sought-after resource for communities, as well as EPA personnel to assist with community involvement processes at NPL sites. Based on this finding of the importance of network connections, I revisited the quantitative study and incorporated a variable to address the occurrence of a previous, nearby TAG. As discussed in the previous chapter, this relationship was found to have a significant impact, positively affecting the award of a TAG.

Two technical advisors were interviewed; one consultant worked on three sites and the other consultant worked on the other three sites. One technical advisor was associated with a local university and was familiar with one of the community representatives through common task force work and the other advisor worked for a firm that provided environmental consulting services and performed much of their work on Superfund sites.

The interviews were semi-structured, with a pre-determined list of questions that solicited open-ended answers. Follow up questions were asked as needed for clarity or additional details. The interview question decks are included in Appendix A. The results from the interviews were captured and compiled in mind maps. The responses on a question-by-question basis are included in Appendix B (for community representatives), Appendix C (for EPA representatives) and Appendix D (for technical advisors/consultants. The thematic responses to interview questions by community representatives and EPA are summarized in Table 8-1.

Table 8-1
Drivers and Impacts
TAG Awards at Selected NY Superfund Sites

Themes	Site A	Site B		Site C		Site D		Site E		Site F	
	Comm	EPA	Comm	EPA	Comm	EPA	Comm	EPA	Comm	EPA	Comm
BENEFITS											
Empowerment			X		X		X				X
Streamline Process		X						X			X
Educate citizens		X	X					X	X		X
Increase trust		X						X		X	
EPA credibility		X						X		X	
Comm credibility	X	X	X						X		X
Access to EPA	X		X		X		X		X		X
Question options									X	X	
Understand options	X		X		X		X		X	X	
Info from community				X	X	X	X			X	
Info to community	X	X									X
Balance PRPs	X				X		X				X
DRAWBACKS											
Admin burden	X		X		X		X		X		X
City resentment									X		
Comm. resentment					X		X				
Resources limited	X										
Limited recipients				X		X					
Expensive process				X							
OUTCOMES											
Slowed process											
Sped process								X	X	X	X
Impacted remedy	X				X		X		X		X
No impact on remedy		X	X	X		X		X		X	

Many of these responses are consistent with the theoretical bases presented in Section 3.1, regarding democracy (equity and power), resource dependency, network support and others.

8.1 Why do communities pursue a TAG award?

A summary of the reasons that individual community representatives decided to pursue a TAG is presented in Figure 8-1.

The common themes among the responses are a lack of trust in the process and the agency, dissatisfaction with the speed of the process or information flow, opposition to the remedy being proposed and the influence of more powerful players, and the desire for more information and transparency. At one site (Site E), the state agency was being replaced by EPA as the lead agency and the community did not trust EPA to correct the missteps and adequately address community concerns so action was driven by a history of inadequate involvement. At two sites (Sites C and D), there were powerful private parties involved in the process and the community felt that they needed to provide an alternate voice at the table and they needed to "provide a spine to EPA" to stand up to the PRPs.

The understanding that the community needed technical expertise to better understand the massive quantities of technical data was mentioned for every site. This included one site (Site B) where the community representative had significant experience in dealing with similarly complex data from a state Superfund site (where no TAG program was available) and still realized that assistance was needed to assist in making informed decisions.

In addition, every community representative learned about the TAG program from a representative of another site or from EPA introducing them to the TAG process. Even the representative for Site E, who was involved in an assistance role at three of the other five sites, learned about the TAG program from her involvement in a state-wide task force and from a TAG

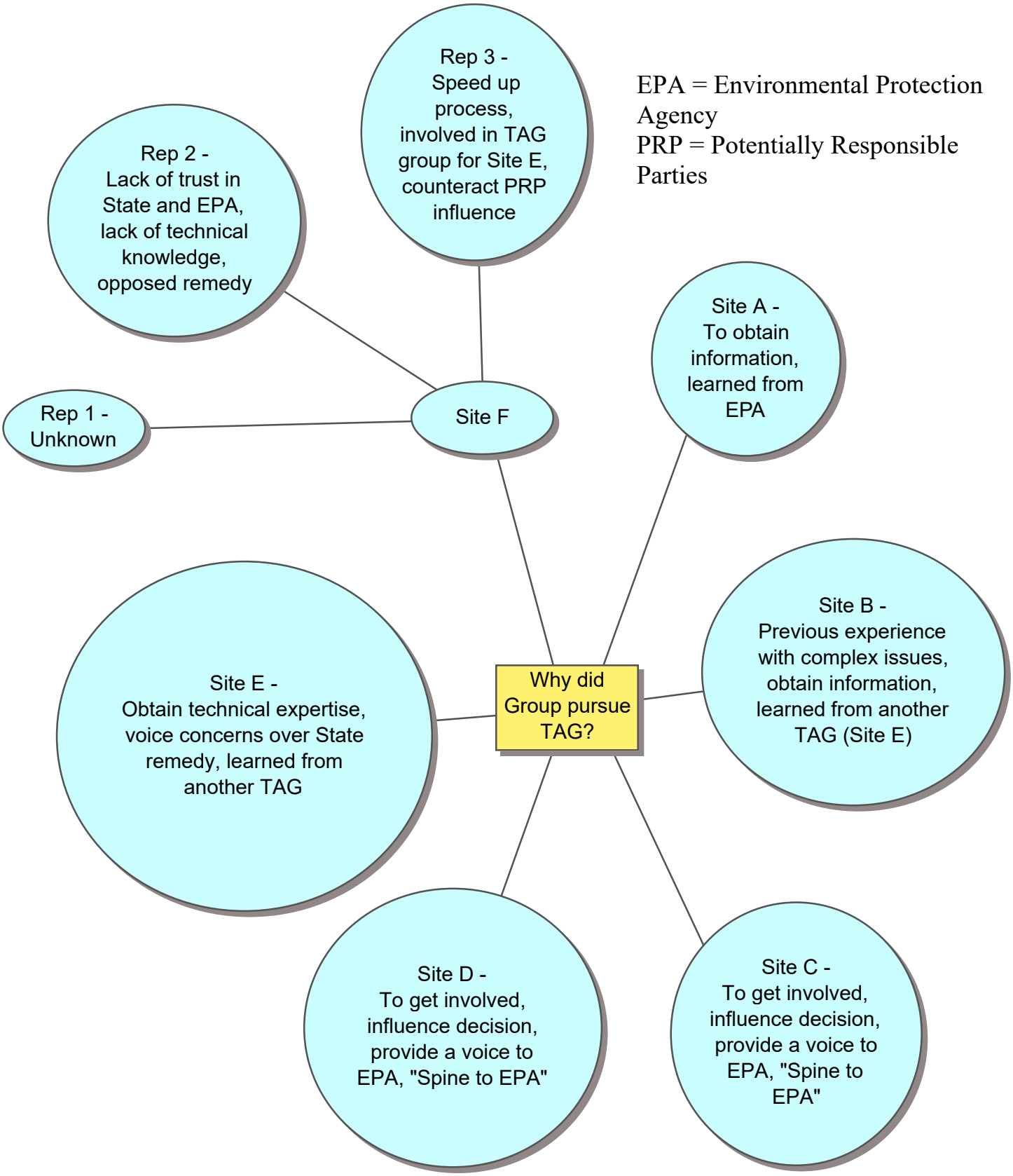


Figure 8-1. Why pursue TAG? Community rep. responses

coordinator for a site that was not a part of this study, underscoring the importance of network connections and support.

Dissatisfaction with the current rate of progress of the process was a stated driver for one site (Site F). This supports the idea that slow progress can encourage mobilization and public participation to address the concern. The community representatives for all but one of the sites (Site A) had previous community advocacy experience and existing social capital to assist them in the process. This ranged from direct NPL site experience to state Superfund site experience to addressing local environmental concerns (drinking water, organic gardening and recycling) to social outreach programs (such as the Salvation Army).

Table 8-2 presents a comparison of the findings from EPA and TAG group interviews on the question of why a community pursues a TAG. There is consistency on the responses and both groups mention trust of the agency, lack of information flow, and an uneasiness with the Superfund process. The community representatives also mention the need to counterbalance PRP influence while the agency identifies agency procedural problems as drivers.

Table 8-2
Why do communities pursue TAGs?

EPA	**Community Group**
Mistrust of state and EPA	Mistrust of state and EPA
Lack of information flow	Lack of information flow
Overall unease with Superfund	Need for technical knowledge
Government procedural problems	Balance PRP influence
	Knew advocate with experience
	Opposed proposed remedy
	Learned about program from others

8.2 How did the TAG process work?

The TAG program does not, overall, embody the ideals of "good participation". It is technocratic, not a designed deliberative, solution to the participation question. A summary of community representative responses on how the TAG application and process work is presented in Figure 8-2.

Overall, community members were frustrated with both the application process and the administrative burdens of the program, which may partially explain why the take-up rate for TAGs is so low (~15%). The availability of a seasoned TAG veteran (the Site E representative) was cited as a positive factor for three of the other five sites.

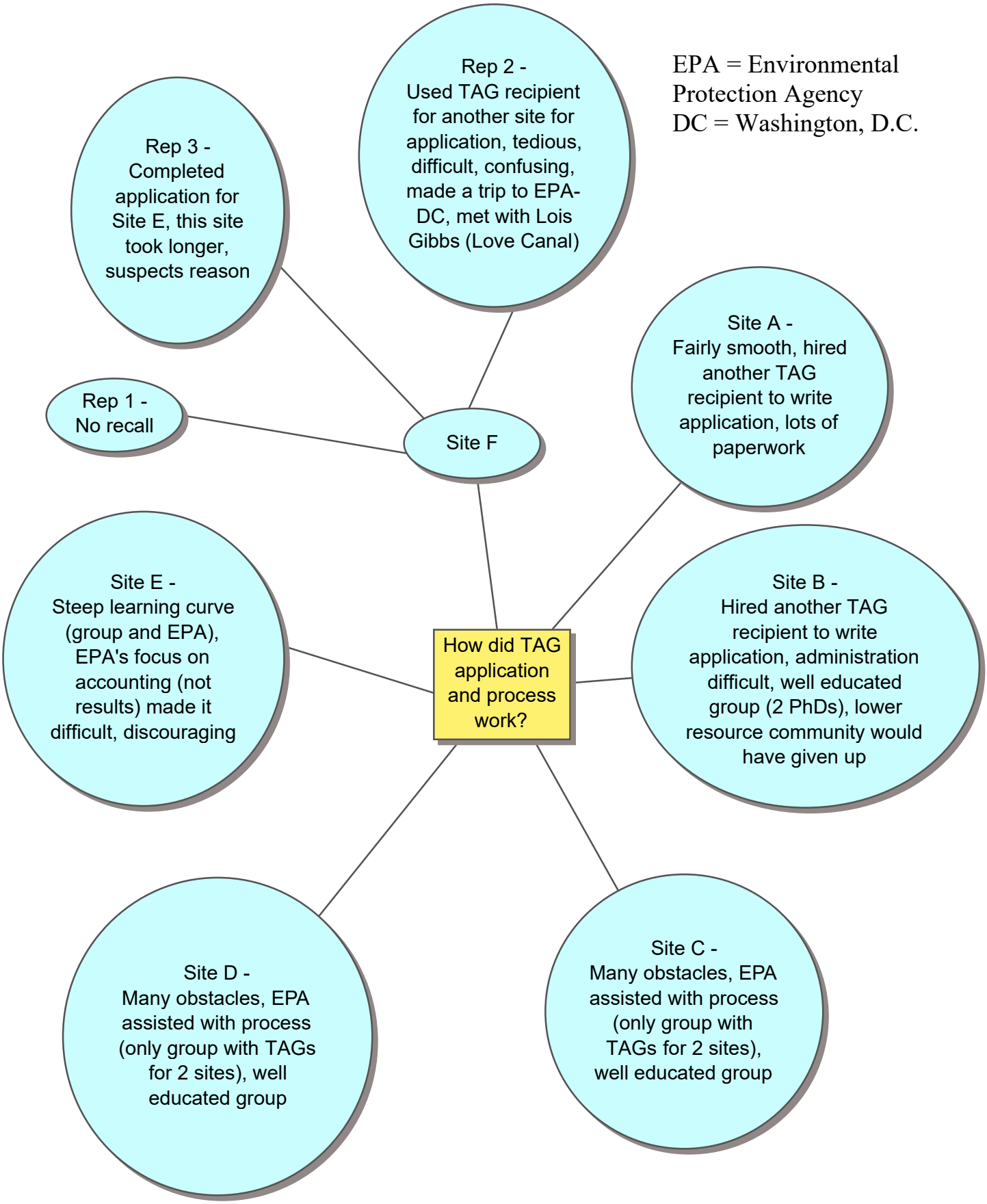


Figure 8-2. How did TAG process work - Community rep responses

While none of the groups stated that they would forego the TAG, they did express concern that a group without access to the resources that they had may not pursue the TAG award. Several groups referenced EPA's assistance in the process as a positive, while others stated dissatisfaction with EPA's focus on accounting, not results. This may be partially explained by the difference in dealing with EPA technical versus accounting personnel, but may also be an indicator of the role of individual EPA project manager support for the program. In addition, at Site F, one of the community representatives expressed the concern that EPA sped up the ROD process to avoid dealing with the TAG consultant prior to issuing the ROD.

The two primary representatives for Site B were university professors with PhDs; the interviewed representative stated that they joked that "it takes a PhD to administer a TAG and they still had to hire someone to write the grant for them." She also stated that she heard anecdotes about groups that gave the grant back after recognizing the administrative burden of the program. Most of the groups met the 10% matching fund requirement by providing "in kind" services, such as photocopying, accounting, or administrative/technical services.

8.3 What are the benefits of the TAG program?

While the TAG process may have been a frustrating one for the communities, interviewees also identified numerous benefits resulting from the TAG award and expressed overall support for the TAG process. A summary of the benefits referenced by the community are presented in Figure 8-3.

RPM = Remedial Project Manager
EPA = Environmental Protection Agency
DEC = Department of Environmental Conservation
PRP = Potentially Responsible Parties

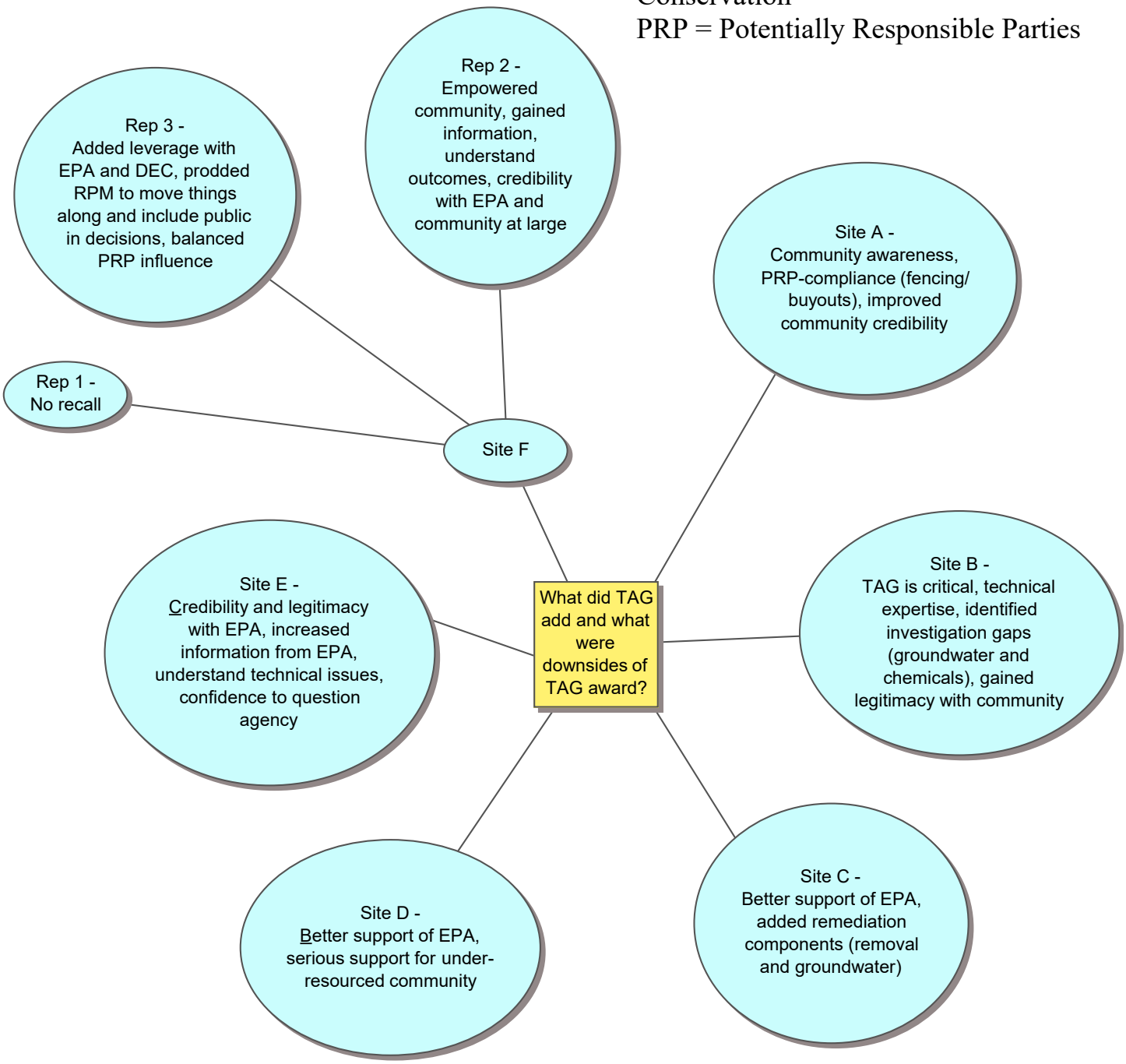


Figure 8-3. What does TAG add? Community rep responses

The findings show that the TAG process empowers and educates citizens, increases the credibility of the community and governmental agency, increases trust in and legitimacy of the agency and the process, gives citizens a voice in the process that matters deeply to them. The problem, as postulated in Chapter 4 and confirmed in the quantitative research, is that the TAG program is an underutilized resource; therefore, many of the potential gains go unrealized because of the barriers.

Table 8-3 presents a comparison of the findings from EPA and TAG group interviews on the question of benefits of the TAG program. Both groups identified added credibility as a benefit. Interestingly, each group focused on their own credibility, not the credibility of the other party or the process in general. EPA and the community also agreed that the TAG increased the flow of information to and from the public, streamlines communication, improves technical understanding, and speeds the schedule by addressing conflict in a constructive manner. Community groups also stressed their input being taken seriously and counterbalancing influence of PRPs. One EPA manager also noted that the TAG improved the remedy selection process.

8.4 What are drawbacks of the TAG program?

There were observed problems or drawbacks with the TAG process as shown in Figure 8-4. The heavy administrative and resource burden of the program was mentioned by most participants. The TAG program requires that the group incorporate and provide 10% matching funding to obtain the TAG. One group (Site F) ran the TAG through the group that formed for another site (Site E) to share resources and spread the administrative burden. One group applied for and received TAGs for two proximally located sites (Sites C and D). The representative stated that her group was the only one that she knew of with two TAGs.

Table 8-3
What are the benefits of TAGs?

EPA	**Community Group**
Credibility for EPA	Credibility of TAG group
Citizen confidence in the process	Community input taken seriously
Increased info to and from public	Technical info to public
Coalesce the community	Means to inform EPA
Streamlines communication	Streamlines communication
Speeds up schedule	Speeds up schedule
Strengthens community voice	Balance PRP power/influence
Improves technical understanding	Improves technical understanding
Strengthened remedy selection	Provides access to EPA

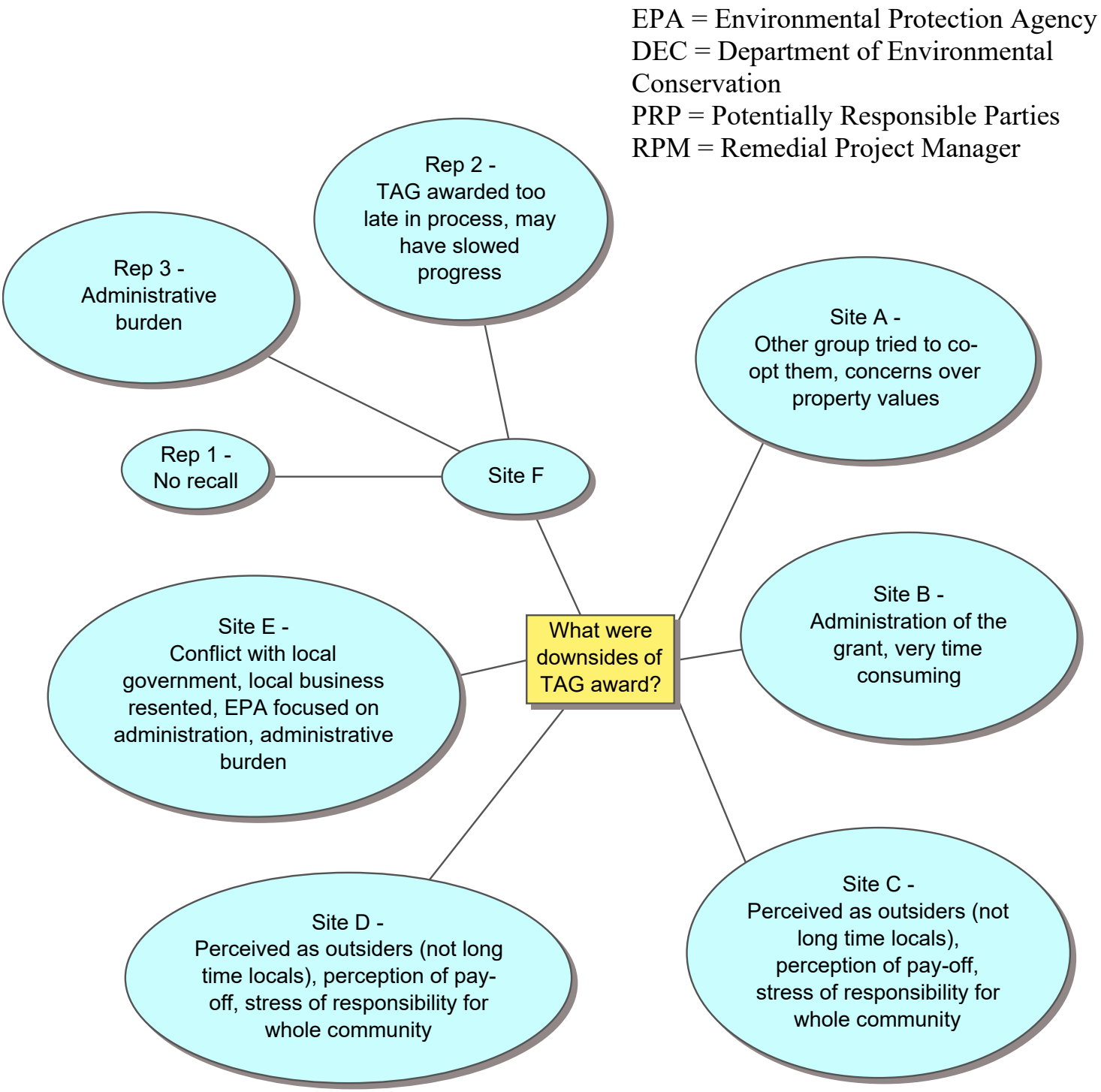


Figure 8-4. What were downsides of TAG? Community rep responses

There were several interesting consequences that were revealed. One participant mentioned the attempt by another environmental (an anti-nuclear group) to co-opt the TAG group once they found about its existence. Other group representatives spoke of resentment from the community that the TAG group was given access to the process and other citizens felt that group members "got a payoff" to go along with the agency. Other resentment from both the local community and local government focused on the potential impact that aggressive community involvement would have on the industrial and business community, either through "attacks" on major employers or through an overall community stigma resulting from publicizing the presence of an NPL site.

Table 8-4 presents a comparison of the findings from EPA and TAG group interviews on the question of the drawbacks of the TAG program. Again, most parties agreed that the program comes with significant administrative burdens and that the bureaucracy of the program (or accountability) tends to focus on resource utilization instead of process improvement or outcomes. One EPA manager, who worked on two sites in the study, was a bit skeptical of the TAG program and its implementation at the sites that they managed. The manager felt that the TAG group was very limited and was not representative of the community and that the cost of the TAG program was high to please such a small contingent of the population. These sites were in a community where the major PRP was also one of the largest employers in the area and many citizens were reluctant to get involved in the process, so the community representative felt the TAG group gave voice to the public that would not have otherwise been heard. Interestingly, her assessment of the success of the TAG process at the two sites (very beneficial) was in contrast to the EPA manager's assessment (too expense and focused on too narrow a group of citizens).

Table 8- 4
What are the drawbacks of a TAG?

EPA	**Community Group**
Administrative burden for citizens	Administrative burden
Limited community resources	Cost sharing requirements
Inefficient process	Community and government resentment
Limited audience of impact	Burden of responsibility
	Attempting co-opting from other causes

8.5 How does TAG award impact schedule and remedy selection?

Several questions were fashioned to elicit input regarding the impact of the TAG award on schedule and remedy. I attempt to identify impacts to the process schedule separately from the schedule for implementation of the selected remedy. These questions were difficult for many of the community representatives to answer, since they had limited, or no, involvement at other NPL sites and no real basis for comparison.

Community responses to the impact of the TAG on schedule issues are presented in Figure 8-5.

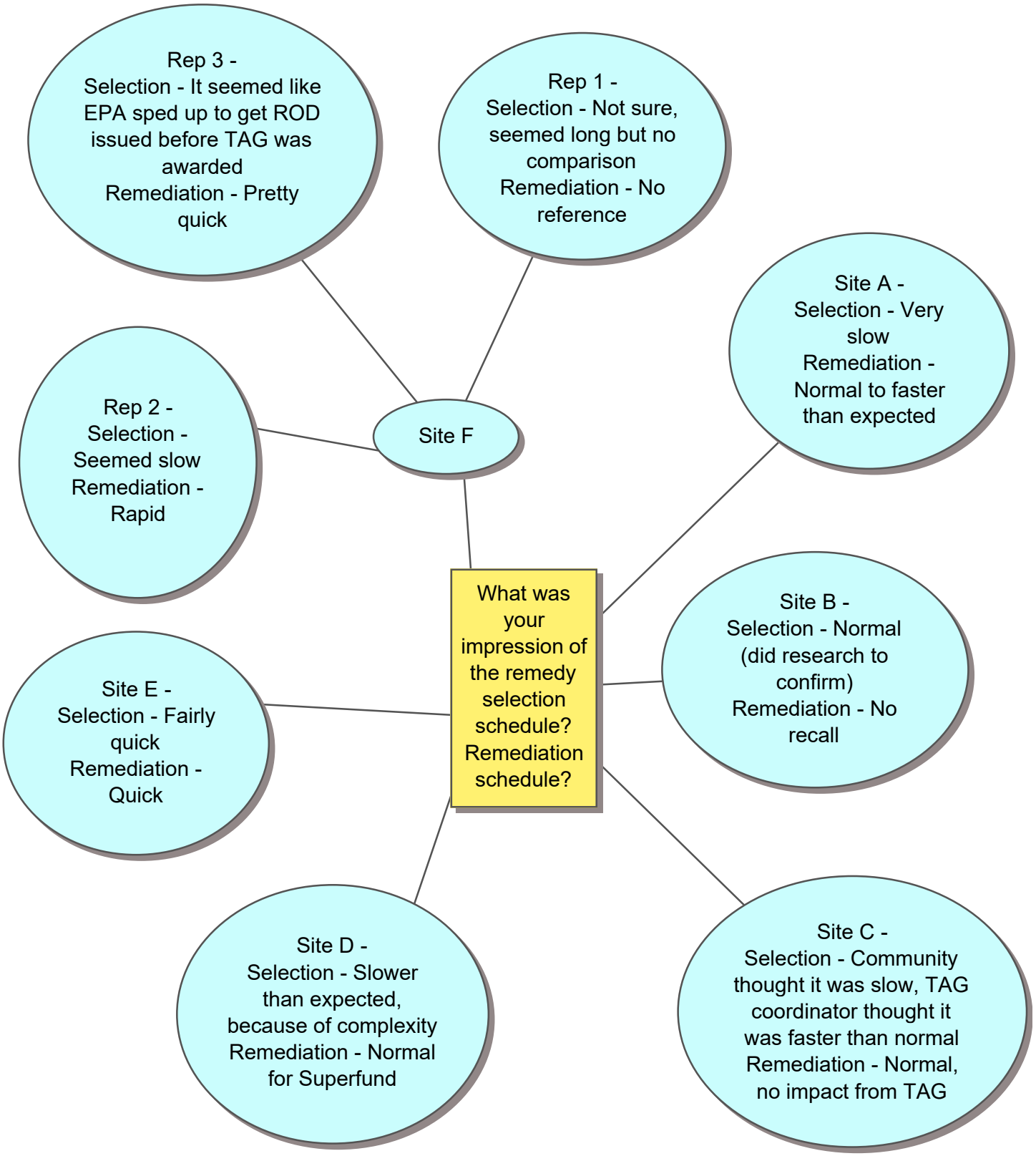


Figure 8-5. What was impact of TAG on schedule? Community rep responses

While many respondents stated the TAG group streamlined the process, many perceived the remedy selection schedule to be normal, but again had a limited frame of reference. One of the representative for Site F felt that the remedy selection process went very quickly. This TAG application process was underway during the selection time-period and was awarded after the ROD. The representative expressed concern that the ROD was "sped up" to complete it before the TAG was awarded. As it turns out, the remedy was changed after the ROD was issued from incineration to a more palatable remedy (low temperature thermal desorption).

Table 8-5 presents a comparison of the findings from EPA and TAG group interviews on the question of the schedule impacts of the TAG program.

Table 8- 5
What were the impacts of the TAG on remedy and schedule?

EPA	**Community Group**
Some observed no schedule impact	No perceived schedule impact
Some saw a streamlining	"It felt streamlined"
No impact of remedy	Perceived impact on remedy
Collaboration improved	Dependent on: EPA manager Timing of TAG award
Acceptance increased	

The differences between EPA and community respondents illustrates the importance of perspective and the operational lens through which one views the process. Most EPA managers,

who had experience at many non-TAG sites for comparison, observed no impact on the selection (ROD) or implementation schedules, although one manager did mention that the TAG streamlined the process. While there may not have been schedule impacts, EPA managers still recognized that the TAG (and resulting improvement in communication) resulted in better conflict resolution processes. EPA managers, who are shaped by professionalism and technical expertise, felt that the TAG had *no effect* on the remedy chosen. They took inputs of information, processed the data, and made the selection of the proper response action. The responses are like the "decide, inform and convince" model of decision-making. The role of the TAG was to create a more knowledgeable public, get the but-in and support from a neutral third party (the technical advisor), manage the conflict process and keep the program moving forward.

The community groups were convinced that the TAG resulted in a better remedy, either by changing the remedy, providing a "spine" to EPA, or being a watchdog on the system. While trust may have been improved in the process, it was not full confidence in the agency to act in the best interest of the community. At the site mentioned above, where the TAG was awarded after the ROD and the remedy was subsequently changes, views on the driver for that change differed by respondent. The EPA manager stated that EPA made the decision based on new technical information and convinced the community that the change was the right thing to do. One community representative felt that the community pressured EPA to make the change and one community representative felt that the PRPs forced the change because of significant cost savings.

8.6 Other observations

EPA managers, community representatives and TAG technical consultants all offered insights into the TAG process that were general in nature and not a response to a specific question from the interview deck.

The EPA manager for Sites C and D stated that they were involved in numerous sites without TAGs where the community provided meaningful information and insight and could impact the Superfund process and did not see that the TAG program added much to the process. These two sites (Sites C and D) had a strong PRP presence and a limited number of community members that were involved in the TAG and Superfund process.

The three sites where the community representative from Site E supported their efforts in the TAG program all highlighted the importance of a strong support system to navigate the process and attain success. Other observations from community members included a feeling of being an "outsider" in the community, which is contrary to the findings of community and social capital building expressed at other sites. Many of the community members stated that the bureaucracy of the program would limit participation by many communities without educational resources and assets to participate. One community member who was familiar with the operations at multiple states mentioned the importance of a strong EPA manager to successful inclusion of the community in the process.

The technical consultants also provided interesting insights into the process. The consultant for Site B, C, and D was a professional environmental consultant with broad Superfund experience, with and without TAGs. He observed that community members were going to participate regardless of the TAG program, and once they were committed they went out and found funding. While a TAG did not impact the quantity of communities that would

participate in the process, it absolutely impacted the quality of participation. He also noted several key aspects in the process, as follows:

- Site setting (rural, urban/ suburban);
- The interactions between the PRP group and the community;
- The importance of trust building to success;
- The TAG increases community acceptance of the chosen remedy;
- Third-party technical review does impact the quality of investigation and remedy selection at a site;
- The TAG increases overall community awareness and knowledge, not just among active group members; and
- While $50,000 per site sounds like a lot, there is a lot of work performed by the consultant and they must learn to be efficient to provide true value.

The consultant for Site A, E, and F was a university professor with technical knowledge and insight into Superfund, but was not a full-time environmental consultant. He reiterated that a TAG was not necessary for community involvement and he served in similar roles on sites with no TAG. He also stated that in some ways the TAG created friction that increased the level of effort to maintain a cohesive community.

Chapter 9 – Conclusions and Synthesis of Findings

This research was performed to investigate the performance of public participation in highly technical policy scenarios and the outcomes of this participation. A detailed evaluation of community involvement at Superfund sites, a specific type of complex, highly-technical policy problem, was performed using a mixed methods approach, incorporating a quantitative econometric evaluation and qualitative multiple case study of selected Superfund sites. Public participation within the Superfund program was evaluated via a detailed study of the Superfund Technical Assistance Grant (TAG) program.

The existing literature on public participation presents that citizen involvement, while not without its potential drawbacks, is central to democratic decision-making and is an important part of the policy process. This study was rooted in a series of research questions about public participation in technical settings. These questions addressed the attributes of successful participation, the characteristics of technical policy issues that could lead to gaps in successful participation, the expected impact of the Superfund TAG program in addressing these gaps, and questions about the specific impacts of the TAG program at Superfund sites on outcomes (schedule, remedy selected, and community perceptions and satisfaction with the outcomes).

The research began with a summary of the Superfund program and public participation since the program's inception in 1980 (Chapter 2), a detailed review of literature on public participation theory and previous research on public participation (Chapter 3), and the development of expectations about participation in complex, technical policy settings (Chapter 4).

Chapters 5 through 7 presented the research framework and the detailed procedures for performance of the quantitative and qualitative studies. Chapters 7 and 8 present the results of

qualitative analysis and quantitative evaluation, respectively, of the research questions. The quantitative evaluation provides more definitive answers to environmental outcome based questions with measurable results, while the qualitative assessment provides more detailed understanding of the "why and how questions" and addresses topics of process outcomes and community satisfaction and gains beyond the environmental outcomes. Previous public participation research and theory have identified the importance of the process gains in community and capacity building as well the enlargement of democracy.

Table 9-1 presents a summary of the integrated findings from the two major parts of the study. There is strong agreement between the quantitative and qualitative studies, with the biggest difference being the perception by community leaders that the TAG impacted the remedy chosen. This finding from the case studies was not born out in the quantitative evaluation, which showed no differences in remedies for TAG and non-TAG sites. This finding of no impact on remedy was also consistent with the EPA project managers' perception from the case studies.

The case studies added significant insight into the reasons for and results of TAG award based on factors that were not measurable in the quantitative data set (such as trust, experience and relationships of community advocates, desires to change the remedy, and previous activity of the community at the site). The case studies also added knowledge about outcomes; the capacity building within the community, the credibility gains for EPA and the community, and the increased acceptance of the agency decisions.

The Superfund program is a highly technical and complex policy arena. It has the hallmark characteristics identified in Section 4.1 – technical complexity, expensive solutions to the problems, public involvement is expensive, the process is slow, and the technical parties typically have better access to information than does the public. The TAG program is

Table 9-1
Integrated Summary of Findings

	Quantitative Study	Qualitative Study
Community Attributes Driving TAG		# of #, indicates how many cases met criterion
Resources/assets	Home value (+) Income (-)	Rural/urban/suburban and mostly middle- to working-class
Education	Some college (-)	Sites were varied, education < mean value Community leader typically well educated
Tenure/social capital	> 5 years (+)	Stable, long-tenured neighborhoods
PRP present	Yes (+)	6 of 6 sites
Site complexity	Operable Units (+) Removal (+)	5/6 sites complex (groundwater, innovative remedies)
Previous advocacy of leader	NM	5 of 6 sites
Community already active at site	NM	6 of 6 sites
Slow ROD process	DS to ROD duration (?)	3 of 6 sites
Gain technical knowledge	NM	6 of 6 sites
Influence decision, concerns over remedy	NM	3 of 6 sites
Mistrust of agency	NM	4 of 6 sites
Nearby TAG (awareness)	Nearby TAG	6 of 6 sites
Schedule Impact of TAG		
Overall	TAG before ROD (slower but not significant) TAG after ROD (faster but not significant)	One site closed – consistent with national averages
Discovery to ROD	TAG before ROD (-)	TAG before ROD (2 of 3 sites slower)
ROD to closure	TAG before ROD (faster but not significant) TAG after ROD (faster but not significant)	One site closed – consistent with national averages
Remedy Impact of TAG		
Impact on remedy selected	Not significant	3 of 6 sites, community perceived that TAG impacted remedy selection. EPA stated no impact
Community Gains		
Capacity	NM	Yes
Technical knowledge	NM	Yes
Trust and credibility	NM	Yes
Voice and meaningful input	NM	Yes
Balance to Power	NM	Yes

Notes:
+ = statistically significant positive impact
- = statistically significant negative impact
? = not statistically significant
NM = not measure in quantitative study

specifically designed to improve the participation process at Superfund sites. The case studies provided support for the expectations presented in Chapter 4 – expectations about barriers to public participation in complex, technical settings and expectations about the ability of the TAG program to address some of the participation gaps.

It was expected that the presence of a TAG would alleviate problems with trust, credibility, communications, differences in power in the decision-making process, and overall satisfaction with the participation process. These hypotheses were supported by the findings of the qualitative case study research. A problem is that only a small fraction (about 15%) of communities near Superfund sites actually apply for and are awarded a TAG. The case study interviews support the idea that this is a result of the financial and administrative burdens that make a TAG infeasible or undesirable for many communities. This study has highlighted the complexity of the Superfund process, the many factors that influence the schedule and remediation decisions at these sites and the many facets of community involvement.

The following sections describe a number of findings from the study that can improve public participation in complex policy decisions. The extrapolation from the TAG program to other technical policy areas is an important and valid application. The findings are rooted in the complexity of the policy issue are more widely applicable to complex, technical problems beyond Superfund and the TAG program.

9.1 The Importance of a Technical Advisor and Communication

A number of interrelated findings are based on the availability and selection of a trusted, independent technical advisor. The advisors improved the ability of the agency to communicate with the public and vice versa, serving as both an advocate for the community and an intermediary with the ability to interpret technical information and translate community

preferences into the technical language of the agency representatives. This also served to increase trust and credibility on both sides of the decision-making. The technical representatives were also unbiased (or even biased toward the community views) increasing the public trust in the process. The consultants also provided an interpretation of technical results in a manner that non-technical community members could understand, removing potential power imbalances and "leveling the field" for community involvement in decision-making. They were also able to present community views in a way that was more readily incorporated into the process.

9.2 The Importance of Networks

The case studies identified the importance of established networks of support and resource provision. Each of the TAG groups relied heavily on a "mentor" in the process to identify the program and assist in navigation of the complexities and bureaucracy of applying for and properly using a TAG. This also highlights the opportunity for government agencies to assist in establishing the infrastructure for such resource networks and building the capacity of citizens to participate and add to the process. Such programs could increase the availability of resources for community involvement and the knowledgebase of available methods and actors to assist in the process.

9.3 The Importance of the Citizen Advocate

The case studies also underscore the importance of previous community advocacy for public participation in environmental policy decisions. All but one of the community leaders had a strong track record of community involvement prior to pursuing the TAG. The one member that did not have such experience relied heavily on another TAG leader to work through the

process. This finding supports the previous concept of the importance of a support network for community involvement in technical issues.

A key question for public administration is how to cultivate this behavior and support the growth and development of community leaders. Strong movements require strong leaders, and as, EPA representatives stated, the process was streamlined through the informed and reasoned action of a knowledgeable public.

9.4 Capacity Building within Public Administration

This research demonstrated that a capable and experienced public administrator provides support, process structure, and enhances the opportunities for successful public participation. The importance of a strong EPA manager was a constant thread throughout the interview process. A strong and supportive manager made the TAG process meaningful, productive and successful. The communities that referenced capable and experienced project managers also mentioned that as a reason for satisfaction with the process and one of the keys to success.

While the motivation of an individual manager is important to support and enhance public participation, sustainable improvements in the citizen involvement process require organizational support. Individual managers can change jobs, be moved to other projects, or lack the stamina to continue as the catalyst for public participation efforts. Organizational support and programs, such as resource provision, managerial incentives, and public participation training, can increase the likelihood that managers support public participation. This level of organizational support can also signal the importance of citizen involvement to managers that are not predisposed to encourage participation.

EPA has community engagement personnel (Community Involvement Coordinators) who are active in the planning of the public participation programs, and provide support and guidance to the manager. This is one of the provisions of the TAG program to enhance public participation at Superfund sites. Additional training and support to agency project managers, who are the personnel most likely to interact with the public on a frequent basis, is also expected to improve participatory programs. Public managers, who are often technically trained scientists, will benefit from training in the skills in negotiation, conflict resolution, collaboration and facilitation, as well as the temperament to "govern with instead of governing over" (L. Bingham, O'Leary, & Nabatchi, 2005).

9.5 Areas for further research

There are a number of questions that were raised during this study that could benefit from additional research. First, the case study research included only Superfund sites where a TAG had been awarded. Expanding the case studies to include sites that did not receive a TAG would provide useful information on the reasons why communities did not pursue and obtain a TAG.

Second, additional information from the community could be obtained by expanding the interviews to include community members that were not active members of the TAG group. The interviews included only community members who were leaders in the TAG group, introducing potential bias to the case study findings.

Third, the interview program could be expanded to include additional personnel involved in the process. This could include additional EPA personnel (the CIC), members of the PRP community, and state and local government officials. This information would provide additional perspectives on process outcomes.

Fourth, the case studies could be expanded to additional geographic areas. This would provide information about the potential regional, cultural or political differences. It would also provide the opportunity to assess EPA regional and state regulatory differences.

Finally, the research program could be expanded to investigates a different highly technical problem area. This would provide information to confirm (or refute) the findings herein that relate to the extrapolation of the findings. It is also likely that the study of another policy area will identify additional areas for improvement of the public participation process.

Appendix A
Interview Questionnaires
TAG Case Study

Appendix A-1
Interview Questionnaires
Community Representatives

C. **Community Group Representative**

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1. How familiar were you with the Superfund process before you got involved at this site?
2. Are you active in community involvement at other Superfund sites? Other environmental sites? Other community advocacy projects?
3. How long have you been representing the community for this site?
4. At what stage of the Superfund process did you get involved in the site?
5. Based on your familiarity with the historical aspects of the site, is there anyone else that I should talk to in the community group regarding earlier time periods?
6. Are you familiar with the Technical Assistance to Support Communities (TASC) program?
7. Have you ever utilized this program?
8. If so, what were the results?

TAG Process (for the Site)

9. Who are the stakeholders in the process at this site?
10. What were the community involvement activities at the site prior to the TAG award?
11. When in the process did your group become involved?
12. What group received the TAG for this site?
13. Besides the group that holds the TAG, are there other citizens involved in the process?
14. Why did the group decide to obtain a TAG?
15. How did the TAG application and award process work?
16. Tell me about the impact that you feel the TAG award has had at this site.
    - What do you feel that the TAG adds at a site?
    - Are there any downsides that you see resulting from TAG award?

Remedy Selection Process and Project Schedule

17. I understand the Superfund remedy decision process well but I am interested in the specifics of the remedy selection process for this site.
    - Who was involved in decision/negotiation process?
    - Was there conflict surrounding the ROD? Lawsuits? ROD amendments?

18. If there were changes to the remedy (such as a ROD amendment), what was the relative importance of the following in the decision to change the remedy? Use the following scale to rate impact.

    1- No impact 2- Little impact 3- Not sure
    4- Moderate impact 5- Significant impact

    - New technical information
        a. About new remedies available
        b. About site problems
        c. About site risks
        d. Public perception or involvement (TAG)
    - Private party involvement
    - Institutional precedent
    - Other

19. What is your impression of the schedule for the remedy selection process for the site?
20. What is your impression of the schedule for remediation for the site?
21. Is there anything else that you feel I should know about the remedy selection at this site?

Interaction between TAG and Remedy Selection

I am going ask questions now regarding the interaction between the TAG award and remedy selection. The first question relates to the process and subsequent questions relate to the specific outcomes.

22. What is your impression of the impact of the TAG award on the remedy selection process for this site?
23. How did the TAG award influence the actual chosen remedy?
24. If there was a remedy change, was the revised remedy technically better?
25. Is the remedy more complex than it would have otherwise been as a result of the TAG award?
26. If so, did the technical issues merit this more complex remedy? Was the more complex remedy driven by public acceptance of the remedy?

Interactions between Community Involvement Programs

27. Are there other community involvement programs that are applicable to this site (DOE, DOD, State)?
28. If so, have you worked within any of those programs?
29. Did the additional programs require more work on your part?
30. Do the programs work well together?

Appendix A-2
Interview Questionnaires
EPA Representatives

A. **Regulatory Project Manager (State and Federal)**.

This individual is the agency representative that is currently managing the activities at the case site. This individual (or potentially a predecessor) should be the most familiar with the technical details at the site. The goal of interviewing this person is to obtain insight into the interaction between TAG award and the remedy selection process and the implementation process. This individual will hopefully have insight into both the technical aspects of remedy selection and implementation and the role of public participation attributable to TAG award.

Project Manager Background

1. How long have you been with the agency?
2. How many Superfund projects do you manage?
3. At a typical site, tell me about your interactions with community involvement coordinator?
4. Your involvement with the community?
5. What percentage of your sites is awarded TAGs?

Site Background

6. How long have you been the project manager at this site?
7. At what stage of the Superfund process did you get involved in the site?
8. Based on your familiarity with the historical aspects of the site, is there anyone else that I should talk to at the agency regarding earlier time periods?

TAG Process (for the Site)

9. Who are the stakeholders in the process at this site?
10. Were there any community involvement activities at the site prior to the TAG award?
11. What group received the TAG for this site?
12. Do you know how the group has utilized the grant funds? If so, how?
13. Besides the group that holds the TAG, are there other citizens involved in the process? Is this typical for your sites?
14. Did the award of the TAG to one group change the way that other groups interacted?
15. Did you notice any change in the level of the group's knowledge of the technical issues after the TAG award?
16. Tell about the impact that you feel the TAG award has had at this site.
    - What do you feel that the TAG adds at a site?
    - Are there any downsides that you see resulting from TAG award?

Remedy Selection Process and Project Schedule

17. I understand the Superfund remedy decision process well but I am interested in the specifics of the remedy selection process for this site.
    - Who was involved in decision/negotiation process?
    - Was there conflict surrounding the ROD? Lawsuits? ROD amendments?
18. If there were changes to the remedy (such as a ROD amendment), what was the relative importance of the following in the decision to change the remedy?

    1 – No Impact **2 – Little Impact** **3 – Not Sure**
    4 – Moderate Impact **5 – Significant Impact**

    - New technical information
        a. About new remedies available
        b. About site problems
        c. About site risks
    - Public perception or involvement (TAG)
    - Private party involvement
    - Institutional precedent
    - Other
19. What is your impression of the schedule for the remedy selection process for this site? How does this compare with other sites with TAGs? Sites without TAGs?
20. What is your impression of the schedule for remediation for the site? How does it compare to other sites with TAGs? Sites without TAGs?
21. Is there anything else that you feel I should know about the remedy selection at this site?

Interaction between TAG and Remedy Selection

I am going ask questions now regarding the interaction between the TAG award and remedy selection. The first question relates to the process and subsequent questions relate to the specific outcomes.

22. What is your impression of the impact of the TAG award on the remedy selection process for this site?
23. How did the TAG award influence the actual chosen remedy?
24. If there was a remedy change, was the revised remedy technically better?
25. Is the remedy more complex than it would have otherwise been as a result of the TAG award?

26. If so, did the technical issues merit this more complex remedy? Was the more complex remedy driven by public acceptance of the remedy?

Interactions between Community Involvement Programs

27. Are there other community involvement programs that are applicable to this site (DOE, DOD, State)?
28. If there are other programs, which program took precedence?
29. Are the programs collaborative in nature or is there a different method in complying with each?

Appendix A-3
Interview Questionnaires
TAG Consultant Representatives

E. Technical Assistance Grant Consultant

This individual is the representative from the firm that was hired by the community group to serve as a technical advisor. This individual should be able to identify technical issues that were most problematic at the site for the layperson and identify areas in which the TAG award had the most impact.

Consultant Background

1. How long have you been performing technical activities at Superfund sites? Tell me about your typical project. Who is your client and what is your role?
2. How many Superfund projects have you worked on? What percentage of your work is Superfund related?
3. How many TAG grants have you worked under? Which ones?
4. At the typical site with a TAG, tell me about your involvement with the EPA RPM?
5. At the typical site without a TAG, tell me about your involvement with the community advocacy leader?

Site Background

6. How long were you involved at this site?
7. At what stage of the Superfund process did you get involved in the site?
8. Based on your familiarity with the historical aspects of the site, is there anyone else that I should talk to regarding earlier time periods?

TAG Process (for the Site)

9. Besides the group that holds the TAG, were there other citizens involved in the Superfund process?
10. Did you notice any change in the level of the group's knowledge of the technical issues after the TAG award?
11. Tell about the impact that you feel the TAG award has had at this site.
    - What do you feel that the TAG adds at a site?
    - Are there any downsides that you see resulting from TAG award?

Remedy Selection Process and Project Schedule

12. I understand the Superfund remedy decision process well but I am interested in the specifics of the remedy selection process for this site.
    - What role did you have in decision/negotiation process?
    - Was there conflict surrounding the ROD? Lawsuits? ROD amendments?
13. If there were changes to the remedy (such as a ROD amendment), what was the relative importance of the following in the decision to change the remedy?

    1 – No Impact **2 – Little Impact** **3 – Not Sure**
    4 – Moderate Impact **5 – Significant Impact**

- New technical information
    a. About new remedies available
    b. About site problems
    c. About site risks
- Public perception or involvement (TAG)
- Private party involvement
- Institutional precedent
- Other

14. What is your impression of the schedule for the remedy selection process for this site? How does this compare with other sites with TAGs? Sites without TAGs?
15. What is your impression of the schedule for remediation for the site? How does it compare to other sites with TAGs? Sites without TAGs?
16. Is there anything else that you feel I should know about the remedy selection at this site?

Interaction between TAG and Remedy Selection

I am going ask questions now regarding the interaction between the TAG award and remedy selection. The first question relates to the process and subsequent questions relate to the specific outcomes.

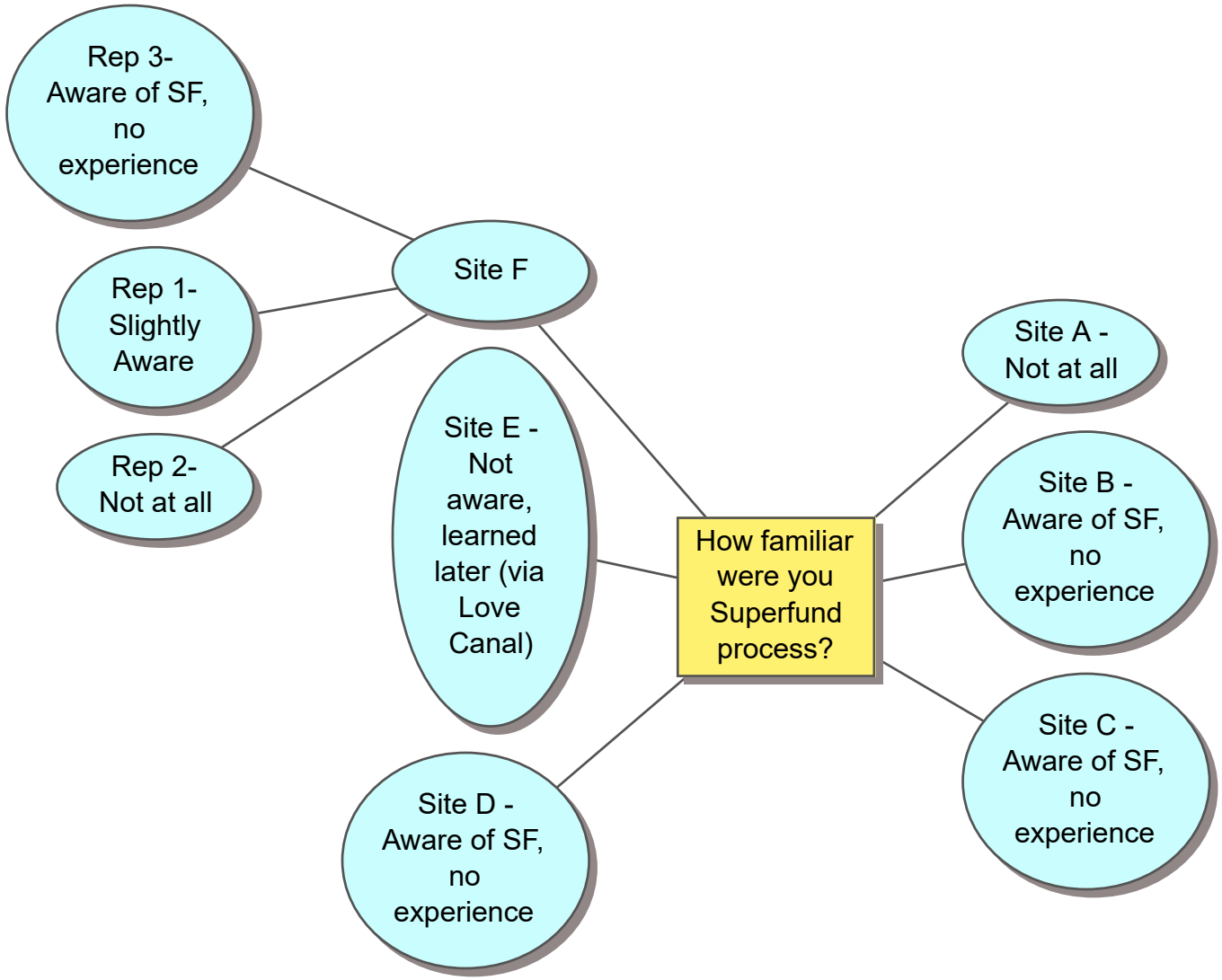
17. What is your impression of the impact of the TAG award on the remedy selection process for this site?
18. How did the TAG award influence the actual chosen remedy?
19. If there was a remedy change, was the revised remedy technically better?
20. Is the remedy more complex than it would have otherwise been as a result of the TAG award?
21. If so, did the technical issues merit this more complex remedy? Was the more complex remedy driven by public acceptance of the remedy?

Interactions between Community Involvement Programs

22. Are there other community involvement programs that are applicable to this site (DOE, DOD, State)?
23. If there are other programs, which program took precedence?
24. Are the programs collaborative in nature or is there a different method in complying with each?

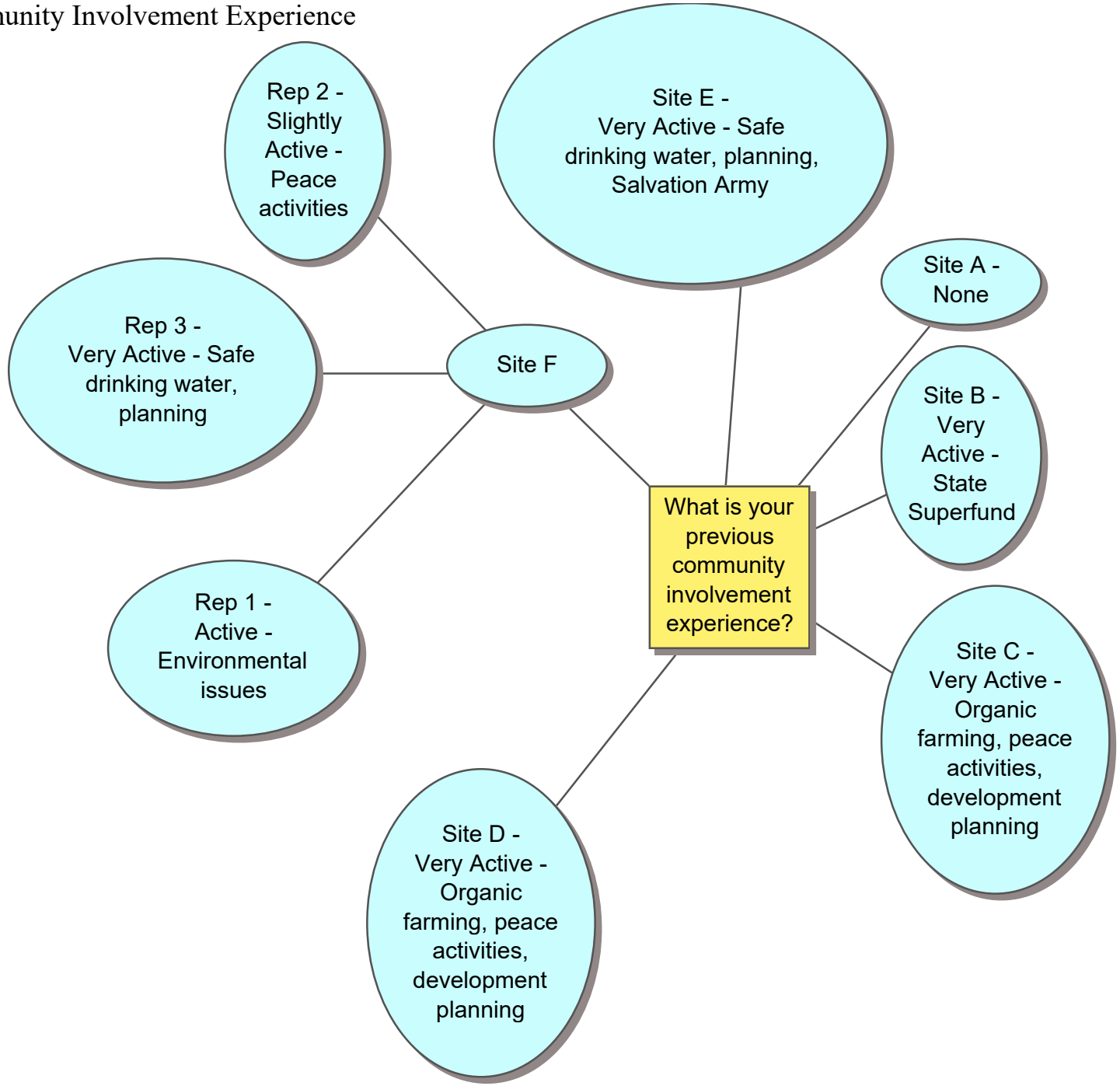
Appendix B
Interview Responses
Community
Representatives

Question 1 - Comm Rep
Superfund Awareness

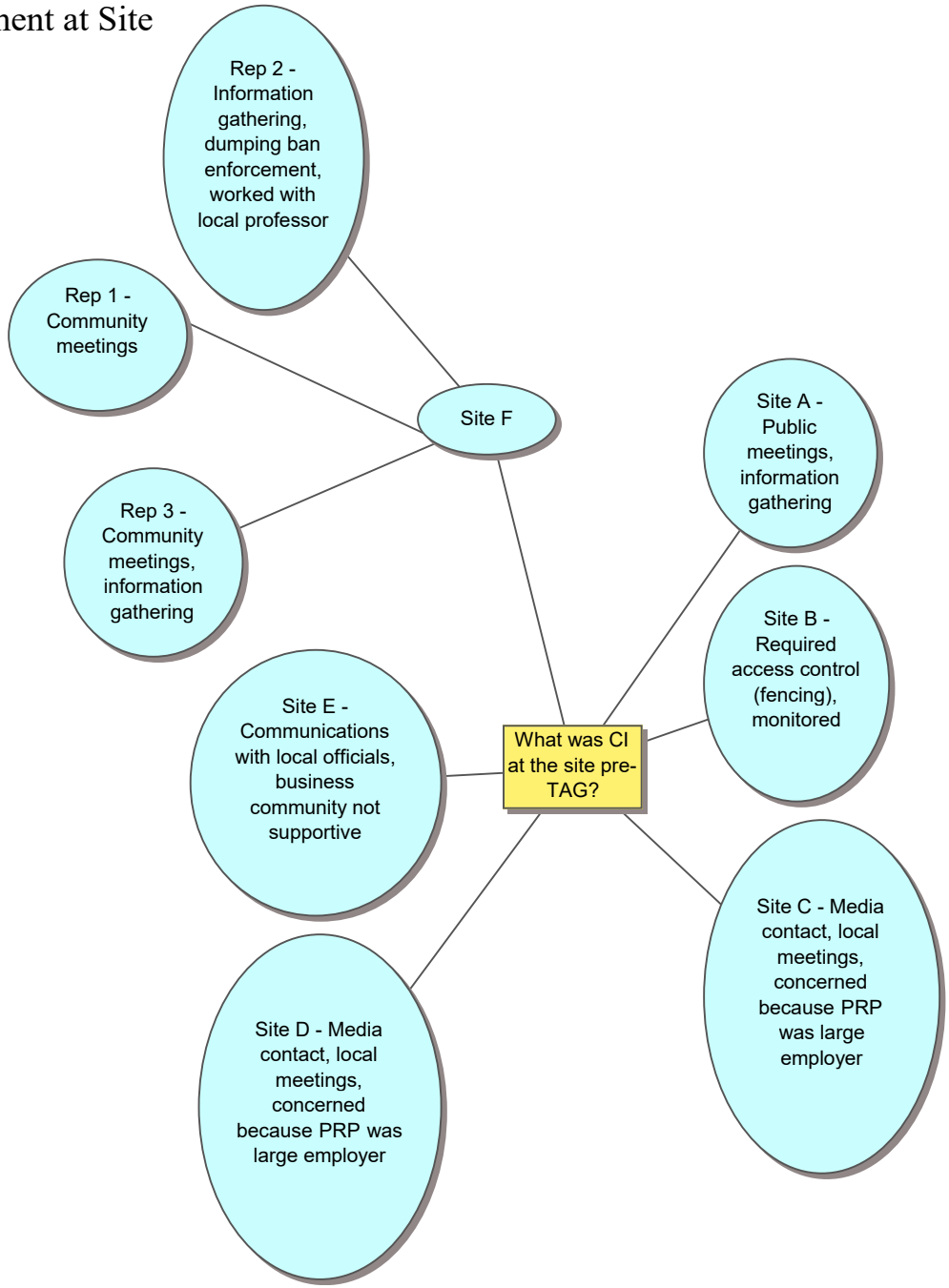


SF = Superfund

Question 2 - Comm Rep
Previous Community Involvement Experience

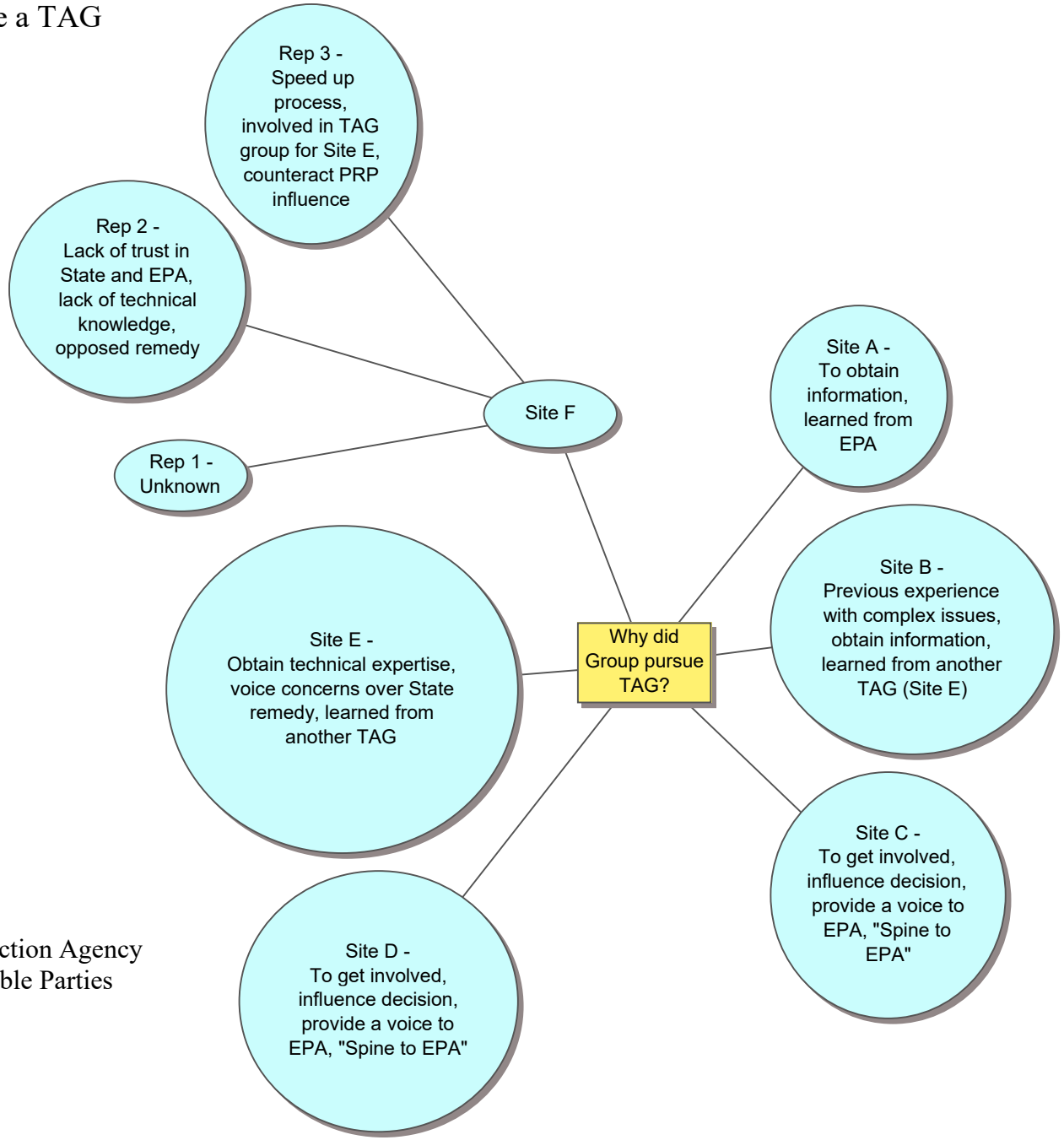


Question 10 - Comm Rep
Previous Community Involvement at Site



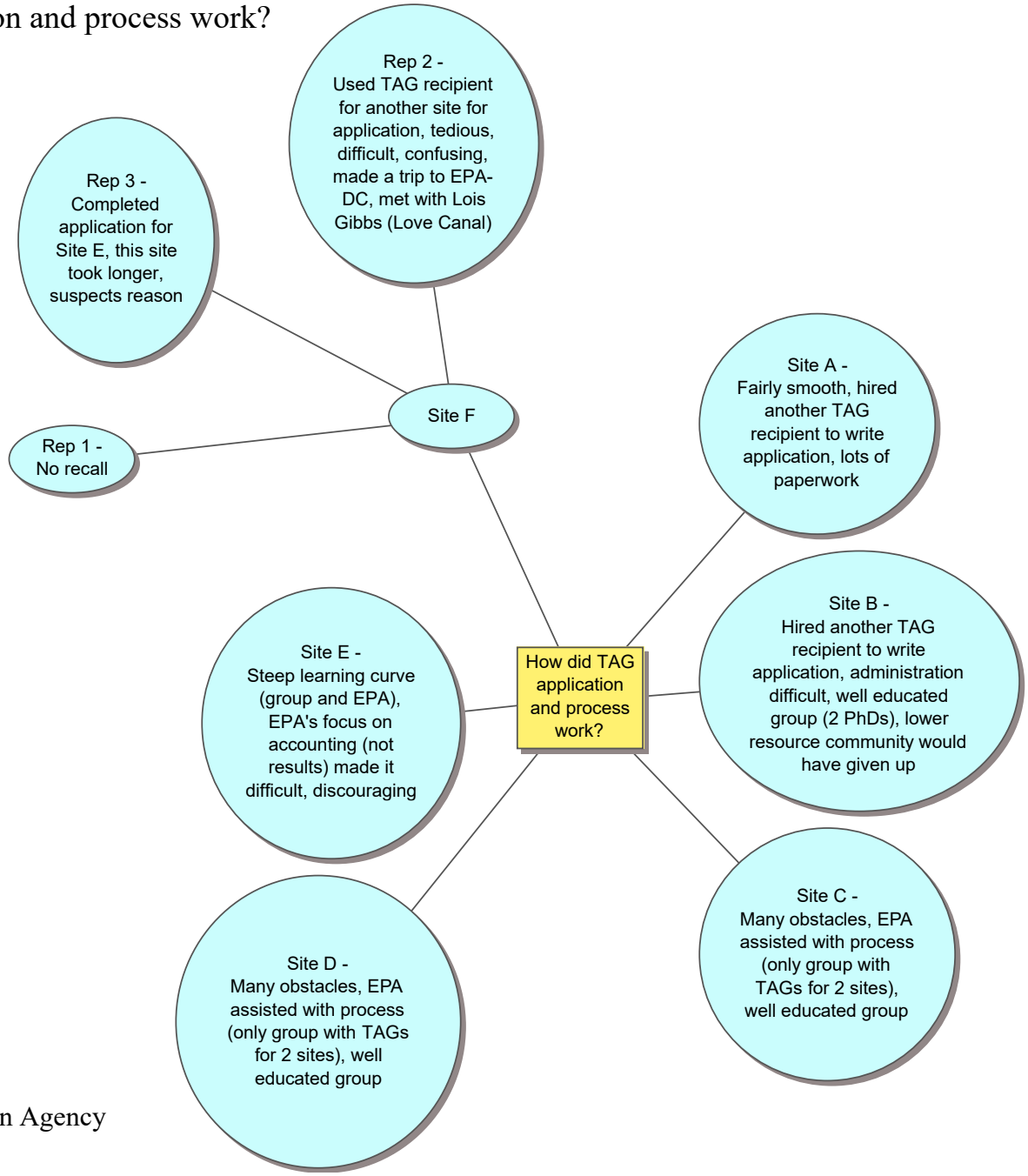
CI = Community Involvement

Question 14 - Comm Rep
Why did group pursue a TAG



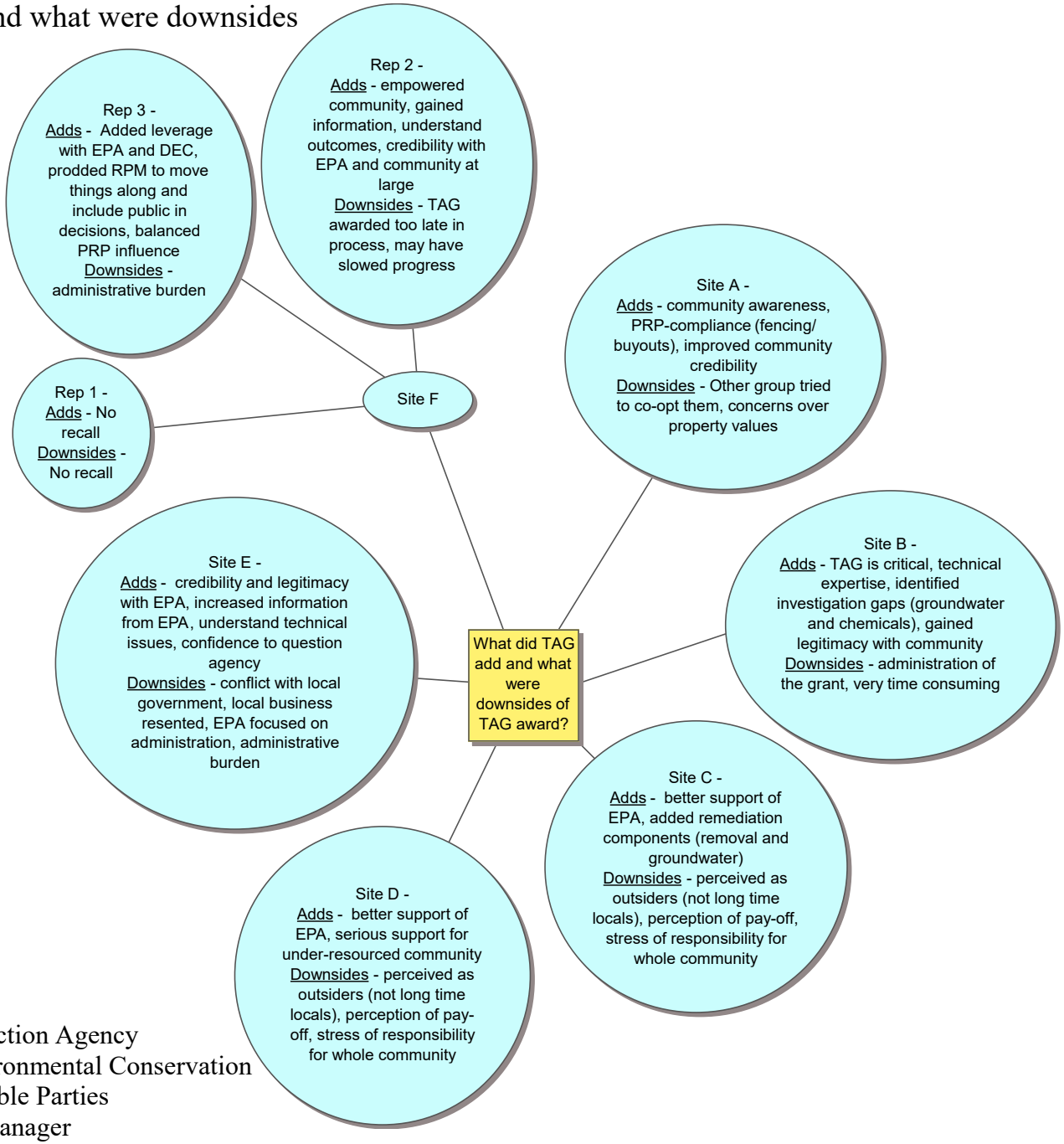
EPA = Environmental Protection Agency
PRP = Potentially Responsible Parties

Question 15 - Comm Rep
How did TAG application and process work?



EPA = Environmental Protection Agency
DC = Washington, D.C.

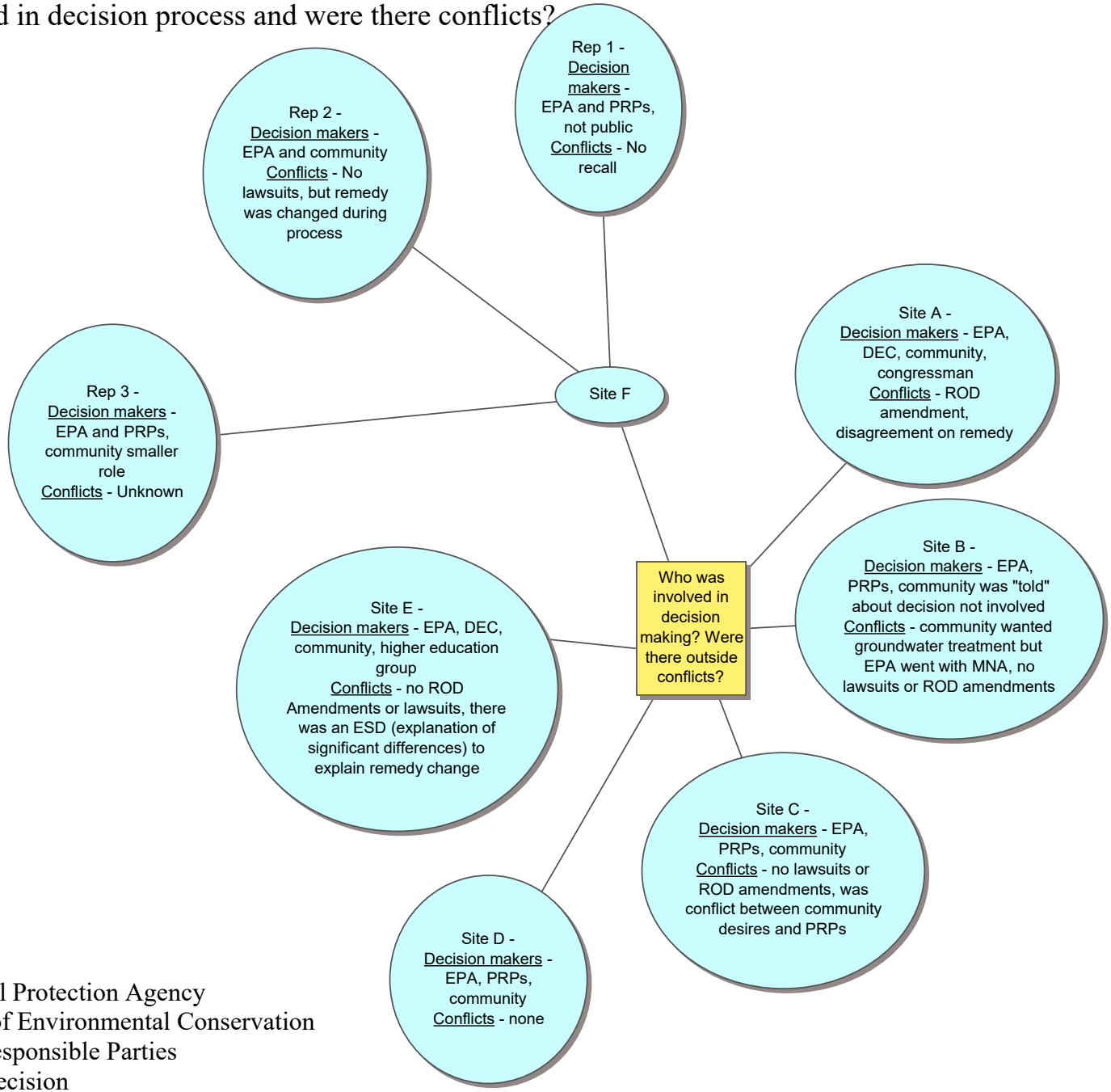
Question 16 - Comm Rep
What did TAG add and what were downsides



EPA = Environmental Protection Agency
DEC = Department of Environmental Conservation
PRP = Potentially Responsible Parties
RPM = Remedial Project Manager

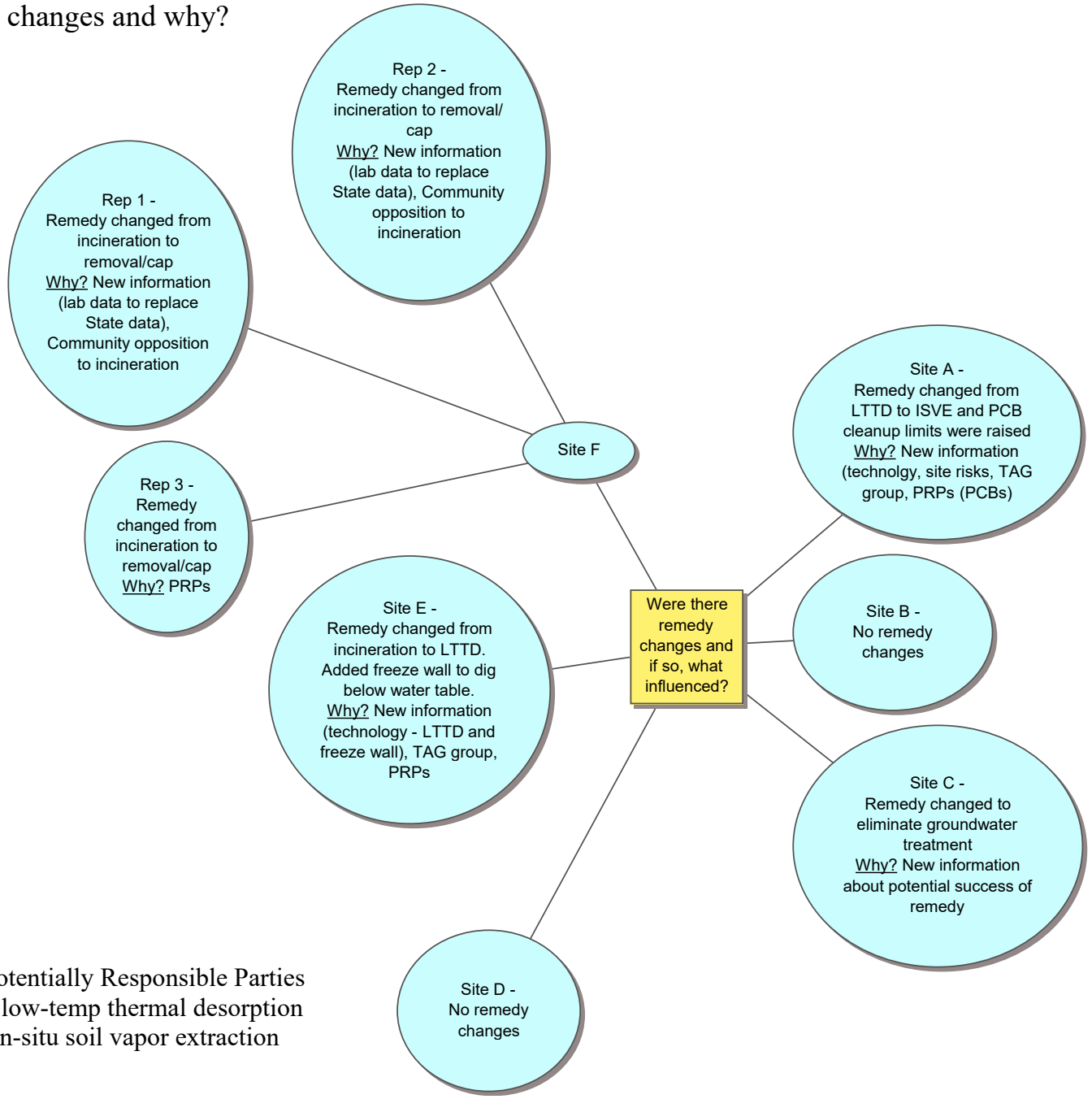
Question 17 - Comm Rep

Who was involved in decision process and were there conflicts?



EPA = Environmental Protection Agency
DEC = Department of Environmental Conservation
PRP = Potentially Responsible Parties
ROD = Record-of-Decision

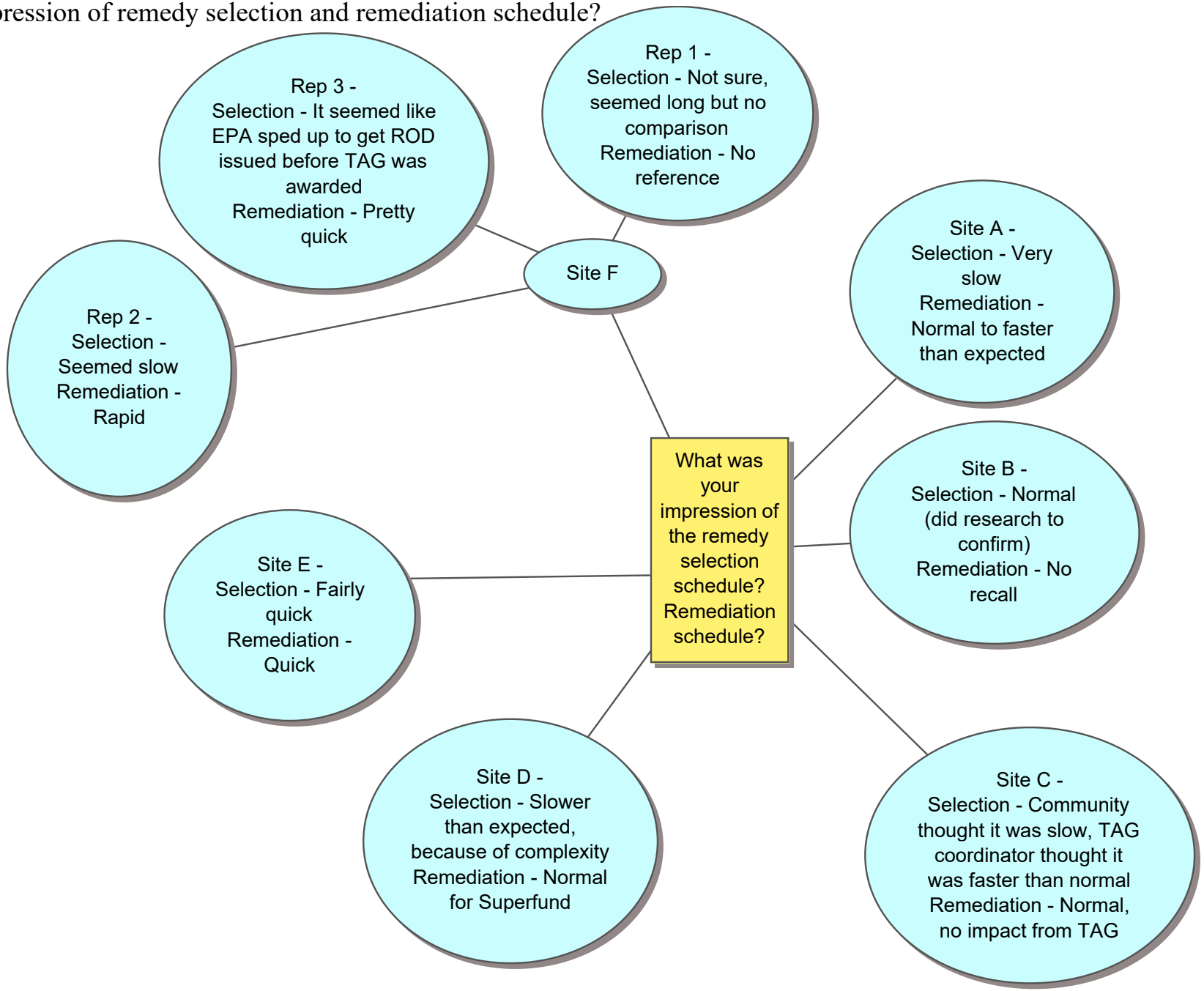
Question 18 - Comm Rep
Were there remedy changes and why?



PRP = Potentially Responsible Parties
LTTD = low-temp thermal desorption
ISVE = in-situ soil vapor extraction

Questions 19/20 - Comm Rep

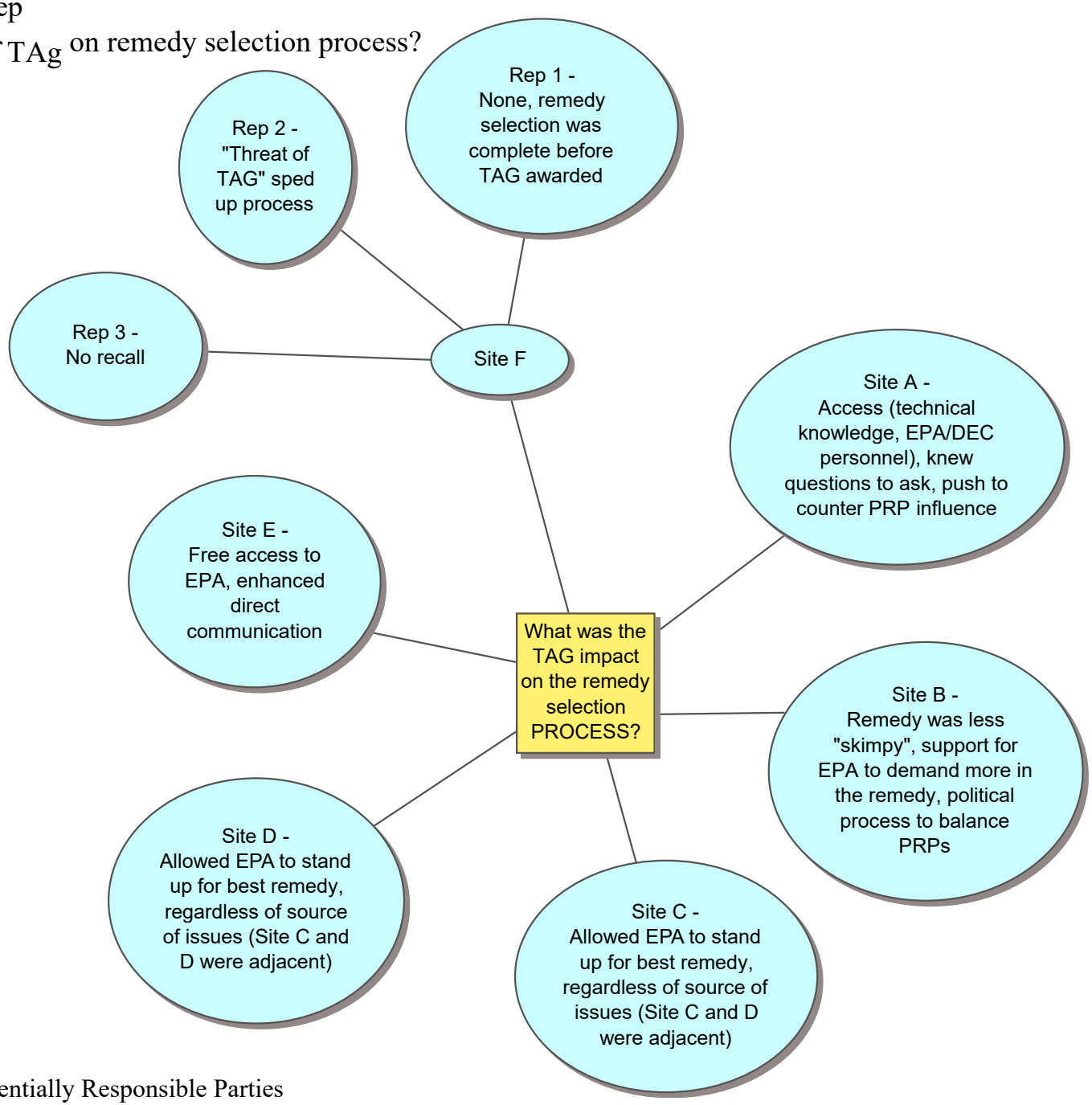
Your impression of remedy selection and remediation schedule?



ROD = Record-of-Decision

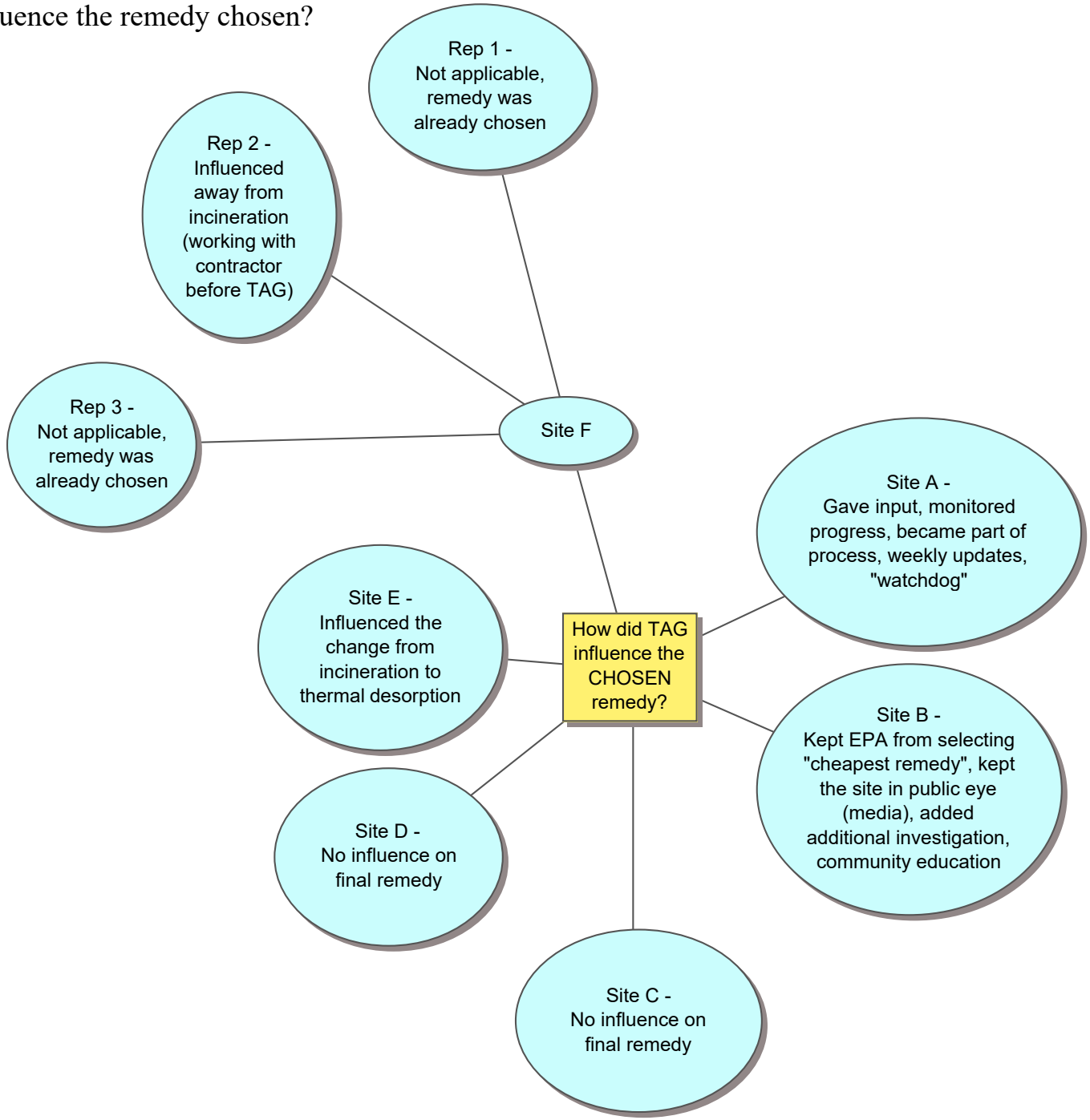
Question 22 - Comm Rep

What was the impact of TAg on remedy selection process?

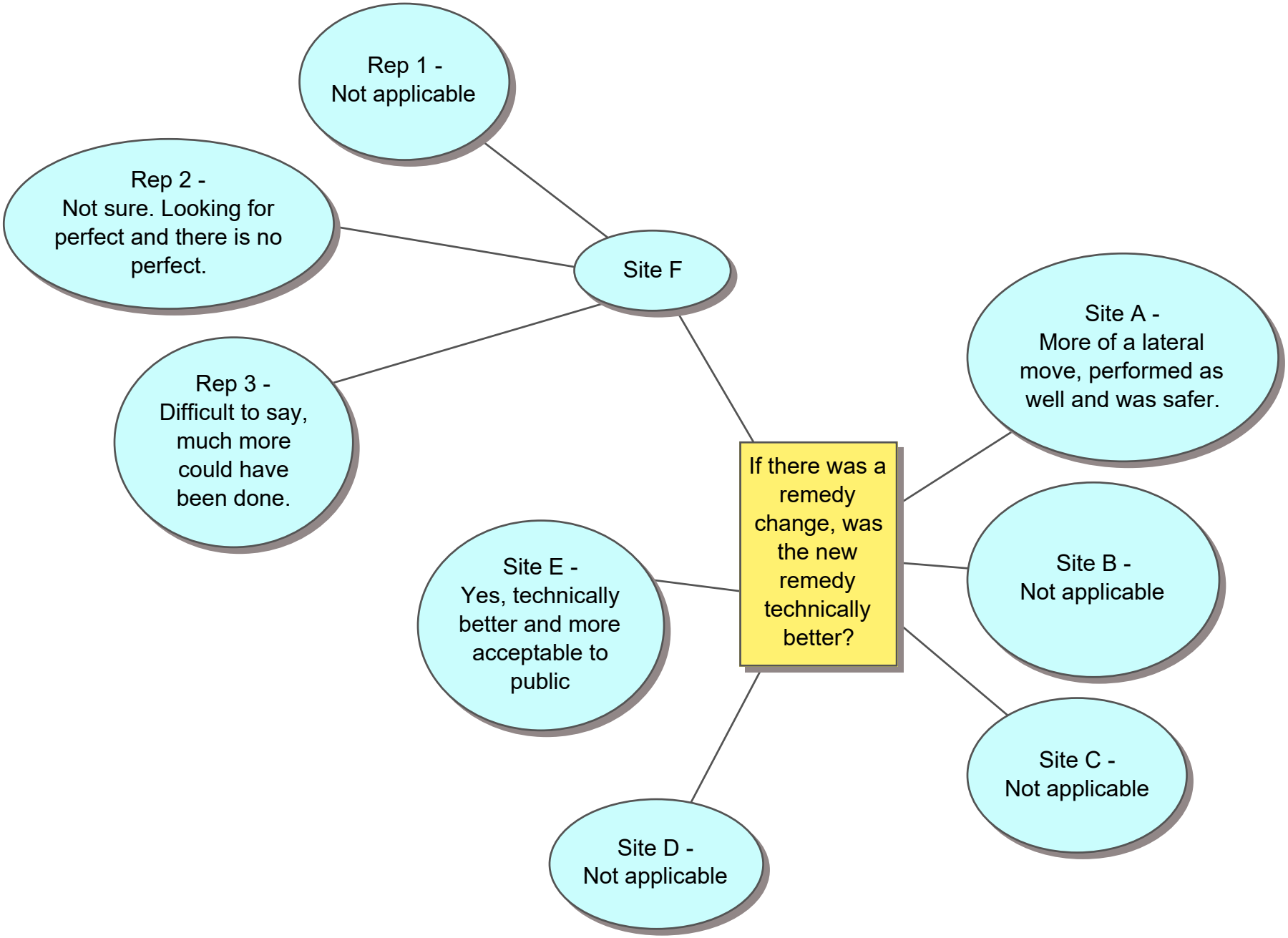


PRP = Potentially Responsible Parties
EPA = Environmental Protection Agency
DEC = Department of Environmental Conservation

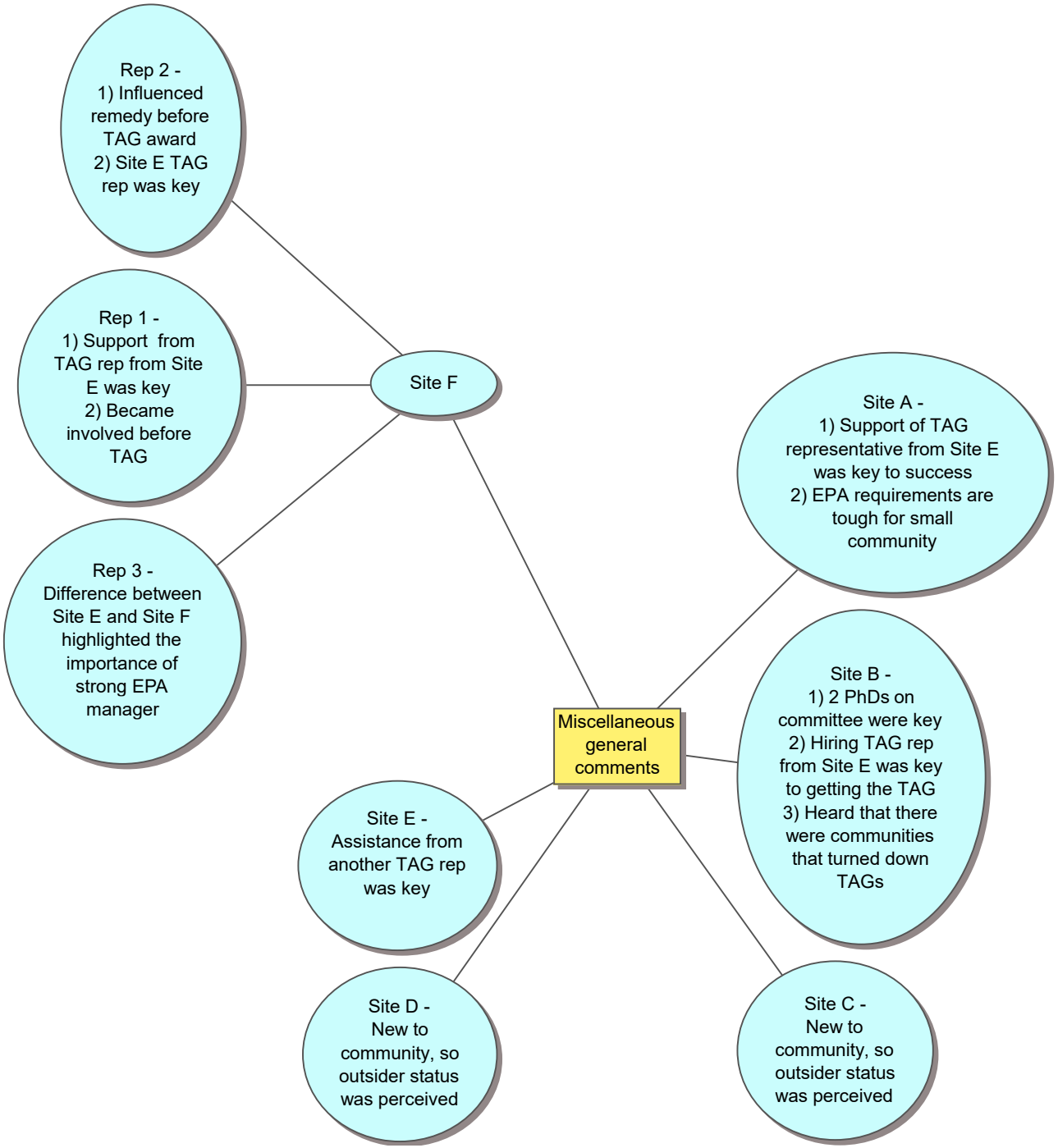
Question 23 - Comm Rep
How did TAG influence the remedy chosen?



Question 23 - Comm Rep
How did TAG influence the remedy chosen?

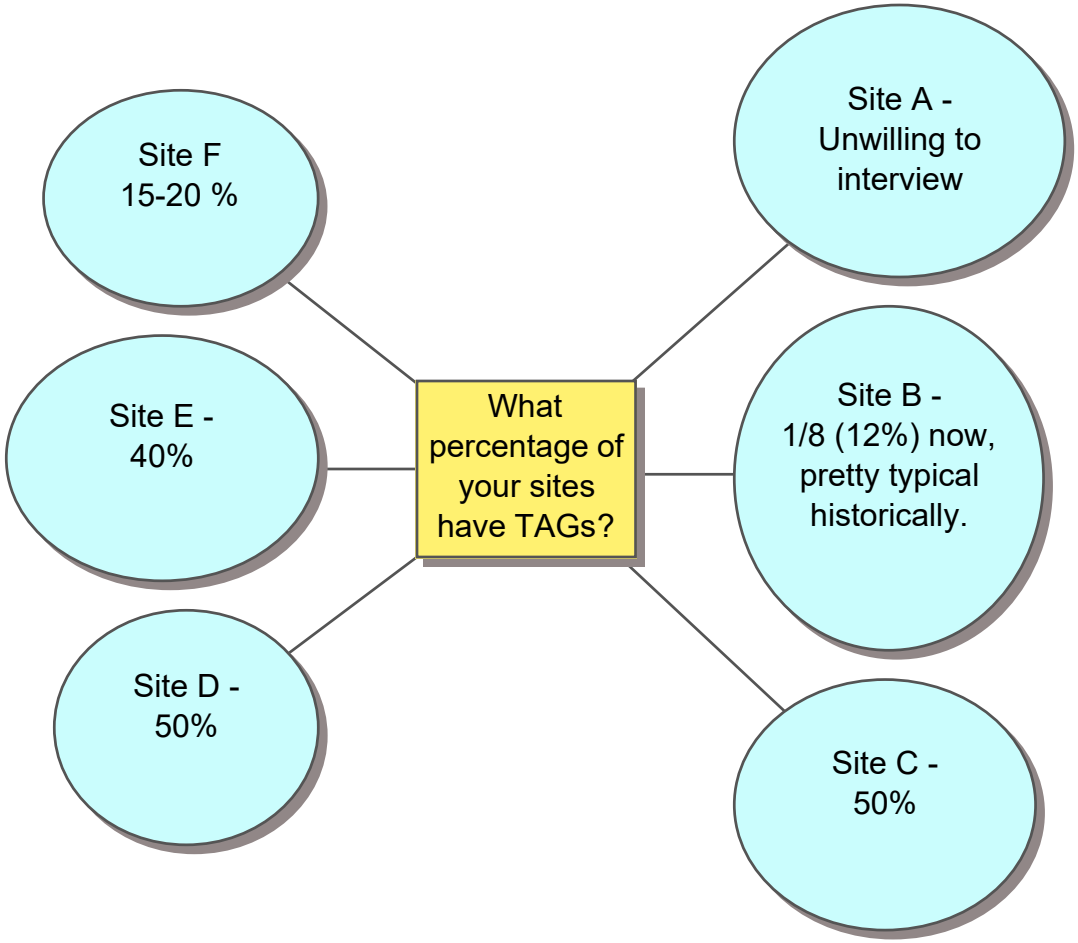


Comm Rep
General Comments

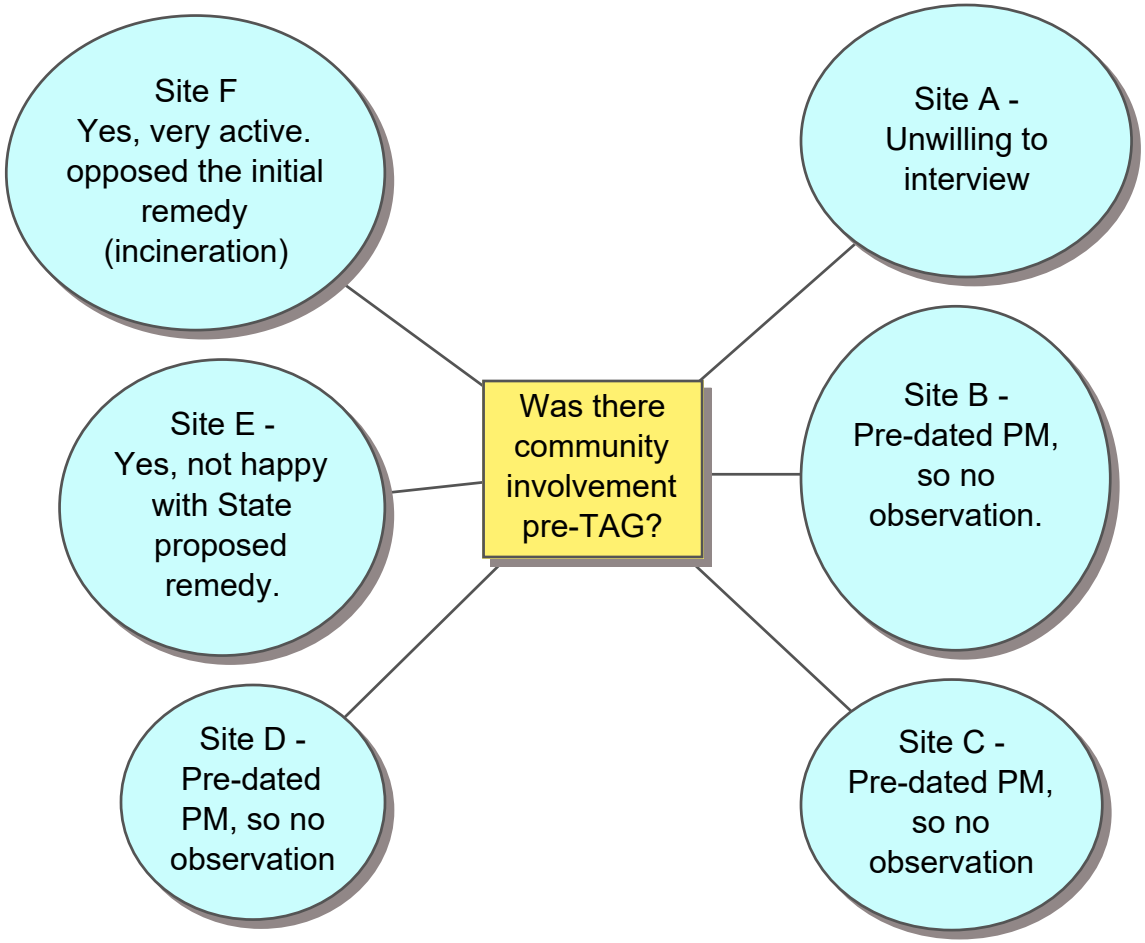


Appendix C
Interview Responses
EPA Managers

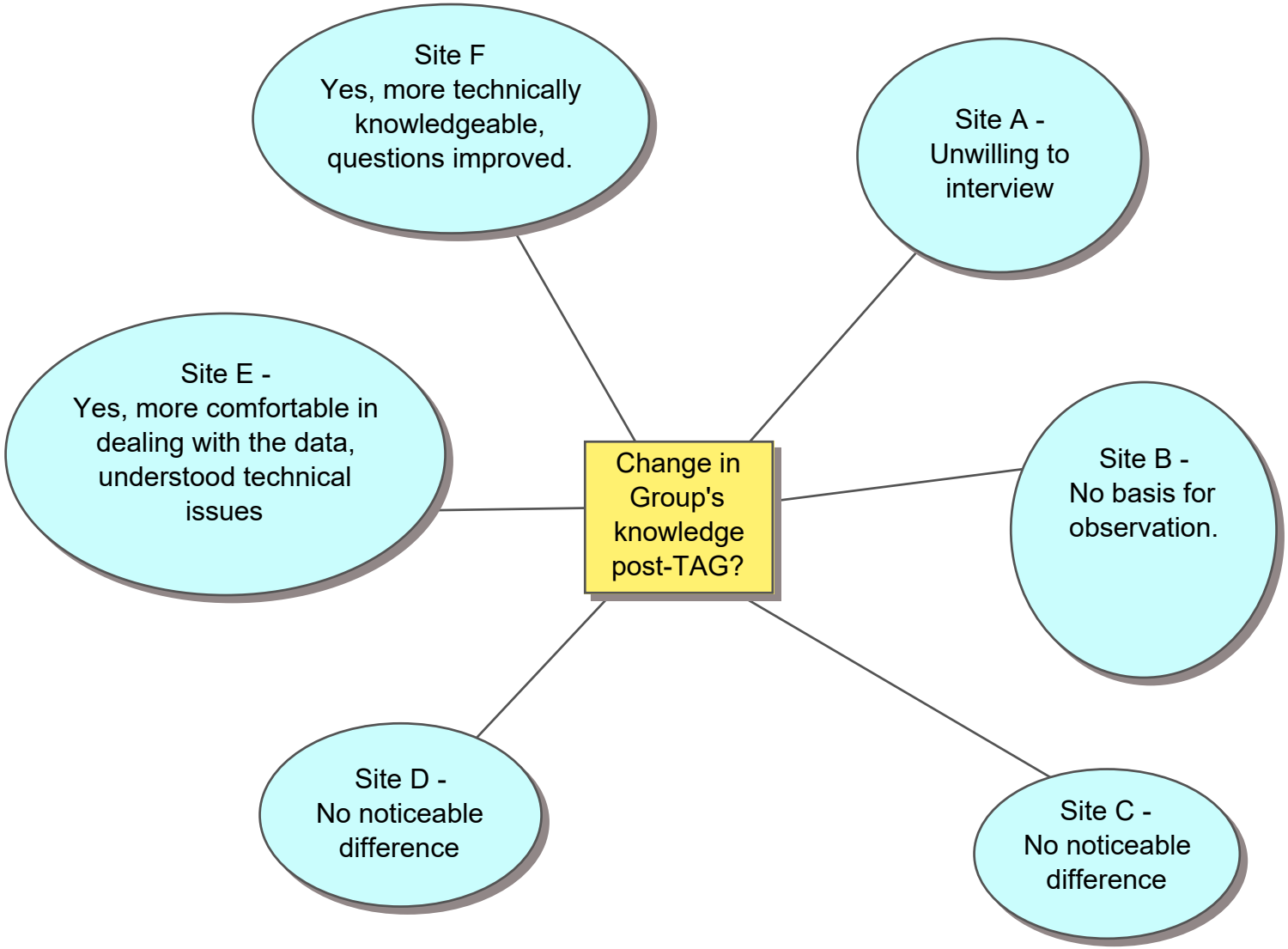
EPA Q5
What percentage of your sites have TAGs?



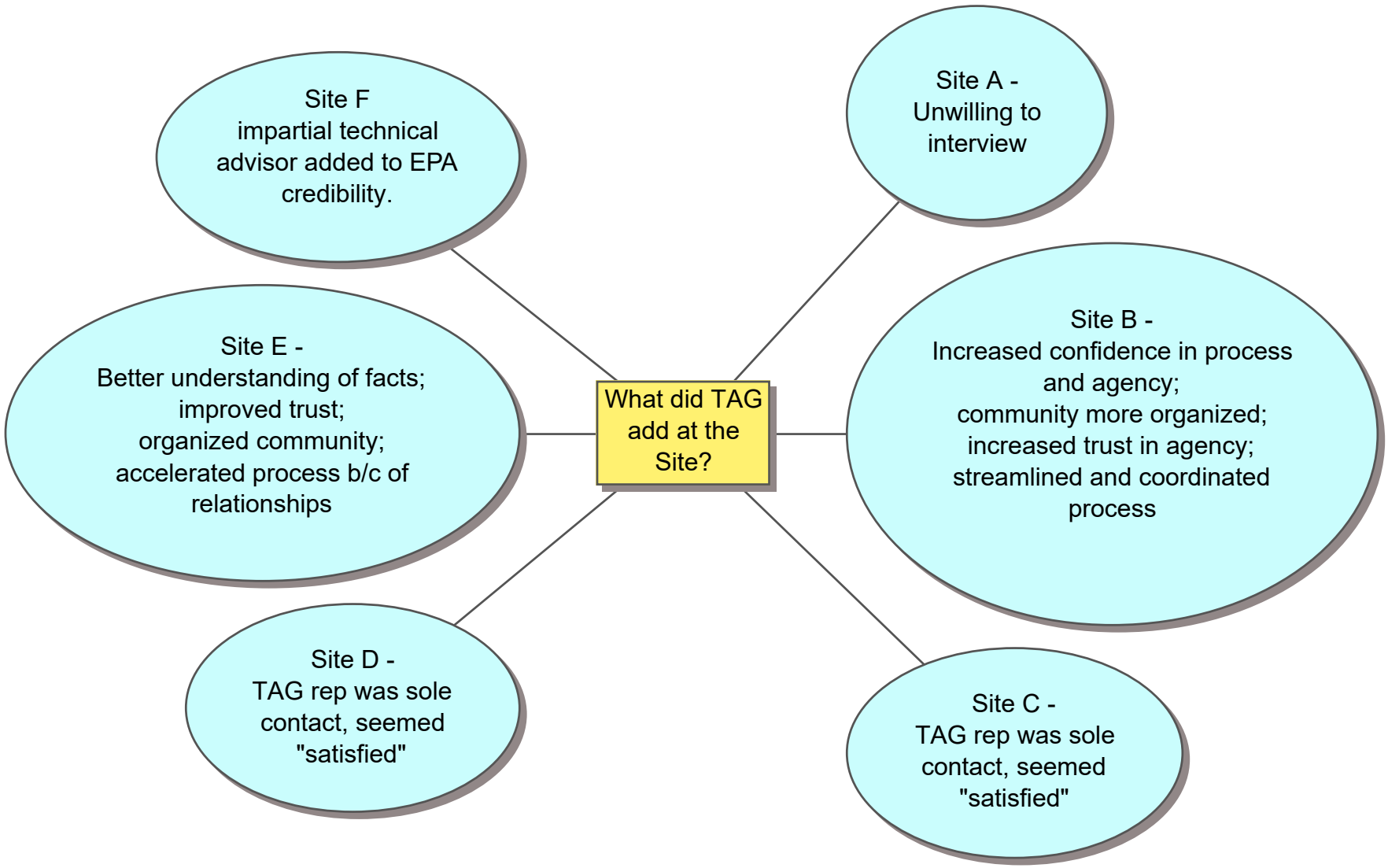
EPA Q10
Was there community involvement pre-TAG?



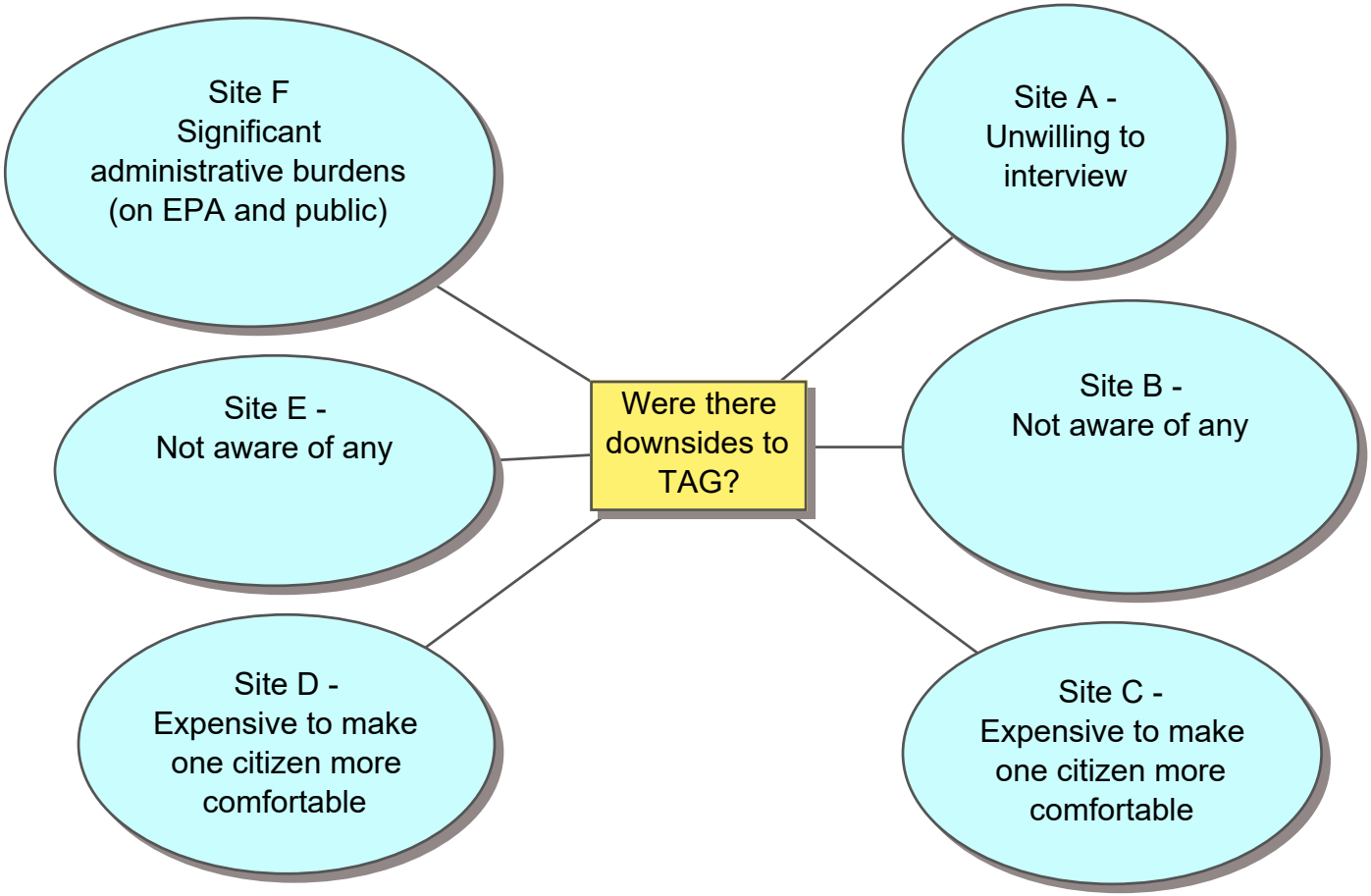
EPA Q15
Did you notice change in group's knowledge post-TAG?



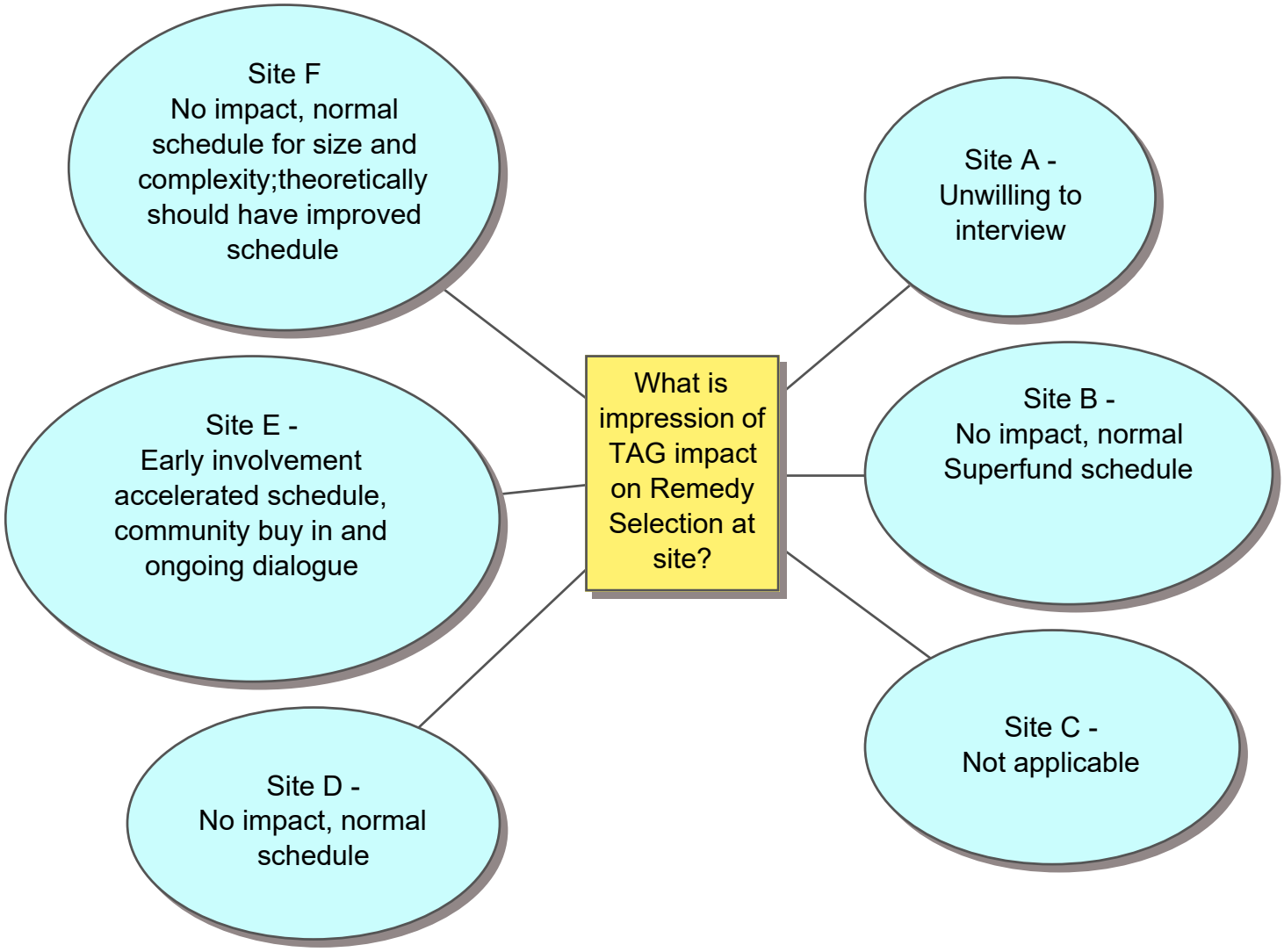
EPA Q16A
What did TAG add at the Site?



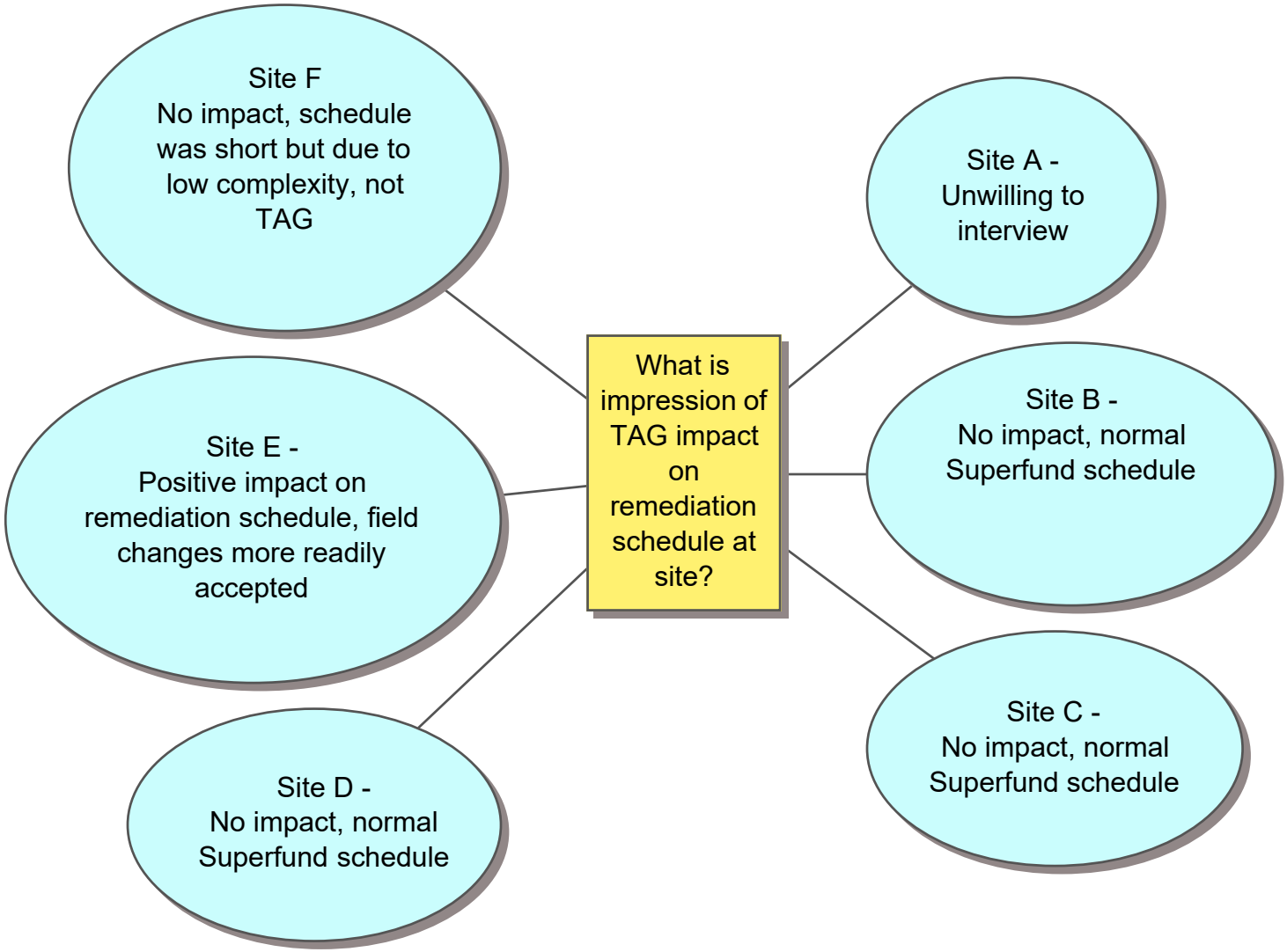
EPA Q16B
Were there downsides to TAG?



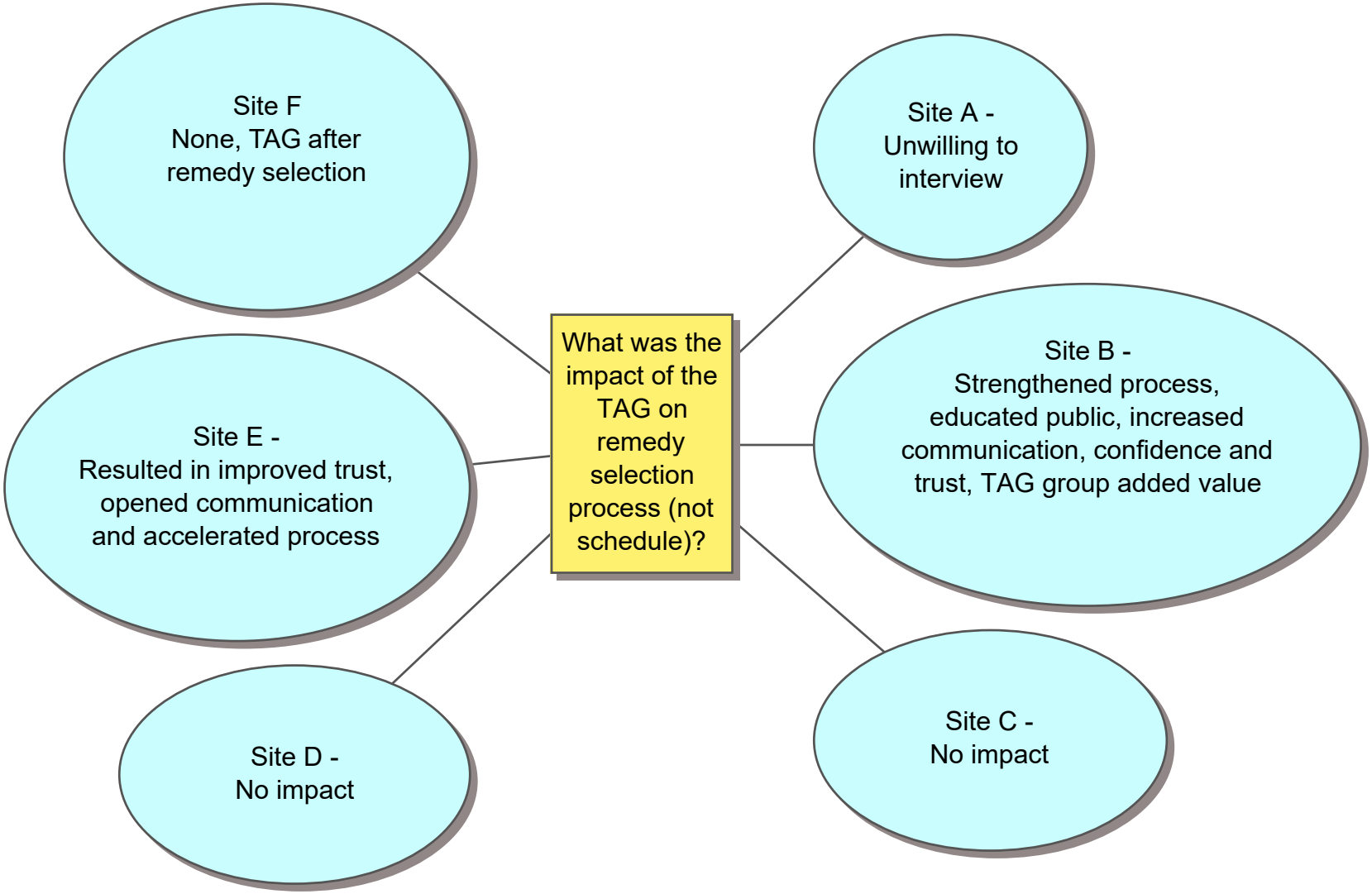
EPA Q19
TAG impact on remedy selection schedule?



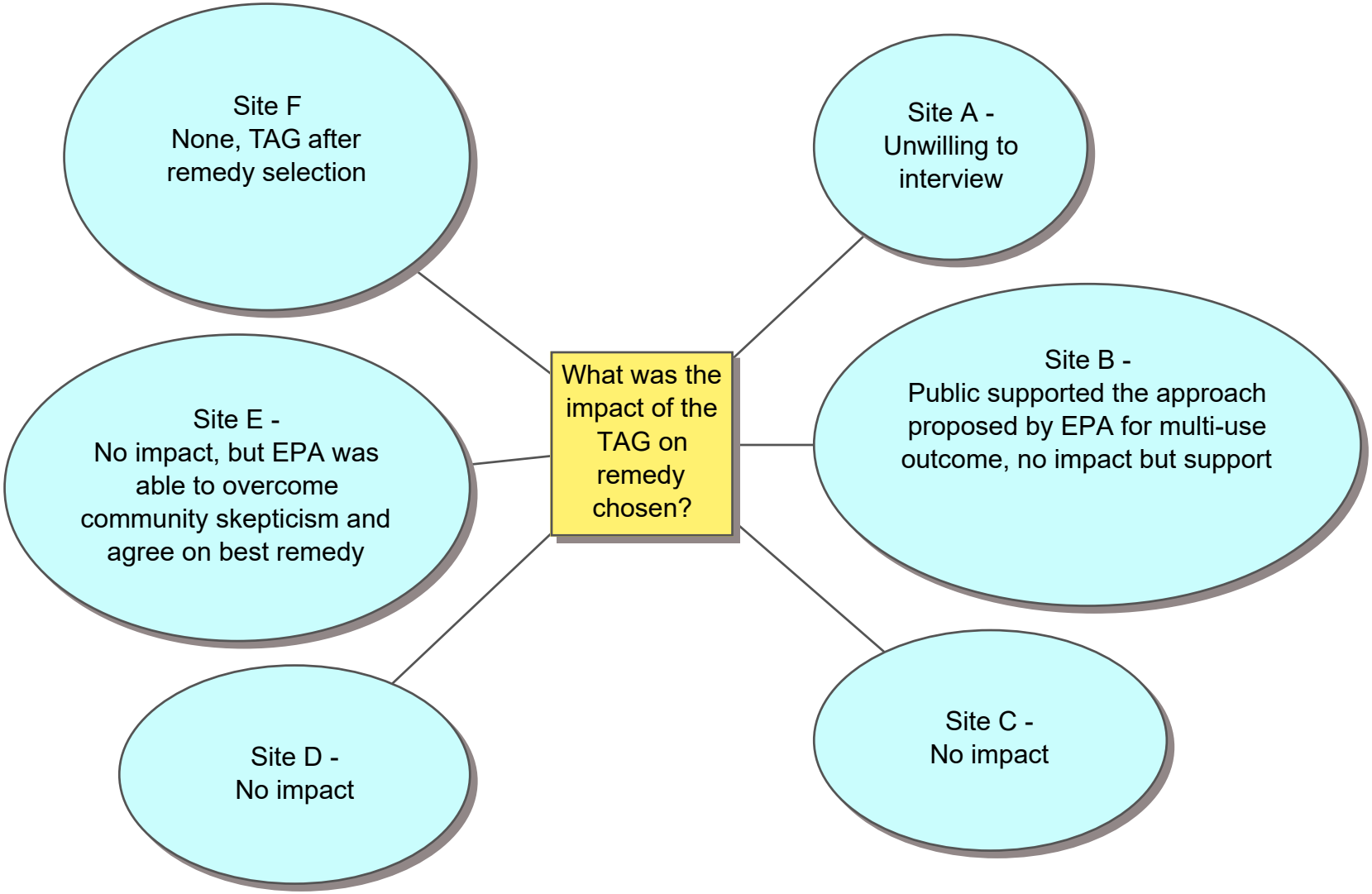
EPA Q20
TAG impact on remediation schedule?



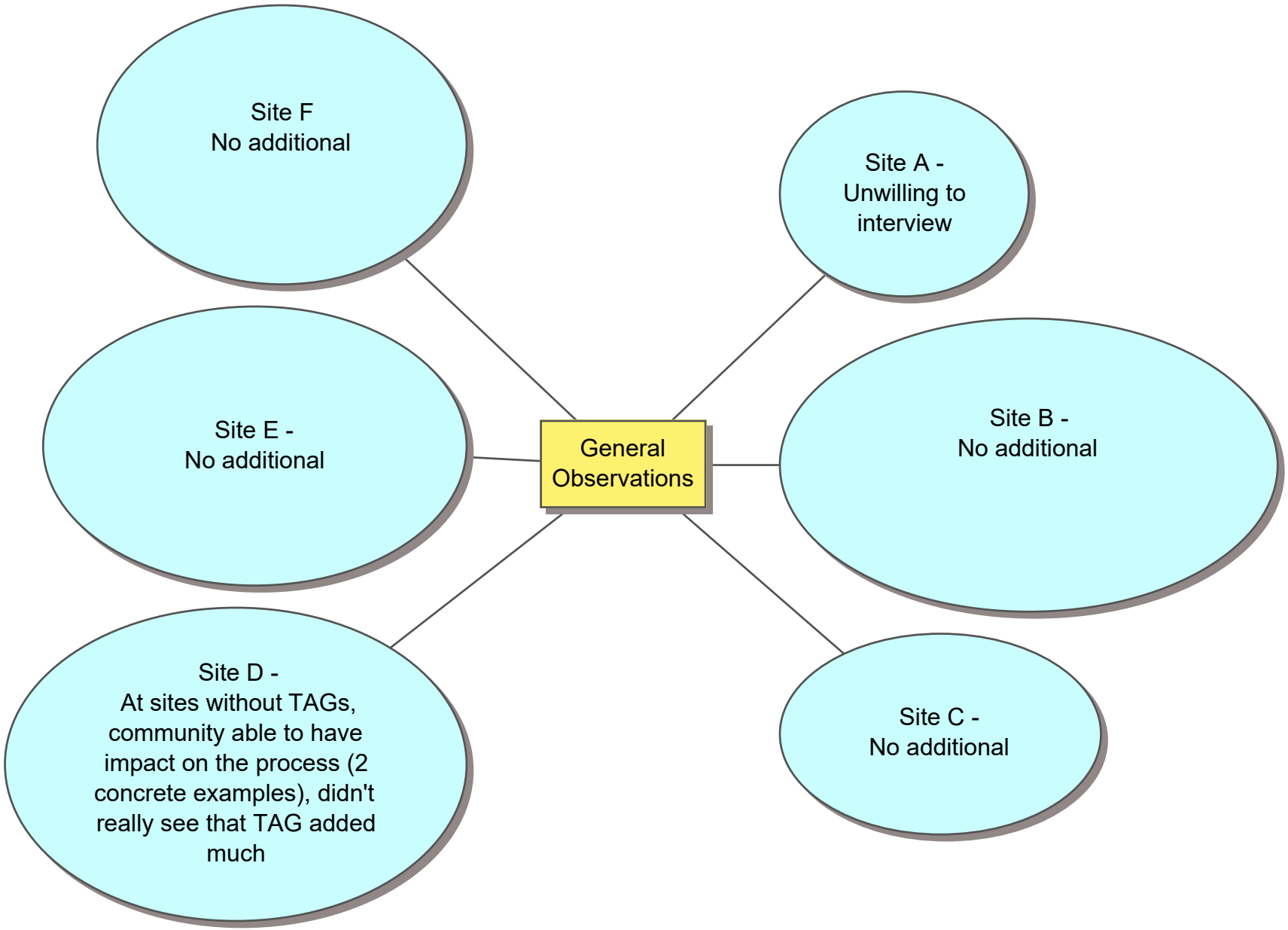
EPA Q22
TAG impact on remedy selection process (not schedule)?



EPA Q23
TAG impact on remedy chosen?

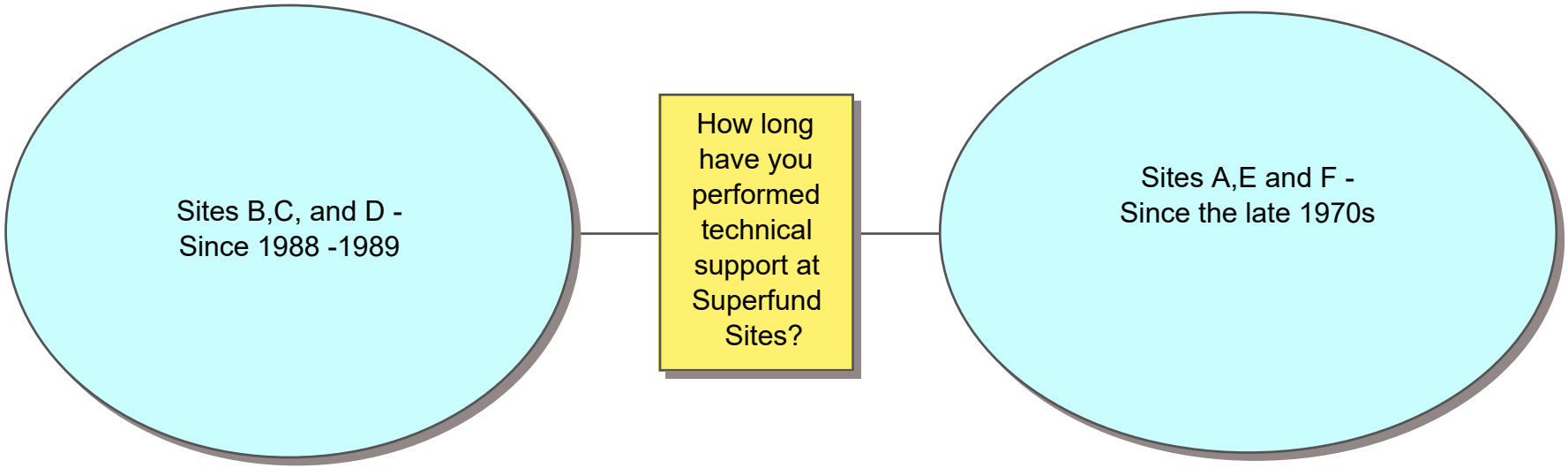


General Observations from EPA project manager

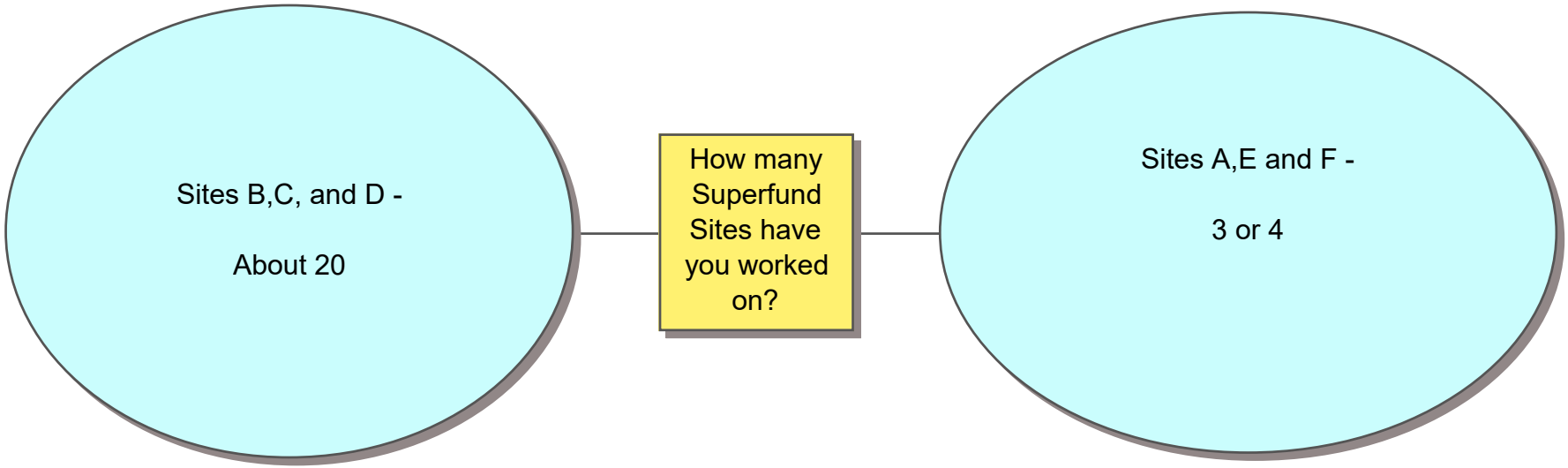


Appendix D Interview Responses Technical Consultant

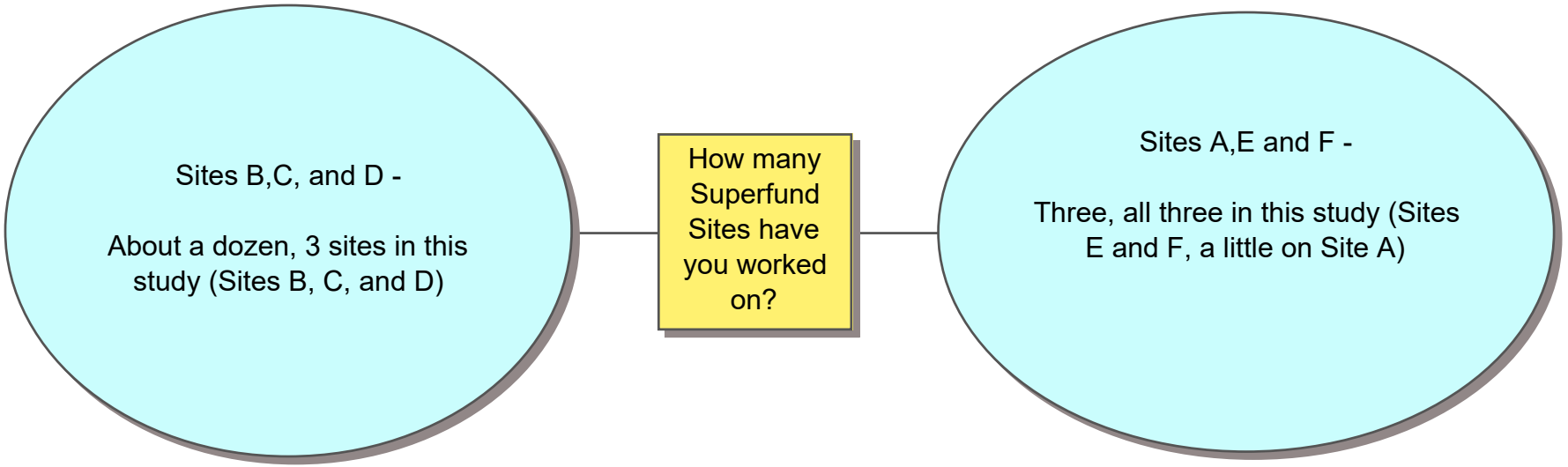
Q1 Technical Consultant
How long have you performed technical support at Superfund Site?



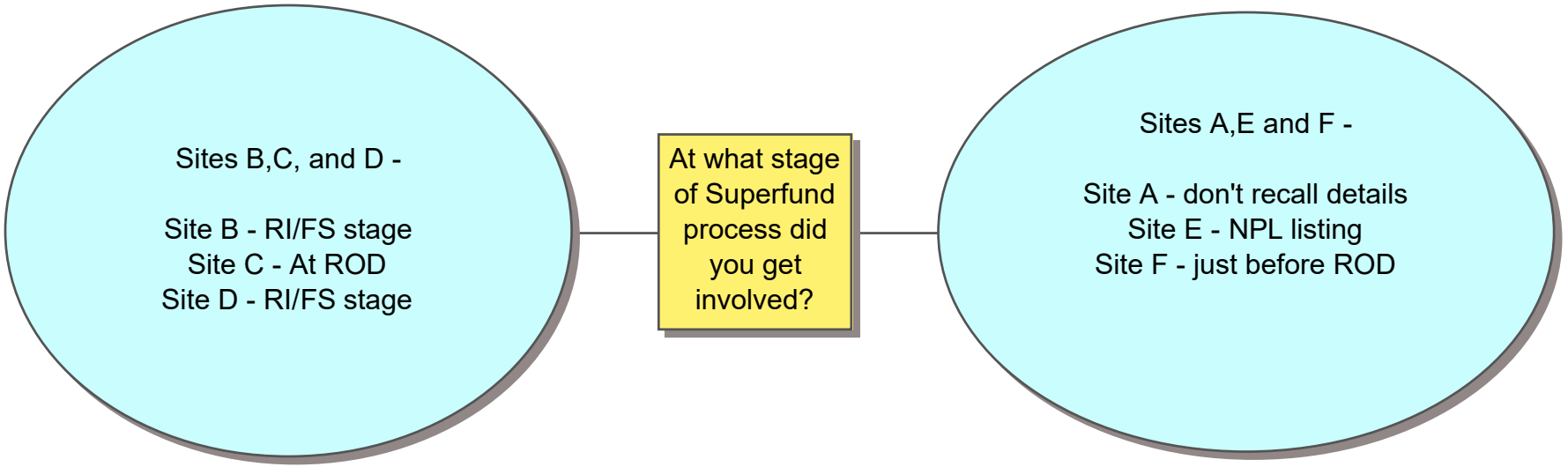
Q2 Technical Consultant
How many Superfund Sites have you worked on?



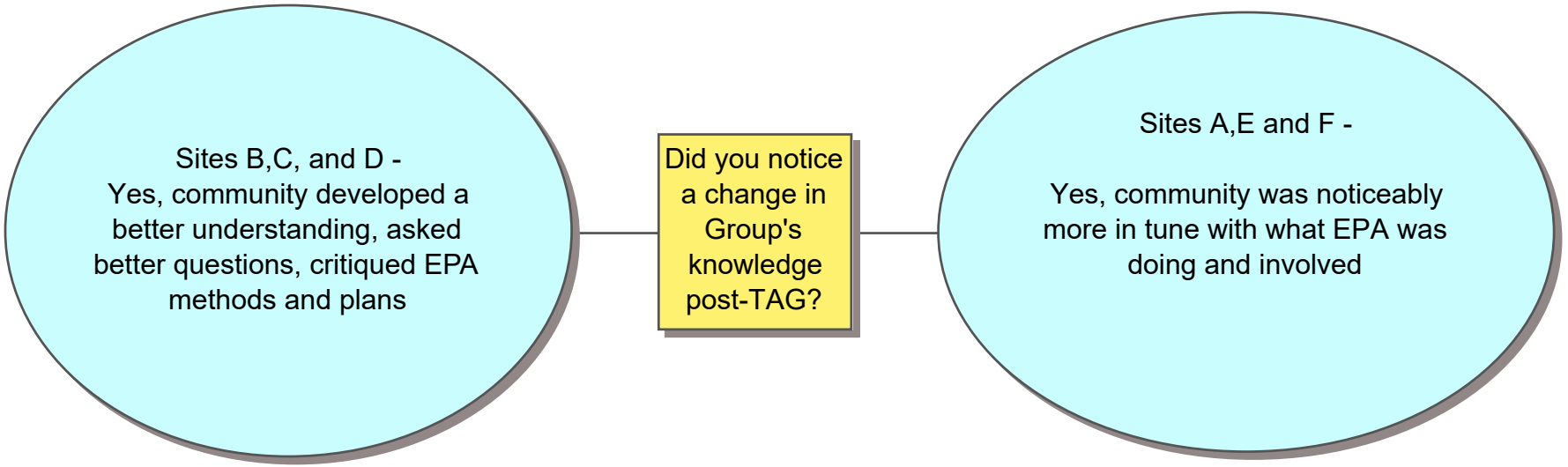
Q3 Technical Consultant
How many Superfund Sites have you worked on?



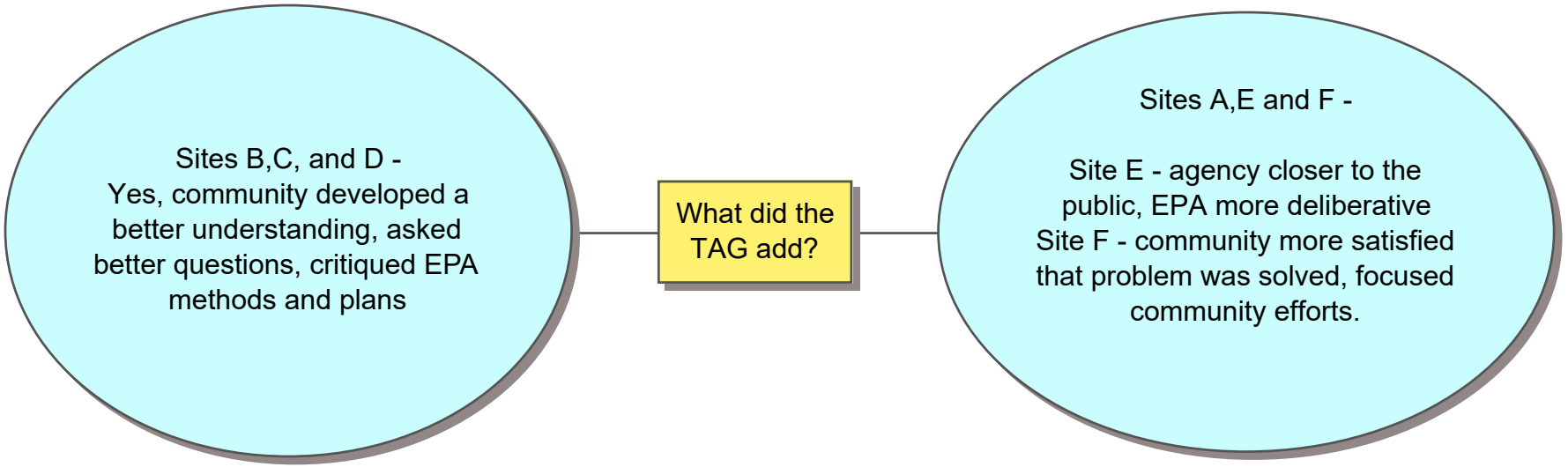
Q7 Technical Consultant
At what stage of Superfund process did you get involved?



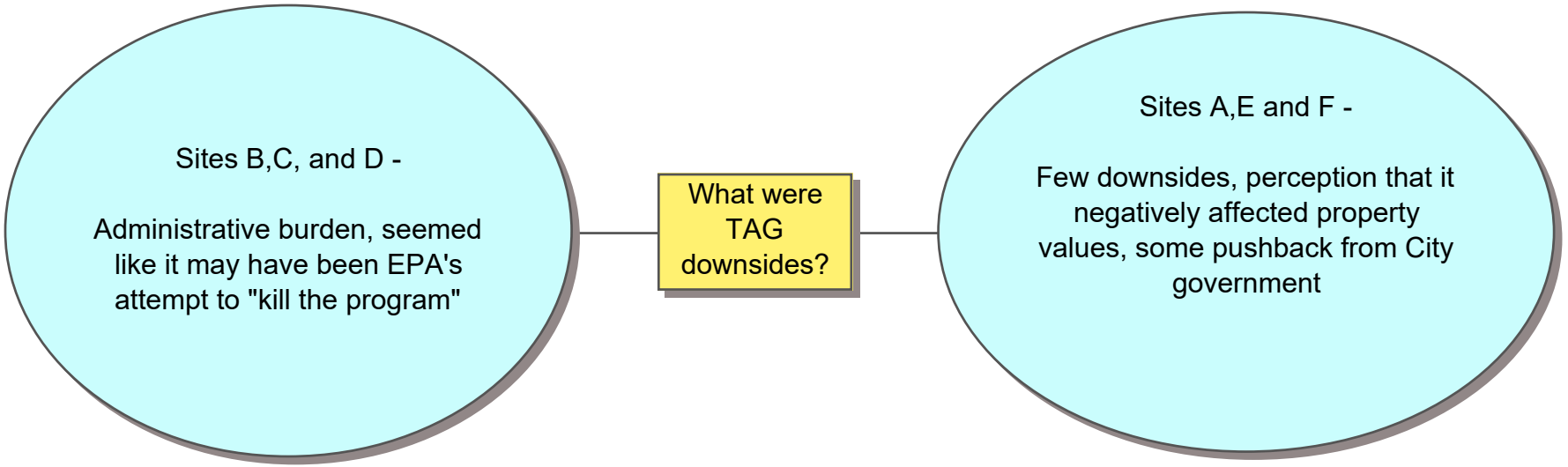
Q10 Technical Consultant
Did you notice a change in Group's knowledge post-TAG?



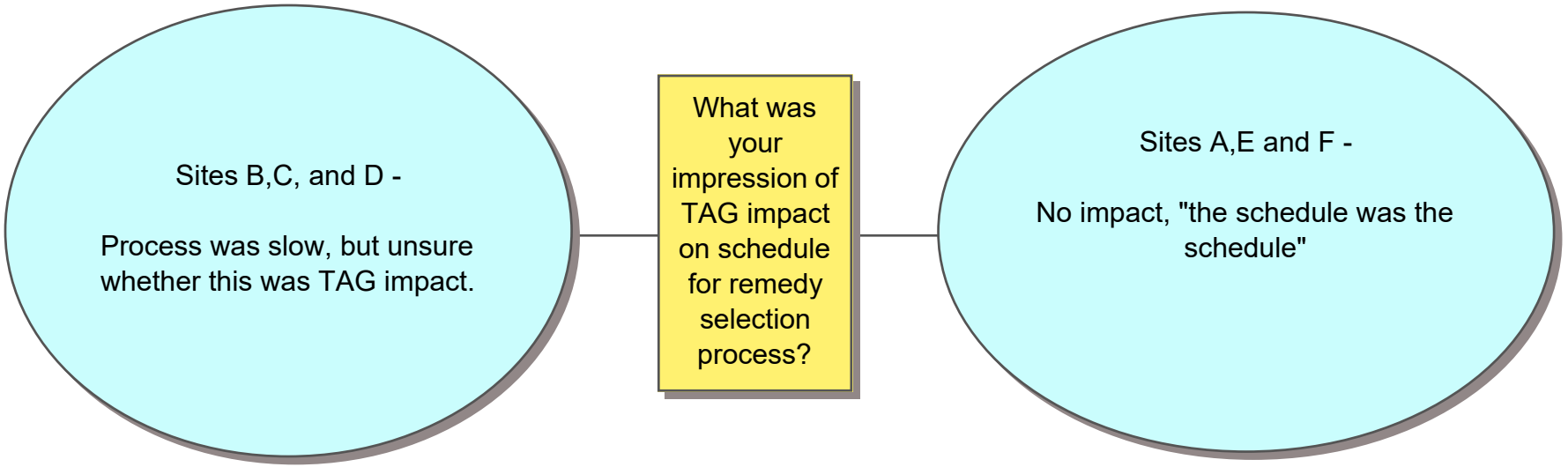
Q11A Technical Consultant
What did the TAG add?



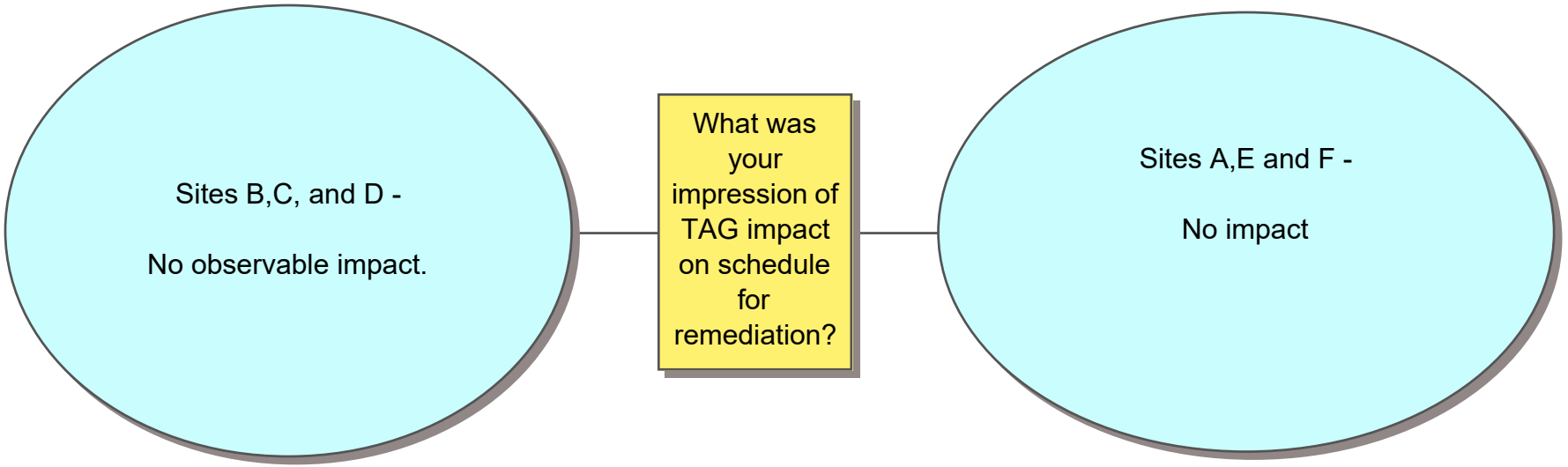
Q11B Technical Consultant
What were TAG downsides?



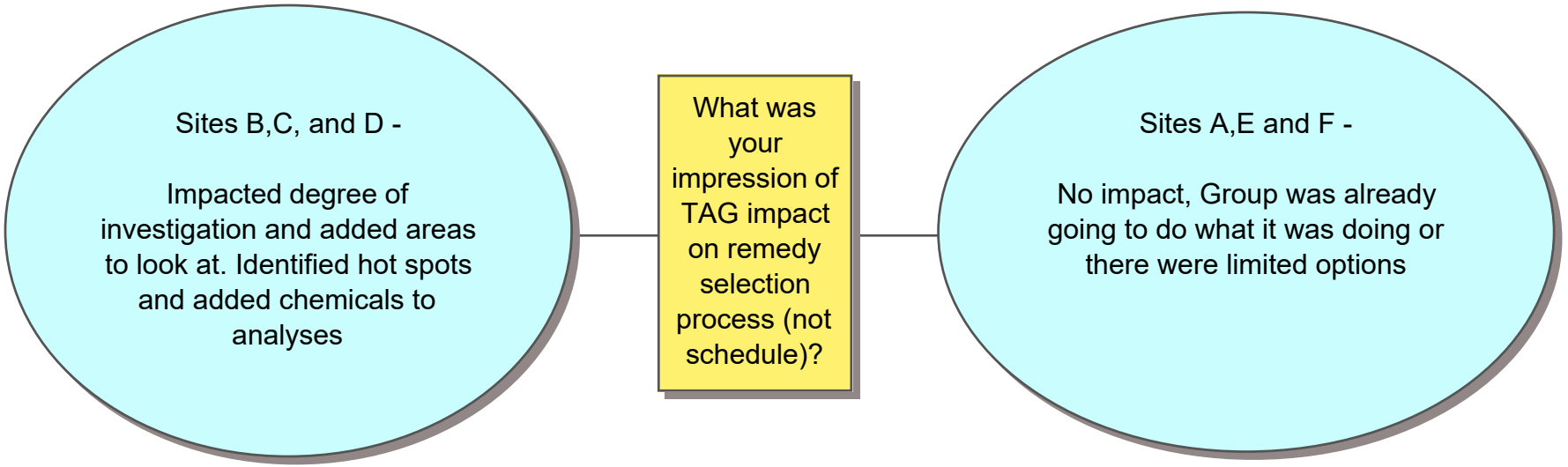
Q14 Technical Consultant
What was your impression of TAG impact on schedule for remedy selection process?



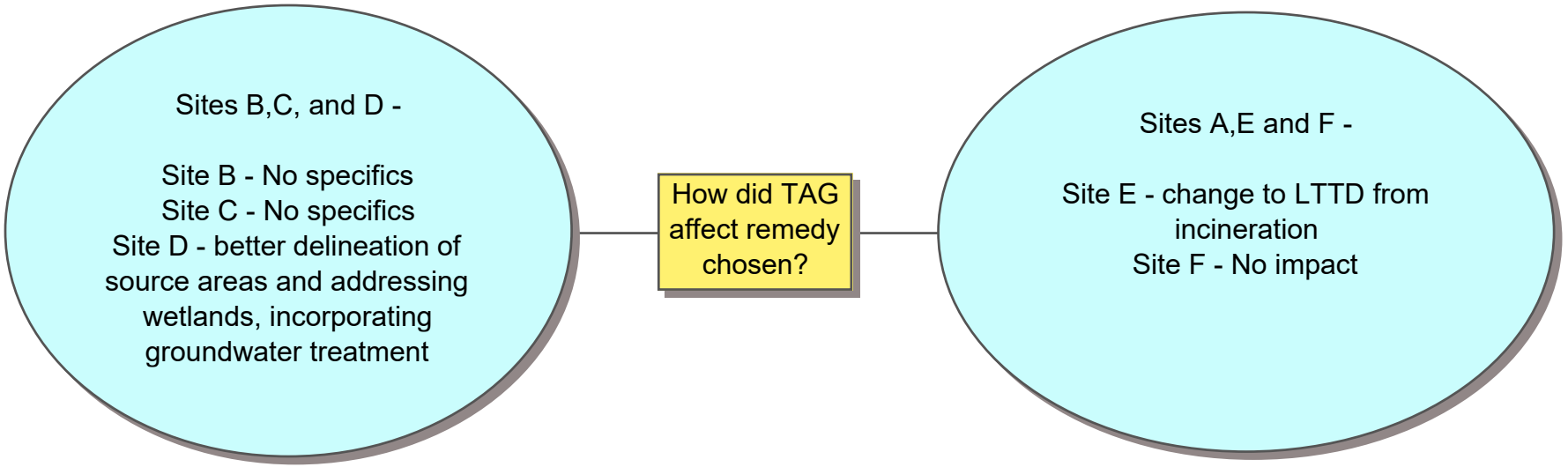
Q15 Technical Consultant
What was your impression of TAG impact on schedule for remediation?



Q17 Technical Consultant
What was your impression of TAG impact on remedy selection process (not schedule)?

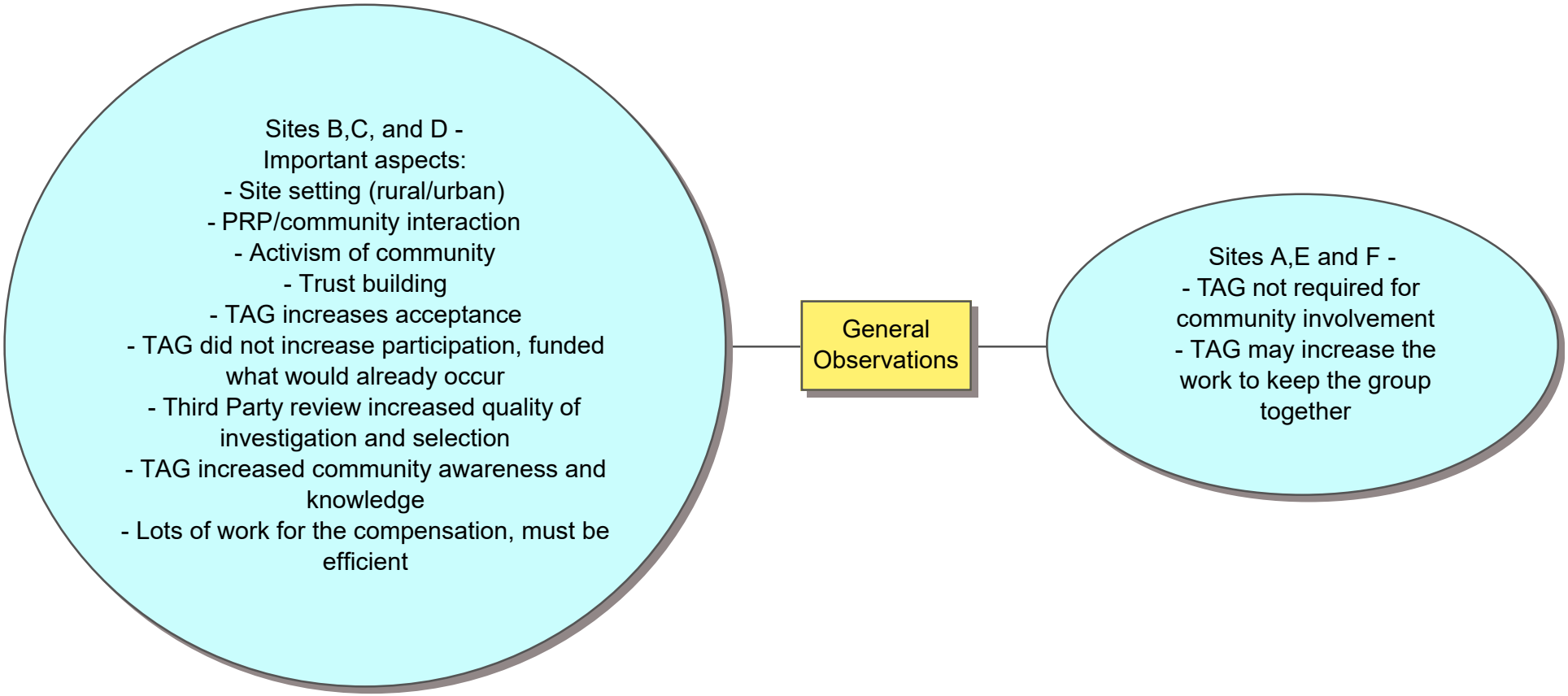


Q18 Technical Consultant
How did TAG affect remedy chosen?



LTTD - low temperture thermal desorption

General Observations from technical consultants



REFERENCES

Abrahamson, E. (2013). Innovation Diffusion. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 372-377). Tousand Oaks, CA: SAGE Publications, Inc.

Ackerlund, W. S. (2011). *Exploring public participation decisionmaking at Superfund sites: A mental models approach.* (Dissertation/Thesis), ProQuest Dissertations Publishing.

Andrews, C. (2016). Integrating public service motivation and self-determination theory. *International Journal of Public Sector Management, 29*(3), 238-254.

Ansell, C., & Gash, A. (2007). Collaborative Governance in Theory and Practice. *Journal of Public Adminstration, Research and Theory, In Press*.

Applegate, J. S. (1998). Beyond the usual suspects: the use of citizens advisory boards in environmental decisionmaking. *Indiana Law Journal, 73*(3), 903.

Arnstein, S. R. (1971). Eight Rungs on the Ladder of Citizen Participation. In E. S. Cahn & B. A. Passett (Eds.), *Citizen Participation: Effecting Community Change* (pp. 69-91). New York: Praeger Publichers.

Barnes, M., Newman, J., Knops, A., & Sullivan, H. (2003). Constituting 'the public' in public participation. *Public Administration, 81*(2), 379-399.

Barnett, H. C. (1994). *Toxic debts and the Superfund dilemma*. Chapel Hill: University of North Carolina Press.

Bartsch, C. (2003). Community Involvement in Brownfield Redevelopment: Northeast-Midwest Institute.

Beierle, T. C. (1998). Public Participation in Environmental Decisions: An Evaluation Framework Using Social Goals (pp. 31). Wasgington: Resources for the Future.

Benveniste, G. (1977). *The politics of expertise* (Vol. 2d). San Francisco: Boyd & Fraser Pub. Co.

Bhattacharyya, A. (2015). Corporate Social and Environmental Responsibility in an Emerging Economy: Through the Lens of Legitimacy Theory. *Australasian Accounting Business & Finance Journal, 9*(2), 79-92.

Bingham, L., Nabatchi, T., & O'Leary, R. (2005). The New Governance: Practices and Processes for Stakeholder and Citizen Participation in the Work of Government. *Public Administration Review, 65*(5), 547-558.

Bingham, L., O'Leary, R., & Nabatchi, T. (2005). Legal frameworks for the new governance: Processes for citizen participation in the work of government. *National Civic Review, 94*(1), 54-61.

Bingham, R. D., & Felbinger, C. L. (2001). *Evaluation in practice: a methodological approach* (Vol. 2nd). New York: Chatham House Publishers/Seven Bridges Press.

Brulle, R. J. (2010). From Environmental Campaigns to Advancing the Public Dialog: Environmental Communication for Civic Engagement. *Environmental Communication, 4*(1), 82-98.

Charnley, S., & Engelbert, B. (2005). Evaluating public participation in environmental decision-making: EPA's superfund community involvement program. *Journal of Environmental Management, 77*(3), 165-182.

Chess, C. (2000). Evaluating environmental public participation: Methodological questions. *Journal of Environmental Planning and Management, 43*(6), 769-784.

Chess, C., & Purcell, K. (1999). Public participation and the environment: do we know what works? *Environmental science and technology, 33*(16), 2685-2692.

Cleves, M. A., Gould, W. W., & Gutierrez, R. G. (2004). *An Introduction to Survival Analysis Using Stata*. College Station: Stata Press.

Cooper, T. L., Bryer, T. A., & Meek, J. W. (2006). Citizen-Centered Collaborative Public Management. *Public Administration Review, 66*, 76-88.

Coursey, D., Yang, K., & Pandey, S. K. (2012). Public Service Motivation (PSM) and Support for Citizen Participation: A Test of Perry and Vandenabeele's Reformulation of PSM Theory. [Article]. *Public Administration Review, 72*(4), 572-582.

Daley, D. M. (2007). Citizen Groups and Scientific Decisionmaking: Does Public Participation Influence Environmental Outcomes? *Journal of Policy Analysis and Management, 26*(2), 349-368.

Daley, D. M. (2008). Public Participation and Environmental Policy: What Factors Shape State Agency's Public Participation Provisions? *Review of Policy Research, 25*(1), 21-35.

DeJordy, R. (2013). Social Network Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 742-746). Tousand Oaks, CA: SAGE Publications, Inc.

Delli Carpini, M. X., Cook, F. L., & Jacobs, L. R. (2004). PUBLIC DELIBERATION, DISCURSIVE PARTICIPATION, AND CITIZEN ENGAGEMENT: A Review of the Empirical Literature. *Annual Review of Political Science, 7*(1), 315-344.

Denhardt, J. V., & Denhardt, R. B. (2015). The New Public Service Revisited: 1. *Public Administration Review, 75*(5), 664.

Denhardt, R. B., & Denhardt, J. V. (2000). The New Public Service: Serving Rather Than Steering. *Public Administration Review, 60*(6), 549-559.

Depoe, S., & Delicath, J. W. (2004). Introduction. In S. P. Depoe, J. W. Delicath & M.-F. A. Elsenbeer (Eds.), *Communication and Public Participation in Environmental Decision Making*. Albany: State University of New York Press.

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New Public Management Is Dead: Long Live Digital-Era Governance. *Journal of Public Administration Research and Theory: J-PART, 16*(3), 467-494.

Ellis, R. A., & Disinger, J. F. (1981). Project Outcomes Correlate with Public Participation Variables. *Journal (Water Pollution Control Federation), 53*(11), 1564-1567.

Ferris, D. (1994). Communities of color and hazardous waste cleanup: expanding public participation in the federal superfund program. *Fordham Urban Law Journal, 21*(3), 671.

Folk, E. (1991). Public participation in the Superfund cleanup process. *Ecology Law Quarterly, 18*(1), 173.

Frederickson, H. G. (1982). The Recovery of Civism in Public Administration. *Public Administration Review, 42*(6), 501.

Fung, A. (2004). *Empowered participation: reinventing urban democracy* (Vol. New). Oxford;Princeton, N.J;: Princeton University Press.

Fung, A. (2006). Varieties of Participation in Complex Governance. *Public Administration Review, 66*, 66-75.

Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review, 75*(4), 513-522.

Furuseth, O. J. (1989). Community sensitivity to a hazardous waste facility. *Landscape and Urban Planning, 17*(4), 357-370.

Golden, M. L., Yetman, G., & Chai-Onn, T. (2008). Assessment of Populations in Proximity to Superfund National Priorities List Sites. Palisades, NY: Columbia University Center for International Earth Science Information Network.

Graham, A. C. (2004). A Social Communication Perspective Toward Public Participation: The Case of the Cispus Adaptive Management Area. In S. P. Depoe, J. W. Delicath & M.-F. A. Elsenbeer (Eds.), *Communication and Public Participation in Environmental Decision Making* (pp. 35-58). Albany: State University of New York.

Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology, 78*(6), 1360-1380.

Green, A. J. (1997). Public Participation and Environmental Policy Outcomes. *Canadian Public Policy, 23*(4), 435-458.

Greenberg, M., & Lewis, M. J. (2000). Brownfields redevelopment, preferences and public involvement: A case study of an ethnically mixed neighbourhood. *Urban Studies, 37*(13), 2501-2514.

Halvorsen, K. E. (2003). Assessing the Effects of Public Participation. *Public Administration Review, 63*(5), 535-543.

Hamilton, J. D. (2004). Competing and Converging Values of Public Participation: A Case Study of Participant Views in Department of Energy Nuclear Weapons Cleanup. In S. P. Depoe, J. W. Delicath & M.-F. A. Elsenbeer (Eds.), *Communication and Public Participation in Environmental Decision Making* (pp. 59-82). Albany: State University of New York Press.

Hamilton, J. T. (1993). Politics and Social Costs: estimating the impact of collective action on hazardous waste facilities. *RAND Journal of Economics, 24*(1), 101-125.

Herian, M. N., Hamm, J. A., Tomkins, A. J., & Zillig, L. M. P. (2012). Public participation, procedural fairness, and evaluations of local governance: the moderating role of uncertainty. *Journal of Public Administration Research and Theory, 22*(4), 815.

Hood, C. (1991). A PUBLIC MANAGEMENT FOR ALL SEASONS? *Public Administration, 69*(1), 3-19.

Hourdequin, M., Landres, P., Hanson, M. J., & Craig, D. R. (2012). Ethical implications of democratic theory for U.S. public participation in environmental impact assessment. *Environmental Impact Assessment Review, 35*, 37-44.

Huang, W.-L., & Feeney, M. K. (2016). Citizen Participation in Local Government Decision Making: The Role of Manager Motivation. *Review of Public Personnel Administration, 36*(2), 188.

Innes, J. E., & Booher, D. E. (2004). Reframing public participation: strategies for the 21st century. *Planning Theory & Practice, 5*(4), 419-436.

Jin Lee, S., & Sang Yoo, D. (2012). The Adoption of Collaborative Governance Institutions: The EPA-States Performance Partnership Agreements (PPAS). *International Review of Public Administration, 17*(2), 143-161.

King, B. G., & McDonnel, M.-H. M. (2013). Social Movements. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 740-742). Tousand Oaks, CA: SAGE Publications, Inc.

King, C. S., Feltey, K. M., & Susel, B. O. N. (1998). The Question of Participation: Toward Authentic Public Participation in Public Administration. *Public Administration Review, 58*(4), 317-326.

Koontz, T. M. (2005). We Finished the Plan, So Now What? Impacts of Colaborative Stakeholder Participation on Land Use Policy. *The Policy Studies Journal, 33*(3), 459-481.

Koontz, T. M., & Thomas, C. W. (2006). What Do We Know and Need to Know about the Environmental Outcomes of Collaborative Management? *Public Administration Review, 66*, 111-121.

Laurian, L. (2003). A Prerequisite for Participation: Environmental Knowledge and What Residents Know about Local Toxic Sites. *Journal of Planning Education and Research, 22*(3), 257-269.

Lee, J., & Kim, S. (2011). Exploring the Role of Social Networks in Affective Organizational Commitment: Network Centrality, Strength of Ties, and Structural Holes. *The American Review of Public Administration, 41*(2), 205-223.

Long, J. S., & Freese, J. (2014). *Regression models for categorical dependent variables using Stata* (Vol. 3rd). College Station, Tex: StataCorp LP.

Lorsch, J. W. (2013). Contingency Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 144-147). Tousand Oaks, CA: SAGE Publications, Inc.

Lowndes, V., Pratchett, L., & Stoker, G. (2001). Trends In Public Participation: Part 1 – Local Government Perspectives. *Public Administration, 79*(1), 205-222.

McKinney, M., & Harmon, W. (2002). Public Participation in Environmental Decision Making: Is It Working? *National Civic Review, 91*(2), 149-170.

Merchant, C. (2007). *American environmental history: an introduction*. New York: Columbia University Press.

Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology, 83*(1), 340.

Mitchell, G. E., O'Leary, R., & Gerard, C. (2015). Collaboration and Performance: Perspectives From Public Managers and NGO Leaders. *Public Performance & Management Review, 38*(4), 684.

Moynihan, D. P. (2003). Normative and Instrumental Perspectives on Public Participation: Citizen Summits in Washington, D.C. *The American Review of Public Administration, 33*(2), 164-188.

Nabatchi, T. (2010). Addressing the Citizenship and Democratic Deficits: The Potential of Deliberative Democracy for Public Administration. *The American Review of Public Administration, 40*(4), 376-399.

Nabatchi, T. (2012a). *Manager's Guide to Evaluating Citizen Participation*. Washington, D.C.: The IBM Center for The Business of Government.

Nabatchi, T. (2012b). Putting the "Public" Back in Public Values Research: Designing Participation to Identify and Respond to Values. *Public Administration Review, 72*(5), 699-708.

Nabatchi, T., & Amsler, L. B. (2014). Direct Public Engagement in Local Government. *The American Review of Public Administration, 44*(4), 63S-88S.

Nabatchi, T., Ertinger, E., & Leighninger, M. (2015). The Future of Public Participation: Better Design, Better Laws, Better Systems: Future of Public Participation. *Conflict Resolution Quarterly, 33*(S1), S35-S44.

Nabatchi, T., & Leighninger, M. (2015). *Public participation for 21st century democracy*. Hoboken, New Jersey: Jossey-Bass.

Nalbandian, J. (1999). Facilitating Community, Enabling Democracy: New Roles for Local Government Managers. *Public Administration Review, 59*(3), 187-197.

O'Faircheallaigh, C. (2010). Public participation and environmental impact assessment: Purposes, implications, and lessons for public policy making. *Environmental Impact Assessment Review, 30*(1), 19-27.

O'Leary, R. (2010). Guerrilla Employees: Should Managers Nurture, Tolerate, or Terminate Them? *Public Administration Review, 70*(1), 8-19.

O'Leary, R., & Pizzarella, C. (2008). (Not) Measuring the Performance of Environmental Conflict Resolution: Lessons from U.S. State Programs. *International Review of Public Administration, 13*(1), 11-26.

OIG. (1996). *Report of Audit: Agency Management of the Superfund Technical Assistance Grant (TAG) Program*. (6100160). Washington, D.C.

Osborne, D., & Gaebler, T. (1992). *Reinventing government: how the entrepreneurial spirit is transforming the public sector*. Reading, MA: Addison-Wesley Pub. Co.

Palerm, J. R. (2000). An Empirical-Theoretical Analysis Framework for Public Participation in Environmental Impact Assessment. *Journal of Environmental Planning and Management, 43*(5), 581-600.

Petts, J., & Leach, B. (2000). Evaluating Methods for Public Participation: Literature Review. *Environment Agency (UK)*.

Pfeffer, J. (2013). Resource Dependence Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 659-664). Tousand Oaks, CA: SAGE Publications, Inc.

Popp, D., Newell, R. G., & Jaffe, A. B. (2010). Chapter 21 - Energy, the Environment, and Technological Change. In H. H. Bronwyn & R. Nathan (Eds.), *Handbook of the Economics of Innovation* (Vol. Volume 2, pp. 873-937): North-Holland.

Critical Issues Facing the Superfund Program, 18 (2006).

Renn, O., Webler, T., Rakel, H., Dienel, P., & Johnson, B. (1993). Public Participation in Decision Making: A Three-Step Procedure. *Policy Sciences, 26*(3), 189-214.

Richardson, R. (2003). Governing Western Mineral Resources: The Emergence of Collaboration. *Natural Resources Journal, 43*(2), 561-586.

Roberts, N. C. (1997). Public Deliberation: An Alternative Approach to Crafting Policy and Setting Direction. *Public Administration Review, 57*(2), 124-132.

Roberts, N. C. (2008). Direct Citizen Participation - Challenges and Dilemmas. In N. C. Roberts (Ed.), *The Age of Direct Citizen Participation* (pp. 3-17). Armonk, NY: M.E. Sharpe.

Rosener, J. B. (1978). Citizen Participation: Can We Measure Its Effectiveness? In N. C. Roberts (Ed.), *The Age of Direct Citizen Participation* (pp. 3-17). Armonk, NY: M.E. Sharpe.

Rowe, G., & Frewer, L. J. (2000). Public Participation Methods: A Framework for Evaluation. *Science, Technology, & Human Values, 25*(1), 3-29.

Schroeter, R., Scheel, O., Renn, O., & Schweizer, P.-J. (2016). Testing the value of public participation in Germany: Theory, operationalization and a case study on the evaluation of participation. *Energy research & social science, 13*, 116-125.

Schumaker, P. (1993). Estimating the First and (Some of the) Third Faces of Community Power. *Urban Affairs Review, 28*(3), 441-461.

Schweitzer, L., & Stephenson, M. (2007). Right Answers, Wrong Questions: Environmental Justice as Urban Research. *Urban Studies, 44*(2), 319-337.

Senecah, S. L. (2004). The Trinity of Voice: The Role of Practical Theory in Planning and Evaluating the Effectiveness of Environmental Participatory Processes. In S. P. Depoe, J. W. Delicath & M.-F. A. Elsenbeer (Eds.), *Communication and Public Participation in Environmental Decision Making* (pp. 13-34). Albany: State University of New York.

Smith, Z. A. (2013). *The environmental policy paradox* (Vol. Sixth). New York;London;: Routledge.

Stewart, W. J. (2006). *Collins dictionary of law* (Vol. 3rd). Glasgow Collins.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management. The Academy of Management Review, 20*(3), 571.

Suddaby, R. (2010). Challenges for Institutional Theory. *Journal of Management Inquiry, 19*(1), 14-20.

Suddaby, R. (2013). Institutional Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 379-384). Tousand Oaks, CA: SAGE Publications, Inc.

Taylor, F. W. (1911). *The Principles of Scientific Management*. New York: Harper Brothers.

Thomas, J. C. (1995). *Public Participation in Public Decisions*. San Francisco: Jossey-Bass Publishers.

Toker, C. W. (2004). Public Participation or Stakeholder Frustration: An Analysis of Consensus-Based Participation in the Georgia Ports Authority's Stakeholder Evaluation Group. In S. P. Depoe, J. W. Delicath & M.-F. A. Elsenbeer (Eds.), *Communication and Public Participation in Environmental Decision Making* (pp. 175-200). Albany: State University of New York Press.

Tolbert, P. S., & Zucker, L. G. (2013). Neo-Institutional Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 505-508). Tousand Oaks, CA: SAGE Publications, Inc.

Trochim, W. M. K. (2001). *Research methods knowledge base* (Vol. 2nd). Cincinnatti, OH: Atomic Dog.

Tuler, S., & Webler, T. (2010). How Preferences for Public Participation are Linked to Perceptions of the Context, Preferences for Outcomes, and Individual Characteristics. *Environmental Management, 46*(2), 254-267.

Upreti, B. R., & van der Horst, D. (2004). National renewable energy policy and local opposition in the UK: the failed development of a biomass electricity plant. *Biomass & Bioenergy, 26*, 61-69.

Ventriss, C., & Pecorella, R. (1984). Community Participation and Modernization: A Reexamination of Political Choices. *Public Administration Review, 44*(3), 224.

Vigoda-Gadot, E., Eldor, L., & Schohat, L. M. (2013). Engage Them to Public Service: Conceptualization and Empirical Examination of Employee Engagement in Public Administration. *The American Review of Public Administration, 43*(5), 518-538.

Vigoda, E. (2002). From Responsiveness to Collaboration: Governance, Citizens, and the Next Generation of Public Administration. *Public Administration Review, 62*(5), 527-540.

Wagner-Tsukamato, S. (2013). Scientific Management. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 677-681). Tousand Oaks, CA: SAGE Publications, Inc.

Wang, X. (2001). Assessing Public Participation in U.S. Cities. In N. C. Roberts (Ed.), *The Age of Direct Citizen Participation* (pp. 401-415). Armonk, Ny: M.E. Sharpe.

Webler, T. (1999). The craft and theory of public participation: a dialectical process. *Journal of Risk Research, 2*(1), 55-71.

Webler, T., & Tuler, S. (2006). Four Perspectives on Public Participation Process in Environmental Assessment and Decision Making: Combined Results from 10 Case Studies. *Policy Studies Journal, 34*(4), 699-722.

Webler, T., Tuler, S., & Krueger, R. (2001). What is a Good Public Participation Process? Five Perspectives from the Public. *Environmental Management, 27*(3), 435-450.

Weeks, E. C. (2000). The Practice of Deliberative Democracy: Results from Four Large-Scale Trials. In N. C. Roberts (Ed.), *The Age of Direct Citizen Participation* (pp. 296-313). Armonk, NY: M.E. Sharpe.

Wernstedt, K. (2001). Devolving Superfund to Main Street. *Journal of the American Planning Association, 67*(3), 293.

Wernstedt, K., & Hersh, R. (1998). Through the Lense Darkly - Superfund Spectacles on Public Participation on Brownfields Sites. *Risk: Health, Safety & Environment, 4*(9), 153-173.

Williamson, O. E. (1999). Public and Private Bureaucracies: A Transaction Cost Economics Perspective. *Journal of Law, Economics, & Organization, 15*(1), 306-342.

Williamson, O. E. (2010). Transaction Cost Economics: The Natural Progression. *The American Economic Review, 100*(3), 673-690.

Worsham, J. (2011). Principal-Agent Theory (pp. 1352-1354).

Yin, R. K. (2009). *Case study research: design and methods* (Vol. 5.;5;). Los Angeles, Calif: Sage Publications.

Zaccour, G. (2013). Game Theory. In E. H. Kessler (Ed.), *Encyclopedia of Management Theory* (pp. 297-302). Tousand Oaks, CA: SAGE Publications, Inc.

Lance R. Cooper, P.E.

Education

Ph.D. in Public Administration, Syracuse University (Expected 2017)
Bachelor of Science in Engineering (Civil), Arkansas State University (1985)
Master of Science - Environmental and Water Resources Engineering, Vanderbilt University (1987)

Professional Registrations

Registered Professional Engineer (Civil) in Louisiana (1994)
Registered Professional Engineer (Environmental) in Louisiana

Experience Summary

Twenty-five years of environmental consulting experience and five years of academic research and University teaching experience. Served in various consulting positions including principal-in-charge, project manager, office manager, engineering manager and project engineer. Consulting experience encompasses a variety of regulatory programs (CERCLA, RCRA, air, solid waste, natural resources), industrial sectors (oil and gas exploration and production, oil and gas refining, wood treating, manufacturing, chemical production), and locations (Louisiana, Texas, Oklahoma, Mississippi, Arkansas, Ohio, Pennsylvania, Illinois, Oregon, Washington, and Idaho as well as Europe, Asia, Central and South America). In addition, performed numerous non-regulatory, business-driven projects (corporate risk evaluation, insurance assessment, environmental and business due diligence, litigation support and remediation reserve setting and evaluation). Taught undergraduate and graduate classes in Environmental Studies, Environmental Policy, Research Methods and Public Administration and Policy.

2013 – present, Michael Pisani & Associates, Inc., Senior Project Manager and Shareholder

2012-2013, Rochester Institute of Technology, Visiting Assistant Professor, Science, Technology, and Policy Department

2011-2012, State University of New York, Environmental Science and Forestry, Adjunct Professor, Environmental Science Department

2006-2010, Syracuse University, Research Assistant, Public Administration Department

1988-2006, Environmental Resources Management, Senior Associate

1987-1988, CH2M Hill, Project Engineer

1985-1987, Vanderbilt University, US Department of Energy Engineering Intern