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BEST PRACTICES for:

Public Outreach and Education for Carbon Storage Projects

2013 Revised Edition

NATIONAL ENERGY TECHNOLOGY LABORATORY

U.S. DEPARTMENT OF ENERGY

Disclaimer

Cover Photos

Top Left: SECARB teacher training session

Center: MGSC–Illinois Geological Survey CO_2 storage demonstration

Bottom Left: SECARB tour of Plant Daniel CO_2 pilot injection
(Credit: Southern Company–Mississippi Power)

Bottom Right: BSCSP information session

Public Outreach and Education for Carbon Storage Projects

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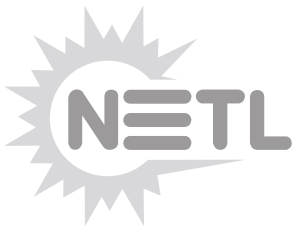
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List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
3-D	Three-Dimensional
Big Sky	Big Sky Carbon Sequestration Partnership
CBM	Coalbed Methane
CCP	CO_2 Capture Project
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
CSI	Climate Status Investigations
DOE	U.S. Department of Energy
ECBM	Enhanced Coalbed Methane
EERC	Energy and Environmental Research Center
EIS	Environmental Impact Statement
EOR	Enhanced Oil Recovery
EPA	U.S. Environmental Protection Agency
FEP	Features, Events, and Processes
GCCC	Gulf Coast Carbon Center
GIS	Geographic Information System
GHG	Greenhouse Gas
H_2S	Hydrogen Sulfide
IABC	International Association of Business Communicators
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LBNL	Lawrence Berkeley National Laboratory
MGSC	Midwest Geological Sequestration Consortium
MIT	Mechanical Integrity Test
MRSCP	Midwest Geological Carbon Sequestration Consortium
NATCARB	National Carbon Sequestration Database and Geographical Information System
NETL	National Energy Technology Laboratory
NEPA	National Environmental Policy Act
NGO(s)	Non-Governmental Organization(s)
OWG	Outreach Working Group
PCOR	Plains CO_2 Reduction Partnership
PPE	Personal Protection Equipment
PRSA	Public Relations Society of America
RCSP	Regional Carbon Sequestration Partnership
SECARB	Southeast Regional Carbon Sequestration Partnership
SWP	Southwest Regional Partnership
UIC	Underground Injection Control
WESTCARB	West Coast Regional Carbon Sequestration Partnership

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Executive Summary[1]

This manual represents a distillation of best practices for public outreach and education to support carbon dioxide (CO_2) storage projects; it is derived from the experiences of the seven Regional Carbon Sequestration Partnerships (RCSPs). Within the scope of the RCSP initiative, the partnerships have recognized the importance of conducting public outreach in tandem with the pilot-scale field tests. The goal of these field tests is to validate CO_2 storage opportunities in each of the RCSP regions. Results obtained from these efforts are providing the foundation for future commercialization efforts – and even more extensive outreach efforts. The best practices highlighted in this manual add a valuable perspective by addressing the practical implications of implementing CO_2 storage projects across a variety of U.S. geologic and cultural settings. The objective of the Public Outreach and Education for Carbon Storage Projects Best Practices Manual is to communicate the lessons learned and to recommend best practices emerging from the first six years of public outreach conducted by the seven RCSPs. The manual is intended to assist project developers in understanding and adopting best practices in outreach to support CO_2 storage projects. Although project developers are the primary audience for this document, other stakeholders may find the contents of this document of interest.

Early CO_2 storage projects have been highly visible and their success will likely impact future CO_2 storage projects. The primary lesson learned from the RCSPs' experience is that public outreach should be an integrated component of project management. Conducting effective public outreach will not necessarily ensure project success, but underestimating its importance can contribute to delays, increased costs, and community ill will. Effective public outreach involves listening, sharing information, and addressing concerns through proactive community engagement. The intent of the individuals who have contributed to this document is to facilitate project success and boost the effectiveness of outreach efforts. The following best practices represent a framework for designing an outreach program associated with a CO_2 storage project. Based on the specific characteristics of a planned project, the project developers, and the community in which the project is planned, some of these best practices may be more relevant than others. This manual was developed as a means to share the experience gained to date and inform future project developers.

Best Practice 1: Integrate Public Outreach with Project Management

Best Practice 2: Establish a Strong Outreach Team

Best Practice 3: Identify Key Stakeholders

Best Practice 4: Conduct and Apply Social Characterization

Best Practice 5: Develop an Outreach Strategy and Communication Plan

Best Practice 6: Develop Key Messages

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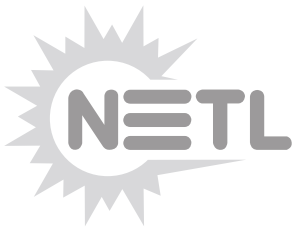
[1] The first edition of this document was published in December 2009. This 2013 Revised Edition includes modifications to address a 2012 National Research Council (NRC) Report, titled, "Induced Seismicity Potential in Energy Technologies: The National Academies Press."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Public Outreach and Education for Carbon Storage Projects

1.0 Introduction

Carbon dioxide (CO_2) is the most common anthropogenic greenhouse gas (GHG). According to the U.S. Environmental Protection Agency (EPA), the United States emitted roughly 6.2 billion tons of CO_2 in 2006 due to the combustion of fossil fuels.[2] Nearly 40 percent of these emissions were due to combustion of fossil fuels to generate electricity.[3] Carbon capture and storage (CCS) is an emerging strategy for preventing the emission of anthropogenic CO_2 into the atmosphere. The long-term storage of anthropogenic CO_2 is a promising technology for slowing, and ultimately reversing, the buildup of GHG emissions in the atmosphere. Carbon dioxide storage can take place in several settings, including terrestrial ecosystems (biomass, soils, and trees), oceans, and deep geologic formations. The latter, known as geologic CO_2 storage, is the focus of this manual and is referred to as "CO_2 storage" hereafter. Underground geologic features, such as depleted oil and gas reservoirs; unmineable coal beds; and deep, brine-filled (saline) rock formations, are all potentially suitable reservoirs for secure, long-term CO_2 storage.

The U.S. Department of Energy (DOE) estimated a potential storage capacity of 3,900 billion tons of CO_2 within geologic reservoirs in the United States and parts of Canada.[4] This capacity estimate is sufficient to store CO_2 emissions for at least several centuries from large "point sources" in these two countries at current emission rates. The Intergovernmental Panel on Climate Change (IPCC) states, "…to continue to extract and combust the world's rich endowment of oil, coal, peat, and natural gas at current or increasing rates, and so release more of the stored carbon into the atmosphere, is no longer environmentally sustainable, unless CCS technologies currently being developed can be widely deployed."[5] The prospect of achieving significant CO_2 emission cuts through CO_2 storage has led to growing interest and investment by governments and the private sector to develop the necessary technology and to demonstrate how this approach can be safely and effectively implemented.

One of the prominent CO_2 storage demonstration programs in the United States is DOE's Regional Carbon Sequestration Partnership (RCSP) Initiative managed by DOE's National Energy Technology Laboratory (NETL). The RCSP Initiative has the goal of developing a network of public-partnerships at the regional level to lay the groundwork for practical and environmentally sound CO_2 storage. In Fall 2003, DOE funded seven regional partnerships to work with regional experts to identify and characterize major CO_2 sources; identify and characterize major geologic zones suitable for storage of CO_2; address regulatory needs, best practices, and CO_2 storage project opportunities; and undertake outreach and education (see Appendix 1 for additional information).

At the onset of the RCSP Initiative, CO_2 storage was unknown to many audiences, including policy developers, community leaders, nongovernmental organizations (NGOs), educators, and the general public. During the early years of the RCSP Initiative, public opinion surveys revealed little public familiarity with the term "CO_2 storage" and even less understanding of the meaning of the term.[6, 7] Low public awareness, combined with related concerns

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2 U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006," Table 2-5: CO_2 Emissions For Fossil Fuel Combustion By End Use Sector, Washington, DC (2008).

3 Ibid.

4 DOE – Office of Fossil Energy (FE), NETL: Carbon Storage Atlas of the United States and Canada, Second Edition, 2008.

5 B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), "Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," 2007, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

6 Curry, T.E., D.M. Reiner, M.A. de Figueiredo, and H.J. Herzog, "A Survey of Public Attitudes towards Energy and Environment in Great Britain," March 2005.

7 Reiner, D.M., T. Curry, M. de Figueiredo, H. Herzog, S. Ansolabehere, K. Itaoka, M. Akai, F. Johnsson, M. Odenberger, "An International Comparison of Public Attitudes towards Carbon Capture and Storage Technologies," presented at the 8th International Conference on Greenhouse Gas Control Technologies, Trondheim, Norway, June 2006.

on climate science and fuel preferences, suggested that ongoing outreach and education would be critical to boosting the public's understanding of CO_2 storage and to getting their informed input to project implementation decisions. These concerns include: the degree to which an individual believes climate change is occurring and could personally affect his or her way of life; the feasibility of other carbon-reducing options; the status of CO_2 storage as an emerging technology with potential risks; and environmental concerns over expanded use of coal, petroleum products, or other fuels.

In recognition of the importance and complexity of the issues involved with CCS, DOE charged the RCSPs with developing and implementing an outreach and education program that would:

- Raise the awareness and understanding of the general population in the RCSP regions with respect to long-term CO_2 storage in geologic formations for GHG reduction.
- Focus outreach on audiences in areas where CO_2 storage validation tests or long-term demonstrations are planned.

The significant technical underpinnings for CO_2 storage are found in the processes of enhanced oil recovery (EOR) (where CO_2 is injected into mature oil fields to help lower the viscosity of residual oil that might not be recovered otherwise), underground natural gas storage, and disposal of industrial fluid wastes in the subsurface. There is extensive information available that describes the discovery of CO_2 in the subsurface; the history of CO_2 use in EOR and now the new application in geologic storage; the geologic occurrence of CO_2; and the underlying technologies of CO_2 capture, transport, and underground storage and monitoring. However, access to information is of little use if the efforts for sharing that information are poorly matched to the needs of the target audiences. This manual represents a distillation of best practices for outreach and education derived from the experience of the seven RCSPs that have conducted CO_2 storage field verification tests and are now planning and/or conducting large-scale CO_2 storage demonstrations in their respective regions. These best practices add a valuable perspective by addressing the practical implications of implementing CO_2 storage projects across a variety of U.S. geologic and cultural settings. The manual represents a framework for designing an outreach program associated with a CO_2 storage project. Based on the specific characteristics of a planned project, the project developers, and the community in which the project is planned, some of these best practices may be more relevant than others. This manual is intended to assist project developers in understanding and adopting outreach best practices to support CO_2 storage projects. Although project developers are the primary audience, other stakeholders will likely find this manual of interest.

The Lifecycle and Parameters of CO_2 Storage Projects

Most CO_2 storage projects will unfold through a series of overlapping stages, including project conceptualization and fundamental source/sink matching, site screening and selection, site characterization, project design and permitting, project operations, closure, and post-closure monitoring and environmental stewardship (See Figure 1-1). In some stages, obtaining legal or regulatory permission for several aspects of a project, such as access to public and private property, use of pore space, and permits for drilling and CO_2 injection, will necessitate some level of public interaction on behalf of the project team. Furthermore, most organizations strive to develop and maintain good relations with the communities where their facilities are located. One goal of public outreach is to establish open lines of communication between project developers and a host community; this will provide a means to solicit community input, build trust, and ensure the community that the project will be safely and responsibly carried out. In many cases the developer may have longstanding relationships with the community where a project might occur. When this is true, a goal of public outreach is to build on those relationships.

Despite important differences, CO_2 storage projects all share some common characteristics – they occupy land at the surface of the earth, as well as a three-dimensional (3-D) space in the subsurface. As such, CO_2 storage projects have a highly visible surface component and a subsurface component that can only be visualized through the use of monitoring technologies.

CCS projects may be affiliated with existing CO_2 sources (i.e., industrial plants) or they may be part of a plant expansion or a new development. Thus, local stakeholders may have a long history with the

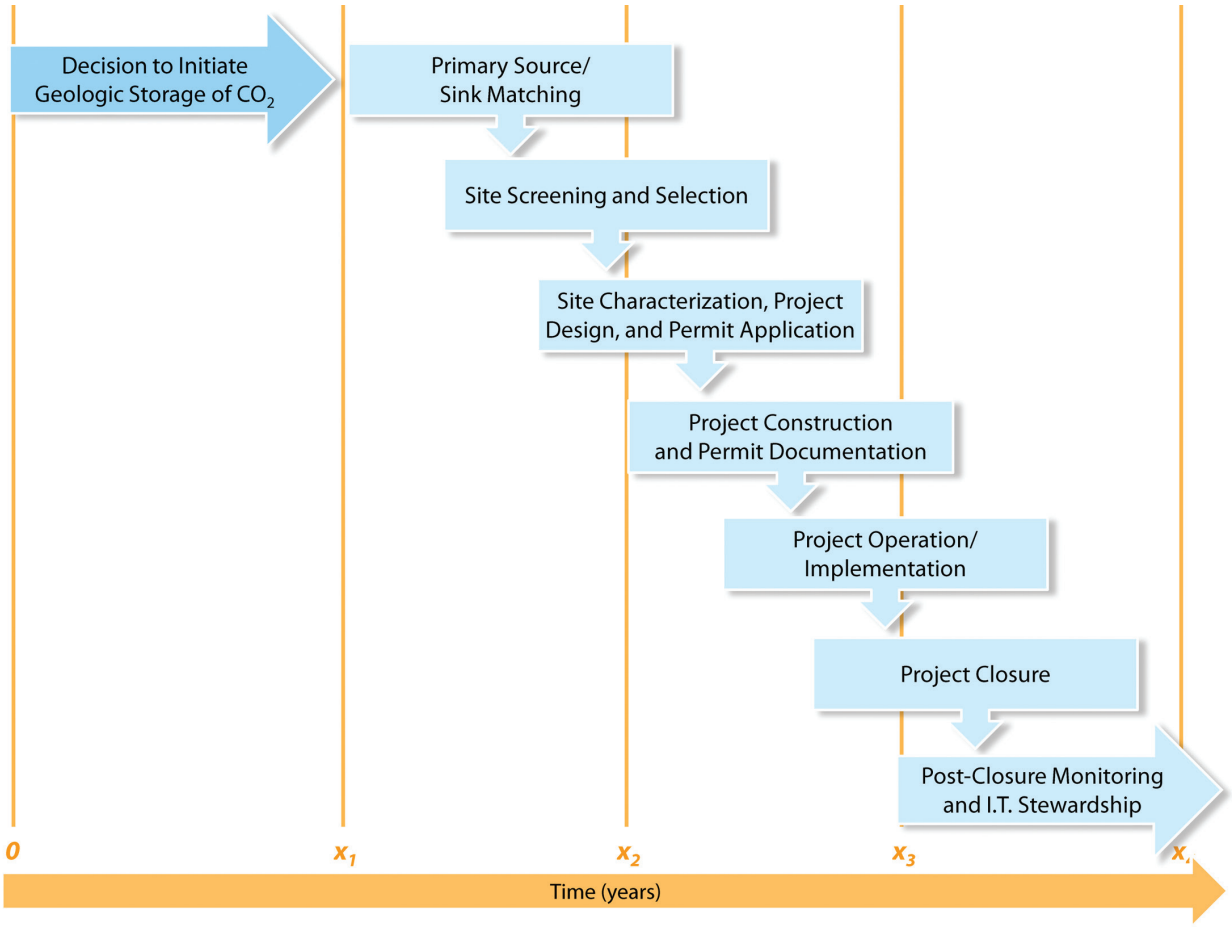

Figure 1-1: Public Outreach Process Flow Chart

CO_2 source or, in the case of a new facility, may be unfamiliar with both the operator and the CO_2 storage operations proposed in conjunction with the new facility. In the future, projects may also take the form of central regional CO_2 repositories serving a number of CO_2 sources linked by pipeline(s).

In addition, the level of activity at a CO_2 storage project site can range from minimal alterations to oil field equipment in the case of an EOR project to major engineering projects that entail alterations to the CO_2 source, pipeline construction, drilling injection wells, and installing monitoring systems.

Public Outreach – What Is It? Why Is It Necessary?

Public outreach involves both the transfer of information and a means to gauge the success of the transfer. It begins at the onset of the project, continues through the close of the project, and involves each individual on the project team. In addition, public outreach encompasses an array of activities through which information about CO_2 storage projects is shared with, and feedback is obtained from, stakeholders. In this context, stakeholders are the parties who believe they are most affected by CO_2 storage project decisions.[8] Hence, the group of relevant stakeholders for a particular project will be somewhat self-defined based on the project specifics.

When done effectively, public outreach can be used to help identify the main values and concerns of a host community as well as the perceived benefits of a proposed project. This understanding can help a project team to foster public acceptance by addressing the issues of relevance to a particular community. However, it should be noted that public outreach, even when done well, does not guarantee public acceptance of a given CO_2 storage project.

[8] Cox, Robert. 2009 Edition. Environmental communication and the public sphere. Sage Publications, Thousand Oaks, California, USA.

The RCSPs' concept of public outreach involves significant efforts to understand, anticipate, and address public perceptions and concerns about CO_2 storage in a community being considered for a project. Ideally, public outreach can lead to a mutually beneficial outcome where project developers move ahead with the support of well-informed stakeholders who are comfortable with the project benefits and potential risks and trust the project team.

In the absence of a concerted outreach effort, research and experience suggest that community members will form their opinions of CO_2 storage technology based on elements[9, 10] that may not reflect the technical merit of the project. Public opinions may be influenced by inaccurate perceptions of project risks or benefits; by whether the project is viewed as consistent with the community's long-term goals; by social factors, such as the degree of trust placed in the project team and government agencies; and by the perceived equity in the process for developing a project. Media coverage; word-of-mouth; and information sources, such as blogs and other electronic media, often influence how individuals form opinions. Perceptions that may seem exaggerated from a technical point of view must be taken seriously. Perceived risks are no less "real" for purposes of implementing a public outreach program. If these concerns are not addressed by project developers, they can rapidly transform into public opposition.

BIG SKY CARBON SEQUESTRATION PARTNERSHIP (BSCSP)

Value of Outreach

In the initial stages of the Big Sky Carbon Sequestration Partnership's (BSCSP) Phase II pilot test, the focus was on understanding the project's technical component and project logistics, and obtaining the necessary permits. Outreach activities and community engagement for the project was limited. The partnership did not view outreach as a priority because of the small amount of CO_2 that was injected and unfamiliarity with the local community. As the project moved forward, local community groups expressed valid concerns, largely due to a separate initiative of a developer interested in building a coal-based power plant on the pilot test location. Several groups in the community opposed the power plant and did not trust the developer. These feelings and attitudes transferred to the pilot test, and some individuals vocally opposed the project. At this point, the project team launched a concerted public outreach effort. The project location was moved to a paper mill. A member of the BSCSP outreach team and the paper mill communications manager collaborated to develop an outreach strategy and materials that described the benefits of the pilot and its importance in providing the public with sound data on CO_2 storage technology. The team conducted dozens of interviews and discussions with stakeholders in order to develop a better understanding of the specific concerns and how they could be addressed. The media was briefed on the project prior to the issue of a press release containing new project details and information on the partnership with the paper mill. In addition to interviews, interested groups were given the chance to attend an open house and take a tour. The project team also met with several regional geology professors and invited their classes to tour the laboratories and the drilling site. This outreach resulted in an increased understanding of the pilot's objective, clarified misconceptions held by some individuals in the community, and reduced apprehensiveness about the project. These efforts resulted in little to no public opposition toward the modified pilot test, positive articles in the press, reduced project delays, and improved public trust and public relations. Additionally, student interns have become involved with the research.

Figure 1-2: BSCSP Information Session

[9] Bradbury, J., K. Branch, J. Heerwagen, and E. Liebow, "Public Involvement In Chemical Demilitarization," Paper Presented at the 20th Annual Conference and Exposition of the National Association of Environmental Professionals, Washington D.C., June 10-13, 1995, Battelle Research Center.

[10] Bradbury, J., I. Ray, T. Peterson, S. Wade, G. Wong-Parodi, and A. Parker, "The Role of Social Factors in Shaping Public Perceptions of CCS: Results of Multi-State Focus Group Interviews in the U.S.," Paper presented at GHGT-9 Conference in Washington, DC, November 2008, IEA.

2.0 Best Practices in Public Outreach Programs and Activities

The most valuable lesson learned by the RCSPs is that public outreach needs to be incorporated as an integral component of CO_2 storage project management – ideally starting at the time of project conceptualization. Although there is no single formula for conducting effective outreach, success typically relies on the following:

- A strong, capable outreach team.
- A productive working relationship with the project's technical and regulatory teams.
- Extensive preparation that involves listening to the community.
- Readily accessible information that explains the project and addresses local concerns.
- Frequent monitoring of the project and outreach team performance.
- The flexibility to make changes as conditions warrant.

The following best practices are intended to serve as a framework to aid developers in designing and implementing effective outreach programs. A continuing theme throughout this manual is that outreach needs to take into account the needs and concerns of the target audience as well as the extent to which the developer already has relationships in the community. In some cases, it may be appropriate to emphasize certain best practices over others. This can only be determined on a case-by-case basis. Best Practices #1 through #4 generally relate to "doing the homework" necessary to understand the community in which a project will be located as well as other stakeholders. Best Practices #5 through #7 generally relate to developing outreach plans and materials that reflect what has been learned about the community and its concerns. Best Practices #8 through #10 generally relate to the operational steps of outreach including implementation, assessment, and refinement as necessary. Although these best practices are presented in a sequential order, the RCSPs' experience shows that they will be utilized in an iterative manner.

Best Practice 1: Integrate Public Outreach with Project Management

Timing can have a significant effect on the cost of implementing a CO_2 storage project. Carbon dioxide storage projects proceed in a series of overlapping stages (Figure 1-1). By including outreach in the critical path of a CO_2 storage project, outreach activities will be more effective, in sync with other key project stages, and beneficial to the overall project. A key component of integrating public outreach with project management is building in the time necessary to accomplish the various steps in advance of engaging the public. Questions like how and when to engage stakeholders need to be addressed as part of the overall project management plan. This will be especially critical during the early stages of a CO_2 storage project.

As a project progresses through the various stages, there are several outreach points when the project personnel will seek (and may be legally required) to interact with the public, or when the project will become highly visible. In addition, the public could learn of a project at an early stage in the project lifecycle before the outreach efforts have officially begun. An effective outreach program supports each of these project stages (Figure 1-1) and includes measures for handling early notice by the public.

The RCSPs believe that it is preferable to proactively implement public outreach in order to avoid having to act in a reactive or responsive mode. Flexibility also plays a role because the project team may need to adjust the nature and timing of outreach activities if events do not go as planned (e.g., the public learns about the project before it has been announced). As part of the site selection process, it is useful to ensure that the key project steps are fully understood for the jurisdiction in which a potential site is located. This includes developing an understanding of the regulatory process, as well as any other necessary permissions or approvals. The outreach team should also consider the process that will be internally used to complete final review and production of outreach materials. This kind of analysis will assist the project team in taking a proactive approach to project management.

Outreach points often coincide with times of high exposure for a project. To prepare for high visibility outreach points and required engagement activities, it is useful to review

the full range of regulatory permits and approvals that a storage project must obtain. They likely include the following (and may include others):

- National Environmental Policy Act (NEPA) review (if Federal funds or lands are involved) or comparable state legislation or other requirement for an Environmental Impact Statement (EIS).
- Permission to conduct seismic surveys, access private property, and/or use public roads.
- Access to private land for site characterization activities, surface equipment, and/or monitoring activities.
- Access to pore space for CO_2 storage or in zones potentially impacted by the CO_2 storage project.
- Permission for drilling non-injection wells (e.g., stratigraphic test wells, monitoring wells, or other exploratory wells).
- A permit for injection (including completing a public hearing, staged approvals of project design and construction).
- CO_2 injection permit renewals.
- Approvals by other regulatory agencies, including those with jurisdiction over wildlife areas, historic or cultural sites, local zoning, or business oversight, etc.
- Certification of closure.

In addition to outreach in support of permitting and approvals, several other possible points of public interaction include:

- Contract requests for qualifications or proposals.
- Meetings or focus groups with stakeholders.
- Interviews with community leaders.
- Start of drilling or CO_2 injection operations.
- Reporting of monitoring data to the regulatory agency.
- Site visits or tours.
- Periodic scheduled project update meetings with the public.
- Interactions with the media.
- Other community events (e.g., farm shows, science open houses).

A final point of public contact that must be considered in planning for CO_2 storage projects is a potential crisis event. This topic is covered in Appendix 4: Sample Communications Plan.

Although it may not be possible to anticipate all occasions, events, or circumstances for public outreach at the inception of a CO_2 storage project, early and ongoing consideration of these matters will help the project team to define areas where more information is needed and ensure that outreach efforts are coordinated with other activities throughout all project stages.

Best Practice 2: Establish a Strong Outreach Team

Outreach is not simply an add-on activity – it is integral to implementation of the project. It is essential to establish a strong outreach team with a clearly defined structure that delineates roles and responsibilities covering both internal and external communication. Carbon dioxide storage projects can involve many individuals from the host company and, potentially, from several companies, including: plant managers, scientists, government relations officers, company spokespersons and communications personnel, safety personnel, onsite supervisors, technical service providers, and other personnel who are key decision makers in project communications. These individuals become the face of the project – whether in the community where the project is located or at other levels (e.g., state or Federal); their words and conduct can have a direct influence on the public's perception of whether the project is being carried out professionally and in a safe, transparent manner.

It is imperative that the outreach team include individuals who are involved in and knowledgeable about the technical details of the project, as well as individuals who have backgrounds in communication, education, and community relations. In cases where multiple companies are involved, it is invaluable to include employees who have some knowledge of the local community and can help to identify opinion leaders, interested citizens, and other key stakeholders. These employees may also be able to help identify benefits to the community or may know other individuals or groups who can provide a better understanding of community values.

Given that the outreach team will consist of individuals who also have other responsibilities, care must be taken to ensure coordination of efforts, consistency of information, sensitivity to major concerns, and awareness of good communication practices. As discussed in Best Practice #5, a communications plan should be developed that clearly identifies team member roles and responsibilities, key messages, communication protocols, and other information. This plan should be shared with the outreach team so that all communications reflect a common understanding of stakeholder concerns and perceptions.

Accountability is another key issue. Establishing a structure for the outreach team and identifying "message developers" and spokespeople, as well as someone to provide follow-up information, will help team members to understand their roles and responsibilities.

Many companies have adopted safety as a core element of their corporate culture. In these companies, each individual has a role in ensuring and promoting safety. Ideally, within companies participating in a CO_2 storage project, outreach can become a facet of the corporate culture, where each individual understands his or her role in helping the public to have confidence in CO_2 storage.

Best Practice 3: Identify Key Stakeholders

Early CO_2 storage projects may be viewed as primarily local concerns, but they are being carried out in the context of national and international debates on climate change mitigation. Stakeholders may come from an area that extends well beyond the project's locale and regulatory jurisdiction. The RCSPs believe that it is critical to identify and engage all stakeholders in the project lifecycle.

Section 1 defined stakeholders as parties who believe they are affected by the decisions regarding a CO_2 storage project. At the local level, these may include elected and safety officials, regulators, landowners, citizens, civic groups (including environmental, business, and religious groups), business leaders, media, and community opinion leaders. If storage is associated with a power plant, the plant employees are key stakeholders as they are integrated into the local community. In the case of FutureGen[11] in Illinois, for example, farmers were a key stakeholder group.

Moving further away from the project site, state or regional stakeholders may include elected and appointed officials (e.g., Governors); regulatory agencies, including those with oversight and permitting of pipelines, utilities, natural resources, and environmental protection; economic development groups; and environmental and business groups. At the national level, stakeholders may include: government agencies, such as EPA and DOE; Congressional leaders, committee/subcommittee chairs and key staff; national environmental groups; and other individuals in fields that have an interest in CO_2 storage, such as the financial community and the legal profession. Table 2-1 presents a brief description of various stakeholder groups and strategies for identifying them. Not all of these groups may be relevant in a specific community; the following table is offered to provide an overview of the types of groups that may be important to a project. The RCSPs have also found it valuable to work with a partner with an excellent reputation in the community to identify stakeholders and their concerns.

MIDWEST REGIONAL CARBON SEQUESTRATION PARTNERSHIP (MRCSP)

The Value of a Diversified, Coordinated, Team Approach to Planning

The Midwest Regional Carbon Sequestration Partnership's small-scale CO_2 injection test in Michigan benefitted from the use of a subgroup to develop a strategy and plan for outreach activities related to the test. The team included Battelle technical and outreach staff, staff from the host site who were able to apply local knowledge in planning and implementation, technical and communications staff from two local partners (Core Energy, the site operator, and DTE Energy), and geologists and educational staff from Western Michigan University. The team provided diverse perspectives upon which the project could draw, including technical understanding of planned activities, valuable knowledge about local culture and politics, an existing network of media and local contacts, and effective ways to communicate with local residents.

The team first identified several key points of interaction with the public as the technical project progressed: announcing the test location and initiating site activities; applying for an injection permit; injection activities; and project closure. In effect, outreach planning and implementation consisted of a series of plans tailored to the particular technical stage of the project.

For each project stage, the team developed timelines and a matrix to guide the specific outreach objective and the interactions and associated information materials to be undertaken with identified stakeholders. The matrix, shown in Appendix 2, was an iterative working document that used a systematic approach for identifying and interacting sequentially with stakeholders and gradually built up the necessary information base. It also established clear roles and responsibility for each activity, which proved invaluable for keeping participants coordinated and on track.

[11] Based on discussions with stakeholders involved in the development of proposals for the two candidate sites in Illinois.

Table 2-1: Description of Major Stakeholder Groups

Stakeholder	Key Points	Identification Strategies
Officials	Individuals at the local, regional, state, or national level who represent the community, or who have special interest in matters such as energy and/or climate change, the economy, or the environment. This may include elected or appointed individuals, individuals serving in volunteer capacities, executive boards, and others. Officials will be especially sensitive to activities that may affect their constituents and will want to be informed beforehand so that they can answer any questions raised. It may be valuable to talk with officials to help sort out who has jurisdiction over what area of decision-making in instances where government is multi-layered. For example, there may be several jurisdictions involved in giving approval for activities like a seismic survey. Each jurisdiction could have different requirements – for example, in one jurisdiction the Mayor may have authority over road use and in another it might be a Township Trustee or a Regional Engineer. Insight into how the community makes official decisions, how it is governed, and how it relates to surrounding communities can help a CO_2 storage project proceed smoothly. Some officials may have a strong influence on a project, even if their explicit permission is not required to move ahead with the project. For example, the Commissioner of Public Health may not have jurisdictional authority over a project but may have a leadership role if something goes wrong and therefore may have a strong opinion about the project from the outset. Thus, it is prudent to try to identify and work with officials who may become involved as well as those with direct responsibilities.	• State, county, and community websites • Local phone books • Interviews with stakeholders in this category • Local newspapers
Regulators	Typically, one of three agencies will have primary regulatory oversight of the injection portion of CO_2 storage projects: the EPA regional office, the state environmental protection agency, or the state natural resource (including oil and gas) management agency. However, other regulatory agencies may have authority to review the project or may govern other aspects of a project. For example, regulatory officials in charge of land management, fisheries and wildlife, water, solid waste, air emissions, or other areas of jurisdiction could have a permitting and oversight role. Permits may also require a review for potential impacts on coastal zones, historic sites, and other protected features.	• Federal and state websites or directories • Stakeholder interviews
Business Interests	Economic development professionals may be elected or appointed officials and could also hold volunteer or non-governmental posts. Business groups in a community may be quite interested in a CO_2 storage project. This interest can range from a broad interest in long-term community development to contracting opportunities and/or concerns about secondary impacts on their businesses. In the case of CO_2 storage, there may well be synergistic relationships with the local business community, particularly if the area supports other subsurface economic development activities.	• Local chamber of commerce • Local phone books • Stakeholder interviews • Local newspapers

Stakeholder	Key Points	Identification Strategies
Landowners and Neighbors	These are the individuals most likely to be directly impacted by and interested in the project, although CO_2 storage may not be familiar to them. It is important to identify neighbors along transportation routes for project-related materials and/or for whom site activities will be visible, as well as neighbors who fall within the regulatory Area of Review or from whom access may be required for conducting a seismic survey. Open communication with neighbors ensures they have an opportunity to learn what steps are involved in a project and to voice any questions or concerns.	• Local outreach team members • Town or county clerks, surveyors • Legwork (driving around the site to identify who are the neighbors)
Civic Groups	Even small communities can house hundreds of non-profit civic groups. Although some of these groups will have no interest in a CO_2 storage project, many will and can provide a vehicle for communicating with members of the community and learning about their concerns (e.g., chapters of the League of Women Voters; clubs like Elks, Kiwanis, Rotary, and Shriners; garden clubs).	• Local Chamber of Commerce • Local economic development personnel • Local phonebooks • Group websites
Environmental Groups	Both local and national/international environmental groups have expressed interest in CO_2 storage projects. At the local level, an important subset could be environmental justice groups, particularly if there are "legacy issues" in the community as a result of past emissions/discharges or insufficient reclamation from industrial or governmental operations. At either the national or local level, it is common to find environmental groups that offer cautious support for CO_2 storage because of its potential role in addressing climate change, as well as some groups that oppose the technology out of concern about continued reliance on coal or other factors.	• Stakeholder interviews at local level • Website reviews • Local newspapers • Local outreach team members
Senior Citizens	Increasingly, senior groups are becoming involved in local issues and the national climate change debate. The views held by seniors' organizations can vary as much as any other segment of the community. Their interest in serving as community guardians can range from activism in environmental protection to monitoring the size and role of government.	• Local Chambers of Commerce • Local outreach team members • Local newspapers • Website reviews
Religious Groups	In some communities, the strong social networks of religious groups provide a means for information exchange. Many religious groups have an environmental stewardship focus within which to promote reduced GHG emissions and reduced impact on the environment.	• Ask local religious leaders to help identify groups
Educators	Educators are key disseminators of information in a community. They often serve as a conduit for current events and have the opportunity to interact with multiple stakeholder groups. They can also provide information specifically related to CCS or to a particular local project once they become informed on these subjects.	• State and local boards of education • Community colleges

Best Practice 4: Conduct and Apply Social Characterization

As used in this manual, social characterization[12] is an approach for gathering and evaluating information to obtain an accurate portrait of stakeholder groups, their perceptions, and their concerns about CO_2 storage. This can be applied to identifying the factors that will likely influence public understanding of CO_2 storage within a specific community. The information gathered will enable the project team to develop better insights into the breadth of diversity among community members, local concerns and potential benefits, and assist in determining which modes of outreach and communication will be most effective. Social characterization is initiated in the early stages of a CO_2 storage project and continues throughout the project. The level of effort necessary for this varies based on the community characteristics and the extent to which the developer has existing relationships in the community.

Numerous issues contribute to public perception of CO_2 storage projects. Examples of information collected during social characterization may include:

- **Local economic conditions**: What are the major industries employing individuals in the community? Is the base more service-oriented or industrial? How is the economic health of the community and the region? What is the tax base? What are local energy costs? What are the local perceptions of the likely benefits and role of the project in the community?
- **Local empowerment**: How established/present are local property owners? Do community members feel that they have a voice in making decisions that impact the community? Are there examples of this? What is the community's experience with industry or environmental concerns?
- **Underlying views**: Can any overarching views on climate change, fossil fuel-based energy, alternative energy source, coal mining, drilling, oil and gas production, natural gas storage, and emissions trading be identified? How do local residents view the role of the Federal government in funding research? Is there a history of royalty payments for mineral or other property rights?
- **Environment**: Has a community experienced environmental damages in the past? How was this issue resolved?
- **Energy**: What are the local and regional sources of energy? What role does energy play in the economy?
- **Trust**: Who do the stakeholders trust? Why are these individuals trusted? Do stakeholders trust regulators, project developers, and the Federal government? Are there any key community gatekeepers? Do community members look to local universities or environmental groups for unbiased information?
- **Media**: Is there a strong local media presence? What forms of media are common in the community? Where do individuals get their information?
- **Local education:** What educational resources are in the area – community colleges, universities, schools? Are there academic stakeholders who can be brought into the project? Are there opportunities to collaborate with the local schools in implementing educational programs, such as those developed by the Keystone Center,[13] or with a local community college in developing training opportunities and future employment for local youth?
- **Local traffic conditions**: The impacts of project construction and implementation on local traffic congestion and safety can have a major influence on community opinion regarding a particular project.
- **Local hazards**: Questions may arise concerning issues, such as microseismic events and whether or not drilling in an area or the injection of CO_2 may cause microseismic events. Similarly, in some areas, the ability of CO_2 injection and storage infrastructure to withstand hurricanes or tornadoes may be perceived as having an impact on overall project safety.

Outreach presentations to the local community should show thoughtful consideration of the information learned during the social characterization research.

As is the case with technical geologic site characterization, the process of gathering social data is iterative. A first round of information gathering would focus on readily available sources, including government and civic group websites, media, published demographic data, local news

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[12] This concept of social characterization has emerged from the RCSP experience. See Appendix 3 for additional information about this framework.

[13] The Keystone Center, "Climate Status Investigations," curriculum and teacher training program, see: http://keystone.org/cfe/pel/services/csi.

media archives, local blogs, published surveys and opinion papers (if available), and conversations with stakeholders at all levels (local, state, and national). These data sources may be used to supplement information already available to the site host or project developer. In the same manner that readily available information is used in technical geologic site characterization to develop a preliminary or static geo-model, readily available social information can provide the project developer with a preliminary understanding of community concerns and opportunities for synergy.

A second round of community information collection involves more direct investigation. Key representatives of important community stakeholder groups might be consulted through more detailed discussions or interviews. Representatives may be initially identified through the aforementioned secondary information sources and through a project developer's existing network of contacts and subsequently expanded through a "snowball" approach (i.e., concluding an interview with "who else should I talk to?"). These kinds of community discussions lay the groundwork for relationships that can impact a CO_2 storage project as it moves forward.

As a sense of the issues that need to be addressed is formed, several tools may be used to identify specific concerns. These tools include interviews; focus group sessions; surveys; and small, interactive briefings involving a representative cross-section of the community. Opinions and concerns from the first round of information gathering can be validated, and additional information gained, through such activities.

For stakeholders with strong vested interests or for interested citizens who can afford a greater investment of time, the development of a citizen task force or citizen advisory panel may be appropriate. Such citizen groups enable active citizens to become more involved in project development and possibly serve as a more impartial source of communication to others than the project developer alone. Other tools that could be productive include structured discussions using frameworks such as the Princeton Wedge Game[14] or an approach to risk assessment using the Features, Events, and Processes (FEPs) that is being adapted for CCS by the International Energy Agency (IEA), the CO_2 Capture Project, Lawrence Berkeley National Lab (LBNL), Schlumberger,[15] and others. These open-ended exchanges can be undertaken independently or as part of a citizen task force and can help in identifying crucial acceptance factors that might not stand out in less interactive sessions with the community.

These same tools can be used during project implementation to monitor changes in public perceptions over time. Once a project is underway, canvassing tools like public opinion surveys (which may not be sensitive enough before opinions are formed or informed), may become useful as stakeholders gain experience with a project and the project team.

Best Practice 5: Develop an Outreach Strategy and Communication Plan

The outreach strategy and communications plan ties together the information, planning, and preparation referred to in Best Practices #1 through #4. The outreach strategy formulates an approach to outreach that is tailored to the stakeholder needs and concerns of a particular CO_2 storage project. The strategy should inform the overall plan to manage and monitor project outreach throughout the duration of the project. Specifics will include outreach objectives, outreach tasks, and events that coincide with the project stages, a timeline for outreach activities, and the roles and responsibilities of the outreach team. The outreach strategy will also identify key stakeholders and messages, and the timelines, roles, and responsibilities for producing outreach materials and managing outreach events. A component of the outreach strategy is a communications plan that focuses on representing the project directly to the public and through the media. It should include plans for everyday communications, high visibility communication periods, and communications in the event of a crisis. Crisis communications should cover who has responsibility for specific tasks in the event of an emergency, how emergency services will be handled, and what safety procedures will be followed.

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[14] Carbon Mitigation Initiative (CMI), "Stabilization Wedges: Solving the Climate Problem with Current Technologies," developed by Princeton University, available online at: http://www.princeton.edu/wedges/.

[15] K. Hnottavange-Telleen, I. Krapac, C. Vivalda, "Illinois Basin – Decatur Project: initial risk-assessment results and framework for evaluating site performance," Presented at GHGT-9, Schlumberger Carbon Services, Cambridge, MA, 2008.

A documented outreach strategy is valuable because it enables the outreach team to achieve the following objectives:

- Implement a "no surprises" engagement plan that starts early and publicly defines the project before the media and other outside sources of information weigh in.
- Develop an approach to public outreach that allows stakeholders to:
  - Learn how CO_2 storage works and how it can contribute to global climate change mitigation.
  - Learn about the CO_2 storage project in their region early in its development and be assured that the project developer has the appropriate expertise and will conduct the projected safely.
  - Express their views to project team members in a manner with which they are comfortable.
  - Form relationships with project team members.
  - Proactively and constructively address stakeholder concerns.
  - Monitor the success of outreach activities and events.

As noted in Best Practice #1, the RCSPs have identified several key points of interaction with the public as a CO_2 storage project progresses, including: announcement of the project location and target storage formation; applying for drilling and injection permits; initiating site characterization activities (seismic testing, if applicable, and drilling); infrastructure development, injection activities and routine permit compliance activities (e.g., well mechanical integrity tests); monitoring, verification, and accounting (MVA); and project closure. The outreach strategy can be viewed as a series of plans tailored to the particular technical stages of a project.

To be effective, the outreach team should use a systematic approach (See Appendix 2) for identifying and interacting sequentially with stakeholders, and gradually building up the necessary information base. Elements related to each event include:

- Timeframe.
- Stakeholder group.
- Research – focus groups, media clips, etc.
- Outreach objective(s) for each stakeholder.
- Activities and performance metrics.
- Needed materials/logistics.
- Responsibility.
- Follow-up.

The outreach strategy should include a timeline of activities in parallel to the project steps. The timeline can be derived by working backwards from the expected date of key steps that will involve interaction with the public. For example, a critical path item is often the Underground Injection Control (UIC) permit application process. This activity entails public disclosure of substantial project detail, for which the outreach team may wish to conduct briefings with community leaders and elected/safety officials. The lack of adequate coordination among planners could inadvertently put the outreach team into a reactive, catch-up mode. Appendix 2 provides additional details about the types of activities that are likely to take place during various stages of a project. In general, the RCSPs have found that it is best to begin detailed planning several months in advance of any planned interaction with the public.

The outreach team will need to establish protocols for developing and reviewing outreach materials. Typically, the RCSPs follow a process that allows for the development of print and web materials by the outreach team in consultation with the technical team, followed by review from the site host, others in the management team, DOE officials, and sometimes, external peer reviewers. This review process can take a substantial amount of time and must be accounted for in the planning phase. Slide presentations follow a similar, although somewhat abbreviated, development cycle.

Typically, a project involves various parties with different interests and areas of expertise. For the RCSPs, this has included the research team, the host company and, in some instances, technology providers. All individuals and companies working on the project should be familiar with the outreach strategy and communication plan. One RCSP used a sign-off sheet to ensure that staff read and understood the plan.

Working with the Media

News media are a particularly important community stakeholder group because – despite the best outreach efforts – a large portion of the public is likely to hear about a project, an event, or an incident associated with a project through the media, and individuals are likely to form their opinions based on media coverage.

The strategic tradeoff inherent in media engagement is that the media provide wide distribution of project information at little cost (compared with advertising or direct mailing) in exchange for the loss of control over the message. The best chance of the media conveying the message desired by the project team results from well-prepared and well-executed media outreach efforts, but no effort can ensure success (however, ill-prepared efforts heighten the risk of unfavorable coverage).

In the news business, media types are generally categorized as "print" (e.g., newspapers and magazines) and "broadcast" (e.g., radio and television). Internet media is similarly divided, with blogs and Twitter akin to print, and video sites, such as YouTube, akin to broadcast. The nature and depth of stories for print and broadcast media differ and the associated outreach team preparations for media engagement should differ accordingly.

Media interest is dependent upon the interests and instincts of reporters and their editors. In small communities, individual reporters may cover every type of story. At major daily newspapers in metropolitan areas, reporters have topical "beats," and a CO_2 storage project could be covered by a reporter specializing in science, energy, environment, business, or even human interest (in which case the project would be explained through a story on a profiled individual from a project team). It is useful to be familiar with a reporter's beat assignment and the types of stories he or she has previously written on carbon sequestration, if any, or more broadly on industry and government initiatives to address air quality and climate change.

A media member will report on a project as he or she sees it. The outreach team must provide an adequate understanding so that reporters can relate the story to others; however, providing too much detail can overwhelm busy reporters and the story could be dropped in favor of others that can be quickly completed. Journalism training – and human nature – suggest that every story has at least two sides, and as a result, despite efforts by the outreach team to be objective, it is common for news stories to contain quotes or viewpoints from a project opponent or skeptic, even though their familiarity with the project, or carbon sequestration in general, may be minimal.

Deadlines and timely news govern the media world. Reporters are often writing on short deadlines and do not normally provide drafts of their stories for technical review in advance of publication. Magazines may occasionally provide drafts for review or conduct fact checking, but daily newspapers operate on such short time cycles that this is impractical. Consequently, it is common to find factual errors and lost nuances. Furthermore, reporters sometimes dispense with the qualifications on information typically provided by scientists, such as the preliminary nature of data or limits on the applicability of findings or conclusions. Thus, in general, success is defined as having the major facts and messages about the project come through clearly and correctly in any given story. An understanding of the news media's business environment can assist the outreach team in crafting and supplying project information in a manner that eases the reporter's task in "seeing the news hook" and writing the story, and build relationships for further news coverage.

Best Practice 6: Develop Key Messages

Carbon dioxide storage is technically complex, involving advanced science related to climate change, geology, and other fields of study; public policy related to energy, environment, and the economy; and issues related to risk, safety, and financial assurance. Therefore, identifying a set of key messages that can be consistently repeated in outreach activities and materials can help stakeholders develop a clearer understanding of the project and how their concerns will be addressed. The following is a list of potential topics and key messages that could be used in outreach activities and materials; developers will have to determine the key messages that are appropriate for their project:

Potential Topic Areas:

- Role of CO_2 storage in mitigating CO_2 build-up in the atmosphere.
- Foundation of experience for CO_2 storage, including other projects and injection practices.
- Standard practices used to ensure project safety.
- Role of government in overseeing/regulating CO_2 storage.
- Experience of the project team.
- Potential costs and benefits to the community from CO_2 storage.

Potential Messages:

- Protecting public safety is a priority for these projects.
- Engineered geologic storage of CO_2 has been safely practiced for 30 years.
- Natural geologic CO_2 storage has occurred for millions of years (e.g., Bravo Dome, Sheep Mountain, and McElmo Dome).
- Pipeline transportation of CO_2 is a mature and safe technology.
- Injection and reservoir monitoring are mature technologies.
- There is a well understood approach to site selection and characterization to ensure that geologic conditions are suitable and that storage projects are conducted safely.
- Sensitive tools and techniques for monitoring at the surface, in the wellbore, near-surface and in the subsurface can be used to ensure project safety and to comply with regulations. For example, passive seismic monitoring can be used to detect microseismic events that can occur in the subsurface. Use of this type of monitoring is consistent with recommendations made by the National Research Council.[16]
- There are similarities between the major expansion of oil and natural gas systems after World War II with respect to pipeline and natural gas storage location development and the expected deployment of CO_2 storage projects.

Best Practice 7: Develop Outreach Materials Tailored to the Audiences

First and foremost, the development of outreach materials involves consideration of the intended audience. The amount of information and level of technical detail provided must be tailored to match the audience's degree of interest, education, and time constraints. Any concerns that have been identified, including perceived risks, should be addressed in language and formats suited to the intended audiences. In some instances, stakeholders may need to hear information more than once and in a different format in order to gain an understanding of the subject matter. Having multiple types of materials available provides the outreach team with the flexibility to use different options, depending on the audience's makeup and interests.

The RCSPs have developed a broad array of fact sheets, PowerPoint briefing slides, physical models, videos, websites, posters, and other information materials that are available as examples or for use by others. Collectively, these materials describe DOE's RCSP Initiative, provide specific details about each RCSP, and outline the general processes and mechanics involved in CO_2 storage. A primary objective has been to craft materials that are readily understandable, jargon-free, and contain information that is technically accurate and addresses common concerns, such as safety.

16 National Research Council, 2012, Induced Seismicity Potential in Energy Technologies: The National Academies Press, Washington, D.C., 228 p.

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP (WESTCARB)

The Value of Analogies and Visualization Aids in Communication Materials

Outreach materials can help stakeholders and the public create a mental picture of subsurface CO_2 storage processes even when the reader or listener has little or no familiarity with geology or underground injection. A combination of cogent explanations of porous rock formations and caprock seals along with analogies and other means of helping an individual visualize CO_2 trapping can foster a clearer understanding. Visuals and physical models help in face-to-face meetings (see the Midwest Geologic Sequestration Consortium [MGSC] text box), but there is a comparable need for verbal means of facilitating visualization in telephone or radio interviews, lecture halls, newspaper stories, etc.

The WESTCARB outreach team has observed that CO_2 storage practitioners often use particular natural and industrial analogues to illustrate technical or legal points, but that outside of professional circles, these analogues – such as natural gas storage – may not convey the intended message. For example, a primary design criterion for natural gas storage sites is easy retrieval of the injected gas, which clearly is not the objective of CO_2 storage. WESTCARB personnel have used imagery that depicts ready absorption of fluids but difficult extraction, likening CO_2 storage, for example, to condensation dripping down the side of an iced drink into a sandstone coaster. In this example, the water is readily absorbed, yet turning the coaster upside down or shaking it will not release a drop.

The depth and scale of CO_2 storage projects are also outside the norms of usual conceptions about the subsurface. Carbon dioxide storage sites must be more than one-half mile deep, and can often be one to two miles deep, whereas a typical water well might be 100 to 200 feet deep. That is a significant difference in terms of the path length any escaping CO_2 would have to travel to reach the surface. WESTCARB personnel have found that scale diagrams of stratigraphic columns can reinforce the point that a significant number of rock layers help to keep any CO_2 that should happen to leave the storage zone from reaching the surface. One recommendation for public presentations is to show diagrams to true scale and without exaggeration of the vertical axis, which is common in professional communications among geologists (this practice inadvertently makes mild dips appear more severe, potentially heightening concerns about stored CO_2 migration upward).

In addition, CO_2 quantities are typically expressed in tons, which few individuals can conceptualize. For its small-scale injections tests, WESTCARB has likened the size of a 2,000 ton subsurface CO_2 plume to the volume of water in a community swimming pool. Commercial projects will entail much larger volumes, but they are still small relative to the volume of water in a lake or reservoir, which can be used as comparative references.

An understanding of a CO_2 storage project can also be facilitated by general interest information on the geology and paleontology of an area, particularly if natural features offer dramatic display, such as in the canyon lands of Western states. For an example, see WESTCARB's webpages on Arizona geologic formations, available at: http://www.bki.com/westcarb/formations.html.

The most effective method for developing outreach materials has been for the outreach team to serve as the lead and work with technical team members to draft the structure and content, taking into account social characterization data and other information relating to audience concerns.

The RCSPs developed the following checklist of high-quality outreach material characteristics:[17]

- Relates specifically to the interests of the community.
- Easy to read and understand.
- Visually appealing.
- Main message repeated at beginning and end.
- Credible research, researchers, and institutions.
- Relevant to audience and attention grabbing.
- Tells a story.
- Call to action by the audience, when appropriate.
- Incorporates available feedback from the intended audience.
- Continuity and consistency with other outreach materials.
- Appeal to multiple learning styles – visual, auditory, etc.
- Opportunity for the public to interact and be involved in learning about CO_2 storage.

Topics covered by outreach materials include the following:

- The science of climate change and the potential role of CCS in the energy economy.
- How CCS works.
- Key characteristics of the selected storage site that are necessary for safe storage, including a confining zone that includes at least one primary impermeable caprock above the storage reservoir, a good injection zone, and an apparent absence of transmissible faults in the rock layers.
- The role of CO_2 storage in addressing atmospheric CO_2 build-up and climate change.
- Safety precautions to ensure that CO_2 storage projects will protect human life and the environment, under plausible scenarios, such as brine displacement or, depending on location, microseismic events.
- Explanations of the implausibility of perceived risks such as a natural, rapid release of CO_2 caused by a Lake Nyos-type event.[18]
- Project-specific information, such as local geologic formations, well depth and construction information, information about injecting CO_2, and monitoring results.
- CO_2 injection details, including potential sights, noises, and truck traffic, and what will be done to mitigate these impacts.
- How a seismic survey is conducted and how seismic data are interpreted.
- How a computer simulation of subsurface CO_2 location is developed, validated, and calibrated, and what the results show.
- Permitting processes and the role of the developer and regulator in that process.

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[17] Based on discussions with PCOR Partnership staff.

[18] "Lake Nyos and Mammoth Mountain: What Do They Tell Us About the Security of Engineered Storage of CO_2 Underground." NETL Program Fact Sheet. http://www.netl.doe.gov/publications/factsheets/program/Prog064.pdf.

MIDWEST GEOLOGICAL SEQUESTRATION CONSORTIUM (MGSC)

The Value of Physical Models and Demonstrations

MGSC approached outreach with the idea that showing audiences what sequestration might look like would be the best way to open the CO_2 storage discussion. They have had success with two different physical demonstrations that focus on key questions often asked in the context of CO_2 storage: (1) how will you keep the CO_2 in the ground, and (2) what happens to the CO_2 once it is injected into the ground?

Figure 2-1: Physical Model Demonstration at an MGSC Open House

Demonstration kits were made for key presenters, including the chief scientist and communications coordinator. The kits include a whole core sample of the carbon storage unit (Mt. Simon Sandstone), a whole core sample of the caprock seal (Eau Claire Shale), and a small water dropper. Using this kit allows a simple discussion of porosity, permeability, and the impermeable nature of the seal.

MGSC also created a three-dimensional model that demonstrates EOR and storage of CO_2 in a deep saline reservoir. The model has several rock units, represented by different gravel material, that are isolated from each other. Oil can be placed in the EOR reservoir. When CO_2 is added to water and injected into an "injection well" oil and formation water are produced. The deep saline reservoir has a single injection well and a pressure-valve system for injection. When liquid CO_2 (oil for the purposes of the model) is injected, the observer sees CO_2 dispersing into pore spaces and being held in place by the caprock seal above.

The main value of these physical tools has been to provide learning opportunities for multiple audiences, from farmers to business executives and teachers to legislative decision makers. These models served as door openers during public meetings. Presenters often found that when stakeholders did not know who to approach or what questions to ask, these models provided an easily accessible way to ask questions in a non-threatening manner.

Best Practice 8: Actively Oversee and Manage the Outreach Program throughout the Life of the CO_2 Storage Project

Outreach programs should be actively managed to ensure that consistent messages are being communicated and that requests for information are fulfilled. The identification of an outreach leader or coordinator to manage, coordinate, and direct outreach is crucial for project success. The outreach lead will be supported in their efforts by the outreach team and other project team members. As a project unfolds, public perception will be influenced by the extent to which the project and the project team are well coordinated and responsive.

Moreover, sharing information about a CO_2 storage project and soliciting input from stakeholders cannot be done passively. The project team needs to seek out opportunities to engage stakeholders and make an effort to inform the media and respond to media requests for information. This pro-active engagement can contribute to a sense of project openness and transparency. It is worth noting that some stakeholders may be skeptical about whether the government or the project developer will provide accurate information. This underscores the need to present unbiased, accurate information and seek opportunities to partner with spokespeople who have gained the public's trust.

SOUTHEAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP (SECARB)

The Value of Employee Advocacy, Beginning with Plant Management

Goals of the employee advocacy program include:

- Acceptance and understanding of CCS by the employees.
- Outreach to the community through plant management, plant personnel, and their families.
- A willingness to talk to neighbors "over the fence" about CO_2 storage.
- Building support, understanding, and an educational base for community acceptance.

How it happened?

Plant management of the CO_2 provider, upon hearing of the potential for the CO_2 capture project, embraced the project and the concepts of CCS from the initial stages of project development. Management briefings were held with key plant personnel and information was disseminated to all plant employees through company newsletters, briefings, and even an open house for employees and their families. After all, neighbors talking to neighbors are extremely effective in taking the case to the community.

In fact, when the plant manager was moved to a second plant, another opportunity to participate in CCS demonstration evolved and, once again, this community outreach approach was valuable in achieving public acceptance of the project.

Management of the outreach program should evolve over time to meet the differing needs of each phase of a storage project. During the early stages of a CO_2 storage project, heavy emphasis will likely be placed on developing a common vision of outreach among members of the team and using appropriate tools to develop an understanding of the stakeholders and their concerns. Extensive planning will take place as site selection focuses on a particular location. As a project location firms up, outreach will involve direct engagement with community leaders and other stakeholders. This is when the face of the project will emerge and the public will begin to judge for themselves how they view the project, the project team, and CO_2 storage. Frequent communication amongst the outreach team and the rest of project team helps to ensure consistency and identify that emerging concerns are addressed. It is also important at these early stages to evaluate how to communicate with stakeholders; this can be done in part by working with stakeholders and the project team to obtain feedback on early outreach efforts.

As the project moves forward to the design and permitting stages, outreach becomes a key element of the overall project and involves every member of the project team at some level. Some of the most effective outreach activities may involve significant interaction with stakeholders both as a means of conveying technical information about the project and also as a means for the project team to obtain invaluable information about the community's views and concerns about the project.

As a project enters operations, the focus of the outreach program may shift to sharing the progress and results, which can serve to keep stakeholders engaged. As a project nears closure, the outreach activities will likely ramp up and involve more active discussion with stakeholders about the status of the project and future safeguards. The efforts to actively manage the outreach program help to ensure that the project team members are fully integrated in outreach activities and to productively involve stakeholders.

Best Practice 9: Monitor the Performance of the Outreach Program and Changes in Public Perceptions and Concerns

Monitoring the performance of the outreach program allows the project team to stay abreast of how the community perceives the project and gauge the effectiveness of the outreach activities. Monitoring can also help identify any misconceptions about the project or CO_2 storage and develop outreach strategies to correct them. Monitoring can be accomplished through informal telephone calls and/or routine interviews with key stakeholders both within the local host organization and in the community. The tone of coverage in local media can also provide a source of information, as is true of social media (e.g., blogs, Twitter, and Facebook), which are becoming increasingly common. In addition, websites that discuss the project could be informative and provide a platform for public interaction on a more spontaneous basis.

Outreach program monitoring also takes into account changes in local conditions, such as economic fluctuation or other significant impacts, which may influence the perception of a CO_2 storage project.

As a project moves from conceptualization to implementation, the same activities used in social characterization (see Best Practice #4) will be useful in monitoring project performance and identifying potential areas of concern to be addressed in ongoing public outreach.

THE PLAINS CO_2 REDUCTION (PCOR) PARTNERSHIP

The Value of Using Geographic Information Systems (GIS) to Monitor Performance

Carbon dioxide storage projects require a match between large-scale CO_2 sources and a suitable geologic CO_2 storage site. These projects also occur within a human framework. Both the technical and the human aspects of storage projects have a geographic component. The technical information fundamental to storage assessments (e.g., CO_2 source location, injection location, pipeline route, terrain, geology) can be complimented by layers of "human" information. The PCOR Partnership Outreach Information System contains general layers addressing political and geographic divisions; population; households; school districts; coverage areas for key media; service areas for utility partners; coverage areas for ongoing partner outreach programs; as well as layers containing information regarding CO_2 sources, sinks, mineral extraction activity, regulatory jurisdiction, and CO_2 storage projects. By adding outreach information into this framework, assessments can be made that take into account coverage areas and populations served for select media (e.g., key newspapers, key magazines, public television, and PCOR Partnership outreach materials), as well as outreach activities (e.g., location and number of attendees of presentations or teacher seminars, location of school teachers who have attended education seminars, and locations and attendees for focus groups). In most cases, the county is the fundamental area used for assessment. The output consists mainly of thematic maps, tables, and sums dealing with the general question "number (or percent) of households in a particular area exposed to a particular type of outreach action during a particular period" or "number, type, and number of attendees for a certain type of presentation during a particular period" and the like. Data entry for outreach activity is supported by a simple set of questionnaires and forms filled out on a periodic basis, and output can be readily customized.

SOUTHWEST REGIONAL PARTNERSHIP ON CARBON SEQUESTRATION (SWP)

The Value of Using Feedback to Refine Outreach Programs

SWP conducted focus groups in order to provide outreach materials that responded to the primary concerns of the public, as well as concerns that CO_2 storage project developers believe are important. Focus group participants were encouraged to share their concerns, ask any questions they believed were important, and voice potentially controversial concerns. SWP members told the participants that they were primarily interested in learning what was important to them, rather than advocating for the technology. In addition, SWP also provided assurances of confidentiality. The outreach team then developed outreach materials that responded directly to the concerns identified through the focus groups. Thus, the focus groups were initially used to identify basic concerns and questions of the public. After the materials were drafted, additional focus groups were conducted to determine whether the outreach materials provided information in ways the public believed to be useful and obtain suggestions for how to improve the materials. Participant comments were then used to guide refinement of outreach materials. SWP used two separate strategies to organize participants in the focus groups. First, SWP recruited participants from communities that were near potential CO_2 storage sites to uncover specific questions that may be limited to communities concerned with siting issues. Second, SWP conducted focus groups that targeted specific sectors that might be expected to have special interest in the technology, such as science teachers. SWP used the combination of (1) community-based and (2) sector-specific groups to guide both message development and subsequent determination of appropriate means (media, channels, etc.) for sharing the message.

Best Practice 10: Be Flexible – Refine the Outreach Program As Warranted

The outreach team must be ready to adapt to changes in information about the site, unexpected events, and other conditions that may have a strong influence on the public's perception of CO_2 storage during project implementation.

The analogy to technical geologic site characterization furnishes a good model for considering feedback and response processes. In technical geologic site characterization, a series of monitoring activities are designed to calibrate and validate the reservoir simulation model. More importantly, the feedback from monitoring is used to improve the project performance by making the necessary operational changes. Likewise, developing processes to collect, analyze, and respond to feedback gathered through outreach can be used to continually improve the overall performance of the project and the outreach team while helping to work toward increasing public acceptance. External outreach processes and materials, as well as communications within the project organization should be updated as needed to reflect project progress, lessons learned, and communication improvements identified through target audience feedback. If a case arises where some concerns cannot be addressed, the communications materials should explain why.

3.0 Conclusion

This Best Practices Manual presents the lessons learned and experience gained by the RCSPs during the Validation Phase (Phase II) small-scale CO_2 storage projects and commencement of Development Phase (Phase III) larger-scale projects. Early CO_2 storage projects will be highly visible and their success will likely influence public receptiveness to future CO_2 storage projects. The primary lesson from the RCSPs' experience is that public outreach should be an integral component of project management. Although conducting effective public outreach will not necessarily ensure project success, it can make important contributions to schedule adherence, cost controls, and community goodwill. Effective public outreach involves listening to individuals, sharing information, and addressing concerns through proactive community engagement. The RCSPs have developed the following best practices as a way to share the experience gained to date and to inform future project developers.

Best Practice 1: Integrate Public Outreach in Project Management

Best Practice 2: Establish a Strong Outreach Team

Best Practice 3: Identify Stakeholders

Best Practice 4: Conduct and Apply Social Characterization

Best Practice 5: Develop an Outreach Strategy and Communication Plan

Best Practice 6: Develop Key Messages

Best Practice 7: Develop Outreach Materials Tailored to the Audiences

Best Practice 8: Actively Oversee and Manage the Outreach Program throughout the Life of CO_2 Storage Project

Best Practice 9: Monitor the Performance of the Outreach Program and Changes in Public Perceptions and Concerns

Best Practice 10: Be Flexible – Refine the Public Outreach Program as Warranted

Appendix 1

RCSP Information

When DOE formed the RCSP initiative in 2003, it took into account the differences in the United States' geology, topography, climate, economic activity, population density, infrastructure, and socioeconomic development. DOE awarded cooperative agreements to seven partnerships through an open and competitive solicitation. The RCSPs are regionally based networks of state agencies, universities, private companies, national laboratories, environmental groups, and nonprofit organizations, whose diversity has proved relevant to their success. Under this arrangement, the various partnerships could focus on the CCS opportunities within their specific regions, collectively build an effective and robust nationwide initiative, and begin to build the regional infrastructure necessary to deploy the technology. The seven RCSPs currently comprise more than 350 organizations covering 43 states and four Canadian provinces.

The RCSPs are founded on the premise that local citizens, institutions, and organizations will contribute valuable experience, expertise, and perspectives that more appropriately represent the concerns and desires of a given region, resulting in the development and application of technologies best suited to their areas of the United States. In addition to geologic carbon storage, the RCSPs are also evaluating terrestrial sequestration options in soils and organic material through the restoration of agricultural fields, grasslands, rangelands, wetlands, and forests.

The RCSP effort consists of three interrelated phases – Characterization, Validation, and Development – with each subsequent phase augmenting and building upon the previous phase. This approach has provided the RCSPs with invaluable knowledge and experience. The purpose of the Characterization Phase (also referred to as Phase I), completed in September 2005, was to collect data on CO_2 sources and sinks and develop the resources to support and enable future CO_2 storage field tests and deployments. By the end of this phase, each partnership had succeeded in establishing its own regional network of companies and professionals working to support CO_2 storage deployments; created a network of regional carbon storage atlases for the United States (NATCARB), which were used to identify the most promising CO_2 storage opportunities; and raised awareness and support for CO_2 storage as a GHG mitigation option, both within industry and the general public. During the Characterization Phase, the partnerships also began to assess public awareness and attitudes toward carbon storage.

The transition from the Characterization to the Validation Phase (Phase II) began in 2005. The focus shifted to pilot-scale field tests of geologic and terrestrial sites to validate the efficacy of CO_2 storage technologies in the United States and Canada. General information on the RCSP Validation Phase activities is shown below (Figures A1-1 and A1-2). Included are the locations of the pilot-scale tests conducted between the RCSPs and their commercial partners for injecting CO_2 into saline formations, depleted oil and gas reservoirs, and unmineable coal seams, and the locations of terrestrial sequestration projects. During this work, the RCSPs continued their efforts to characterize regional geologic and terrestrial CO_2 storage opportunities by using the results of the field projects and collecting additional data. The Validation Phase tests allowed the partnerships to further their knowledge of the geology in various regions and to test techniques and approaches for modeling and monitoring injected CO_2. The field tests provided them with the opportunity to work closely with the public to develop a better understanding of the concerns about carbon storage and the ways in which those concerns could be successfully addressed.

The Development Phase (Phase III) started concurrently with the last part of the Validation Phase and includes seven to nine large-scale field demonstrations, each injecting at least 1 million tons of CO_2 into a range of geologic formations. Each formation is considered to be a major storage reservoir in its respective region. Together, these formations are expected to have the potential to store hundreds of years of stationary-source CO_2 emissions. In total, the third phase will last 10 years, including two to three years of site characterization, three to four years of injection operations, and at least two years for post-injection monitoring and site closure after injection has ceased. For the Development Phase, the RCSPs are developing outreach and educational materials to actively engage the public, stakeholders, and policy makers and to communicate the progress, results, and benefits of the large-scale projects and the overall benefits of removing CO_2 emissions from the atmosphere. Public outreach and education during the Development Phase will also encompass issues related to regulatory compliance.

Because public outreach plays a significant role in the RCSPs' activities, there is an outreach coordinator for each partnership, who is required to develop and implement detailed outreach plans during each of the phases of research. Development Phase outreach efforts will employ the best practices learned in the first two phases and may yield further best practices as large-scale projects are undertaken.

Each of the partnerships has developed information relating to the geology and projects within their region. In general, this information includes:

- General information about the partnership and its region; the project team, its partners, the partnership's lead organization; announcements and technical reports as they are published.
- General information about carbon storage, climate change, and CO_2.
- Access to the national or regional atlas of CO_2 sources and emissions in the region; information on geologic CO_2 storage potential in the region; information on terrestrial sequestration options in the region; and regulatory and permitting information.
- Detailed information about the Phase II and Phase III storage projects.
- Information and educational products developed by the partnership, including fact sheets, briefing materials, links to the latest carbon storage news stories; and links to scientific topical reports.
- Links to photographs, video clips, and other multi-media resources.
- Information about energy saving, GHG calculators, and other tips for reducing CO_2.
- Frequently Asked Questions page.
- Links and resources with additional information.
- Links to educational resources and pages for "kids" to help school-age children learn more about the climate and the weather, potential climate change, and the greenhouse effect through online games, climate animation, and other activities.

The list below includes links to each RCSPs' website and is followed by a summary description of each RCSP:

- Big Sky Carbon Sequestration Partnership – http://www.bigskyco2.org
- Midwest Geological Sequestration Consortium – http://www.sequestration.org
- Midwest Regional Carbon Storage Partnership – http://www.mrcsp.org
- Plains CO_2 Reduction Partnership – http://www.undeerc.org/pcor
- Southeast Regional Carbon Sequestration Partnership – http://www.secarbon.org
- Southwest Regional Partnership on Carbon Sequestration – http://www.southwestcarbonpartnership.org
- West Coast Regional Carbon Storage Partnership – http://www.westcarb.org

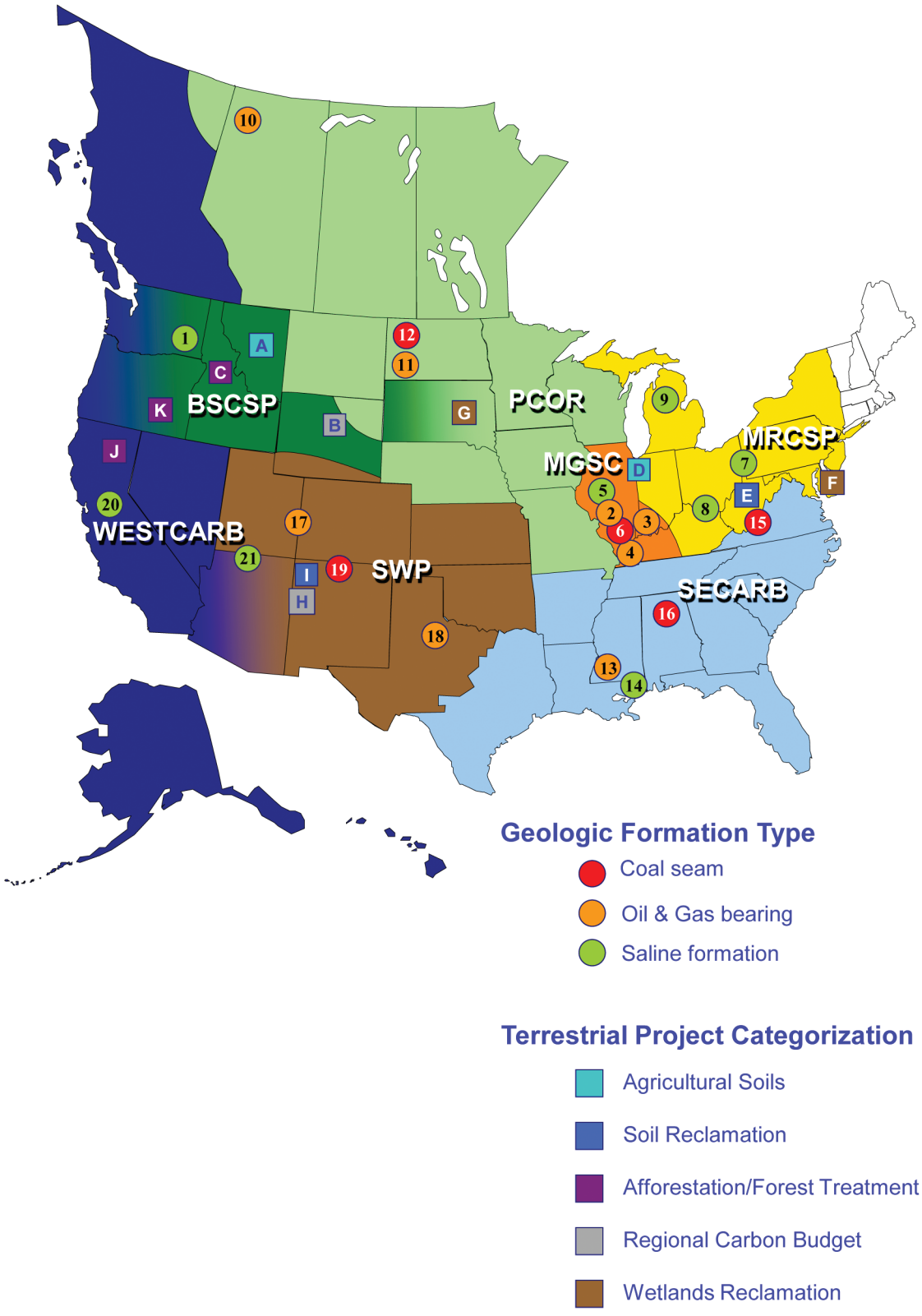

Figure A1-1: RCSP Validation Phase Activities (as of late 2009)

	Partnership	Geologic Province/ Location	Geologic		Terrestrial
			Total CO_2 Injection (tons CO_2)	Approximate Depth (feet)	Estimated CO_2 Capacity
1		Columbia Basin	0*	2,500 – 4,000	
A	Big Sky Carbon Sequestration Partnership	North Central MT			60 Mt over 20 years
B		Eastern WY			30 Mt over 10 years
C		Region-wide			640 – 1,040 Mt over 80 years
2	MGSC	Loudon Oil Field	< 50	1,550	
3		Mumford Hills Oil Field	2,700*	1,551	
4		Sugar Creek Oil Field	4,600*	1,548	
5		Illinois Basin	0*	6,650 – 7,050	
6		Illinois Basin	100	1,000	
7	MRCSP Midwest Regional Carbon Sequestration Partnership	Appalachian Basin	< 100	5,900 – 8,300	
8		Cincinnati Arch	1,000	3,200 – 3,500	
9		Michigan Basin	60,000	3,200 – 3,500	
D		Region-wide			25 Mt over 20 years
E		Region-wide			100 Mt over 20 years
F		Cambridge, MD			TBD
10	The Plains CO_2 Reduction Partnership (PCOR Partnership)	Keg River Formation	30, 000	5,000	
11		Duperow Formation	440	10,000 – 10,500	
12		Williston Basin	90	1,600 – 1,800	
G		Great Plains wetlands complex (PPR)			14.4 Mt
13	SECARB Southeast Regional Carbon Sequestration Partnership	Gulf Coast } stacked	500,000	10,304	
		Gulf Coast }		10,400	
14		Mississippi Coastal Plain	3,082	8,600	
15		Central Appalachian	1,000	1,600 – 2,300	
16		Black Warrior Basin	0*	1,500 – 2,500	
17	SWP Southwest Partnership CO_2 Sequestration	Paradox Basin–Aneth Field	250,000	5,600 – 5,800	
18		Permian Basin	475,000	5,800	
19		San Juan Basin	18,430	3,000	
H		Region-wide			TBD
I		San Juan Basin Coal Fairway (Navajo City, NM)			TBD
20	West Coast Regional Carbon Sequestration Partnership westcarb.org	Sacramento Basin*	0*	8,000	
21		Colorado Plateau	0	4,000	
J		Shasta County, CA			4,600 Mt over 80 years (CA)
K		Lake County, OR			900 Mt over 80 years (OR)

* Currently injecting or will begin injecting in 2010

Figure A1-2: Validation Phase Geologic and Terrestrial Field Test Project Details (as of late 2009)

Big Sky Carbon Sequestration Partnership (BSCSP)

BSCSP is a coalition of more than 60 organizations including universities, national laboratories, private companies, state agencies, Native American tribes, and international collaborators. The BSCSP region has extensive basalt formations, saline formations, deep coal seams, and depleted oil reservoirs with significant storage potential for the regional CO_2 emissions. The region also includes vast acreage of agricultural, range, and forest lands that can be managed for greater storage of soil carbon and carbon in biomass. While the BSCSP region currently produces only four percent of the CO_2 emissions in the United States, it is a key area for fossil fuel energy development and has one of the largest population growth rates in the Nation.

Midwest Geological Sequestration Consortium (MGSC)

The MGSC is assessing the technical and economic feasibility of geologic formations in the Illinois Basin to store CO_2 in coal seams, mature oil and gas reservoirs, and deep saline formations. Highly favorable storage areas exist in this region, given that two or more types of potential CO_2 storage formations are vertically stacked in some localities. MGSC is also developing MVA protocols, investigating CO_2 capture technologies for the region's stationary sources, and determining the costs of transporting large quantities of CO_2 via pipeline, and conducting regional hydrologic studies to determine the effects of commercial development of CCS in the region.

Midwest Regional Carbon Storage Partnership (MRCSP)

The MRCSP lands have a great potential for carbon storage in deep geologic formations, including large areal extents of deep saline formations, depleted oil and gas reservoirs and coal seams. Gaining a better understanding of the distribution of these formations across eight states and their ability to store CO_2 is a continuing focus of MRCSP's geologic research. MRCSP's terrestrial field tests to demonstrate soil carbon storage in cropland, degraded wetland and marshland, and reclaimed minelands have enabled the partnership to measure the impact of improved land management practices and increased their understanding of storage opportunities in the region.

Plains CO_2 Reduction (PCOR) Partnership

The PCOR region, covering parts of both the United States and Canada, offers significant potential for storage in limestone, sandstone, coal seams, and depleted oil and gas reservoirs. PCOR has confirmed an enormous potential for carbon storage in strata suitable for EOR and estimates additional oil recovery through regional EOR applications of over 1.4 billion barrels. Geologic field tests conducted by PCOR have established the multiple benefits of CO_2 storage with EOR, CO_2 storage with hydrogen sulfide (H_2S) disposal and simultaneous EOR, and CO_2 storage with simultaneous enhanced coalbed methane (ECBM) extraction. PCOR's wetland restoration activities in the Prairie Pothole Region are providing the background information needed to determine carbon offsets, develop protocols and standards for land management practices, and provide a market-based CCS strategy for the future. PCOR is one of only two of the RCSPs encompassing a part of Canada.

Southeast Regional Carbon Sequestration Partnership (SECARB)

SECARB estimates that 31 percent of the Nation's CO_2 stationary source emissions come from the states in the SECARB region, and the region's deep saline formations offer potential capacity for safe and permanent storage of those emissions. SECARB is working to characterize carbon sources and potential storage sites in the Southeast; identify the most promising capture, storage, and transport options; and address issues for technology deployment. SECARB has determined that the saline formations of the Gulf Coast and mature coalbed methane (CBM) reservoirs in the Appalachian and Black Warrior Basin are extensive and of regional significance as potential sinks for carbon storage.

Southwest Regional Partnership on Carbon Sequestration (SWP)

SWP was created to advance early commercial opportunities for carbon storage. The partnership is investigating a variety of carbon sink targets for storage potential. More specifically, SWP is leveraging 30 years of EOR experience in the region to determine the potential for saline formations, natural gas and depleted and marginal oil fields, and coal seams to store CO_2. SWP is exploring the option to utilize the CO_2 produced from natural CO_2 reservoirs with anthropogenic CO_2 from power plants for EOR and natural gas recovery in the region. The existence of CO_2 pipelines that link CO_2 sources with potential CO_2 storage formations in the region makes the southwestern United States an optimal location for carbon storage.

West Coast Regional Carbon Storage Partnership (WESTCARB)

WESTCARB, encompassing areas in both the United States and Canada, is examining the storage potential in depleted oil and gas reservoirs, coal seams, and deep saline formations. The region offers significant potential for storage in porous sediments greater than 2,500 feet deep, especially the saline formations and depleting hydrocarbon reservoirs of California's Central Valley, Washington's Puget Trough, and the depleting oilfields of Alaska's North Slope. WESTCARB is also quantifying the extent to which changes in the management of forests, rangelands, and agricultural lands could increase carbon storage by plants and soils.

National Energy Technology Laboratory (NETL)

The NETL website, http://www.netl.doe.gov, offers extensive information about the elements that help to define the DOE Carbon Storage Program. The website provides an extensive program overview webpage with details about the five technical Core R&D focus areas, Systems Analyses capabilities, a FAQ information portal, information about the RCSPs with links to the partnership websites, and an extensive reference shelf. Links to numerous resources can be accessed via the Carbon Storage Reference Shelf on the NETL website. Each of the 10 categories on the Carbon Storage Reference Shelf has a variety of documents posted for easy access to current information. Once at: http://www.netl.doe.gov/technologies/carbon_seq/refshelf/refshelf.html, click on the category link to view all materials related to the following categories:

- The Carbon Storage Newsletter
- Major Carbon Storage Educational Resources
- Program Overview Presentations
- Program Reports, Plans, and Roadmaps
- Journals and Scientific Articles
- Conference Proceedings and Presentations
- Project Descriptions
- Program Fact Sheets
- Regulatory and Policy Issues
- Systems Analysis
- Peer Review
- Best Practice Manuals

Appendix 2

Planning and Managing Public Outreach Activities

RCSPs have identified several key points of interaction with the public during the routine progression of each project. These include: announcing the test location and initiating site activities (seismic testing, if applicable, and drilling); applying for an injection permit; injection activities; and project closure. In effect, the overarching outreach strategy can be viewed as a series of plans that are tailored to the particular technical stage of the project.

The expected outreach objectives and activities for each of four basic project stages are outlined in greater detail below. For each stage, the outreach team can develop a matrix or other tool to guide the specific outreach objective and the interactions and associated information materials to be undertaken with identified stakeholders. These matrices can be used as iterative working documents that change as events that are further away become more pressing.

Table A2-1: Examples of Outreach Objectives and Activities by Planning Stage

Stage	Objectives	Outreach Activities
1. Selection of Project, Conducting the Seismic Survey, Drilling and Core Sampling	Identify and inform key stakeholders about the nature of the project and types of likely activities, identify and inform stakeholders along the seismic survey routes, secure permit for drilling, and prepare for potential media coverage or public inquiry.	Activities may include: • Developing talking points • Conducting social characterization • Holding informal conversations with local officials and key community leaders • Developing project facts sheet and PowerPoint briefings • Developing and disseminating information about the seismic survey • Developing additional information about climate change, carbon storage, and the range of project activities
2. Submission and Review of Injection Permit	Build public awareness and support, secure injection permit, prepare for potential requirement for public hearing, and prepare for potential media coverage or public inquiry.	Activities may include: • Updating talking points, fact sheets, PowerPoint briefing and the website, and preparing and distributing additional information materials as needed. Project updates (photos ongoing activities) are a helpful way of showing what is happening • Confirming the preliminary list of stakeholders • Scheduling and conducting telephone calls or informal meetings/briefings with identified stakeholders to provide information, ensure project awareness of potential issues of concern, and need for additional outreach • Deciding on the extent of media activities • Coordinating with the regulators in conducting an open house/informational meeting • Where the regulator required a public meeting, providing an information table and staff to respond to questions at that hearing
3. Injection	Focus attention on the research, respond to questions, build further public awareness and support	The types of activity will depend on the process and outcome of the permitting process and may include: • Media event(s) • Site tours • Website and information materials development
4. Closure, Research, and Dissemination of Results	Cement relationships by keeping the community informed and disseminate results to a broad audience	Activities may include: • Website and materials development • Informational briefings • Presentations

Table A2-2: Sample Planning Matrix: Managing Pre-Site Announcement Activities and Seismic Survey

Timeframe (time in advance of event date)	**Stakeholder**	**Outreach Objective**	**Outreach Approach**	**Needed Materials**	**Responsibility**	**Completed**
3-4 Months	Prepare and print needed information materials: -- neighbor letter -- briefing (ppt) -- fact sheets -- bullets				Outreach staff Corporate and plant site to review	
3 Months, before any activity occurs	State regulatory contacts	Initiate working relationship		Project briefing	Technical lead and staff	
6 Weeks, before any activity begins	Plant employees	Inform, provide opportunity to ask questions	Brief as part of regular employee meetings and communications	• Neighbor letter • Summary fact sheet	Plant manager; project team to assist with materials	
6 Weeks, before any activity begins	Corporate staff	Inform, address questions				
~ 4 Weeks (coordinate with press release)	State officials (identify by name: 1, 2, 3, etc.)	Initiate low-key courtesy call	Telephone call, informal meeting	• Briefing (ppt) • Summary fact sheet • Other?	Government Affairs staff with assistance from project team	
~ 4 Weeks (coordinate with press release)	State and Federal legislators (identify by name: 1, 2, 3, etc.)	Same	Same	• Six bullets • Briefing (ppt) • List of 6 bullets	Government Affairs staff with assistance from project team	
~ 4 Weeks (coordinate with press release)	Local officials in nearby states (identify 1, 2, 3, etc.)	Initiate low-key courtesy call	Telephone call, informal meeting	• Briefing (ppt)? • Neighbor letter • Fact sheet	Plant manager with assistance from government affairs and project team	
~ 4 Weeks (After host site contact with key officials)	Broader local public	Announce selection	Press release: Battelle press release followed by host site release	Draft release for management review and approval prior to Partners' meeting	Outreach staff with technical leads	

Timeframe (time in advance of event date)	**Stakeholder**	**Outreach Objective**	**Outreach Approach**	**Needed Materials**	**Responsibility**	**Completed**
2-3 Weeks, ahead of seismic studies	Local road authorities and property owners	Discuss potential access/traffic issues on local roads with affected jurisdictions Obtain permission from private landowners for access to property	Individual contact	Permission form and information packet (cover note, neighbor letter, project fact sheet and seismic graphic)	Project team and seismic subcontractor (will coordinate with outreach staff and plant manager)	
2 Weeks, after press release	Broader public	Inform about broad activities, including selection of geologic and any other related work	Post information on website	• Program information and fact sheets • Site-specific information and fact sheets	Outreach staff	
1-2 Weeks, just before and at onset of seismic studies	Neighbors who may feel/see testing	Inform and provide contact information in case of questions	Door tag information package	• Neighbor letter • Project fact sheet • Seismic graphic from subcontractor	Project team and seismic subcontractor (will coordinate with outreach staff and plant manager)	
Post event: post selection of demonstration sites on project website	Leaders of state and regional environmental organizations	Inform/provide opportunity for constructive engagement	Low-key call to inform about latest additions to website and provide for continued contact	Information posted on website	Outreach staff	

Appendix 3

Using Social Characterization to Enhance Project Management

"Social characterization" is an approach that uses social science methods to gather information about a community's perceptions of geologic CO_2 storage and concerns about the technology in order to begin to develop an understanding of perceived community benefits from a project.

In this context, RCSPs define social characterization[19] as the rigorous and iterative investigation, analysis, and use of social science methods to improve project performance throughout the stages of site selection, project design, construction, operation, and project closure. By conducting social research within a community, the project team can begin to understand the ways in which individuals perceive the need for, risks of, and tradeoffs of carbon storage in a particular community. This research can yield insights about the different "publics" or stakeholders within a community and their levels of interest, information needs, and perspectives. Social characterization can also suggest appropriate ways to address those differing needs.

The purpose of social characterization includes:

- Developing a solid understanding of the stakeholders' concerns and perceptions about geologic CO_2 storage.
- Developing materials and outreach approaches that inform and address various concerns, convey benefits, and making these materials accessible to target audiences.
- Gaining the broader public "permission" to conduct a storage project (in addition to necessary permits) through openness and transparency.

Just as the steps in geologic site characterization involve collecting and interpreting data, so the steps in social characterization also involve interpretation. The two diagrams in Figure A3-1 qualitatively portray this notion.[20] The diagram on the left shows some of the data collected during geologic site characterization. The axes of the graph represent the degree of difficulty (cost or access) in collecting the data (vertical) and the relative importance of the data in assuring the performance of a project (horizontal). For example, it may cost more to conduct a seismic survey than it does to collect and review generic information on the regional geology of a site. However, the detailed information provided by a seismic survey may be more valuable in determining

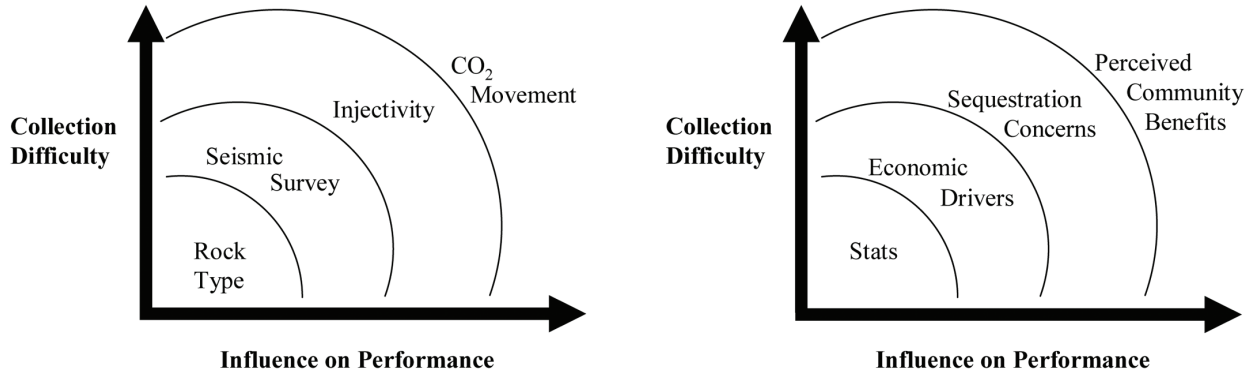

Figure A3-1: Comparison of Data Collection Challenges and Information Values

[19] Wade, S., S. Greenberg, "Afraid to Start Because the Outcome is Uncertain?: Social Site Characterization as a Tool for Informing Public Engagement Efforts," Presented at GHGT-9, Washington, DC, 2008, El Sevier.

[20] Kelly, B. et al., "The Regional Carbon Sequestration Partnerships: Scaling-Up Outreach Efforts for the Deployment Phase," presentation by Outreach Working Group at Carbon Sequestration Conference, May 2009, Pittsburgh, PA.

the suitability of a site. Yet, neither piece of data stands on its own and must be integrated for a full geologic "picture" of a site. As one moves to the upper right quadrant, it also takes more effort to interpret the data, requiring a higher degree of training and experience.

In similar fashion, the diagram on the right presents information collected during social characterization. In the upper right quadrant, the information not only becomes more important to the success of a project, but it also becomes increasingly difficult to interpret.

Although the concept of social characterization may seem straightforward, it requires concerted and methodic effort to do well. To the extent public outreach plays an important role in the cost-effective implementation of projects, social characterization should be approached seriously and integrated into the overall effort to develop a project. It should be noted that social characterization is not a means by which to identify communities that are economically or otherwise disadvantaged. Rather, it is a means of gaining insight into the driving forces, key decision makers, questions and concerns, and group dynamics within a community – all factors that contribute to community engagement.

Appendix 4

Sample Communications Plan

Creating a communications plan is a major step in defining and making explicit the communication strategy for a project or partnership. Several components need to be considered when creating a communications plan, such as: who will be communicating, what methods will be used, which project member has priority, how will multiple partners be represented, when will communication take place, etc. This appendix provides an outline for creating a communications plan. These guidelines are meant to be used as a starting point and will not be all-inclusive for any individual project or partnership. A useful communications plan will be tied to the specifics of a project and will provide guidelines for how a partnership will conduct its communications activities.

Questions for discussion include:

- What are the communication goals for each main partner?
- Who needs to be at the table?
- Who will be communicating about the project?
- What are the media goals?
- Who talks to the media?
- What is the message?
- Who responds in a crisis?
- Whose communications get priority?
- Which policies get priority?
- Who is included in press releases?
- Will there be site visits?
- Will photography be allowed?
- How will the communications plan be implemented?
- How do communications impact safety and operations?

Open and early discussion needs to take place between all partners about what their respective communications goals are. Partners may have different communication goals that will need to be integrated into the overall communication plan and strategy.

For example, one organization might want to highlight the scientific contribution they are making toward the project and to be recognized as a leader in storage research; another company may want to highlight their technological contribution to site characterization, site development, and project management; while yet another could be interested in highlighting themselves as a project cooperator.

Several meetings may need to be held to prior to writing a communications plan. The following is a sample approach the writing and review process for the development phase of a communications plan:

- Hold an initial meeting to discuss project communication goals.
- Create a draft plan between one or two of the major partners.
- Incorporate lessons learned from other sites, if possible.
- Have plan reviewed by principals.
- Send draft to multiple groups and individuals who will have input into plan.
- Host meetings to discuss merging of corporate policies.
  - Safety.
  - Crisis.
  - Media.
  - Photographs.
- Have a second round of revision and review incorporating all comments and policies.
- Distribute final version.

When implementing a communications plan, devise a way that all individuals and companies who will be working on the project receive a copy of the plan. Another option is to have a sign-off sheet that is distributed with the plan (either in person or via e-mail). This assures that staff has read and agree to the plan.

Distribution of the plan is best handled in person with a brief presentation about the contents of the plan. Pick a meeting where the staff will be present, such as a mandatory Quality, Health, and Safety Training. E-mail copies of the plan to individuals who cannot attend such a meeting. All new personnel should

Sample Communications Plan Outline

1. Purpose of Plan
Explain why the plan was created, who needs to read and follow the plan, and give contact information for individuals who have questions about the plan.

2. Project Information and Description
Create a standard description of the project background that provides plan users with information. This description can also be used by the communications team when a project description is requested by the media or other contacts.

3. Consortium Descriptions and Funding Statement
Provide the standard funding statement for all publications.

4. Target Audiences
Outline your target audiences and define how this plan will be used to reach those target audiences.

5. Communications
Identify the individuals who are cleared/trained to speak with the media and conduct project communications. Provide contact information for those individuals. You may also want to write a simple response statement for your project staff to use when referring media to someone on your approved list.

6. Papers, Presentations, and Research Findings
Outline how each of these categories will be handled on the project. Discuss the review process, the posting process, delivery guidelines, etc. Provide contact information, including who to contact with questions.

7. Site Visits
Outline how site visits will be handled, who will conduct tours, onsite rules and procedures. State whether or not cell phone usage or photographs will be allowed. CO_2 storage projects have the potential to attract a lot of attention. Planning ahead for visitors and providing learning opportunities is an important piece of the communications strategy. By having a plan in place, you can be prepared for periods of high activity, such as drilling wells (and other activities outlined in Appendix 2). Consider possible audiences to determine how site visits will be done and your onsite policies. Audiences may consist of:

- International visitors.
- National and local media.
- VIPs.
- Partnership meetings.
- Community members.
- Government officials.
- EPA personnel.
- University faculty and students.
- Teachers.
- Bus drivers.

8. Personal Protection Equipment (PPE) Requirements
Give a brief description of the onsite PPE requirements to reinforce personnel understanding of what is expected of them onsite.

9. Photography Policy
Define and describe the photography policy: Are photographs allowed? If so, is there a designated person/group that must approve photos taken? How will approved photographs be shared?

10. General Safety Rules
Describe onsite safety rules.

11. Crisis Communications
Indicate who is cleared to speak to the media in the event of a crisis, the call tree order, the procedure for communicating with onsite staff. It is important to stress that crisis responses to the media will be dealt with *only* by specific personnel, who are listed along with their telephone numbers.

12. Webpage
Give the link to your website here and a general outline of the contents so everyone can familiarize themselves with it and refer interested parties to seek more information.

13. Frequently Asked Questions
Consider providing a set of frequently asked questions so that the staff knows the answers and are familiar with the project.

receive a copy of the plan. Other parties to consider for plan distribution: corporate partners, new onsite personnel, office personnel, new scientific personnel.

There are additional professional communicator resources a project developer may wish to consider in developing communications plans. These include the International Association of Business Communicators (IABC) and the Public Relations Society of America (PRSA).

Crisis Communications

The project manager, major subcontractors, and host industrial partner should develop a crisis plan to go into effect in the event a technological crisis occurs. This document, which may be called a "bridging document," details responsibility for specific tasks in the event of an emergency, how emergency services will be handled, and what safety procedures will be followed. The first step for the communications team, when thinking about crisis response, is to determine if the project has a crisis plan in place. If it does, the outreach team should familiarize itself with the details of the plan, consider how that information relates to communications, and determine what details need to be repeated in the communications plan. The team also needs to define how communications will be handled in the event there is a crisis. Who are the individuals authorized to speak to the media? How will each member of the team be notified? Who is the first call?

The point to remember in crisis communications is that many key individuals will be busy handling the crisis and the communications team should be able to respond externally with a spokesperson or two who can quickly, calmly, and effectively communicate with the media. The crisis communications plan needs to account for this fact and ensure that the individuals who need to be on the ground handling the crisis are not the same individuals who will speak with outside sources.

- Crisis team defined.
- Plan in place.
- Call list established.
- Emergency phone number posted at each telephone.
- All staff safety induction.
- Risk reduction and mitigation.

There are additional professional communicator resources a project developer may wish to consider in developing communications plans. These include the International Association of Business Communicators (IABC) and the Public Relations Society of America (PRSA).

Appendix 5

Sample Press Release Elements

The following template contains four main sections and guidance for writing a good press release.

Guide for Writing a Good Press Release

1. **A release date** (and time, if needed).

   Example: FOR RELEASE June 20, 2010.

   Use "FOR IMMEDIATE RELEASE" when information is not time sensitive.

2. **Contact information** for the person journalists should contact if more information is desired.

3. **Headline**

4. **Body text**:
   - Try to limit the overall length to one or two pages. Make each word count. Keep paragraphs short. Consider using the Associated Press Style Guide.
   - Write a strong opening. Lead off with a "capsule" of the most important information (who, what, where, when, why) in paragraphs one and two. Allow for elaboration and greater detail in subsequent paragraphs.
   - Write a complete story as you want it told. The news release, or part of it, may appear in a publication or with little or no modification.
   - Write in a plain, direct style that is easy to read:
     - Avoid jargon, clichés, and hyperbole
     - Spell out acronyms
     - Use active verbs whenever possible
     - If it is necessary to use terms or concepts that are likely to be unfamiliar to the general public, provide concise explanations
   - Consider using direct quotes from reputable sources to provide a first-person point of view.
   - Ask another person or several people to proofread the news release to identify any errors or omissions and to suggest possible improvements/clarifications. If several organizations are involved, try to obtain review from each.
   - Check any images to make sure they do not contain unintended visual messages (someone without a hardhat on a drill site, for example).
   - If you are using outside sources, make sure you have permission. Provide credit if it is requested by the source.
   - Include brief background information on the organization(s) involved in the project or event.
   - Gain exposure for your news release by posting it on your website, alerting media contacts, and notifying potentially interested parties (partners, people mentioned in the news release, DOE/NETL, and/or other organizations engaged in similar activities).

Appendix 6

Sample Fact Sheet and Poster Guides

Outlined below are some useful considerations for creating fact sheets and posters for CCS projects:

- **Targeting an Audience:** The first aspect to determine when planning a fact sheet or poster is the intended audience. A document designed for general readership is going to differ from a document drafted for a targeted audience such as a community with a proposed CCS project. Where more general content would work for broader distribution, fact sheets and posters for a targeted audience should contain more localized or specialized content that addresses the information needs and level of understanding of the intended audience.

- **Providing Useful Content and Addressing Gaps in Public Knowledge:** One of the most common mistakes made when writing a document for the public is to assume that individuals are aware of the activities in their community, region, or nation. Some individuals are limited by time and resources, including accessibility to information and knowledge of where to look. This is especially true for information pertaining to climate change and strategies for mitigation and adaptation. To account for possible knowledge gaps, fact sheet and poster content should provide background information, which may include topics such as why CO_2 storage is important, how it is done, what goes into choosing a suitable site for storage, and what safety measures are in place to address risk. Interaction with a community and research to better understand their needs and concerns can help determine what information is appropriate and what gaps exist. This includes obtaining demographic information and researching past experiences with health, economic and environmental issues. A community's history with industry and government agencies can potentially impact community members' overall view of a project (i.e. trust and fairness issues). A community's belief in or skepticism toward climate change should also be taken into account. This background research can then be used to shape the content of the document, making the information relevant to the community by addressing their specific questions and concerns about the proposed project within the context of their understanding.

- **The Power of Objectivity and Transparency:** When individuals are notified about of a proposed CCS project in their community, they want factual information that accurately depicts the possible impacts (e.g., economical, environmental, and social). They are not interested in promotional materials. Fact sheets and informative posters need to use statements that are straightforward, while avoiding an authoritative tone (i.e., implying the experts know best), which can be off-putting. The audience should be allowed to draw their own conclusions about a technology without feeling pushed in one direction or another.

  In relation to objectivity, fact sheet and poster content should also strive to be transparent. This includes being open about such things as locations, impacts, partners, etc., as well as admitting to uncertainties. Though transparency will not eliminate skepticism, it can build trust with a community, opening up opportunities for more positive discussion.

- **Message Clarity:** Crafting a message that speaks to an audience of various educational levels and backgrounds requires limiting the use of technical terminology. Technical language can alienate a general audience and cause them to miss the point of the document. Instead, fact sheets and posters should employ more common terms. A useful strategy for catching terms not commonly used in the public lexicon would be to test the content on individuals unfamiliar with the technology and make changes accordingly. Acronyms and abbreviations should be used sparingly, and a complete title should be written out before the continued usage of either.

Length is another consideration. Time is a valuable commodity in today's society and a fact sheet or poster that is too long runs the risk of losing the audience's attention. Short, concise documents that present a clear message without peripheral information tend to be better received. This means providing only information that directly pertains to the project and/or process. Individuals want to be able to pick out the main points quickly and easily without getting bogged down in lengthy explanations. Font and font size are also something to consider, especially for posters. Trying to squeeze too much information into a document can be overwhelming, resulting in individuals moving on before reading the entire poster. Individuals also want to be able to read a poster from a distance to allow other readers the option of reading it at the same time. Therefore, text size and font should be scaled accordingly.

A final consideration is the possible need for materials in languages other than English. In areas of the United States where English may not be a first language, such as states bordering Spanish speaking countries or regions with Native American nations, this is especially important in order to ensure inclusion of all members of a community. Research into a community should be able to determine whether or not translated material will be necessary.

- **Providing Contacts and Access to Further Information:** A key piece of information for any fact sheet or poster is the inclusion of contact information. Individuals want to know they can actually contact someone if they have questions or concerns about a project. In addition to serving as an additional reference to project outreach materials, providing contacts also builds community trust and contributes to future opportunities for open communication. Information should include multiple forms of contact such as a mailing address, e-mail address, and phone number.

  Fact sheets and posters should also note other resources for accessing information about a project and/or planning process. This can be done by providing a project website or, where possible, a physical location where more information is available.

- **The Value of Visuals:** It is often said that a picture is worth a thousand words. In the case of CCS, an image sometimes communicates better than a long description and has the added benefit of saving space and breaking up text. Providing visuals, especially when discussing underground activities and processes, is a useful way to communicate how CCS works. Like the rest of the document, visuals and captions should use common language when possible. Examples of visuals include pictures and figures depicting equipment and activities (i.e., vibreosis trucks, injection wells, maps, models, and geologic cross sections) as well as tables demonstrating site capacities and timelines. It is also helpful to show action shots, provided they are visually appealing and compliment the written content. Complex figures that do not lend anything to the message should be avoided.

- **Potential Topics for Fact Sheets and Posters:** As mentioned in the best practices, fact sheet content depends on the audience and their questions and/or concerns about a project. Listed below are a few suggested topics for CCS project fact sheets:
  - CCS as a strategy for climate change mitigation.
    - CO_2 storage.
    - Terrestrial storage.
  - Policies related to CCS projects.
    - Liability.
    - Party responsibilities.
  - Facts about the project and the process of CCS.
  - Monitoring tools and techniques.
  - CO_2 sources and sinks.
  - Mitigating risk.
  - Frequently Asked Questions.
  - Information and best practices derived from DOE's Carbon Storage Program.

- **Use of Sidebars and Text Boxes for Fact Sheets:** These sections can accommodate smaller pieces of information such as contact information, project or corporate websites, project costs and funding sources, a list of partners, project logistics (location, duration, etc.), additional references, or a digest of a company's mission statement.

- **Written Content for Fact Sheets and Posters:** The following suggested sections depend on document topic, relevancy, and space. For fact sheets, one- to two-sided documents are preferable, but size can be expanded if content warrants it. Poster sizes can vary and are generally dependent on display space. Remember to use an easily readable font on fact sheets. Posters on the other hand require a larger font size.
  - Introduction or description.
  - Background.
  - Goals/benefits to society.
  - Action steps or activities.
  - Timeline/status.
  - Successes/Accomplishments.

The RCSPs have developed numerous posters, fact sheets, and visual content about CCS and many of these materials are posted on the individual partnership websites, which can be accessed through: http://www.netl.doe.gov/technologies/carbon_seq/partnerships/partnerships.html.

Appendix 7

Planning a Site Visit

Site visits and tours provide an excellent opportunity to show stakeholders what is involved in a CO_2 storage project and provide opportunities for one-on-one informal discussions with members of the technical team. There are four main phases to planning a site visit:

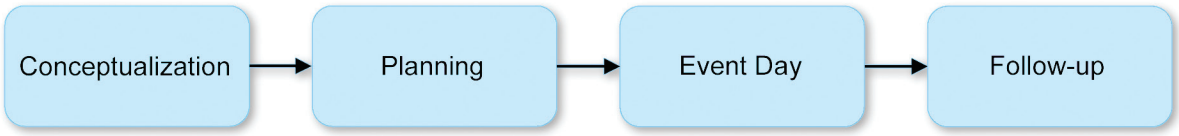

Figure A7-1: Main Phases to Planning a Site Visit

This section offers suggestions for facilitating a productive site visit.

Phase 1: Conceptualization

Determine the Purpose of the Site Visit

Defining the purpose of a site visit will assist in the later steps of the planning process and also allow you to gauge the effectiveness of your efforts. The purpose could include any of the following: community education; generating positive project publicity; relationship building; networking with partners; community trust building; information exchange with regulators; and/or generating community ambassadors/ supporters. In all cases, staff should use the visit as an opportunity to learn from the audience and engage in two-way communication. This can be accomplished by making sure there is adequate time for the audience to ask questions and to have discussions with project staff.

Determine the Expected Outcomes

In conjunction with defining the site visit purpose, the desired outcome(s) for the site visit should be determined. If possible, the desired outcome should be something that is measureable. Desired outcomes may include: public approvals, statements, endorsements, or quotes from community leaders; favorable press in local media; generation of financial support for the project; engagement with student interns; and/or improving or streamlining the permitting processes.

Determine the Audience

The audience will likely become apparent once the purpose and expected outcomes are defined. Audience members may include: industry representatives, researchers, non-profit members or staff, community leaders, interested groups, landowners, politicians or other decision makers, regulators, members of the media, teachers, students, or the general public. In a multi-stakeholder or public event, it is advisable to include those who may have vocally opposed the project. This will help initiate open relationships, correct misinterpretations, and ensure that community concerns or educational needs are addressed and do not become barriers for project implementation or financing.

Determine the Type of Site Visit

Once the purpose, expected outcomes, and audience have been determined, determine the type of event needed to accomplish the objectives. Group size, site visit location, and duration of event are factors to consider.

- *Group Size:* Group size should be limited if substantial one-on-one interaction with the audience is desired. In some cases, a site visit tailored to one person may be valuable if that individual can significantly influence the project.

In other cases, a large group may be appropriate to gain exposure for the project in the community. Group size will also be dependent on the number of available staff and site capacity.

- *Site Visit Location:* Site visits are often conducted at the field site, or sometimes at a laboratory. However, it may not always be possible to visit a field site due to weather, security, or other reasons. In that case, a site visit may be held at another public or private facility. Another option is to have a "tour" type visit, with stops at multiple locations. This can be a nice option if individuals need to be briefed in an inside setting, prior to or after a trip to the field site. Transportation, accessibility, and timing for the visit must all be taken into consideration to ensure that individuals can reach the site safely. Offsite parking may be necessary to keep the group together and limit the number of cars onsite or provide a gathering point for sites with restricted access.

- *Duration:* The duration of the event will depend on: project personnel's and attendees' schedules; travel time and time for safety briefings; and time necessary to accomplish the tour's objectives, including allowing ample time for questions, answers, and discussions.

Phase 2: Planning

The planning phase will establish and organize many of the key details necessary for the event to be a success.

Preparatory Planning

- *Planning Team:* First determine the roles and responsibilities of the staff who will be involved in the site visit. These individuals will make up the site visit planning team and will take care of the event planning. The following roles should be identified: group leader, spokesperson/ people, materials developer, safety manager, and additional staff support (administrative, note taker, photographer, videographer, etc.). It is a good idea at this point to discuss the event with project partners and determine their role(s) as well.

- *Budget:* The budget for the event will need to be determined. Event expenses typically include: venue fees, materials and supplies, staff time, publicity/marketing expenses, hospitality expenses, and transportation.

- *Communications:* Establish a communications team for the event and identify spokespersons early on. The communications team should be sure to cover both internal and external communications for the event. Company staff, while not working, often serve as ambassadors in the community and can inform individuals about the event and project outreach. Outside of the company, potential participants you may wish to invite include community leaders, partners, permitting agencies, and the public. This underscores the importance of having a presence in the community or, at a minimum, some contact with invitees prior to sending out event invitations. The communications team should also determine forms of marketing/publicity to be used for the event. Marketing options may include: advertising in local news (newspapers, TV, bulletins); online calendars/e-mail listservs; flyers; radio ads; press releases; website announcements and social media (Facebook, Twitter, etc.).

- *Safety:* Safety should be considered in the planning effort. This would include answering questions such as: What are the provisions for ensuring the safety of visitors? If visiting a site located on an existing industrial site, what are the safety protocols already in place at the industrial site? What are the contingency plans if an accident at the CO_2 storage site or the host industrial site occurs while the site visit is underway? Do visitors need to have safety equipment (e.g., hard hats, goggles, and/or noise protection) or wear appropriate clothing (e.g., steel-toed boots, closed shoes, and/or no loose fitting clothing)? Planners should also consider the logistics of keeping track of visitors and guiding them through the site.

Site Visit Logistics

Site visit logistics include many details and are best completed early.

- *Determine a Time and Date for the Site Visit:* To determine the time and date of the event, first check with the personnel who will be involved with the event. Also, consider coordination with project activities, coordination with other community events, weather and seasonal conditions, and traffic.

- *Determine the Site Visit Location and Policies:* Determine if the event can be held in the field on site facilities. Alternative public locations include libraries, churches, schools, town hall rooms, or community centers. If the event is going to be inside (or have an inside component), consider the number of tables and chairs needed, audio-visual equipment needed (projector, laptop, cart, microphones, speakers, podium, stage, and screen). Determine the best options for transportation to the location (personal vehicles, company vehicles, or rented vans or buses). In addition, determine the visitor capacity of the location to make sure there is adequate space for the visitors and restroom facilities. For onsite or laboratory visits, visitor safety is a primary concern. Be sure to obtain a copy of site visitor regulations and permissions for the location and allow time for any required safety training or personal safety gear check-out. Determine the photo and media policy of the host site or facility. Decide if visitors will be provided with any refreshments. Write up an information sheet to include with the invitation to inform visitors of any policies or items they need to bring or wear (closed-toe shoes for example).

Develop Site Visit Materials

- *Invitations:* In advance of the event, start working on invitations. Establish the invitee list and their contact information and determine the best format(s) for the invitations (personal phone call, e-mail, letter, newspaper announcement, website postings, etc.). It is also wise to determine who the best person to deliver the invitations is for the event. Often, an invitation from a third party, community member, or local host may be more effective than from the project developer. After sending out the invitations, send out follow-up information that includes: directions, maps, policies, what to wear/bring, background information, and the event schedule and agenda. Send out reminders near the event date and include contact information for any event-related questions.

- *Other Materials:* Determine what materials will be needed in advance and allow adequate time for development and production. Consider having some or all of the following materials on hand for the visit: event agenda, logistical information, project fact sheets, company brochures, PowerPoint presentations, question and answer sheets, project maps, project timeline, posters, folders for handouts, nametags for speakers and guests, sign-in sheet for attendees, signs to guide individuals, host site policy information, company contact information, rock or core samples, storage or other models, and multimedia (CCS or project videos).

Phase 3: Event Day

By the day of the event, most of the work has been already taken care of to have a successful site visit. Here are some tips to run a smooth event: make sure all personnel involved know their roles, allow for ample set up and clean up time, bring all necessary materials, make sure food delivery times are coordinated, be sure to document the event (photos and notes), *and* have a "Plan B" in case of inclement weather or other unforeseen circumstances.

Phase 4: Follow-up Phase

Event follow-up can be as important as the site visit for the overall project outreach. Good event follow-up can solidify relationships, clarify questions, and show individuals that the outreach team is available and cares about their concerns. Below is a list of possible follow-up items: write-up an event summary; post any materials (photos, PowerPoint presentation, and/or posters) on website or distribute as needed; answer any inquiries from attendees; send thank you notes to appropriate individuals; track all post-event press, publicity, and feedback; determine if an additional event may be needed; revise materials for the next event based audience understanding and feedback; and update the mailing list.

Appendix 8

Conducting a Focus Group

Focus groups provide information and guidance about a research topic through the use of group dynamics. Focus groups are essentially group interviews. A moderator guides a small group discussion on topics raised by the moderator. What participants in the group say during their discussions is the essential data in the focus group.[21] According to Blankenship and Breen, "focus groups are an invaluable tool for marketing researchers and the sponsors that use them. For many purposes, nothing duplicates what can happen when a group of persons interested in a topic sit around a table for one to two hours discussing how they feel about that topic."[22]

Effective moderation of focus groups is a specialized skill. Knowledge of facilitation techniques, developing appropriate questions, and how to analyze qualitative data are essential elements for effective focus groups. This document will not teach how to conduct a focus group, but simply provides helpful tips and information that can be used when conducting them.

A focus group's success will be aided by the preparation that occurs before focus group participants become involved. In particular, consider these steps in planning and executing a focus group. Note that several suggestions in this Appendix refer to a focus group report prepared by the PCOR Partnership after conducting focus group interviews during the first phase of the partnership initiative. This report, entitled, "Carbon Sequestration – A Community Focus Group Study of Attitudes," can be found in the reports section of the RCSP page on the NETL CCS website: http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/workproducts_table.html.

Step One: Establish a Purpose[23]

Defining the desired purpose from the outset will help guide the development of the focus group. For many focus groups, the purpose is likely explorative or descriptive in nature. However, focus groups can also be used to explain findings obtained from other methods, in which case research question(s) or hypothesis(es) should also be identified along with the overall purpose.

Step Two: Choose a Research Team

In addition to a moderator, someone experienced in qualitative data analysis is needed. Moderating the focus group and the resulting qualitative data analysis is typically done by the same person, but can involve more than one person or be a team effort. If a moderator is hired, spend some time communicating with him/her about the project. The moderator should understand the purpose of the research and what role it will play in the overall project.

Step Three: Plan the Overall Logistics of the Focus Group(s)

Holding at least two focus groups is useful to compare and contrast findings. Focus groups should meet in neutral territory to minimize bias. A hotel room or conference room in a convenient location is best; corporate settings should be avoided. The dates and times of the focus group should be set far in advance, perhaps up to three months ahead of time. Plan to limit the time for a focus group to two hours or less. Usually somewhere in the range of 60 to 120 minutes is ideal. It may be appropriate to budget a stipend for participation of at least $25 per attendee or some suitable gift or gift certificate for participation. In addition, a meal or refreshments should be provided to help participants relax and feel comfortable.

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[21] Morgan, D.L., 1998, The focus group guidebook: Thousand Oaks, California, Sage Publications.

[22] Blankenship, A.B., and Breen, G.E., 1993, State of the art marketing research: Chicago, Illinois, American Marketing Association, p. 225.

[23] Hanson, Sheila K., Daniel J. Daly, Edward N. Steadman, and John A. Harju. "Carbon Sequestration – A Community Focus Group Study of Attitudes in Williston, North Dakota." PCOR Partnership, June 2005. http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/pdfs/CommunityFocusGroup.pdf.

Step Four: Recruit the Focus Group

A focus group consists of a small number (6 to 10) of relatively similar individuals who provide information to the interactive group discussion.[24] Having a larger group does not allow sufficient time for all participants to speak and may also limit the detail of the responses because participants feel pressure to share time with others. Conversely, participants in a group that is too small may feel pressured into participating in the discussion more than they would like. Focus groups are particularly well suited for gaining insight into what issues are most relevant to target populations.

- ***Determine a participant mix.*** The type of participants and the group dynamics in your focus groups will drive the type of information gathered. Focus group participants are typically chosen for their ability to provide insight into the issue under study. A balance is sought between homogeneity, so that the group gets along, and diversity to ensure that the group is truly representative of the population of interest. In the case of "general public," an equal balance of men and women would be sought. It is also common to include various demographic categories, such as different age brackets and racial groups.

- ***Develop a contact list of potential attendees.*** An initial list can be derived from a regional phone book and recruited randomly. Although focus groups are not statistical samples, they should still be representative of the underlying population of interest.

- ***Locate and screen participants.*** Once a source of contacts is determined, the potential focus group participants should then be contacted, using a script, until the quota for the session is reached. The script should contain some background information about the purpose of the research, describe the incentives for participation, provide logistics of the meeting, and possibly provide questions to recruit just those individuals that meet the demographic requirements. For example, 18 may be set as the minimum age for participation. Typically, focus groups are over recruited with the expectation of last-minute cancellations and no-shows. If eight participants are desired, recruit about 12 participants with the expectation that six to ten participants will ultimately participate.

- ***Collect background information from the participants***. In the case of the PCOR Partnership focus groups, participants were asked to answer some questions intended to characterize the focus group participants (background, age, and employment) and to characterize their opinions on various topics related to the environment. A few participants completed the questions in advance, while others answered them onsite before the focus group meeting began. Sample questions are found within the PCOR Partnership Focus Group Report referenced at the beginning of the Appendix.[25]

- ***Confirm and encourage participation.*** Prior to the focus group meeting, participants should be sent a letter confirming their participation and providing them with the logistics of the focus group (time, date, place, directions, stipend amount, time commitment, etc.). Correspondence may also include background material about the topic and/or brief background questions as previously mentioned. Reminder calls should be made the day before each session with some cancellations expected.

Step Five: Design Questions for a Discussion Guide in Advance

Planning questions in advance is important to obtaining valuable feedback from focus group participants. Typically, an experienced moderator, together with staff, would prepare the questions. However, it is called a "guide," because conducting a focus group is more of an art than a science. An example of a discussion guide is found in the PCOR Partnership Focus Group Report. Some considerations for designing questions include:

- ***Use open-ended questions***. In most cases, a moderator seeks to elicit more than one- or two-word answers from participants. Open-ended questions, as opposed to yes/no-type questions, encourage participants to provide a more detailed answer.

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[24] Popham, W.J., 1993, Educational evaluation: Needham Heights, Massachusetts, Allyn and Bacon.

[25] http://www.netl.doe.gov/technologies/carbon_seq/partnerships/phase1/workproducts_table.html.

- ***Use follow-up or probing questions***. An experienced moderator will know how to "work the group," following up or probing relevant lines of questions to try to uncover the feelings and motivations behind the statements. Having some follow-up questions planned in advance is also useful.

- ***Avoid leading questions***. In order for focus group findings to be valuable, they should reflect the participants' genuine thoughts and feelings. Moderators should be neutral about the questions they pose and avoid questions that suggest any type of answer. For instance, "Wouldn't you agree that climate change is threatening our planet" is an example of a leading question.

- ***Consider using both direct and indirect questions***. Direct questions are easiest to write and easiest for participants to give a simple response. However, when direct questions are likely to put participants on the defensive, make them uncomfortable or not elicit truthful answers, indirect questions may be helpful. An experienced moderator will be familiar with indirect questioning techniques. Projective techniques are a useful type of indirect questioning. For example, asking how a focus group member's neighbors would feel about an issue is useful. The participants often "project" their own feelings through their neighbors. It is safer to say how your neighbor would feel than how you feel. These indirect techniques are useful with controversial topics, such as climate change.

- ***Plan a logical flow to the questions***. At the beginning of the group, start with one or two general questions that allow each group member a chance to speak and see what they have in common with the other group members. These "icebreaker" questions help build the group dynamic. It is customary to start with the easier questions and then move on to the more difficult ones.

- ***Expect a realistic timeframe***. In order for participants to respond thoughtfully to moderator's questions, they must have sufficient time. Estimate in advance how many questions can realistically be posed in the given timeframe. For example, if participants will require an average of one minute to answer each question, then a group of six participants would be able to cover just 10 questions an hour or six minutes a question. Also, some extra time for the unexpected and follow-up questions is useful.

Prioritizing the questions is advised, and these priorities should be discussed with the moderator. That way the moderator can judge the amount of time and pace of the group progress accordingly. If the group is going longer than expected, the moderator can cut the less important questions.

Step Six: Facilitate the Focus Group(s) with the Research Team

It is not advisable for more than the essential researchers to attend the focus group. The necessary team includes the moderator and one or two individuals to handle the audiovisual aspects and note taking. Observers, who do not have an active or behind-the-scenes role, will make the participants feel nervous and may bias the results.

The amount and quality of information gained from focus groups will relate directly to the style and quality of group facilitation by the moderator. These suggestions will help ensure focus group facilitation:

- ***Introduce the research team and the organization.*** In order for focus group participants to offer opinions freely, they must feel at ease and trust the moderator. Unless there is some reason to keep the name of the organization secret, an upfront introduction is helpful. Introduce the moderator to the participants along with any other researchers that are present, such as a note taker and an audiovisual assistant.

- ***Provide the context for the focus group.*** Most participants will have questions about why they been invited to offer their opinions, how the group will function, and who will ultimately use the results the group generates. Moderators should provide a brief overview of how and why the group has been assembled and offer to answer any questions. This is also a good time to explain the logistics of the session, why the session is being recorded (taped or notes taken), and that there are no wrong answers to any focus group questions.

- ***Establish a conversational atmosphere with some ground rules.*** Because focus groups are intended to gather participants' opinions, it is essential that participants are at ease and feel that their input is valued. Moderators should be attentive listeners themselves. They should not interrupt or appear disinterested, but should encourage the attendees to participate. This code of behavior applies to participants as well. A skilled moderator will ask each participant to introduce himself or herself to the group, provide the rules for group discussion, and diplomatically intervene if one participant interrupts another, is dominating the conversation, or is otherwise disrespectful. In order to create an atmosphere that encourages participants to share their thoughts and feelings. The focus group should held in a space that is comfortable, free of distractions, and conducive to conversation and listening. For example, cell phones should not ring (or vibrate).

- ***Arrange to record participants' discussion***. In order to analyze and compare focus group results, it is essential to record the participants' comments. As it is difficult for one person to both moderate a group and effectively record the session, it is best to arrange for a research assistant to take detailed notes along with tape recording and/or videotaping the group. Since backup data is always valuable, it is recommended to do all three (notes, tape recording, and video recording).

Step Seven: Analyze the Results

Once the focus groups have been conducted, conclusions can be drawn from the participants' comments. It is recommended that the person analyzing the results have experience in qualitative data analysis, typically someone with graduate education in marketing research, psychology, sociology, education, or counseling or some specialized training in focus groups or qualitative research. Transcribing the focus groups is often the starting point, before analyzing the qualitative "data." General suggestions for analyzing focus group results include:

- ***Look for consistent patterns.*** Results that are consistent among focus groups or across different demographics represent consistent patterns. If a consensus emerges about a particular issue or question, it deserves attention as a finding, typical of a sample from the population. For example, if focus group participants are almost universally suspicious of corporate press releases but trusting of university press releases, that represents a finding.

- ***Analyze results within the context of the group.*** Some patterns in focus group results may only be evident with certain participant demographics. For example, a younger demographic may wish to hear more about the environment via e-mail updates. Whatever the finding, note the group or context, so that findings are not generalized out of context.

- ***Identify issues about which participants feel strongly.*** Some focus group questions or topics may generate passionate responses, which can be flagged. For example, if some focus group participants are passionate about doing something about environmental issues, the project team may want need to consider how to involve the public in a meaningful way. Difficult or sensitive issues should also be noted.

- ***Gather ideas about messaging and how to reach the audience.*** Focus group research is an invaluable resource in developing outreach materials and to guide the development or refinement of outreach products. Outreach products or draft outreach products may be used within the groups to stimulate conversation. For example, the PCOR Partnership group used the video entitled "Nature in the Balance" as a starting point for group discussions.

The final product of the focus group analysis is PCOR Partnership's report of the findings: "Carbon Storage – A Community Focus Group Study of Attitudes in Williston, North Dakota."[26]

[26] Focus Group Study in Williston, North Dakota, June 2005.

Appendix 9

Additional Information about CO_2 Storage

There is significant experience in selecting sites for underground injection, as well as safely operating, monitoring, and closing them. This section describes some of the resources available for use in developing outreach materials. It also includes website addresses that are active as of the publication of the manual. The reader can also contact the partnerships through the websites listed in Appendix 1 if seeking additional information resources.

Physical Models of CO_2 Storage – There are several physical models that can be used to visually illustrate the concepts for CO_2 storage. Interested developers may be able to borrow or recreate these as follows:

- **Understanding CO_2** – Dry ice is actually a solid form of CO_2 that has been compressed and refrigerated. When it is allowed to melt, or sublimate, in a glass jar, it gives off CO_2 gas. Because CO_2 is denser than air, it will collect in the glass jar and can be used in various ways to demonstrate the properties of CO_2. The Gulf Coast Carbon Center (GCCC) has created a worksheet called, "An audience-pleasing physical model to support CO_2 outreach," which can be used in conjunction with dry ice purchased at a local ice or beverage store to demonstrate the properties of CO_2. The worksheet can be found in the kids' section of their website: http://www.beg.utexas.edu/gccc/ and http://www.beg.utexas.edu/education/co2_outreach/co2_outreach03.htm. This worksheet also includes instructions for building a model from glass marbles, a glass jar, colored water, and vegetable oil to demonstrate porosity and permeability.

- **Using Core Samples of Rock to Demonstrate Porosity and Permeability** – Western Michigan University developed a demonstration tool using core samples of rock taken from a deep well. One sample is of a porous and permeable rock such as sandstone; the other is from an impermeably rock, such as shale. A hole is drilled about two inches into each sample and the fitting for a bicycle pump is cemented into the hole. To complete the demonstration, each sample is submerged in a large beaker full of water and bicycle pumps are attached to the fittings. The audience is asked to attempt to pump air through the samples. It is relatively easy to pump air through the porous rock; this demonstrates the concept of an injection zone. It is impossible to pump air through the impermeable sample; this demonstrates the concept of a caprock. Posters can be developed to more fully explain these concepts and to relate them to the local geology. Pictures of the setup are available on the MRCSP website and a copy is included below; developers interested in using this kind of a model should either contact an RCSP representative or the state geological survey for assistance in developing a set of samples.

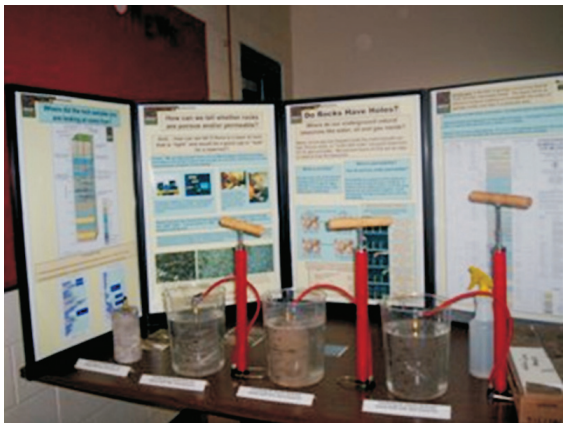

Figure A9-1: Core Sample Demo (Courtesy of Battelle)

- **Physical Model of EOR and CO_2 Storage in Saline Reservoirs** – The MGSC developed a dual sectioned Plexiglas model (see Figure 2-1) that allows the audience to see a representation of the process of EOR in one section and CO_2 storage in a saline reservoir in the other section. The model operator uses a combination of colored water, vegetable oil, and CO_2 generated by sublimating dry ice in a bottle of water (or baking soda and vinegar) to show how injected fluids move through the pore space created by gravel. NETL developed four of these models for use by interested parties. There is an instruction booklet with the models and/or someone who is already trained may be able to assist.

Fact Sheets and Posters – Fact sheets and posters are a versatile method for conducting outreach since materials can be easily adapted for various publics and can cover a wide breadth of information ranging. The RCSPs can assist in the development of posters or may have posters and fact sheets that can be used for outreach events. The RCSPs can be contacted through the websites indicated in Appendix 1.

Videos – There are several videos and animations that may be of use in outreach:

- Overviews of the RCSP Initiative:
  - NETL Multimedia page: NETL's Carbon Capture and Storage Program http://www.netl.doe.gov/multimedia/index.html.
  - Overviews of CO_2 storage:
  - NETL multimedia page includes several videos with overviews of CO_2 storage and interviews with researchers: http://www.netl.doe.gov/multimedia/index.html.
  - Prairie Public Television documentaries cover several aspects of CO_2 storage: http://www.undeerc.org/PCOR/documentary/default.aspx.
  - CO_2 Capture Project (CCP) has created two videos describing how carbon storage works and explaining their research program: http://www.co2captureproject.org/.
- Technical Aspects of CO_2 Storage
  - Schlumberger has an animation of a seismic survey and the construction of an injection well on their carbon services homepage: http://www.slb.com/content/services/additional/carbon/index.asp?entry=carbonservices&; this site includes contact information for individuals wishing to use the video for their outreach efforts.
  - MRCSP has a video of vibroseis trucks conducting a seismic survey posted at the bottom of the webpage for the Phase II East Bend project: http://216.109.210.162/CincinnatiArch.aspx.
  - Smithsonian documented how a well is drilled and what goes into CO_2 storage as part of series on energy. The video can be viewed at the following link, but arrangements would need to be made with Smithsonian to use the footage elsewhere: http://www.learner.org/resources/series209.html.

Best Practice Manuals: In addition to this BPM, NETL has posted six others that are related to geologic storage on the Carbon Storage Reference Shelf via the NETL website: http://www.netl.doe.gov/technologies/carbon_seq/refshelf/refshelf.html. These manuals cover topics including: geologic formation classification; site screening, selection and initial characterization; monitoring, verification and accounting (MVA); risk analysis and simulation; and well management. The Reference Shelf also contains documents and other reference materials generated through the RCSP Initiative.

Reservoir Maps – RCSPs contributed to the development of a national atlas of potential storage reservoirs and a basic primer on storage. This atlas is available online and as an interactive website. Most RCSPs have included a mapping function for their region on their website. In addition, a national map can be accessed at: http://www.netl.doe.gov/technologies/carbon_seq/natcarb/index.html.

Professional Development for Teachers and Curricula – There are a number of resources available for teachers:

- PCOR Partnership Educators page includes multiple resources for teachers (http://www.undeerc.org/PCOR/educators/default.aspx).
- Keystone Climate Status Investigation (CSI) – (http://www.keystone.org/cfe/pel/services/csi).

Image Libraries

- CO2CRC (http://www.co2crc.com.au/imagelibrary/index.html).
- CCP (http://www.co2captureproject.org/media.html).

Additional CCS Information Resources

- Research Institutes
  - Massachusetts Institute of Technology (MIT) (http://sequestration.mit.edu/).
  - Princeton (http://cmi.princeton.edu/research/storage.php).
  - Stanford (http://pesd.stanford.edu/research/climate/).
  - University of Texas (GCCC) (http://www.beg.utexas.edu/gccc/).
- Other Research
  - CO_2 GeoNet (http://www.co2geonet.com/).
  - IEA GHG (http://www.ieagreen.org.uk/).
  - CO2CRC (http://www.co2crc.com.au/).
  - IPCC (http://www.ipcc.ch/).

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