

COMPUTER CENTER PHYSICAL SECURITY AND DISASTER RECOVERY IMPACT ANALYSIS

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1. GENERAL

1.01 The guidelines in this section were developed by a multicompany GUARDSMAN project team under the direction of AT&T Information Systems Technical Support and Standards. This section is issued by AT&T Director—Information Systems Planning and Support for implementation by Bell System Companies.

1.02 Whenever this section is reissued, the reason(s) for reissue will be given in this paragraph.

1.03 Decisions to commit corporate resources to the security and recovery capabilities must be based on a realistic evaluation of the impact on the company should the computer facility be destroyed or severely impaired. This section defines the methods for determining that impact as well as determining the weaknesses of the current security and recovery systems. The results of the impact analysis are used to determine the degree of physical security required and to set priorities on the recovery of the applications.

1.04 There are four steps that must be completed to arrive at the final result from this section. The first two steps are designed to identify and place a value on what needs to be protected and recovered. The next step is to identify the potential threats to the computer facility and to determine the current weaknesses in the physical security. The final step is to make recommendations on methods to correct the current weaknesses based on the value of the environment that is to be protected. Listed below is a brief summary of each of the four steps.

(a) The **application evaluation** is designed to evaluate the criticality of each application to the company. The result of this step is a priority list for recovering applications and an evaluation of the application impact on the corporate priorities.

(b) The **asset analysis** is designed to identify and place a monetary value on the physical assets of the computer facility. The result of this step is an inventory of the physical assets of the computer facility and the cost of those assets.

(c) After it has been determined what needs to be protected, it is necessary to evaluate

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what to protect it from, and where the current weaknesses in the security are. This is the step. The next step, the **physical security evaluation**. The result of this step is a list of recommended measures identified to correct the existing security weaknesses.

(d) The final step is to determine priority of the recommended security measures based upon the impact of the applications affected and on the cost of the physical assets being protected. This step is called the **vulnerability study**.

2. APPLICATION EVALUATION

A. General

2.01 The purpose of the application evaluation is:

(a) To determine the critical and discretionary applications in each computer facility and to develop an application priority list for use during a disaster recovery operation.

(b) To develop an impact evaluation of an application on the corporate priorities, thus providing a means to determine the amount of physical security and recovery planning necessary to ensure the continued operation of the computer facility.

2.02 The method chosen to evaluate the impact of an application on the corporation relies on determining the major areas of the corporation that are impacted by computer systems. These will be referred to as impact areas and are further described in paragraph 2.07. Once the impact areas have been defined, two surveys must be conducted. The first survey, taken at executive level, is used to establish the relative importance of the impact areas. The second survey is used to establish the effects of an application on the impact areas. By combining the results of these two surveys, a list of applications in priority sequence is created. A complete explanation of this procedure is included in Exhibit 1 at the end of this section. Paragraphs 2.03 through 2.06 contain an outline of this process.

2.03 A sample executive level survey is included in Exhibit 2 at the end of this section. It is designed to identify the relative importance to the company of the impact areas in terms of distributing scarce resources during an emergency. The survey (Exhibit 2) should be completed by

each member of the Computer Security Review Board as described in Section 007-590-300. The results of the survey will define, on a scale of 1 to 100, the weighting factors for each impact area.

2.04 A sample application survey is included in Exhibit 3 at the end of this section. It is designed to identify the impact of a given application on the impact areas. The users and developers of each application should jointly complete the survey form. In addition to determining the effect of the application on the impact areas, the survey documents other factors, as described in paragraphs 2.08 through 2.16, which will be used to determine the priority of the application.

2.05 Combining the executive level survey results with the application survey data, as described in Exhibit 1, results in an application priority index. Each application will be associated with a range of numbers which indicates its relative priority within the corporation. This index is the basic priority sequence for the site.

2.06 By evaluating the other factors for each application (see paragraphs 2.08 through 2.16) and altering the priority list as required, a final Recovery Priority List is generated. This list is used in Section 007-590-304 for recovery plan development.

B. Impact Areas

2.07 Seven major areas of the corporation have been identified as being impacted by computer systems. This list may not be complete and each individual company may make substitutions if appropriate. The impact areas substituted must be of equal value. The following paragraphs define the seven impact areas.

(a) **Service:** The ability to provide communication to the customer which includes:

- Dial Tone or Basic Service
- Teleprocessing Service
- Critical Services (Police, Fire, 911, etc).

(b) **Network Maintenance:** The ability to maintain the integrity of the telephone network.

(c) **Customer Relations:** The direct support of the company's ability to meet the customer requirements in the areas of:

- Business Office
- Sales of Services and Equipment
- Installation and Maintenance Service.

(d) **Employee Relations:** The ability of the company to meet obligations to the employees which includes:

- Payroll Applications
- Personnel Support Applications.

(e) **Financial:** The ability to maintain the financial structure of the organization including:

- Recording of Billing Data
- Billing Customers
- Collections and Disbursements
- Corporate Books.

(f) **Operations:** The ability to maintain the internal operation of the corporation including:

- Inventory Control Applications
- Work Procedure (ie, systems used to assist in determining working load requirements and used as scheduling devices)
- Forecasting and Engineering
- On-Line Systems.

(g) **Legal Obligations:** The ability of the company to meet its legal obligations.

2.08 When evaluating the impact an application may have on the corporation, additional factors must be considered. These factors, which are described in the following paragraphs, can be used to modify the priority of an application. For example, if an application is placed low on the priority list but has a very high monetary impact, consideration should be given to changing its priority. This is further explained in Exhibit 1.

2.09 The monetary impact of an application outage must be determined. Listed below are some of the considerations to be used in making this determination. The results should be expressed in projected loss in dollars for 1 day, 1 week, and 1 month. Projected loss may increase significantly per day as outage persists.

(a) **Determination of System Downtime:**

In the economic analysis, the amount of time a computer facility is down will play a vital part. Therefore, it is mandatory that downtimes be associated with each application. The downtime must include the time to return to the point at which the system went down (including interruption, initialization, and rerun), not just the time interval of the interruption.

For example, an application that records billing information amounting to \$2 million a year accrues this revenue at the rate of about \$5500 per day. In addition to the revenue accruing type of application, an application can be involved with service operation, eg, traffic management or critical maintenance. In this case, the loss of the application can result in reduced call completions and, hence, reduced revenues.

(b) **Incremental Labor Cost:** This paragraph concerns labor costs that are related to restoring an application after an interruption. The discussion is limited to only identifiable, incremental, out-of-pocket expenditures. That is, even though there may have been employees disrupted by the interruption, if the task left undone during the downtime can be completed during normal working hours, no incremental charges should be considered. On the other hand, if (catching up the point where the system went down) reduction of backlog requires overtime, this should be included in the economic study.

The number of people involved in this situation may be quite significant since those involved are not limited only to processing system personnel. This is especially true in the case of centralized maintenance and administrative systems where personnel located remotely from the computer facility rely on the application's output to schedule their activities. Furthermore, in the instance of distributed data processing networks, the effects of one application on other applications must be assessed for the total impact on the labor force.

The money associated with this expense will, in most cases, be the major incremental expenditure associated with the interruption. It should be calculated on a loaded basis. For example, a craft person may have a loaded salary of \$18,000 per year, which is equivalent to \$18,000/year divided by 2,000 hours/years=) \$9 per hour. The company out-of-pocket expense is based upon the loaded amount. Of course, overtime rate is usually higher than straight time.

2.10 An on-line application priority could be escalated if its impact is in a critical area of corporate processing.

2.11 Some applications are critical at specific periods. When evaluating these applications, consider the critical processing period applicable to that application.

2.12 Frequency of run should be considered because of volumes and possible impact on down-stream processing.

2.13 The difficulty of reconstruction of a particular application could create an escalation of priority; this is referred to as recovery criticality. If this is the only factor creating a high priority, a review and redesign of the application should be considered.

2.14 Applications are required to include and document the provisions for backup and recovery (contingency plans). If existing applications do not include these provisions, a need to escalate their recovery priority may arise. If this is done, a review and redesign of the application should be considered.

2.15 When determining the criticality of an application, consideration should be given to the quality of the user alternative plans for that application. If the Computer Security Review Board determines that the plans are deficient or lacking, the criticality of the application could be increased. The user should then develop alternative plans and a new review of the application should be scheduled.

2.16 The impact of an application on other applications should be determined. The priority established may be equal to that of the most critical application affected.

3. ASSET ANALYSIS

3.01 The first consideration in computer security planning is to identify what needs to be protected and to assign a dollar value to each item. A method of accomplishing this goal is to assemble all data necessary to break down the elements of the processing environment into a dollar value. The product of this phase will be:

(a) An inventory of all physical items of the processing environment which will be incorporated into the Site Disaster Recovery Manual (Section 007-590-304). In the event of disaster, all information will be readily available to assist the Disaster Recovery Team.

(b) The dollar value of each item of the processing environment which will be input into the vulnerability study and assist in justifying the cost of the recommended remedial security measures.

3.02 Determining the investment in the physical assets of the computer facility will entail thorough and extensive research into present in-place equipment in each element of the processing environment.

3.03 A physical inventory of all equipment in each area of the processing environment specified in Section 007-590-301 must be recorded. This inventory should include:

- Description of item
- Serial number
- In-place cost
- Replacement cost
- Vendor name
- Vendor contact
- Prepared order forms.

(a) On leased equipment, the following additional information will be required:

- Transportation costs
- Set-up cost

- Lessor name
- Lessor contact name
- Obligation of lessee and lessor.

(b) The inventory should include all special equipment used by associated areas and by the user. This list should include such items as:

- Inserting machines
- Decollators
- Slitters
- Sorters
- Collators
- Photocomposition devices.

3.04 Environment control is an intricate part of each computer facility. An inventory of the environmental control systems should be developed. This inventory should contain costs as well as capacities of each element. Included in this inventory are:

- Air conditioning
- Humidity control devices
- Water cooling
- Power equipment.

3.05 The largest single investment in each site is the building and surrounding area. The site investment is determined by an inventory of the space occupied. This would include areas housing:

- Computer facility
- Magnetic media storage
- Air conditioning equipment
- Cooling towers
- Humidity control devices

- Loading docks
- Backup power facilities
- I/O control unit
- Distribution office
- Customer engineers
- Computer output microfilm center
- Storage of supplies
- Administrators
- Communications devices
- Photocomposition center.

3.06 Communications is an important part of each computer facility. Should an interruption occur, it is essential to the operations of the facility that communication be reestablished as rapidly as possible. Therefore, an inventory of all communication devices should be completed and equated to a dollar value. The devices listed below should be included:

- Frames
- Test facilities
- Data sets (modems)
- Data communication circuits
- Voice communication circuits.

3.07 Office furniture and equipment necessary to operate a computer center and associated areas must be inventoried and dollar values specified. Some items to be included are:

- Desks
- Chairs
- Tables
- File cabinets
- Tape racks
- Calculators

SECTION 007-590-302

- Copy machines
- Typewriters.

3.08 Supplies necessary to sustain a complete computer facility (including the computer, staff, and support groups) should be recorded and evaluated. This is not a detailed list of the number of each item, but a list of supplies that are an essential part of any computer facility with the average dollar investment. This list would include:

- Preprinted forms for a particular facility (ie, checks, bill forms, etc)
- Tapes
- Disks
- Stock forms
- Carriage tapes
- All other.

Suppliers should be contacted and emergency replacement time periods firmly established. This agreement and list should become a part of the Site Recovery Manual. (See Section 007-590-304.)

3.09 Each application should be considered as an asset. The cost of the development or acquisition of each application within the computer facility can be used to determine the value of the asset.

4. PHYSICAL SECURITY EVALUATION

4.01 This part is designed to assist a computer facility in recognizing the hazards or threats that exist, to review the present security systems, and to determine their weaknesses. These weaknesses should then be evaluated and recommendations for correction made.

4.02 Possible threats to a computer facility determine the security measures that should be investigated. Threats or hazards can be divided into four categories.

- Natural phenomena
- Design
- People
- Other.

These threats cannot be absolutely prevented. Therefore, plans must be developed to mitigate their impact should one occur. A thorough investigation of an area should determine local hazards. Section 007-590-303 describes the precautions that should be taken to reduce the risks associated with these threats.

4.03 Some types of natural phenomena exist as a threat in each area of the United States. The occurrence rate is low, but the destruction is potentially great with correspondingly high financial loss. The design of the computer building is the best protective measure against these threats.

(a) Earthquakes are a threat to a large portion of the United States. They have a relatively short recorded history and no reliable method of prediction has been developed. Figure 1 illustrates known earthquake risk areas in the United States.

(b) Windstorms represent a risk to most areas of the United States. Tornadoes create a high potential risk for computer facilities located in the Midwestern states. (See Figures 2 and 3.) Hurricanes constitute a high potential threat to the Atlantic Coastal States. (See Figure 4.) Extreme high winds create the same potential risks as tornadoes and hurricanes. Site Computer Security Administrators should contact their local branch of the National Weather Bureau for the historic data on windstorms in their area.

(c) There are three types of hazardous flood areas:

- Riverine flood plains where floods are due to heavy rainfall or snow melt runoff, or to obstruction of a narrow channel.
- Coastal flood plains where floods can result from high tides, wind-driven waves, tsunamis, or a combination of these effects.
- Debris cones deposited at the base of a mountain by storms.

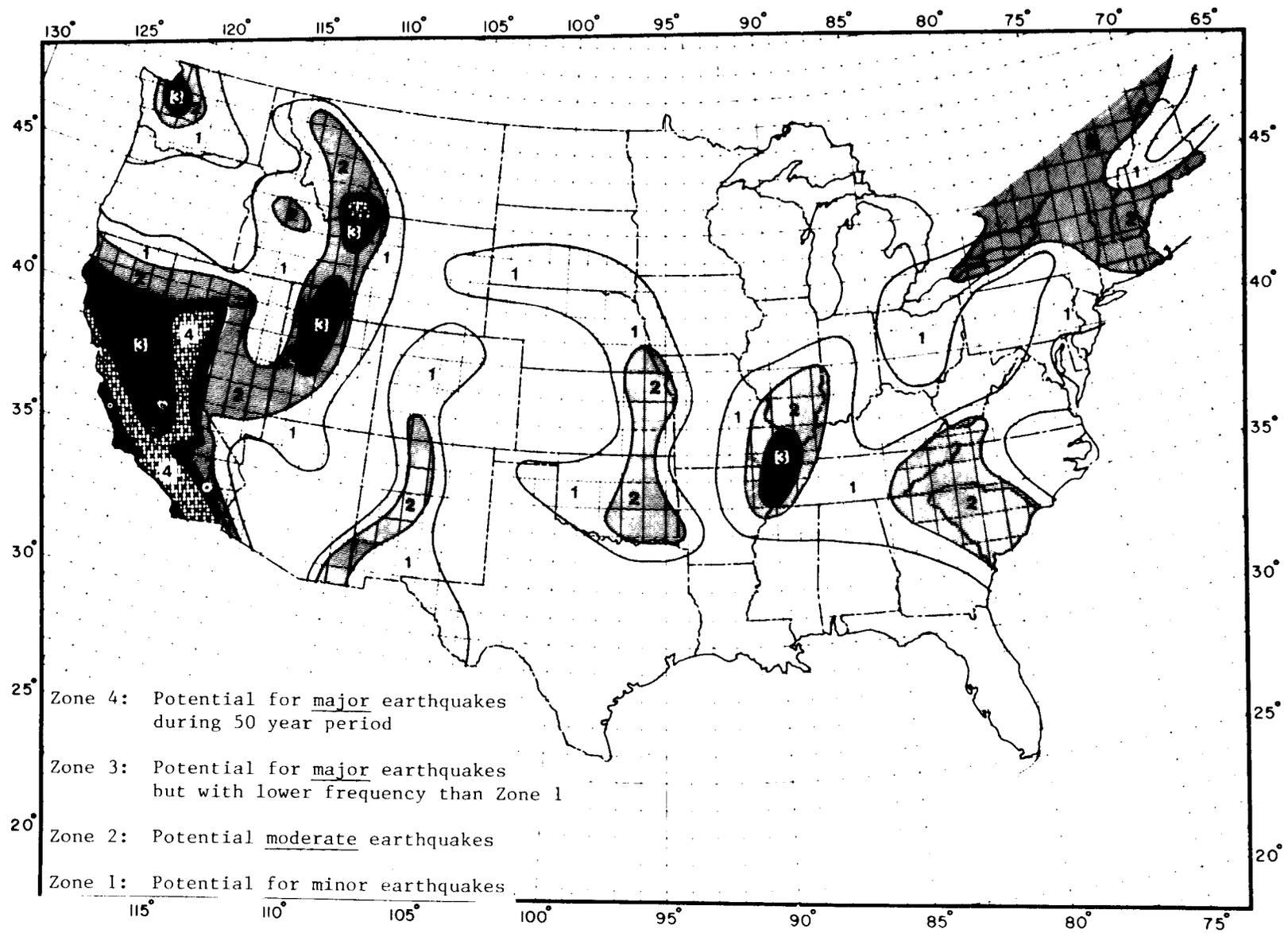


Fig. 1—Bell System Earthquake Zoning Map

**TORNADO INCIDENCE BY STATE AND AREA
1953 — 1969**

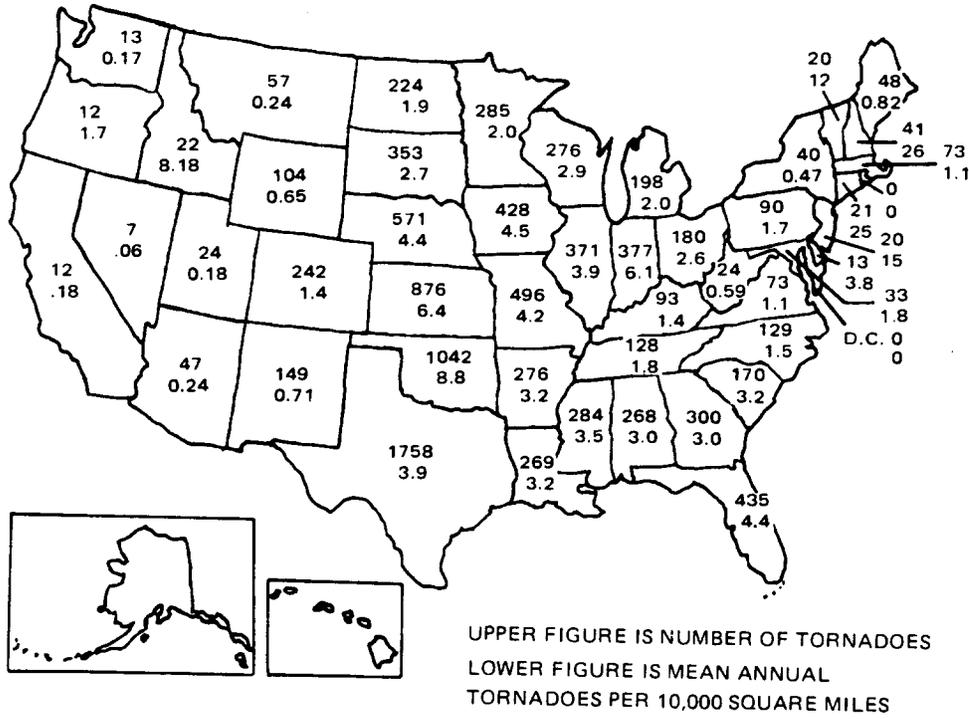


Fig. 2—Tornado Incidence by State and Area

TORNADO INCIDENCE

The occurrence of tornadoes by state during the period 1953 to 1969 is listed below. There was an average of 642 tornadoes per year. The mean number per 10,000 square miles per year is tabulated below for the high incidence states:

STATE	TORNADOES/ 10,000 SQUARE MILE/YEAR
Oklahoma	8.5
Kansas	6.0
Indiana	6.0
Massachusetts	5.4
Florida	4.9
Iowa	4.5
Nebraska	4.3
Missouri	4.3

For all other states the incidence is less than four. There is some evidence to suggest that tornadoes tend to reoccur in some relatively limited areas. Therefore one should not base an estimate of occurrence probability on the gross figures given above. Rather, if the computer facility is located east of the Rocky Mountains, the Computer Security Coordinator should consult with local authorities of the nearest National Weather Service office for information about the past record for the location of the computer facility.

Fig. 3—Tornado Incidence

HURRICANE FREQUENCIES

A study of hurricane frequencies based on occurrences between 1886 and 1970, reported in "Atlantic Hurricane Frequencies Along the U. S. Coastline," will be helpful to the security coordinator in evaluating the exposure of the facility. Results of the study for high probability areas are summarized below:

ANNUAL PROBABILITY (PERCENT)	LOCATIONS
16	Fort Lauderdale, Florida
15	Palm Beach, Florida
14	Brazoria County, Texas
13	Lafourche Parich, Louisiana
13	Mobile, Alabama-Pensacola, Florida
13	Key West, Florida
12	Chambers County, Texas
11	Carteret County, North Carolina
9	Matagorda County, Texas
9	Franklin Parish, Louisiana
9	St. Bernard Parish, Louisiana

Fig. 4—Hurricane Frequencies

Determine the proximity of the computer center to a flood hazard by contacting one of the following Federal Government agencies:

- Army Corps of Engineers
- Tennessee Valley Authority
- Department of Agriculture
- Department of the Interior
- Department of Commerce
- Housing and Urban Development
- The Office of Emergency Planning.

Some state and local agencies may also have information available about past floods which could assist in the evaluation.

4.04 Design and geographic proximity can be a threat to the computer facility.

(a) A thorough survey of the neighboring area should be conducted. Identify possible industrial hazards such as:

- Oil fields
- Nuclear plants
- Airports
- Chemical processing plants
- High crime areas
- Railroad main lines.

(b) As computer technology develops, the size and complexity of a computer center becomes a hazard to itself. When defining backup procedures for a large multifaceted center or one that contains several large scale computers, it becomes evident that consideration should be given to limiting the size of installations to recoverable proportions.

4.05 People represent the largest single risk to a computer center. This risk can be divided into two categories.

(a) Accidents are the most frequent cause of problems in the computer facility.

(b) Deliberate acts that are potential risks to the computer facility may be caused by:

- Sabotage
- Paramilitant groups
- Fraud
- Disgruntled employees
- Arson.

4.06 Other threats (accidental or deliberate) to a computer facility include fire and power failure.

(a) Fire is perhaps the most destructive of these threats. Not only does fire constitute a threat, but water, which is the most common fire deterrent, is also a threat to the facility.

(b) Power failure must be recognized as a threat and procedures developed to prevent this risk from manifesting itself.

4.07 A physical security evaluation is necessary to identify the areas of vulnerability that exist in a computer facility. One method of determining these vulnerabilities is through a self-examination of present security systems. Section 007-590-400 contains a comprehensive list of questions that will assist in evaluating the present security system.

4.08 At the end of the evaluation, a summation of the present security system should be compiled, identifying all security problems. The corrective measures and costs should then be determined. The recommendations resulting from the physical security evaluation are used as input to the vulnerability study.

4.09 The impact analysis for any system or operation should be marked:

PRIVATE

THE INFORMATION CONTAINED HEREIN SHOULD NOT BE DISCLOSED TO UNAUTHORIZED PERSONS. IT IS MEANT SOLELY FOR USE BY AUTHORIZED BELL SYSTEM EMPLOYEES.

The impact analysis should be safeguarded according to existing security measures, such as those issued in May 1973 by AT&T Engineering entitled, *Guidelines and Procedures for Safeguarding Proprietary Information* and similar instructions issued by Bell Laboratories, Western Electric, and Operating Telephone Companies within the Bell System. These guidelines provide overall day-to-day operating procedures for company-wide adherence and should always be followed. These guidelines also provide specific additional procedures which must be implemented in connection with the Bell System Proprietary Data such as Risk Analysis reviews.

5. VULNERABILITY STUDY

5.01 The objective of this part is to determine priority of the recommended security measures with the associated costs from the physical security evaluation.

5.02 Priorities should be assigned with the following considerations:

- The dollar value of the asset to be protected

- The priority of the application(s) with the facility
- The dollar impact of the projected loss of the application
- The cost of the remedial measures themselves.

5.03 Facilities with high priority application(s) but low investment must assume a priority relative to the most critical application(s) within the facility.

5.04 Facilities with high asset value but low priority applications would assume a high priority to maintain the integrity of the physical asset.

5.05 High-impact, low-cost security measures should be the first considered for implementation. Examples of this are key control procedures and welded hinge pins on exterior doors.

1. This exhibit describes the procedure for developing an application Recovery Priority List based on the impact generated by the loss of each application. The Recovery Priority List is developed by evaluating the criticality of each application.
2. Evaluating application criticality is completed in four tasks: The first task involves an executive level survey to generate impact area weighting factors. The second task, which should be done independently of the first, is the user's evaluation of an application's impact significance. The third task involves generating the impact index, and the fourth task modifies the impact index, based on other considerations, to produce a recovery priority list. Other results from this methodology are lists of user organizations which require alternative plans, applications which require Recovery Planning, and indications of which systems have major recovery obstacles.
3. The impact area weighting factors determine the relative criticality of several major objective areas of the company when planning for recovery from a disaster. By surveying corporate executives and combining the individual responses, a single weighting factor is produced for each impact area. A sample survey, with instructions, is included in Exhibit 2. The following should be considered when planning and executing the survey:
 - (a) The survey is based on comparison statements, where each statement compares two impact areas. All statements must be answered by each participant.
 - (b) In the sample survey, the comparison items have been arranged to reduce bias in the responses.
 - (c) Each executive should complete the survey individually and without peer discussion beforehand.
 - (d) The mathematical evaluation is based on having five to twelve respondents.
 - (e) The executives to be included in the survey are discussed in Section 007-590-300.
 - (f) An OTHER category can be added to the survey, or substitutions can be made for the areas included at the discretion of the OTC. But a chosen area should be of the same caliber as the seven major impact areas shown.
 - (g) To avoid biasing the responses to the application survey, the results of this executive survey should not be published or distributed. The executives should be cautioned against discussing the survey or results with anyone involved with the application survey.
4. Combining of the individual executive survey responses to produce the weighting factors is a 2-step process. The first step generates positive and negative decimal numbers as weighting factors. The second step converts these numbers into positive integer numbers in the range from 1 to 100. The first task, combining the individual survey responses, is accomplished using Forms 1 and 2.
5. The numbers produced in paragraph 4 above are the raw weighting factors. The most positive number is the most significant impact area; the most negative number is the least significant. To simplify later use, these numbers are converted to integer numbers using Form 3.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 1 of 10)

6. The integer values produced in paragraph 5 above are the impact area weighting factors as determined by the corporate executive survey. These values are used in paragraph 8. The technique used to generate the raw-weighting factors (row 2 of Form 2) is called a Z Transformation. The technique used to generate the integer weighting factors (row 5 of Form 3) is called a T-Transformation. The Business Research group of each OTC can provide a more detailed explanation of the process and some help in how to use it.
7. The methodology for application impact analysis combines qualitative and quantitative measures, thus allowing subjective evaluations of important areas which cannot easily be quantified. The basic methodology uses a survey form to be completed for each application. (A sample survey form and instructions are shown in Exhibit 3.) Section 007-590-300 discusses the people responsible for completing the survey. Part I of the survey requires numeric estimates, on a scale of 0-4, of the impact the application will have in each of the major impact areas. Separate numeric evaluations are made for two time periods: immediate impact at the time of failure, and impact due to an extended outage. Part II of the survey requires a review of the application design and documentation. Evaluation of the user's alternative plan, the application's recovery planning, and recovery criticality are required; the latter is an indicator of increasing recovery complexity as recovery is delayed. The critical processing period, a time frame in which the system must run with high priority, is needed also. In conducting the survey, the following items should be considered.
 - (a) Since there is only one evaluation for an application, the survey response must represent a consensus of user opinions; all using organizations must be included.
 - (b) The weighting factors for the impact areas should not be known by the application evaluation personnel to avoid bias.
 - (c) The numeric estimates of impact are based on a 0 to 4 scale with the following interpretation.
 - 0 — **Deferred Impact:** Interruption of this application for extended periods will either have no impact or can be accommodated without serious penalty.
 - 1 — **General Impact:** Interruption of this application for up to a working day may cause some inconvenience but is an acceptable disruption of normal work efforts. The interruption will not affect any essential activities and will require only resumption of routine activities after termination of an unscheduled outage.
 - 2 — **Priority Impact:** Interruption of this application causes moderate disruption of normal work effort for a limited group of people, has only minor effect on any essential activities, and/or requires reasonable time and effort to fully restore the application after an unscheduled outage.
 - 3 — **High Priority Impact:** Interruption of this application causes significant disruption of normal work effort for a large number of people, may degrade but does not interrupt any essential activities, and/or may require extensive time and effort to fully restore the application after an outage.
 - 4 — **Critical Impact:** Interruption of this application cannot be tolerated. Generally, such applications directly impact fundamental objectives of providing service, assuring revenue, and maintaining integrity of the core network.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 2 of 10)

- (d) The immediate impact criterion means same day impact. The extended outage criterion means impact after an outage of one week.
8. The application impact index is a combination of the impact area weighting factors (Form 3, row 5) and the application impact evaluations. Separate indexes are calculated for immediate impact and extended outage impact. The procedure for calculating each index is straightforward and produces an index value for each application. The computations are completed using Form 4.
 9. Two impact indexes have now been calculated, one for immediate impact and one for extended outage impact. Higher application index values, in either index, indicate higher priority applications. The mean value can be used for comparisons. An application value higher than the mean has higher priority and should be considered critical. Those applications with values below the mean may be considered discretionary in terms of distributing critical resources.
 10. The immediate impact index should be used to identify and schedule critical applications during a short-term outage. The extended outage impact index should be used to identify critical applications for recovery planning.
 11. Evaluation of the subjective factors in the application survey may require modifications to the application value or list position. An application documented to have a critical recovery requirement, but with a low value, may have to be moved to a higher position in the index list. Such changes in list position may be considered application design flaws; all applications that require and receive higher index positions should be documented and scheduled for design review. The final list, a modified extended outage list which accounts for subjective consideration, is called the Recovery Priority List. A Recovery Priority List in Section 007-590-304 is used in developing a Site Recovery Manual. Other results from evaluating the subjective data are:
 - A list of users with incomplete or no alternative plan, for follow-up review
 - A list of applications with incomplete or no recovery plan, for follow-up review
 - A table of applications versus critical processing periods, for inclusion in a Site Recovery Manual.
 12. Figure 1 of this exhibit is an example of the steps required to create the impact index. The numbers developed are not based on an actual survey and should not be used in any way.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 3 of 10)

SELECTED IMPACT AREA →	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL	← REJECTED IMPACT AREA
								SERVICE
								NETWORK
								FINANCIAL
								EMPLOYEE
								CUSTOMER
								OPERATIONS
								LEGAL

IMPACT AREA TALLY SHEET—FORM 1

For each comparison on each survey, find the column of the selected impact area and the row of the rejected impact area. Place a count mark in the intersection box of Form 1 above.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 4 of 10)

SELECTED IMPACT AREA →	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL	REJECTED IMPACT AREA ↓
								SERVICE
								NETWORK
								FINANCIAL
								EMPLOYEE
								CUSTOMER
								OPERATIONS
								LEGAL
								ROW 1
								ROW 2

IMPACT AREA RAW-WEIGHTING FACTORS—FORM 2

- (a) Prepare a work sheet as shown above. Use Table A to convert the number of count marks in each box of Form 1 into a decimal number in the same box of Form 2 above. Note that only one column of Table A is used and it depends on the number of survey respondents. All boxes in Form 1 with zero count marks generate the Table A zero count value in the same boxes of Form 2 above.
- (b) Add the numbers in each **column** and enter the column sum in row 1. Note that each column can contain positive and negative numbers and that the sum can be positive or negative.
- (c) Divide the sum of each column by the number of impact areas. Enter the result in Row 2 above.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 5 of 10)

	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL			
ROW 1								SUM ①	DIVIDED ②	SQUARE ROOT ③
ROW 2								(VALUES FROM GRID 2)		
ROW 3								RAW WEIGHTS (ROW 2) SQUARE ROOT (BOX 3)		
ROW 4								ROW 3 X 10		
ROW 5								ROW 4 + 50		

IMPACT AREA WEIGHTING FACTORS—FORM 3

- (a) Copy the raw-weighting factors from row 2 on Form 2 to row 2 above.
- (b) Square each entry in row 2 and enter in row 1.
- (c) Add **row 1** and enter the sum in box 1 at the right.
- (d) Divide the value in box 1 by the number of survey respondents and enter the quotient in box 2.
- (e) Take the square root of the value in box 2 and enter the result in box 3.
- (f) Divide each entry in row 2 by the value in box 3 and enter the result in row 3.
- (g) Multiply each entry in row 3 by 10, round to the nearest integer, and enter the result in row 4.
- (h) Add 50 to each entry in row 4 and enter the result in row 5.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 6 of 10)

IMPACT AREAS		ROI	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL
WEIGHTING FACTORS	0								
	APPLICATIONS								
	1								
	2								
	1								
	2								
	1								
	2								
	1								
	2								
	1								
	2								
	1								
	2								
	1								
	2								
									BOX 1

IMPACT INDEX—FORM 4

- (a) From Form 3, row 5, copy the weighting factors to row 0 above.
- (b) List the applications surveyed on the left side above.
- (c) For each application surveyed, copy the evaluations for immediate or extended outage impact to row 1 above for that application.
- (d) For each application and each impact area, multiply the entry in row 1 by the weighting factor in row 0; enter the product in row 2 of the application.
- (e) For each application, total the entries in line 2 and enter the value in column A; the numbers in column A are the index values for the listed applications.
- (f) Add the entries in column A, divide by the number of entries, and enter the result in box 1. The result is the mean value for this index.

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 7 of 10)

TABLE A
Z TRANSLATION TABLE
Number of Respondents

TALLY	5	6	7	8	9	10	11	12
0	-2.020	-2.038	-2.071	-2.103	-2.130	-2.156	-2.189	-2.217
1	-0.842	-0.966	-1.067	-1.151	-1.220	-1.280	-1.335	-1.383
2	-0.253	-0.430	-0.565	-0.675	-0.765	-0.842	-0.908	-0.966
3	0.253	0.000	-0.182	-0.319	-0.430	-0.524	-0.604	-0.675
4	0.842	0.430	0.182	0.000	-0.140	-0.253	-0.349	-0.430
5	2.020	0.966	0.565	0.319	0.140	0.000	-0.114	-0.210
6		2.038	1.067	0.675	0.430	0.253	0.114	0.000
7			2.071	1.151	0.765	0.524	0.349	0.210
8				2.103	1.220	0.842	0.604	0.430
9					2.130	1.280	0.908	0.675
10						2.156	1.335	0.966
11							2.189	1.383
12								2.217

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 8 of 10)

SELECTED IMPACT AREA	IMPACT AREA TALLY SHEET—FORM 1							REJECTED IMPACT AREA
	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL	
								SERVICE
///								NETWORK
///								FINANCIAL
///	///			///				EMPLOYEE
///								CUSTOMER
///	///	///		///				OPERATIONS
								LEGAL

IMPACT AREA TALLY SHEET—FORM 1

SELECTED IMPACT AREA	IMPACT AREA RAW WEIGHTING FACTORS—FORM 2							REJECTED IMPACT AREA
	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL	
								SERVICE
	-2.020	-2.020	-2.020	-2.020	-2.020	-0.842		NETWORK
2.020		-0.253	-2.020	-0.253	-2.020	-0.842		FINANCIAL
2.020	0.253		-0.842	-0.842	-2.020	-0.842		EMPLOYEE
2.020	2.020	0.842		2.020	-0.842	-0.842		CUSTOMER
2.020	3.253	0.842	-2.020		-2.020	-0.842		OPERATIONS
2.020	2.020	2.020	0.842	2.020		-0.253		LEGAL
0.842	0.842	0.842	0.842	0.842	0.253			ROW 1
10.942	3.368	2.273	5.218	2.273	8.668	4.463		ROW 2
1.563	0.481	0.325	0.745	0.325	1.238	0.638		

IMPACT AREA RAW WEIGHTING FACTORS—FORM 2

Fig. 1—Sample Calculations for Application Evaluation Survey (Sheet 1 of 2)

Exhibit 1—Procedure for Developing an Application Recovery List (Sheet 9 of 10)

DISASTER IMPACT AREA SURVEY

This survey is intended to determine, through statistical sampling, the priorities to be assigned to major objectives of the company when planning for recovery from a disaster. The statistical sampling technique is designed to integrate the opinions of several executives without the bias associated with a conventional voting or consensus approach.

The survey procedure uses comparison statements to determine the importance of each major objective area relative to other areas. Responses will be merged with those of other executives to develop a weighting factor for each impact area.

INSTRUCTIONS

1. Please review the impact area definitions on sheet 2 of this exhibit and consider each comparison statement on the survey in light of the definitions.
2. For each comparison statement, check the objective area that you consider more critical in long-term impact on the company and where you would distribute scarce resources during a disaster recovery.
3. To eliminate bias, do not discuss the survey with others until yours is completed.
4. Each comparison statement must be answered even if both areas are considered of equal importance.

Exhibit 2—Disaster Impact Area Survey (Sheet 1 of 3)

IMPACT AREA DEFINITIONS

1. Service — The ability to provide communication to the customer including:
 - Dial Tone or Basic Service
 - Teleprocessing Service
 - Critical Services (Police, Fire, 911, etc).
2. Network — The ability to maintain the integrity of the telephone network.
3. Customer — The direct support of the company's ability to meet the customer requirements in the areas of:
 - Business Office
 - Sales of Services and Equipment
 - Installation and Maintenance Service.
4. Employee — The ability of the company to meet obligations to the employees including:
 - Payroll Applications
 - Personnel Support Applications.
5. Financial — The ability to maintain the financial structure of the organization including:
 - Recording of Billing Data
 - Billing Customers
 - Collections and Disbursements
 - Corporate books.
6. Operations — The ability to maintain the internal operation of the corporation including:
 - Inventory Control Applications
 - Work Procedures (ie, systems used to assist in determining the work load requirements and that are used as scheduling devices)
 - Forecasting and Engineering.
7. Legal — The ability of the company to meet its legal obligations.

Exhibit 2—Disaster Impact Area Survey (Sheet 2 of 3)

DISASTER IMPACT AREA SURVEY

For each comparison statement, check the impact area you consider more important in terms of distributing scarce resources during a disaster recovery.

STATEMENT	AREA 1	CHECK	VERSUS	AREA 2	CHECK
1	Employee	—		Network	—
2	Financial	—		Legal	—
3	Customer	—		Service	—
4	Legal	—		Employee	—
5	Network	—		Financial	—
6	Service	—		Operations	—
7	Customer	—		Legal	—
8	Employee	—		Operations	—
9	Service	—		Network	—
10	Legal	—		Operations	—
11	Employee	—		Customer	—
12	Financial	—		Service	—
13	Customer	—		Network	—
14	Operations	—		Financial	—
15	Service	—		Employee	—
16	Operations	—		Network	—
17	Financial	—		Customer	—
18	Legal	—		Service	—
19	Operations	—		Customer	—
20	Employee	—		Financial	—
21	Legal	—		Network	—

Return to: _____ Room: _____

APPLICATION IMPACT SURVEY

The purpose of this evaluation survey is to determine the impact on several areas of the company resulting from loss of this application. In addition, evaluations are required for several other factors related to disaster recovery preparedness. The survey is intended to be completed jointly by the application developers and all user organizations.

This survey is in two parts: Part I requires evaluations on a scale from 0 (no impact) to 4 (maximum impact) of the application's effect in seven impact areas. These evaluations are made twice, once for immediate impact and once for extended outage. Part II requires evaluation of design and operational factors and cost estimates of the outage.

INSTRUCTIONS

PART I

1. Each participant should study the impact area definitions on sheet 3 of this exhibit.
2. As a group, discuss and decide on the impact values, on a scale from 0 (none) to 4 (maximum) based on the definitions listed below. Include immediate and extended outages in this discussion.
 - 0 — **Deferred Impact** Interruption of this application for extended periods will either have no impact or can be accommodated without serious penalty.
 - 1 — **General Impact** Interruption of this application for up to a working day may cause some inconvenience but is an acceptable disruption of normal work efforts. The interruption will not affect any essential activities and will require only resumption of routine activities after termination of an unscheduled outage.
 - 2 — **Priority Impact** Interruption of this application causes moderate disruption of normal work effort for a limited group of people, has only minor effect on any essential activities, and/or requires reasonable time and effort to fully restore the application after an unscheduled outage.
 - 3 — **High Priority Impact** Interruption of this application causes significant disruption of normal work effort for a large number of people, may degrade but does not interrupt any essential activities, and/or may require extensive time and effort to fully restore the application after an outage.
 - 4 — **Critical Impact** Interruption of this application cannot be tolerated. Generally, such applications directly impact fundamental objectives of providing service, assuring revenue, and maintaining integrity of the core network.
3. Record the final values on the survey form.

Exhibit 3—Application Impact Survey (Sheet 1 of 5)

PART II

1. Each participant should study the definitions on sheet 4 of this exhibit.
2. For monetary impact, each user group, and the developers/maintainers, should provide individual evaluation of daily, weekly, and monthly losses. These losses are combined and reported.
3. As a group, discuss each of the remaining items and develop a consensus of opinion.
4. Record the conclusions on the survey form. Add comments as necessary.

Exhibit 3—Application Impact Survey (Sheet 2 of 5)

IMPACT AREA DEFINITIONS

1. Service — The ability to provide communication to the customer including:
 - Dial Tone or Basic Service
 - Teleprocessing Service
 - Critical Services (Police, Fire, 911, etc).
2. Network — The ability to maintain the integrity of the telephone network.
3. Customer — The direct support of the company's ability to meet the customer requirements in the areas of:
 - Business Office
 - Sales of Services and Equipment
 - Installation and Maintenance Service.
4. Employee — The ability of the company to meet obligations to the employees including:
 - Payroll Applications
 - Personnel Support Applications.
5. Financial — The ability to maintain the financial structure of the organization including:
 - Recording of Billing Data
 - Billing Customers
 - Collections and Disbursements
 - Corporate books.
6. Operations — The ability to maintain the internal operation of the corporation including:
 - Inventory Control Applications
 - Work Procedures (ie, systems used to assist in determining the work load requirements and that are used as scheduling devices)
 - Forecasting and Engineering.
7. Legal — The ability of the company to meet its legal obligations.

Exhibit 3—Application Impact Survey (Sheet 3 of 5)

DEFINITIONS OF OTHER FACTORS

1. **Monetary Impact** — The monetary impact of an application outage must be determined, with results expressed in projected loss in dollars for one day, for one week, and for one month. Projected loss may increase significantly per day as outage persists.
2. **Critical Processing Period**—Some applications are critical at specific periods. When evaluating these applications, consider the critical processing period applicable to that application.
3. **Contingency Plan** — Applications are required to include in all programs and documentation the provisions for backup and recovery of the system.
4. **User Alternative Plan** — Documented and tested procedures to be followed by users during the interval between the loss of services and the recovery of services.
5. **Recovery Criticality** — The difficulty of reconstruction of this application could create an escalation of priority; this is referred to as recovery criticality.
6. **Impact on Other Applications**—The impact of this application on other applications should be determined.

Exhibit 3—Application Impact Survey (Sheet 4 of 5)

APPLICATION IMPACT SURVEY

System Name _____ On-Line _____ Batch _____
 Users: _____ Dial _____ RJE _____
 _____ Leased _____

Part I

Impact Areas	SERVICE	NETWORK	FINANCIAL	EMPLOYEE	CUSTOMER	OPERATIONS	LEGAL
Immediate Impact Evaluation							
Extended Outage Impact Evaluation							

Part II

Monetary Impact \$ ____ / First Day \$ ____ / First Week \$ ____ / First Month
 Comments _____

Critical Processing Period Daily _____ Weekly (Day) _____ Monthly (Day) _____
 Comments _____

Contingency Plan Yes _____ No _____ Partial _____
 Comments _____

User Alternative Plan Yes _____ No _____ Partial _____
 Comments _____

Recovery Criticality High _____ Medium _____ Low _____
 Comments _____

Impact On Other Applications High _____ Medium _____ Low _____
 Comments _____

Exhibit 3—Application Impact Survey (Sheet 5 of 5)