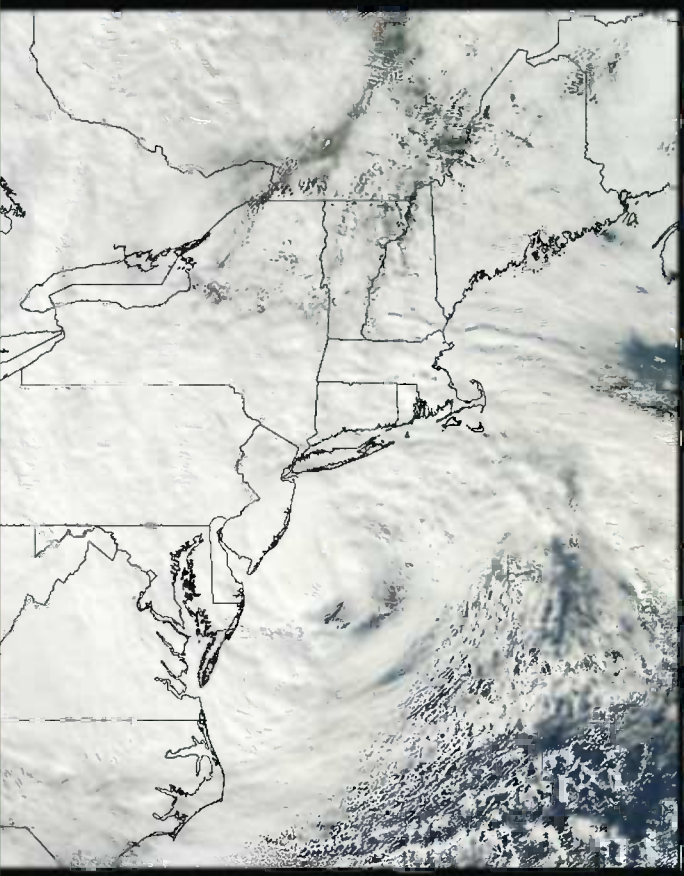
Emergency Planning Guide for Utilities

Second Edition



Samuel Mullen

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Dedication

This book is a product of having a tremendous amount of love and support from people who have shaped my life and helped me to understand how to help others. This book is dedicated to my family and close friends, and I'll mention a few of those special people here.

Marie, my dedicated and intuitive wife and friend, who has dedicated her life to be a nurse that shows compassion every day for everyone she meets.

A son, Sam III, a talented engineer, with a big heart he continues to show family and friends. Sam is completed by his environmentally conscious and dedicated wife, Karen.

A son, Eric, with his love for family and a keen eye for business and sports, but his smile is what wins you over. Eric is completed by his wife Sharon, mother of our three grandchildren, Jack, Ava and Ryan…always smiling close by.

A beautiful, talented, and very creative daughter, Sandra, who cares for us all and shows us every day how much life is worth living and sharing. Sandy is completed by her husband, Frank, one of my golf buddies who has served his country and continues to do so.

A very close friend and mentor, Paul Biggers, PhD, who inspires me with his generosity, regularly travelling abroad and in his community to help establish a level playing field for the downtrodden and medically challenged by helping to establish sound medical alternatives…and hope where there is none.

And finally, I'd like to dedicate this book to fellow Veterans of the Vietnam War, and military service personnel who continue to unselfishly guard our country, a country born out of our love for freedom and the continual search for knowledge.

Sam Mullen

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Preface

For many utility managers and specialists, planning for emergencies hasn't evolved to a point where they can be fully confident that the next emergency they encounter will be met with a successful response. For that reason, including others, utility professionals are still looking at options open to them. One option is to continually refine the way they think about the needs of the utility as emergency planning evolves. How can they implement measures to make the utility more resilient and responsive?

History bears out that utilities will spend hundreds of millions of dollars annually to make repairs and reconstruct utility infrastructures following major storms alone, even as other threats emerge. These immense expenditures have forced utility management to reconsider its options and take action sooner rather than later through better planning initiatives and mitigation measures that include system hardening and investment in smarter, energy-wise alternatives.

There is little room today in utilities for those without a firm belief in continuing to improve the level of planning for emergencies. Today's utility is moving toward a "best practices" approach that includes, with strong commitment, adopting the Incident Command System. ICS is used by all levels of government—federal, state, tribal, and local—as well as by many nongovernmental organizations and the private sector (www.fema.gov). This system fosters unified command and places limits on the span of control, which reduces the chaos that can be ever-present following emergencies and disasters.

While advocating the use of ICS, this guide is not written to be a source of information for implementing ICS in utilities. Readers are urged to consult the FEMA website and training websites that offer courses providing in-depth information on the inner workings of setting up an incident command structure and implementing it when handling system emergencies.

The reader will be exposed to a model that has been continually improved over the years. This model provides in-depth information on defining and developing the strategies that are needed to fully develop the emergency plan as well as a more formal emergency program. While training and exercising is addressed in addition to the planning, this guide will maintain a concentration on the strategic approach to emergency preparedness planning and the necessary steps to take when writing a viable utility emergency plan.

Readers will also find important tips on maintaining momentum during the plan and program development process. Keeping other people interested in emergency preparedness is necessary for continued development. The emergency plan is a living document that should continue to reflect the current needs of the organization. That's why all utilities should have at least one person who is steadily moving the program forward and continuing to look for vulnerabilities and gaps in the planning.

Of course, in today's environment, virtually all employees can and should play a part in helping to monitor the security of all facilities owned and operated by the utility. Emphasizing this at new employee orientations and at regular meetings can be effective in reducing physical and cyber security problems. Maintaining awareness of the many forces that threaten utility operation is a great asset, and increasing awareness will help improve resilience to many types of threats.

When the utility finds itself unprepared for emergencies as a result of insufficient planning and awareness, consumers stand to lose the benefits that lifeline services bring and many of those benefits are critical to public health and security. With the tools that are available today, there is little excuse for remaining unprepared for emergencies. Utilities are under the microscope at the state and local level and sanctions for lack of preparedness are growing more severe. Whether the sanctions are warranted or just contribute to the problems faced by utilities, the fact is clear that being better prepared is expected and the time to do that is now.

This second edition of *Emergency Planning Guide for Utilities* presents considerably more detail. Emergencies and disasters have grown more frequent and severe, but we have learned more about how to handle them. So appropriately, and throughout the book, new methods on how utilities can handle damaging events are presented and I hope these will help many readers. In addition, readers will observe many new checklists and shortcuts to help minimize the time it takes to get emergency plans into useable format.

This guide was written for those who believe in doing more each day to keep the mission of lifeline service organizations alive and those who are willing to make emergency preparedness part of the culture in their utility. It is hoped that the reader will gain sufficient insight through the use of this guide and other resources to make a positive change in the level of preparedness in their utility and continual program improvement for years to come.

I wish you good fortune in performing this important work.

Sam Mullen

About the Author

Sam Mullen has more than 35 years experience in utility operations, planning, and management. He is the author of three books on contingency and emergency planning and technical communications, including *Emergency Planning Guide for Utilities* 1st and 2nd Editions and *Critical Communications: An Operations Guide for Business*.

Sam holds a BS from Stockton College of NJ, and an MBA from Monmouth University. He has completed the Project and Investment Risk Management program at Massachusetts Institute of Technology (MIT), and graduate program courses at the University of Pennsylvania in Organizational Dynamics. He also holds several professional certifications and has completed programs in electrical engineering technology (EET), power system operations (General Electric), energy management (CEM—Association of Energy Engineers), and disaster recovery planning (CDRP).

After a long career in power system operations and utility system planning, Mullen founded MPS in 1994, a practice working primarily with utilities. Sam manages and consults on a full range of projects involving power system operations, system emergencies, operating procedures development, information technology, business process design, computer applications and controls, communications, and regulatory compliance.

Past project partners and employers have included Florida Power Corp., Northeast Utilities, Niagara Mohawk Power Corp., Merrill Lynch, Engelhard Corp., Electric Power Research Institute (EPRI), Atlantic City Electric Company, Power Technologies, Inc., Black & Veatch, Westin Engineering, Las Vegas Valley Water District, City of Detroit, Tennessee Valley Authority and Tennessee Valley Public Power Association, American Public Power Association, Northeast Public Power Association, and Innovative Emergency Management, Inc. He has been a guest speaker at a number of industry conferences, workshops and webinars, and contributes to *Energy Pulse* online, energypulse.net.

Introduction and Use of the Guide

I

Introduction 1

Discussion Points

- Opening remarks
- The second edition
- Organization of topics
- Using the guide with other resources
- Quick-start methods and tools included in this guide
- A word about emergency programs and resilience
- Using a modular approach to planning
- A process diagram that provides guidance and direction
- Getting people involved (and keeping them interested)

Opening Remarks

The primary goal of this second edition of *Emergency Planning Guide for Utilities* is to offer readers a working guide that presents both new and seasoned approaches to plan development, training, exercising, and emergency program management. I have found that in today's compliance-based environment, utility managers and planners often find it difficult to understand the depth and breadth of action needed to help ensure organization-wide resilience and meet consumer expectations. The guide will also emphasize the minimum communications requirements to help ensure that utility emergency programs evolve beyond the planning stage. Woven into the discussion will be personal experiences from other professionals that have taken the initiative to help their organizations become more prepared for damaging events.

This guide, or any book for that matter, could not possibly include all of the possible examples and advice that is available in the field. The reader is strongly urged to continue investigating options that will help advance his or her knowledge in the field of emergency planning while maintaining compliance with federal, state, and local guidelines.

Primary Learning Objectives

The primary learning objectives offered in this guide are as follows:

- Review proven methods to attain more effective emergency plans.
- Determine risks that need to be prioritized with the goal of developing the necessary strategies for effective response.
- Carry out a utility-wide risk assessment that makes sense for utilities seeking to improve their plans.
- Be able to more effectively evaluate the processes that go on across the utility and determine how those processes affect the mission of the utility during routine and emergency conditions.
- Develop emergency plans that leverage the knowledge gained through risk identification and experience.
- Perform a viable emergency communications study that will help the utility determine future investment in technology and its use during response and recovery.
- Evaluate security in various parts of the utility and determine how diminished security resources during major emergencies will affect people, services, and utility infrastructure.
- Identify local, state, and federal emergency management organizations and determine how the utility will interface with them for larger scale emergencies and disasters.
- Identify training resources that will help utilities fulfill their training and indoctrination needs, which will help maintain readiness and a high level of coordination with outside organizations.
- Determine the preferred methods for requesting and handling outside crews and support personnel to help reduce the time needed for an extensive recovery.
- Be able to effectively audit emergency plans and programs applying metrics so that plans can be significantly improved and tailored for the utility and its finite resources.
- Apply effective modeling techniques so that response plans can become more modular in design and easier to use.
- Learn how tasks, such as a damage survey, can be completed in the least amount of time so that crews can begin work and consumers can be restored to service.
- Assess how new technologies, including smart systems and devices, will perform during and after a major storm or other damaging event.
- Determine how new consumer-based technology, such as smart devices and electric vehicles, will be effected by damaging events that occur on the electric system.

- Review the use of computer and web-based outage and control systems before, during, and after major storms and how those systems affect restoration.
- Determine the best sources of information on the Internet for improving utility emergency plans, training, and exercises while maintaining regulatory compliance.

Introduction to the Second Edition

The first edition of *Emergency Planning Guide for Utilities* was published in 1994 and had a scope that did not include some of the necessary planning that would be required in today's utility environment. Both this edition and the former are primarily directed at utilities that may or may not have telecommunications, gas, or water distribution responsibilities in addition to power delivery. In past experience, electric and multiple-service utilities have been able to use the concepts presented to significantly enhance their programs in all areas of utility operation congruent with their mission.

The frequency of disasters, coupled with the current regulatory requirements and advanced technology, has made it necessary to offer a more comprehensive guide for utilities to consider. This revised and expanded second edition will bring much greater substance to the planning and reach farther into the utility in terms of dependencies and rationales for effectively responding to emergencies and disasters. Therefore, the reader will hopefully draw a higher level of both the fundamentals and more advanced tactical methods to help bring their utility's emergency program forward, more closely meeting current needs.

There are many excellent references covering the topics of emergency response and, for example, the transmission and distribution of electric power. This guide was not written to educate the reader on electrical theory or to try to explain the reasoning behind new regulations. These topics are covered in other publications and are well documented on the Internet. The real purpose of this guide is to present some thoughts and ideas on how the utility planner, trainer, and responder can more effectively improve the level of their utility's resilience and, in so doing, reduce the impact that damaging events have on the utility's infrastructure, people, and finite resources.

As the result of having written a number of plans, training guides, web-based training resources, papers, and articles on emergency planning, communications, and related topics, I will now present a single volume of in-depth knowledge that can both inform and encourage the reader to move forward. The knowledge gained through both formal training and experience working with and for utilities and utility associations since the late 1970s will allow me to offer the reader a guide that is both easy to read and, I predict, very useful. In short, I will be covering the subject matter in a way

that I would have wanted to explore it if such a guide were available much earlier my career, but from a current point of view.

Some referenced material that was published in the first edition will be included in this edition, because the ideas presented are just as important today as they were in the first edition. While some of the publications referred to are no longer in print, some may be located in libraries and through out-of-print channels. I would encourage any reader who may have an interest in reading further to try to locate them or perform a search online to discover more about them. Documentation in this field has grown steadily for the past three decades and will continue to grow and continue to be refined.

Organization of Topics

The book is organized into four sections. Section I provides introductory information to the guide that should help the reader move more quickly into the chapters that are of greater interest and getting a good start on the work ahead. Section II looks at the past, present, and future of emergency planning in utilities. Section III details the methods and dynamics involved in emergency planning. Section IV contains exhibits and tools to make it easier for the reader to understand the concepts offered in the guide and provides samples of ready-to-use templates, checklists, and other useful tools to help expedite the planning.

A Quick-Start Development Guide is included in the first part of Section IV, which includes tools and exhibits to help save the reader time and enhance understanding. The Quick-Start Guide can serve readers who may be on a very tight schedule for creating a plan, but who also need to have a global perspective of the main points in creating a program for their organization.

Using the Guide with Other Resources

This guide is meant to be used with other resources, as the reader would with other books on any topic. When we study a discipline to understand it in detail, we should avail ourselves of other points of view. We find those viewpoints by reading a number of articles, books, white papers; by attending seminars and conferences; and by viewing webinars. Webinars have found their way to the forefront by offering information in a concise format in the convenience of the office, home, or airport. If readers are interested in a webinar, but can't attend when it is presented, it is commonly made available on demand following the original presentation. Slides and other visuals may also be downloaded to allow the reader to study the topic for as long as desired.

Paper resources have been widely replaced by electronic versions that can be read via electronic readers, tablets, smart phones, and notebook PCs.

This makes it simple to download electronic versions of resources and retain them for further reference during the emergency planning project. These references become a part of the emergency planning program information base that is referred to in the Emergency Plan Development Model (Figure 1.1) found in this guide.

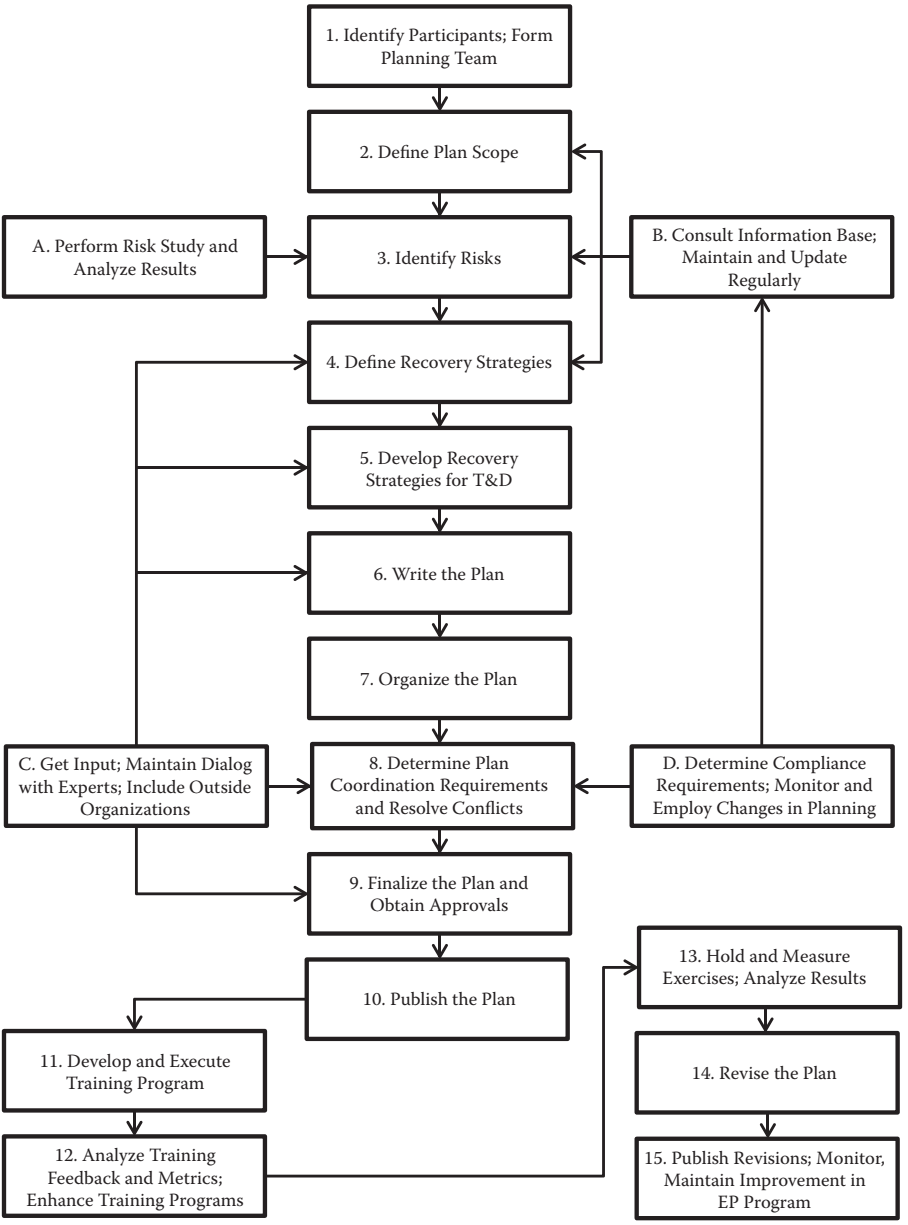

Figure 1.1 Emergency Plan Development Model.

Emergency Programs and Resilience

Utilities have many problems in common when they face emergencies. They share in the constraints of limited resources: people, material, equipment, cash, etc. They must plan to use outside help to deal with disasters and major emergencies. Equipment that they use daily can often break down when used under emergency conditions. Logistical problems associated with feeding and housing people, and working them around the clock, can be overwhelming.

Decision makers who have a plan can initiate procedures with a high level of confidence, knowing they were developed when there was time to think rationally and when there was time to get needed input from people who must respond. This doesn't mean they will do everything by the book, or that they won't make mistakes when disaster strikes. They do know that the odds of doing a better job will be in their favor when they have a plan. The plan will give them that advantage, an important advantage, when a situation couldn't look much worse.

When a crisis hits, everyone should be working toward a common goal. People in various departments or units must communicate well and work under guidelines, or they will get a slow start or, perhaps, a false start. Similar to a football game in this respect, if a team member doesn't get the right play while standing in the huddle and thus doesn't execute the right moves, he may set his team up for a loss. It's a similar situation during an emergency except, as we know, the results can be much more devastating. A plan will be an asset to the organization if each player (participant) knows his or her job and follows the guidance offered in the plan.

When people abandon their company's emergency plan in a gallant effort to restore systems and services, they can lose the advantage that factors such as teamwork, planned resources, clear communications, and coordination could have given them had they operated under the guidance of the plan. Veering too far from the plan or simply making many critical decisions on the fly can be very costly. Many books and documentaries have covered events where individuals, or groups in charge, have made decisions that have brought irreparable damage, death in their own companies, and injury or death to citizens in local communities. After-action assessments have uncovered the lack of careful planning and communications in virtually all of these events.

Still, you've probably heard the following opinions expressed before: "We're ready for anything!" or "Plans are no good to anyone when a major storm hits," or "Our people are professionals and they know what to do." As we have found in after-action assessments following damaging events, these statements often cover up an underlying problem, and one that the planner must identify and overcome if his or her company is to move forward

as a prepared organization. As authors Thierry C. Pauchant and Ian I. Mitroff write in their comprehensive book, *Transforming the Crisis-Prone Organization* (1992, 47):

> It is becoming clear that many crises are caused by overly simplified conceptions.… As virtually all large-scale disasters remind us, broadening both our thinking and our feeling is no longer a luxury but a necessity.

Of course, leaders need to make it clear in their organization that the planner or project leader has management's support in developing the emergency plan, whatever it might cover. That support should extend to both completing a plan and in continually promoting it. From a leadership perspective, viable plans have proven their worth many times over in utilities. They merit the time, money, and action necessary to put them into place.

Industry emergency planning professionals realize that it's not enough to know how to restore a device or system to service. Usually, there is far more to consider. You must be able to restore it in a safe and proper way, utilizing people who may not be as experienced as the front-line experts. It's a fact that the experts in any given area of operations may not be available when disaster strikes. And, whatever it is that must be dealt with must often be done in a chaotic environment, and that adds yet another dimension to the problems that have emerged. So, a plan can help to create a more level playing field and reduce the effect of disparity in experience as people work under the difficult conditions of recovery.

Will an emergency plan save an organization from experiencing great loss? Some very remarkable experiences have come out of utilities and other types of organizations in the wake of disasters. According to many after-action assessments, emergency plans are clearly advantageous tools and should therefore be in the mix of the many projects taking precedence today. A preparedness program will bring into play factors such as written plans, training, valid exercise programs, and effective triggers to get people and systems working in synchronism, all while instilling a sense of responsibility at all levels in the organization. The reader is encouraged to review the list of after-action assessment questions in the Exhibits section (Section IV) to get an idea of where vulnerabilities lie and what their plans should address going forward. The next topic will help readers identify how they should address planning from a more personal perspective.

Your Plan for Your Company

Many people who are new to emergency planning ask why they can't take a plan that has been developed by another company and simply change a

few names and numbers to fit their own organization. Before you copy anything, consider what you'll have when you're done: a plan that was written for another company under different circumstances owning varying levels of resources. If you use the plan someday, how many people will have accepted it as *their* company's plan, and will know what's planned inside for each of them to do? Was the plan that you copied a viable plan? Was it ever exercised? Has an unbiased authority, a qualified consultant, or an experienced planning professional reviewed it in the context of your organization's goals for recovery? More importantly, ask yourself whether or not your company's survival is important enough to develop a plan that has been specifically written for your company and not another.

When I started writing plans, I wondered if a plan that was used in another organization could be altered to fit in my organization. I was looking for a magic bullet to get me started and on to completion. I knew that my utility needed a plan that would help us reduce recovery time and reduce costs associated with storm recovery. After looking at some plans and attempting some rewriting, I found that it would be better if I wrote the procedures using the most suitable model for the utility that will be using the plan: my own.

I knew it was a good mental exercise to develop procedures using knowledge and experience I had gained from working in various roles and actively soliciting input from other people. This approach will help new planners understand the procedures more completely and develop better training when the time comes. So, my suggestion is to borrow some good ideas when you can, but be hesitant to use too many shortcuts and so-called boilerplate plans.

If you plan to use a vendor-supplied computer application or web application that has been purchased by your company, make sure the application is not leading you down a path that will make it difficult to tailor your plan to your specific needs. Some vendors amass ideas and approaches from many types of organizations and infuse their own ideas to create an application that may be too general for use in your utility. Vendors may tell you that they will customize the application for you, but this could involve many hours of additional programming and additional expenses that go with the demands of customizing an application. I will be covering the topic of planning using a software approach later in this guide, but be advised to do your homework before going this route.

When you work with others on developing a plan, show them you aren't willing to rush through the process without giving each content area careful consideration. This book offers a model and guide to develop a useful plan from scratch. A sample table of contents is also included in the Reference Materials section to give you an idea of what might be included in your emergency plan.

If you feel a certain amount of anxiety about having to develop a plan, let me try to set you at ease. Every organization, large or small, should begin by

writing a plan to cover the loss of critical systems and services. It will be *the plan* until someone writes another one, perhaps better than the original. That iterative process should continue. A few years and several revisions later, it will be time to assess whether the plan should be completely rewritten and brought up to the new needs of the organization. Years from now, after a number of revisions, few people (except you) may remember what was in the original version of the plan. But you'll know that the plan you developed was important to the future improvement of planning across the organization. It may likely contain many of the original procedures that you and your planning group painstakingly drafted. There simply may not be a better way to restore a system or service. So, have confidence in your ability, and have confidence that you've made a difference!

There are other benefits to writing emergency plans, many of which lie outside the realm of emergency planning. These benefits will become clear as you explore the workings of your organization to develop an information or knowledge base for your plan (discussed later in this book). You will likely uncover basic problems that have been in existence for years, and only through your efforts will they be revealed and, I hope, resolved.

Uncovering problems can create controversy, however, and you should be aware of this at the outset. Resolving problems in the righteous name of "corporate preparedness" won't always win you more friends. Also remember that just because you see the need for continuous improvement in your emergency plans, this doesn't mean that the entire organization shares your view. In fact, I'd be surprised if that were the case.

When you're working with other people at their work location through virtual means, or in a meeting room, go in open-minded and ready to work. Go in prepared to show people why it's to their advantage to get on board as quickly as possible. Try not to appear as if you are the one who knows best, full of good intentions, or you may not get the cooperation you need. Large or small, organizations are made up of people driven by varied interests. You'll have to show others that by assisting you in the project, they will be helping the organization realize its goal to survive an emergency or disaster. Bottom line: If they do help you, that's really what will happen.

Plans that you write will have to be presented to management and participants for approval and support. You'll get a higher level of approval and support by respecting people's varied points of view as you move through the project. You probably won't win everyone over no matter what you do. But you are more likely to succeed at writing your plan if you keep a global view and stay interested in the program. When and if you can move faster to get the plan installed, do so, but don't be too unrelenting or you'll likely lose some followers.

Remember that emergency preparedness usually takes time to gain momentum in organizations. This is because the average employee has no

expertise in it unless he or she learns by experiencing a disaster firsthand. As more people see the advantages of being prepared, momentum will build.

Models for Plan Development

This guide will introduce readers to a model for developing emergency plans. The model is presented as a method for developing a plan and eventually producing a fully developed program. Of course, there are many models that can be found throughout the business-continuity and disaster-recovery industries, and you may even want to develop one yourself.

The model presented herein may seem more complex or involved than a planner might want or need for writing a plan that is narrow in scope. However, the key elements for developing a broad spectrum of plans and an ongoing program are presented in the model. Each of the strategies and processes in the model are explained in the text. By referring to this guide, you'll have the advantage of being exposed to useful examples and models to help you develop your skills more thoroughly, leading to more favorable results.

A Quick-Start Development Guide is also included in the Exhibits section (Section IV) of this guide. This guide is more closely targeted for the user who demands a bare bones approach to getting started and is offered to readers who want to move forward as quickly as possible with their planning projects to minimize risk in the near term. I felt that this option should be available to readers, but it should be used only if this approach makes sense for their organization. It is not offered as a model for implementing a full program.

Closing Notes for Using This Guide

This guide wasn't written to suggest the precise steps or procedures necessary to deal with specific types of damage or equipment-specific failures that strike utilities. That undertaking is best left to your experts or employees, who can summon the expertise of equipment manufactures or consulting engineers. Covering all of the varied types of events confronted by utilities is, of course, beyond the scope of any single source of reference. To be more accurate, you may call this an emergency-plan and program-development guide, for that is its intended focus. It is specifically written to put the reader on a productive path to define needs for his or her utility. It will also be of value to those companies that work closely with utilities in defining and serving their critical needs.

That being said, you will still find useful information and tips that should lead you to the correct path for dealing with damaging events and

failures of critical infrastructure. This information is based upon many years of experience by myself and others that I have worked with. There are many strategies for recovery and restoration in utility operations, and by reading this guide, I believe you will be able to apply strategies that have worked with greater success.

If you already have a plan in place, this guide can serve as a resource for helping you to decide whether a plan should be rewritten or reorganized to make it a more effective tool. I would highly recommend this kind of evaluation on an annual basis, with a general review semiannually.

References

Pauchant, T. C., and I. I. Mitroff. 1992. *Transforming the crisis-prone organization: Preventing individual, organizational, and environmental tragedies*. San Francisco: Jossey-Bass Publishers.

II

Past, Present, and Future of Emergency Planning

Looking Back 2

Discussion Points

- Roots of utility emergency planning
- Need for change recognized
- Introduction of metrics in planning
- A new approach is part of the strategy
- Discovery of outside interest: Who are those groups?
- Regulation enters the picture
- Management gets more interested

Roots of Emergency Planning

Throughout the 1970s and most of the 1980s, electric utilities were guided by few regulations covering requirements for emergency plans, outside of those at nuclear and other plants. This meant that utilities basically started with a clean sheet of paper and wrote down strategies and procedures that would, for example, lead them to a recovery following a major storm. Plans were usually organized in a three-ring binder, with logo-enhanced cover, and placed on the shelf behind the training and development (T&D) manager's desk or in the dispatch center. Several months later, an exercise might be planned, but there were few or no metrics to measure results. Employees were sometimes told that their utility had a plan, but few people saw it or knew how it could affect them.

Plans were sometimes developed independently in various departments, such as substation and telecommunications. The substation department might have a plan for hooking up a mobile unit in a substation where a transformer failed, while the telecommunications department might have another for the loss of several communications towers. Information technology (IT) plans evolved with the implementation of business process and substation automation. However, departmental plans might not have been coordinated, and utilities had few standards that guided them in terms of format or implementation.

The entire process of developing emergency plans was fueled by a small number of people in the utility who saw a correlation between controlling recovery and having some useful guidelines that could help key people respond. Managed by experienced utility personnel and blessed with skilled line and troubleshooting crews, utilities often saw outstanding results in restoring circuits to customers for moderate-level storms. C-level executives often found, however, that even the best managers and recovery teams needed better strategies and procedures to meet the demands of a major storm recovery. Proactive executives knew that more active government regulation would come if utilities simply waited and did not have an active emergency response program (ERP). In some utilities, emergency planning projects became high-level corporate objectives and were assigned to special task forces to assimilate the lessons learned, to apply expertise, and to develop plans, training, and exercise programs leading to higher levels of resilience.

Need for Change: Developing More Effective Plans

After a damaging storm or other damaging event, questions would often arise in terms of emergency preparedness. After-action assessments often include the following questions or ones that are similar:

1. Were plans based on recovering key resources in a logical and prioritized order?
2. How did employees respond, based on the scale of the emergency?
3. Was the command center or emergency operations center equipped and occupied for effective management of the event?
4. Were the right triggers in place of sufficient scale to implement response and recovery efforts?
5. Were several types of emergency plans implemented during the event, such as technology recovery plans, facility evacuation plans, plant recovery plans (e.g., power, water, and gas), security plans, etc., and were they coordinated to work together?
6. Was the utility able to assess damage to the system in a timely manner?
7. Was technology current for outage management, supervisory control, and dispatch (for example) used effectively?
8. Were the people assigned to use the technology aware of its limitations and able to correctly interpret the data generated, such as customer outage data, crew locations tracking data, and geographic information systems data, during and after the event?
9. What types of assumptions, made at various times during recovery, contributed to the length of recovery, any safety concerns, misuse of materials or equipment, or other notable problems?

10. Were there sufficient standby power sources, such as portable generators and auxiliary power sources, at plants, backup facilities, and substations, available to help maintain operation under blackout conditions?
11. Did the utility have fallback methods (manual procedures) for recovery knowing some technology would be compromised or unavailable?
12. What systems were used to record and act upon each damage location or point of failure, and how was the public kept isolated from damaged equipment and downed conductors?
13. What decision process had to be made at each stage of recovery and by what level of management?
14. How did the utility work with city, county, state, and federal emergency management officials?
15. How were vendors of critical equipment and services linked to the utility's response and recovery efforts?
16. What was the content and frequency of distribution of information designated to keep the public updated?
17. Was the utility able to maintain safety and help prevent injuries to their response personnel and the public?
18. What safety equipment was available, and in what quantities, to people working in the field?
19. Did responders have sufficient rest during the response and recovery efforts to maintain their own safety and ensure the safety of others?
20. How were outside crews brought in, and what did they bring with them that would expedite the recovery process?
21. What did the host utility, or utilities, do to ensure a continual supply of job-critical tools and equipment to a mixed workforce, with varying needs, throughout the recovery?
22. How was the security and maintenance of vehicles and critical recovery equipment handled around the clock?
23. How were employees able to communicate with their families on the job and help to ensure their well-being?
24. Were contact lists current for all vendors, officials, employees, and emergency services?
25. Were there sufficient accommodations, meals, and vendor-supplied needs available to all response personnel?
26. How did people communicate at all locations when communications systems were interrupted or unavailable?
27. Were there conflicts in the direction of orders sent to people on the job sites, and how was this corrected?
28. How did people update their status such as work location, tasks completed, who they were working with, and where they planned to go after completing each phase of their work?

29. What will the utility do to improve their level of preparedness and overall resiliency knowing what they know now?
30. Bottom line: How would you (we, the assessment team) rate the overall preparedness of the utility for the event that was experienced?

These questions are critical in determining the state of preparedness in virtually all utilities. If the utility has not considered similar questions in their planning, it's almost certain that other organizations will do so in after-action assessments. It is important that answers to these questions be proactively addressed prior to the next emergency. Note that further guidelines and more in-depth information that can be used to answer these questions appears in the Sample After-Action Assessment Questions module in the Exhibits section (Section IV) of this guide.

From the early 1990s, well before the 9/11 terrorism events and up to the present day, many utilities began taking a closer look at their plans, often bringing in experienced planners to help them create a more organized approach. A look at the costs of damaging storms in the recent past is enough to raise awareness of the continual need for improved response and recovery. Hurricane Fran cost Progress Energy $115 million in 1996. An ice storm in 2002 cost Duke Power $87 million. In 2005, Entergy released a preliminary storm cost estimate associated with Hurricane Katrina of $750 million to $1.1 billion. Of course, of far greater importance is the impact on the safety and loss of human life associated with all disasters.

Utilities are always stretched for resources after major storms, tornadoes, earthquakes, and floods. They want safe and effective recovery solutions to help them make headway when danger lurks and coordination is essential. They also want to be more compliant with agency guidelines, which have continued to become more detailed as terrorism and the reliance on technology grew to be major concerns. Today, many utilities have managers dedicated to address all aspects of emergency planning across business processes, technology, and power system operations. In general, I have found that utilities are receptive to new ideas that will help them shave days, or even hours, from a costly recovery effort, and will invest in proven mitigation measures. This should continue well into the future as new and improved technologies and materials are developed.

Agency Involvement

Answers to many of the questions on disaster preparedness come as utilities move toward compliance with agency guidelines. It turns out that this doesn't mean giving up control of power system recovery or resource planning. Except in targeted areas, the government is not ready to tell utilities

how to write their ERPs. That's because most people believe utilities have the expertise to deal with the recovery of power systems and should have detailed plans for this purpose.

The Federal Emergency Management Agency (FEMA) and the Department of Homeland Security (DHS) are in agreement. They view utilities as lifeline service providers in many of their planning documents, and they encourage local, county, and state officials to communicate and coordinate emergency planning with utilities. In fact, they developed sophisticated guides under the National Response Framework (NRF) that point out the criticality of electric power. Utilities appear as nongovernmental entities that maintain critical infrastructure, defined as follows on the FEMA website (www.fema.gov/emergency/nrf/glossary.htm):

> **Critical Infrastructure**: Systems, assets, and networks, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

In many cases, agency guidelines are mandatory. Rural electric cooperatives, for example, need to review and act on the guidelines under the USDA-Rural Utilities Service (RUS) to maintain compliance and qualify for funding. However, RUS does not advocate specific templates for developing emergency plans for all utilities. Instead, it takes the following approach, as written in RUS Bulletin 7 CFR Part 1730 B-2:

> RUS recognizes that the borrowers themselves know their systems better than any federal department or agency and that it is prudent that borrowers develop their own Vulnerability and Risk Assessment (VRA) and Emergency Response Plan (ERP) through that knowledge.

The North American Electric Reliability Corporation (NERC) provides the following list of guidelines under "Security Guidelines for the Electricity Sector," which are also endorsed by RUS:

Communications
Continuity of business practices
Continuity of operations
Control system: business network electronic connectivity
Control system: cyber security incident response planning
Cyber: access controls
Cyber: intrusion detection
Cyber: IT firewalls
Cyber: risk management
Emergency plans

Employment background screening
Patch management for control systems
Physical response
Physical security
Physical security: substations
Protecting potentially sensitive information
Securing remote access to electronic control and protection systems
Vulnerability and risk assessment

It's important to note that the Internet holds vast resources for obtaining electric utility–related compliance information. Readers will want to think outside the box in terms of how power affects critical infrastructure, such as transportation and communications systems. For example, Title IX of Public Law 110-53 should be reviewed in the context of coordination and cooperation between DHS and the private sector. A simple Internet search using this title will reveal a number of links.

The Energy Sector Specific Plan refers to the fact that public utilities are subject to dozens of regulations and, of note, that several organizations closely monitor utility practices and may fine or penalize utilities for noncompliance. This is not new information, but it is a growing trend for writers to show the relationship among various agencies and growing levels of compliance required by utilities. The 2010 Annex to the National Infrastructure Protection Plan (NIPP) is packed with tables and graphics that offer a comprehensive overview of compliance references; these are well done and should not be missed.

NIMS and the Incident Command System

FEMA has long endorsed the use of the Incident Command System (ICS). Utilities are urged to study this design, which makes use of specialized teams to deal with various levels of emergencies. ICS is a transferable and scalable system that can be used by utilities as well as government agencies. ICS is a worthwhile study for anyone involved in utility emergency planning. Once the principles of ICS are known, the planner can set up similar structures in the utility emergency plan and be many steps closer to being able to coordinate and plan with local emergency officials. Being on the same page when disasters strike can make recovery go faster for all response organizations.

Many utilities have already embraced ICS, either through compliance or by program enhancement, and that wave is moving across the United States in utilities small and large. Of course, there are many more links of great value in learning more about the National Incident Management System (NIMS) and ICS, and we will be covering these additional points in this guide.

Utility emergency plans and related support tools have been essential to utility operation for many years. Utility officers and managers have long recognized that if plans and procedures are not documented and exercised, they are too easily left open to interpretation for various emergencies, creating inefficiencies, or worse. The fact that emergency response plans and risk assessments (among other requirements) have become agency imperative is an important consideration for utility emergency programs development. Whether the agency guidelines themselves have improved power system restoration and have created higher levels of public safety is left to the reader to decide. One thing is certain: Agencies have been and will be reaching out to utilities well into the foreseeable future.

However, we know that fragments of yesteryear are still with us. Outdated and infrequently exercised plans are still in our document libraries. Many key utility personnel still don't fully understand their roles during emergencies. Why not ask them now about their roles and regularly thereafter? Existing 24/7 call lists may include long-gone employees as well as suppliers and vendors who may have gone out of business or changed their phone numbers. Why not set aside some time to call those vendors and see if you still have the same understanding with them now as you did when their numbers were put on the lists? If we don't watch our own perimeter, someone else will be rising up to watch it for us—or tell us how to watch it.

So, what path should utilities take? Business resilience plans, disaster recovery plans, business continuity plans, and emergency plans all carry a similar mission: to be prepared, reduce recovery time, and help save critical resources. Having spent many years consulting in the field of power system operations and emergency planning, I believe that the combined activities of developing best practices, setting objectives, and holding true to deadlines for implementation is the right way to go for any utility.

As is true for any important practice, consistency is king and the devil is in the details. Seek out the resources now on the Internet and determine how the agency guidelines, relevant white papers, and pertinent reports apply to your utility. Then, in the most expeditious way, implement the right plans to minimize risk, promote safety and security, reduce recovery time, and maintain compliance.

Where Are We Now? 3

Discussion Points

- Current planning needs for the utility
- Planning for continuity and resilience
- Planning for technology advancements
- Use of outage management systems and demand management systems
- The role and use of geographic information and GIS
- Communications technology planning
- Use of technology before, during, and after damaging events
- Consumer expectations for utilities handling emergencies

Current Planning Needs for the Utility

This guide will cover many aspects of utility planning and emphasize a number of the areas where planning is critical for utilities, such as conducting a thorough damage assessment following major storms. But the utility should consider many other areas of emergency planning, and each utility should consider where there is a need for improvement based, for example, on past emergencies and major storms.

Some utilities excel in some areas of planning and have demonstrated that over the years. However, based on after-action reports and lessons learned, all utilities can improve their planning and preparedness to some degree. Whether it's planning for mutual assistance crews, making sure they have sufficient high-use materials, verifying contact lists that may have become outdated, or simply communicating better with the public, there is always something utilities can improve upon. So, it's really up to the people in the utility to seek a higher level of preparedness by performing regular audits of their response to emergencies and comparing what they find with what they have planned for and discovering the gaps that are present in their plans.

In the absence of real emergencies, utilities should regularly exercise their plans and prepare detailed logs and reports capturing lessons learned. When a utility has not experienced real, damaging events for months, or

even years, exercises can help the utility meet its goal to remain prepared for when it does.

Planning for Resilience

Resilience is the ability to deal with damaging events in a manner that minimizes their impact. We can see that taking steps to reduce the impact of those events by planning for them will help maintain resilience. In many cases, steps can be taken for very little cost if we know what to look for and prepare for. This guide includes content for examining the vulnerabilities that we may have and then setting up processes that will help minimize or, in some cases, eliminate vulnerabilities. A vulnerability and risk assessment (VRA) is a method used by companies around the world to help discover what their most important processes and assets are and then take steps to make them more resilient to damage or interruption. This is resilience in its purest form, and utilities are taking it more seriously by making it part of their culture.

Planning for Technology Advancements

Today's smart-grid and critical infrastructure projects represent significant expense and exposure to risk and require dedicated planning. Project plans should show that utility project managers have carefully considered how the loss or compromise of any new system will affect both system operations and the security of the power system and the consumers served.

Utilities in compliance with today's guidelines for vulnerability and risk assessment and with emergency response planning will have adopted viable plans to cover vital areas of technology, utility systems, and business continuity. However, as utilities add new critical infrastructure and the people needed to manage and maintain it, the viability of existing plans can come into question when utilities are exposed to damaging events. It follows that plans should exist to help ensure that any new and significant additions to infrastructure are recovered in a timely and safe manner under the National Infrastructure Protection Plan's (NIPP) Critical Infrastructure/Key Resources (CI/KR) guidelines (DOE 2007).

This guide reviews some basic steps to help ensure that emergency response and recovery planning will be an integrated part of new project planning and that appropriate plans are installed. The risks associated with any shortfalls in planning could substantially add to recovery costs and undermine the safety and security of utility personnel and the public.

Maintaining Compliance and Preparedness

First and foremost, utilities should have reviewed requirements and implemented the following, depending on the size, type, and mission of the utility:

- VRA (vulnerability and risk assessment)
- ERP (emergency response plan), system and service restoration (USDA 2007, 12)
- Mitigation projects and plans
- Regular training programs
- Annual exercises
- Cyber and physical security plans (NERC 2006, 2)
- BCP (business continuity plans)
- COOP (continuity of operations plans)
- Technology and data disaster recovery plans
- Evacuation, relocation, and shelter-in-place plans
- 24/7 vendor agreements
- Mutual assistance plans
- Emergency communications plans
- Pandemic plans
- Other plans and tools that will help minimize loss and maintain safety

When a utility determines that operations or service could be improved by the addition of a new system or device, it then begins research and installs pilot projects, actively gathering information. When the project scope starts to take shape, it's important that the project manager and project team begin to look at the risks associated with the project and to identify how those risks can be mitigated. A best practice is to develop contingency plans that cover unanticipated problems along the path to project completion. These might include dealing with problems associated with key components or with vendor performance or layoffs.

At key stages in the project, a discovery might be made that could force a utility to substitute a key component that may affect other components or their functions when the entire system goes into operation. Contingency plans can help the utility deal rationally with design and implementation problems, but these may not otherwise address problems caused by natural disasters after a project goes into commercial use. This leads us to the theme of this guide: Ensure that critical systems supporting lifeline services are covered by emergency or disaster recovery plans.

When should disaster recovery planning begin? To be practical, it should be concurrently developed under the timeline used for new project planning rather than near the end of the project, or as an afterthought. However, if a

new critical system is in operation and has not been included in emergency or disaster plans, any shortcoming should be addressed as quickly as possible in the appropriate plans.

Evaluating Systems for Planning Requirements

In the book *Normal Accidents*, author Charles Perrow (1984, 94–95) distinguishes systems as being loosely or tightly coupled. Perrow explains:

> In tightly coupled systems the buffers and redundancies and substitutions must be designed in; they must be thought of in advance. In loosely coupled systems there is a better chance that expedient, spur-of-the-moment buffers and redundancies and substitutions can be found, even though they were not planned ahead of time.

Utilities employ systems that fall into both of the categories that Perrow mentions in his book. It is apparent that tightly coupled systems are looked at carefully during design and fabrication and are closely controlled when they go online. Power plants, for example, fall under this category. Supervisory Control and Data Acquisition (SCADA) systems also fall into this category. If SCADA telemetry—the means by which the data is brought back to the control center—to several substations is lost, it is critical that personnel be dispatched to monitor substation status. Natural disasters, cyber terrorism, and other events can bring about problems that affect complex systems. Emergency procedures are therefore a necessary part of the recovery of these systems when emergencies, such as hurricanes and tornadoes, strike a utility's substation control building or pole-mounted devices.

Procedures are written and people are trained to respond to specific scenarios that affect system security and customer service. We write procedures to help ensure that people understand how these tasks must be completed. If training has been performed well, trainees will also understand the reasons behind why they need to perform tasks in a specific way.

Summary of Steps to Consider

Responsible planning: As the utility moves into more elaborate systems for monitoring and control, it follows that recovery plans should be expanded to include the recovery of new systems. Closely coupled with a new system improvement project is the responsibility to help ensure reliable and safe operation of the new system, subsystem, or component.

Project contingency plans: Review the risks associated with bringing a new system online. Evaluate the project risks and develop the necessary contingency plans to cover these risks before the new project goes through the approval process. As the project evolves, ensure that contingency plans are still valid and that people know how to use them. Make sure that project meetings and reports include updates on possible contingencies and how the contingency plan addresses them.

Expanded coverage in emergency plans: In parallel with the contingency planning process, study how the new system could fail under emergency and disaster conditions or as the result of cyber terrorism and breaches in physical security. Study the links and dependencies that the new system will have with existing systems and procedures. How might the new system affect emergency operations and recovery? How will the new system affect customer service, internal and external communications, critical data flows, and the overall safety and security of employees and consumers?

Outline of changes: Outline the necessary changes and additions in existing emergency and disaster recovery plans that will be required to recover the system following damaging events. Include appropriate plan-implementation triggers to implement the plan when specified events occur. Make sure people are assigned to maintain the plans as systems evolve and people change jobs or leave.

Recovery expertise: Training of personnel to operate the new system(s) during routine and emergency conditions is also essential to project success. By the time the new system comes online, people should be aware of their roles and recovery procedures to ensure that losses are not compounded during the recovery process. Set up a program that includes regular refresher training and include lessons learned from past emergencies. Schedule exercises that include walk-throughs and people to observe and verify recovery knowledge.

Compliance and recovery: Maintain the appropriate records and reporting schedules for all activities associated with critical infrastructure projects. Consult the record-keeping requirements under each agency or organization's guidelines. Ensure that vital data is regularly backed up and off-sited, and review required recovery metrics—recovery time objective (RTO) and recovery point objective (RPO)—for systems and data on an annual or more frequent basis.

This guide has briefly introduced the subject of maintaining viable contingency and emergency plans for utility systems and new projects. Revising and upgrading plans are certainly things that should be considered with each new and significant addition to utility infrastructure. Readers are urged to continue to investigate what is required to help minimize risk and maintain compliance.

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What Can We Expect? 4

Discussion Points

- Are we on the right track for our future planning requirements?
- Where better engineering and technology can help
- How more regulation will affect utility planning
- Expectations for future storm emergencies
- What will consumers need and expect of utilities?

Use of Technology: Before, during, and after Damaging Events

The implementation of better engineering in SCADA (supervisory control and data acquisition) systems, OMS (outage management systems), DMS (distribution management systems), and GIS (geographic information systems) has made it possible for utilities to maintain a sharper eye on the power system. The SCADA systems of the 1980s and 1990s that replaced the crude monitoring systems back in the 1970s and early 1980s made it possible to monitor conditions across the system and respond with far better judgment when systems were stressed during major storms. In a matter of several years, through careful planning, system operators began seeing real-time information from not only their main transmission substations, but also in the utility's transmission and distribution substations.

Today's monitoring systems are significantly smarter, and there is a greater measure of resilience to failure. System operators can draw information from a number of sources, and there have been major advancements in the way information is displayed, so operators can respond faster and with greater precision. Remote monitoring now includes the ability to see farther down into the electric system, down to remote switches operating out on the distribution network. All of this equates to fewer concerns in monitoring and dispatching trouble, because we simply know more about what's happening dynamically on the system and what's installed at thousands of pole locations. Engineers and operators can drill down to the device level on the

pole and see varying levels of detail as to the equipment installed, so damage assessment and crew planning can proceed much more smoothly following storms.

But knowing this means that utilities are being called to higher standards in terms of system and service restoration. Towns and cities that experience higher numbers of outages and only moderate performance in service restoration are calling on utilities to do better following storms. Society has grown accustomed to reliable service, and with so much of people's lives being driven by technology, even outages lasting several hours are becoming unacceptable for consumers. However, even though utilities are seeing more of their system, they still have to deal with *all* of the problems associated with major storms—not just a few. Several problems still remain and, in some cases, have gotten worse.

What are the problems that utilities are still dealing with that aren't always mitigated by installing new technology? Here are a few of the problems that still remain when storms leave a path of destruction through the utility's service area.

- Getting sufficient crews in to help from other states
- Competing with other businesses and industries for feeding and lodging facilities that can house their crews and ones from out of the area
- Getting employees into work when streets are clogged with debris that forces officials to close the roads that would allow utility employees to get to work
- Helping employees' families to find shelter and food so the employees can return to work without worrying about whether their families are taken care of
- Answering the needs of municipalities that insist on power being restored to downtown areas and priority facilities before the utilities can even get power into the area from the transmission system (City officials who do not know how the power system works are not aware of the requirement that power must come into an area through the transmission system before it can go farther down the line to feed municipal buildings.)

It's true, the utility now has higher levels of automation, but many of the key requirements to run a utility, especially after storms, are still unrelated to technology. The utility is left to maintain a higher level of communication and coordination with city officials and those directly involved with managing emergencies. What's more, there is a strong need to refresh consumers and city and state officials on the problems utilities must deal with every year. Utilities across the country are becoming more engaged in this work

and have become much better communicators. But the problems listed above will not soon diminish.

Some states have gotten tougher on utilities in the form of regulation that forces utilities to resolve some of the issues discussed above or face penalties that will force them to spend more money. Of course, this is a double-edged sword. When utilities have to spend more, it will cost consumers more to purchase their energy. Bigger government doesn't necessarily mean that power will be restored sooner to neighborhoods after storms. We still have the issues surrounding the timely clearing of roads so crews can get out and repair the damage on the system and getting employees into work. What it may mean is that town centers will get their lights back on a little sooner, probably using backup power resources or microgrid technology, but the payment for increased levels of service will largely come from increases in taxes or increased energy costs that are being funded by other consumers around the state or through private and federally funded projects.

Many utility experts agree that we will continue to find more effective ways to generate and store power at the local level, which will eventually bring about change in the industry as far as the transmission of electric power over long distances goes. This also means that any new power resources installed at the local level, such as resources to provide power to a community, must be both cost beneficial and robust. This leads many to believe that new power supply systems will feed facilities underground, which is nothing new, but underground feeders that cover wide areas is. They are traditionally very costly to implement. But if we say that much of the power will be generated using fuel cells or a combination of fuel cells, solar, wind, and other resources, we are also saying that much of the power will be generated at or near the home or public facility, reducing the need to bury a large number of cables throughout the neighborhood. Residential load will be substantially served by installing a combination of more efficient systems on the property instead of down the street. Again, tomorrow's green power and exotic systems will be far more efficient than we are seeing today, and will be able to withstand more of the effects that moderate storms bring.

III Methods and Dynamics of Emergency Planning

Risk Studies and Analysis

5

Discussion Points

- Why risk studies are integral to the process of planning
- Determining the risks for the utility
- Conducting the vulnerability and risk study
- Use of metrics and qualifying data
- Helping eliminate gaps in preparedness
- Analyzing the risks and leveraging the risk study
- Preparing for the emergency planning process

Why Are Risk Studies Important?

Risk studies are critical to the development of the emergency plan for all business units. This is because those studies help to reduce or eliminate guessing of what should go into the emergency plan and how the response efforts should unfold. If there were no other reason for implementing the risk study, this reason in itself should make it a priority for the utility. We can see a reference to this task by noting it on the Emergency Plan Development Model (see Figure 1.1, box A).

The risk study and the analysis that follows serve as a springboard for further development of the strategies, tasks, and assignments that are included in the plan. The facts that we gain from these studies, properly leveraged, will make the plans viable and abundantly supported. Further, when utility performance is studied and criticized by regulators, consumers, and litigators, the utility will be able to show that it has thoroughly reviewed its risks and has systematized its approach to planning. Therefore, it is important to approach the study process as if it were more of a science than a summary of what people on the planning team believe is the right approach to creating a plan (or plans) for the utility.

Assessing Risks for the Utility

Using a simple spreadsheet tool or other method, we can catalog risks to each business unit and, through a weighting method, we can determine the urgency or priority for recovering each business unit function. Applications used by each unit can be listed in the technology recovery section of our study. Physical requirements, such as building infrastructure, telecommunications, hardware, and other necessities can be listed, weighted, and prioritized in individual sections according to our study design requirements. Workforce requirements can also be reviewed in terms of how many people and which roles need to be scheduled to meet the minimum requirements for each input and output for the business unit.

We will review each function performed by each unit and subunit and the time it takes for each function to be performed. We will look at links between all of our business units to determine which links must be in place to reach a desired service level needed by the utility. We will review service-level agreements and standards adopted in the industry to make certain that the requirements are being met both in our study and further along, as we develop our business continuity plans. We will be looking strongly at recovery time objectives as well as recovery point objectives to ensure that these are being met by whatever method or methods we have chosen for off-siting and recovering our data. The reader is urged to review current practices and vendor agreements that are in place with IT section personnel on an annual or more frequent basis to ensure that a thorough study of risks and recovery is well understood and practiced across all business units. This guide will not go into detail on the regulations and standards in the IT (information technology) industry, which are under constant change and refinement.

Recovering the utility system—be it power, gas, water, or telecommunications—takes place under carefully devised, orchestrated, and regulated plans that take into account security, safety, and the science by which each process is governed. Power utilities, for example, have a very complex, technology-based method by which the transmission and distribution networks are kept in a continual balancing act so that power is generated, transmitted, and distributed in step with the capabilities of the infrastructure being used by utilities.

Power system operating standards are controlled at the federal level, administered by regional coordinating councils, and followed virtually "to the letter" by utilities across wide geographic areas. But, above all, the reliable operation of electric power systems, under routine and emergency conditions, happens because the physical laws and characteristics of electricity are being monitored and adhered to. This is most often carried out by highly trained people in control centers and, out on the system, by skilled technicians. The design and specification of electrical devices that reside in plants,

substations, and elsewhere on the power system are carefully engineered and maintained so that power can be reliably delivered across vast distances to end users.

System and service restoration is the responsibility of utilities after weather emergencies and disasters, which cost utilities billions of dollars per year. Utilities monitor the weather and system dynamics 24/7. For example, during the risk study/studies and plan development process concerning electric infrastructure, risk levels and anticipated impact to facilities must be considered. This, of course, is shared by other types of lifeline-service utilities such as gas, water, and telecommunications.

In the case of electric utilities, among the others, there is not a time when the power system is not being monitored, because the frequency, voltage, and load on the system changes by the microsecond. When these variances happen in sufficient magnitude, equipment can fail or be automatically taken off-line, and large areas can instantaneously be without power. There are relatively few ways that energy can be stored in sufficient quantities to even partially supply a city or town that has been isolated from the transmission grid. Therefore, at the high-voltage transmission level, utility emergency plans must address the loss of supply (generation of power) and loss of interconnection with other utilities when severe, damaging storms move across an area.

At the subtransmission level, emergency plans must address the loss of mid-level voltage transmission facilities that transmit power to subtransmission and distribution substations. Along with this, the loss of T&D substations, due to damage sustained to equipment in the substation yard or in the control building, must also be considered among the risks studied and then in the planning for restoration.

At the distribution substation and distribution network level, risks are studied for loss of power feeding communities that not only serve residential customers, but also serve medical centers, telecommunications facilities, police and fire stations, emergency management centers, and other critical facilities.

Taking a global view of the entire spectrum of risks is the most beneficial way to study risks. Thinking globally will allow you to see through the chain of events that produced damage and measure the contribution that each event had in causing the most damage or creating the worst roadblocks to recovery.

I recently watched a webinar that discussed the use of social media during disasters as a means of communicating problems and keeping people updated. While I agree that social media websites offer a valuable way to update and relay information, we also need to think about what makes the websites work. An obvious answer might be that we need to have continuously available web tools so that we can post and update the information prior to and throughout the event timeline. But fundamentally, we also need

continuous power during that time—either through normal utility power, stored power, or a method to generate the power—such that the entire system remains available.

In the case of major storm disasters, that might not necessarily be the case. The fact is, not all people in the affected area of the disaster have the capability to use an Internet-connected device due to damage of the electric infrastructure, among other problems. In many cases, people must be evacuated from affected areas, and there will be gaps in obtaining information while they are looking for a place to receive news. They probably will not have access to functional information retrieval devices, and information transmission, if remotely available, would likely be spotty, at best.

Bottom line: When examining a chain of events and determining risks, go very broad in scope at the start and then narrow the view as you move forward. Never assume that some mainstream tool will be readily available in disaster scenarios. Always look at what supports the tools that you plan to use. For energy supply to be available, many complex and vulnerable systems and devices must be operational, and a very high level of continuity and availability must also be there in support of those systems and devices.

Look at backup methods as seriously as you look at primary methods for completing tasks and maintaining contact with others. Automated methods may not be available for hours or even days following wide-area disasters.

Conducting the Vulnerability and Risk Study

With the method of performing the study firmly in hand, such as using a spreadsheet on a tablet or notebook PC, take another look at the design of the spreadsheet or forms being used to capture data for the study. If you are using a commercial application to perform the study:

- Make sure that you and others using the entry forms are well trained on how the vendor has envisioned using the application. It's important that you don't begin the study until all users are dialed in to what's intended for the study and how it will be carried out.
- Make sure that others have provided input.
- Make sure you have all the row and column titles and fields populated and error free.
- Ensure that the format you are using fits the task and that the output will be universally readable to the people who will be involved. In the event that you capture the information remotely or if other people will be capturing it for you, ensure that this process can be done without a problem.

- If the data that is captured will be sent to some other application for reporting purposes, make sure to test this process in advance. Perform several runs of sample input and output using test data.
- The format of the spreadsheet should be user friendly, and all numeric fields should be protected from users. Numeric data entered should enable the user to form an assessment of the criticality of applications and other resources being reviewed.
- You will need a timetable to accompany the execution of the study that includes progress milestones and reasonable time for the data to be compiled and reported, and for response from management so that adjustments to the tasks can be made. Regular reports and highlights to management should give them reason to continue their support.

If you have done a good job in capturing the risks and ranking them, developing the plan should come faster, and the utility will be on its way to substantially reducing the impact of emergencies and disasters on core services.

Using Metrics and Qualifying Data

The metrics that you chose to use for the study will have helped you see where the risks lie and how critical it is for you to develop strategies and procedures to recover the resources studied. In the early years of performing risk studies, you will be arbitrarily assigning values for each resource being studied. For example, if you have fifty or more applications that are being used on a daily basis by the business units, you will initially be looking at which units use which applications. You will then be looking at what the applications do (function) and, through their use, what results are anticipated. You will be looking at the as-programmed processing flow for each application (inputs and outputs).

From this baseline information, you will be assigning a relative value in terms of importance for the utility on an hourly, daily, weekly, monthly, and yearly basis. Some applications will output to other applications, which will in turn output to another application, which may combine the input of the first two applications and produce a report or some other function that is important to the utility. The process may be simpler than this or far more complex. The point is, you will be breaking down a process or processes into fundamental tasks and looking at relative costs, people needed to ensure that a process works, and so on. You could use a system for gauging the relative importance of each application by assigning a number of, say, from one to five or one to ten, with ten being the most severe in terms of loss.

Loss can affect tangible as well as intangible values that collectively contribute to or adversely affect such things as revenue, reliability, customer perception, credit ratings, liability, security, and other parameters. This is why it's very important to choose metrics well and determine how you will qualify the accuracy of information that could change the approach you use to recover the applications and other resources that your study will cover.

Eliminating Gaps in Preparedness

Gaps in emergency preparedness are often due to conditions that can be corrected through a more rigorous program in utilities. Let's look at a few that can be resolved, and should be resolved, as soon as possible.

Problem: Out-of-date emergency plans

Approaching a solution: Set aside time throughout the year to review existing plans, checklists, contact lists, etc. Create a spreadsheet or use a date planner to write down any gaps you find and suggest solutions for improvement. Set up a quarterly meeting to discuss problems, gaps, and advancements in planning, preferably in advance of storm season. Also, after a major storm or system emergency, make sure a full report on the various metrics you have set up to measure performance is developed and shared with key people. If gaps are numerous and have proved costly, make sure they are resolved through frequent updates on progress.

Problem: Disorganized approach to system and service restoration, leading to extended recovery time

Approaching a solution: Several key steps must be in place to mount an organized recovery. The emergency plan should be well written to fit the utility and the people who will be responding to the emergency (as well as the anticipated resources that need to be allocated). Every responder needs to be well versed on the strategies involved in recovering from emergencies that are within the scope of the plan. There must be clear triggers in the plan that will produce a desired result at a given point on the timeline for recovery. These triggers (description of a specific event and its level of severity) should be written so that there is a preapproved course of action associated with those triggers. Triggers are developed in concert with event descriptions. For example, if a level 3 storm approaches the service area, the following actions will be set into motion: Steps are then listed in order of priority, and they are assigned to specific personnel or teams to carry out. Of course, a level 3 storm would have been described in detail, so all

responders are aware of what type of damage such a storm will be anticipated to bring. As soon as the storm moves through the service area and it's deemed safe to begin recovery, responders will know where to report and what action will likely be required. Granted, this explanation is brief, but steps like this will help get the utility more organized as plans are developed and refined.

Problem: There are often shortages of materials and equipment during severe storm recovery, especially when we call in outside crews and support to assist us. How can we handle those crews better in the future?

Approaching a solution: Many utilities would agree that the business of handling mutual aid crews is a whole art and science by itself. That's why utilities often set aside part of their plan for developing all the details for handling outside crews. As a host utility, you should have the details concerning work planning well thought out so crews can come in and be productive from the start. Agreements should be set up in advance with vendors, and high-use items should be kept in reserve for major storms. If mutual aid (or mutual assistance, MA) crews come in poorly stocked, they won't be much help to you without compatible tools, materials, and equipment. Make sure there is a checklist for making sure the crews are ready to work your system before they leave their own utility. It's really too late to make sure of this when they are heading into your service area.

During the course of your planning, you and your team will be looking at onboarding of mutual assistance crews and support personnel from entry points on your system through to the point where they exit your service area following restoration work. You will be looking at communicating with crews; feeding, lodging, guiding them; and making sure they work safely throughout restoration. Your damage survey process should be advancing far enough so that incoming crews will receive work packages (feeder maps and marked-up damage locations) and people or GPS (Global Positioning System) units to help them get to the right locations.

On the tail end of repairing and rebuilding damage locations leading to full restoration out on feeders, you will be systematically releasing MA crews. To help complete your planning, you will need to look at how you can capture materials and tools that came from your own supplies or storm kits prior to MA crew departure. This can mean setting up additional processes or modifying processes that will help minimize the trouble that it takes to reclaim your property, such as grounds, wire, insulators, splices, and similar high-use items, as well as tools. Special radios, GPS devices, and similar items may also remain unreturned in the process. While you are not trying

to alienate MA crews through a delayed exiting process, you know that many thousands to millions of dollars of equipment can literally walk away from your utility after going through a lengthy restoration.

Utility managers can make some headway by discussing key points on this topic with utility managers from sending utilities and contract crews' managers. Do some research through utility associations and mutual assistance websites to learn more about the planning and best practices used in requesting crews from out of your service area.

Problem: Our utility simply doesn't have reliable information resources relating to our performance in prior storms, so mistakes are sometimes repeated.

Approaching a solution: If your utility has not written and archived in-depth after-action assessments on past storms and other damaging events, you can make it a regular practice to read and archive articles and papers written by other utilities. There is a wealth of information to be discovered by performing a search on the Internet using your favorite browser. You are likely to find relevant information on these topics using the following search criteria:

Utilities and storms
Hurricane Katrina and utility restoration
Wide area disasters and utilities
Lessons learned by electric utilities
Communications and disasters
Utilities and tornadoes
How utilities handle emergencies
Utilities and storm restoration
Electric utility emergency plans
Utilities and mutual assistance
Water utilities and emergencies
FEMA and utilities
Utility system disasters
Energy sector plans for emergencies
Utilities and ice storms
FEMA, NIMS, ICS and utilities
Lightning and power systems
Earthquakes and utilities

Close your own information gap by making it a regular practice of keeping accurate and organized records of storms you encounter. Immediately after storms and system emergencies is the best time to

capture good information from people in your utility. It's also a great time to put the steps in place to remediate problems that seem to happen whenever your utility faces damaging events. Make it a practice to put lessons-learned information into a format that can be easily retrieved for the prestorm meetings that you have every storm season.

Leveraging the Risk Study and Analysis

After listing, analyzing, and reporting the findings of the vulnerability and risk study, it will be time to turn that hard work into action. Leveraging your findings means establishing priorities for your plans based on those findings. A few sound practices for establishing your approach follow in the list below.

Review all data associated with your research in context with the following prior to writing your plan:

- Gaps in preparedness that can cause major delays in restoration
- Gaps that can set up the utility for major financial impacts and penalties
- DHS and FEMA standards that apply to utilities
- Safety and security standards used throughout the industry
- Damage to reputation as the result of gaps in preparedness and delays in restoring service to high-priority locations, such as shelters and medical facilities
- Other critical factors that need to be considered

Ask the question, What steps can I take to merge or meld the analysis and associated data with the development of strategies, tasks, and procedures that will likely be included in the plan? If your vulnerability and risk assessment (VRA) was well orchestrated when it was carried out, it should be relatively simple to channel that information into plan development. The VRA should provide sufficient "fuel" to breathe life into the emergency plan. Also, try to keep in mind that the emergency plan will eventually be tested through the efforts of your responders during scheduled exercises and real events.

Implementing the Emergency Planning Process

Chapter 6 will introduce a model and the critical tasks needed to develop the emergency plan for your utility. Some of the material that has been covered in this chapter will be covered again, with thought given to process order, which is the purpose of introducing the Emergency Plan Development Model (Figure 1.1). If you have covered the previous introductory chapters, the model should be easier to understand, and it should help you move forward with greater success.

Emergency Planning Guidelines

6

Discussion Points

- Review of the basics of utility emergency planning
- Writing or revising emergency plans
- Auditing existing plans and recommending changes
- Increasing management involvement and commitment
- Involving individuals and teams in the process
- Involving outside organizations
- NIMS, ICS, and federal guidelines
- Instilling cooperation and coordination
- Project management guidelines for emergency planning
- Developing metrics for the planning program
- Merging people, resources, and management
- What are emergency plans? (revisited)
- Categories of plans and scope of recovery
- Plan management and approvals
- Plan implementation across the utility
- Maintaining plans and the utility emergency program
- Methods and tools for continuous improvement
- Closing remarks and considerations for future planning

What Are Emergency Plans?

Let's recap about tasks associated with emergency planning.

What constitutes an emergency in your organization? Books written about emergencies often approach the topic by listing systems or services that have been placed in jeopardy by some type of event. That event could be natural or human made, or it could be a characteristic of the device itself—one that could lay dormant or hidden, waiting for a precise set of circumstances to unfold.

We also know that some devices and systems may be exposed to conditions in the field that exceed design specifications. Their failure may not

be immediate, but it is almost always inconvenient and oftentimes costly, because it may have a profound effect on systems or services. For whatever the reason, it makes sense for us to have plans to deal with reasonable risks that could occur during routine or unusual conditions.

Emergency plans will include detailed procedures for responding to damaging events. The term *emergency plan* is used generically in this manual to discuss various types of documented plans that satisfy those needs. *Emergency preparedness programs* include the development of emergency plans, as well as training, exercising, and all issues associated with emergency preparedness.

At the outset, let's pledge not to get caught up in jargon, and I'll try to keep it to a minimum. While a few naming conventions have been attempted, many people are naming their plans with what they feel are appropriate titles without regard for those conventions. Let's concentrate on results and on areas where we can see real improvements. If your plan accomplishes what you want it to accomplish, then most people shouldn't take exception to what you call it.

An important term, *core services*, was introduced early in the text. This term is used frequently by planners and is appropriate for describing the essential services and systems that the utility is fervently trying to restore. As we will discuss, restoring core services is a fundamental purpose for developing the plan. The term is commonly used in the information- or data-processing disaster-recovery arena, but is also appropriate in the other areas of utility operation. This manual is not specifically concerned with recovery of data or of information processing equipment, or of any specific system used in utilities. The planner is free to use this manual to develop emergency plans for nearly any area of operation, but it is not specifically recommended for use in developing agency mandated plans, such as those found at nuclear facilities, as we have mentioned earlier. Regulatory agencies have specific mandates for developing procedures and responding to events specified by those agencies. No part of this guide should be used in a manner that could serve to replace or diminish the importance of regulatory procedures and compliance mandates.

Following some useful introductory comments and tips for planning in a utility setting, subsequent chapters will take you through a process for developing plans. We will follow a model for plan development that should make the process somewhat less difficult. Theory will be introduced along with practical exercises to help develop the necessary skills to write viable plans. A shorter version, a Quick-Start Guide for getting up and running, is also included in the final section of the guide (Section IV). It is a highly abbreviated version that explains the process of plan development in very simple terms.

When you finish reading and applying the principles in Section III, you should be on your way toward becoming a more prepared individual, on a

mission to better prepare his or her organization. It follows that you'll want your associates and top management to maintain that momentum. For some insights on how to do this, read and consider implementing the promotional methods recommended in this section.

Preparedness versus Response

Your planning should take into account the time that is available to you prior to an oncoming emergency or disaster. This time might be termed *preemergency* or *pre-event time*. It's up to your decision makers to determine what they will do with the time they have to prepare—and for most organizations, that time is probably right now.

The Federal Emergency Management Agency (FEMA) has defined mitigation as "any action taken to eliminate permanently or reduce the long-term risk to life and property from natural and technological hazards" (FEMA 1990).

Here are a few example procedures distilled from early guidelines to illustrate the concept:

Contingency: Earthquakes
Area affected: Information Processing Center (any industry)
Mitigation procedures:

1. Place large data-processing equipment on casters to allow some movement during shaking, but also securely tether it to either the building structure or floor to restrain motion.
2. Back up all equipment essential to business operation with emergency power generators that are properly installed to resist earthquake motion.
3. Make battery racks and UPS (uninterruptible power supply) devices earthquake resistant with chemical-resistant straps to ensure that batteries will not topple or shake loose. Bolt the racks securely to the floor.

It follows that this time is the time that utilities have between emergencies (in peacetime, if you will) to make progress in a critical area of preparedness.

For major storm events, other than tornadoes, the utility generally has several hours or days to prepare. Fortunately, the National Weather Service has standardized many of the terms it uses to warn the public, and as long as public and private industry receive that information, necessary precautions can be taken.

Many people would agree that there may be little time or no time at all to prepare for events such as security breaches, bomb threats, vandalism,

earthquakes, explosions caused by faulty equipment, toxic chemical releases, and the like. They believe that for those types of emergencies, there is usually only time to *respond*. However, as seen in Section II, there often is time to plan for many kinds of contingencies. Just as preparedness and mitigation planning helps reduce the likelihood of great loss, response and restoration plans guide decision makers and responders through restoration of core systems and services.

Peacetime versus Real-Time Planning

I'd like to introduce, for discussion purposes, the terms *peacetime* and *real-time* planning to help describe the notion of preparedness. *Peacetime* mitigation (PM) activities refer to action and time spent preparing for reasonable risks when there is *no current threa*t on the horizon. *Real-time* mitigation (RTM) activities refer to time spent preparing for an event that *is* on the horizon. This might be a major storm or perhaps floodwaters that are predicted to enter an area within twenty-four hours. The plan may also refer to this as preemergency time.

There is an unmistakable difference between these two types of planning. Peacetime does not carry the notion of immediate risk; real-time most certainly does. Companies that are real-time planned will likely leave themselves open to the costs associated with maintaining this type of planning policy, such as price gouging by vendors and lack of support, which will be critical after the event unfolds.

PM-planned companies not only avoid many of the costs associated with RTM planning, but they build alliances with organizations that can offer invaluable support during recovery. PM-planned companies are also going to be more responsive to their publics and employees, because they will have developed primary and secondary message systems to inform them of events that affect their lives and livelihoods.

The more prepared organizations will have a higher percentage of peacetime planning in place, and they will no doubt spend much less money and experience fewer injuries as a result of their foresight. Having an ongoing emergency preparedness program, which includes a healthy measure of peacetime planning, can help an organization reduce the likelihood of an event becoming an overwhelming crisis.

Now, let's discuss response plans. Response plans are plans that you will use to help restore your core (essential) services, i.e., those services that, through prioritization, should be restored as safely and quickly as possible. Three words in the sentence worth repeating are *restored*, *safely*, and *quickly*. The most important word is *safely*. You don't want anyone to be injured or killed by responding to a problem haphazardly. Your plans should reflect that

your organization is dedicated to working safely under routine and emergency conditions.

Sometimes called *resumption*, *recovery*, or *restoration plans*, these plans outline a safe, logical approach to restore a system to a specified level of service. Keep in mind that, at the outset, you may not be able to—for economical or logistical reasons—restore a system or service to preemergency levels. However, it is important that you restore at least part of the operation to service as soon as it is safe to do so. This includes the utility's own facilities. But, for utilities, there is an order that must be followed during system restoration that reflects the utility's ever-demanding need to maintain system security, stability, and safety.

For example, during severe storms, homes that have been severely damaged are not ready for their utilities to be turned on even if a service and meter were still in place. All building utilities and the structure of the home would still need to be checked by an inspector prior to receiving service. In the case of electric utilities, transmission lines with a minimum level of capacity will need to be energized down to and including the area substations prior to distribution network service being restored. In the case of a severe hurricane, for example, transmission lines within a broad geographic area will need to be patrolled, damage repaired, and the lines energized prior to restoring any facilities served at the lower voltages. This is why residential consumers often don't see their power restored for several days, and perhaps weeks, following a wide-area severe storm emergency. Your strategies and procedures should reflect this kind of foresight.

Key Objectives for Plans

Emergency plans are developed to satisfy several key objectives, as follows:

- To quickly contain problems associated with the event as much as possible and restore priority systems and services as safely and quickly as possible to a specified level. This could be damage to a pipeline, a power line, a communications system, a drilling rig, a customer call-taking center, or other system or service that must be operational.
- To minimize further damage through incorrect action. There are physical laws that must be addressed so that additional equipment is not damaged and people are not injured or killed in the rush to recover.
- To eliminate unsafe conditions, such as hazards, and minimize injury to the public and responders on the job.
- To efficiently and effectively deploy limited resources and prearrange for the use of assistance from outside of the utility.

- To minimize recovery time and associated costs.
- To provide an orderly, well-coordinated, and proven approach to response for specific levels of severity.
- To reduce the number of decisions that must be made during recovery. People that are prepared are not as unsure about what actions to take.
- To restore revenue-producing systems to reduce financial hardship and stabilize the financial health of the organization.
- To maintain customer, shareholder, and regulator confidence.

Few people would debate the value of these objectives. It is for these reasons that we write plans and carry on emergency preparedness programs in the organization. Call them what you will, but the objectives for having plans are at the root of survival for the utility.

Of course, there are more reasons than those listed above, but the general focus of planning is *mitigation*, *control*, and *recovery*. You should do what is necessary to prepare for the event, and you must take control over recovery in a timely manner to minimize further loss. That's essentially it—no magic, no secrets. And remember, the most important part of emergency planning is to get your written plan into the minds of the people who must be prepared and must respond.

With those thoughts in mind, let's move to our emergency plan development model.

Steps to Develop a Plan

Plan Development Model

In this guide, we will be referring to the Emergency Plan Development (EPD) model (Figure 1.1), which will guide us through the plan development process. As mentioned in Chapter 1, we will be exploring the theory behind developing plans as well as practicing what we've learned. Take a moment to refer to Figure 1.1 to get a feel for what we will be covering in detail, largely contained in this chapter.

Let me propose a challenge to you while you are reading through the section. Keep a notebook PC or writing pad near you to write down your own ideas for how you will approach your own project. Gather your ideas and share them with your group. See if you can come up with better ways to approach a task. Remember, you'll get more out of your project if you put more of your own ideas into it. It will also become more interesting work going forward.

Emergency Plan Development (EPD) Model

EPD Model, Element 1: Identify Participants and Form Planning Team

Group Formation Emergency planning projects often come about through the efforts of group participation and interaction. Companies often form small groups to do the planning. Such groups are often called task forces, project teams, or committees, and they can be found in virtually any organization, carrying out various assignments.

The task force has a limited life. Its members work on the emergency planning project until it is completed. Once completed, the plan becomes the responsibility of an individual or department to revise and maintain.

The committee, on the other hand, may be ongoing, meeting periodically to develop and improve the plan, make revisions, or develop training programs to enhance corporate readiness. From personal experience and after consulting for a number of organizations, I can tell you that committees can work well and can also fail to do what's required, depending on the makeup of the committee. I've discussed group work with people for many years and have found that, in some cases, there are people who want to drive the actions of the group to a point where the plan never seems to get completed. The leader of any committee will need to make decisions that help keep the mission of plan development on track and not let the politics of a few members drive the planning where it will result in a plan that is not the right fit for the organization and may only meet the needs of select groups or business units.

Companies that have the resources will often use a full-time emergency planning manager or director to facilitate planning year around. That person may share a role to help direct recovery operations following a major emergency, or may observe and measure the actions of others during real events and during exercises. An example job description appears in the Exhibits section (Section IV) that covers many of the duties anticipated for an individual who performs emergency programs management in an electric utility. This can be adapted to many types of utility organizations.

Project size will often be a factor in whether a group should be formed to do the work. Let's briefly go through the thought process of determining whether or not to form a group to develop the emergency plan. Here are some important questions for consideration:

Does the scope of the plan call for input by several departments or business units?

Will people in several parts of the utility be called to respond to the emergencies identified in the risk study performed and are they aware how the utility will respond?

Will the plan require technical or operations expertise from several parts of the utility before it can be written?
Will the plan be part of an overall preparedness program that the utility will maintain?
Will the plan be filed with local and/or state government agencies that will need utility representation when disasters strike?

If you answered yes to at least some of these questions, it's a good indication that a group should be formed to begin the project. Make sure you maintain a global view on who should be involved, so that critical points like media communications, logistics, work planning, and other vital areas will not be left out of your plan.

If the plan is limited in scope, and will only be used by one or two departments—such is the case for a plan that addresses an isolated equipment failure—then it may not be necessary to get a lot of people involved in developing the plan. It will most likely take several exercises to determine who needs to be a regular part of plan development going forward, because you will discover gaps that need to be addressed by people who may not have been considered when the plan was initially developed. This is usually easy to correct, and some of those people will welcome the opportunity to play a role in making the plan more effective.

Group members should be chosen carefully. Planners seldom receive immediate satisfaction in performing this work. Those members who may expect rewards or high levels of gratification may not want to volunteer for this work. It can be tedious and quite demanding. However, one or more people may find a high level of satisfaction in performing the work and may want to continue to be a part of planning going forward.

Group Work Members are often asked to complete assignments, which are usually handed in or presented when the group meets periodically to work on the project. If a complex emergency plan must be developed, an assignment-based development routine can help ease the burden of plan development and, at the same time, create interest in the plan. If members put work into building a plan, it follows that they will probably believe in and follow the plan when it's published.

It's important to note that the assignments turned in by members need not be polished or in final form. No one can expect the new planner or planning group to turn out their best work in the first draft. The refinements to the materials that members turn in can take place after the first draft is published for review. Another option is to submit the first draft to a professional planner for comment. An expert can recommend changes that will bring a borderline plan up to higher, best practice standards.

Task-force or committee members should complete plan-building assignments on time, and they should do all the work that's assigned to them. Make it clear at the first meeting what will be required of group members. If you

don't, you may have 20% of the people doing 80% of the work, and the high-output people may not appreciate this. Further, they may stop contributing to the project in favor of other work.

An important advantage of having a group develop the plan is that, if the group is made up of members that will be called to respond in the emergency, it would be reasonable to assume that the same people who served on the planning task force will be familiar with what's in the plan. Those people would also be likely candidates for helping to develop training or exercises after the plan has been approved and installed.

Many of the problems associated with group work can be avoided by planning out the work well in the first few meetings. Make sure everyone in the group has a clear idea about what must be done in the weeks and months ahead. Remind those who are insistent on creating "the ultimate plan" the first time around that the object is to get a good, first-cut plan—not a perfect one—completed (on paper or electronic format or, preferably, both). A better plan will come later, with experience, training, and exercising. The plan should be fully vetted by experts in the utility.

Much like a programmer develops subroutines in a computer application to do specific tasks, break your project or program down into subprograms, which are easier to manage. It will also help you identify the key team members or individuals that will need to be consulted during the development process. If you've got a big writing project on the agenda, it will make sense to lay out the stages for developing the plan, e.g., determine scope, determine specific risk(s), develop strategies, decide how resources will be used, organize teams, list notifications and reporting requirements, etc. In other words, step through the project, giving careful thought to each part, but don't spend too much time (or get stalled) on any one topic. Experienced project managers know that projects can stall when people make any one concern unresolvable by failing to come to an agreement. When this happens, everyone can lose.

Where processes are involved, it's almost always helpful to have diagrams of the process. I recommend using diagrams that can be developed using dedicated applications and ones that foster rapid development. Look for low-cost graphics or diagramming tools that can be used by people on your team. You've probably heard the saying, "If you can't diagram it, you probably don't understand it." Consider mapping the processes to the point where you and your team understand how each process works.

Here are some sample processes to map:

- *Damage assessment process*: Determining what damage has been found on the transmission and distribution system, for example, in terms of conductors down, transformers damaged, poles damaged, etc.
- *Work planning*: Turning damage assessment information into work packages for crews

- *Hazard clearing*: Methods used to clear debris from utility lines so that people and equipment can move through neighborhoods to repair damage
- *Emergency communications*: Getting and updating information on daily progress by utility crew restoration work to disseminate to the media and government
- *Staging areas and work centers*: Setting up staging areas and work centers throughout the service area to channel crews and equipment into affected areas following a major storm

A project like developing emergency plans is suited for tracking by project planning software. Some of the better-known project planning applications can be set up to handle a number of people performing varied tasks related to plan development. I would take advantage of any tool that can both provide project-related charts and diagrams and can be used to track the status of a project at any given time. Some tools are more suited for diagramming than tracking, but more advanced applications can give you graphics, charts, progress reports, and other important elements that make it reasonably simple to maintain a good grasp on where you are with the project at any given time. I have worked on projects where weekly reports from team members are tracked on a project management application where, in turn, executive reports can be developed on demand. This solution can resolve a number of problems and help keep management apprised of progress as you move forward.

Don't forget the people in your company who are good prospects for providing consultation, whether they are on the development team or not. The people who will be using the plan—the actual or potential responders—can be ideal candidates for consultation on what should go in the plan. Stay within your scope and refocus your team when discussions start to go too far out of line with what should be in the plan.

EPD Model, Element 2: Define Plan Scope

Size and Scope of a Plan Specific types of risks should be covered by emergency plans. To list in detail all types of risks that should be covered by emergency plans is not within the scope of this guide. The utility should recognize regulatory requirements and meet them. In the absence of regulation, planners should determine the appropriate risks to systems and infrastructure and then define the scope of their plans.

The plan can be complex, covering several hundred pages, complete with charts and diagrams. Or it can be quite simple, requiring only checklists, procedures, and a list of names and phone numbers. Your plan can be somewhere in between these two levels. It's up to the people who are developing

the plan to know when they have enough detail in their plan. Realistically, it will take an emergency to recognize the needs of the organization, but you have to begin somewhere.

Too often, response experience comes after a real emergency strikes when systems are tried and some of them fail. This doesn't mean that the planner will automatically be adding more pages to the plan following a real emergency. It could mean that some procedures should be rewritten to increase clarity and level of coordination. I favor a review of strategies, tasks, procedures, communications, and other critical elements of the plan, following an event that called for its use.

It is worth repeating: Don't attempt to put more into your plan than is required, as defined by the scope. A wordy, overstuffed plan will give you more to compose, and it will be more difficult for others to understand. Any plan that is written to cover a multitude of events may be more complex than you want it to be. Unless you have a large training department with several trainers dedicated to performing emergency program training, keep your plan concise, and where you can, look for ways to make it simple for a trainer to use it for developing training. If you need several plans to cover several types of events, then develop them under separate cover and start a revision schedule and scope out required training for each one.

An overview plan or executive summary that ties in all the core elements, triggers, methods to centralize or decentralize, use of the Incident Command System (ICS) unified command structure, methods for damage assessment, setting up inboarding and outboarding for crews, maintaining communications, alternatives for loss of communications, and other key areas of emergency planning can be of value. However, be very cautious with developing general plans that are not inherently specific and active in nature. If you don't have solid emergency operating procedures that are specific, active, and effective at getting people moving, you will be highly criticized by area officials if your utility does not do a stellar job of recovery following damaging storms. In short, your plans should show meaningful and actionable information.

In many cases, having separate plans to cover different events makes sense, and this is often the practice in utilities. Look at a specific event (major storm, serious substation equipment failure, damaging and severe act of vandalism) using a global view. Think about what might happen, what strategies would be best for recovery, who will be involved with the recovery, how they will coordinate work with others, what they will need, and how they will communicate, and then put the plan together based on those needs. More on this will be discussed when we look at Elements 3 and 4 of the Emergency Plan Development Model.

All of this doesn't mean that people who handle many types of equipment failures, for example, can't combine them into a single emergency

manual. We may have, after all, limited our scope to equipment failures, and not both equipment failures and storms, for example. A single department, especially one that is proficient at dealing with equipment failures, will probably be able to handle the complexity of having several types of equipment failure procedures in one manual (as long as it is well organized).

Otherwise, be very cautious about content. You could (and probably will) confuse a prospective participant by handing him or her a lengthy document that deals with several different types of emergencies, some of which may not require his or her knowledge, experience, and participation.

What constitutes a reasonable, well-defined scope for an emergency plan? The scope of any emergency plan should be detailed enough to allow all people who must be involved to complete their mission—to help restore essential core services in the safest, most economical, and most expeditious manner possible.

What are the basics for developing a statement for the scope of an emergency plan? It's helpful to be concise, but you want to say enough to paint the right picture for the work ahead. Look at how we changed the scope of several types of emergency plans in the examples that follow, in the "general" and "more precise" formats:

General: This emergency plan is for use when the company experiences a major storm.
More precise: This emergency plan contains procedures to restore the XYZ Company electric distribution system following a major storm.
Analysis: What did I do in this example? The general version didn't tell us much about what we really want to do, did it? If you were handed the general version of the scope, and asked to write a plan, you would no doubt have a lot of questions. "What are we working to restore?" is the first question you might ask. Let's continue with two more examples.

General: This plan covers the permanent loss of the mainframe computer.
More precise: For loss of the mainframe computer, this plan contains procedures for resuming essential computer processing at XYZ Company's backup site, in Computerville, New Jersey.

General: This plan deals with the loss of a substation transformer.
More precise: This plan will be used to install a properly sized mobile substation, for loss of a substation transformer, and restore customer load.

Hold your place on this page, turn to the Forms and Diagrams section in Section IV, and use or make a copy of form EP-1 (Emergency Program-1). You will be working with it now.

Before we do the exercise, be aware that you have a couple of options available to you. If you feel that you are ready to begin writing your own plan and have a project assignment to get started on, you may apply what you've learned to begin that project. You may want to use your own assignment instead of the practice assignments in this text.

Take a look at the general plan scope for a sample plan in the example that follows, and rewrite it to more precisely describe the plan.

Event: Serious fire, or other hazardous event, in the system control center of an electric utility. (A control center is usually a secure room where system operator personnel control the system.)

What must be done: Relocate system control personnel to the backup control center, if the control center cannot be reoccupied within a set time period. From the backup center, reestablish control and communications with appropriate channels.

Involvement: Technical staff, system operations staff, security transportation, office services, others.

"General" scope of sample plan: This plan will address the procedures necessary to deal with an event that affects the operation of the control center, making it necessary to relocate personnel assigned there.

You may write *your* version of the scope in the sample format that follows or in a similar format. For the purpose of this exercise—which is to help you write a viable plan scope—write several versions of the scope and decide which version is best after you are through. If you write three versions, you can number them 1, 2, and 3 when finished, with 1 being the scope you are most satisfied with. Examine each one and decide which is best, based on your best judgment, or use the consensus of your planning group.

#__ More precise scope: _____
_____
_____

#__ More precise scope: _____
_____
_____

#__ More precise scope: _____
_____
_____

How did you do with this exercise? Remember, much of what you do in the ensuing parts of plan development hinges on the scope of your plan. The scope

is the foundation of plan development, and you shouldn't rush through this or any other part of the process. Stay with it until you are pleased that you have a scope defined well enough, so that each member of your group understands the purpose of the plan and what it is specifically designed to address. If you are using your own example to write a scope, you may want to ask your management to review the scope before you move further in developing your plan.

If you are writing a plan of limited scope, for example, a departmental emergency plan, as opposed to a corporate-level plan, your scope should reflect this.

What kind of plans might be considered corporate-level plans, involving a larger number of resources? Let's look at a few examples:

- Major natural disaster plans
- Evacuation plans for wide-area emergencies
- Site disaster plans to cover multiple sites
- Regulatory-mandated plans to cover major emergencies
- Plans to restore a power grid, a major network, or high volume pipeline facility that involves several areas of the utility

What are some of the common factors in corporate-level plans? These would include multiple departments involved, possible outside direction or assistance in direction, wide-area impact, high-level leadership involved, and larger numbers of resources required to deal with recovery.

What kinds of plans might be considered departmental or business unit plans, or other specialized plans?

- Power plant emergencies
- Substation restoration plans
- Disaster recovery plans for technology recovery
- Site disaster plans
- Emergency customer service information plans or media plans
- Smart-system recovery plans

These are plans that generally involve one primary section, business unit, or department in the company; however, this can vary with the type of organization. The differentiating factor is the level of participation by the primary unit, or units, in each case.

The important concept here is to understand what constitutes a viable plan scope. If you are not comfortable about this concept, continue to practice writing more scope statements using other examples that you can generate in your group. When you are ready, move on to the next element.

EPD Model, Element 3: Identify Risks

Risk Assessment We've already looked at defining the scope of emergency plans, and we've worked through several examples. Your plan scope should have defined what you are protecting and, more importantly, what you are trying to maintain. Some examples include a critical piece of equipment, a critical service or operation, a critical transmission line, microwave towers, a control center, a special computer, or other devices critical to your operation.

EPD Model, Element A: Perform Risk Study and Analyze Results Reemphasizing the importance of the risk study, we find it again here by covering our EPD model in detail. An arrow is drawn from Element A, "perform risk study and analyze results," to Element 3. You have seen and will see references to the Risk Study topic in several parts of the book. It's important to develop a risk study and analyze the results prior to developing any emergency plan. The reason for this is clear: If we don't know which systems and services are critical to our operation, we may write our emergency plan without having performed the right analysis for what should go in it and in what order of priority. Remembering that we have specific risks for all of our key systems and services, we need to define those risks and develop strategies to recover them if they are interrupted for reasons we identify in the study. This risk study information becomes the foundation for our emergency plan; it is the way we justify our course of action when we respond. We will uncover various levels of detail on this topic in the guide, but we are looking at it here because there is a strong link between this element and the risk identification task in our model.

EPD Model, Element B: Consult Information Base; Maintain and Update Regularly Taking another look at the diagram of our model (Figure 1.1), you'll notice that an arrow is drawn from auxiliary Element B, "consult information base" to Element 3, "identify risks." It's important to study the way other organizations experience storms and other damaging events or events that cause interruptions to critical systems. Our goal is to know how these lessons learned have made other utilities take another look at identifying their risks and how they play into the further development of their emergency plans. Of course, this is only one topic that you'll want to include in your growing information base. There are many more topics to consider. Design your information base so that it's simple for you to review on an ongoing basis and share with others. Below are some examples of information you can gather and include in your information base.

Articles and research papers on some or all of the following topics:

- Approaches to developing emergency plans and risk studies
- How XYZ Utility recovered from _____ storm.
- Emergency communications
- Telecommunications systems and their use in emergencies
- Reducing risk in critical areas of operation
- The damage caused by tornadoes on utility systems
- Rebuilding transmission and distribution systems following disasters
- Winter storms and their effect on utilities
- Storm restoration techniques to minimize outage time
- Technical communications practices
- Information technology disaster recovery plans
- Restoration of buildings following damaging storms, fires, and floods
- Power distribution systems hardening
- Tree trimming practices for electric utilities
- Outage management systems (OMS)
- Damage tracking methods
- Crew tracking methods
- Mutual assistance practices: bringing in outside help
- Poststorm hazard clearing
- Damage assessment practices
- Estimating restoration times for power outages

Following the Emergency Plan Development model, we will now go further into the development of our emergency plan by defining the risks that will bring critical services to a halt.

Remove or copy the form EP-2 from the Forms and Diagrams section in Section IV of this guide. Hold your place here, as you will be returning to this section for further instructions. As a tip, you may want to copy all fill-in-the-blank forms from the Forms section of the manual and then place them in a separate notebook or computer file for ease of use. Remember that any form can be scanned and converted to an Adobe® PDF file format and fields can be added for ease of entering information and saving the form to a file that can be altered later.

The forms in this manual work like building blocks to help you develop a plan. At the top of the form EP-2, you'll find blank lines that allow you to transfer the scope of the plan from form EP-1 to this form. This is valuable because, at each step of the development process, it's important for you to have the scope of the plan in mind. Use the sample cases to get started, or use an example from your own company (preferred method).

Now, let's take a look at a sample case study that will help you to assess risks in your own organization.

Case Study: The Chosen Electric Company (fictitious company and location)

INTRODUCTION

This case study offers a simplified example in which to help the reader understand the mentality involved in developing emergency plans and procedures. Readers are invited to develop their own case studies that are applicable to their own utility's circumstances when providing for the demands of consumers.

BACKGROUND INFORMATION

A combustion turbine generator (a jet engine coupled to a turbine generator), operated by Chosen Electric Company, is located on a barrier island, called Placid Island. It is heavily populated during tourist season in the summer, and during the winter, peak loads place heavy electrical loads on the island's generator. Placid Island's winter population has also continued to grow. Two high-voltage cables from the mainland also supply residential and commercial customers on the island. But the two lines can become overloaded if the generator cannot be brought on line or when there is a problem with the generator. When this is the case, Chosen Electric has had to manually reduce load by rotating feeders, on and off, for predetermined lengths of time until the overall demand of consumers is reduced during the overnight hours.

Chosen Electric is in a dilemma because it can't get approvals to install additional generation on the island. The single, aging combustion turbine generator has grown less reliable, and replacement parts are more difficult to come by. Chosen can't get the necessary permits to install another power source.

Chosen Electric management personnel are convinced that emergency procedures should be developed to cover the various contingencies that could black out the entire island should the generator fail during an unusually high load period. Management has also determined that several nearby homes could be in jeopardy in the event of an explosion at the generator site. A major storm might also put the generator out of service indefinitely. Other potential problems might also be identified as reasonable risks.

Chosen Electric management has asked Bill Johnson, a planner from the power generation section, to develop an emergency plan. He has called a small task force together to get input. At an early meeting, the group developed a scope for the plan, as follows:

> This plan identifies the procedures necessary to restore electric service to Placid Island required by the loss of the island generator or high-voltage cables.

Bill then asked the group to come up with a list of possible events that could cause a blackout on Placid Island. Now, pretend that you are on the task force. From the background information given above, what reasonable risks would you submit for consideration at the meeting? Be creative. Try to list several

risks before you look at the examples that follow. Use a copy of form EP-2 or a separate sheet of paper or your e-writing device to write your answers.

It may be helpful to try and think of risks as being weaknesses or problems. Regardless of the principal business you're in, you can plug in those systems and services that are at risk. Then determine what risks might be reasonable risks to plan for. Consider examples from other utilities.

What are the problems faced by Chosen Electric in supplying power to Placid Island? What are some of the events that could create havoc? What dangers might be experienced?

Remember to look at the scope when you get stuck. What does the company want to accomplish through the development of this plan? We talked about explosions in the last paragraph of the background information. Did you notice that the scope does not confine the plan to explosions? Why do you think this was done? It is because our focus is not on explosions, but on ways to restore power on Placid Island.

Brainstorm this problem for a few minutes. What did you and/or your group come up with? Here are a few examples to compare with your own:

1. A hurricane could bring a storm surge that would inundate Placid Island. The elevation of the generator and control equipment is 10 feet above sea level. A storm surge, coupled with normal tides, could easily destroy the generator or make it unavailable for several months. Risks: loss of generator and controls due to water inundation, fuel contamination, and possible long-term unavailability.
2. An explosion or fire in the control building would render the island's combustion turbine unavailable. Risks: catastrophic failure, with loss of control building and the ability to operate the generator; possible destruction of nearby facilities; danger to life and property; loss of production of power.
3. A problem with the fuel-handling system to the island's combustion turbine could make it unavailable. This would include the ability to deliver fuel to the site. Risks: disruption of fuel-handling system that supplies fuel for the combustion turbine.
4. The island's combustion turbine has become difficult to maintain since its builder went out of business. Some parts will surely fail, and a few have been identified as being difficult, if not impossible, to replace. Risks: parts failure availability, lead time to obtain parts, prohibitively high costs.

Several risks were identified in these examples. Perhaps your risk assessment was similar to the samples, and you may have identified a few more by brainstorming and playing out the situation. This is highly encouraged.

Keep your list of risks handy for the section coming up on recovery strategies. In that section you'll be developing the procedures to deal with the risks you've listed. But first, let's take a look at the problem of prioritizing core services. This will be important to the development and organization of your emergency plans.

PRIORITIZING CORE SERVICES

Electric service is the *core service* provided by Chosen Electric to its customers. However, behind the scenes there are other services Chosen also considers to

be core services. Some of these services help Chosen meet its obligation to provide electric service to its customers, such as customer accounting, information systems, engineering, system operations, telecommunications, and field operations, all of which are paramount to utility operation.

Chosen should then go further to examine the underlying systems and procedures in order to determine which of them are absolutely essential to the organization and its mission to provide electric service. These are the core services that must come back on line as soon as possible following a disaster. As you will surmise, there are clearly operational and business considerations that will guide you in determining which services must be restored within the first few hours, a day, or several days—you define the appropriate duration—following the event.

Your goal as a planner or planning group is to determine what core services will be affected by each of the risks outlined in the previous section and ones you may have identified for your own organization. Turn to form EP-3 to do this, or create a list using a plain piece of paper.

When any company develops a list of core services, they are really identifying their most critical needs and the most critical needs of stakeholders. They are identifying systems and services that make production possible. That is the focus of this exercise.

The Island Combustion Turbine case is an example of an isolated emergency that may not have a direct effect on the entire company, but is nonetheless important. The instructions on form EP-3 ask you to look at an event that will affect several departments or your entire organization. This is done to get you to take a more global perspective in developing emergency plans. As a tip, always look at the case from a broad perspective—the broad-reaching prospects of specific events—and then narrow your focus to bring strategies and procedures into place. Ask yourself, "What's really necessary and important in this case?"

Emergency procedures, which, through the identification of risks to core services, require the coordination of several departments, are often challenging for the planner or task force to develop. Input from all participants is important when many factors contribute to the solution to complex problems.

IMPACT ANALYSIS

It's a good practice to identify real and hidden costs associated with the loss of a critical system or service. This can be done by performing an impact study and analysis. An impact study need not be a complex task. In many cases, costs can be easily identified and associated with a specific system or service. A quick trip to the accounting department can often clear up any questions a planner might have about costs.

Pad and pencil in hand, the planner breaks down costs into real and hidden costs over time. If System A fails, what are the immediate costs? What costs will accumulate, or perhaps grow exponentially, for each minute or hour System A is down? Can some costs be avoided if System A is restored in X number of minutes or hours? Could the company lose credibility and set itself up for a major loss if System A is not covered by a workable recovery plan? What is the maximum lead time that the company has in order to avoid substantial or catastrophic loss?

If costs are substantial, it would be appropriate to install backup systems—whatever is appropriate—and develop a comprehensive recovery plan to get critical systems back on line as quickly as possible.

EPD Model, Element 4: Define Recovery Strategies

What Are Recovery Strategies? Recovery strategies are objectives that have been carefully thought out and documented to get your critical core services back on line, minimizing the risk of further loss during recovery. You understand why speed is of the essence in recovery, and, of course, safety is always important to everyone, but exactly what do we mean by "minimizing further loss" during recovery?

In the utility industry—as well as in many other industries—there are procedures in place to remove specific pieces of equipment from service for maintenance or for retrofit purposes. Likewise, there are procedures to properly return the equipment to service. This is true for machines, carriers, transmission lines, and a multitude of other devices and systems. Often, when a device or system fails, there are methods used to reconfigure the system so that service is only interrupted for a minimal amount of time. In many cases, there is a level of redundancy built into a system to allow routine maintenance or even a failure to take place without sacrificing service at all.

Because there is almost always a tendency to rush to get systems back on line, there is a tendency to bypass some procedures, thereby adding a level of risk and subsequent loss. So, when you write your recovery strategies and procedures, you need to take this factor into consideration. There are several other issues to consider. Review the following questions to get a better idea of what I mean by this:

1. What state might a device or system be in when it fails? Will it be affecting the operation of other systems immediately, within an hour, or perhaps longer?
2. What will people have a tendency to do when they find it this way?
3. What strategies/procedures will minimize further loss?
4. What safety considerations should be factored into the recovery strategy?
5. How many people should be involved to control the recovery and minimize potential loss?
6. What procedures should be used to communicate the loss when the system or device fails? Who should be notified, and in what order?
7. Are there environmental or regulatory issues to be considered? Do state and local agencies need to be notified?
8. Are special hard-to-acquire parts likely to be involved in restoring a system to service? Is lead time to ship a part a consideration?

9. Are specialists required to help with the recovery? Is travel time a consideration?
10. Does financial loss due to downtime become a major consideration after a specified period of time? Might the company suffer other losses, such as loss of public confidence?

Use your answers to these questions to help develop recovery strategies—strategies that should minimize your losses and get systems back on line as quickly as possible. When you write down your strategies, remember to refer to the plan scope for guidance.

Develop your strategies using teams if it is appropriate to do so. People often exceed expectations when they work together toward a common goal. Don't restrict your teams to experts in a given field, because those experts may not be available when a problem occurs. Other people should be exposed to training and problem solving. Alternates should train alongside regulars and have copies of the checklists assigned to regulars. The fewer surprises, the better chance you have for a swift recovery.

Remember, you probably won't write the most effective strategies and procedures the first time you sit down to write them. However, following recovery, the prudent planners and managers can be found reviewing what went wrong and fine-tuning existing plans. Never lose sight of the value of getting a first draft of the plan finished; fine-tuning will come with experience, exercising, and training. Also, never forget that a carefully developed plan, with input from others, will be far better than not having a plan.

Your strategies will be translated into procedures that will lead you to recovery, but first you should develop your strategies. Let's get a few strategies down on paper right now. We'll be using another example that follows for those readers who are not currently working on developing an emergency plan. Those readers who are developing a plan for their organization should use their own project instead of the example. You'll be that much farther ahead! Form EP-4 can be used to record your strategies. Take it out now, as you examine the next example, or use a blank sheet of paper to record strategies that relate to your own project.

Case: The Everspark Electric Company (fictitious company)

BACKGROUND INFORMATION

Everspark Electric Company has elected to write an emergency plan to deal with the loss of a substation transformer. A substation transformer is used to reduce electric system voltage to a level required for distribution to communities. Management knows that if the substation transformer fails in its

Pleasantville substation during a high load period (many customers using large amounts of power), for instance, Everspark couldn't pick up the customer load served by Pleasantville on another substation. Utilities can frequently pick up customers on another substation in the area by operating switches on the distribution feeders.

Everspark has had some problems with substation transformers over the years, and several years ago they elected to purchase a mobile substation for use during emergencies. The mobile substation can be hooked up to a truck, transported to a substation, connected, and placed in service to temporarily replace a failed transformer. Once connected, the mobile substation has sufficient capacity (capability to serve customers) to carry the load so customers could be restored, and the failed transformer could then be replaced or repaired. A mobile unit substation contains a transformer, circuit breakers, and protective relays—virtually the same equipment as can be found in a distribution substation that serves a community.

Also a concern, Everspark has had some problems with the process of dispatching, transporting, and hooking up the mobile substation. In two prior emergencies, it took Everspark sixteen and eighteen hours, respectively, to get the mobile substation in place, connected, and carrying customer load. In the summer months, this can mean adverse publicity for Everspark, because residents have to go out and buy ice to keep food from spoiling. Everspark's management isn't pleased with the response time for putting the mobile substation in service.

Carol Miller, a planner in the substation department, called a task force to develop a plan for installing the mobile substation under emergency conditions. The group was then ready to develop strategies to help decrease installation time. From those strategies, specific procedures would be developed and issued to all substation, relay, transportation, security, and system operating personnel. The procedures would be part of a special emergency plan. Let's take a look at the strategies developed by Carol's task force. As a final note, if you have trouble understanding some of the terms and nomenclature, don't worry. The exercise is not about becoming an expert in the equipment we are discussing, but in understanding how you will apply the example in your own utility.

MOBILE SUBSTATION EMERGENCY PLAN: RECOVERY STRATEGIES

1. To expedite mobilization, always assume load cannot be transferred.
2. Request mobile unit immediately upon indication of substation transformer failure. This will put the necessary departments into motion, and we can always cancel installation if it turns out that the transformer can be quickly returned to service.
3. Substation department will provide one small crew to test the failed transformer.
4. Substation department will provide two crews dedicated to connecting the high- and low-voltage sides of the mobile unit, once the unit is in position in or near the substation.
5. Substation department to provide on-site coordinator. This person will oversee the proper testing and installation of the mobile substation.
6. The manager of the substation will provide management with an update of conditions as they progress.
7. Portable radios or phones will be issued to the on-site coordinator. The supplied substation phone may be used by personnel working in the control building and for management updates.

8. Transportation department will provide a truck outfitted with emergency portable lights for night installations. The truck will also be equipped with a portable generator.
9. Arrangements will be made to bring in food for all on-site personnel.
10. Security department will provide one or more people to monitor personnel entering the substation.
11. Standardize mobile unit low-side connections.
12. Predetermine mobile unit physical location and low-voltage-side cable lengths.
13. Identify substations where mobile units may not be an acceptable way of restoring customer load. The need for better feeder ties or additional transformer capacity should then be evaluated.
14. Prepare predrawn mobile unit connections.
15. System operations department will monitor the critical path during restoration.
16. Substation department to check phase rotation.
17. Develop standard CT (current transformer) ratios and generic relay settings to speed this process.
18. Use of mobile unit for other than emergency work should be avoided during peak load periods.
19. Safe restoration of customer load is a top priority. No shortcuts will be taken.
20. Check mobile units weekly, including battery readings.

Remember, strategies are not procedures. They are general *descriptions* of recovery methods that will produce a desired outcome. Procedures are more detailed step-by-step activities performed by people at a specified time. For example:

Strategy: Hook up mobile substation to minimize restoration time.
Procedure: Hook cable A to bushing H-1. Ensure tightness of connections.

In the mobile substation example presented here, it was suggested that two crews be used to connect the high- and low-voltage side of the mobile substation. You can compare this with any operation in your organization that can be done in parallel: two separate tasks done at the same time to save time. Two or more crews or teams—you can call them whatever is appropriate—can be assigned to do specific tasks.

Another important strategy cited here involves the use of security personnel to help restrict access to an area where technicians are working. You may have similar policies in your company. It's important to remember to include security procedures in your plans and work out the detailed procedures for notifications and placement of security personnel in advance. This will allow your emergency restoration personnel to work unhampered by news reporters and people who should not have access to the more secure areas of your facility. You can't make a swift recovery when your crews have to worry about the safety and security of outsiders.

Item 8 is another issue that may be overlooked while people are rushing to restore service. Do you have sufficient lighting to work in a facility that may be without electric service in an emergency? What type of portable lighting might be required to help ensure the safety of your workforce? If your strategy takes this important issue into consideration, you'll be better prepared.

In the tests that I've conducted, I have asked participants to temporarily disconnect regular service and bring their standby generators on line to check their capability. It's better to find out in advance that your units have been undersized or you don't have an adequate number of circuits on backup power supplies. This would be true for your uninterruptible power supplies (UPS) as well. Are they sized to handle your critical loads?

If you don't have an immediate planning project in the works, think of examples in your organization where strategies can help you develop better procedures. If you do have a project that you're working on, include strategies that will help you gain a higher level of control over recovery.

EPD Model, Element B: Consult Information Base; Maintain and Update Regularly

Collecting and Studying Relevant Information Now that you have been exposed to several of the elements, it's time to introduce an auxiliary element, called "Consult Information Base." The principle here is simple but nonetheless important to the success of your program.

When you begin to develop emergency plans, you should surround yourself with as much information as you can about the topic. Encourage other people in your task force to do the same. The material you'll find today, with a little research on your part, may contain the equivalent of years of study and millions of dollars worth of experience.

Your information base (info base) for the project can be random notes, news articles, magazine articles, regulatory compliance information, videos, technical books, papers, online databases, and of course, plans and procedures currently being used in other companies. Use all applicable materials to your advantage in writing your plan, but do this with one important caution in mind: When you write your plan, avoid copying a lot of procedures directly from another plan, just to save time. Each plan is different and should be written as such.

Organize your research materials and share them with each member of your plan development group. When each person has read the materials and understands their relevance to the project, your meetings will be more productive. Pay particular attention to articles that tell how other organizations have handled emergencies. Make a mental note to pay attention to the smallest details while doing your research.

You will find it to your advantage to prepare a notebook or a computer database to gather important information about emergency plans and lessons learned. Form EP-8 can help add order to your information-gathering stage of plan development. Take a look at form EP-8 now to get an idea of how it can be used.

The form is simple in design, and if you fill in all of the source information blanks, you'll be able to retrieve an article in a book or magazine more easily later on. If you decide to set up a computer database to allow quick retrieval

and printing later on, the "topic" blank can be used as a keyword search utility to make it easy to locate all information on a specific topic later on.

For instance, you can set up a database using many commercial applications available on popular operating systems, such as Windows or Macintosh. You can also scan your historical records into your database of important references and plan-related information.

Tap into a host of online databases available from industry research and development organizations. Use your favorite Internet search tool to find articles using the key words *emergency*, *disaster*, *preparedness*, *crisis*, and words that relate directly to your area of operation, from general to more granular in detail. You may find that other companies have published articles on the topics that will help you get a running start on developing your plan. Also, don't simply look for articles that relate to your specific industry, such as natural gas, electric power, or telecommunications. You *will* be able to use the lessons learned from unrelated industries' emergencies, because many of the preparedness and response issues are similar.

Remember, an information base will help you in the plan development and writing phases of your project and it will help you for years to come when you want to revise and improve your plan. These are times when the information base can be readily populated, given the information available throughout the industry. The planner should avail himself or herself of the information. Never stop adding to the information base. Review it for inspiration and ideas whenever necessary. While you are reading your next article on emergency planning, jot down a few notes that you find interesting, and add them to your growing information base.

Before we discuss the next main element, let's look at another auxiliary element that supports several main elements of emergency plan development.

Referring to our EPD model in Figure 1.1, we see another auxiliary element to the left of the mainstream of the model, below Box A: "Perform Risk Study and Analyze Results," titled Box C: "Get Input; Maintain Dialog with Experts; Include Outside Organizations." Outside input is essential to plan development and administration. As the model suggests, it is especially important when matching tasks to resources (human, equipment, devices, vehicles, etc.), integrating and coordinating plans, writing the final draft and obtaining approvals, and holding tests or exercises.

The model also shows feedback as an important, positive influence following training. The model lists it as a main element, differentiated from outside input, because the feedback directly relates to the training held. Further, it helps the planner design a test and determine what issues should be addressed prior to future tests. As we will discuss in a later section, when we develop the test, we will draw upon the direct feedback from training as well as the outside input from all areas of the organization.

That leads us to a definition of *input* in our model: Input is the gathering of recommendations, concerns, ideas, and data from participant and non-participant sources for the purpose of developing and improving emergency plans. Its primary purpose is to help us develop the best possible plan and to gain the support and buy-in necessary to get all participants to follow the plan. The model includes this element because I've found the practice to be lacking when inexperienced plan writers develop plans. Calling your attention to it here will help you stay on a successful path to plan development.

How do you execute your strategies? With procedures that are followed by people who are included in, and familiar with, the plans. People are your most valuable resource in emergency response. It's time to plug them into your plan! Take out sample form EP-7 and read the instructions. Once you have a feel for how the form is organized you can develop your own and include the information that you think is important.

Another form in the Exhibits section (Section IV) relating to emergency assignments is called the Emergency Duty Description form. You can use this form to create a single-page reference for employees to use during emergencies. Of course, using an electronic version is suggested. It will tell them whom to report to, where to report, what to bring with them, what their duties will be (in general terms), how often to report, to whom to send reports or status updates, and what to include. It offers employees a quick reference to get them up to speed in a hurry.

In larger organizations, it's a good idea to add emergency-duty information to personnel databases—the same ones used to track all employee records. Set up several additional fields in the database to handle your emergency-duty needs. When an emergency occurs, you can have rosters printed out to cover all necessary tasks. Prior to then, you'll want to train your people on what they can expect in an emergency, and let them know that all employees share in emergency preparedness for the utility.

Take advantage of expertise gained in prior work assignments, special training, certifications, and other credentials when assigning people to tasks. But remain flexible. You will have a lot of tasks that do not require special expertise, and you may not have enough people to fill those needs. In that case, you'll need to draw from rosters from all areas of your company, and you may not have the luxury of being able to save people for special duty based on their expertise. You will simply have to use them where they are needed most.

Emergencies can often bring out the best in people, especially in utilities. Many people simply want to help with the recovery and aren't particular about what they are doing, as long as it's useful work. People who make the copies, pass out the materials, enter the data, sort the forms, take the calls, and make the coffee are doing very important work. It should be acknowledged as such.

What have you written thus far about recovery strategies and tasks? If these concern a project in which you are currently involved, are the strategies and tasks sufficiently clear in your mind to begin developing procedures? Let's take a look at writing procedures for a given strategy and task.

From the Everspark Company case, Strategy 7 concerns the use of portable phones to be used at the site. We can see that Everspark wants to cover the contingency of not having sufficient means to communicate at the site, so they are covering this contingency by first developing a strategy. The strategy is to supply a sufficient number of portable phones. How will they do this? What tasks will have to be performed to fulfill this strategy? We will construct procedures for this task.

Strategy 7: Portable phones will be issued to the on-site coordinator. The existing substation phone may be used by personnel working in the control building.

Procedures: Up to ten portable satellite phones can be obtained through the telecommunications department using the following procedures:

1. Notify Jack Smith, supervisor of telecommunications, of the type and severity level of the emergency at the following numbers:
   Office: 0800–1630 hours: (000) 123-4567; 24-hours (000) 555-5555
   Notify alternates:
   - Bob Kane 0800–1630 hours: (000) 123-4567; 24-hours (000) 444-5555
   - Jan Smith 0800–1630 hours: (000) 123-4567; 24-hours (000) 666-5555
2. Provide telecommunications department with number of phones required, and when you (or a delegate) will pick them up. Order one additional phone as a backup, if supplies are sufficient. A telecommunications technician will test the phones and have them ready when you arrive.
3. Assign phones at the site. An instruction sheet is issued with each phone. Personnel who are not familiar with the phones should read these instructions prior to use.
4. Order additional phones from the site (using the numbers above) if more are required. Telecommunications department can arrange to have the phones delivered to the site, if required.
5. Arrange to drop off phones to the telecommunications department when they are no longer needed. This should be done as soon as possible to make them available for another emergency. Telecommunications department can arrange to have the phones picked up at the site, if required.

Another way to write your procedures is in outline form, as follows:

Procedure	Assigned to
I. Emergency cellular phone distribution	W. Smith
A. Telecommunications notified	
1. Number of phones, plus one spare	
B. Phones obtained from security cabinet	
C. Phones tested	
D. …	

The writer should experiment with writing clear procedures and get some feedback from people who must use them. Never lose sight of the objective: Procedures provide the means to get people to do what is necessary to restore critical services in the correct manner, safely, and in the proper sequence. If, after review by several people, your procedures do not appear to be accomplishing this objective, you should rewrite them. Get suggestions from the people in your training and safety departments.

Procedures bring consistency to a specific activity, where that consistency may be the difference between life and death. You can see this concept in action every day in hospitals and in many routine operations that occur in your utility. This doesn't mean that procedures should be followed blindly, without question. Every individual should be encouraged to question procedures that do not appear to be appropriate in a given situation. Also, there are times when a procedure may be inappropriate for use in a given location. Experience and training can help each of us to do the right thing when the time comes, but in these days of rapid movement throughout organizations, it can be difficult to acquire enough experience. Training is therefore of paramount importance, and training is often built on the processes and procedures found in existing manuals and plans.

Pick a strategy that you have written, either for one of the examples or for a project that you are working on in your company. Turn to form EP-5 in the Forms section and practice writing procedures that will support your strategy. Be as thorough and detailed as you can in writing procedures.

Long paragraphs and run-on sentences should not appear in emergency plans. Use simple words and as few buzzwords and technical terms as possible. Also review the examples we have already covered. Will you simply number your procedures and list them, or will you use an outline style? The choice is yours.

Using Checklists I believe that checklists are important tools for emergency planning. I firmly believe they are one of the most effective tools available to the plan writer and plan user. What's more, you can use checklists to help introduce people to what's in the emergency plan.

In many cases, checklists appear to be visually simpler and clearer than written procedures. They usually consist of a few concise words, on a single line, often preceded by a line or box to check off once you have completed the step.

When you write emergency plans, consider including checklists. In some cases, a checklist may be all that many participants need to prepare for or act on a problem.

Another good application for checklists is to use them whenever you are communicating with people who are already familiar with a procedure and simply need a guide to make sure they don't forget a step in a process. Checklists are also very effective for preparing for an event.

Consider using checklists in the opening pages of a plan to gear up for a specific event. If you are calling a meeting of a crisis management team to deal with a problem, a checklist will get people up to speed fast. Designate a person in the team to read the checklist aloud, and each member can respond to an action item on the checklist as it's being read to the group.

Once drilled or exercised, checklists and procedures can be altered to fit the needs of all participants. This can be done during the plan development process or during an upcoming revision to an existing plan.

EPD Model, Element 5: Develop Recovery Strategies for T&D

We will cover a number of useful methods for developing strategies and bringing what you've found to the planning table. From the strategies you develop during peacetime, you will then outline essential tasks and procedures for emergency plans that will assist response teams in the recovery of transmission and distribution (T&D) systems.

However, as is the case in major storm disasters, the T&D systems that were affected by the storm will not be the only infrastructure that has been degraded or damaged, making those resources unavailable for your recovery effort. This is the reason why vulnerability and risk assessments are needed in the preplanning stage of your project or program.

Priorities for Restoration of T&D Systems in Electric Utilities As the plan developer, you can employ numerous forms of information to assess the vulnerabilities on the utility system.

Transmission Restoration Following a disaster that causes major damage to the transmission system, the system must be restored in a manner that maximizes system security and stability. The XYZ transmission emergency plan and related operating guides are used by XYZ and their system operations staff to restore the transmission system following system emergencies. The XYZ transmission team is activated for transmission emergencies on the XYZ system. XYZ staffs team members in their emergency operations center (EOC).

Readers who work or have worked in a system operations control center environment are normally introduced to a transmission restoration plan as part of their training. These plans are typically developed under guidelines set forth by regulators and members of an oversight group at the regional control level and through a coordinating council. This guide will not attempt to provide details on how system operators orchestrate the restart of power systems. However, the planner or planning group should be aware of the restoration priorities that are included in these plans so that further development of subtransmission and distribution network recovery plans may include sufficient accuracy to make recovery of these systems possible.

Plans affecting recovery of transmission and distribution systems must be well coordinated and correct from an electrical perspective, a security perspective, and a safety perspective. In today's utilities, transmission restoration plans and distribution restoration plans often appear under separate cover, but my experience in working with many utilities tells me it's important to integrate the planning to the point where both groups are aware of the constraints and requirements that must be considered for a complete recovery of T&D systems.

Also of importance to the transmission side of the planning is the development of black-start plans to prepare for the contingency where all or a significant part of a geographic area has lost power, and it is necessary to restart the generators and reestablish electrical ties supplying the area to restore power to that area. When electric utilities develop black-start plans, the model they use may assume *no damage* to the power system infrastructure. What is then crafted are models, strategies, and procedures to otherwise configure the system so that one or more generators may be brought online picking up a minimum amount of load that will satisfy design requirements for stability of the generator when the unit breaker is closed. This process sets up islands, where part of the T&D system in a geographic area begins serving at least part of the load in that area. Once the system operator determines the points where load can be further restored and the transmission system can be synchronized and reconnected, more generators may be brought on and additional load may be served. Ties to other utilities and/or other parts of the transmission system can then be orchestrated, leading to a full recovery of the transmission grid.

Assuming *no damage* is one way of developing the black-start plans, but it is also a useful exercise to employ a strategy for developing black-start plans where some damage has been experienced, dovetailing the possibility that a damaging storm has also played a part in creating the need for a restart on the electric system. While this layer of complexity is difficult to plan for, most experienced planners know it is essential to the practice of maintaining a global perspective, i.e., if it can happen, it very well may happen. So, why not plan for it and set up the strategies, tasks, and procedures that may be

necessary to facilitate the restart of the system *after* damage locations have been restored to the minimum operating requirements to stage a restart.

This extensive damage model goes hand in hand with developing effective procedures for mobilizing crews to rebuild high priority infrastructure that is necessary for timely system and service restoration. All utilities, regardless of their contribution to maintain lifeline services, should maintain a global perspective for modeling and planning recovery following the disaster scenario. This *cannot* be done effectively without considering how all plans are integrated at all levels in the organization.

Distribution Restoration Strategies for developing emergency plans at the distribution-network level should reflect that a study has been done on which facilities will be considered priorities during restoration. Keep in mind that restoring a power system often entails restoring critical parts of the transmission system prior to restoring critical parts of the distribution network. This is not a bargaining point; it simply should be accepted as fact in most parts of the world. Installation of backup power systems at critical locations is still an option for facility managers to explore.

There are still many commercial facilities, for example, that are highly dependent on technology infrastructure where both backup power and uninterruptible power systems (UPS) *have not* been installed, leading to both power quality problems and failure of technology infrastructure, such as telecom and computer resources, when there are spikes and unstable power delivery at the outlet or point of connection to the device. The lack of knowledge of the importance of stable incoming power to technology infrastructure is not necessarily the fault of the host utility and, rather, should be a priority concern for those who specify and use the systems in the facilities. The leading companies that provide power quality solutions for public and private industries and commercial buildings provide many resources, including white papers and guides, to educate the consumer.

The following list offers a glimpse of some facilities that may be considered among those in a higher priority bracket when the distribution network is being restored by utilities following a wide-area interruption of power. However, there are factors to consider. The distance involved and damage sustained between the utility distribution substation and facilities mentioned in the list often determine which facilities will be restored first. Why? Because utilities are often short of skilled crew resources in the early hours and days of recovery from damaging storms. Despite the tremendous efforts most utilities place in getting additional crews from neighboring utilities and those coming from several states away, crews are often slowed by travel restrictions and permitting as they travel to utilities in need of assistance. In addition, political pressure and threats—for example, sometimes received on the street by crews restoring power—make it difficult for utility restoration

planners to do their jobs, and sometimes this contributes to lengthened outage times. Here are some priority facilities and locations to consider.

- High priority distribution substations (utility owned)
- 3-Phase main (backbone) feeders serving:
  - Federal facilities
  - Federal and state restoration-related facilities, including telecommunications
  - Hospitals, medical facilities, critical care facilities, nursing homes, blood banks
  - Freshwater treatment, pumping
  - Emergency shelters
  - Critical utility company facilities
  - Wastewater treatment
  - State and local government facilities
  - Life-sustaining medical customers
  - Food-processing plants
- Lower priority substations (utility owned)
- Remaining 3-phase main (backbone) feeders out of substations
- Laterals (or taps)
- Secondaries
- Services
- Street lighting
- Other, including energy storage and recharging facilities

Potential Issues and Concerns to Address for Utilities We know that each emergency will present different challenges for customer restoration. It is clear that there are several common issues concerning emergencies on the distribution system, as follows:

- Electrical interruptions caused by damage to equipment
- Electrical interruptions caused by transient conditions
- Potential for wire-down emergencies and other problems affecting public and employee safety
- Potential for extensive damage and the need to rebuild entire feeders
- Potential for shortages of resources, including critical distribution components
- Equipment misoperation and malfunction, including stuck breaker operations
- Outside crew construction and safety practices
- Road hazards that can slow progress

- Weakened system components that could fail in the days immediately following the emergency, including poles and hardware
- Potential for postemergency problems, including vandalism, theft, accidents, human error, security problems
- Customer and media communications issues that should be addressed
- Data security and replication for loss of local power
- Potential for loss of communications during or prior to restoration operations (damaged towers, components, loss of backup power, etc.)
- Provision of security team for crews under certain hazardous conditions

Restoration Strategy Checklist for Distribution Network Facilities The following general guidelines refer to distribution restoration and may be used as a general checklist that can be expanded by the incident commander or delegate, and can be based on whether a utility has centralized or decentralized its recovery and restoration (note that items may be prioritized by the incident commander):

- Review all preemergency checklists and determine if all resources are ready for the initial days of restoration operations. It could take several days before sufficient mutual assistance crews, FEMA, and DHS (Department of Homeland Security) assistance is available.
- Execute damage assessment procedures, coordinating needs through the XYZ Emergency Operations Center and neighboring utilities, based on response level declared for this emergency. See XYZ's Transmission Emergency Plan for more detailed information and contact numbers. Review Damage Assessment section that follows.
- Coordinate restoration of distribution feeders through the dispatch center, prioritizing repairs.
- Determine how transmission restoration is planned from XYZ and determine how this will affect your plan for substation and main-feeder restoration.
- Review needs for hazard clearing of roads with municipal or county roads department and substation access roads with internal crews and contractors.
- Ensure that all contact lists are current and available to everyone who needs them.
- Brief all personnel on how you expect the restoration to proceed. Make sure crews are well briefed at the beginning of each workday, including contractors and mutual aid crews.
- Review vendor requirements and fuel delivery needs.

- Discuss the proper use of telephones and telecommunications equipment, priorities, etc.
- Urge that all personnel carry their ID cards and that field personnel should be ready to coordinate work with county and state emergency management reps in affected areas.
- Discuss day- and back-shift duties and set reasonable work and rest hours.
- Discuss handling of injured employees and fatalities and how this will work with rescue and EMS (emergency medical services) crews from local rescue units.
- Discuss backup-power use in the building with all personnel.
- Discuss reporting requirements with all employees, including methods for handling contact with their families.
- Discuss safety rules and make this a regular part of daily announcements to all employees.
- Stage workforce to cover all shifts for a multiday or multiweek recovery.
- Determine distribution restoration procedures for internal as well as contract and outside mutual aid crews. How will you handle a wide-area "everything on the ground" restoration utilizing all resources that may become available to you?
- Look at restoration from the substation breaker out, including hazard clearing to get to the work.
- Review the restoration process during various stages of work completion, including re-fusing, reenergizing mains and laterals, and cleanup work to get services back on.
- Review work-completion reporting procedures from crew foremen for updating progress reports.
- Be prepared to scale up or scale down resources, based on new information.
- What forms, supplies, tools, and equipment will be needed on a daily basis? How will you get them to the people who need daily replenishment of them?
- Review FEMA requirements for record keeping (forms, logs, photos, etc.) to help facilitate reimbursement following the emergency.
- Estimate when you are likely to run out of critical items and how you will replenish stock.
- Coordinate information and updates with local FEMA and local emergency officials.
- Maintain updated maps and lists of customers restored on a daily basis. If the SCADA (supervisory control and data acquisition) system is operational, set up regular reports that can be generated through the system.

Use of Staging Areas and Satellite Work Centers *Staging areas* are large areas, such as open fields and large parking lots, that are used for staging mutual assistance crews and contractors. Staging areas may be normally set up and coordinated by one or more districts to serve a given area. Properly set up, staging areas can serve many mutual aid crews or contract crews from outside the utility service area. *Satellite work centers* may be located at larger substations and operations centers that are used to manage restoration in a specific geographic area.

The concepts of satellite work centers and staging areas are used successfully by utilities and are strongly recommended when recovering from high-level emergencies. Satellite work centers are normally set up by utilities as an orderly method of handling restoration of larger blocks of customers in urban areas, delegating area restoration to an experienced team leader on location. Satellite work centers may be used to closely coordinate the restoration of one or more substations, using a "breaker out" methodology, where the team leader (or other designation) runs restoration crews from the substation breaker out onto the backbone feeder to get the entire circuit free of damage locations prior to closing the feeder breaker and energizing the feeder out to the customers served. Depending on the level of damage, sections of the feeder may be energized up to the point where additional work is needed before more of the feeder can be energized. In the meantime, customers are being restored as work progresses.

EPD Model, Element 6: Write the Plan

As we continue to work through our utility plan development model, let's move away from the specifics of developing strategies and coordinating restoration on utility systems to discuss the task of writing the plan.

Following is a brief look at some major considerations involved in writing an emergency plan, presented here as a quick review. They are not in any specific order, leaving open the option to approach the planning project according to your own expectations. Use these ideas in concert with other models presented in this guide and ones you find doing research for your project.

- Perform a vulnerability and risk study (refresh annually) that incorporates all areas where the combination of risk level and high impact can bring about major loss for your utility. Remember that your reputation is one of those high-impact results for lack of performance during damaging events. Maintaining lifeline services is part of your mission to the people you serve.
- Choose a writing method and develop formats. Plans today are maintained in both paper and electronic format. website-based plans

are included as an additional way to familiarize many members of your response organization. What's more, plans are ready for review 24/7 from virtually any location.

- Use tools that both track progress and make it possible to draft reports for management.
- Look at and plan for group involvement and how the group will work together to help formulate the plan.
- Perform the necessary research on how utilities restore service following storms along with references from various government agencies, standards organizations, and other good sources of information on how to develop plans and how to maintain compliance. Determine what the plan will contain, draw up an outline, and organize the draft. Your first and subsequent drafts will be reviewed, edited, and resubmitted for review before the final draft is approved and installed.
- Submit the draft for review and critique by experts in utility operation. Allow people to suggest changes. Incorporate those changes. Write the final draft and secure necessary approvals.
- Create distribution lists. Remember, your plan may include sensitive information, not to be released outside of your company. Sensitive information should carry a note indicating that it is not to be copied or disclosed outside of the organization.
- Package, promote, and distribute the plan.
- Prepare maintenance schedules and follow them to the letter. As a general rule, revise at least twice a year if time-sensitive information is in the plan.
- Prepare training and exercise programs, materials, and schedules. Look at various models for exercising the plan available through the DHS and other agencies and groups.
- Train people to use the plan. Get their feedback on the training.
- Exercise the plan using a systematic approach and metrics that can be measured and tracked as you move forward with your preparedness program. Get input. Incorporate the input in subsequent revisions.
- Review your goals for long-term maintenance of the plan, including major revisions and complete rewrites to the plan, if warranted.
- Look at ways to improve training and exercising to get maximum participation and performance from all participants.
- Look for ways to maintain interest and momentum in emergency planning. Continually promote the concept of what it means to your utility to be prepared.

A Perspective on Plan Development and Some Tips to Consider for the Process When you are ready to write your first draft, you'll already have a good idea of what the plan content will be and how it will be organized. It will then be a case of producing the content. If you start writing your draft prematurely, before you have a solid picture of what the plan will look like, you'll spend more time cutting, pasting, and rewriting, and have less time researching and formulating your strategies and procedures.

In the distant past, I wrote plan content on my PC, printed a paper copy, reviewed and marked up changes, and gave everything to a typist on disk. As the typist finished organizing and proofreading each section in the plan, the work would be printed out again and handed back to me for review. I would make additional changes and hand several pages back to the typist for revision, if necessary. We would reach a point where a section was ready to go into the final draft and print stage. After the final draft was approved, it was printed and distributed. The whole process was tedious, to say the least.

Today, we have fewer people to perform these tasks and may even have commercially developed applications to help guide us in developing the plan. Some companies prefer this method, feeling they don't have specialists that can develop emergency plans for the organization. However, some companies have found that it still takes a considerable amount of labor to enter the required information into the application and keep it current, and additional costs are incurred for the software licensing, ongoing maintenance agreements, and training of personnel to use the application.

Plan writing is precise work. You need to be in touch with every sentence. It has to come off as an accurate, concise, believable, and, all considered, a professional-looking document. A simple expression, abbreviation, or error in comma placement can change the entire meaning of a procedure. Even something as simple as choosing the font (typeface examples: Helvetica, Bookman, Courier, Times New Roman, Arial) that your manual will be printed in will make an impression on the user and his or her ability to read and comprehend it. Avoid the fancier fonts or fonts that are incompatible with other software or your website.

Your work environment is critical to plan writing. Pick an area away from noise and other distractions. If necessary, schedule a meeting room in your building and use it to write your plan or pick a vacant office away from areas where you can constantly hear people talking. Distractions will make your work far more difficult than it needs to be.

Always retain a copy of what you have written on a duplicate storage medium, and back up all work you save on a hard disk to CD, DVD, or USB storage device or to a host server. Back up your work using automatic backup settings, or discipline yourself to back up files often. Keep your backup in a safe

place, in addition to a protected folder on the server, appropriately labeled, and never leave media on your workstation or desk. If approved by your IT (information technology) people, keep duplicate copies off-site in a protected location. Keep copies of what you write in a universal format for compatibility.

Use a folder to store a paper and electronic draft in an appropriate protective sleeve as it is being completed. This will allow each section to be a module or unit, so you can give it to someone else to work on or review, when required. When you've completed all sections, you'll want to prepare draft pages for publication, number and date them, and transfer them to a notebook complete with dividers. This will allow you to see how the draft looks fully assembled, ready to go to print. Your management can also review sections of the plan pertaining to their area of expertise and control.

Your IT experts can take electronic versions of your plan for use on the company host computer(s) and maintain user security for viewing under password protection. Today, companies often have some types of documents available for view by employees under a secure partition, and you will need to investigate how your plan will be made available to the employee population and whether it will be accessible from remote locations. Writing the first draft of the plan is easier if you have most of your books, periodicals, and snippets in a format that enables you to locate information quickly and transfer that information to your draft copy. If you are not the person who is doing the typing, you'll have to develop an understanding with your staff person or persons on how you will be giving them the work to type as you give them files in draft form.

With notebook and tablet PCs now the norm, you may want to consider writing your plan, or parts of it, using the company-approved device supplied to you. Notebooks and tablets (generic term to cover PCs that are easily carried) can be ideal for plan writing, because you can complete your work almost anywhere, speak with experts on location while you type notes, and, possibly, move faster at completing your project. Let's cover a few tips on plan content that are worth emphasizing before we move on.

The best plan is a plan that is easy to read, use, and understand. I've said this earlier, but it's worth repeating. You've probably seen large notebooks holding plans that are difficult to pick up let alone use in times of emergency. Strive for quality instead of quantity. Keep your paragraphs short. If you use acronyms and special terms, make sure they are clearly defined wherever they are used. Include a definition at the bottom of the page; otherwise, provide a "list of terms and definitions" conveniently placed in your plan.

Make charts as clear and simple as possible. If you give a chart or diagram to a plan user, and he or she can't tell you what it is after a brief examination, it's probably not a clear diagram. Make sure all diagrams have an explanation of how they are to be used. Avoid large diagrams and charts that

will make your plan difficult to revise and use. Foldout pages often get ripped when people unfold them.

The plan may be as detailed or general as required to fulfill its intended purpose. There should be enough detail in the plan to provide guidance that can be easily understood by the average person who must use the plan. A plan that is too general will force the participant to make some assumptions about what is written. What will their assumptions be?

Your plan should reflect the needs of your particular area of operation, and it shouldn't closely mimic a plan written for another company or business unit. What works for some other company might be inappropriate for your plan. There is no clear-cut convention for naming your plan. However, emergency plans (generic title) can be named with some consideration given to what the plan is designed to do (see Plan Scope, covered in EPD Model, Element 2). Organizations call their plans what they want to call them, and they certainly aren't limited to the titles that follow. Don't get overly concerned about titles; do be concerned about the contents of the plan. Here is some basic nomenclature for plans.

- *Mitigation plan*: A plan to reduce the severity of specific types of events. A mitigation plan might, for instance, detail the steps necessary to reduce the hazard of a fire in a computer room, by installing a Halon system.
- *Preparedness plan*: A plan to prepare for an event that has been recognized as hazardous to the operation of the utility. A storm preparedness plan might, for instance, include checklists to help a utility gear up for major storms. This would include setting up logistical systems to deal with problems known to complicate or delay a restoration, such as bringing in and outfitting outside line and tree-trimming crews. A preparedness plan would recommend a system for feeding and housing these crews, and seeing to their personal needs. If a utility waits until a storm moves through to set up these systems, they will likely find motels booked or closed, restaurants closed, and material and equipment suppliers low on stock. A few phone calls and meetings ahead of time can save hours and days in trying to get these systems in place.
- *Recovery plan*: A recovery plan is a plan that details how to recover to some minimum acceptable level of service. It doesn't normally include all of the procedures necessary for a complete recovery. For example, a recovery plan may call for a utility to restore a minimum number of voice and data lines.
- *Restoration plan or major emergency plan*: A plan that contains procedures for a complete recovery. Such a plan is usually comprehensive, covering logistical as well as detailed restoration procedures.

- *Crisis management*: A plan to handle specific crises that can have a major impact on company operation or reputation.
- *Business continuation or resumption plan*: Restores business to pre-disaster levels. Restores market share and seeks to maintain customer service.
- *Disaster recovery plan*: Years before business resumption and business continuation plans were in place, the data center was the hub of disaster recovery planning for the corporation. Data centers are covered by disaster recovery plans; however, other plans may be appropriately titled "disaster recovery plans."

While the title isn't as important as the content, it should be a title that your organization can live with, and hopefully will be easy to remember. Before you reach a point where you are ready to put a title on the cover, consult with others and check to see whether similar titles have already been used on plans in your company. You'll reach a point where you're ready to put all of your work together into a presentable draft to be used to get final approvals before distributing the finished product. Let's look at a few important points that will help you get a quick approval.

1. Make a good impression, starting with your first draft. Does your plan look like you've paid attention to details?
2. Include a cover letter that will explain the purpose of the plan and how you would like to proceed from the first draft on, i.e., production schedule, distribution, training, and exercising.
3. Include an executive summary that points up the main idea for the plan and how you've approached the development. Try and make it interesting enough to get people to read further. You don't want executives to simply read the summary; you want them to dig deeper and discover more about your plan. You want them to discuss the plan with others. This fosters awareness, interest, and support at high levels in the organization.
4. Ask for further input. Don't let anyone think that everything is cast in stone, now that the draft is up for approval. You want buy-in, and to get it, you may have to change the plan to get high-level people to approve it. Include a statement in your cover letter that asks for ideas and input on format, content, and use.
5. Triple check the draft before sending it out for approvals. Don't let one or more simple grammatical errors, for instance, make your plan appear to be amateurish and in need of a lot of editing. Ask yourself if the people you are sending it to will understand what's in it. Will a lot of unexplained and undefined technical jargon and acronyms

keep them from approving the plan? Perhaps a simple explanation with examples will facilitate getting the approvals you need.

6. Not everyone will be able to attend your meeting to present the plan for approval (assuming you will have such a meeting). If a secretary gets the draft in the mail, will he or she know that it requires priority handling by the manager? The sooner you get the plan installed, the better off your company will be. Will this message be communicated to those who will ultimately approve the plan?
7. Before you distribute the draft, check page, diagram, and exhibit numbers for accuracy. (Also see the content in this guide on organizing the plan.) Make sure that nothing has been left out.
8. Include your phone number or the name and number of the person who will answer questions about the plan. If you or a delegate can't be reached for question or comment, the plan won't likely be approved. Make yourself available and encourage people to ask questions.

After you have the draft ready, you'll need to make several copies for review purposes. The copies will then be distributed to management and technical people for a final review. You'll be incorporating their comments and ideas into the draft prior to printing the plan and distributing it.

In your first draft, your attention should be focused on making the writing accurate, complete, and as simple to read as possible. The people who will critique your first draft should not be concerned with how attractive your page design is, but rather with what's written on the pages. It doesn't hurt, however, to accept other people's ideas on page format. After the final editing is done, you may want to design an attractive page to hold your text, which might include the company logo and boxes for revision dates or approvals. You can then load your printer with the preprinted forms and print your plan. I'd recommend that the final draft of the plan be formally presented to management at a special meeting. If this isn't possible, it may be wise to hold a brief presentation for each member of the approval committee, at their convenience. This method has certain advantages, even though it will take more of your time. Separate meetings will give you the opportunity to ferret out problems with the plan and answer questions that a person might not ask at a group presentation. Before you leave the presentation, make sure that all immediate questions have been answered, and don't forget to tell the approval committee members how long they should take to give their approval so that you and your group can remain on schedule.

If you find that one or more approvals are taking longer than you had requested, approach the people who are hesitating and ask them if they have any questions that haven't been answered. If you still have problems getting approvals, ask your reporting senior if he or she would have a word with the person or persons who haven't given their approval.

Be patient, but never lose sight of the goal to get the plan installed as soon as possible. There have been several examples, in recent years, of corporations who had recently completed writing or revising their plan when disaster suddenly struck. Some companies have attested that their plan saved them from considerable loss.

Now let's look at good techniques for writing procedures for the plan. What will we need to consider for the users of our plan so that we can get the best possible results?

Emergency Procedures: Writing for Maximum Results This segment will offer some guidelines for delivering clear, safe, and effective emergency procedures to skilled professionals in the utility industry.

Skilled operations managers and hands-on professionals in the field need written procedures and guidelines that produce the results required to safely and effectively carry out tasks. Tasks may be routine, i.e., completed on a given schedule, or they may be event-driven, such as those that must be carried out during uncommon events. Event-driven procedures, including emergency procedures, have been scrutinized of late as the result of rampant natural disasters. After-action assessments performed by many organizations after major storms usually point to the need for more comprehensive planning.

For the purposes of this guide, emergency plans may include a set of procedures that are used to complete specific tasks in support of a recovery strategy, which is also documented in the plan. I use examples in the guide that focus on utility system operating procedures; however, the reader is urged to adapt these guidelines to other areas that play an equally important role in emergency recovery operations and restoration.

Higher risks imposed by damaging events must be met with more effective recovery strategies to mitigate their effects. Recovery strategies are carried out by people completing a set of prioritized tasks required by each strategy. People need clear procedures to help them apply their skills to complete tasks during extreme conditions.

An ordered, albeit simplistic sequence for developing plans can take the form shown in the string of activities that follows:

1. Events > 2. Strategies > 3. Tasks > 4. Resources > 5. Procedures > 6. Recovery

Stepping through the process, we will do the following:

1. Define the types of damaging *events* that can profoundly impact critical systems. Prioritize and allocate resources based upon the level of severity of each type of event. Doing this systematically will help us determine the focus and scope of our strategies and documented plans.
2. Develop the *strategies* that will help us most effectively deal with the events and minimize their impact when they occur. Measures

to reduce impact are taken ahead of time to mitigate the risks that we defined earlier. We need to prioritize mitigation projects to maximize the impact of the limited resources that we have to dedicate to them, preferably during peacetime.

3. *Tasks* that are to be performed will support our strategies for recovery. We list those specific tasks in a prioritized manner under each strategy.
4. *Resources* are then preassigned to each task. We stage our human and material resources so that there are fewer allocation questions to answer when damaging events occur and to minimize recovery time.
5. *Procedures* are documented, rehearsed, and refreshed on a regular basis to help ensure familiarity in completing them and to ferret out potential uncertainties and concerns with each step of the task.
6. A timely and safe *recovery* is what we expect to happen if we have done what we need to do in each of the first five steps. If we have fallen short on any step, we can expect to see a response that will be short of our expectations and will likely be costlier. If we have gone to task with each step and done well with our planning, our risks will have been minimized.

Needed Guidelines Today's utility, regardless of size, should adopt development guidelines that will produce the best, most accurate procedures for all teams and individuals engaged in emergency work. Utility or consulting personnel engaged in writing emergency procedures for the utility should have clear goals and realize that routine tasks can quickly become tasks to be completed under extreme duress. That's why there should be sound guidelines and models for writing emergency procedures. The development team or individual, depending upon how the project is approached, should have some quality controls to adhere to prior to writing or rewriting the plan. Consultants brought in should give thought to how the procedures will be used in training sessions from the beginning of the project.

One of the best examples I can think of for examining procedures, and hopefully improving upon them through quality standards, is to look at substation switching. Switching requires clear procedures for the safety of switching personnel and the integrity of the power system. System operators and switching personnel know what can happen when disconnect switches are mistakenly opened under load. During an outage emergency, the pressure to restore power in a timely manner necessitates clear and accurate switching procedures, flawlessly performed. Switching via SCADA or EMS (energy management system) controls requires a similar level of attention to detail, or we can risk a cascading loss that may ultimately cause a blackout and necessitate a system restart. Wide-area events necessarily force us to examine the sequence of switching procedures with precision and care.

Procedure Writing Criteria First and foremost, senior management buy-in is essential to your recovery planning project as a whole. Tell management what you plan to do, how you will do it, and why you should do it the way you have planned. Make sure you are meeting all regulatory guidelines as you meet internal guidelines for the final product. Get the needed backing and approvals and proceed without delay. Our exposures are too great to do otherwise.

Define Exposures and Strategies What are your exposures to damaging events? What are your strategies to recover critical parts of your system and then complete your eventual full recovery? Have you consulted your lessons-learned sources?

Support your strategies and assumptions with research. It is useful, and often required, to perform an impact study and analysis in order to support your approach to mitigation and recovery planning. This is a very useful and financially sound method for learning why you should prioritize recovery in a specific way. If there is a question about your approach in the future, the impact study offers useful support on your behalf.

Accurately Develop the Scope of Your Plan Develop a concise scope for each of your recovery plans. Wandering about and including an all-encompassing scope will lead you down the road to a bloated and confusing recovery plan. Avoid this at all costs. I used the term *plans* in the plural because many utilities need several plans to handle emergencies in specific areas of operation. For example, a substation emergency plan may have procedures for wheeling in and connecting a mobile substation for the loss of a substation transformer in a remote location. This probably isn't a company emergency, but certainly qualifies as a local operations emergency, especially in the dead heat of summer or extreme cold of winter in many areas of the country.

Local or departmental plans will have a very narrow scope, and so the scope written in the plan introduction section will reflect this. Start your scope statement with, "This plan will…" (and complete the scope statement). In most cases, the scope statement will be no longer than one sentence, concisely written.

Keep Your Plan Concise Pay close attention to your intended contents represented by the scope. A ten-year-old policy letter from an ex-CEO may be interesting to discuss at one of your meetings, but it probably doesn't belong in your new emergency or disaster plan. Keep your plan on a strict diet that supports the scope. You are not writing new management policy; you are writing specific procedures to restore your system or parts of it. Watch the quantity and quality when including exhibits in your plan, including policy letters or directives, system diagrams, or any other supporting documentation. Avoid foldouts and anything larger than standard page size. Larger

pages can easily be torn and will become dog-eared. Your plan is not a filing cabinet and should never appear that way.

Diagram the Procedure to Enhance Clarity Visualize the procedure as you write it and read it. Could it be diagrammed to reduce any uncertainties? If so, where should the diagram appear? Diagrams are usually more suited to training manuals, but I have seen them used widely in emergency plans. Diagrams and illustrations (visuals) in manuals should be standardized so that they appear uniform in size and in level of complexity. More complex diagrams may need to be broken down into smaller ones. Some parts may need to be resized or simplified. Think about some of the diagrams you've seen in manuals and how you might have improved them to aid comprehension.

Give Thought to Organization of Subject Matter as the Plan Is Being Written Make sure you format and organize your plan carefully to make it easier to find information in a hurry. Provide a table of contents that makes it simple to locate preparedness, response, and recovery information in the format that steps in at the right point and gets a handle on the information that will meet your users' needs. I use content-oriented quick search indexes, a Quick Locator page or pages, in the front of the plan to help people locate information by topic, with the topics arranged alphabetically.

Know the Needs of the Plan User Write the procedures only after speaking to target users in detail about how they normally approach a task. Never assume that you, as a writer, know their daily routines and work habits. Remember, after doing your best writing, you will be returning to get their full buy-in to use the plan. That will be more difficult if they already suspect that the plan differs from their fundamental training and experience.

Not too many years ago, when flying onboard a commercial plane, I noticed a sign on the bulkhead that, at first, was laughable, but then I thought it might not be funny at all. The sign read, in so many words, "If you cannot read, please ask someone seated near you to assist in reading the emergency procedures card." I suspect the author of this sign was taking a bit too much for granted, and I naturally became suspicious of the competence of the company that was flying me at 35,000 feet.

Seriously though, keep in mind that in addition to content, emergency plans are living documents that must be revised often to maintain accuracy and usefulness. If a plan user suspects, or comes to realize, that a plan or set of procedures has outdated information and has been poorly maintained, he or she will question its worth as a tool. Next to content, it's important to keep plans and procedures as current as possible.

Make Your Primary Goal a Safe Recovery Tie all procedures to user safety requirements and standards, as well as proper operation of devices

on the system, such as in the case of switching and grounding. Emergency plans are no plans at all if they are not inherently safe for everyone to use at any time, or if they help contribute to postemergency injuries or deaths. Emergency plans must always meet all requirements for safety, regardless of their content.

Keep Procedures Concise Use as few words as necessary to convey a procedure to your end users. Use bullets and spaced formatting to clarify and simplify reviewing a set of procedures. If it's necessary to get more detailed to maintain clarity, use references, footnotes, and appendices to go into depth. Use a clear system for linking specific types of information in your plan.

It's usually a good idea to begin a page of procedures with a concise description of what they will accomplish with regard to the task. This will help the users gain a mental picture of what they will be doing each step of the way.

In your user or operator training, ask users to visualize a given task and have them describe it mental frame by mental frame as they would be doing it. Make notes about how each user has described the procedure he or she would use for each task. Does the plan's user seem confused about one or more procedures? That should send up a warning flag to make sure that the procedure is written to enhance understanding. Revise any procedure if it will enhance user safety and reduce errors.

Emphasize Best Practices If a plan user, such as a qualified switching person, is required to verbally repeat back a procedure to a system operator prior to executing it, the practice should be emphasized in training and actual practice, as is the case in many utility training programs. It should also be written into the procedures to help underscore the importance of the practice. Think of this in terms of applying best practices and apply them whenever you can.

Use Color Codes Sparingly, if At All If color codes are used in your procedures, consider their value and whether or not they add complexity to an already complex procedure. People who are to varying degrees color blind will not see the color codes as you intend, and colors may be more of a hindrance than an aid. However, there is no getting away from color coding in some applications, such as those used in SCADA and EMS to differentiate voltage levels, for example, which has been a practice for many years.

Avoid Creating Acronym Jungles Some plans could qualify as acronym jungles. They present so many acronyms that procedures become difficult to understand, let alone execute. We use acronyms for devices, e.g., OCB (overcurrent breaker), GCB (gas circuit breaker), GOAB (group-operated air break) switch, and letters and numbers for labeling breakers and types of switches. This alphabet soup should be carefully considered when we communicate through written procedures and switching orders, and especially

in the case of training new people. Make sure your procedures contain as few acronyms as possible and footnote acronym definitions regularly throughout your plan.

Know the Ties That Bind Many emergency or disaster recovery plans have distinct links to other plans or resources that might be used in executing other plans. If the links aren't there, another problem may be evident, and that is plan conflicts. For example, if two plans call for the use of the same resources and those resources may be called for during a wide-area disaster, you have a potential conflict. Consider a plan that calls for the dispatch of a special type of vehicle to a particular location somewhere on your system. What if another plan in a different area of operation also called for the use of the same vehicle? Some type of prioritization and practice would need to be written into both plans to help avoid the conflict. I term these *conflicts*, and your planning should eliminate them or else you'll risk a longer and more costly recovery.

When emergency plans are activated, there is a continual stream of resource allocation and dispatch of those resources to where they are needed. This is especially true in wide-area disasters. We have seen in recent disasters that lack of coordination and effective triggers to implement plans can severely delay some vital recovery activities. Further, emergency plans that fail to acknowledge procedures being carried out by local and state emergency organizations (and other utilities) can help produce out-of-sync recovery operations. In my view, we need to regularly reach out to emergency management organizations to help ensure the most coordinated recovery from all responders.

Frequently Asked Questions on Emergency Planning

How Do We Improve Our Plans if Our Resources Have Dwindled in Recent Years? Incrementally enhance your plans by creating a solid program that is conducive to better planning. Planning is a programmatic process, not an isolated project. New plans should be developed on the right footing that takes into consideration the previous recommendations presented here. Of course there are many more things to consider, but never make the mistake of assuming that your chances for a viable program are inhibited by internal resource constraints. I've seen small utilities make great strides with very few resources, but they do have a program that works.

If We Have a Plan That Is Technically Accurate from a System Recovery Standpoint, How Much More Do We Need? Plans should be logistically as well as systemically and technically correct. People are the prime movers of recovery, so any emergency plans should take into account the way people work and live. Think of the fate of a battle plan that only includes the way tanks and artillery are to be placed on the battlefield based upon the range of

the weapons. That plan would certainly fail. Knowing your system and the capability of devices is only part of what should be considered.

Many Have Said That to Plan for "the Big One" Is Really an Impossible Plan to Develop. Is There a Point When You Have to Say That No Plan Would Work for a Major Disaster? This may be the costliest assumption that any company or organization can make. Emergencies and disasters present a set of challenges that should be met with an orderly response by people who are able to respond. Recovery from disasters represents a series of tasks performed safely and effectively. Some of those tasks can be modeled and, hence, they can be planned. For anyone or any group of people to know, understand, and implement all complex processes needed to recover from a major disaster is wishful thinking. We have many examples to prove that this strategy is shortsighted and, in fact, dangerous.

Regulations that exist now and in the future will force companies to plan more effectively. A company program that stays ahead of regulatory compliance will be less costly to administer than one that is mandated. If for no other reason, use the scenario that good work started today will potentially take fewer resources than mandated work started next year. In short, the smart company stays ahead of forced compliance and will be rewarded with fewer casualties and lower recovery costs over the long haul.

Closing Remarks on Emergency Procedure Development Utilities have long been proud of their dedication and skills for restoring their systems and services under emergency conditions. We owe that to the dedicated people on our front lines who want to do their best, and to the people who have recognized the need to continually improve emergency plans and procedures. I hope that, as utility professionals and utility consultants, we never produce or accept anything but safe and precise plans and procedures in answer to our ever-changing and oftentimes threatening environment.

EPD Model, Element 7: Organize the Plan

Organizing the plan into a user-friendly plan that is also comprehensive enough to satisfy the utility's needs can be challenging. Similar to other processes, the order of the subject matter can make a great difference in how the plan is received and used by the intended users. Some of the plan's content can be set up using a simple timeline methodology.

Using a Timeline to Help Set Priorities As you move through the process of writing procedures to correspond to your strategies and tasks, think about the order in which each set of procedures must be completed. Doesn't it make sense to put your procedures in an order that will get people working on high-priority items first?

Consider using a timeline. It's a simple way to get your priorities in order. Let's look at a practical exercise and example.

Take out form EP-6 in the Exhibits section (Section IV) and read the instructions. When you are ready, number each strategy or task, and its corresponding set of procedures, according to the sequence they will have in the recovery. Transfer the number and a title to a place on your recovery timeline.

Remember, in writing plans, strategies represent actual tasks that must be completed to recover core services. The procedures are used to complete each task. What you are doing now is placing them in an order that makes sense from the standpoint of recovery.

Another topic to consider is specialization. A utility may want to put their own personnel and technicians on specific work projects that they would rather not assign to contract and outside crew personnel. Emergency plans would reflect this level of specialization and the policies in place to support it. The organization and restoration sequence in the plan should be considerations in plan development.

When working on a plan for your utility, take a sheet of paper or use a software tool to mark off a timeline that will make sense for your recovery plan that will address your desired scope. Use examples from your information base—examples of past events in your utility, or others—to help determine a time frame for recovery. You can use increments of 15 minutes, 30 minutes, or full hours. It depends on what type of event you are recovering from, how many procedures will be needed, and how many procedures can be done in parallel. You will need to be specific when writing all strategies, tasks, and procedures, with titles, device nomenclature, and other specifics clearly defined and listed.

The timeline can be drawn as shown in Table 6.1, with increments of time plotted. This will require your favorite electronic writing device, large enough to write tasks legibly. You can use an alpha or numeric character that corresponds to a task on the line. In the simple example of Table 6.1, tasks were labeled as A, B, C, etc., and a corresponding key was used to identify the tasks. This process can be completed using graphics software or a spreadsheet, with points marked at desired intervals and preparedness and response activities at times anticipated for the utility.

The key to the success of the utility in handling major storms is to stage resources at the right time and rehearse activities so that all responders know their roles and remain vigilant prior to anticipated events. The ICS structure maximizes resources and limits the span of control. Utilities that model their response from the ICS command structure can plug people into the roles when there is time to consider their qualifications and allocate the right people to back them up when it's time for relief. Think about the key areas of operations,

Table 6.1 Example Timeline

Time	0	15 min	30 min	1 hour	1 hour 30 min	2 hours	>2 hours (as granular or broad as necessary)
							→
Tasks	A	B	C	D	E	F	etc.

List tasks → along timeline

Key to tasks shown on timeline:

A. Complete notifications

B. Storm level evaluation—Level 3
   Open EOC
   ICS team stages personnel for extended recovery

C. _____

D. _____

E. _____

F. _____

etc. _____

planning, logistics, communications, and finance, along with leadership roles and how rosters would look after the best suited people are assigned.

Using Software to Write Emergency Plans This is an appropriate time for a brief discussion on computer software or web-based applications that can be used when writing plans, scheduling resources, and other emergency plan related tasks.

An alternative way of prioritizing tasks, assigning people, and otherwise scheduling the recovery of core services is to use a computer. Business-recovery software can help you write comprehensive plans. So, if you decide to investigate the advantages of using disaster recovery planning software, ask the vendor if the software assists the user with prioritization of tasks.

I've used the term *planning software* to describe the type of software used to assist you in your emergency plan related work. In your research, you'll find that vendors call the software a number of titles from *disaster recovery,* to *business continuity*, or *business resilience,* depending on the application. Each product has its strong points, and only a few brands may be suitable for your application, especially with respect to utilities. Let's look at several points to consider, as follows:

- Remember, the software itself won't do the planning for you, and of course you wouldn't want it to. If a vendor says their software will cover all of your needs for emergencies, provide a comprehensive list of your needs and allow the vendor representative to prove it.

- Will the software be current three to five years from now? Some software can go out of production, and companies can fold, leaving you with no support. Pick a reputable company that offers a proven product.
- Will the software really save you time over a more conventional method of writing your plan? In some cases it will, but you'll need to know whether the benefits justify the costs of additional user training and maintenance to the software.
- What is the real purpose for the software you are considering? Is it for general business continuity planning or for a more specialized use, such as recovery of a data center or microwave site? There are software or Internet-based applications to consider, based on your budget. I'd recommend attending a disaster-recovery or business-continuity conference or exhibition—several are held annually—to get a better idea of what is offered by each vendor. Vendor exhibits are part of the conferences, and vendors are eager to earn your business.
- Request some demo DVDs, links to demo websites, white papers, and other information from the vendors to get a better look at their products. Go to their websites to look for testimonials from other companies. Look at successes as well as inherent problems utilities have had. In some cases, there may not have been any sales to utilities, and that may be due to the design of the applications or the training-intensive requirements of the application, which can make utilities wary due to limited budgets and personnel.
- Take a look at one or more of the recovery planning magazines, such as *Disaster Recovery Journal,* or their websites, which regularly advertise and compare products as well as providing dates for disaster-recovery planning conferences. Also consult websites, such as LinkedIn and other social media sites, and look for groups that are related to the utility industry; the IT industry; the emergency and disaster-recovery planning industry; government and regulatory bodies, such as FEMA and DHS; and others.

We've said that the way you organize your plan is important. However, in some plans, the order might not be quite as significant as in others. For instance, a coal-fired power plant might have an emergency plan that covers several types of emergencies, from turbine or boiler problems to bomb threats, with each emergency having its own section in the plan.

If a plan covers one type of emergency, you may want to consider the arrangement of the contents, with a goal to make it easier for participants to read and follow. For instance, as a simplified example, a plan that covers major storms might be arranged as follows:

1. Contents
2. Scope
3. Notifications
4. Prestorm checklists and meeting agendas
5. ICS command structure: Implementing command and control
6. Support and liaison
7. Damage assessment
8. Restoration teams' mobilization
9. Mutual assistance: Onboarding, staging, satellite work centers
10. Prioritized recovery procedures
11. Restoration
12. Postrestoration
13. After-action assessments and report requirements
14. Exhibits

Let's look at a few reasons for using the order shown here.

When a storm is coming, it's important to get the message out to all participants and potential participants. This would be your employees, vendors, contractors, local officials, and communities that might be affected by the loss of utility service. So, notifications may be found near the front of the plan.

Next, the utility will probably want to hold meetings to discuss the impending storm situation and to review the status of items that must be addressed. At the meetings, it would be advisable to have a list of items that can be checked and assigned to attendees for action. Checklists covering all facets of operation under emergency conditions would be appropriate.

You may also want to include a sample meeting agenda for prestorm and poststorm action to set the tone for the days prior to and after a major storm.

A little further into the plan we find information concerning support and liaison activities. As we get people geared up for a storm, we also want to get all support systems in place, such as staging areas, food and lodging arrangements, and any other systems that help to support your critical efforts. Liaison activities might include sending utility representatives to emergency centers staffed by local officials. Such arrangements are made in advance through city and town emergency management personnel. It's important to understand what the utility will be doing at various stages of storm restoration and what the town or city will be doing, such as road clearing for the city, and clearing electrical hazards from the streets, which is done by the utility. Communications utilities are also a part of poststorm wire clearing, so coordination is essential by all utilities and municipal public works departments.

We may want to also cover such issues as how employees and outside agencies are going to be kept informed. If you cover this in your communications plans, you may want to provide an outline in the storm plan of how this will be handled. Time and again, there have been problems with

communications during major storm recovery, so get out ahead of this problem by having the right procedures and the right people involved in this part of the planning.

Remember, in the heat of battle, people can get frantic and become disorganized. Encourage people to stick with the recommendations for action that are written in the plan unless there is a great reason to stray from them. People will be more likely to follow the plan if it's well organized and if decision makers believe it's the best alternative to recovery.

In summary, you may want to use the timeline method (Table 6.1) to help determine the logical order for recovery of systems or services. And, when writing and assembling the plan, organize it so that people can get up to speed in a hurry, using a logical approach. Make it easy to use!

EPD Model, Element 8: Determine Plan Coordination Requirements and Resolve Conflicts

How Will a New Plan Fit In? Any new plan that is written will take its place logically with existing plans and procedures. Some existing plans may not be well known to many people in the organization. Therefore, integrating and coordinating your plan may be more complex than you may think.

Before you can install the new plan in your organization, or even go for approvals to install it, you must first check to see if it conflicts with any plan currently in existence. One or more of the following conditions could exist:

1. Similar resources have been marked for tasks outlined in more than one plan, and conditions could present themselves whereby several plans are used at approximately the same time. (For example, several plans were in place to cover oil spills at the Port of Valdez, Alaska, at the time of the *Exxon Valdez* oil spill disaster.)
2. Communications channels and the prioritization for use can be in conflict. (Which of your departments or business units has top priority when using various communications systems?)
3. Command and control may not be appropriately assigned for emergencies that occur at or nearly at the same time. (Which of your management personnel will be in charge for restoration in a given event?)
4. Authorities and stakeholders outside of the organization may have opposing views as to what should be expected to occur for a given emergency. (Do outside emergency-response groups expect your utility to assist them in a specific manner, such as in answering media questions, attending to spill cleanups, clearing debris from a storm damaged area, etc.?) It's becoming clearer, through the experience gained by utilities and local government, how each will work together following major storms. Cooperative emergency exercises,

including state or local emergency groups working in concert with local utilities, can help all responders from participating organizations learn their roles. The planner should research existing plans and negotiate resource allocations and response methods so that plans can effectively coexist.

We know that emergencies can often occur at the same time, leaving decision makers in a quandary as to which plan should be used at a given point in time. If plans are properly designed to work together, wasted time and great expense can be avoided.

What steps might be taken to complete this element in the model? Let's look at a few and then do an exercise to improve learning.

1. Determine whether similar procedures exist in other emergency plans. Research should be done inside and outside of the organization.
2. Determine whether similar resources are allocated for use in other plans. If so, how and when will they be expected to be used?
3. Determine who will be in charge for a given emergency. Have the same people been earmarked for a decision-making position in more than one plan? What conditions might make this inappropriate?
4. Determine which facilities have been designated as ones that will be used for recovery purposes. What conditions might make these assignments inappropriate? If there is a catastrophic loss of an important recovery or command facility, will this condition make it inappropriate to continue using the plan? If so, what can be changed to provide alternatives?

Now that you have gone through this analysis, what parts of your plan can be changed or otherwise made to work if multiple plans are to coexist in the organization? Is further coordination between departments necessary? At what point will you say that the various plans have been effectively coordinated?

Never forget that the needs of the organization, and the customer base it serves, outweigh individual and departmental needs. This ties in with the concept of looking at emergency planning from a global perspective.

Sample Exercise for Coordinating Emergency Plans This is a group exercise. Divide your planning group into two smaller groups. Try to have at least two people in each group, with a facilitator available to help the groups with the exercise. One group should play the part of a department that already has a plan in place. (Try and find an existing plan that can be used as a model, giving group members ample opportunity to review it prior to the exercise.)

The other group should play the part of the planning group that is introducing a new plan in the organization, hopefully with some common issues with the existing plan.

Review the various steps listed previously to check for integration and coordination needs, and brainstorm the problems that might come into play with the introduction of a new emergency plan. The result of your exercise will be to explore and resolve conflicts (or potential conflicts) through negotiation with other members. Determine whether major changes in either plan will be necessary and whether policy decisions might have to be made in the organization to resolve some of the issues. Use this exercise to help address the needs for your new plan.

This will not be your last opportunity to coordinate and integrate plans in your organization. As you will find in the exercise element of the EPD model, Element 8, coordination issues often surface when exercises are held, giving you other opportunities to discover these problems and resolve them in future revisions. It is far more desirable, however, to address potential problems in the plan development stage.

An excellent example of lack of contingency plan coordination is cited in "The *Exxon Valdez* Oil Spill: A Report to the President" (National Response Team 1989). This, of course, is a large-scale example, involving private industry, environmental groups, and the government. But the application of the lessons learned applies in virtually all emergency plans in organizations. Here is an excerpt from the report:

> Lack of coordination between the Alyeska and Exxon plans appears to have caused confusion in structuring the response to the *Exxon Valdez* incident.… There was no provision for review by the federal OSC [on-scene coordinator], who establishes priorities for response actions. Therefore, coordination was further limited.

The underlying meaning of this excerpt is presented for further consideration. It represents a fundamental concept—the coordination of plans—that rings true in all industries and, specifically, where industries must coordinate plans with outside agencies.

EPD Model, Element C: Get Input The model we are discussing (Figure 1.1) includes an auxiliary Element C: "Get input; maintain dialog with experts; include outside organizations." I'm including this element to call attention to the fact that planning should not be done in a vacuum. It's important to get input not only from the people on the plan development team, but I believe planners should look to other areas of the utility and to people who can offer keys to further development and refinement of the plan. For example, meeting with local emergency management officials to discuss the key parts of

your plan is not a bad idea. This shows your willingness to coordinate plans and reach out to get input for your program. This also includes, for example, input on holding exercises and having regular meetings to help ensure cooperation during recovery from major storms.

EPD Model, Element D: Determine Compliance Requirements The model we are discussing (Figure 1.1) includes an auxiliary Element D: "Determine compliance requirements; monitor and employ changes in planning." Here again, we are looking for potential conflicts in the way our plan approaches recovery as compared to current regulations, guidelines, and coordination recommendations that are offered by outside agencies. Planning is not done in a silo, at least not any longer. Today's utilities have already considered and implemented the practice of the Incident Command System (ICS) in designing their command structure for handling emergencies. Even larger utilities have taken steps to phase in the ICS structure and elevate the structure in the organization when dealing with recovery from major storms. While this has been difficult for some utilities to implement, sometimes due to regimented thinking from decades gone by, many utilities have taken a step back and viewed their plans from a global perspective, which is what is required. Further, utilities are studying the HSEEP (Homeland Security Exercise and Evaluation Program) program for holding exercises.

From the FEMA HSEEP website, we can learn the following:

> The Homeland Security Exercise and Evaluation Program (HSEEP) is a capabilities and performance-based exercise program which provides a standardized policy, methodology, and terminology for exercise design, development, conduct, evaluation, and improvement planning. HSEEP Policy and Guidance is presented in detail in HSEEP Volumes I–III. Adherence to the policy and guidance presented in the HSEEP Volumes ensures that exercise programs conform to established best practices and helps provide unity and consistency of effort for exercises at all levels of government. (FEMA 2012)

EPD Model, Element 9: Finalize Plan and Obtain Approvals

It's recommended that you send segments of your plan to approval managers as they are written so it's not a burden to review the entire plan and then approve it. As segments are approved, you will get feedback along the way, allowing you to make adjustments, and these adjustments will feed into the process of writing future chapters, knowing what managers want to see, based on their comments.

If you write the entire plan before getting approvals, you will be assuming that what you have written will be approved all in one step. You could be setting yourself up for a massive rewrite, leading to more time in the development and approval process prior to installation. Plans with a smaller scope

can be approved all at once, such as one that would be used for damage in a substation, or some other isolated event. So, use your best judgment as to approvals and consider the time needed for review for the people who will be signing off on the plan.

Consider writing an executive summary of the contents of the plan and its scope. Send this out a week or so prior to sending out the segments you need to get approved (or the entire plan). If the people approving the plan have a heads-up on what will be coming their way, it may help shorten the approval process. Another suggestion would be to develop a video covering the key points of the plan and its intended purpose. A road-show presentation may also be considered when you have the plan near the end of the approval process and you are ready to introduce it to the company. This will lead us to the next segment on the topic of publishing the plan.

EPD Model, Element 10: Publish the Plan

You've received the approvals necessary to install the plan in the company. Now you've got to get it into the hands of the people who need it. Let's cover a few of the finer points of distributing the plan to prospective users in the guidelines that follow.

A few questions might help us determine how we will publish the plan and get it out to users, as follows:

- Where will the plan be kept (locations) in the utility, and how many copies or e-versions will be distributed?
- If the plan will be Internet webpage-based, where would be an appropriate place for it to reside?
- If all or portions of the plan will be available in paper format for targeted users, how will that be handled?
- What will be the best way to publish the plan to help ensure people will become familiar with it in order to respond effectively for emergencies and disasters?
- If paper copies are distributed, how will the copies remain under the control of the utility? Of course, the same could be said for the security of electronic copies and downloadable versions.
- Does each participant need a complete copy of the plan, or will a single checklist be all that's required for some users?
- How will users know of the existence of other plans or documents that are directly related to the plan and its contents? The short answer is to make sure you include a list of alternative references in the plan so that users can refer to those documents as well. When introducing the plan, make sure you emphasize the plan's relationship to other documents, regulations, and plans that exist elsewhere.

Here are several tips to consider concerning the distribution of the plan in electronic or paper formats. Some of these may correlate with the questions and concerns that may have surfaced when you reviewed the previous questions.

1. Make the plan as modular as possible to simplify distribution and use. If someone needs an extra copy of a specific section, you can grab the master, copy it, and send it off to them quickly. Training can also be designed around the modular concept. A module consists of a section of the plan that thoroughly covers a specific activity or topic. It might appear as several pages of information or procedures located between two index tabs in the plan. It might, for example, be a section that covers communications or, perhaps, logistics. People who are working in an emergency duty that concerns logistics would want to become very familiar with the logistics section in the plan. It's in that section where they may find specific details to help equip a team of technicians at a remote location, for example.
2. Include a clearly written cover letter or introduction that persuades the user to review the plan and make his or her ideas and comments known. You'll want the user to open the plan as soon as possible and start digesting the information. You *don't* want them to shove it in a drawer and put off reading it until a training session is given or, worse, until a real emergency comes!
3. Prepare the mailing list with care. Do you know who should receive copies of the plan? Do they need the entire plan, or should they only receive a specific section or sections? Do you plan on distributing a limited number of plans in the first mailing, or will you distribute all of them at once? Don't forget to keep a number of copies for distribution to interested outside parties—other companies, agencies, regulators—and for training purposes. Estimate this number before you get the plans printed.
4. Has anything important changed in the organization that would now make the plan out of date during the review period? Avoid sending out a plan that will draw fire from users because it's not current; you'll lose valuable credibility when you need it most.
5. Have you decided to add a level of security to plan distribution? Will the plans be numbered and assigned to certain people who must sign for them? How will you deal with lost or misplaced copies of the plan? If the plan were to fall into outside hands, what are the possible ramifications? Determine if your plan should be numbered and where those numbers should appear. Determine if a copy warning should be placed somewhere in the plan to discourage people from making copies of all or part of it. This might

appear as a brief message, such as, *Confidential Document, Do Not Copy or Disclose Contents.* Of course, using a common document format, like Adobe PDF, security can be included, including password protection.

6. After the copies have been distributed—in person, by e-mail, or both—have a date in mind for a simple follow-up to determine what plan users think of the new plan. This will be your initial feedback, and it is very important. A weak reception could mean that follow-up action is warranted. Do people have questions? Do they understand why they were chosen to receive a copy of the plan? Do they know where they fit in with respect to the execution of the plan, all or in part? Where have they decided to keep their copy of the plan? Does this give you any indication as to how they view the importance of the plan, or if they will refer to it with some regularity? Again, get management's support and guidance on delivery of this very important tool for your company.

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Training and Exercising 7

Discussion Points

- Training guidelines for the utility emergency program
- Training conducted by government organizations
- Exercise guidelines and tools for measuring results
- Use of drills and targeted processes to close gaps
- Internet resources for training and exercising
- Scheduling and administrating training and exercising programs

EPD Model, Element 11: Training

Programs to Enhance Preparedness

Emergency response means getting important tasks done in a timely manner. Of course, people must be trained to do this. The utility industry must embrace the importance of emergency preparedness by developing the necessary training programs to sharpen employees' skills so they are ready to deal with emergencies at all levels of severity.

This is not to say that training in emergency preparedness is lacking in all areas. Many utilities have programs that address training. But there is almost always room for improvement. Pauchant and Mitroff explain in their book, *Transforming the Crisis-Prone Organization*:

> In the midst of a crisis, few people can act efficiently and calmly without some training. Preparation involves designing various scenarios and sequences of actions for imagined crises, and testing them fully until all those involved are familiar with their roles. (Pauchant and Mitroff 1992, 137)

Let's look at a few ideas that will help us develop effective training.

1. Unless people have been prequalified, never assume that they know what to do. And even if they're qualified, you should assume that they need to be refreshed prior to an exercise or prior to getting into the season of the year when you see a regular number of severe storms.

2. Good training programs require people to practice the theory. Use walk-through simulations to reinforce what people have learned in the classroom. If mock-ups or simulators are too expensive or not justified for your company, arrange a visit to another utility's training facility that may have what you need. Ask your training department to research and recommend an alternative facility.
3. Use your plan to help you develop training. Link critical procedures in the plan to training modules. For example, if a strategy involves recovery of an essential system, such as a telecommunications system, develop a training module to deal with the recovery of that system. Determine who are the regular and alternate personnel involved in the recovery of that system, and develop a telecommunications recovery training module based on that strategy. Once you have that training module developed and in your program, proceed to develop other modules, by order of priority, and install each module in your training agenda. Then set up your schedule to accommodate the people to be trained.
4. Involve decision makers in the training. A training module for our example telecommunications recovery plan will include a segment on how decision makers will interface with technicians and how progress reports will be delivered. Decision makers should be aware of how complex a system is to repair in order for them to disseminate useful information to other participants, the media, and stakeholders. Training might include distilling a process into several segments, with each segment taking approximately x hours to complete. If a decision maker knows that technicians are working on segment two, for example, he or she will know that the technicians will probably complete the entire process in x hours, if all work goes according to the plan.
5. Training can include outside vendors or agencies that will be a part of the recovery process. This is recommended, as it will help to limit the number of questions that might have to be answered when the emergency occurs.
6. Frequency of training is as important as the training itself. Lay out a training schedule for each module and get the people trained as soon as possible. Then train them again the following year. If necessary, and if your budget permits, hire an external training consultant to help you meet your schedule.
7. Study your growing information base for examples of how other companies handle training. Get follow-up materials and information from companies that share similar objectives. Visit other companies when they train or exercise their employees. Bring back some ideas you can use.

8. If your exercise method allows, don't be afraid to weave some training into the exercise of the plan (to be covered in Element 13 of the EPD Model) in limited areas. After you outline specific duties in your plan, you may find that some emergency duties don't call for people to attend formal training classes, because people can perform those duties following a simple briefing. People who perform clerical tasks, such as sorting forms, making photocopies, faxing reports, delivering parcels, or handing out supplies, may simply be briefed during a drill on what would occur during an actual emergency. They will need to know where they should report and to whom they will likely report.
9. Do some research on the FEMA Homeland Security Exercise and Evaluation Program (HSEEP) website (https://hseep.dhs.gov/pages/1001_About.aspx) to learn more about standardized training that has been a regular way of life for government employees and a number of utilities across the nation. This guide will not cover specifics on the website, as they are likely to be revised and re-issued as more organizations adopt the methods presented there.

In addition to the application of these concepts, do some brainstorming in your own group to come up with training needs. Invite experts in. Don't plan your training without input.

EPD Model, Element 12: Analyze Training, Feedback, and Metrics; Enhance Training Programs

Why Feedback Is Essential to Development

Any trainer needs feedback on what he or she has taught a group or individual. When a group sits before an instructor, the instructor looks for subtle signs that the group is, or is not, grasping what has been said. The trainer incorporates metrics or learning objectives and measurements for determining how well class members grasped the concepts presented.

Based largely upon what the metrics tell the trainer, he or she may want to revise the training to include more emphasis in specific areas and enhance the content of the topics presented. In the case of emergency plan training or indoctrination programs, the instructor is looking at metrics in terms of how well participants know their response procedures or how well they might communicate with others, based on their knowledge of team dynamics under emergency conditions. The instructor may incorporate limited drills or scenarios to help identify problem areas while participants are in the controlled environment of a training room or other type of training facility.

Training programs are designed and redesigned to accommodate participants. Good training programs take feedback from students and translate it into improved programs. For example, a crisis-management team may be trained to deal with complex issues and make decisions based on limited information. If the team is introduced to problems in a controlled environment and, after some time, cannot agree on the approach to a problem, the trainer may want to find a different way to approach the problem. He or she may want to allow extra time for the team to air their differences. Either way, the team and trainer benefit by providing and implementing the suggestions of trainees.

We're not going to spend too much time here reviewing how to incorporate feedback into improved training programs. Your training professionals are already skilled at doing this. If you are responsible for the training as well as plan development, you'll want to learn more about training groups of people and specialists who are very knowledgeable about procedures and processes in their area of specialization. Suffice it to say that this element is important enough to be a part of our development model. Training and exercising will certainly benefit from the element of feedback and the use of training measurement systems.

EPD Model, Element 13: Hold and Measure Exercises; Analyze Results

When You Hold a Drill or Exercise

Untested plans are not going to be worth much to your organization when you really need to use them. The cyclical process of emergency plan administration calls for you to train your participants, get their feedback, plan and administer a drill or exercise, analyze the results, revise the plan (based on exercise results and feedback), and issue the revisions. Then you should reexercise certain processes and procedures that gave you a problem during the exercise, or wait until the next annual or semiannual exercise and concentrate on the weaker areas from prior exercises.

While the diagram of our model doesn't show it, utilities may elect to retrain or refresh participants prior to the next exercise. This helps to ensure that everyone will be exposed to training prior to exercising, including those absent in prior training programs. You'll want to provide regular (annual or semiannual) training for some key tasks, in any case.

If, for instance, a section, division, or department elects to exercise their emergency plan in June every year, they may want to administer training during the months of March, April, and May. With participants up to speed on their emergency roles, the exercise is the next step in enhancing the level

of preparedness and familiarizing people with the plan. For utilities that are affected by hurricanes and tropical storms, holding training and exercises prior to tropical storm season is worthy of consideration. Thunderstorms can also be very intense and carry high winds through the service area, and for many states in the United States, July through September carry greater risk. Geographic areas not affected by tropical storms should consider the optimal months for training and exercising.

Developing the exercise is not as difficult as it may seem. And, if it's any consolation to the developer, each new exercise will likely be a better one than the last if lessons learned (gaps in preparedness) are dealt with prior to the next exercise. Like the training element, the exercising element relies on good feedback from the people involved. In addition, the exercise will help point out shortcomings in strategies, procedures, and resources. If it has occurred to you that training and exercising are as important as writing the plan, you're absolutely right.

Think about the exercise element in our model as a capstone for emergency plan development. That's precisely what it is. It is a way for you to help confirm that all of the strategies are really going to get systems or services back on line in the manner that had been expected. There are no pass/fail expectations in the drill or exercise. There are, however, expectations and opportunities for improvement. What's interesting is that exercises can help reveal gaps in processes that can help the utility meet its goals more effectively and economically.

You can make your exercises as complex as time and budget allow, but the best approach is one that gets your people up to speed in a reasonable period of time, and allows you to spot weaknesses in the plan, the training, or in the procedures themselves. People aren't going to respond well if you make the exercise too complex or too demanding the first time around. In fact, you may wind up having a lot of questions about the results yourself!

I believe the best approach is to concentrate on a few key areas every time you hold an exercise—call them your "core areas" or other designation—representing areas such as communications, logistics, operations, and command and control, for example. These are important areas and will quickly make a difference in your recovery if they aren't working. In addition to these essentials, other areas should work well for you, such as materials resources, vendor support, and contractor assistance. So, you should develop exercise segments to check these areas as well.

Many utilities today use the Incident Command System (ICS) of unified command in their planning. ICS roles should be carefully assigned so that critical areas like operations, planning, and logistics, for example, are carried out to effectively deal with a damaging storm scenario. People assigned to operations need to be able to restore the network without being concerned with logistical or planning issues. Exercises, if scripted properly, should bring out potential areas of concern that may need to be addressed in future planning.

Depending on the scope of your plan, keep working other key areas into your exercise program until you reach a point where you are exercising multiple strategies and getting as many people directly involved in the exercise program as possible. This will require a lot of coordination and participation, so you'll need some support in carrying out the exercise.

Don't be discouraged if you come up short of your expectations in the early years of exercising your plans. Simply do the best you can with the resources your company has allocated for the exercise program. If, after several exercises, you feel you need to expand the exercise, approach your management with a proposal to include more resources and more in-depth scripting in your program. It's sometimes the case that, when exercising with only a small number of people in the utility, too many assumptions are made about what other people will do in a real event. Try to get enough people involved so that you feel more confident that a good response will be the result.

What should an exercise look like for your organization? Let's look at a few tips to help put your organization on the right track toward developing one.

1. Develop your exercises in modular form. Begin by writing an exercise procedure outline for each module. Some examples to consider: one module for decision makers to handle the media; one to get a team to quickly restore a system or device; one to handle employee information; one to dispense materials at key locations; and one to exercise a group on handling customer calls. Think of some others. Write outlines on how each exercise module should work on exercise day.
2. From the exercise procedure outlines, determine how much training will be required to get people up to speed on their duties. Get your training department involved, if you have one. If you are short of training people, consider drafting trainers from the ranks of experienced employees. Get them to commit one or more days to help you with your program. If you don't have trainers, or a commitment from experienced people, bring in a training consultant from outside.
3. With the training scheduled or already held, start to look at the mechanics of how you will handle each exercise. If you want to pull together several teams and have a larger scale exercise, coordination will be a key issue. Put together a map or diagram of what you want to accomplish on exercise day. Find a marker board and start drawing your map or diagram of the activities you want to include. Remember, if you can't diagram it, you may not understand it yourself.

Write down the name of each module you're exercising, scattering them around the board, and draw a circle or oval around each one. Now, start writing down, at random, the items you will have to consider as each part is executed. Let's see how this might work, as follows:

Looking over your plans for exercise day, you may say to yourself, "There should be an observer here and facilitator there…. We'll need information packages for each team leader…. Get XYZ Organization involved there," and so on. Just start writing down random thoughts on the board (or on your electronic device) until you have "exercise day" mapped out. Draw lines to connect items with other items to show a relationship or an important consideration. Take a look at Figure 7.1 to see what I mean. Your map will no doubt be more complex, as there will be a lot that you have to consider. Mapping out your exercise will get your mental juices flowing. Get your group members to make suggestions while you rough out your map on the board.

4. Once you have your major exercise segments and concerns mapped out, you should be ready to organize your exercise on paper or on your PC. Transcribe what you have on the board, organizing key exercise segments, support systems, and concerns. Meet with your planning group to get the modules finished. Lay out proposed exercise dates based on expected training completion dates.
5. On exercise day, you should have everything ready. Ask for help where you need it and be ready to answer questions. You can't be everywhere. Ask for help from your planning group in observing the exercise and answering questions posed by participants. Teams who will be walking through their exercise modules should have an observer on hand to take notes on problems encountered. Ask the observers to route the observer notes back to you and your planning group for analysis and to prepare for the next exercise. Revisions may have to be written into your plan to reflect exercise results.
6. Invite all participants in for a debriefing meeting following exercises. Get everything down on paper—likes and dislikes—and encourage everyone to contribute their ideas for future exercises.
7. A follow-up after-action report will outline experiences of participants and some planned improvements or changes for the next exercise. Detail the action items—areas you want to improve—and assign people to resolve them prior to future exercises. Emphasize that, unless action items are addressed, problems and needs will surface again, possibly during a real emergency!

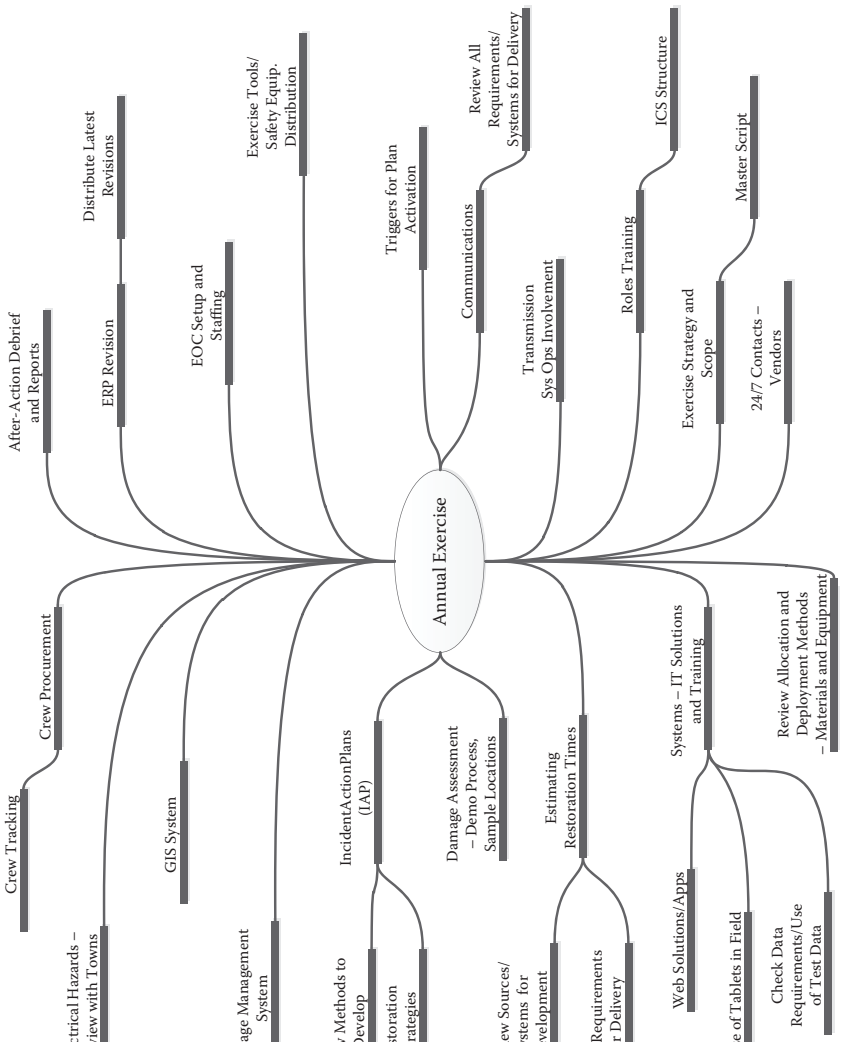

Figure 7.1 Sample map for exercise design—customize, based on scope of exercise.

EPD Model, Element 14: Revise the Plan

Keeping Your Plan Current

Emergency plans should reflect the needs of the organization as it is today. Regular revisions provide the means to keep the plan current. Revision schedules should be developed to cover incidental changes, such as names and phone numbers, and less frequent changes, such as major revisions to contents and procedures. With your planning group's input, decide how frequently the plan will be reviewed and revised. Management may want more or less frequent revisions, but in either case, discuss your intentions with them.

When the plan is revised, various members of management may want to approve any changes made. If a lot of people want to review changes made to the plan, be wary that this may add weeks or longer to the revision process. A better way to handle it might be to hold brief meetings with management to discuss any proposed changes and have them voice their concerns during the meeting. After everyone has voiced their concerns, implement the desired changes and process the revision. Get the necessary approvals as soon as possible so you can issue the revisions.

As your expertise as a planning professional or planning group grows, you will begin to sense what measures are needed to improve your plan. Your skills may very well increase to the point that you'll need very little assistance in writing new procedures, or adding a section, to the plan. Never lose the global view of the entire process. Regardless of how good you think your emergency plan is, you haven't been as successful as you would like to be until the participants know what's in the plan and what to do when an emergency or disaster strikes. This view will keep your feet on the ground and your company better prepared.

The following checklist may be used to update and revise emergency plans:

- Record revision date on pages revised and in the revision records table.
- Prepare an introductory letter or memo that details what has been revised in the new revision. This should be included in the revision mailing.
- New sections or groups of procedures should be added to table of contents and index. New procedures should be reviewed with users and drilled as part of the annual exercise program.
- If pages are stored in a notebook by users, ensure that three-hole punched pages are used or plain pages are punched prior to distribution.
- Internet-based versions of the plan and revisions may need to be converted to portable document format (e.g., Adobe PDF™) or HTML, or similar format, for viewing on the Internet.

- Allow adequate time for approvals, but if a review appears to be moving too slowly through the approval process, alert reviewers that a timely approval is needed in order to get the revision out by a predetermined date.
- Ensure that revisions are approved prior to distribution and that any significant changes are vetted to help ensure revisions are accurate and feasible.
- If an outside printer (i.e., office supply store) is used, allow sufficient time for the revisions to be printed and packaged for distribution. Make sure a reputable printer is used and there is security that your plan will not be viewed by others or that copies will not fall into the wrong hands.
- In some cases it may be necessary to record completed revisions in a revision log should there be a need to determine what was revised and when the revision was installed. Review document control and compliance requirements for the type of plan that is being revised.
- If a revision affects the procedures in another plan in the organization, it will be necessary to check the coordination requirements so that plans will not conflict if both are required to be followed during certain types of emergencies.
- Make sure that there are adequate footnotes and cross-references inserted for a newly added guideline or procedure that requires them.
- It may be necessary to visit groups of plan users in person to explain more about a new set of procedures. This will also help people to remember the new revisions and to ask questions.
- Ensure that all procedures are technically accurate by including an expert on the topic in the review and/or approval process.
- Ensure that electronic copies, paper copies, and web-based renditions of a revised plan are all updated to show the same revisions.
- Ensure that management is aware of new procedures, as well as public relations or customer relations, so that they are able to answer any questions from outside organizations that may be on your distribution list, such as government agencies.

EPD Model, Element 15: Publish Revisions; Maintain Improvement in the Emergency Program

Packaging and Issuing Revisions

Once you have all of the necessary approvals, package the revisions for distribution to all plan holders. Before you simply stuff them in the envelope, or send them out electronically, review the following tips to make the process work even better.

1. When you write the cover letter or introduction for your revisions (recommended), assume that whoever opens the envelope knows nothing about the plan or where it's kept. Remember, the recipient of your revisions may have many references—the plan may be difficult to find. If your emergency plan revisions appear somewhere on the utility's website, or server, provide a full description of where they are located to save the users some time.
2. If users will be looking at a paper version, list revisions that will replace specific pages in the plan. Or, simply tell them that the revision covers Section 15, or Exhibit 3, etc. Whatever the case, make it clear which pages the recipient is to replace.
3. What about notebook dividers, or e-sections, if the plan is online? If your paper plan has them—most plans do—then you'll want the recipient to keep them in the notebook, and not accidentally discard them. This is easily done when people have to replace a lot of pages. If you really want to be sure about what has been placed in the paper versions of the plan, schedule a routine visit to plan holders to check the contents of their plan. In the case of an electronic version, try to develop a system that allows you to check on which individuals have visited the plan and revisions online, perhaps through an online audit system that is already built in or can be built at your request.
4. After you send out a revision to the plan, be ready to take a few phone calls. People who aren't familiar with the plan may have a few questions relating to what you want them to review. You may occasionally find that people can't locate a copy of the plan, and they may want you to direct them accordingly. Always keep a demo copy of the plan with you for on-the-spot questions or concerns.

Once you have mailed out several revisions, you'll start to develop your own system to make the task easier. Make sure you have thoroughly checked the package of revisions before you start sending them out. It's no fun to discover an error in the package after you've sent out several dozen of them.

Before we leave this section, I think it's important to mention one more tip about plan distribution. With many companies going through radical changes in organizational structure, it's a good idea for the plan administrator to perform an audit every couple of years or so. The administrator can visit plan holders to check the condition of plans, but in many cases this may not be practical.

A special audit form can be sent out that asks plan holders to provide the necessary information. Consider what you'll want on the form. You'll want to find out whether a plan still exists in the area where it was originally assigned; who is currently responsible for updating the plan; how many copies have been located; what the condition of the plan is (perhaps it's falling

apart?); the most recent revision date; and whether it's still appropriate for the plan holder to keep a copy of the plan (e.g., in their current job, is he or she still responsible for knowing what's in the plan?). Provide instructions to the recipients on what they should do with the plan. If they are to keep it, then they should make certain that it's maintained. If they are to return it, or forward it to someone else, then tell them where to send it. See the sample audit form in the Exhibits section (Section IV) of this book.

This concludes our study of the Emergency Plan Development Model. I hope the tips and techniques presented will make your job as administrator, planner, or planning group member easier and more productive. Remember, the model may be used for a variety of planning projects in your company. The elements may only differ from one plan to another by the level of detail required in each plan. You may place more emphasis and effort on some elements than others, but if you try and gloss over an element without giving it the consideration it deserves, you may be inviting problems.

Maintain Quality Control in the Years Ahead

It's never too late to make a good plan better the next time you revise your plan. Take some time to go through the plan again when you are adding, deleting, or changing content in the plan. I guarantee that you will find content that should be reworded, reorganized, or otherwise made clearer to your plan users.

The quality measures you have put in place for the plan should be maintained, and even improved, where possible. This doesn't mean constantly stressing over the details; it means devoting the time it takes to continue researching emergency planning and looking for ways you can improve the tool you have developed. The emergency plan is a tool that can serve your utility well in the years ahead and maybe even help make the lives of people you serve a little better.

The Corporate Emergency Preparedness Program

Prepared Organization Models

Emergency programs work through the knowledge, perception, and response of people. We will be looking at several of the behavioral aspects of emergency preparedness as we open this section through the introduction of two models. We will also examine many of the critical administrative issues, such as designing the right kind of triggers to get people ready to respond. And we'll conclude the section with tips on promoting your preparedness program.

We'll begin with a discussion of a model that illustrates the concept of perception and opportunity in organizations. Figure 7.2 will help explain the

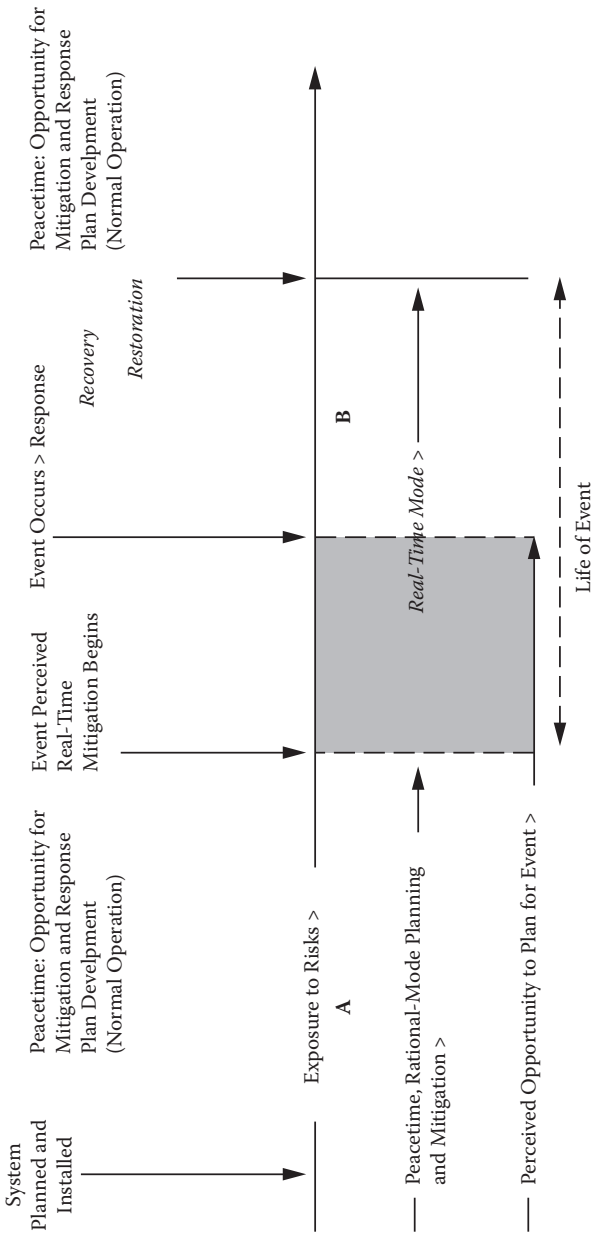

Figure 7.2 Emergency Planning Opportunity Model.

concept of perception and opportunity to plan for system emergencies in organizations. We will call this the Opportunity Model. Let's work through the model from left to right on a conjectural time line.

With the installation of any system (electric, gas, telecommunications, water, etc.)—large or small, complex or simple—organizations move through an opportunity window for planning. We can see *System Planned and Installed* as an event in time in the time interval labeled A. Interval A can be thought of as an interval on a longer timeline, which we can think of as that period in which the system is exposed to risk. In your organization, think about something that's been installed that could be put out of action by some contingent event—perhaps a telecommunications system, a new generator, distribution network, control center, or some other system that has been installed. Now, think of the operation of that system or device over time, say twenty years, with a crisis that threatens its existence or operation sometime during that period. When should you be preparing for that event?

We can see from the simple model that interval A represents a time when *peacetime, rational-mode planning and mitigation* can occur. The model also shows us that the organization—its management and staff—perceives that it has all of time interval A, leading up to the event, to plan for the event. You've probably talked with people who have little interest in preparing for an event until it is perceived as a threat. We can see that this perception is represented by the bottom line in the model: *perceived opportunity to plan for event*.

Few people would argue that once the damaging event is perceived, the organization would not take steps to prepare for it. Once the event is perceived, the organization jumps into a real-time preparedness mode. (Note the shaded interval in the model.) As many of us have seen, this interval is often wrought with problems and irrational thinking. The *Life of the Event* interval (interval B) is where the organization learns the lessons of emergency preparedness and where it has fallen short in planning for the event.

Following restoration, our model tells us that the window for peacetime mitigation and preparedness planning opens again—until the next emergency. This is often when a company comes to the realization that it was ill prepared for the event and takes positive action to correct deficiencies. Some thought provoking questions come to mind here: In your organization, would those items that prevented you from being prepared be resolved following an emergency? Might some of those items remain unresolved, regardless of the problems that they caused? If so, how can your organization stay on track to resolve all documented action items?

The Prepared Organization Response Model

Figure 7.3 will help us understand the element of response and its association with what's written in our emergency plan. When a damaging event is

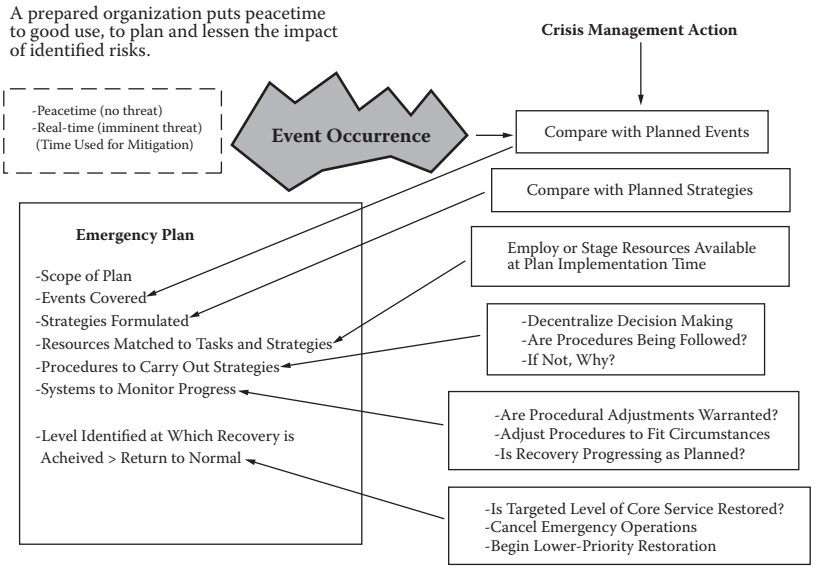

Figure 7.3 Prepared Organization Response Model.

perceived as imminent, management can compare it with those events covered in their emergency plan. This is shown as the first event in the chain of events, which is termed *Crisis Management Action* in our model. Once the event is compared with the plan, management will make a crucial decision in the chain of events concerning the emergency. Will management use the plan, as written, or will it abandon the plan? Perhaps the decision will fall somewhere in between those two extremes, and management will use some of the procedures in the plan. In any case, the question will be asked during the postemergency analysis: "Did you use and follow your emergency plan?"

Using the plan means embracing the strategies that were developed during peacetime. Our model refers to this step as *Compare with Planned Strategies*. This means that we often formulate strategies as we perceive a threat; we begin to look for a way out of the crisis. It's a perfectly natural response. The recommendation that the model offers is for us to embrace strategies that we've formulated during peacetime, and not be eager to follow another path to recovery unless conditions overwhelmingly warrant a new approach. There has to be sufficient support in the organization for this notion to endure.

We matched resources to tasks when we developed our plan. The next step is to employ or stage those resources to effectively deal with the situation. How many resources are available? What will we do if there aren't enough? These questions tell us that we will need to address those concerns in our plan. The prepared organization will understand and account for its weaknesses by doing a better job of planning and establishing alliances during peacetime.

The next block in our model reemphasizes that we use the procedures that we've placed in our plan. Management should make it clear that safety procedures, for example, are not abandoned in the heat of battle. And, as our next block tells us, we should also be willing to adjust specific procedures when they are not appropriate for the conditions that are being experienced.

This block also poses the question, "Is recovery progressing as planned?" Adjustments to procedures may produce a dramatic change in recovery time. Opportunities that reduce recovery time without sacrificing safety and system security should be evaluated and, if appropriate, pursued.

The plan should outline a condition when operations can return to normal. This is covered in the last block of our model. The prepared organization will have developed its plans with care and will have followed them with equal care.

These two models set the stage for understanding and moving forward with an emergency program. However, in order to raise the organization to a desired level of preparedness, it will be necessary to get people to participate in an ongoing program. Where and how will it all begin?

Approaching Organization-Wide Plan Development

Specifically, what are we preparing for? A disaster does not have to be an event on the scale of Bhopal, Chernobyl, or Hurricane Andrew to cause damage and loss of life and livelihood.

> Major industrial accidents, computer breakdowns, loss of a critical sole-source supplier, product recalls, terrorism, and the like are potentially ruinous to a company. What they all have in common, however, is that preparedness planning is highly cost effective. (Lykes 1990, 277)

So how are preparedness programs established in organizations? One obvious way is to call some people together, put some ideas up on the board, and discuss them. Hold your place now and turn to the Exhibits section (Section IV) in this manual. Review the sample meeting overheads to get some ideas for a presentation to your group. Review the sample table of contents (for an emergency plan). Finally, take a look at the case study. The case should help your group move through the thinking process of promoting and implementing emergency planning.

Those organizations who already have a plan in place will want to review the questionnaire, "Some Prudent Questions for Organizations," also included in the Exhibits section (Section IV). It will help to stimulate a discussion on plans that may already be in place in your company.

Once you get your group on track, move on to the following questions:

What impact would (pick an example problem) have on our operation?
What would we do if the event happened?
What would the costs look like?
How would (the event) affect revenues, customer opinion, system security, reliability, and other systems or services? (You may have to give them examples.)

Another good exercise is performing the *impact analysis*. This exercise can be simpler than you might think, and it can help you discover characteristics of your organization that should be changed. When you have the events prioritized, get them on paper and ask your analysts to review them. Have them detail costs for given examples and roll up each into a case for further examination. For example, what would happen to this facility in a hurricane? How about if this storage tank exploded? What if this valve failed? What would each of these contingencies cost? What essential services would be lost during recovery? Once the analysts have prepared a report for your group, call a meeting to discuss the report.

Ask the analysts to provide a presentation on how they went about examining each event and developing the potential loss numbers. The risk management department may be invited to elaborate on insurance and liability issues for contingent events. Once the presentation is over, the project leader will determine what should be done about developing plans to cover reasonable risks and events that could produce the most significant losses.

Are mitigation plans the answer to some of your problems? What should mitigation plans address? Let's look at several areas, as follows:

Upgrade or install fire suppression
Install redundant systems
Upgrade or harden installations
Change construction standards
Allocate funds
Install monitoring devices
Upgrade insurance policies
Increase security
Allocate additional storage and emergency supplies

Once the plans are written, you can concentrate on preparedness enhancement issues, such as training and exercising.

Budgeting for Preparedness

One method of stimulating the implementation of a budget for emergency preparedness is to do some simple worst-case calculations. Assistance in

determining event frequency can be obtained from insurance carriers and government agencies. A simple Annual Loss Exposure (ALE) calculation can help us put some numbers together for review (Munro 1989).

$$\text{ALE} = \text{Impact} \times \text{Frequency}$$

Example: Complete loss of communications center in X Corporation
Expected loss frequency = once every 100 years
Loss estimate: $50,000,000

We can express our frequency of once every 100 years as the ratio 1/100. So our formula yields

$$\text{ALE} = \$50{,}000{,}000 \times 1/100$$

$$\text{ALE} = \$50{,}000{,}000/100 = \$500{,}000$$

This tells us that the X Corporation has an annual loss exposure of $500,000 due to a totally destructive fire at the center in question. It would follow, then, that X Corporation will compare this estimate of annual loss exposure to other similar calculations affecting risk to other critical systems and services in the company. Because this is an example of a substantial loss, the company would logically elect to install systems (remember *peacetime planning*?) that will help reduce this risk as much as possible.

> Any competent risk analysis will include a calculation of the ALE. In fact, it is a cornerstone of the risk analysis method recommended by the Bureau of Standards (NBS) in FIPS Publication 65. (Munro 1989, 45–46)

How might we go about calculating the total estimated loss of a facility? Why is it often much higher than we imagine? Let's look at some of the contributing factors.

- What is the value of the facility? Consider a total loss.
- What revenue does the facility assist in generating? For example, if you lost the use of the facility for a month, what losses might be experienced?
- How many people would be displaced as a result of the loss? What alternative facility might they need to occupy while the center is being rebuilt?
- What backup equipment will be required at the facility?
- How many customers or employee clients are served by the facility?
- Will the loss of the facility seriously degrade customer service? Might this reflect negatively on future transactions?
- Is the facility in a location that could affect nearby businesses or industries, should it be destroyed by fire or explosion?

Once the dollar loss value has been calculated, you can look at years between events to determine the divisor for our formula. In coming up with this value, you may discover that your exposure is much greater than you had imagined, prompting both mitigation measures and recovery planning. Call in an expert to assist you with this estimate if you cannot do it in-house.

Affiliation with Agencies during Disaster Recovery

It's important for utilities to understand their role in recovery with respect to government agencies. The Department of Energy, for example, published an excellent report in 1991 covering disaster recovery—"Major Natural Disaster After Action Assessment"—to shed some light on this coordination following Hurricanes Hugo and Gilbert and the Loma Prieta earthquake. The reader is urged to obtain a copy of the actual report, but here is an excerpt:

> The DOE should work with the energy industry (particularly electric and gas utilities), the telecommunications industry, appropriate Federal departments and agencies in the States to improve and document service restoration priority systems meeting essential civilian and national defense needs. (Trumbower 1991, 9)

Not all emergencies constitute wide-scale coordination, but some do. It is for us as utility managers, professionals, and staff to seek out coordination and liaison opportunities wherever possible, because we know that our resources are indeed finite, and there is much to gain by pooling resources and prearranging their use.

Who are the *partners* in your emergency plan? Let's look at a few examples (McGee 1992).

Regulators: Monitor utility emergency performance. Recommend changes to enhance response.

News media: Disseminates information to the public.

Neighboring utilities: Can provide support: personnel, equipment, materials.

Edison Electric Institute: Maintains mutual assistance plans for electric utilities.

North American Electric Reliability Council: Maintains a comprehensive database of equipment.

Federal, state, and local governments: Provide coordination with larger recovery efforts.

Military units: Can provide field support, such as lodging and food for emergency crews, portable generators, and road clearing.

Emergency response teams: Local fire, police, rescue, and paramedic teams help with safety, transportation, crowd problems, and can deal with injuries to crews and public.

Aid organizations: Salvation Army and Red Cross, for example, can help with housing, feeding, and care of disaster victims.

Others: Each utility can search out organizations that can help with specified emergencies and work with those organizations in developing emergency plans.

Backup Power Systems

Uninterruptible Power Supplies

Uninterruptible power supplies (UPS) have become commonplace in modern office buildings and other facilities, and they are an important part of emergency preparedness. They allow low-power-demand devices to continue operating during an outage of conventional power supplies. Properly configured, they allow a significant number of critical devices to operate for hours on backup batteries. Batteries are the backbone of UPS systems, and if the normal source of power is typical, they are called upon to carry the load only several times a year.

> The frequency of three-phase outages lasting longer than 100 milliseconds is quite low—perhaps zero to six times per year on average. In order to achieve a 99% level of performance, battery failure should occur no more than once every 16.7 years. Unfortunately, actual battery failures run much more frequently—typically once every three years.… Cells that appear to be fully charged under float conditions can actually be uncharged or undercharged. Currently, the only way to reliably determine cell capacity is to actually discharge the battery and plot the results.… It is common for 50% or more of an entire battery string, particularly the low-maintenance types, to be replaced in less than five years.… The industry needs simple diagnostic tools to take the black magic out of assessing whether a battery will actually perform in an emergency. (Brill 1991, 54)

UPS can be found everywhere, but the sad truth is, most of us don't know what they can do and how long the batteries will last. Manufacturers' guarantees are conservative, so read them closely to know what you are buying. Regular maintenance and testing will give you some satisfaction (Brill 1991, 52).

Backup generators are another source of emergency power. They should be sized and maintained properly, as is the case for UPS systems. A weekly test under load is a common method of testing emergency backup generators. Users can have the units on a timer that executes a start and runs at the same time each week. The untested backup generator is not a reliable source of power. Test the unit often and record fuel levels, making sure that fuel is kept topped off and that oil and coolant systems are checked, depending on the type of backup unit you have. It's best to schedule a real test for the unit, which includes running the unit at full load, carrying the devices that it is

supposed to carry. It's far better to find out what you have on the generator and whether the unit will carry the load.

Of course, outlets on the UPS and generator should be clearly marked to prohibit abuse of either system. Color coding the outlets is a standard practice, but won't be covered in detail here. Install an ammeter and audible alarm that is preset to warn people when they are loading the unit up beyond a safe level, as this can occur quickly in the heat of recovery. Also make certain that the unit is checked frequently during its operation. A faulty lubrication system, for example, can bring trouble. Make sure that all of the employees at the facility know what the backup systems can and cannot do.

A backup generator can also become a dangerous device when it back feeds into the primary electric supply system. Customers of electric utilities are being told by many utilities to use the units with extreme care. If a portable generator is allowed to back feed into the secondary service and up into the primary wires through a distribution transformer, an unsuspecting utility line crew can be placed in danger. Make sure that there is no possible way for a backup generator to feed into the utility supply system, and make customers equally aware.

While it's never a good idea to scare the public with information, it's important that they know the real scoop when it comes to emergency generator operation. Take a look around in a home supply center that sells emergency generators and see if they have information posted on the proper use of generators near the displays. Utilities should offer information that can be posted near the generators to forewarn customers on improper use. It could someday save line workers from injury.

Poststorm Damage Assessment

Where to Begin

There's no doubt about it. Damage assessment is one of the most—if not *the* most—critical part of your recovery plan, particularly in the early hours of recovery. Everything you do from the first hour of recovery pivots on your assessment of damage. Picture yourself in a room you may call your command center. It's where you, as a decision maker, will be immediately following a corporate-wide disaster. If the emergency is more localized, you may still be asked to report there in order to better interface with your colleagues. Your first question is likely to be, "What is the extent of the damage, and what are we going to do about it?"

The first part of the question is critical to answering the second part. Almost everything you do centers on what has been damaged on the power system. Alarms and SCADA (supervisory control and data acquisition) information may be valuable sources of information for dispatching repair

personnel. But your final game plan will likely be developed after people have visited the site or sites where damage has occurred. So, your best source of information is people, if it's possible to dispatch them. For local area emergencies, when danger is gone, you will be able to assess damage with the right procedures in place. But in a widespread disaster, such as an earthquake or major storm, you may have to wait several hours before it is safe to begin damage assessment. Even then, your people may not be able to move into areas as quickly as you would like or had planned for.

Make sure you have discussed debris removal with local authorities. Understand how they plan to perform debris removal and determine whether it will likely be a potential problem for damage assessment crews and all crews associated with the restoration. The utility should have a hazard clearing policy in place that takes into consideration the fact that communications cables, trees, transformers, and other apparatus will likely be across the road, blocking access to critical parts of the backbone circuits and laterals following major storms.

Prior to dispatching damage-assessment teams, you'll need to equip and brief them on what is expected. Any training for damage assessment should be done as part of your regular training program. You will not have the time to train them when disaster strikes, so get it done soon, during peacetime, while you can. Forms to record damage should be easy to use. Maps and diagrams should be easy to read and not out of date. Surveyors can be easily confused by maps that do not reflect what they see while out on a feeder.

When Hurricane Andrew hit Florida, the high winds took street signs with it. So if you are writing or revising plans to deal with major storms, your plans should take into consideration such problems as people getting lost. Whatever is left standing will have to serve as a point of reference for survey crews. Frequent check-in times will help you keep track of people surveying, and survey coordinators should be ready to answer procedural questions when they call in.

Handing the damage survey crew a stack of survey forms along with feeder maps is a standard, albeit manual, method of recording damage information on the distribution network. Many utilities have automated the recording of damage on the system, but during very damaging storms, and where outage management systems are difficult to use, manual methods still serve as a backup.

When the damage surveyor completes the assessment, he or she will get that information back to the survey coordinator for further sorting and analysis. Work packages are made in a timely manner after receiving survey results. The work packages will be used by crews to begin restoration of backbone feeders, laterals (or taps), and all final work on the feeder.

Overseeing Damage Survey Teams

Survey teams will need to be dispatched and coordinated. Their personal needs will also have to be addressed while they are out on the survey. It makes sense for damage survey personnel to have a coordinator when there are many crews assessing damage in a given geographic area and when they are dispersed out of sight of other crews. The field coordinator can see to the needs of several crews and coordinate the delivery of the assessment forms and return of equipment when the survey is over. The coordinator can also help ensure that safety precautions are being taken and can arrange for relief personnel and emergency medical care should a surveyor be injured on the job.

When damage surveying is done while the surveyor is riding in a vehicle, it's wise to assign an experienced driver to each survey vehicle. The surveyor shouldn't be driving, filling out forms, watching for traffic, reading a map, and performing other duties simultaneously. Assigning a driver to do all the driving makes sense from the standpoint of safety. Also, drivers who are familiar with a given area will likely be a real asset to the surveyor in getting to the damage locations.

A central coordinator can oversee the dispatching of a number of survey crews and arrange for more relief survey personnel from various sources. He or she can account for the number of crews dispatched to a given area and provide a synopsis to management of the crews and wire guards dispatched anytime during the assessment period.

Sample Procedures for Requesting and Dispatching Damage Survey Personnel

Let's back up a bit and take a look at the planning that might be involved for the damage survey process from a procedural standpoint. Here are a few examples of some of the procedural language that might be included in your plan.

1. If sufficient warning is received prior to the storm, all personnel who may become involved in this procedure should discuss their availability, vehicle status, and the need for materials, safety equipment, maps, and other required gear with the survey coordinator or other assigned person.
2. Any gear that may be required should be purchased or made available from stock and stored at dispatch locations for damage survey teams. These locations may be anywhere it is convenient to dispatch survey teams.
3. Following the storm or system emergency, after it has been determined that survey teams may be safely dispatched, a survey coordinator or leader makes arrangements to dispatch survey teams.

4. Teams are equipped with sufficient forms to record damage and feeder maps that will be used to help navigate the backbone feeder first, and then the taps, writing up damage information as instructed. The types of damaged equipment that will be reported is prioritized to facilitate a timely completion of the survey.
5. The survey crews are responsible for the survey areas assigned to them and may be redispatched at any time there is a need to cover an alternative area.
6. When a survey team is no longer needed, or is relieved in the field, the team shall return to the staging location to check out or assume other duties.
7. Team personnel will then notify their immediate supervisor that they have been released from survey duty.

We know that major storms can affect both the transmission and distribution systems in the case of an electric utility. An example of damage survey guidelines for each part of a utility's power system are presented in the following subsections.

Types of Damage Surveys

General Area Assessment (GAA) The purpose of this survey is to provide the systems operations center (SOC) with information as to the general condition of the service area. This survey provides management with a quick overview of the physical condition of the system. From this information, the SOC can determine the following:

Which staging areas might be activated
Which satellite work centers might be activated
The approximate manpower requirements
The need for additional damage survey crews
Other initial response needs

It will also allow the incident commander (IC), or delegate, to discuss needs with neighboring utilities, emergency management, and other people involved in recovery.

GAA Survey Crew Needs GAA crews may consist of a qualified driver and line supervisor or foreman or other person qualified to assess line damage and roughly estimate number of man-hours to repair. It is also beneficial to have employees who are coming to work to assess damage and road conditions they can see on their way to work.

Survey proceedings shall be activated as soon as it is apparent that a distributor has widespread and extensive damage. Survey routes may be set up as follows:

- Preselected so that coverage extends in both north-south and east-west directions until routes overlap adjacent distributors
- Established to cover a representative sample of each of the various types of construction within the area. (For example: if the survey area contains urban, suburban, and rural sections, the survey route should go through a portion of each of these sections.)
- Situated so as to require a maximum of two hours to cover under poor driving conditions

Each route should include 15% to 20% of the total circuit miles in the survey area. This number may vary by area or division.

- Marked on suitable maps (An adequate supply is maintained in each operating office. Maps should show the percentage of total circuit miles in the survey area covered by the route.)
- Reviewed at least every six months and revised if necessary

Manager will establish report-in procedures to accumulate survey information and tabulate the level of work required for restoration.

This survey should be completed within eight hours of the passing of the storm event, depending on driving conditions and postevent weather. It also assumes that the survey is completed during daylight hours.

Transmission Line and Substation Assessment (TL&SA) The purpose of this assessment is to determine the condition of transmission lines, substations, and feeder breakers at substations as early as possible. Some information may be obtained from SCADA systems in dispatching centers, if available. However, SCADA information will only reveal monitored line outages and where the status of breakers on SCADA has not been affected. This assumes that substation buildings are not damaged to the point that might render SCADA equipment unusable. This requires that the team leader dispatch personnel to some substations as quickly as possible to observe and report conditions.

- TL&SA personnel shall consist of qualified switching personnel. They should be supplied with radio equipped vehicles.
- Personnel should not be sent to attended stations that have been previously manned by other personnel (unless more information is required from the station).
- Dispatching of TL&SA personnel shall be by the IC or a delegate in the following order of priority:
    - Substations with known transmission or distribution circuits out of service
    - Substations where it is suspected that feeders are out of service
    - Substations in the affected area where there have been no indications of line or feeder outages

TL&SA Procedures Upon arrival at the substation, survey personnel will inspect the station and observe, record, and report the following information:

- Oil or gas switches open and locked out
- Air-break switches that have opened
- Distribution feeder breakers or reclosers open and locked out
- Other switches in abnormal position; fuses blown
- Condition of devices (burnt or other damage)
- Station service supply status
- Loading (ammeter reading) on all transmission lines and power transformers
- Targets/indicators on all relays that have operated
- Substation damage
- Loading (ammeter reading) on all distribution feeders

Report the above information by phone to the dispatch center.

Guidelines for Action If phone service is not available, the above reports shall be made by radio or other means available. Personnel should not perform unsupervised switching in substations during restoration from a major storm, or under blackout conditions, unless the IC is aware of the situation *and* the system operator has granted approval for the switching being performed. Adherence to regulations helps to ensure control and safe restoration of the distribution network.

TL&SA Survey Evaluation From the reports of this survey, the IC will learn what condition the substations are in. He or she can then dispatch transmission line damage survey crews and specific main-feeder-appraisal crews accordingly.

As soon as sufficient information is received, the IC shall report the results of the survey to the EOC and SOC.

Transmission Line Damage Survey (TLDS) The purpose of this survey is to locate and report specific damage on faulted transmission lines so that crews may be effectively dispatched to make repairs and restore service.

TLDS Crew Needs TLDS crews may be composed of line crews or portions of line crews and shall be supplied with radio-equipped vehicles. They are dispatched as directed by the IC or delegate.

Assuming good weather, aerial patrols can be the fastest and most effective way to conduct transmission line surveys. Maximum use should be made of air patrols during daylight hours and suitable flying weather.

Dispatching of TLDS Crews It is essential that this survey be made as early as possible. However, the TLDS crews should not be dispatched until sufficient

information is received from TL&SA survey reports and other sources to establish a restoration objective.

The patrolling of transmission lines by TLDS crews may be limited to:

- Faulted main tie lines between major transmission substations that have caused loss of service to a large area
- Faulted transmission lines that have caused loss of service to one or more distribution substations

Because of conditions elsewhere on the system, the IC may request other lines to be patrolled.

Reports of Damage

- The TLDS shall be reported to the emergency operations center (EOC) by radio for each case of damage as it is discovered.
- The report shall include a description of the damage, location, and an estimate of crew-hours required to make repairs.
- TLDS crews shall not attempt to make any repairs unless specifically instructed to do.
- After having patrolled sufficient transmission lines to establish a restoration procedure for minimal transmission restoration, TLDS crews shall be released from surveying duty.
- Any additional surveying required may be done by aerial patrol or other method requested.

Main-Feeder Assessment (MFA) The purpose of the MFA survey is to determine and report specific damage on three-phase, backbone feeder sections, so that crews can be sent to make repairs and restore service.

Survey Crews and Dispatch Procedures

- Survey crews shall consist of a qualified driver and a person trained in damage reporting, called a *damage spotter*.
- Drivers may be called to drive while spotters record damage.
- Damage survey crews are coordinated by personnel designated for this, based on availability.
- One crew leader shall work with several crews (up to five crews) to see to their needs in the field and to oversee the completion of the surveys in a timely manner.
- A damage survey and assessment leader may be assigned to oversee dispatching of all survey crews from a central location, such as an area work center, administrative center, or operations office.
- Survey routes shall follow the actual route of the three-phase section of the feeder as shown on the feeder maps. Include designated points where survey parties are to stop and call in the patrol report.

This survey may include some brief surveys of lateral portions of feeders, as deemed necessary by the coordinator or IC. Dispatching of MFA survey crews shall be at the discretion of the IC. This may not be done until results of the TL&SA survey have been evaluated as well as customer reports of outages.

Priority for dispatching MFA crews shall be as follows:

Feeders known to be locked out, and where dangerous conditions have been reported, such as wire-down emergencies
Feeders not locked out, but known to have some damage
Feeders not locked out, but where damage is suspected because of customers' reports
Feeders in the affected area not locked out and on which there have been no reports or indications of damage

MFA Survey procedures are as follows:

- After being dispatched, the survey crew shall proceed along the survey route, observing and recording damage to conductors, poles, and equipment.
- These conditions shall be recorded by placing an *X* and an identifying number on the feeder (circuit) map at the location of the damage. The damage shall then be described after the identifying number on the reverse side of the feeder map or on an attached log or form.
- At specified points on the survey map, the survey crew shall report to the crew leader and to the operations survey coordinator or work scheduler the conditions found up to that point. Telephone facilities, if operating, may be used for reporting. Report locations should be designated where telephone facilities are available. Radios, if provided, may be used for reporting if phones are not operating and in cases of extreme urgency.
- The IC or restoration team leader may set up alternative reporting procedures as deemed necessary.
- Where possible, crews shall observe, record, and report the condition of sectionalizing devices such as fuses, reclosers, automatic switches, lightning arresters, capacitors, and regulators.

Concluding Damage Survey (CDS) The purpose of this survey is to locate and report all damage to lines and equipment that were not patrolled through the main-feeder assessment (MFA). This includes damage to branch feeders, single-phase laterals, secondaries, service wires, streetlight circuits, etc.

Crew Makeup and Dispatch Procedures CDS survey crews shall consist of a qualified driver and a person trained to spot damage (spotter). Dispatching of CDS survey crews shall take place before, or immediately after, the associated three-phase main (backbone) feeder has been restored to service.

CDS survey procedures are as follows:

- The IC, or a delegate (work planner), is responsible for establishing CDS survey routes.
- Survey routes should be plotted on suitable maps. The maps should be maintained in sufficient quantity at operations centers.
- Survey maps should be clear, concise, and accurate so that they may be easily understood by outside survey crews.
- CDS parties shall follow the feeder maps to patrol all branches of the main feeders.
- Recording and reporting of damage shall be the same as described in MFA procedures.

General Operation of MFA and CDS Both the main-feeder appraisal and concluding damage survey may be completed using staff personnel. It is recognized that operating personnel will be actively involved in restoration activities and may be unable to patrol main feeders and laterals following a major destructive storm. It is also known that much of the routine work done by staff personnel may be temporarily stopped until our electric system is well on its way to being restored. As restoration progresses, new work must be prioritized, planned, and made immediately available to the crews for disposition.

Tabulating Accurate Results

The result of any damage assessment has to be funneled back into headquarters for the purpose of appropriating resources and determining a restoration plan or an incident action plan. Whatever method you are using in the field or on-site to gather this information must therefore be efficient, easy to work with, easy to roll up totals, and easy to transmit to headquarters or into a tracking system. Any automated systems used for estimating and reporting restoration times to the media and officials should work accurately and help establish those times throughout the restoration effort. Keeping the assessment and reporting process simple and efficient will help keep customers, regulators, and government officials satisfied.

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Emergency Communications

8

Discussion Points

- Basics of emergency communications and primary goals
- Effective use of communication tools
- Preplanning messages
- Communications across the utility
- Interorganizational communications
- Consumer communications and the media
- Communicating with officials and emergency management
- Wide-area communications requirements

Emergency Communications: How Will You Handle Them?

Communications are essential to recovery. It's important for all employees to know how communications will work under emergency conditions. Communications from the field to headquarters, and vice versa, are certainly important, but so is communications with the public, outside agencies, shareholders, regulators, and of course with your own employees.

Utilities should keep their employees apprised of recovery progress for several reasons. One important reason is coordination; another is morale. Employees want and need to know how they are progressing as a team throughout the recovery effort. They will get a certain amount of information through the grapevine. They will get some from their associates, some from their reporting senior, and they may even get information on the radio or TV, if it is available where they're working. However, in most cases, the only place they can get reliable information is from the individuals who have been assigned the duty to disseminate recovery-related information. That team will have a plan for getting accurate information and seeing to it that it is disseminated in a timely manner.

Employees are sensitive to the amount of information they receive from reliable sources. They feel that if they must be on the job, they should not be

penalized for being there, and management can do a lot to help them cope with a difficult situation. There are a number of ways organizations communicate with their employees on a day-to-day basis, and many of these same methods are appropriate for emergency communications as well, except they are updated and sent out more frequently, perhaps several times daily. These methods include bulletins: paper, electronic, video, or other effective means. The type of emergency will also dictate the type and frequency of employee bulletins.

Media Communications

A number of excellent books have been written about how companies should work with the media during emergencies. Most of them provide details on how to handle media inquiries, how to set up a media reception area, and what equipment should be made available to make the process work better for everyone involved. Reporters require detailed information about emergencies. If they don't get it from you, they will get it from other sources. Let them get it from you, so that you have some control over what information is disseminated.

Richard M. Morrow, in an article that appeared in *Public Utilities Fortnightly*, entitled "Coping with Crises," offered his views. In a series of three simple, but insightful, messages, Morrow tells us what we need to tell the outside world.

> Emergency preparedness and business resumption activities alone will not communicate the necessary reassurances to our customers, communities, and financial stakeholders. Getting these messages out—backed up by action—is the challenge that we are now learning to face.

#1: "*We Are Ready*"—We recognize that our readiness is judged not only by how well we handle a crisis but also by the public perception of our performance.… Assurances to the public that the company is ready must come from a credible source. For this reason, the key to our plan is that the public is made aware that senior management plays a central role.

#2: "*We Are In Control*"—We have total confidence in the ability of our highly trained employees to handle all sizes of emergencies.… This ability has been demonstrated effectively in situations ranging from routine repairs in our distribution pipeline system to more devastating problems such as what was experiences in the Sylmar earthquake or even a fire at a gas storage field.

#3: "*We Are Concerned*"—The third part of our message to the public is that we will take responsibility to right the situation and to make amends. To this end we offer help and accept help from others. We

> cooperate closely with appropriate government officials and involve them in communicating with the public as well. It is natural that there will be skeptics, but we will make our commitment publicly, delivered by the highest officers in the company, the same people who are responsible for overseeing its fulfillment. (Morrow 1992, 21–22)

The three messages listed by Morrow are simple, but nonetheless effective in our goal to keep the media informed. However, as Morrow suggests, we must back up these broad and profound claims with effective plans and a proven track record for dealing with emergencies.

I would also offer that, regardless of how well a company performs, no utility should become overly confident. There are too many factors and conditions that come into play in emergencies, and there's always a different set of conditions for each emergency. Events of moderate impact that a utility may be able to handle well may be dwarfed by a high-impact event that it may not handle nearly as well.

If the utility experiences such an event that stops it dead in its tracks, it's important that it *not* tell the media that "everything is under control" when this is not the case. Rather, successful companies have had better success when they tell the public that the depth and breadth of the disaster has made it necessary to call in other companies to augment internal resources, and all resources will work together to bring about a timely recovery.

Communications Systems

Let's take a look at devices and systems used to communicate during emergencies. As a program administrator, you are urged to research this topic, in depth, from other sources. Besides people, communications has been described as the next most important factor in emergency preparedness and disaster recovery. Without the necessary systems and procedures in place to communicate, the utility is bound to get off to a slow start in recovery. And, of course, a slow start means dollars wasted and additional exposure to further damage and, possibly, injury or death.

Not having telephone service, or a radio that works, can be a monumental problem. Think about this issue as you are reading this section, and do some further research in articles and reports on disasters as soon as you have the time. One common thread, among others, has been the failure of communications in major emergencies. What causes these failures? How can we prepare for them? How can we restore systems that have failed? What are some alternatives for communicating when systems fail?

To begin, there are many causes for communications equipment failure, from floods to high winds to equipment malfunctions to power surges. In its

research into risks to critical systems, the utility will certainly want to look into the swift development of mitigation and response plans for communications systems.

Telephone landline and cellular systems can experience hardware, software, or even site problems, which can lead to network failures. Here are a few more considerations for troubleshooting purposes that you can use in your planning.

- Phones can malfunction intermittently and make the telecom equipment appear to be giving degrading service.
- Outside plant facilities are usually exposed to overvoltage and lightning. Electrical protection is coordinated with exposure level. Fiber-optic facilities are, by design, inherently more immune.
- Cross talk and noisy circuits can be generated at the site or in degraded telecom equipment, not just in the outside equipment.
- Excessive dirt, dust, temperature, and humidity can cause aging. Likewise, not enough heat or humidity may be just as bad. The most notable is dry air that promotes electrostatic discharge events, which can be fatal to sensitive electronic equipment.
- Poor power quality can cause equipment shutdown at both high and low voltages (relative to nominal operating voltage).
- Other site equipment can influence telecom equipment operation. For example, large motors, welders, induction heaters, poor electrical distribution, two-way radios, etc., may contribute to cyclical or intermittent telecom equipment upset or failure.
- Improperly tested equipment modifications can contribute to intermittent telecom system failure.
- Manufacturer instructions are important to successful operation of a telecom system. Changing the instruction procedures may degrade the overall system performance.
- Telecom systems can be overprotected. For example, indiscriminate placement of uncoordinated surge protection devices may still leave the system vulnerable.
- Stored program-controlled equipment (most digital telecom systems) should be periodically updated to the most appropriate software. (Bush 1991, 35)

What systems (and accompanying procedures) can be used to backup telephone communications? Let's look at a few of them, as follows:

Radio
Satellite phones

Cell phones
E-mail
Text messaging
PCs with Internet access "air" cards
Cell-phone apps
Microwave systems
Relaying of information
Video files
Audio files
Messenger

When should they be used? In an emergency you will use what you have to use to get through, as long as you don't interfere with emergency services agencies. It's a good idea to do research. Check with area agencies and federal guidelines to make sure you are in compliance.

Perform research on past disasters and emergencies to uncover innovative methods used by other utilities. Incorporate those methods in your plans.

The Most Important Asset in Recovery: People

Many utilities that have experienced a major emergency declare that the most important asset is the people who serve. They're saying that people who are prepared to respond are clearly what a recovery is all about! All the plans, all of the materials, all of the procedures, all of the strategies, all of the training, all of these things are for naught without the people to execute the recovery. What does this mean? It clearly means that systems, subsystems, support, and logistics must be designed around the availability and special needs of the response team.

People are likely to need the following items, and more, to do an effective job during emergencies and disasters:

Communications systems that work under extreme conditions
A way to communicate with their families
Safety equipment
Training geared to help them deal with various levels of emergencies
Decentralized control: the ability to make decisions that should be made without a lot of red tape
Support from outside organizations: Red Cross, FEMA, and others
Facilitators who can help them get their domestic lives in order following major emergencies
Support from the employees' own organization: financial, legal, procedural, material, psychological, security, managerial, domestic, and

such other things as child and elderly care, corporate "care packages" if they lost their homes and belongings, etc.

Employee information: Employees should at least be as informed as customers and the media. Employees need to know that they are impacting the recovery effort and that many good things are coming out of their hard work.*

Mobilizing the Response

People Respond to Effective Triggers

A response plan is of no value unless the plan has clearly defined *triggers* that initiate action. A trigger can be as simple as a temperature alarm, an indication of an oncoming storm, a call from a security guard, or whatever you want it to be. The question that needs to be asked is what action will be implemented when a participant in your plan receives this special signal.

Once the trigger is perceived to be real, action should be taken. The key word here is *perception*, because if the participant does not perceive that the trigger is real, or if other problems exist at the time of the signal, the appropriate action may not be taken, which of course could be disastrous. Such "interference" is common under emergency conditions.

Planners who have studied cases like the *Valdez* Oil Spill Disaster can see that interference played a substantial role in the response. Any triggers that were meant to produce timely, effective action were overshadowed by the confusion that went on between the parties involved. The triggers were therefore less effective in mitigating further damage by the spill.

Triggers are an essential part of any response plan, but what about the procedures that follow? Which triggers will correspond to which procedures or action? Should the plan user rely on the validity of one specific trigger to set off a long chain of events, or should he or she look for several signals before taking action? What will the first, second, and third person in the chain of command have to do to help bring the problem under control? What outside agencies might be involved? What are the penalties of a false alarm? These are all important questions for the emergency planner to answer, and the answers will depend upon the type of plan being written, its scope, the number of people involved, the resources to be expended, and so on.

Identify clear signals for action and clearly document the action to be taken. When exercises are planned, look for ways to measure the effectiveness of triggers that will produce action. If you find that the triggers are not convincing or clear enough for participants, you may want to look for other

* I am indebted to past stricken utilities, such as Florida Power & Light, South Carolina Electric & Gas, and others, for sharing many of these "people issues" with me in reports and presentations.

ways to invoke action—or risk having your people get off to a slow start, or no start at all!

How will people handle false indications? What if false indications are common in the area you are covering by an emergency plan? In this case, it will be important to involve the front-line people in developing the triggers for the plan. These people have ways of determining whether alarms or signals are valid. After many false alarms, they simply know where to look for validation. These rules of thumb are important to your plan, because it is what the people will instinctively use as triggers.

Of course, there is also the problem of people waiting too long to initiate action because they think that they know a system better than they really do. It's a little like a jet pilot who waits too long to eject from a doomed aircraft because he thinks an indicator is simply not reading correctly. In these cases, it's apparent that intervention is necessary to avoid a potential catastrophe. How does management ensure that an operator will take action when he or she is required to? You may be able to minimize some of the consequences through comprehensive training.

Probably the best approach is to use simulation whenever possible. Simulators can be electronic, mechanical, or a combination. They are used to train power plant operators, pilots, and other professionals. Depending on your application, look into various types of simulators that may be available for training purposes. Less elaborate simulations can be developed by simply posing a scenario to a group of participants—a natural or technological disaster can be used—and by generating an appropriate list of problems to resolve. Monitor the progress of the group as they engage in resolving the simulated problems.

As some scientists predicted in the past, *virtual reality* programs—realistic, interactive, computer-generated graphics—have become common training tools for larger organizations involved with technical processes and procedures. High-tech companies provide custom programming of simulations for clients using expert systems and virtual reality. This may be overkill for many utilities who simply want to get people trained in their roles without purchasing simulation equipment, but costs for this technology will continue to fall. Look for some technology companies and research organizations to make these technologies more affordable and available to smaller utilities.

Notifications

If there's one thing we can learn from past disasters, it's that many of them were made worse by poor communications and a slow-starting notifications chain. Why does this factor seem to be synonymous with major emergencies? Is it that we forget whom we are responsible to notify, or are we simply hesitant to pick up the phone for fear we could be jumping the gun? What

if we are wrong about the magnitude of the emergency? Perhaps it could be controlled by a smaller number of response personnel. The plan calls for three teams to be activated, but from the initial call you receive, it sounds like three teams will be overkill…or will it be? Perhaps we should attribute poor or nonexistent notifications to other problems. The fact is, many organizations are just not ready to handle emergencies.

We've seen those old World War II movies where the captain of a battleship isn't pleased with the performance of his crew, so he makes them run through a drill numerous times to get it right. Of course, shortly after the drills, an enemy ship appears on the horizon and they sink it without a problem. The captain then gets the loyalty of the crew.

Companies may rarely run through notifications' drills, and this can lead to uncertainty. Managers may not be confident of the information they receive the first time they're contacted by a coworker concerning a potential emergency. When they hang up the phone, they may think of several more questions they should have asked the caller to help validate the need for further notifications. We know that, under such conditions, the string of notifications can take twice as long as it should, and damage can increase.

Set up your notifications chain based on clear, effective triggers from the people on shift. Leave politics and the fear of uncertainty out of your emergency response plans, or they could wind up costing you a lot more than an embarrassment. Patch up your holes in the notifications' chain by running a quarterly drill. Set up a regular meeting with your decision makers and response personnel to discuss emergency plans and notifications' schedules.

Everyone should know his or her place in the notification chain for various emergencies. If people aren't notified, they won't respond in a timely manner. Beware of holes or gaps in your list of notifications. Is it possible that, through an oversight, if one person on the roster isn't notified that several other people will be left out? What impact might this have on your recovery?

Take a close, objective look at your plan for notifications and make it clear to all participants what action will be taken for specific events.

Crisis Decision Making

Better Decision Making through Exercises

Simulations and exercises are excellent ways to enhance decision-making skills. I encourage companies to plan out a full day, if possible, to hold exercises. The exercise director can enlist the talents of several individuals or committee members to plan the exercise. Exercises can be quite involved, in some cases taking months of preparation time. But the exercise is worth the effort, and most people will agree that it's time well spent. If constructed

well, simulated problems can help decision makers know and understand company shortcomings on exercise day. Follow-up exercises can help all participants improve their weaker areas of decision making.

While many people would agree that training should take place prior to the exercise, it's also known that people learn during the exercise. It follows that the exercise is a vehicle for training, and that there is often ample opportunity to train people on the day of the exercise. Use the time to your advantage and train people when the opportunity presents itself. There is no denying that many people learn more in a two-hour exercise than in a full day of classroom training.

Stress and Decision Making

Many experienced managers and supervisors can recall the days when their decisions made the difference between success and failure in critical areas of operation. When the heat is on, the process of decision making is often accelerated. When damage or loss of life is increased with time of exposure to a damaging event, this is the ultimate test for the decision maker. However, the decision maker should continually remind himself or herself that a decision should be made by someone, and at that particular time, they are the most qualified person *on-site* and *on duty* to do the job. Stress is a critical factor, but some can be vented through a debriefing.

> Prior research indicates that exposing people to simulated crises and then having follow-up debriefing sessions during which they talk about their personal experiences can function as *stress inoculation*: Being exposed to preparatory information and related training experiences make people aware, at the visceral as well as cognitive level, of what crises will actually be like. It stimulates them to develop personal coping devices. As a result, they are able to control their emotions and perform much more effectively if and when actual crises subsequently materialize. This process of psychological preparation resulting in subsequent stress tolerance is called stress inoculation because it seems to be analogous to what happens when people are inoculated to produce antibodies that prevent disease. Gradual exposure to anxiety-producing situations appears to be especially effective in enabling people to cope better with emotional stress when threatening events later do occur. (Janis 1989, 252)

Site Emergencies

If You Must Leave Your Building

Emergencies and disasters strike buildings around the world. Some of those buildings belong to utilities. You may even have to leave your building when

a neighboring facility has been destroyed. If your office is in a multistory building and that building is hit by fire or flood, it could be weeks before you get your operation back to minimum levels.

Make the connection between field-operations recovery and its dependence on resource-planning support offices and services. In a major storm or earthquake, for instance, many people may concentrate on preparing for the loss of plant that is exposed to the elements outside of the main office. In reality, many utilities have their command centers located in their main building, and many people fail to fathom the loss of the main building or the center. Along comes the disaster, and decision makers try to take control of the situation from an alternate facility, a facility that is bereft of systems and devices to carry out the recovery.

Your best alternative is to get the backup facility in the plan, and get it set up to handle command and control. Then take a look at what effect the loss of other facilities in the company will have on recovery. Look at materials and equipment holding and storage areas, telecommunications shops, materials and instrument-testing areas, transportation and vehicle service areas, and any facilities that you are likely to depend upon in a major emergency. You may be surprised at what you find. The underlying question: What would you do and where would you go to duplicate the services offered in these areas? On-site personnel can offer immediate help to the planner, because they know the inner workings of their building and its operation. They also have a stake in the outcome of emergency plans that affect their building, so they should be ready and willing to offer full assistance in helping to develop emergency plans.

Start looking at facilities inside and outside of your service area that can serve as backup and make some calls to the proprietors to discuss arrangements. A wide-area disaster could claim your facilities and your neighbor's, so don't depend heavily on nearby facilities to take the place of your own for natural disasters and wide-area emergencies. Also look at what's involved in the setup of temporary shelters, work trailers, and prefabricated structures that might be available through vendors. Think *modular*. How fast can specific operations areas be set up and equipped? What plans will be needed to put everything in place?

Have you given any thought to your paper records? What will you be leaving behind on desktops and file cabinets if you must evacuate your building? What has been duplicated and what will need to be retrieved from off-site storage? Bring in a restoration company to discuss how they would proceed to dry out your paper records, interior walls, and work areas in the event of water damage. Such companies offer a multitude of services to help you return your buildings to minimum standards. Get recovery arrangements in place before disaster strikes!

Keeping the Emergency Program Alive

Marketing the Program

What is the most important task of the emergency program manager? Keeping the program *alive* in the organization. This means effectively promoting and marketing your plan and creating a climate of understanding and willingness to participate. This doesn't come without effort on your part. Begin by employing various programs and tools to invoke interest. Some effective methods are offered to get your company on track, as follows.

The Bulletin or Newsletter

You can do a lot of things with bulletins or newsletters. Spend some time developing this important tool. What should it look like? How long should it be? What articles might be of interest? Remember, you want people to be interested enough in emergency planning to read about it, and to be honest, it's not the most interesting topic to many people. So, you'll really have to put some flash into your product to create interest. Use techniques from professional newsletter publishers to grab attention and get people talking about what they read.

I can remember how good I felt when the first person called me about a newsletter I published on emergency planning. He ask how he could get extra copies sent to his employees. He thought the information was timely and useful. You can certainly do the same in your utility.

No demand for another newsletter or bulletin in your company? Then try to get some space in an existing newsletter to promote emergency planning and inform people. You'll probably be more limited in the number of topics and the amount of information you can provide, so you'll have to do some careful editing.

What kind of information would be appropriate to print in your bulletin? Here are a few ideas:

- Results of a recent emergency plan exercise, including lessons learned
- An excerpt from an article in a trade journal highlighting an emergency experience in another utility
- Articles on past emergencies experienced in your company (Never let people forget that emergencies could strike again! Will you be ready next time?)
- Predictions made by leading experts in the fields associated with emergency planning
- Success stories of departments who have implemented emergency plans
- Special devices used in emergencies to assist responders
- Communications and tracking systems, including special computer programs

These are just a few examples of how you can use a newsletter to attract interest. There are many more. When you publish your first newsletter or bulletin, include a statement that you are looking for stories and news clips from readers. You may get some good ideas from fellow workers. Make sure that you give them credit for their contributions.

Meetings and Presentations

Develop fifteen-minute, thirty-minute, and one-hour presentations on emergency preparedness that you would be willing to present to various departments in your company. The shorter presentations will simply cover the highlights of what's going on in emergency planning. The hour-long presentation should go into significantly more detail, and might include some tips on how departments can develop their own emergency plans. Make it interesting. Remember, you're trying to enlist the support of nonplanners and newcomers from many varied areas. Videotapes and other visual aids on past emergencies can be effective tools in gaining interest and support during the meetings. If you have difficulty in scheduling meetings with various departments, ask department managers if you can get on the agenda in a regularly scheduled meeting, such as a department work progress or safety meeting.

When you develop some expertise in presenting the topic, other utilities and organizations may also express an interest in hearing you speak. All of this will help your promotional effort and increase dialogue between departments and outside companies and organizations. Many benefits could emerge, such as improved plans, new resources, and greater coordination.

Personally, I don't know of a more effective way to minimize costs and improve emergency plans than to use what we've learned. There's no question that much of what companies learn is not committed to their plans, but as an information-hungry program manager or planner, you can help to change that for your firm. If you don't already do so, make it a point to write a detailed report when you return from a conference or seminar on emergency planning. Decide whether to make the ideas a part of your emergency plans.

One of the most challenging activities in which a planner or planning group can be involved is plan promotion, or in a broad sense of the word, plan marketing. You and your planning group should continually look for ways to sell the plan. What can you and your group do to accomplish this? Here are a few suggestions:

- Share reports from other companies that point up the successful use of emergency plans.
- Publish success stories, exercise results, progress of your group, and other information about emergency planning in the company newsletter.
- If you can't get regular space in the company online newsletter, why not create your own? Perhaps a quarterly bulletin or newsletter with

interesting stories about emergencies and lessons learned would appeal to employees. It's done often in the utility news magazines, but doing it yourself can add a personal dimension to the information.

- Develop a useful brochure. Brochures that are attractive, informative, and easily obtained can be a tremendous help in getting the word out. Team up with your public relations or consumer awareness department or teams to develop several brochures and mailers that can be made available to customers and employees. Think of some topics that would be ideal for brochures. To illustrate, here are a few examples of titles of brochures:
  - How We Handle Storm Emergencies
  - What Can Affect Your Gas Service?
  - How Our Smart Systems Keep Us and You Aware
  - When We Receive Your Call
  - When You Can't Place a Call
  - When the Lights Go Out
  - How Emergency Generators Can Be Used *Safely*
- Invite people in from other companies to talk about how emergencies were handled. Get some time on meeting agendas to make the most of your efforts.
- Video parts of the emergency drill or disaster recovery exercise, and set it up on your website for employees to access.
- Request copies of videos from other companies that may have experienced a disaster.
- With management's okay, plan a few short-notice drills that help to demonstrate the need for plans in specific areas, with the help of those that can participate. Make them as enjoyable and informative as possible. Remember, you aren't out to point fingers; you simply want people to see the benefits of having plans and knowing what's in them.

This concludes our study of the basics of emergency program administration topics. I hope that the information presented in this book will foster continued research and action in emergency planning.

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Special Supplement
Emergency Planning for Public Power Utilities

9

Discussion Points

- Opening remarks
- Planning in public power
- The links to public power associations
- Why planning is critical for public power utilities
- Planning with limited resources
- Essential elements to include in your plans
- Resources for more information
- A model for implementing a one-stop interface to essential information
- Closing remarks

Opening Remarks

Today's public power utilities are moving forward with emergency preparedness and mitigation programs for major emergencies. What may have been a bare bones program in years past is continually being refined to encompass more than simply sharing resources when major storms strike.

I have had the privilege of working with several public power associations over the past two decades, each with a dedication to help members enhance their capability in delivering power to tens of millions of people across America. The menu of services for association members has steadily grown and is likely to continue to grow as members become more familiar with the benefits. There are many fine people in public power utilities, and I hope that this special chapter will be of value in their quest for knowledge to enhance their capability to handle damaging events.

Public power sees many severe storms during the course of the year, just as others do, and have learned many lessons to share with their neighbors and those several states away. Public power can, through careful documentation of storm work, be eligible for FEMA (Federal Emergency Management Agency) reimbursement following major storms. But the key phrase is careful documentation of storm recovery, including a well-organized approach to assessing damage. Utilities are urged to maintain a working knowledge of

FEMA regulations and expectations. These will not be covered in detail here because, as is the case with many regulations, they change through the years. websites like those hosted by the American Public Power Association and the National Rural Electric Cooperative Association offer excellent insight to storm planning and are well organized for researchers. Explore all association websites in just a short period of time by starting with a search that leads directly to the information of interest to you and your utility.

Emergency Planning in Public Power Utilities

A number of factors influence the need for emergency plans in public power utilities. Several are listed below.

- High-risk exposure—internal and external
- Escalating costs for major storm recovery
- Critical infrastructure protection
- Agency compliance
- Limited resources—now more than ever
- After-action assessments
- Past and future litigation
- Safe operation of the utility system—"the mission"
- Logistics—the ever-present need to organize and track crews and work completed throughout the service area
- Need for better coordination

We can see from the points above that emergency plans help build a foundation for utilities that can serve them well in the years ahead. Any one of the points makes a case for better planning, but what kind of planning is currently going on across the industry to meet the challenges that utilities face?

Essential Planning and Mitigation Measures

Public power utilities, for example, are aware of these guidelines in USDA Rural Utilities Service Bulletin 1730B-2, "Guide for Electric System Emergency Restoration Plan" (USDA 2005), which refers to the essential nature of employee training. NERC (2006) also addresses the requirements for CIP training in Standard CIP-004-1, "Cyber Security—Personnel and Training."

Some written procedures are valid during both routine and emergency conditions, and some are written specifically for emergencies or disasters. Emergency or disaster plans may contain strategies and task descriptions as well as specific procedures for responders. It's important to determine how any

new system might perform under specific types of emergencies and whether it would be wise to extend existing plans to include recovery of those systems. If the utility employs smart-grid projects that channel critical data and device status control to and from consumers, for example, it would be wise to explore scenarios where these channels could be interrupted for long periods and develop plans accordingly. Also ask, "What would be the status of these systems when reenergized and reactivated?" Due to the high reliability and self-healing capability of fiber-based AMI systems, the bulk of storms experienced may not affect their operation appreciably; however, some devices in the field are still subject to physical damage under extreme storm scenarios.

It's important to think globally when the planning is underway. How will business continuity (continuity of business processes) and IT (information technology) disaster recovery plans (recovery of systems and data) address full recovery, and who will be required to respond under each plan? Electronic mail and communications tools used by emergency notification systems are vital, and along with customer data, records must be recoverable. These concerns and potential gaps would almost certainly be exposed by thoroughly updating a VRA (Vulnerability and Risk Assessment) and using the risk assessment information to help revise the utility's recovery and restoration plans. VRA data can offer the utility a sound baseline for determining priorities and how plans need to address them.

Below is a list of planning and mitigation measures that utilities are implementing throughout the industry. Some comments on each are included.

- VRA: Vulnerability and Risk Assessment
  The VRA has been discussed in prior chapters. It's a process for identifying the critical processes and infrastructure in the utility and, through the use of metrics, assessing priorities for recovery. It enables utilities to look at how the loss of a process, system, or asset will affect the utility looking at a number of criteria. The planner can then look at methods for recovery and assign a priority level for that recovery, given limited resources. The VRA can make a solid case for what the planner will recommend—in terms of strategies, tasks, procedures, and resources—to recovery in the timeliest manner. The emergency plan will reflect what has been found and what should happen within a specified period of time following the loss.
- ERP: Emergency Response Plan (or, simply, emergency plan)
  The ERP is the tool by which people (responders) are activated to effect the recovery of vital systems and infrastructure that help the utility sustain its mission to the people it serves.
- Mitigation projects and plans
  Mitigation is the necessary process of identifying what can be done to reduce the severity of impact following a damaging event. The

simplest example of mitigation is, for example, steps taken to fill sandbags and stack them to help prevent water damage to a facility that is important to the utility.

- Emergency response training programs
  Of course, regular training is currently a part of compliance guidelines for utilities. Training programs should be developed in parallel with the planning going on in the utility. For example, if I am leading a project to develop emergency plans and part of the planning is to develop damage assessment procedures, then I will want to make sure that the necessary training is being developed to ensure that the damage survey team will be ready to assess damage on the system following major storms. Several roles will be developed for people involved with damage survey. I will need to train the damage assessor or the person who will look at a damage location and fill out a form or use a notebook PC or tablet PC to electronically fill out a form that will be sent to another person, centrally located, to assess and track the damage found. That information can then be used to make up work packages for crews and populate a database of customers who are out of service. So, I might be training several people for the damage assessment process: the surveyor, the person driving the vehicle for the survey, the survey coordinator, the work planner, and any other people associated with the process. The important thing to understand in this planning is to maintain contact with the people developing the training and make sure they know how the work will proceed, what the training will entail, and when it should take place. If you do it right, the training will have taken place at the point when you are ready to "go live" with the plan.
- Annual exercises
  It's important to have exercises, at minimum, every year. Drills can be planned for segments of the utility that need to remain prepared for storm seasons throughout the year. The utility can therefore drill for hurricane readiness, summer storms, winter storms, and tornadoes, as appropriate. Area centers, operations buildings, and similar frontline facilities are usually first responders following major storms, so exercises and drills can help people become better prepared for their storm roles at those facilities.
- Cyber and physical security plans
  The federal government and the Department of Homeland Security want to ensure that the nation's critical infrastructure is protected from cyber attacks and physical security breaches that could affect the critical equipment of lifeline-services providers. It's important for all utilities to have plans and take steps to guard transmission and distribution assets from attacks. There are a number of resources

available to help utilities set up the necessary systems. The planner is urged to review those measures through agency websites and to attend meetings that are critical to understanding what should be done.

- BCP: Business Continuity Plans
  Business continuity planning is planning that will help utilities maintain core business processes when they are affected by damaging events. The planner studies all core processes and the systems and people required to perform those processes. He or she then prioritizes the recovery of those processes through the implementation of best practices in the planning that will minimize recovery time and thereby minimize losses. BCP is a necessary part of planning in virtually all organizations and is a common practice in utilities. The planner should review all sources of information on this practice. The Disaster Recovery Institute International is a good place to start. There are several more that can meet the planner's need for BCP information.
- COOP: Continuity of Operations Plans
  COOP planning helps to ensure that alternative facilities are available to fulfill the needs of the organization when disaster strikes, given that facilities may not be available for the response and recovery personnel outlined in the plan. The planner is urged to review information available through FEMA and various online websites to learn more about COOP.
- DR: Technology and data disaster recovery plans
  Today's utilities have a number of systems and applications passing data that will ultimately be used for processes such as customer service systems. The integrity of that data and its availability is critical to the business end of serving the consumer. Technology serves many other areas of the utility as well. Disaster recovery is a method of planning that looks at the recovery of systems and data when those systems are affected by equipment failure and loss of power, for example. It is extremely important for utilities to have disaster recovery plans that will help them recover critical IT systems, applications, and data within a period of time that can be tolerated without great financial implications. Therefore, it's important to have contracts in place with the right vendors to ensure the availability of backup and recovery. Technology professionals in the utility make it a practice of off-siting their data on a daily basis so that it will be available should a disaster affect the utility's information systems at any given time.
- Evacuation, relocation, and facility restoration plans
  It's important for utilities to have evacuation plans for all facilities. There is very little for people to do when they come to work and see

their primary building in ruins after a late night fire. Today's utilities need a plan for relocating people to other facilities to resume their important work. But smaller utilities often do not have their technology and tools replicated at another location so that workers can relocate there until their regular building is ready to reoccupy. That situation can be improved by creating plans for evacuation, relocation, and work resumption. Utility planners can make arrangements to occupy part of another company's building or a backup facility. The planner must then look at options for setting up the building or room so that workers can start work without a lot of delay, which will further reduce costs for the utility. It's important for utilities to contact vendors that can offer a solution for them, and there are several storm-tested companies that can provide turnkey solutions that include, for example, drying out of paper records, rebuilding of facilities, relocating workers, providing them with technology, and refurbishing technology that has sustained exposure to water.

- 24/7 vendor agreements
  This topic is all about making sure that utilities have agreements with vendors that will keep material, equipment, and services coming in after disaster strikes. If you have those agreements in place, check and verify them along with your annual exercise by calling the vendors and making sure that they stand ready to meet your needs. Any gaps that you identify may have can be remedied by having local agreements with vendors in your area and with other utilities that may have material and equipment that you may be needing following a major storm. Look at your agreements soon and make sure you have the bases covered. From time to time, call in representatives to discuss their storm plans with you and make sure you have the most updated information to ensure 24/7 availability for critical needs.
- Mutual assistance plans
  Make sure your mutual assistance plans—plans you have for bringing in crews from other areas, including other states—are in good order for your next major storm. Your plan should include having agreements in place and making sure the incoming crews are well equipped when they leave their home base. You will save time and money by making sure the incoming crews are ready to go to work, with your work packages in hand and guides (bird dogs) ready to take them to the areas affected by the storm. Look to your utility association for more information on this topic and proactively call other utilities that can help you plan the logistical issues involved with mutual assistance.

- Emergency communications plans
  Every utility needs plans for communicating internally and externally with all the people concerned with restoration of the power system. Preplan the types of messages that will be needed for major events and have them ready to customize and release at timely intervals. What's important is that the messages make it clear to nonutility people, including consumers, government agencies, local emergency management, and other audiences, what has occurred, how you are handling it, and when you are likely to recover the lifeline services so people can get on with their lives. It's important to get the messages out in a timely manner, and it will help to coordinate the information with the release of the incident action plans for the day's work. Regular updating from the field by the best methods available to you can help keep the information on progress fresh.
- Pandemic plans
  Plans that deal with illness to a large part of the population and its effect on the workplace are called pandemic plans. Utilities need to be aware of the probabilities for a pandemic and should have plans to help them deal with the loss of a major part of their workforce due to illness. Consult websites and review information available on pandemic planning through federal agencies such as the Centers for Disease Control (CDC).
- Other plans, emergency procedures, and tools that will help minimize loss and maintain safety
  It's important to step back and look at the utility and its mission from a broad perspective. Doing so can help planners see gaps in preparedness and vulnerabilities that can have a profound effect on the operation during clear sky days as well as when disasters strike.

Checklist of What Plans Should Do

In summary, utility emergency plans should be developed with the following considerations in mind:

- Be based on intelligence gained from the Vulnerability and Risk Assessment (VRA)
- Support the mission of the organization
- Prioritize recovery of critical infrastructure
- Provide alternative reporting locations and backup systems and devices
- Be logistically feasible, including the use of staging areas and satellite work centers to cover larger areas

- Make the best use of limited resources
- Clearly show reporting structure (e.g., unified incident command structure, ICS) and teams/personnel assignments described clearly
- Help the utility gain damage information early
- Be self-sufficient for at least seventy-two hours following a major storm
- Help ensure the safety and security of employees and the public (e.g., injuries and switching incidents can occur during recovery)
- Show cooperation with local and area officials
- Include triggers to implement action based on conditions
- Demonstrate good communications practices
- Include current contact information and 24/7 numbers for vendors of critical materials, equipment, and services
- Be carefully coordinated so that conflicts are avoided with plans used throughout the utility
- Be compliant with guidelines issued by agencies
- Be a part of an ongoing program

A Model for Implementing a One-Stop Interface to Essential Information

If you haven't thought about it yet, you may want to consider creating a place on your website for accessing all of the information you've gathered to help you and your team in developing emergency plans. If you decide to make an interface on your website that's accessible to all employees, get your technology team to consider options with the input of your team. If it's too early to consider a permanent home for your emergency program information, you can build a simple page using a spreadsheet or presentation application to get started. Remember, you can create links to information from point-and-click "pushbuttons" in tables, and you can save the page later in a format that allows it to be accessed through your web browser.

Once you set it up, you'll be able to point and click on buttons that are clearly labeled as to content, and then you'll have access to all your information through your browser. On a project that I did for a public power association, I made such an interface for the association to distribute to their members at nominal cost. The members had access to virtually all the emergency planning information created for the project just by opening the webpage file and clicking on the information of interest to them. This included direct links to an emergency planning template that they could customize to suit their utility; access to instructional files, such as quick-start guides; and a host of web resources that I had used to help develop various deliverables

for the project. There are also direct links to government and standards' websites as well as specialty sites, such as weather information and related sites. A sample (edited) example of using this approach appears in the Exhibits section that follows (Section IV).

Think about how easy it will be to create a page that is geared to prepare your response teams for a major storm. Prior to the storm's arrival, you will have access to all the storm preparedness checklists, rosters, storm emergency plans, role-based procedures, triggers for activation of your plan, sources for materials and equipment, 24/7 contact lists, and other resources that will be instantly accessible. You will be able to keep windows of information open and minimized on your desktop, ready to be accessed when you need them. What's more, all of the information will be accessible from any type of device that supports a browser.

Consider how you might organize the browser-based interface to quickly access the information, making it a one-stop menu for the convenience of people in the utility. Once you have the page designed, it will be simple to link all of your references and files to the master menu page. If you need further instruction on how to set up this page and its submenus, consult a friend or associate who knows how to create menus and direct links to web resources.

Closing Remarks

As a planner, if you can continue to make progress and help to ensure that you are meeting many of the goals listed here, you will be on your way to having better emergency plans. Keep refining your process through the years, and other people within and outside the utility will see how your company has improved.

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USDA. 2005. Guide for electric system emergency restoration plan. Rural Utilities Service Bulletin 1730B-2, Exhibit C, FEMA's sample guide for creating an ERP. U.S. Department of Agriculture, Washington, DC. http://www.rurdev.usda.gov/supportdocuments/uep_bulletin_1730b-2.pdf

Exhibits IV

Exhibits Summary 10

Emergency Program Quick-Start Guide

Emergency Plan Development Model

The eight-step model for developing emergency plans is shown in Figure 10.1. Take a few minutes to familiarize yourself with the model. We will be walking through the steps in the model one at a time, starting on the page that follows the diagram. This model offers a logical sequence for developing emergency plans and has been simplified for this Quick-Start Guide. However, there are other ways to approach a project like this, and you are encouraged to look at other guides that address similar projects.

There is no such thing as a perfect model for emergency planning. Projects like this depend on the resources and dedication of the people assigned and their willingness to see the project through. Emergency plans are composed of strategies, tasks, procedures, and methods to channel resources appropriately to minimize recovery time. As your plan continues to improve over the years, based on your experience and research, it will grow closer to what your utility needs for all types of damaging events. With those thoughts in mind, let's move forward.

Step 1: Begin the Project

Here are a few ideas for beginning your project:

Determine which people should be involved. Remember, some people may only have involvement when their expertise is needed. If your plan contains safety guidelines, then you will want to get the input of your designated safety expert, or even have this expert draft a specific part of the plan. This approach would be the same for other people with other expertise.

If an individual is writing the plan, then it would be helpful to develop a schedule showing a list of people with whom that person will want to speak over the course of writing the plan. When consultants write plans for utilities, they use a similar approach so that interviewees are not away or distracted from their regular jobs for long periods of time.

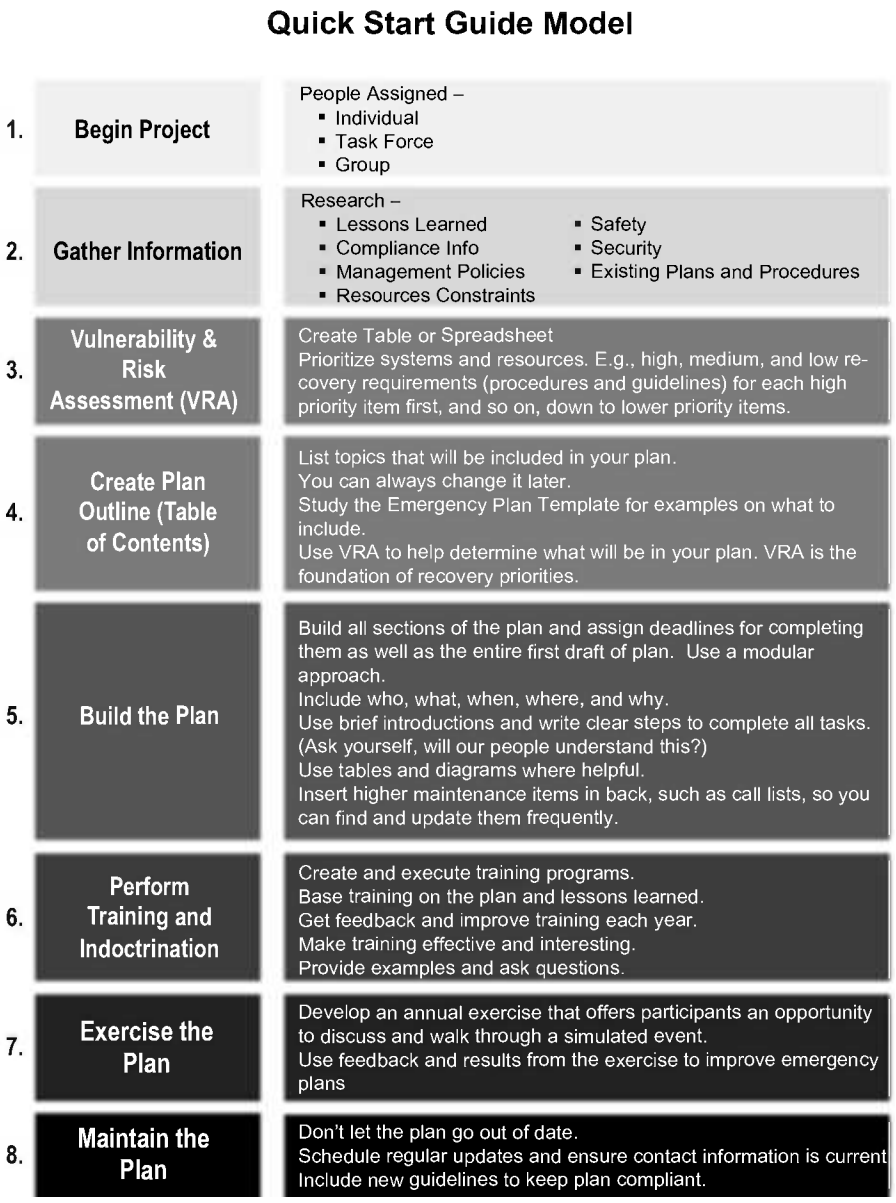


Figure 10.1 Quick-Start Guide Model.

If a task force is charged with developing the plan, make sure there is a person leading the project who can work with people who may not normally work together, or who may be somewhat uncomfortable with the work assigned. It's best to have people who work well in groups and are able to complete assignments on time.

Pick a work location that is conducive to developing strategies and is away from the distractions of calls and people dropping in unexpectedly. Manage the project using the right tracking tools suitable for logging progress and reporting.

Step 2: Gather Information

Gather information that will be useful in developing the plan. This can include the following:

- Guidelines
- Agency compliance documents
- Storm reports from past storms and related logs
- Magazine articles
- White papers
- Website links (see the ones included in this guide)
- Templates: those that already exist internally or from other sources
- Contact lists: internal, external, special government agencies (e.g., FEMA), medical, lodging, food services, neighboring utilities, contract crews, weather centers, city government offices
- Vendor lists
- Emergency management plans (from local and county emergency management offices)
- Organization charts
- Safety guidelines
- Other emergency plans and support documents from other parts of the utility or nearby utilities
- System maps and diagrams
- Special equipment vendor lists, such as heavy equipment
- Mutual assistance rosters and agreements
- Technology guidelines
- Radio or satellite phone lists or procedures
- Parent utility association, transmission company, and FEMA emergency guidelines
- Guides to writing manuals and developing training programs
- Government publications

Create a file system for these resources, as you will be accessing them at various points throughout the project.

Step 3: Perform Vulnerability and Risk Assessment

The Vulnerability and Risk Assessment (VRA) helps guide you to the most critical resources you have and want to maintain. The RUS (Rural Utilities Service), FEMA (Federal Emergency Management Agency), and NERC

(North American Electric Reliability Corporation) guidelines all call for risk assessments to be completed as a foundation to planning for emergencies. Each agency approaches the subject matter a little differently, and so, for compliance purposes, it would be beneficial to review all three sets of guidelines, which are located on their respective websites.

There is also a brief guide to developing a VRA in this guide (see Table 10.1). In its simplest form, a VRA can be a table or spreadsheet. (MS Excel™ is a good tool to use.)

Keep all of the data from the VRA as foundational information to help justify additional mitigation dollars for higher priority resources. Your emergency plan should reflect your need to get higher priority resources restored as quickly as possible. Once you have the resource losses in view, you can then assign people who are best able to recover them. This will help you build the recovery section of your emergency plan.

The VRA may show that you need address recovery using a plan that is separate from one that may be used for recovery of the electric system. If you put too many objectives in your emergency plan for recovering different resources, the plan may become confusing to review and possibly too large. However, if the same people are called for different types of emergencies (in different plans), they will need to know how, where, and when they are required to respond.

Step 4: Create a Plan Outline or Proposed Table of Contents

When creating an outline for the content of your emergency plan, please keep the following information in mind:

- Review the sample table of contents in this guide and from other utilities and agencies.
- Agency guidelines are requiring that utilities have physical and cyber security plans for dealing with these types of incidents. These should be included when you address the contents of your plan.
- Agency guidelines call for up-to-date contact lists for internal and external contacts. Review the current contact lists in your utility and determine how current they are. Call a representative sample of the numbers to determine if some of the numbers are no longer valid and revise accordingly. During exercises, it's best to call as many numbers as time allows and within the context of the exercise.
- Write the plan scope before you create your outline. Knowing the scope up front will help you better determine what should go in the plan. Start with the words, "This emergency plan will be used to…" and fill in the rest. For example: "This emergency plan will be used to recover vital systems and services and continue business operations following an emergency." Another example: "This emergency plan

Table 10.1 Brief Guide to Developing a VRA

Resource	Priority of Recovery	Recovery Time Objective	Recovery Point Objective	Recovery Procedures Available	Owner/ Manager	Potential Loss to Utility
List resources in this column: computers, buildings, software applications, equipment, materials, etc. Place them in appropriate groups on the table for easy reference.	List relative priority for resource: e.g., high, med., low.	Maximum time you can be without the resource.	Maximum time you can be without the data (for data recovery), such as customer records or other critical data.	Do recovery procedures currently exist? What are they and are they effective? Do we depend on any vendor or external resource for recovery?	Who is in charge of this resource? Insert all contact information.	What is the level of damage and type that we can expect for the loss of this resource? Financial, reputation, litigation, fines, penalties, etc.

will be used to restore service using a mobile unit transformer at designated substations following a transformer failure or other event."

Also consult the NERC resource ("Security Guidelines for the Electricity Sector"), which provides the following list of guidelines that are also endorsed by RUS:

- Communications
- Continuity of business practices
- Continuity of operations
- Control system—Business network electronic connectivity
- Control system cyber security incident response planning
- Cyber—Access controls
- Cyber—Intrusion detection
- Cyber—IT firewalls
- Cyber—Risk management
- Emergency plans
- Employment background screening
- Patch management for control systems
- Physical response
- Physical security
- Physical security—Substations
- Protecting potentially sensitive information
- Securing remote access to electronic control and protection systems
- Vulnerability and Risk Assessment

A direct link to these topics is available at http://www.esisac.com/library-guidelines.htm.

Step 5: Build the Plan

Prioritization Strategies: The Foundation of Emergency Planning Effective emergency response will depend on what the utility does during the first twenty-four to seventy-two hours following a damaging event. Priorities, including a damage survey, will be executed within the early hours, as soon as it is safe for surveyors to examine and report initial findings. It is then a matter of dedicating resources to complete initial recovery tasks that are critical to both business and power system operations.

Some Key Points for Plan Development The following points may be useful in developing the emergency plan:

Create a file that will become your draft emergency plan. Use a standard word processing application to ensure that the plan can be easily updated and accessed by appropriate personnel, and can be easily printed and installed in a notebook with sections clearly identified.

Review your outline (from Step 4) of the essential topics that you intend to cover in the plan, using parts of existing templates as a guide. Important: Consult your VRA (risk assessment) for priorities on resource recovery that must be included.

Determine the scope of the plan early on, preferably at Step 4. The scope will help you limit the type of information that should be included and exclude information that is not of value to your recovery. The scope should help you determine whether your plan will be used for business continuity, power system restoration, technology recovery, or building evacuation and relocation, for example.

Refine the outline until you have the core of what you will need in the plan and then start writing each section. Complete the main topics first and then continue editing until you are satisfied with the results. Some elements of the plan will be further refined after staging one or more exercises and applying lessons learned.

Perform quality checks and get approvals with each draft of the plan. Make sure you have stayed within the plan scope and have not included unnecessary writing that will just make your plan more difficult to use.

Gather together, and include in a special section, a comprehensive list of internal and external contacts, which is a key requirement under agency guidelines. These contacts will include the following: all internal assigned personnel; vendor twenty-four hour contacts (feeding, housing, logistics, communications, technology, fuels, building services, etc.); FEMA and local and state emergency contacts; critical safety, health, and security services; outside contractors; as well as other contact numbers important to the utility.

Prior to publication and distribution of the plan, ensure that you have met agency guidelines and the utility's internal requirements or document standards. The plan will become part of your document library and vital records. Electronic versions should be backed up and placed on secure CDs for safekeeping, and they should be password protected if available online to your employees.

Publish the plan and indoctrinate all personnel as to the plan contents and their roles during emergency response. Make certain that the board of directors, officers, and managers understand and approve of the information and required action in the plan.

Step 6: Perform Training and Indoctrination

Training can mean many things when it comes to emergency preparedness. This could include periodic employee discussion sessions to review procedures, technical training in equipment use for emergency responders, evacuation drills, tabletop exercises, and functional to full-scale exercises.

The following list presents a few basic considerations for developing a plan for training employees on emergency procedures:

- Assign responsibility for developing a training plan. Consider the training and information needs for employees, contractors, visitors, managers, and those with an emergency response role identified in the plan.
- Determine for a twelve-month period:
  Who will be trained
  Who will do the training
  What training activities will be used
  When and where each session will take place
  How the session will be evaluated and documented
- Consider how to involve people from all ranks in the organization. The more people know about their emergency roles, the better they will be able to handle them when disaster strikes. There may also be fewer questions that will unnecessarily delay recovery.
- Conduct reviews after each training activity. Involve both personnel and community responders, such as emergency management officials, in the evaluation process, especially if they will be required to coordinate recovery with utility personnel.

The following list presents some questions that can help trainers design better training for employees:

- Which people will be exposed to questions from the media?
- Which employees will be specifically needed in the operations building and which may be assigned to locations closer to their homes?
- If news reporters approach the operations building, who will prevent them from wandering around the building or prevent them from entering dangerous areas in the field, such as substations (if the gates are open), near wire-down incidents, and near crews working in the field? A segment of your training should address these problems.
- Which people are involved in damage survey? Do they need additional training for recognizing damage to electrical equipment in the field?
- How many people have been trained on how to communicate during emergencies?

- How will people be reminded to carry additional prescription drugs and dry clothing if they are assigned to multiple duties over extended hours?
- Do the emergency officials in your area (city, county, and state) know how you repair and restore the distribution system following major storms? What about for local emergencies that affect critical loads?
- Based somewhat on employee feedback, when are the best times of the year to train people on emergency procedures?
- What happens after storms to capture lessons learned from all employees? How are the "lessons learned" used in revising your plans and training people?
- If people might be exposed to possible injury or will come across people who may have been injured during recovery, will they have access to medical kits and will they know how to use them? What is the protocol for reporting injuries in your utility?
- Will employees know what to do if they come across injured people who should not be moved from an accident scene?
- What should employees do if they come upon a possible hazardous materials incident while driving?
- Do all employees know when they should and should not enter a substation yard or materials storage area?
- Which staff members are assigned to an emergency operations center or "war room" and which ones are not? Do you find that people wander in to see what's going on and distract others?
- Have employees been trained to use logs, handwritten notes, computer-generated notes, and tracking forms to document their part in the recovery? Do they know who to give them to when recovery operations end or when their shift ends?

Step 7: Exercise the Plan

The following types of exercises may be planned. Keep in mind that agency guidelines require a regularly held exercise (at least annually) to help maintain familiarity with emergency plans.

Tabletop Exercises *Tabletop exercises*, which originated as military drills for tactical planning, take place in a conference room setting with key personnel in attendance who would normally participate in a real emergency.

Participants confront a crisis scenario—a major winter storm hits a wide geographic area, taking down transmission towers on several critical circuits, for example. For distributors, this will also mean key subtransmission and distribution circuits. Participants analyze what each of the various teams would do in a genuine, full-scale deployment and how they would work with other utilities, outside emergency agencies, and vendors in order to recover.

This and all types of exercises require that a script be written and followed to help ensure that an organized exercise takes place. Each team member should be aware of his or her involvement in the exercise and in a real event. Problems are introduced and dealt with during the exercise period. Logs are kept by participants, and observers record observations made when problems are introduced.

The exercise should measure (using some type of metrics) how successful participants were in dealing with specific problems encountered during the exercise. A debriefing and follow-up report is written and distributed to select individuals.

Functional Exercises A *functional exercise* is a dry run for the real thing: It happens in real time, as a real emergency would, with managers and supervisors orchestrating the same resources that participated in tabletop exercises, but stopping just short of actually deploying assets.

Some utilities deploy a minimum number of resources to check the dispatch procedures and may, for example, check the contents of emergency kits and storm supplies.

A functional exercise can also be an excellent opportunity to call emergency vendors to check contact information and test emergency communications systems.

Information technology managers may want to test backup and recovery procedures for IT systems without actually taking anything out of service. If backup IT systems are available and can be tested, this may also be a part of the exercise. Some companies coordinate disaster recovery exercises with their disaster recovery vendors and off-site storage vendors.

Full-Scale Exercise A *full-scale exercise* is equivalent to a dress rehearsal, a simulated emergency exercise in which multiagency, multijurisdictional participants conduct emergency management activities, complete with equipment and assets that would be required in an actual emergency or disaster. Utilities should participate with outside agencies and organizations in this type of an exercise. All teams are required to participate in the exercise, and the emergency operations center (EOC) is activated and all communications are tested over the course of the exercise.

A full-scale exercise can take one or more days to complete.

Exercise Reports and Benefits Exercises of all levels should conclude with debriefings and one or more reports from all teams. Lessons learned should be documented and problems should be assigned to individuals to resolve as soon as possible, and some improvement should be apparent when the next exercise rolls around. Exercises are used to maintain and improve knowledge of emergency procedures and coordination during times when many

resources may be in short supply. Emergency plans should be revised based on the feedback of participants following exercises.

Step 8: Maintain the Plan

The following checklist may be used to help update and revise emergency plans:

- Record revision date in the revision records table. A record of exercises is also appropriately placed in the plan. If the plan is audited, this information is important.
- Prepare an introductory letter or memo that details what has been revised in the new revision. This should be included in the revision mailing.
- New sections or groups of procedures should be added to the table of contents and index. New procedures should be reviewed with users and tested as part of the annual exercise program.
- If pages are stored in a notebook by users, ensure that three-hole punched pages are used or plain pages are punched prior to distribution.
- Internet-based versions of the plan and revisions may need to be converted to portable document format or HTML, or similar format, for viewing on the Internet.
- Allow adequate time for approvals, but if a review appears to be moving too slowly through the approval process, alert reviewers that a timely approval is needed in order to get the revision out by a predetermined date.
- Ensure that revisions are approved prior to distribution.
- If an outside printer is used, allow sufficient time for the revisions to be printed and packaged for distribution. Ensure that the printer will maintain the confidentiality of your document(s).
- It may be necessary to record completed revisions in a revision log should there be a need to determine what was revised and when the revision was installed. Review document control and compliance requirements for the type of plan that is being revised.
- If a revision affects the procedures in another plan in the organization, it will be necessary to check the coordination requirements so that plans will not conflict if both are required to be followed during certain types of emergencies.
- Make sure that there are adequate footnotes and cross-references inserted for a newly added guideline or procedure that requires them.
- It may be necessary to visit groups of plan users to explain more about a new set of procedures. This will also help people to remember the new revisions and to ask questions.

- Ensure that all procedures are technically accurate by including an expert on the topic in the review and/or approval process.
- Ensure that electronic copies, paper copies, and web-based copies of a revised plan are all updated to show the same revisions.
- Ensure that management is aware of new procedures, as well as public relations or customer relations, so that they are able to answer any questions when the plan is put into place.

Emergency Program Administrator Summary of Duties

Primary Duties Summary

Administration of corporate major emergency plan of operation, the Customer Service Emergency Restoration Plan: This includes semi-annual revisions with ongoing reviews of content, and feasibility of content, throughout the year. The person in this position should have a working knowledge of the various styles and methods of writing effective strategies, tasks, and procedures to meet the preparedness and response needs of the organization. He or she should also have a working knowledge of the transmission and distribution system, as well as central and field control of the workforce throughout the utility's operating area.

Verify and validate contingency plans: The person in this position should serve as a standards professional for emergency planning in XYZ Company. Any and all plans that exist in XYZ Company should be administered by a certified planning professional to verify and validate the precepts offered by each plan, corporate or departmental. Reports have repeatedly cited the absence of plans, and lack of coordination of existing plans, as primary factors contributing to losses following damaging events such as storms and system emergencies.

Resolve disparities in emergency preparedness: The person in this position should be able to recognize critical disparities in preparedness and response that can lead to increased losses. The planner should continually ask himself or herself what must be done to resolve these "action items" that

1. Are least costly to implement
2. Are consistent with management's view as to their level of importance
3. Are achievable

Interface with agencies and partners at the municipal, county, and state levels: Above all, [Insert Company Name] should meet the critical standards in emergency planning that are consistent with the

needs of its neighbors, including the [STATE] State Police, Office of Emergency Management (state, county and municipal levels), [STATE] Board of Regulatory Commissioners, Department of Transportation, Edison Electric Institute (EEI), [UTILITY's] major accounts, and others, to minimize potential conflicts and reduce the probability for loss of life. The person in this position should be knowledgeable of the needs of partners in preparedness and be available for any opportunities to improve the planning.

Provide consultation to neophyte plan developers: As services are identified as being business critical to [UTILITY], plans must be written to provide for the swift recovery of those services after damaging events. People who have been assigned to write departmental plans should be briefed by the planning professional on the verification and validation measures that can help to make the new plan consistent with the needs of the organization. There is also a tendency (based on our experience) to leave plans unfinished. The planner can help to instill in the individual the needed fortitude to complete the project by coaching and counseling him/her through the process. The planner can then provide feedback on the final draft prior to implementation.

Provide ongoing consultation to management: The planner can provide management with the needed insight to formulate the best possible response to an emergency. Drawing upon years of research into what works and what doesn't work for organizations, the planner can provide decision-support information that is critical to the recovery of core systems and services. Prudent risk taking means having a preparedness program in place with ongoing participation at all levels. We know from examples that decision makers in organizations that have slighted this effort have been held accountable and often discharged following a corporate emergency. It is therefore important to hold this planning as fundamental to your operation.

Participate in ongoing research: The planner is responsible for keeping himself or herself informed on the issues, problems, factors, and solutions that surround emergencies and disasters both inside and outside of the utility environment. This knowledge makes it possible for the planner to develop the best possible plans. This includes attendance at seminars, conferences, and meetings that can help to bring the planner's skills in line with his or her responsibilities.

Market and promote the advancement of emergency preparedness planning in [Utility]: We know that agencies and the public are growing more concerned with preparedness issues. These are issues that affect lives. It is therefore important to maintain ongoing interest in this program and to champion progress every day. What is not used is lost, and this includes the necessary skills to handle damaging events.

> We also know that managing risk is a proactive effort as opposed to reactive. The person in this position should publish (at minimum) a quarterly bulletin or newsletter to keep people informed of progress made, issues that are important, and what's going on in other organizations to address critical preparedness issues. Also imperative are the speaking engagements that orient new supervisors and managers to their responsibilities to [Utility]. And we must participate in those events to inform outside agencies of our ongoing activities and to interpret our response to electrical emergencies.

When systems such as those involving telecommunications, computer-aided dispatch, automated mapping/facilities management/Geographic Information System (AM/FM/GIS), smart metering, work methods, staffing, computerized tracking systems, and other systems being planned, or in the process of being implemented, the professional planner can add an important dimension to their development as a viable tool in the utility. Verification and validation of systems should include input from the planner who is capable of answering important questions on the use of equipment in an emergency mode of operation.

Specific Ongoing Duties

Specific ongoing duties for this position include the following:

- Write, revise, and maintain Customer Service Restoration Plan (or other named plan). Related duties include maintaining the distribution list and auditing the condition and location of plans held in the company.
- Develop and host training programs to enhance emergency awareness and preparedness. Example: annual main feeder damage exercise.
- Develop and direct the annual Corporate Emergency Preparedness and Disaster Recovery Exercise.
- Provide ongoing and on-demand reports to management on the status of readiness issues.
- Promote corporate-wide emergency preparedness through ongoing information exchange, assistance, presentations, bulletins, and newsletters.
- Audit the condition of emergency plans being held throughout the company. Establish the validity and usefulness of said plans. Verify the maintenance of plans. Approximately [X number] corporate and departmental plans are now held in the units.
- Monitor the status of action items and provide periodic reports on status.
- Monitor weather status daily using several meteorological services. Interface with meteorologists to determine the status of storms that could threaten the service area.

Perform periodic field audits to determine the condition of plans held, including the condition of load dump and system restoration procedures in the substations. Report any unusual conditions to supervision.
Monitor the status of information systems used for decision support and disseminate emergency-related information to employees and regulators.
Engage in ongoing research into publicized emergencies and disasters to incorporate lessons learned into company planning.
Assist neophyte planners who must develop or improve plans being held at the department level.
Participate in or provide instructional presentations on emergency planning for [STATE] Office of Emergency Management, [STATE] Board of Regulatory Commissioners (BRC), professional organizations, and for any organization that requests these programs.
Assist department supervisors and managers with the development of action plans to address specific issues.
Implement and chair task forces to assist in resolving important issues.
Guide the development and implementation of new software applications.
Monitor the condition of the mutual assistance roster and update same.
Develop formal reports for regulators on storm activity and restoration.
Attend meetings and participate in exercises hosted by [STATE] State Police, Municipal Emergency Management Association, Cellular One Safety Council, County Emergency Management, [AREA] Disaster Recovery and Information Interchange Group, Electric Power Research Institute (EPRI), U. S. Department of Energy (DOE), EEI, [STATE] Blue Ribbon Commission (BRC), [STATE] UA, and others.

Other Related Duties

Emergency Planning Administrator Performance of Specific Duties Outline

1. Write, revise, and maintain Customer Service Restoration Plan
   a. Write (rewrite) the plan
      i. Should plan be rewritten?
         (1) Meet current needs of organization
         (2) Rewrite plan creating new edition
         (3) Verify and validate contents
         (4) Get approvals
         (5) Issue plan
         (6) Develop and host training to indoctrinate players on new plan
         (7) Exercise plan

ii. Should a section be added?
(1) Define scope of new section
(2) Define order for new information
(3) Get input
(4) Research other sources
(5) Draft new section
(6) Verify and validate contents
(7) Get approvals
(8) Install section
(9) Train
(10) Exercise plan with new section

b. Revise the plan
i. General or interim revision?
ii. Approvals needed before install?
iii. Write revision
iv. Verify and validate new procedures
v. Install revision
vi. Train
vii. Exercise revision

c. Maintain the plan
i. Determine condition and location of plans held
ii. Mailing list updates
iii. Cover letters for revisions
iv. Mail revisions
v. Perform plan audits
vi. Provide "help desk" functions on maintenance and use of plan
vii. Honor special requests for plans and related materials inside and outside the company

2. Develop and host training programs to enhance preparedness
a. Determine training needs
b. Develop training programs
c. Schedule training

3. Develop and direct corporate Emergency Preparedness (EP) and Disaster Recovery Exercise
a. Plan event
i. Determine level of involvement
ii. Brainstorm exercise options
iii. Get approvals from section head on likely exercise scenario and scope
iv. Develop exercise scenario and problems
v. Prepare materials
vi. Update exercise mailing list

vii. Mail exercises
viii. Administer on-site exercise (tabletop exercise)
b. Postexercise duties
i. Review exercise results
ii. List shortcomings and action items
iii. Write and publish exercise report
iv. Organize and coordinate follow-up activities; provide regular and special reports for management
c. Research and write reports
4. Promote corporate-wide emergency preparedness
a. Attend meetings—internal and external
b. Call sections together to resolve EP issues
c. Assist departments with EP issues resolution; audit the condition of emergency plans
i. Do plans exist to cover core business services?
(1) Request that departments write plans
(2) Offer assistance in development of new plans
(3) Offer verification and validation services
ii. Audit the plans in place
(1) Are plans feasible?
(2) Verify and validate existing plans
iii. Coordinate cross-department development of plans
iv. Champion the efforts of neophyte planners; monitor the status of action items
5. Define action items
a. Determine who should resolve
b. Enlist participation in resolving items
c. Prepare bimonthly report on action items; monitor the weather daily
i. Interface with meteorologists
ii. Track threatening storms
iii. Update crisis management committee members and other managers and supervisors
iv. Use other systems, such as corporate website, to keep people updated
v. Provide decision support to management on storm status
vi. Analyze performance of meteorologist and make suggestions to improve performance
6. Perform periodic field audits
a. Look for potential problems in the districts that could reduce our effectiveness
b. Monitor radio transmission to determine use and performance of radio system(s)

   c. Visit substations to determine feasibility of use for satellite centers during storm recovery
   d. Determine condition of special plans and documents in substations, such as load dump and system restoration folders
7. Monitor the status of information systems (IS) used for decision support
   a. Interface with IS group on issues that could affect system reliability and the dissemination of information prior to and during storm restoration
   b. Assist in the development of new software to track outages and develop reports for management, the Board of Regulatory Commissioners (BRC), and customers
   c. Assist in resolving action items with IS
8. Engage in ongoing research on publicized emergencies and disasters
   a. Study lessons learned
   b. Incorporate lessons learned into plans
   c. Attend meetings and seminars to discuss preparedness with others
   d. Take part in emergency exercises
9. Assist neophyte planners in plan development for corporate and departmental plans
   a. When approached by departments on how to develop plans, offer assistance
   b. Determine project scope and offer strategy for completing project
   c. Verify and validate precepts covered by the new plan
   d. Help resolve any coordination issues
10. Participate in meetings and provide instructional presentations on emergency planning for [STATE] Office of Emergency management (municipal and county), [STATE] Board of Regulatory Commissioners, professional organizations, and other organizations that request these programs
   a. Attend regular meetings
   b. Provide presentations when needed
11. Implement task forces to help resolve issues
   a. Enlist expertise and support in any issue that needs to be resolved
   b. Coordinate assignments and recommend action
   c. Provide reports on progress
   d. Gain management's approval where required
   e. Install new procedures or systems
12. Guide the development of new software applications or new hardware from an emergency preparedness perspective
   a. Assist in the development of specs for new systems
   b. Assist in the validation
   c. Assist in the development of exercise procedures for new systems

13. Monitor the condition of the EEI mutual assistance roster
    a. Issue periodic revisions to EEI
    b. Place calls to EEI to request updated rosters
    c. Notify risk management department when revisions are made
14. Develop formal reports for regulators
    a. Write poststorm reports to provide BRC with restoration information
    b. Write other specific reports on demand
15. Attend functions hosted by outside agencies
    a. [STATE] State Police Office of Emergency Management
    b. Municipal Emergency Management Assoc.
    c. [Area] Disaster Recovery and Information Exchange Group
    d. EPRI
    e. DOE
    f. EEI
    g. [STATE] BRC
    h. [STATE] UA
    i. Others, as required

Sample After-Action Assessment Questions

After a damaging storm, or other damaging event, questions often arise, in terms of emergency preparedness. These questions, among others, are still being asked today.

1. Were plans based on recovering key resources in a logical and prioritized order?
2. How did employees respond, based on the scale of the emergency?
3. Was the command center or emergency operations center equipped and occupied for effective management of the event?
4. Were the right triggers in place of sufficient scale to implement response and recovery efforts?
5. Were several types of emergency plans implemented during the event, such as technology recovery plans, facility evacuation plans, plant (e.g., power, water, and gas), security plans, etc., and were they coordinated to work together?
6. Was the utility able to assess damage to the system in a timely manner?
7. Was technology current for outage management, supervisory control, and dispatch (for example) used effectively?
8. Were the people assigned to use the technology aware of its limitations and able to correctly interpret the data generated, such as customer outage data, crew locations tracking data, and geographic information systems data, during and after the event?
9. What types of assumptions, made at various times during recovery, contributed to the length of recovery, any safety concerns, misuse of materials or equipment, or other notable problems?
10. Were there sufficient standby power sources—such as portable generators and auxiliary power sources at plants, backup facilities, and substations—available to help maintain operation under blackout conditions?
11. Did the utility have fallback methods (manual procedures) for recovery knowing some technology would be compromised or unavailable?
12. What systems were used to record and act upon each damage location or point of failure, and how was the public kept isolated from damaged equipment and downed conductors?
13. What decision process had to be made at each stage of recovery and by what level of management?
14. How did the utility work with city, county, state, and federal emergency management officials?

15. How were vendors of critical equipment and services linked to the utility's response and recovery efforts?
16. What was the content and frequency of distribution of information designated to keep the public updated?
17. Was the utility able to maintain safety and help prevent injuries to their response personnel and the public?
18. What safety equipment was available, and in what quantities, to people working in the field?
19. Did responders have sufficient rest during the response and recovery efforts to maintain their own safety and ensure the safety of others?
20. How were outside crews brought in, and what did they bring with them that would expedite the recovery process?
21. What did the host utility, or utilities, do to ensure a continual supply of job critical tools and equipment to a mixed workforce, with varying needs, throughout the recovery?
22. How was the security and maintenance of vehicles and critical recovery equipment handled around the clock?
23. How were employees able to communicate with their families on the job and help to ensure their well-being?
24. Were contact lists current for all vendors, officials, employees, and emergency services?
25. Were there sufficient accommodations, meals, and vendor supplied needs available to all response personnel?
26. How did people communicate at all locations when communications systems were interrupted or unavailable?
27. Were there conflicts in the direction of orders sent to people on the job sites, and how was this corrected?
28. How did people update their status such as work location, tasks completed, who they were working with, and where they planned to go after completing each phase of their work?
29. What will the utility do to improve their level of preparedness and overall resiliency knowing what they know now?
30. Bottom line: How would you (we, the assessment team) rate the overall preparedness of the utility for the event that was experienced?

All of these questions are critical in determining the state of preparedness in virtually all utilities. If the utility has not considered similar questions in their planning, it's almost certain that other organizations will do so in after-action assessments. Proactively, it's important that answers to these questions be addressed prior to the next emergency.

Important Links to Emergency Program Information

Of foundational importance to this section, I have provided a short list of website links, and apologize in advance for not including many more. Search as many websites as time allows, from the given links and from those discovered by using popular search engines. This list is not prioritized and is just a start on the path to better planning. All links offer excellent information resources, and any search should include visits directly to utility websites. More utilities are posting valuable emergency planning information on their websites each day.

Dept. of Homeland Security
http://www.dhs.gov/index.shtm

Federal Emergency Management Agency
http://www.fema.gov
http://www.fema.gov/national-response-framework
http://www.fema.gov/national-incident-management-system

North American Electric Reliability Corporation
http://www.nerc.com

Electric Power Research Institute
http://my.epri.com (Search Emergency and Disaster from home page)

U.S. Dept. of Agriculture—Rural Utilities Service
http://www.rurdev.usda.gov/UEP_Homepage.html

American Public Power Association
http://appanet.org/special/index.cfm?ItemNumber=12071&sn.ItemNumber=12121

National Institute of Standards and Technology
http://www.nist.gov/index.html

Occupational Safety and Health Administration
http://www.osha.gov/index.html

National Institute for Occupational Safety and Health
http://www.cdc.gov/niosh/topics/prepared/

American Red Cross
http://www.redcross.org/

Suggested Readings

Briefing Regarding Private Sector Approaches to Title IX of H.R. 1 and Public Law 110-53, "Implementing Recommendations of the 9/11 Commission Act of 2007," written for Paula J. Olsiewski, Ph.D. program director, Alfred P. Sloan Foundation, by representatives of ASIS, DRII, NFPA, and RIMS.

"EEI Report on Utility Storm Restoration Response," by Brad Johnson, independent energy advisor for Edison Electric Institute, January 2004, p. 14.

Stavros, Richard. Editorial. *Public Utilities Fortnightly*, October 2005: 6.

Mutual Assistance (MA) Questions for Group Discussion

Please review the following questions and prepare to discuss them in your group.

1. To your knowledge, does you utility maintain a mutual assistance (MA) agreement with an association or other utilities directly? How is this set up?
2. Is there a generally accepted process (or set of procedures) for requesting MA crews?
3. Does your utility use a form for requesting crews, for example, to fax or e-mail to MA utilities to request crews and equipment information? Does this form follow an example or compliance measures set by FEMA?
4. How are special equipment and materials requested from MA utilities? How is this coordinated across large regions hit by a severe storm, for example?
5. To your knowledge, does your utility use software for tracking crews and repairs? What type? If not, how is this handled?
6. Does your utility have restricted restoration practices for outside MA crews, for example, only allowing them to work on specific parts of the system?
7. Typically, what are incoming MA crews provided when they arrive? Do incoming crews always seem to be short one or more tools, equipment, or materials, or have problems following construction standards?
8. In what areas have communications and coordination been a problem with respect to mutual assistance, e.g., radios, frequencies, cell phones?
9. Can you discuss examples of your utility's exposure to the risks of bringing in MA crews, e.g., injury, vehicle, and equipment damage to outside crews; and how has insurance for this been handled?
10. What has been your utility's experience with FEMA with regard to financial aid to help cover costs associated with MA? Have there been problems with this process?

Forms and Diagrams Section

Description: This part of the Exhibits section will feature ready-made forms that were highlighted in the text for the purpose of exercises. Please refer to the chapters and content for use of the forms. Diagrams are also included in this section, and a brief description of the diagrams will precede each one.

Form: Articles of Corporate Preparedness

Description: This tool will offer a number of prerequisites to consider when developing a comprehensive program for your utility. Review the individual prerequisites and consider what kind of action plan will help bring resolution in making it a part of your overall program. Assign the action and then monitor progress. Review each of the prerequisites every year to help ensure your success in maintaining preparedness in all areas of the utility.

Articles of Corporate Preparedness:
Prerequisites for Responsible Emergency Preparedness in Organizations

In today's environment, we can sometimes lose sight of preparedness issues that can have a costly impact on company operation when disasters strike. One way to keep preparedness issues in focus, and to get action items resolved, is to review and take appropriate action on the prerequisites written here. By assessing the status of each prerequisite objectively and honestly as being completed or not completed, many of the major issues surrounding preparedness in your organization will have been analyzed. This list should be reviewed on an annual basis by those empowered and committed to resolve the issues, because conditions change in organizations. Below each prerequisite is a place for you to begin to formulate an action plan to make it possible to meet the prerequisite. You are strongly urged to get input from the various people that you work with in order to make your action plans more universally sound and beneficial.

1. My organization has a preparedness and response plan to cover the recovery and/or the restoration of our core systems and services.

Action Plan:

2. Individuals are directly responsible for maintaining each plan. (If so, name each person who has that responsibility for each plan and how frequently each plan is updated.)

Action Plan:

3. All employees in my organization have been briefed or trained on the workings of our emergency plans, and each employee has been briefed on his or her emergency duties and responsibilities.

Action Plan:

4. Each plan is tested annually, or more frequently, to help ensure that our plans will work for us. We devote the necessary time and resources when testing to help people better understand their roles.

Action Plan:

5. We monitor our environment continuously to allow us to gear up for a potentially damaging event in the least possible time. (Who monitors and how do they do it?)

Action Plan:

6. Our plans employ measurable, discernible triggers (events that set the people and plan into motion) that foster a rapid response to emergencies.

Action Plan:

7. People in my organization (name them) regularly review applicable emergency plans with outside organizations that have direct responsibility for assisting us, or working with us, during an emergency.

Action Plan:

8. People in my organization are receptive toward resolving the issues that are important to emergency preparedness. (If not, what can we do to change this?)

Action Plan:

9. People in my organization are encouraged to point out problems that reduce our level of preparedness or make for hazardous conditions. These problems are prioritized and added to a list of action items to be resolved. Each item is assigned to an individual or group with an aggressive target for resolution.

Action Plan:

10. My organization has a "crisis management team" that consists of executives who are assigned to deal with the decision-making needs for any major emergency that comes our way.

Action Plan:

11. We monitor the whereabouts of decision makers in our organization. Alternates are assigned for each, who carry out the duties of primary decision makers who are not available.

Action Plan:

12. All critical facilities in my organization have site disaster or site evacuation plans installed to foster a quick setup of backup work sites for employees.

Action Plan:

13. All critical buildings in my organization have standby power systems and logistical needs that are adequate for making the facility self-reliant for several days following a disaster.

Action Plan:

14. Our information processing operations are reinforced and supplemented with backup procedures to help reduce the level of dependence on computers for critical operations. We also have a tested disaster recovery plan to restore computer operations.

Action Plan:

15. We have a communications restoration plan that makes it possible to restore communications across the organization in the least possible time.

Action Plan:

16. We have a documented, rehearsed plan for communicating with the media, vendors, emergency management agencies, and governing agencies during recovery.

Action Plan:

17. Should disaster strike, we have a quick and effective method of assessing damage to our facilities and core business systems.

Action Plan:

18. We know that our employees, and people who are brought in to assist us, are the most critical resource for recovery. Our workforce needs have been arranged, which includes the personal and logistical needs of our people.

Action Plan:

19. Our budgets, performance appraisals, and corporate goals are written and administered with recognition of the ongoing needs of corporate emergency preparedness.

Action Plan:

20. At least one person in our organization globally looks for "weak spots," oversees and fosters the development and maintenance of emergency preparedness and response plans, and offers guidance to people who are charged with developing or maintaining such plans. That person is fully backed and supported by management on all preparedness issues, and is given the authority and resources to suggest and make changes to enhance preparedness.

Action Plan:

Form: EP-1, Developing the Plan Scope

Description: From the text, the purpose of this form is to get started on developing a model scope for your emergency plan. Directions for completing the form are included.

EP-1

Developing the Plan Scope

Instructions: The scope of any emergency plan is formulated first in order to identify the purpose of the plan. The text sets forth a number of examples for you to review. Once you have a feel for developing a useful scope, write your plan scope below and continue on to the next section. You may make copies of this form prior to writing on it. If you are beginning to develop an actual plan, you may use this form to begin documenting your plan.

(You may write your answers below.)

Plan Scope

(This plan will…)

Remember: If you make several attempts at writing a scope, evaluate and rank them by number: for example, 1 (best), 2 (good), 3 (acceptable). You are urged to ask others to assist you. It's a good way to get task force or committee members to begin to work together!

Form: EP-2, Developing the Risk Assessment

Description: From the text, the purpose of this form is begin to define areas of risk to critical systems and services that go on each day in your utility. The risks are examined, and response strategies are developed. You will then look at ways to mitigate risk and, if necessary, recover the system or service in the event that a damaging event has compromised the system or service to a point where it no longer can meet the standards you have set. It may be

partially available, operating at a reduced level of performance, or it may be unavailable. In either case, it will be necessary to implement action to recover. You will also want to implement one or more metrics that help you determine the level of importance that needs to be placed on the loss and, from that, prioritize recovery. You may also develop this assessment using a spreadsheet or by using a commercially developed risk assessment tool. Also review the use of Form EP-3, which is closely related to this form.

EP-2

The Risk Assessment

Instructions: The risk assessment is used to identify risks that could cause or contribute to a temporary or permanent interruption to the operation of a device, system, or service. Your goal is to determine which risks are reasonably likely to occur, based on what you know about the operation of the entity that you are trying to protect. Develop a list of reasonable risks using the most concise writing possible. Review the examples in your manual.

Scope (from form EP-1):

REASONABLE RISKS

Example: A severe storm could inundate generator and control equipment with water.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Form: EP-3, Prioritizing Core Services

Description: From the text, the purpose of this form is to prioritize the systems and services that are of importance to your utility. This form works closely with the Form EP-2.

EP-3

Prioritizing Core Services

Instructions: Make one copy of this form for each contingency listed on form EP-2. For each contingency listed on form EP-2, write down as many essential core services as you can think of that must come back on line as quickly as possible. Because the example given in the book refers to an isolated emergency, take a blank EP-2 form and, for exercise purposes, write down one or more contingencies that could occur in your company that would be serious enough to affect several departments. Once you have done this, proceed to list the core services that would be affected by each contingency.

Example: The Smith Electric Company lost three microwave communications sites due to sabotage. Many vital communications-related tasks rely on the microwave system. The estimated return to full service is two weeks. List the vital core services that must be restored within twenty-four hours, forty-eight hours, seventy-two hours, etc. Prioritize each by numbering them from most to least important. You may also like to weight these by placing a dollar-loss-per-hour or per-day.

ESSENTIAL CORE SERVICES TO RESTORE:

1. Supervisory control and data acquisition (SCADA) to substations
2. Host computer link
3. Security surveillance systems links

———————————

Your example contingency from your company:

ESSENTIAL CORE SERVICES TO RESTORE:

1.
2.
3.
4.
5.
6.

Form: EP-4, Developing Recovery Strategies

Description: From the text, and Forms EP-1 and EP-2, you can begin to develop the strategies necessary to restore core systems and services. Developing Procedures (see Form EP-5) may also need to be written to

help guide the person or team to perform the correct steps to complete the strategies you've outlined.

EP-4

Developing Recovery Strategies

Instructions: Recovery strategies are instrumental in developing viable recovery procedures. Review the examples in the text to help you and your group come up with good strategies for your own emergency planning project. Review the work that you've done on prior forms and the notes that you've made to narrow your focus and build your strategies. The example below can be used if you have no immediate project in your organization.

Example: The customer inquiry unit (call-taking center) of the Rockville Gas Company places importance on the timely response to customer calls. The center handles hundreds of calls a day from across its service territory. Many calls relate to billing questions, but some require a customer service representative to dispatch a repair crew to the customer's home. A task force is now developing strategies for relocating the center, should a fire or some other emergency make it necessary to evacuate.

SAMPLE STRATEGIES:

1. Teams from Security and Facilities are dispatched to the center to assess damage and interface with local emergency services organizations, such as fire and police personnel. A determination is made as to whether the building can be reentered.
2. Teams from telecommunications and support departments are dispatched to set up call-taking services in the "emergency center," in Paterson. Security Dept. is notified to provide access and security services to alternate site.
3. Inquiry representatives take positions answering calls at alternate site as soon as calls are diverted on system. Shifts are set up in advance for maximum coverage during peak business hours.

Others?

YOUR STRATEGIES:

1.
2.
3.
4.
5.

Form: EP-5, Developing Procedures

Description: As described in the text and in completing Form EP-4, it may be necessary to develop recovery procedures to ensure success in recovery of a core system or service. You can begin to get your procedures in order by using this form or using your electronic device to write and format the procedures for easy transfer to the plan or procedure manual you are writing.

EP-5

Writing Emergency Procedures

Instructions: You learned in the text that effective procedures are simple to read and understand. The text provides several examples on procedure writing, so we won't repeat them here. Pick a strategy that you wrote in the last section and write several procedures that will make that strategy work. Where will these procedures appear in your plan, given your event time line?

STRATEGY:

PROCEDURES:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Form: EP-6, Event Timeline

Description: From the text, the purpose of this form is to consider the event timeline. Following a major storm, for example, you will want to perform certain tasks at times that will facilitate restoration, given limited resources. This form, which can also be created on a spreadsheet, can make it easier for you or your team to consider what will be happening as you move through the hours and days, as necessary, needed to recover and eventually restore core systems and services to pre-event levels.

EP-6

Event Timeline

Instructions: When you develop your strategies for recovery, it's beneficial to develop a timeline to put recovery steps into sequence and to estimate how long each task might take to complete. Can some tasks be done in parallel, i.e., while other tasks are being done? Which tasks must be done in series, i.e., in a set sequence? In the space below, think about tasks that must be completed immediately after the damaging event. Place them in their proper sequence along the timeline. Once you have your timeline and strategies in place, you will be ready to move on to writing procedures and organizing them in your plan. Create your own timeline form to fit your needs. This is simply an example using fifteen-minute increments.

*Note***:** In more complex plans, it may be necessary to simply list the tasks that must be completed, then arrange them in proper sequence after you have them written down. In more complex events, it may be beneficial to use project scheduling software on a personal computer to help determine sequence and time to complete recovery.

———————————

Time Zero: Event occurs

List recovery tasks below, in sequence.

+15:
+30:
+45:
1 Hour:
+15:
+30:
+45:
2 Hours:
+15:
+30:
+45:
3 Hours:
+15:
+30:
+45:
4 Hours:

Form: EP-7, Emergency Duty Assignments

Description: From the text, the purpose of this form is to assign individual responders to roles that they will assume when recovering from damaging events. It is recommended that these roles be developed in your personnel database to automate the process of determining how many people you will need in each role. You are also urged to consider the Incident Command System (ICS) model for a unified command structure. (Refer to ICS models available through the FEMA website.)

EP-7

Personnel Emergency Duty Assignments

Instructions: Use this form to help detail the emergency duty assignments for people in your organization. Begin with your strategies form. Determine what action will be necessary to complete the strategies geared to restore your core services. Develop the procedures to fit the strategies. Assign personnel or teams to complete the procedures. Map out the personnel requirements for each strategy.

Strategy: Answer customer calls with qualified personnel twenty-four hours a day. Set up teams to cover shifts, allowing for breaks.

Name	Emergency Duty Title	Team & Shift	General Responsibilities
Bill Smith	Inquiry Rep	A: 6 a.m.–2 p.m.	Take customer calls Complete emergency service orders Coordinate repair schedule with operations Discuss options for service with customers on medical alert rosters

Use a similar form to develop your own rosters. You can add more columns to include reporting location, team supervisor name, etc. Think about what information will be useful on your emergency duty rosters, and then design a form to help organize that information. To add more versatility, make the information part of your regular employee database and revise it on a regular basis.

Form: EP-8, Emergency Planning "Info Base"

Description: From the Emergency Plan Development Model, we can develop an emergency planning information base, or info base, and organize the

contents for later reference. Keeping information that is relative to events that affect utilities can help you with your emergency planning. Of course, putting this information into a spreadsheet or computer database can make the information easily searchable, so I would encourage you to use those tools.

EP-8

Emergency Planning Info Base

Instructions: A form like this can help you organize your information. Feel free to make copies of it and use it while doing your research. The form can make it easier to transfer information to a separate computer database later on, if desired. You may also load this form into your word processor and edit out these instructions to provide more space.

Plan _____ Company _____
Topic _____
Publication Name _____
Edition _____ Page(s) _____ Publisher _____
Date Published _____ Author _____
Information _____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Recorded by _____ Department _____ Date _____

Spreadsheet Risk Assessment Tool

Description: The illustration on page 199 is a reproduction of a spreadsheet that was used to help complete a risk assessment of critical systems and applications that are used for various processes that are important to the operation of the company. Of course, the spreadsheet could be designed in a number of different ways to help you determine which of your applications are more critical, and from this, priorities for recovery can be established.

Utility Emergency Program Resources Menu

Description: Described in the text, this simple model (Figure 10.2) will allow users to point and click their way to information relative to emergency planning on your utility website or at websites that are directly related to planning for emergencies.

Some Prudent Questions to Consider for Utility Organizations

Description: The following brief list of questions can start a discussion concerning emergency program administration. You are encouraged to add more questions and consider their overall impact on your utility.

Emergency Program Administration
Some Prudent Questions For Organizations

- Are several people monitoring your environment, key business systems, and services?
- Are triggers for mobilization in place?
- Are contact lists up to date and handy?
- Do people know their emergency assignments?
- Have you talked with a "restoration" company (site disasters)?
- Have you built alliances with other firms, vendors?
- Is your video camera handy? (Video and photograph your recovery!)
- How will you communicate: phone, fax, voice mail, e-mail, TV, radio, pager, cellular, BBS, messenger, overnight mail, etc.?
- How much of your business depends upon the mail, telephone, computer, etc.? Shouldn't you have plans to cover the loss of them?
- How will you handle communications with employees, media, agencies, vendors, contractors?
- Could clean-up be an issue? Who will do it? Do they hold drills?
- How will you handle the injury or death of an employee?
- How fast can essential equipment be replaced?
- Can you quickly switch from electronic to manual methods?
- Do you need backup power or an UPS?

Emergency Duty Description Form

Description: This form can be used to sketch out a description of duties for each responder, which can then be used to populate a section of your plan dedicated to assigning personnel to response duties. This can easily be put in electronic form for building a database of emergency duties that can be printed out prior to exercises or real events.

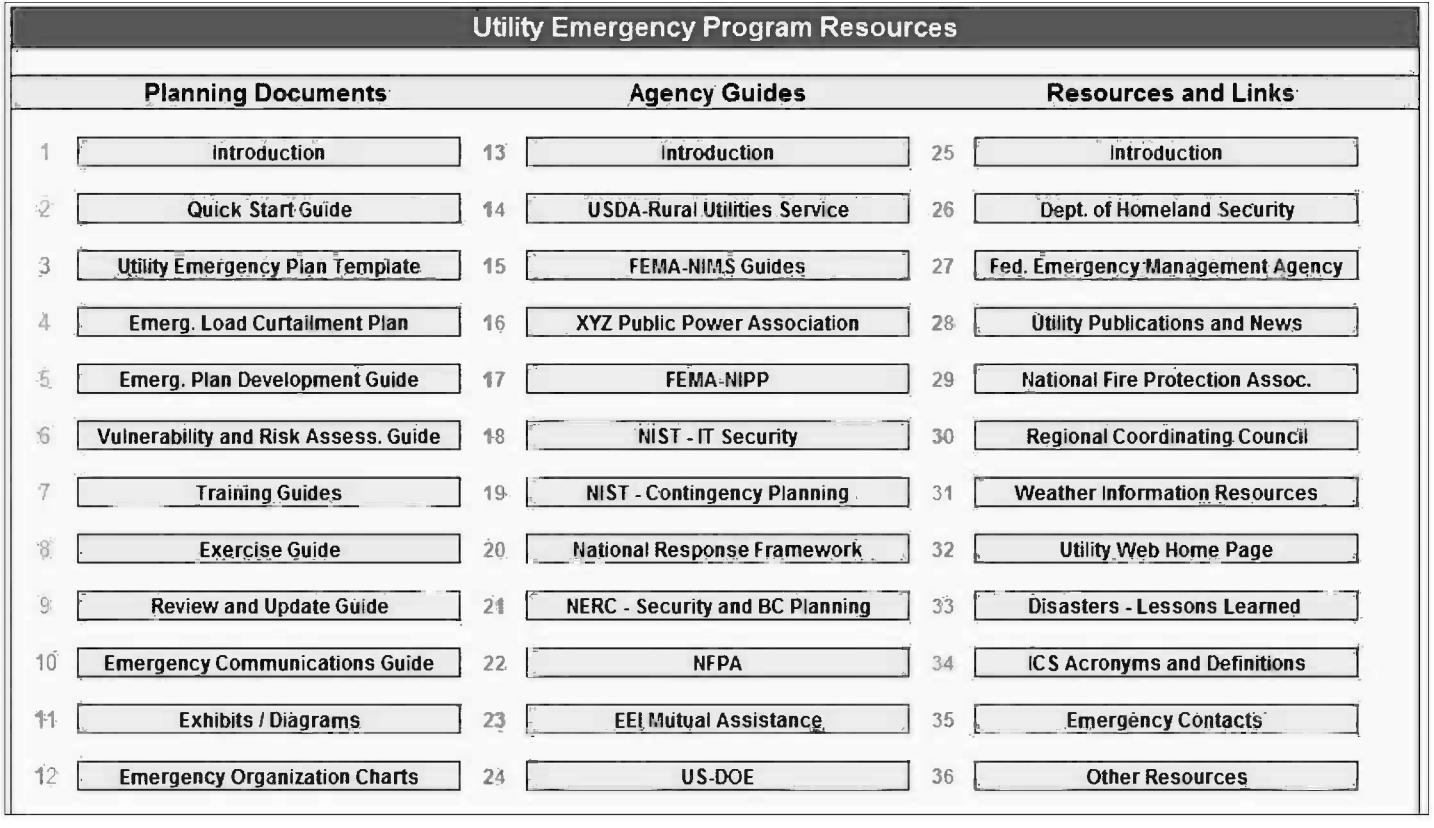


Figure 10.2 Utility Emergency Program Resources menu.

_____ Company

Emergency Duty Description

Date _____ Event Description _____

Name _____ Employee Number _____

Regular Supervisor _____ Phone _____

Assigned to Supervisor _____ Phone _____

Emergency Reporting Locations _____

Special Needs for This Duty _____

General Duties and Accountabilities (List Below):

Reporting Requirements _____

How Often _____ To Whom _____

Report by ( ) Phone ( ) Report Form ( ) Messenger ( ) Fax ( ) Cellular ( ) Radio

Include in your report:

Other Comments (include work relief schedule, if known):

Don't become part of the emergency; work safely every day.

Sample Emergency Plan Contents

Description: Here is another list to consider when you are developing sections in your emergency plan. You can use them as examples of foundational topics, but feel free to customize the list as you continue to develop your plan.

Sample
Emergency Plan Contents

1. *Quick Locator* (optional): For larger plans, think about placing a section in front of the manual to help users locate information quickly, by topic, arranged alphabetically.
2. *Contents*: A detailed table of what's in the plan.
3. *Summary*: Plan purpose and recommended use.
4. *General Information* (optional): Introduction; policy statement.

5. *Pre-Emergency Checklists*: Used to get your organization up to speed in a hurry!
6. *Administrative*: Command and control (who's in charge; reporting requirements; general setup of administration; crisis management team, etc.).
7. *Communications and Reporting*: Notifications and communications procedures; reporting; use of communications systems, etc.
8. *Coordination and Safety*: Coordination issues that affect plan execution; involvement with outside agencies; safety issues that must be addressed.
9. *Customer and Employee Services*: Procedures for handling immediate needs of customers and employees when disaster strikes.
10. *Workforce*: How the workforce is set up to handle recovery; emergency teams; lists and descriptions of emergency duties; special assignments.
11. *Restoration Support*: Role of support departments; how to get specific services.
12. *Outside Assistance*: Plans for bringing in teams, personnel, and equipment from other companies to supplement internal sources. How will you handle a number of additional people?
13. *Mobilization*: Triggers identified and what happens next.
14. *Damage Assessment*: Procedures for assessing damage following the event; channeling the information back to decision makers.
15. *Restoration*: Procedures for restoring a system or service to a predefined level. For wide-area emergencies, decision making is decentralized.
16. *Reference Materials*: Used to support the information in the plan; charts, diagrams, lists, maps, other references.

Sample Newsletter

Description: Figure 10.3 depicts an example of a newsletter that may be considered to promote various aspects of emergency planning that you want your public to see. Of course, you can customize the content to fit your needs.

Topic This Issue:

An introduction to your local utility's emergency planning program

Special points of interest:

- Our dedication to emergency planning and your safety
- The importance of communications
- Major storms and their effect on service
- Restoration priorities
- Public use of emergency generators
- Outside assistance Working together

Inside this issue:

Welcome!

Power-On News

Volume 1, Issue 1 Month, Day, Year

Emergency Planning at Your Local Electric Utility

Emergencies affect us all and some affect the delivery of electric power to our communities. The employees at (utility name) are interested in sharing information on about our emergency plans. That's why we are sending this newsletter to all of the dedicated professionals that respond to emergencies in our communities every day.

Our employees share in the mission to maintain public safety and security by restoring the electric system when it's damaged by storms and other events. Electric power helps people rebuild their homes and businesses, powers the devices that bring them information, and the systems that heat, air condition, and light their homes.

During major storm emergencies, the electric service system can be severely impacted by high winds, water, ice, and flying debris. In order for utility employees to work effectively and in a coordinated and safe manner, we have developed emergency plans. Emergency plans form the basis for action when storms and events of varying severity cause power interruptions. Some of the key strategies and procedures that are written in the plan include the following:

- System monitoring and response levels for activation
- Incident Command System teams-based response (Interpreted from FEMA's approach to handling emergencies)
- Damage survey and assessment procedures
- Communications procedures
- Emergency notifications for the public, the media, officials, and emergency management professionals
- Contact lists
- Physical security
- Cyber security
- Mutual assistance (from other utilities)
- Safety guidelines

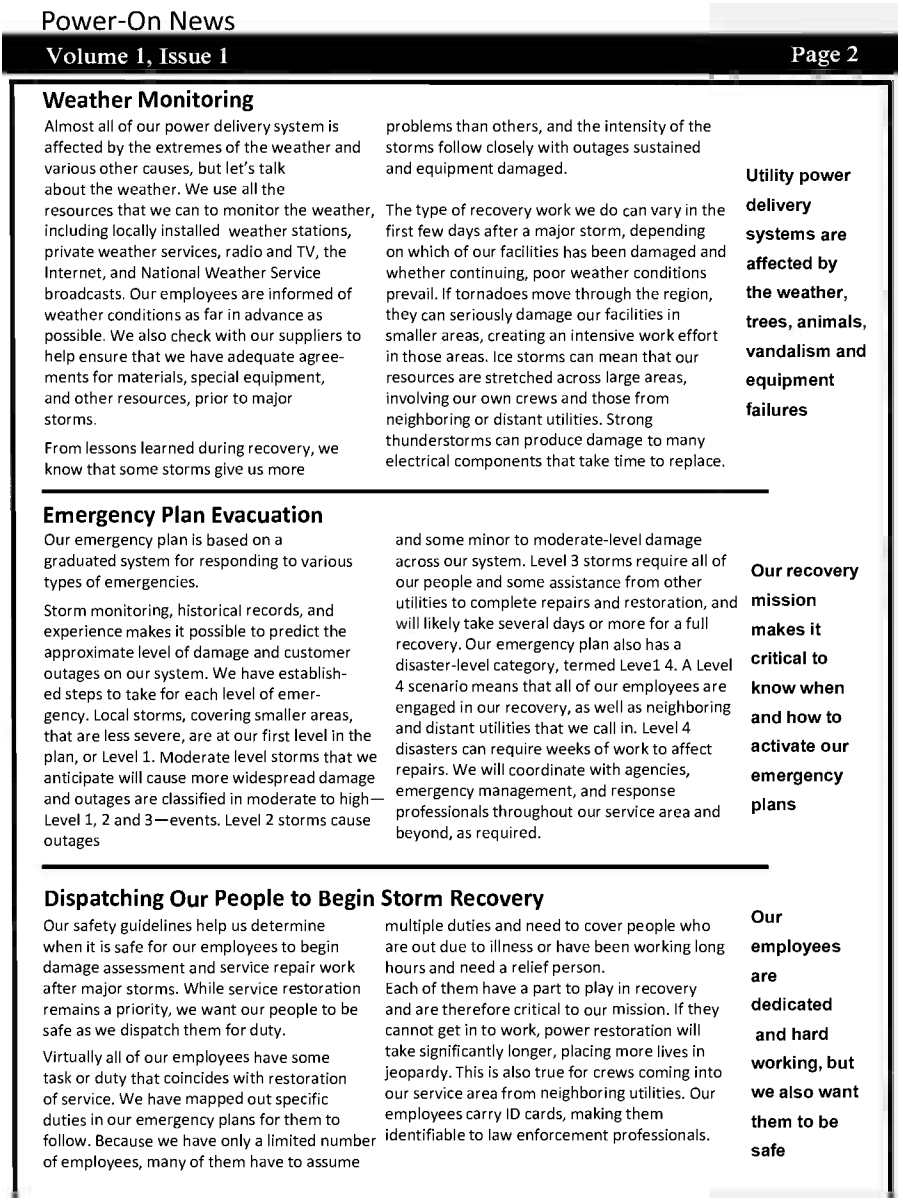
Prior to writing plans, we perform a vulnerability and risk assessment to help us prioritize our response to outages and damage to our critical system components. After the plans are developed, we train our employees on their responsibilities and hold formal exercises annually to prepare them for real events. Lessons learned from each storm are recorded and plans are revised to help mitigate risks.

Emergency plans are revised at least once a year and are held as secure documents, so they don't fall into the wrong hands.

Communicating Dangerous Conditions to Others

Our dedication to safety in the field requires us to communicate with anyone in harm's way and help to eliminate potential dangers on the street. As an emergency response professional, if you see a potentially dangerous situation, such as wires down in the street, please notify us as soon as possible and we will dispatch the right crews to the scene. Before, during and after major storms, we use the appropriate media to alert consumers of the potential dangers of using emergency generators, staying clear of downed power lines, and we publish consumer checklists for preparing for storms. Once we assess damage and begin repairs, we provide regular updates on recovery progress.

Figure 10.3 Example of newsletter.



Power-On News

Volume 1, Issue 1 Page 2

Weather Monitoring

Almost all of our power delivery system is affected by the extremes of the weather and various other causes, but let's talk about the weather. We use all the resources that we can to monitor the weather, including locally installed weather stations, private weather services, radio and TV, the Internet, and National Weather Service broadcasts. Our employees are informed of weather conditions as far in advance as possible. We also check with our suppliers to help ensure that we have adequate agreements for materials, special equipment, and other resources, prior to major storms.

From lessons learned during recovery, we know that some storms give us more problems than others, and the intensity of the storms follow closely with outages sustained and equipment damaged.

The type of recovery work we do can vary in the first few days after a major storm, depending on which of our facilities has been damaged and whether continuing, poor weather conditions prevail. If tornadoes move through the region, they can seriously damage our facilities in smaller areas, creating an intensive work effort in those areas. Ice storms can mean that our resources are stretched across large areas, involving our own crews and those from neighboring or distant utilities. Strong thunderstorms can produce damage to many electrical components that take time to replace.

Utility power delivery systems are affected by the weather, trees, animals, vandalism and equipment failures

Emergency Plan Evacuation

Our emergency plan is based on a graduated system for responding to various types of emergencies.

Storm monitoring, historical records, and experience makes it possible to predict the approximate level of damage and customer outages on our system. We have established steps to take for each level of emergency. Local storms, covering smaller areas, that are less severe, are at our first level in the plan, or Level 1. Moderate level storms that we anticipate will cause more widespread damage and outages are classified in moderate to high—Level 1, 2 and 3—events. Level 2 storms cause outages and some minor to moderate-level damage across our system. Level 3 storms require all of our people and some assistance from other utilities to complete repairs and restoration, and will likely take several days or more for a full recovery. Our emergency plan also has a disaster-level category, termed Level 4. A Level 4 scenario means that all of our employees are engaged in our recovery, as well as neighboring and distant utilities that we call in. Level 4 disasters can require weeks of work to affect repairs. We will coordinate with agencies, emergency management, and response professionals throughout our service area and beyond, as required.

Our recovery mission makes it critical to know when and how to activate our emergency plans

Dispatching Our People to Begin Storm Recovery

Our safety guidelines help us determine when it is safe for our employees to begin damage assessment and service repair work after major storms. While service restoration remains a priority, we want our people to be safe as we dispatch them for duty.

Virtually all of our employees have some task or duty that coincides with restoration of service. We have mapped out specific duties in our emergency plans for them to follow. Because we have only a limited number of employees, many of them have to assume multiple duties and need to cover people who are out due to illness or have been working long hours and need a relief person.

Each of them have a part to play in recovery and are therefore critical to our mission. If they cannot get in to work, power restoration will take significantly longer, placing more lives in jeopardy. This is also true for crews coming into our service area from neighboring utilities. Our employees carry ID cards, making them identifiable to law enforcement professionals.

Our employees are dedicated and hard working, but we also want them to be safe

Figure 10.3 (continued).

Power-On News

Volume 1, Issue 1 Page 3

Getting Help from Others

Utilities are a part of the nation's critical infrastructure. We must comply with federal guidelines and it has long been our mission to restore the greatest number of customers in the least time. This means calling for assistance from neighboring utilities and those in other states when severe storms interrupt power.

We belong to a mutual assistance network of utilities and share in the mission to provide safe and reliable electric power. When severe storms damage the electric system, a large amount of human and material resources are required. We keep working with all of our resources, and when help arrives, they are quickly dispatched to areas still in need of repair.

We ask that they be welcomed into our service area the same way that crews are welcomed from our utility. They are here to do an important job for all of us and often travel long distances to make repairs and get power to our communities as quickly as possible.

Mutual assistance crews and contractors help clear the way for power restoration in our service area and expedite restoration for many businesses that provide essential services. We also coordinate needs with local food and lodging establishments for our crewmembers and employees who work at remote locations.

Outside help is obtained through mutual assistance planning

When Recovery Takes Longer

Electric systems (power plants, substations, transformers, protective devices, switches, and power lines) are used to generate, transmit and distribute electricity across the country. All of us benefit from the distribution of electric power.

When severe storms move through our service area, they can damage utility towers, poles, power lines and other critical components. Electricity needs a continuous path down to homes and business in order to meet the consumer's electrical needs.

When utility crews enter a neighborhood and begin working on the lines, they sometimes find that consumers are using small generators that can energize lines they are working on, creating a danger to them. This means repairs are delayed until crews are sure power is disconnected from the consumer's end. Workers must protect themselves by disconnecting the houses and businesses that are using generators improperly.

Generators must be used according to the manufacturer's and the utility's requirements, to prevent accidental injuries and deaths. Crews **cannot** restore service when they are in danger. When in doubt about connection requirements, consumers should not use generators.

When recovery takes longer than anticipated, new dangers emerge, often from consumer-owned generators.

Closing Remarks and Invitation

Following major storms, power is restored to the largest number of consumers that can safely receive power. This means that some consumers may remain without power due to severe damage to their homes or businesses, making them unsafe to receive power.

Utility crews work around the clock to restore power when it is safe for them to do so. Power feeding hospitals, medical facilities, police and fire stations, communications facilities, emergency centers and shelters, for example, may be restored on a priority basis, because they are critical to the safety and security of people in the communities we serve.

Our utility is concerned with emergency response workers (police, fire, ambulance, emergency medical technicians, reporters, and others) who work in locations that have pole and wire damage. Response personnel should never approach a wire-down location without knowing if downed power lines have been checked as dead. When in doubt, the utility should be called first.

In closing, this newsletter is offered as a resource to foster frequent communication. We would like to extend an invitation to meet and discuss ways we can improve communication and work more effectively together in the wake of emergencies and disasters.

We would like to extend an invitation to meet and discuss emergency planning for our mutual benefit

Figure 10.3 (continued).

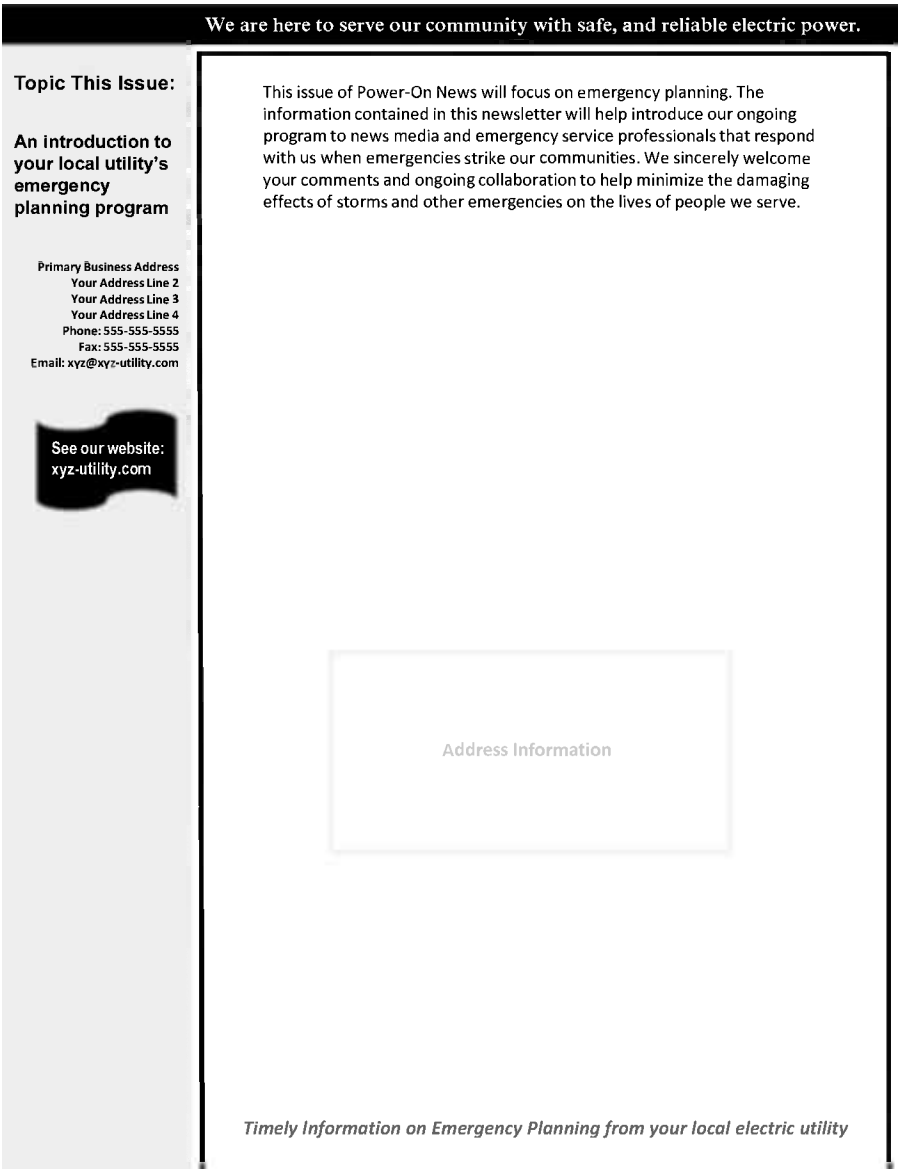


Figure 10.3 (continued).

Sample Plan Audit Form—Paper Version

Description: The form that follows can be used to audit the plans held in paper format throughout the utility. An electronic version that may be e-mailed could also be used. This form is used to determine who has copies of the emergency plan and whether people have the most current version. Many utilities do not circulate their emergency plan outside of their utility, except where there is a requirement to file the plan with legislators, which is becoming a common practice. After editing the content to meet your needs, use the form as a starting point in monitoring the status of your emergency plans around your utility.

(Sample Audit Form)
[name of plan] Plan Survey
Review of Departments' Holding Plans
Officers, Managers, and Department Heads

Prior to releasing the next regular revision of the [name of plan], a survey is being conducted.

We would like to ask for your cooperation in determining the location of [name of plan] being held in various departments. It has been [X] years since the first edition was installed, and many changes have occurred during that time. A survey will help us to better serve the needs of the organization by getting the optimal number of plans in the right departments.

This survey covers the following areas:

1. *Needs*: As a result of the reorganization, some copies may no longer be needed in certain departments. Those plans will be returned. (Instructions to follow.)
2. *Maintenance*: Make sure that the plans are being updated. Determine where to send future revisions.

Criteria for plan distribution: Officers and managers have the option of specifying which departments under their control hold copies of the plan. Officers, managers, and department heads that have direct responsibility under the plan should hold a copy. Managers may hold a copy of the plan, for informational purposes, for people who report to them. They may also borrow a copy for review purposes from the corporate library. Managers and department heads are asked to review the plan with their employees once a year. The average reader can review the plan in about an hour. Participants and decision makers are asked to maintain familiarity with the contents of the plan. All plan holders are asked to update their copy of the plan when revisions are issued (twice annually).

Description of the plan: Approx. [X] pages, double-sided. Distributed in a large three-ring [color of notebook] notebook with [name of plan] written on the cover and spine insert. Cover inserts may be [color of inserts] with black lettering; the most current is white. The plan is comprised of [number of sections] sections, covering [describe what the plan covers].

This survey should only take a few minutes to complete. **Please complete and return this survey by [date]** to [name of person].

Officer, Manager, Dept. Head _____ [name] _____ [phone]

Department Location _____ Location _____

I **(Do) (Do Not)** hold a plan. (Circle one, and verify.) No. of copies held by me ____

Latest revision date: see page [page number] _____ [date].

My copy of the plan is being maintained by _____ [name].

I **(Do) (Do Not)** need a copy of the plan in my area. (Department heads may want to confirm through reporting senior.)

Instructions: Return all unneeded, unassigned, or unaccounted for copies to [name of person]. Please attach a note explaining who the plan belonged to (if known). If you need further instructions, please call [extension of person taking the survey]. Thank you for completing this survey!

Business Impact Analysis (BIA): Process Outage Analysis											
Date:											
(Draft) – Origination Date:											
Form Number:						Accounts Payable			Location:	Comments/Follow-up:	
Business Process:									Phone/Ext.		
Process Leader:									Phone/Ext.		
Survey Participant:									Phone/Ext.		
Survey Participant:									Phone/Ext.		
Survey Participant:											
Survey Instructions:											
Supplemental Instructions Form											
BIA—Notes										BIA Column Header Notes:	1. Financial Impact to XYZ Co. at Max. Allowable Recovery Time:
BIA—Topics Response Form						Supplemental Notes Form					
	A	B	C	D	E	F	G	H	I	J	K
Number	System	Application	Platform	Hardware/ Server Location(s)	Telecomm Notes	Backup Procedures Practiced	Known Outage Costs/ Time Period	Financial/ Other Impact to Company Description	Max. Allowable Recovery Time Objective	Recovery Point for Date/ Frequency of Complete System Backups	Inputs/ Outputs to Other Systems or Apps

Business Impact Analysis (BIA): Process Outage Analysis											
Date:											
(Draft) – Origination Date:											
Form Number:						Accounts Payable			Location:	Comments/Follow-up:	
Business Process:									Phone/Ext.		
Process Leader:									Phone/Ext.		
Survey Participant:									Phone/Ext.		
Survey Participant:									Phone/Ext.		
Survey Participant:											
Survey Instructions:											
Supplemental Instructions Form											
BIA—Notes										BIA Column Header Notes:	1. Financial Impact to XYZ Co. at Max. Allowable Recovery Time:
BIA—Topics Response Form						Supplemental Notes Form					
L	M	N	O	P	Q	R	S	T	U	V	
Security Systems in Place	Manpower Resources Needed for Recovery	Hardware Resources Requirements Documented	Software Resources Requirements Documented	Test Participation Comments	Risk Mitigation Measures Suggested	Risk Mitigation Measures Completed	Minimum Acceptable Recovery Configuration (MARC)	Owner	Phone/Ext.	Meeting With BIA Team/Date Held	

Emergency Planning

An increase in major natural disasters—and the growing number of emergency incidents involving electric, gas, water, and other utilities—has led to heightened concerns about lifeline service utilities and public safety. Due to today's complex, compliance-based environment, utility managers and planners often find it difficult to understand the depth and breadth of action needed to improve organization-wide resilience and meet consumer expectations following major storms and damaging incidents. ***Emergency Planning Guide for Utilities, Second Edition*** offers a working manual that presents new and field-tested approaches to plan development, training, exercising, and emergency program management.

Revised and expanded, this new edition places a greater emphasis on the element of strategy development and examines dependencies for effectively responding to emergencies and disasters. All utilities can gain an advantage using this guide. Readers will learn the fundamentals as well as advanced tactical methods to help bring their utility's emergency program in alignment with current needs.

Topics include:

- Risk prioritization and assessment using tools you already have
- Evaluation of processes and how they affect the utility's mission
- Development of clearly written emergency plans that leverage knowledge gained through risk identification and experience in handling emergencies
- Emergency communications and security issues in today's utilities
- Interfacing with government agencies and emergency management organizations
- Implementing training programs and exercising the plans
- Utilizing mutual assistance crews and support personnel
- Auditing and improving emergency plans and ongoing programs through metrics and modeling
- Efficient completion of damage surveys and other critical tasks during restoration
- How new technologies and systems should be assessed during planning and implementation, and how they may perform and be affected by damaging events
- Implementing methods to help ensure an improved level of response and continued resilience across the utility organization

The book will help utility planners, trainers, responders, and those who work with utilities to more effectively prepare for damaging events and help improve the level of performance in reducing outage times. In doing so, utilities will be able to improve response and restoration strategies while reducing the impact that damaging events have on the utility's infrastructure, people, and resources.

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711 Third Avenue
New York, NY 10017
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