



ICF INCORPORATED

GLNPO CONTINUOUS QUALITY IMPROVEMENT RETREAT

Agenda

Chicago Hilton & Towers
Chicago, Illinois

Thursday & Friday
September 14 & 15, 1989

Day 1

9:00 - 9:15	Why CQI at GLNPO?
9:15 - 9:30	Review Agenda
9:30 - 11:00	The CQI Approach?
11:00 - 11:15	Break
11:15 - 12:30	Overview of CQI Tools
12:30 - 1:45	Lunch
1:45 - 3:30	CQI Tools Continued
3:30 - 3:45	Break
3:45 - 5:00	CQI Tools Continued
5:00 -	Meeting with Project Team Leaders

Day 2

9:00 - 10:00	CQI Tools: Review
10:00 - 2:30	Workgroups Meet to Begin CQI Projects (with lunch)
2:30 - 2:45	Break
2:45 - 4:00	Briefings from Workgroups
4:00 - 4:30	Where Do We Go from Here?
4:30 - 4:45	Wrap-up

THE BIG THREE



TECHNOLOGY



MONEY



POWER



THE BIG THREE

TECHNOLOGY

MONEY

POWER

FORD MOTOR COMPANY:

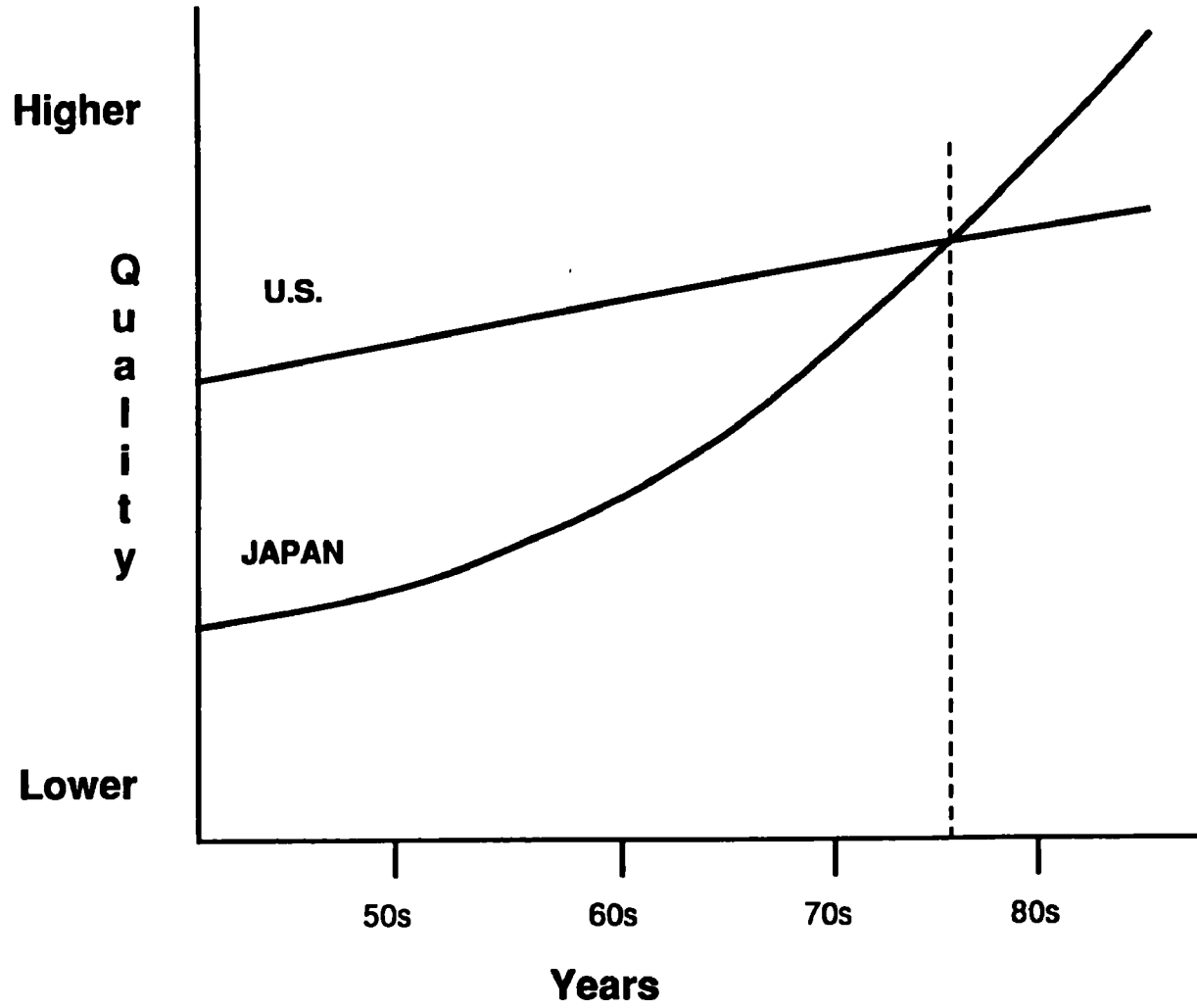
"QUALITY IS JOB 1"

MOTOROLA:

"ZERO DEFECTS IN EVERYTHING WE DO"

QUALITY IMPROVEMENT TECHNIQUES

- ☐ **W. EDWARDS DEMING**
- ☐ **JOSEPH M. JURAN**
- ☐ **KAORU ISHIKAWA**
- ☐ **PHILIP B. CROSBY**
- ☐ **A. V. FEIGENBAUM**



MALCOLM C. BALDRIGE NATIONAL QUALITY AWARD CRITERIA

- ☐ **LEADERSHIP**
- ☐ **INFORMATION AND ANALYSIS**
- ☐ **PLANNING**
- ☐ **HUMAN RESOURCE UTILIZATION**
- ☐ **QUALITY ASSURANCE**
- ☐ **QUALITY RESULTS**
- ☐ **CUSTOMER SATISFACTION**

OMB QUALITY IMPROVEMENT PROTOTYPE AWARD RECIPIENTS

- ❑ EQUAL EMPLOYMENT OPPORTUNITY COMMISSION (1988)**
- ❑ NAVAL AVIATION DEPOT, CHERRY POINT, NC (1988)**
- ❑ FEDERAL TAX DEPOSIT SYSTEM, IRS (1988)**
- ❑ ONE-STEP ACCOUNT SERVICE, SAN FRANCISCO DISTRICT OFFICE, IRS (1988)**
- ❑ FRESNO SERVICE CENTER, IRS (1989)**

**OMB QUALITY IMPROVEMENT PROTOTYPE
AWARD RECIPIENTS
(CONTINUED)**

- ❑ KANSAS CITY MEDICAL CENTER, VETERANS
ADMINISTRATION (1989)**
- ❑ LEWIS RESEARCH CENTER, NASA (1989)**
- ❑ NAVAL PUBLICATIONS AND FORMS CENTER (1989)**
- ❑ NORFOLK NAVAL SHIPYARD (1989)**
- ❑ OGDEN SERVICE CENTER, IRS (1989)**

Continuous Quality Improvement at EPA



THE PUBLIC SECTOR HAS STARTED TO:

- ❑ FOCUS ON THE CONTINUOUS IMPROVEMENT OF ITS PRODUCTS AND SERVICES**
- ❑ IMPROVE QUALITY TO IMPROVE PRODUCTIVITY**
- ❑ INVOLVE EVERYONE IN THE ORGANIZATION IN MAKING CHANGE HAPPEN**

CONTINUOUS QUALITY IMPROVEMENT

- ☐ FOCUS ON THE CUSTOMER**
- ☐ RELY ON THE EXPERTS**
- ☐ IMPROVE PRODUCTIVITY BY IMPROVING QUALITY**
- ☐ CONTINUOUSLY IMPROVE YOUR WORK PROCESSES**

CONTINUOUS QUALITY IMPROVEMENT

- ☒ **FOCUS ON THE CUSTOMER**
- ☐ **RELY ON THE EXPERTS**
- ☐ **IMPROVE PRODUCTIVITY BY IMPROVING QUALITY**
- ☐ **CONTINUOUSLY IMPROVE YOUR WORK PROCESSES**

WHO ARE YOUR CUSTOMERS?

- ☐ **WHOSE NEEDS MUST YOU SATISFY?**
- ☐ **WHO USES YOUR PRODUCTS?**

CUSTOMERS

WHO ARE THEY?

INTERNAL

QAC
Data Processing
RTP
CRL (Bioetics) - Analyzes Precip Samples
CSC - Calculate Loadings of
Metals & Nutrients To
Each of The Lakes

Boss

EXTERNAL

Universities
States
Other Federal Agencies (DOE)

Public
Env. Groups

SUPPLIERS

WHO ARE THEY?

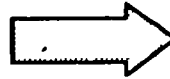
INTERNAL

CSC
Bionetics
GLC (ILP)

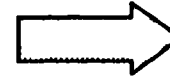
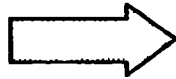
Secretary of State
Grants P.O.

EXTERNAL

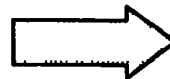
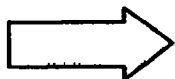
State
Universities
other Federal Agencies



SUPPLIERS	INPUT	GLNPO's OPERATION
Supplies your inputs	Products that you receive	What do you do to convert inputs to outputs? (value added)
<i>Presip Samples From States & Universities</i>	<i>Bionetics Data Analysis of Presip Samples</i>	<i>CSG, Data Processing & I check & enter the data into computer reports</i>



SUPPLIERS	INPUT	GLNPO's OPERATION	DIRECT OUTPUT	CUSTOMERS
Supplies your inputs	Products that you receive	What do you do to convert inputs to outputs? (value added)	Products/Services that you produce	Receive your products/services
States & Universities	Precip Samples	Take precipitation samples & their chemical analysis data	UW-M's & Lake Landings	Annual Landings To Lakes To Creators (States)



SUPPLIERS	INPUT	GLNPO's OPERATION	DIRECT OUTPUT	CUSTOMERS
Supplies your Inputs	Products that you receive	What do you do to convert inputs to outputs? (value added)	Products/Services that you produce	Receive your products/services
 Labs State Environmental Agency	 Lab analyses Remedial Action Plan	 Develop remediation plan Review document	 Report Review of RAP	 State Environmental Agencies IJC

CHANGE

- ☐ **IN THE WAY WORK GETS DONE**
- ☐ **IN ATTITUDES**
- ☐ **IN PROCEDURES**
- ☐ **THAT YOU INITIATE**

CONTINUOUS QUALITY IMPROVEMENT

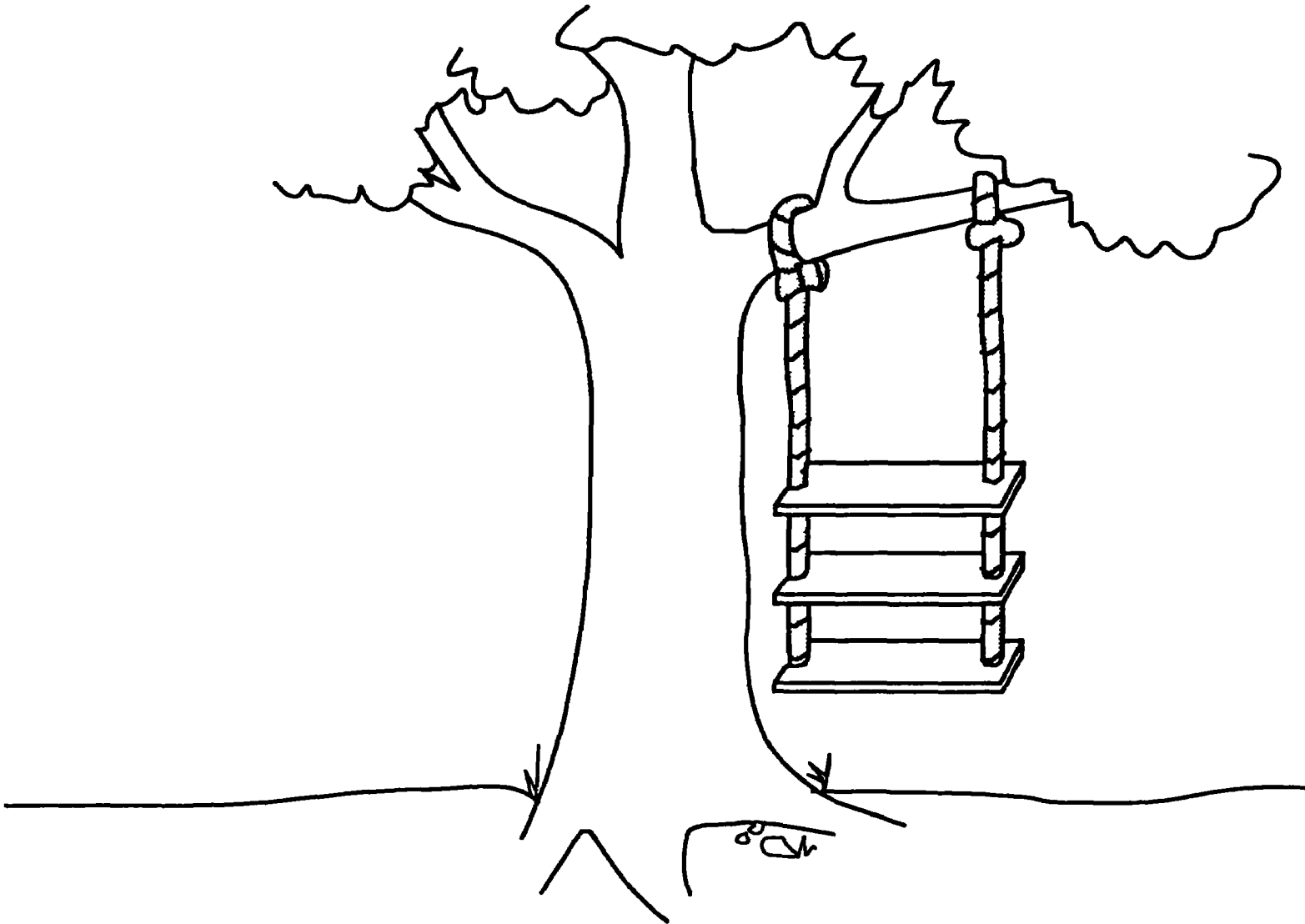
- ☐ **FOCUS ON THE CUSTOMER**
- ☒ **RELY ON THE EXPERTS**
- ☐ **IMPROVE PRODUCTIVITY BY IMPROVING QUALITY**
- ☐ **CONTINUOUSLY IMPROVE YOUR WORK PROCESSES**

AMNESTY

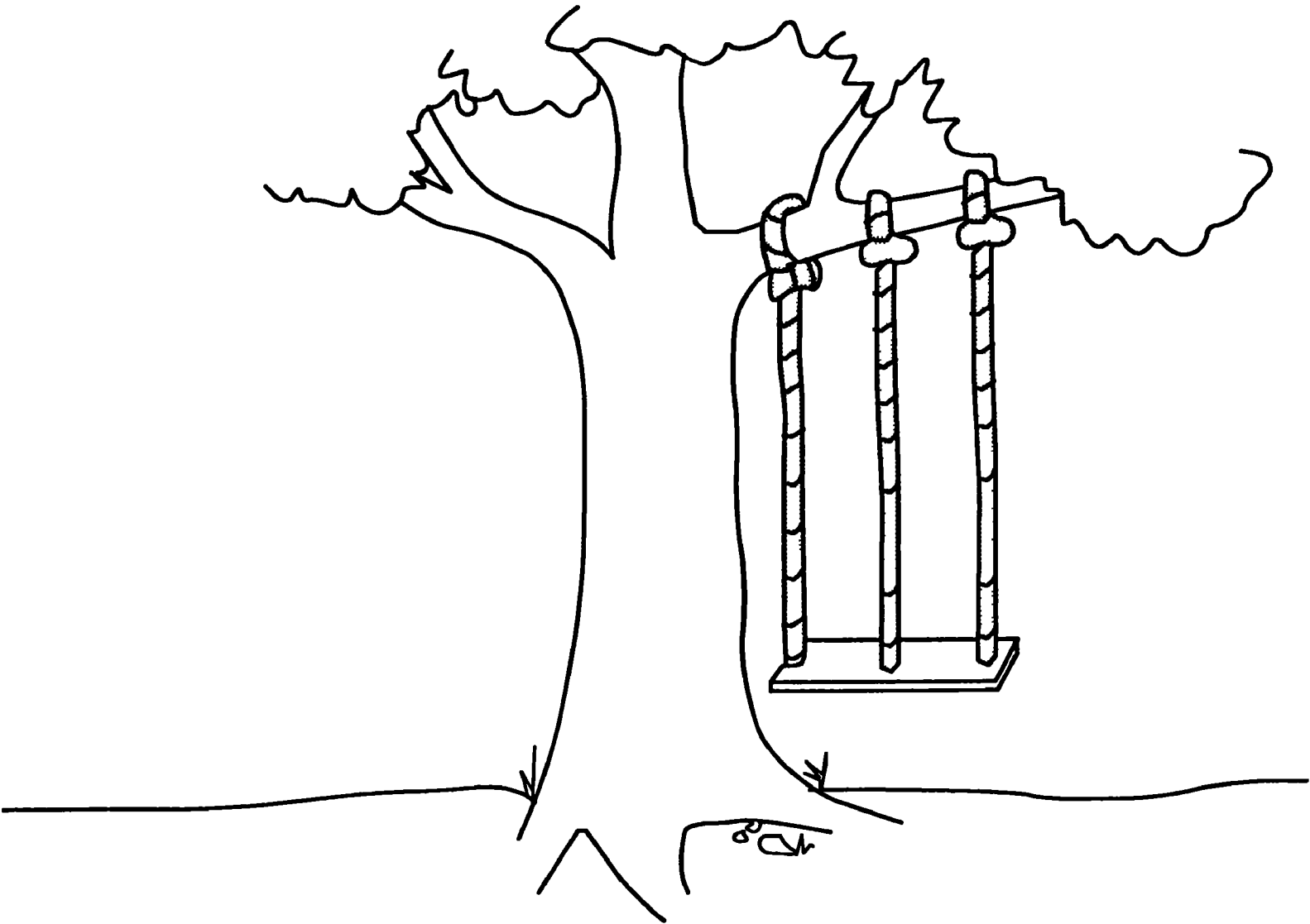
CONTINUOUS QUALITY IMPROVEMENT

- ☐ **FOCUS ON THE CUSTOMER**
- ☐ **RELY ON THE EXPERTS**
- ☒ **IMPROVE PRODUCTIVITY BY IMPROVING QUALITY**
- ☐ **CONTINUOUSLY IMPROVE YOUR WORK PROCESSES**

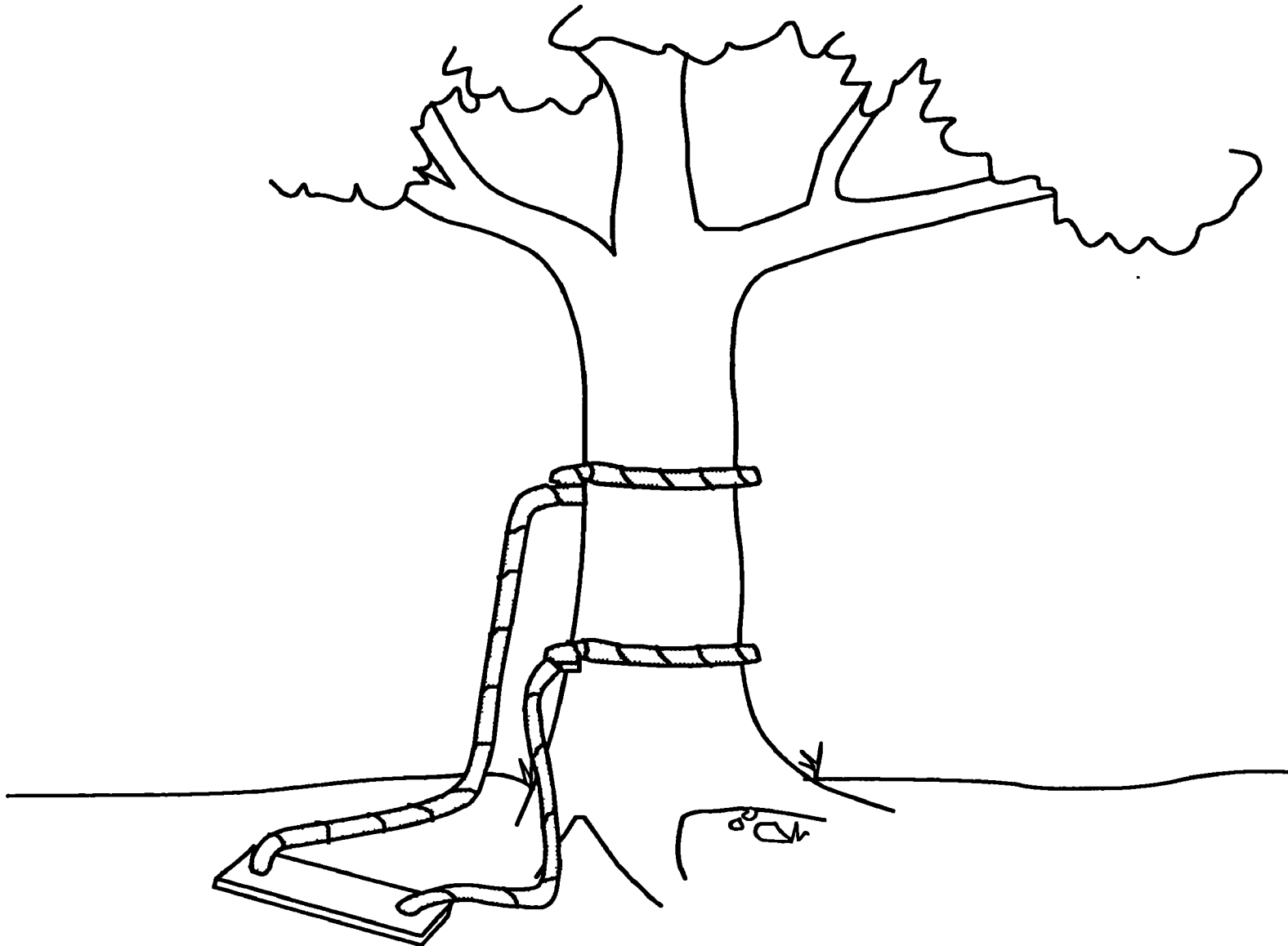
As Marketing Requested It



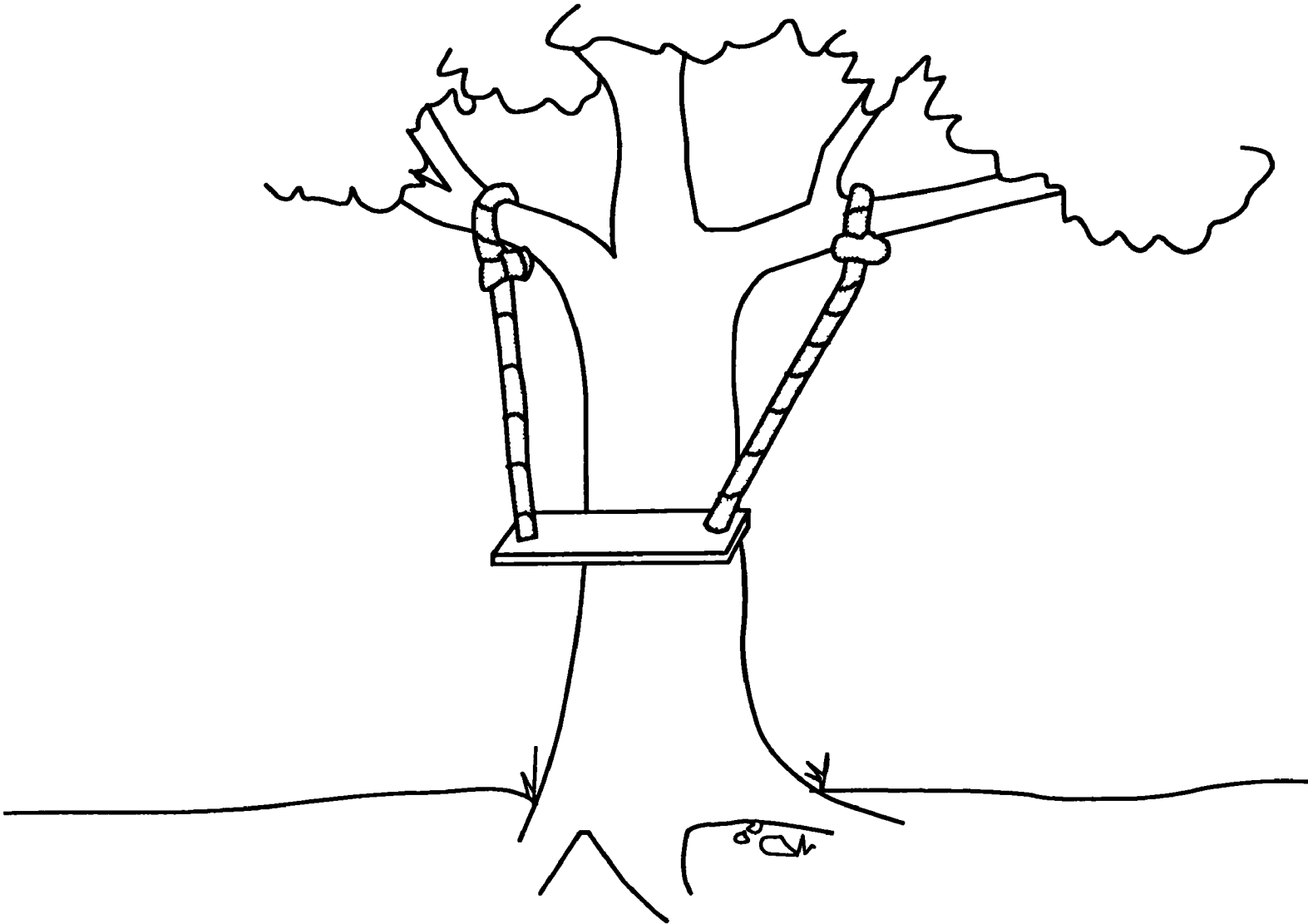
As Sales Ordered It



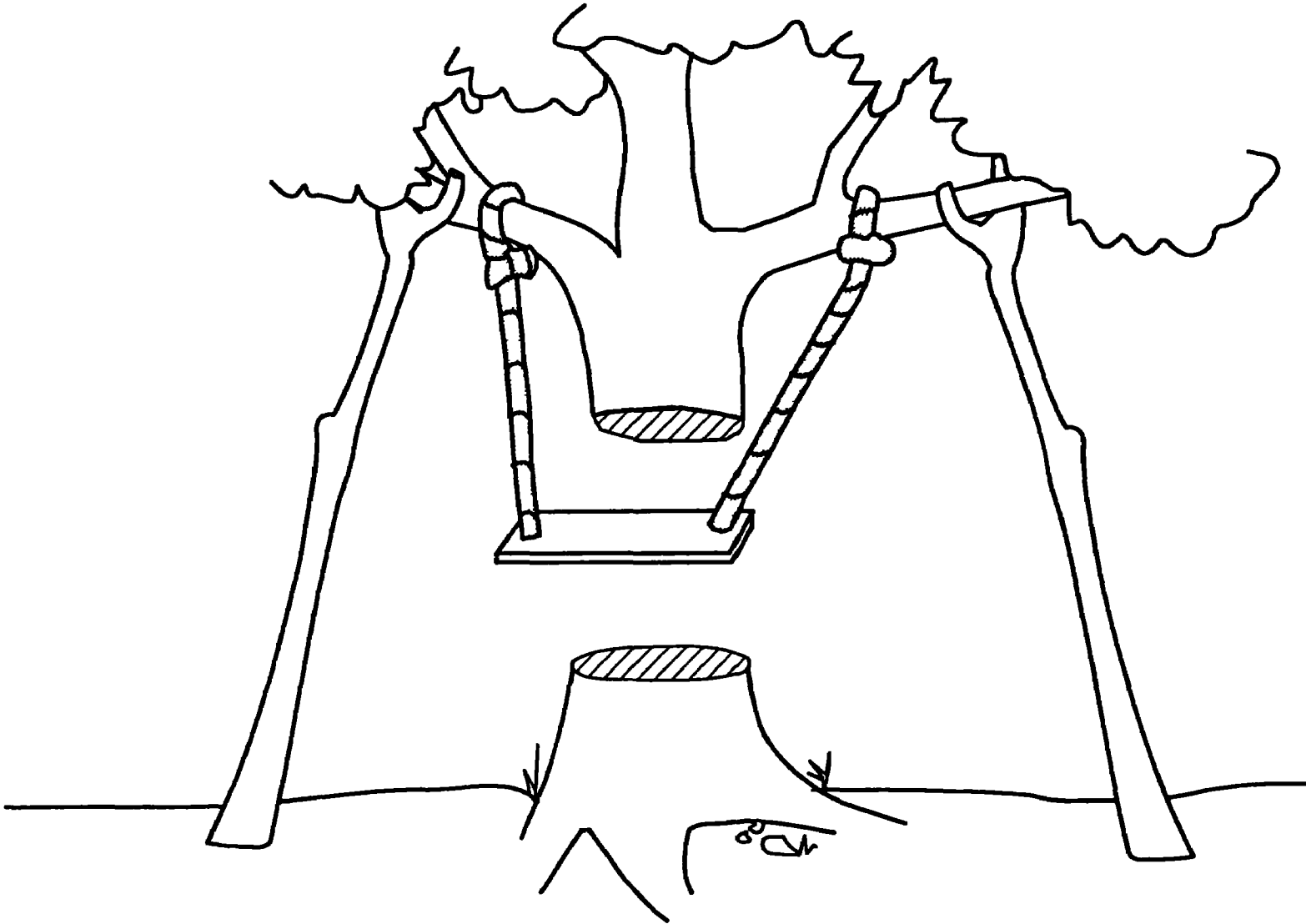
As Engineering Designed It



As Production Manufactured It



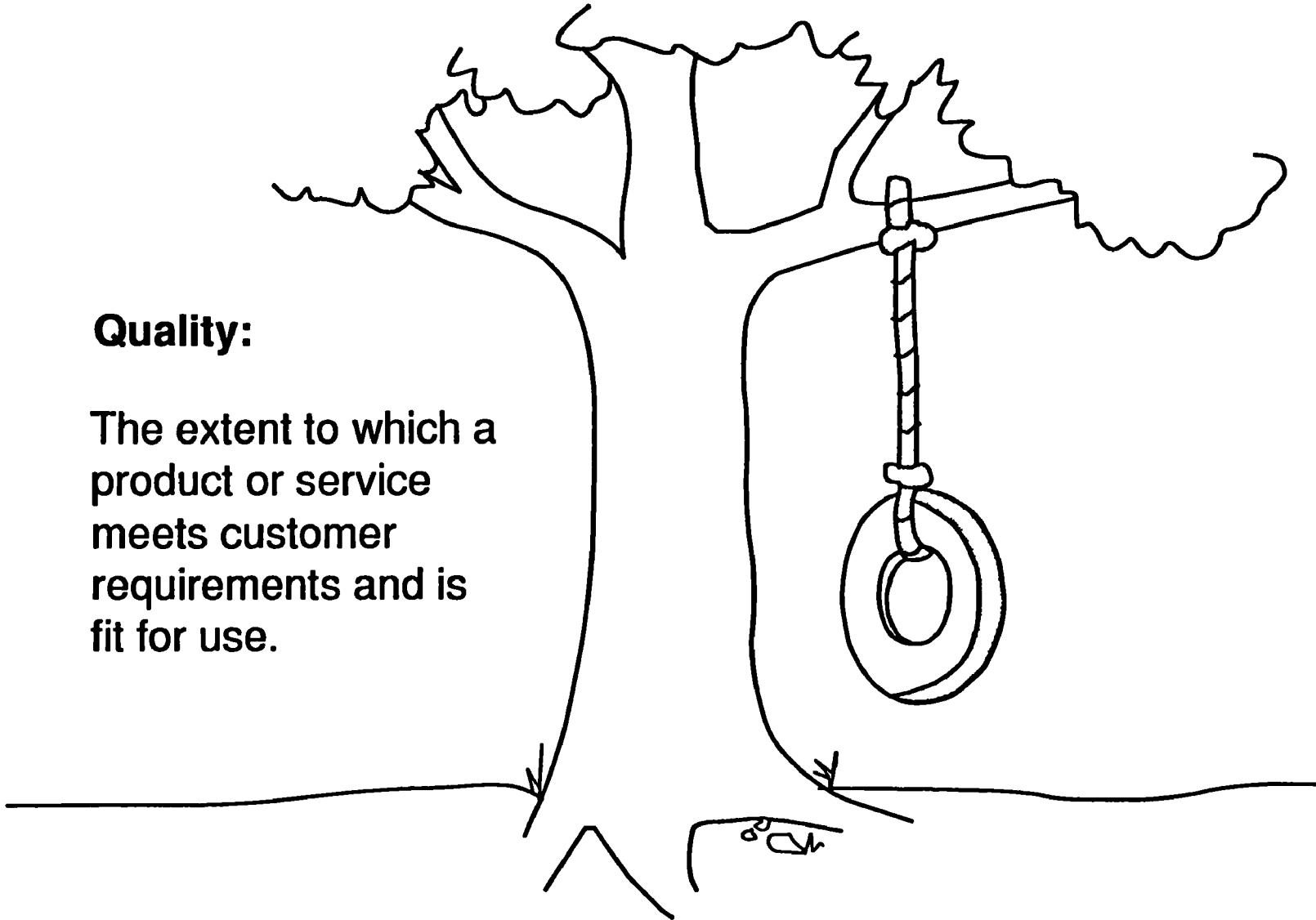
As Plant Installed It



What Customer Wanted!

Quality:

The extent to which a product or service meets customer requirements and is fit for use.



Point source impact zones exist in the vicinity of some point source⁷ discharges. Pending the achievement of the virtual elimination of persistent toxic⁴ substances, the size of such zones shall be reduced to the maximum extent³ possible by the best available technology so as to limit the effects of toxic⁷ substances in the vicinity of these discharges. These zones shall not be acutely^{3b} toxic to aquatic species, nor shall their recognition be considered a substitute for⁷ adequate treatment or control of discharges at their sources. ⁵

TYPES OF WASTE

- ☐ **MATERIAL**
- ☐ **TIME OF PEOPLE**
- ☐ **CAPITAL**
- ☐ **LOST EFFECTIVENESS**

TYPES OF WASTE

Material	Time of People
<i>Missing Supplies</i>	<i>Congressions</i>
Capital	Lost Effectiveness
	<i>Delivery time</i> <i>"Down" Time</i>

TYPES OF WASTE

Material	Time of People
<ul style="list-style-type: none"> - Vendor/supplier quality - Price - Missing supplies - Excess or unused products 	<ul style="list-style-type: none"> - Work and re-work - Pace - Products not needed - Duplication of effort
Capital	Lost Effectiveness
<ul style="list-style-type: none"> - Rental assests - Office equipment not fully utilized or not accessable - Underused space 	<ul style="list-style-type: none"> - Delivery time - "Down" time (waiting) - Equipment failure - Environment: social and physical - Inappropriate products - Unmet commitments

TYPES OF WASTE IN CONGRESSIONALS PROCESS

Material	Time of People
<ul style="list-style-type: none"> - Computer availability for typist - Misplaced disks 	<ul style="list-style-type: none"> - Management, staff chief, clerical and staff time (on-disk) - Multiple reviews
Capital	Lost Effectiveness
<ul style="list-style-type: none"> - Data collection - Equipment failures 	<ul style="list-style-type: none"> - Retyping and typos - Access to needed information - Management changes

VARIATION:

**POINTS TO STEPS IN THE PROCESS WHERE
IMPROVEMENT IS POSSIBLE.**

TYPES OF WORK

- ☐ **VALUE-ADDED WORK** *work done for a customer
(input from supplier, output to customer)*
- ☐ **NECESSARY, BUT NOT VALUE-ADDED**
- ☐ **RE-WORK**
- ☐ **UNNECESSARY WORK**
- ☐ **NOT WORKING**

IMPROVING THE WAY YOU WORK

- ❑ INCREASE VALUE-ADDED WORK**
- ❑ MINIMIZE "NECESSARY BUT NOT VALUE-ADDED" WORK**
- ❑ REDUCE REWORK, UNNECESSARY WORK, AND NOT WORKING**

CONTINUOUS QUALITY IMPROVEMENT

- ☐ FOCUS ON THE CUSTOMER
- ☐ RELY ON THE EXPERTS
- ☐ IMPROVE PRODUCTIVITY BY IMPROVING QUALITY
- ☒ CONTINUOUSLY IMPROVE YOUR WORK PROCESSES {summation of first 3}

CONTINUOUSLY:

- ☐ **FOCUS ON CUSTOMER**
- ☐ **RELY ON EXPERTS**
- ☐ **IMPROVE PRODUCTIVITY BY IMPROVING QUALITY**

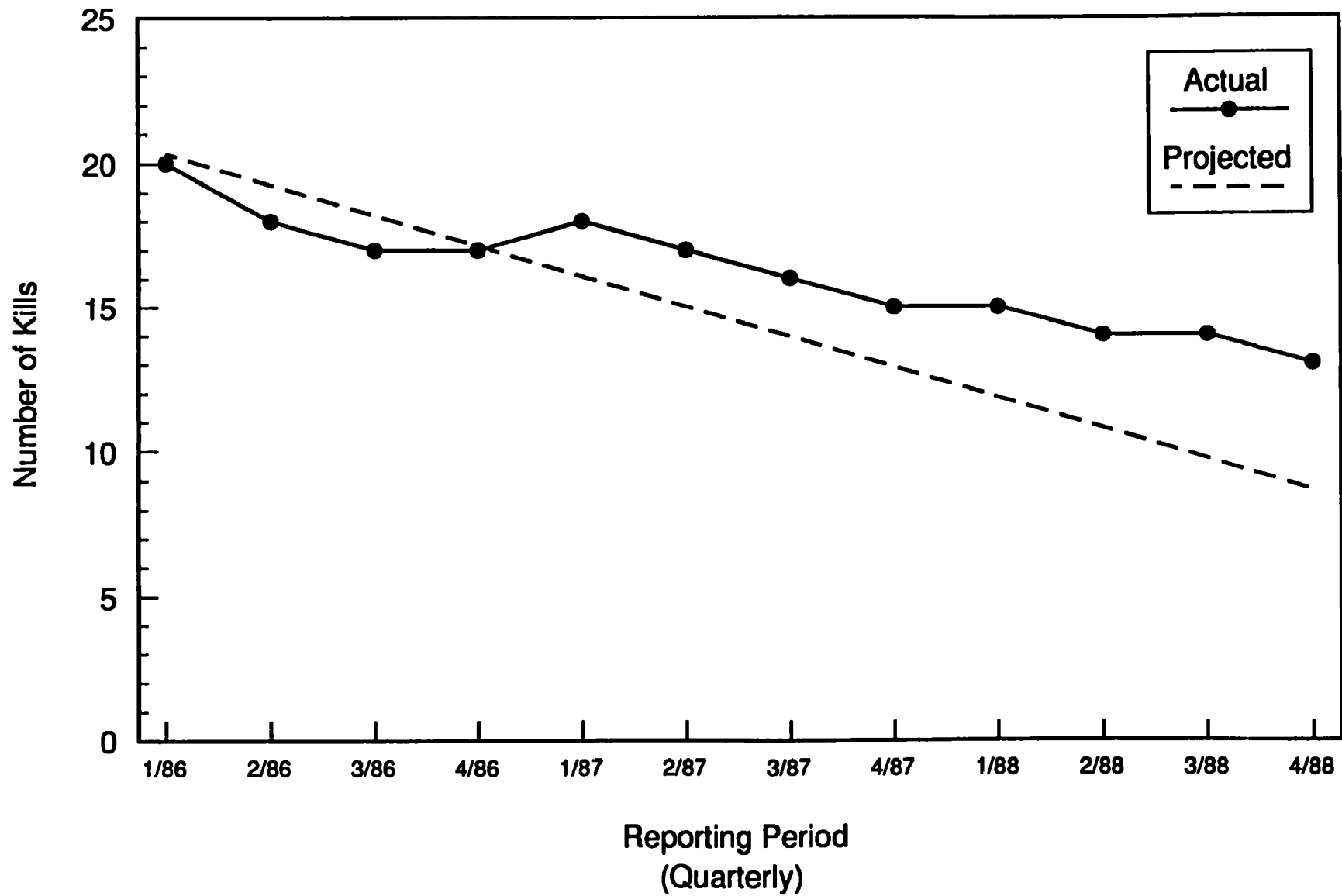
The Case of Fish Kills in Lake Hemos

■ **Background:**

- Lake Hemos is one of the largest lakes in North America.
- Four states border the lake; all are large states with substantial industrial, commercial and agricultural development.
- Commercial and sport fishing are major businesses on the lake, but both have been threatened by pollution and contaminated fish.
- EPA's Hemos Program Office (HPO) is charged with responsibility for planning and for developing remedial programs for cleaning up the Lake.
- Each of the four states that borders the lake has implemented programs to clean up the lake; their regulatory programs, all modeled after EPA regulations, are very similar. HPO is also responsible for assisting in coordinating these state programs.
- Projections done three years ago by lake experts suggested that, given the states' programs and other factors, the number of fish kills in the lake should decline substantially over that period; however, as the chart on the following page shows, actual fish kills have not declined as rapidly as projected.
- Although this slight decline represents some progress, the management of HPO believes that greater progress is both necessary and possible.
- Wally Pike is a Senior Analyst with HPO who is familiar with the concepts and tools of Continuous Quality Improvement (CQI).
- He has been asked by his management to examine this disturbing trend that has been observed.

Number of Fish Kills In Lake Hemos

(1986-1988)



- Our analyst, Wally Pike, wishes to attack this problem using the tools of Continuous Quality Improvement.
- His first analytic step is to call together a group of coworkers to brainstorm about the possible causes of fish kills.
- To structure this brainstorming activity, he organizes it as a "fishbone" session.
- After a brief presentation on preparing "fishbone" diagrams, we will divide into breakout groups to construct a fishbone diagram on the question: What are the causes of fish kills in Lake Hemos?

2.1 Fishbone Diagrams

TALKING POINTS FOR FISHBONE DIAGRAM

1. WHAT IS A FISHBONE DIAGRAM?

Cause Effect Diagram

- It is a diagram that displays causes and effects, or the reasons behind a particular problem or event.

2. WHAT CAN A FISHBONE DIAGRAM DO FOR YOU?

- The fishbone diagram provides a method of structuring or organizing a brainstorming session.
- It can help to direct and stimulate a group's thinking about a problem.
- It can help to depersonalize the analysis of the causes of a problem.

3. WHEN DO YOU USE A FISHBONE IN PROBLEM SOLVING?

- When trying to get at the causes of a problem.
- The fishbone is often used at the outset of a particular project. During initial meetings, a fishbone might be constructed to display the full dimensions of the problem, prior to narrowing the focus of the project.

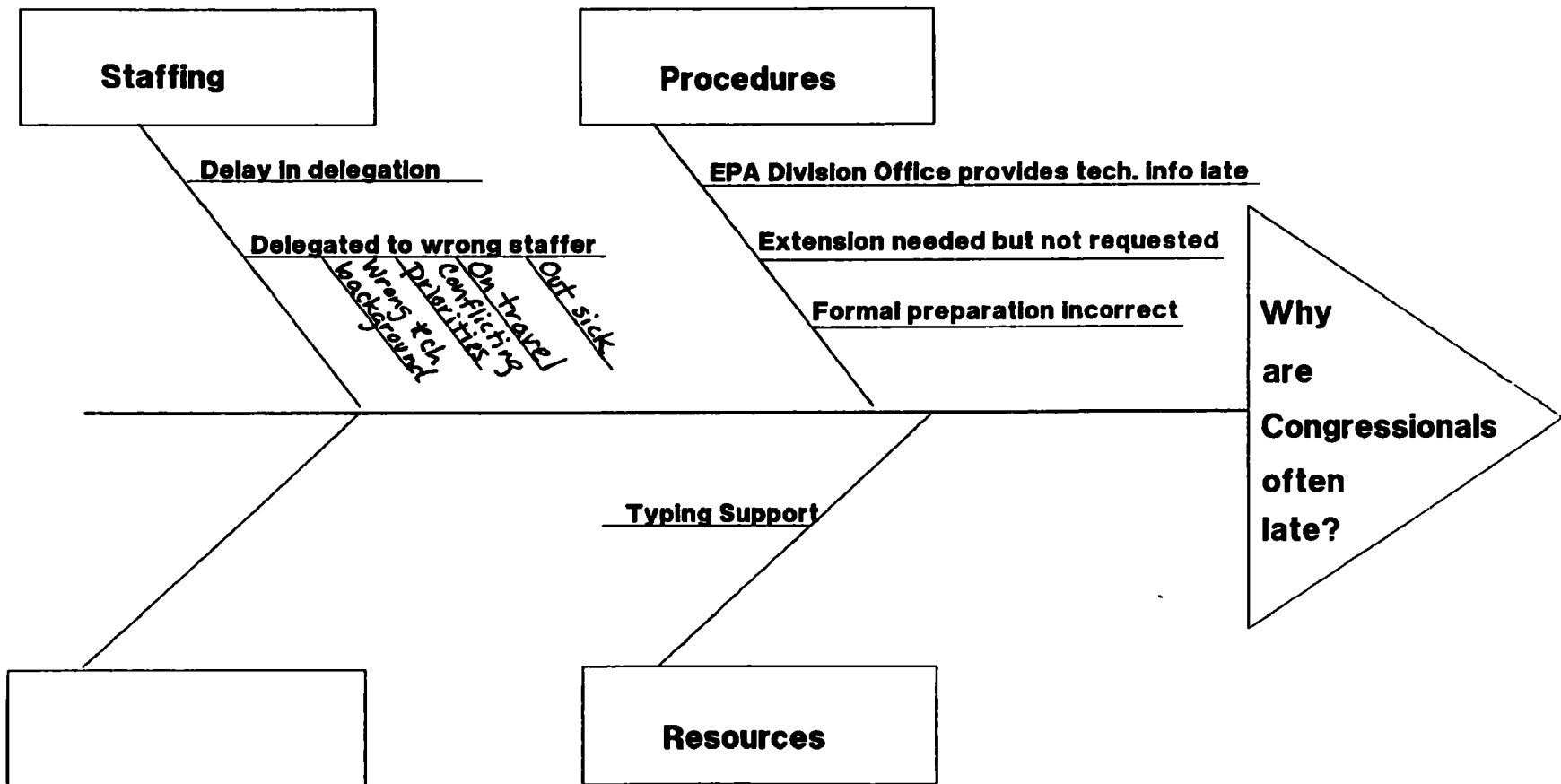
4. WHAT TYPE OF DATA IS APPROPRIATE FOR A FISHBONE DIAGRAM?

- No specific type of data is necessary to construct a fishbone; only the experience and judgment of the members of the group.
- However, it is often worthwhile to receive input from people with different perspectives when constructing a fishbone diagram. This will make the fishbone more comprehensive in identifying causes of a problem or event.

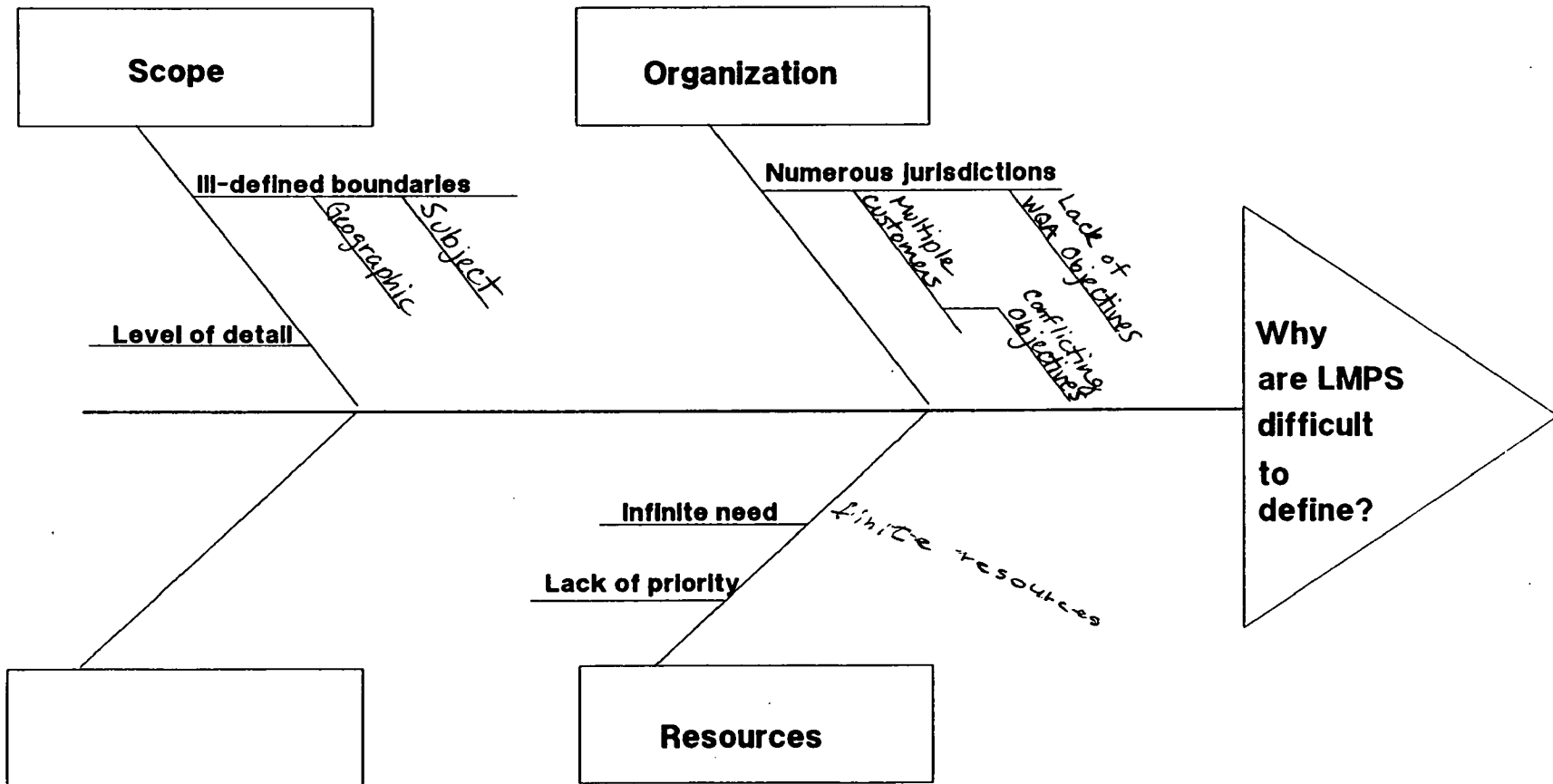
5. HOW DO YOU CONSTRUCT A FISHBONE DIAGRAM?

- The first step in constructing a fishbone diagram is identifying the problem or event you want to analyze.
- The problem or event will serve as the "fish head," while the "bones" of the fish each signify a reason or cause for the problem or the event.
- The fishbone may be divided up into 3 or 4 major categories of causes. This usually helps to organize the group's thinking.
- For each of these categories, more specific examples of causes are identified. Each of these causes can have their own causes, which in turn, of course, can have even more causes.
- In constructing the fishbone, there are no wrong answers. The purpose is to get as many ideas on the table as possible. Don't get sidetracked by long discussions over whether a particular cause belongs or not, or where in the diagram it should go.
- After getting most of the group's ideas down on paper, some refinement of the structure and wording may be worthwhile. Caution: The point of diminishing returns is reached quickly.

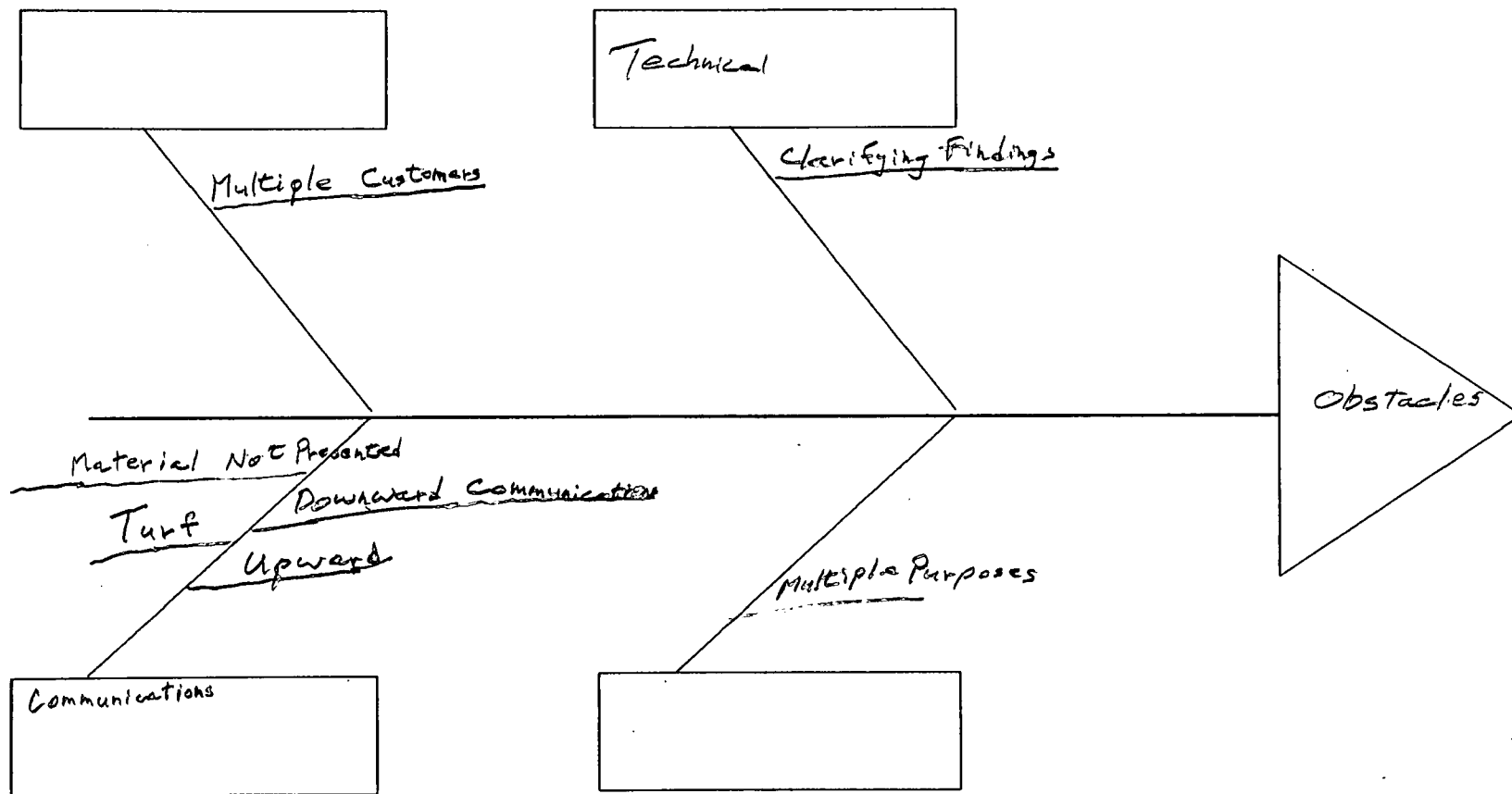
WHY ARE CONGRESSIONALS OFTEN LATE?



WHY ARE LMPS DIFFICULT TO DEFINE?



OBSTACLES TO REFLECTING TECHNICAL FINDINGS IN POLICY DECISIONS



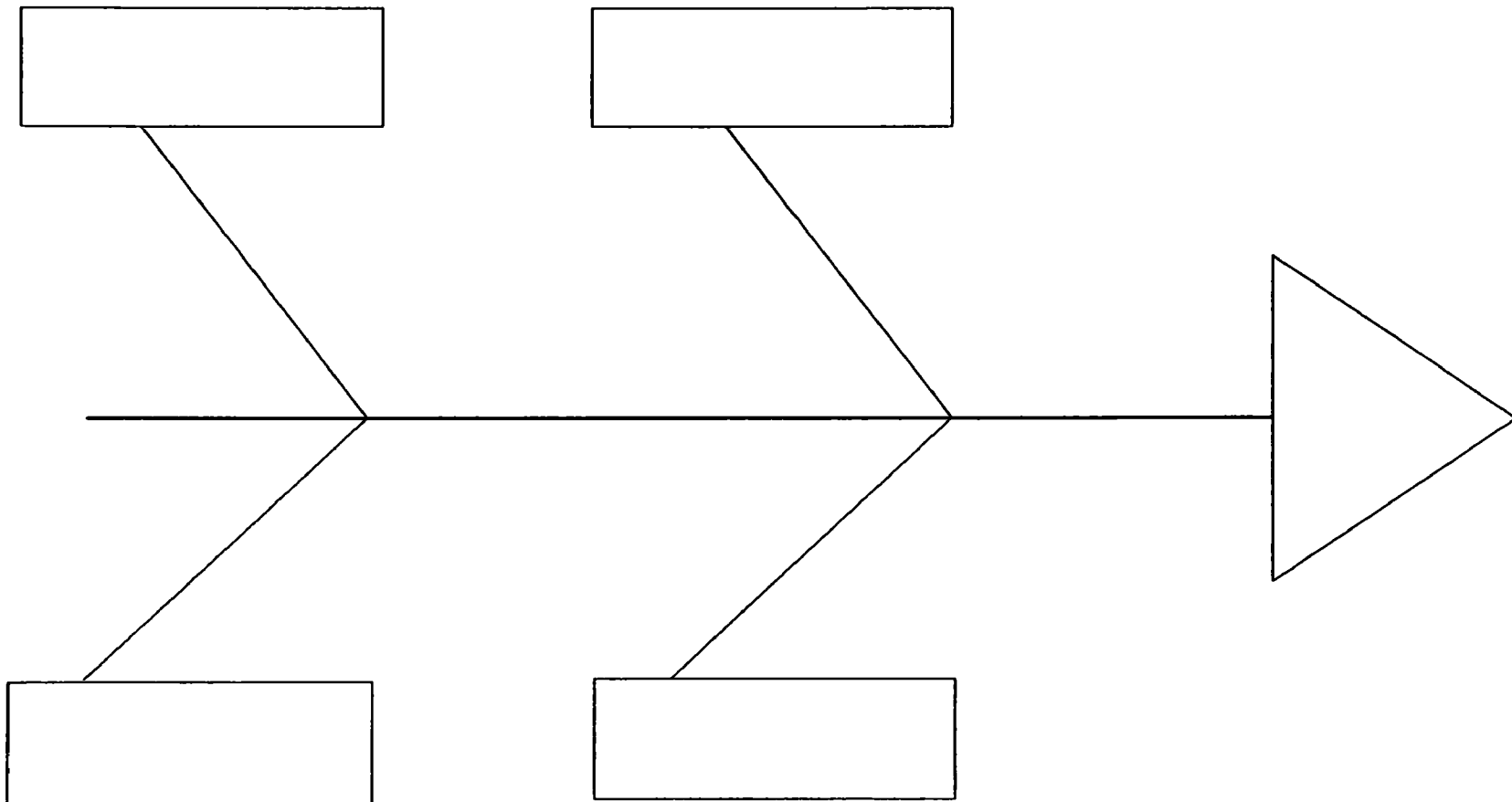
MEANWHILE, BACK AT LAKE HEMOS

Construct a Fishbone diagram on the question:

What are the causes of fish kills in Lake Hemos?

Blank shells have been provided for your use.

WHAT ARE THE CAUSES OF FISH KILLS IN LAKE HEMOS?



- Armed with an idea of the possible dimensions of the problem obtained from the fishbone session, Wally wants to narrow the focus of his analysis.
- The scientific issues involved are fairly complex, there is disagreement among experts, and getting a reasonably conclusive scientific answer to the question of "cause" could require years of research.
- As a means of focusing his efforts, he asks a group of experts to assess the fishbone analysis and to rank order what they believe to be the four most likely causes of recent fish kills.
- Wally wishes to combine these experts' rankings and display them graphically.
- To do this, he uses the data to construct a Pareto chart.
- After a brief presentation on constructing Pareto charts, we will divide into breakout groups to construct a Pareto chart: Causes of fish kills.

TALKING POINTS FOR PARETO CHART

1. WHAT IS A PARETO CHART?

- A pareto chart is a graph that ranks factors in descending order of frequency, duration, or importance.
- The key point is that pareto charts rank the relative significance of various events.

2. WHAT CAN A PARETO CHART DO FOR YOU?

- Pareto charts point out the most significant elements of your problem.
- Pareto charts are good tools to help you to avoid spending 90 percent of your time on 10 percent of the problem.

3. WHEN DO YOU USE PARETO CHARTS IN PROBLEM SOLVING?

- Pareto charts help you decide what you should focus on and are useful in setting project priorities. They indicate where you may need to collect additional data or conduct more analyses.

4. WHAT TYPE OF DATA IS APPROPRIATE FOR PARETO CHARTS?

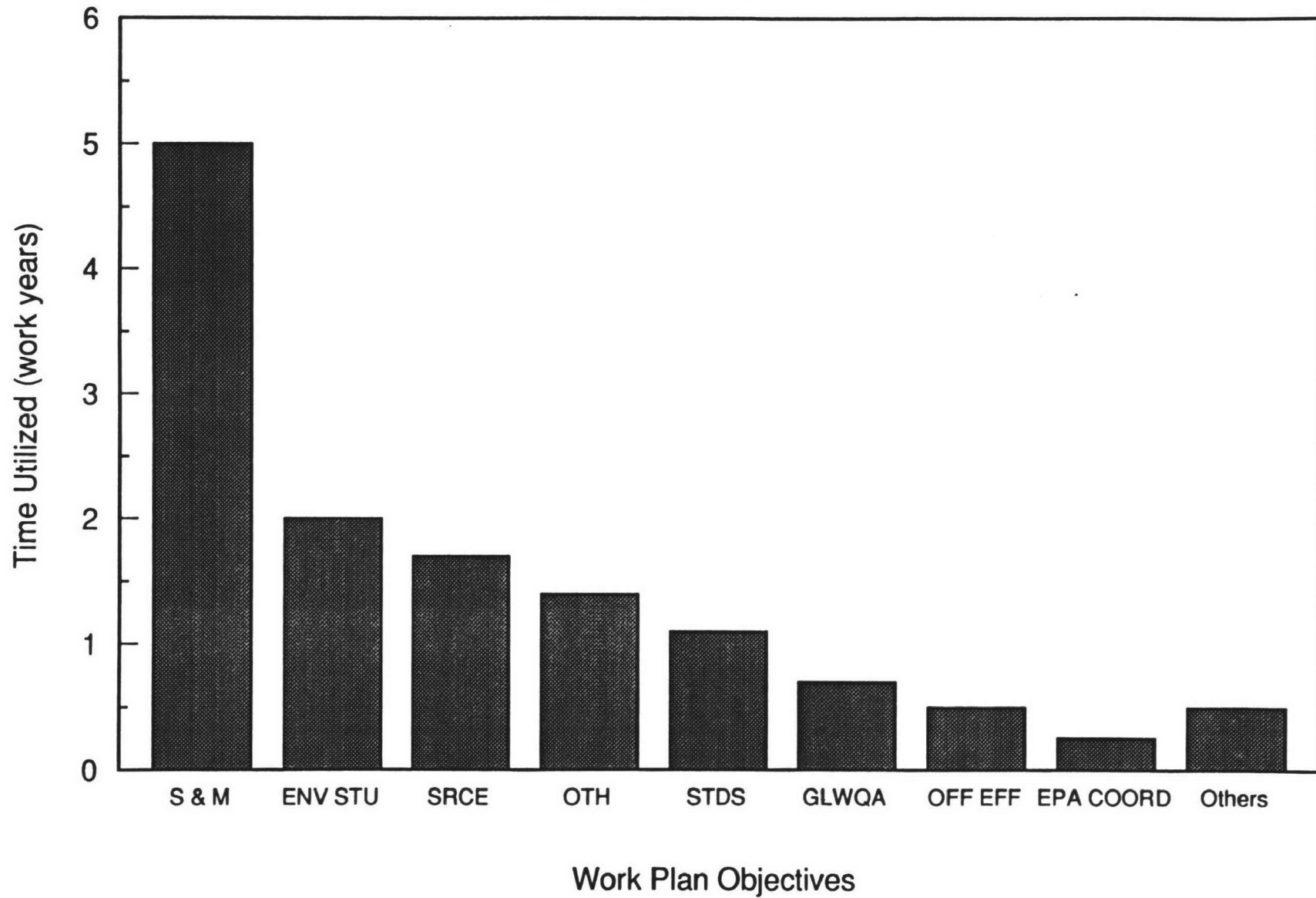
- Pareto charts can be constructed from various types of data.
 - Those based on experts' rankings.
 - Those based on empirical or quantitative data.
- Look for data that tell you:
 - how often;
 - how long; or
 - how important.

5. HOW DO YOU CONSTRUCT A PARETO CHART?

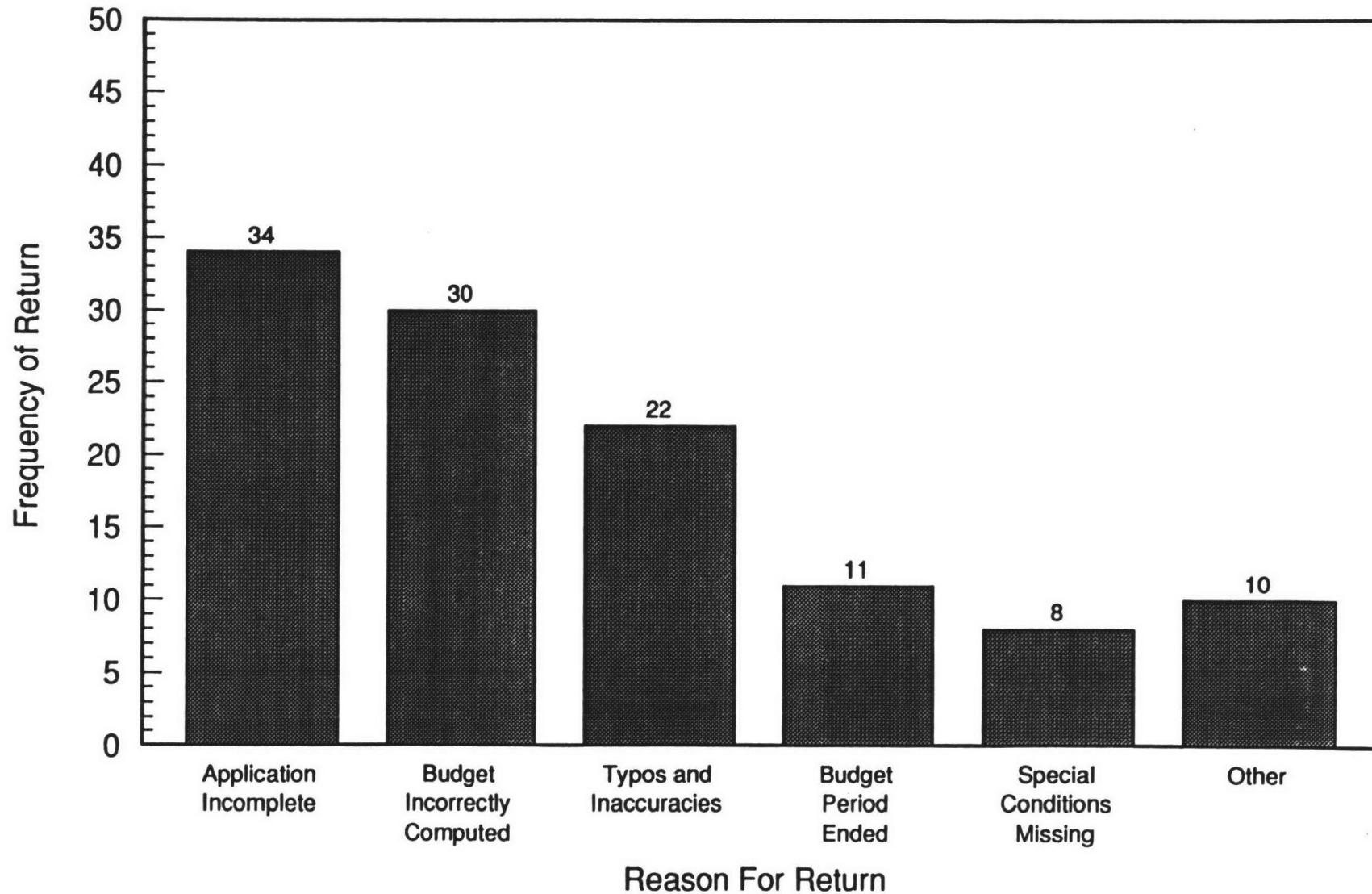
- Select an activity, process, or other event of concern.
- Select the variable elements you wish to rank and represent those on the horizontal axis.
- Select the scale and range of measurements for those elements. Represent the scale on the vertical axis.
- Columns should be placed in descending order of height, from left to right.

REQUIRED SRS INPUT

By Workplan Objective



REASONS GRANT AWARD DOCUMENTS ARE RETURNED BY FMB (FY 1988)



TOTAL PHOSPHORUS IN THE GREAT LAKES (1983 - 1985)*

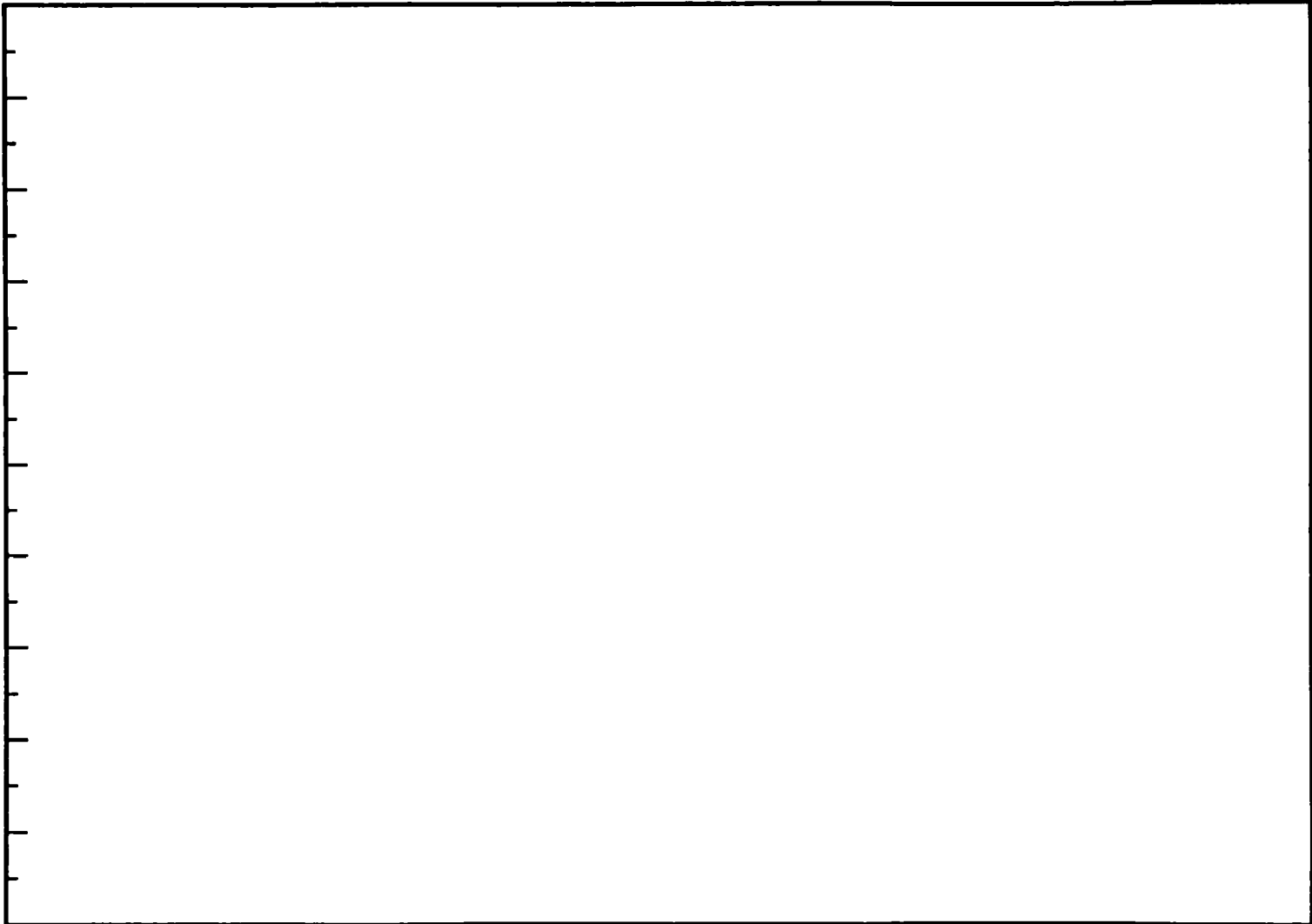
VOLUME WEIGHTED MEAN (VWM) CONCENTRATIONS (UG/L)

<u>LAKE</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
ERIE	9	8	5
HURON	10	10	11
MICHIGAN	6	6	5
ONTARIO	9	8	8
SUPERIOR	7	7	4

*** DATA FROM 1987 REPORT ON GREAT
LAKES QUALITY, PAGE 4.2-8,
MARCH 1989**

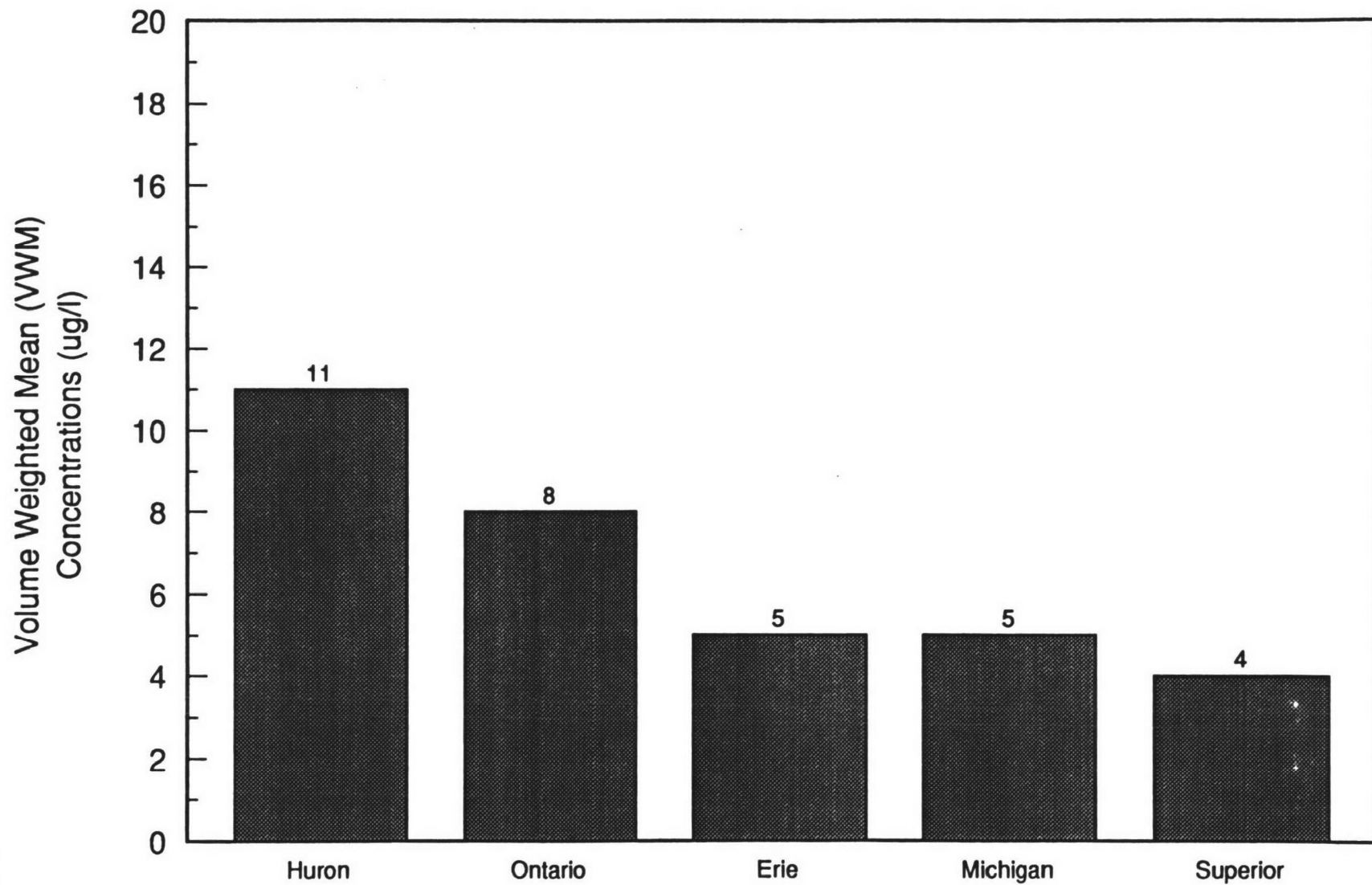
TOTAL PHOSPHORUS IN THE GREAT LAKES

(1985)



TOTAL PHOSPHORUS IN THE GREAT LAKES

(1985)



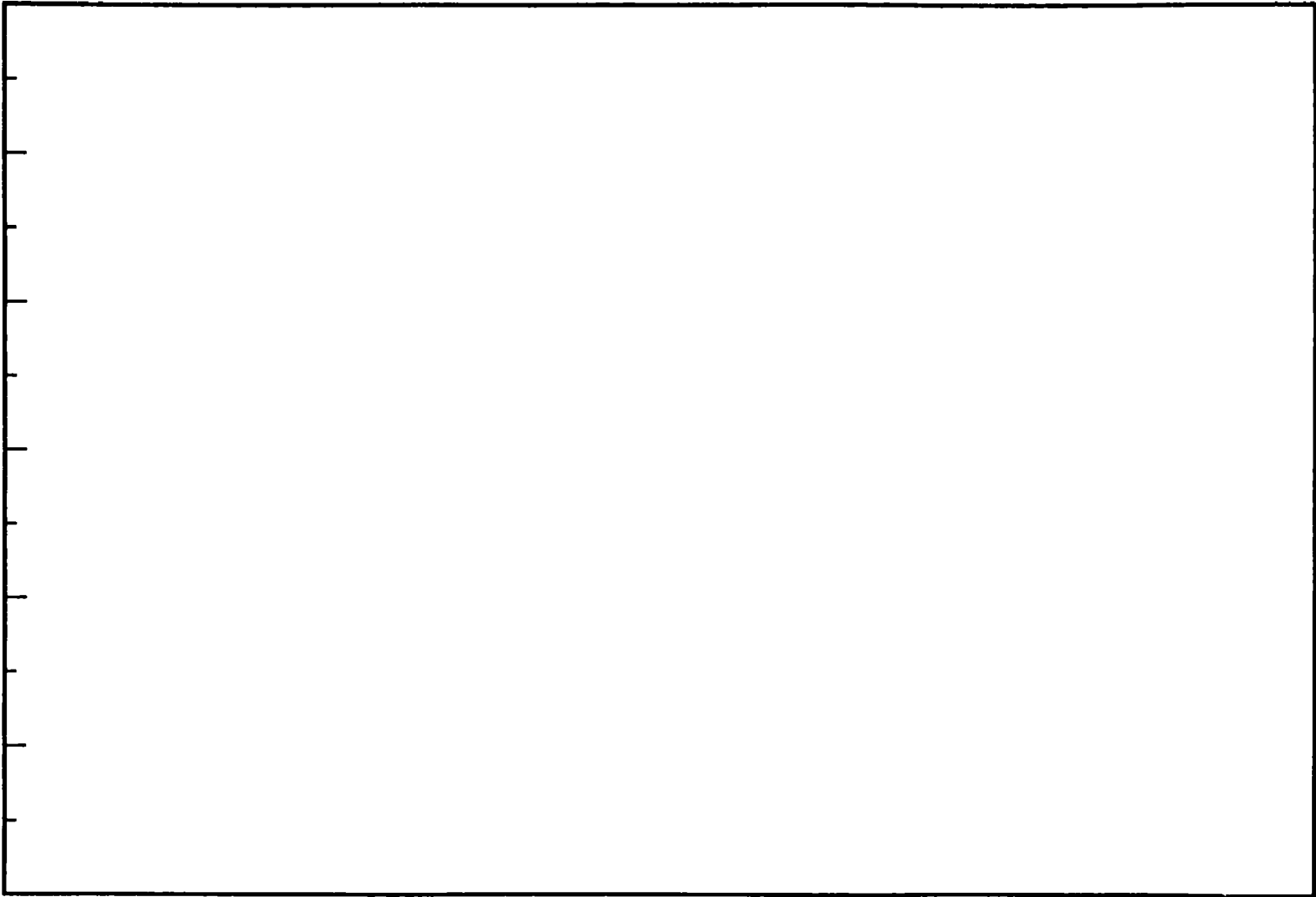
MEANWHILE, BACK AT LAKE HEMOS

**EXPERTS' RATINGS OF
LIKELY CAUSES OF FISH KILLS**

PERMIT VIOLATIONS	22
OXYGEN DEPLETION	16
BACTERIA VIRUS	9
ACIDIFICATION	9

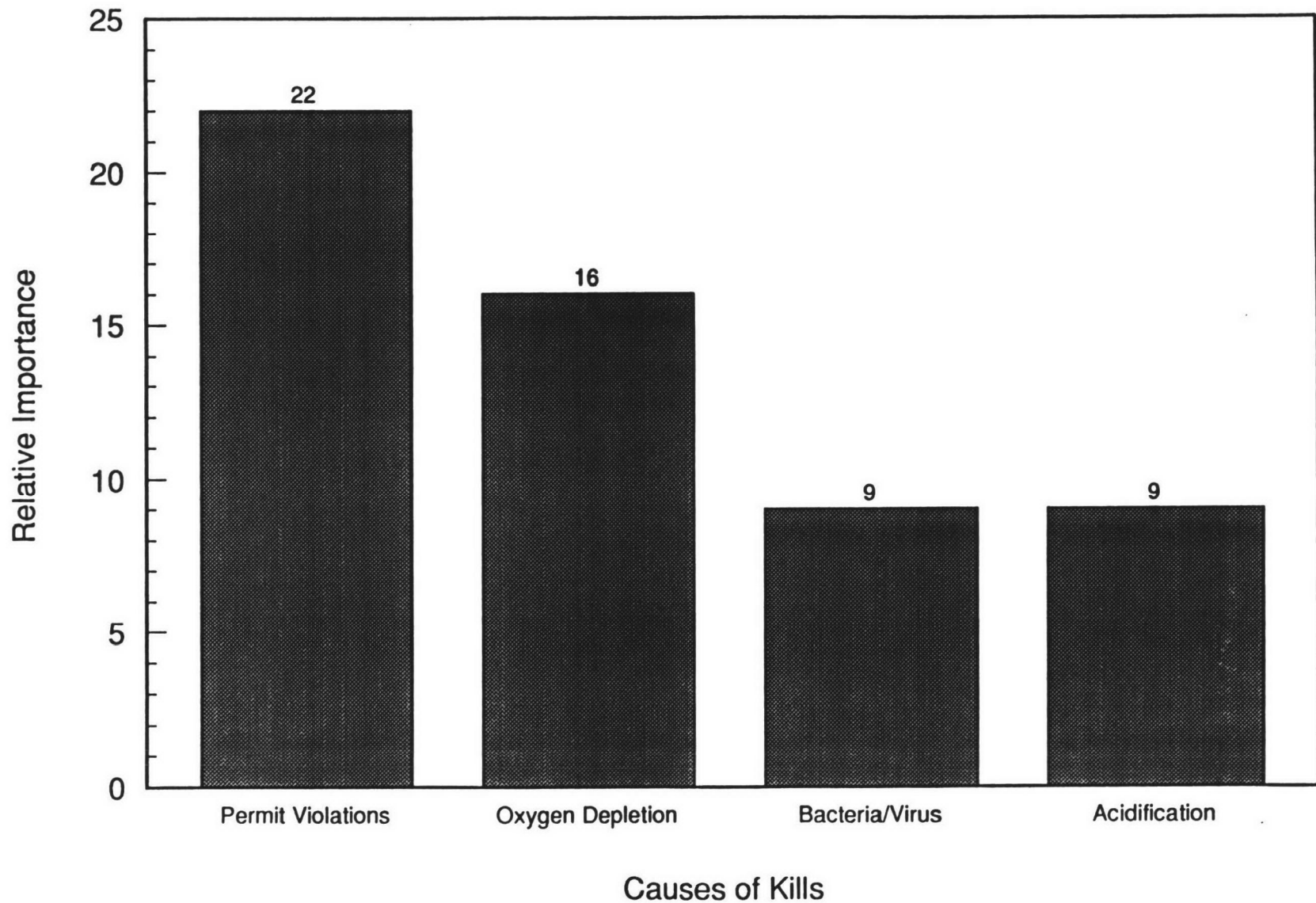
Using the data presented in the table above, construct a pareto on the likely causes of fish kills. Blank shells have been provided for your use.

CAUSES OF FISH KILLS
(Expert Ranking)



CAUSES OF FISH KILLS

(Expert Ranking)



- The likelihood that permit violations are at the root of the problem suggests examining permit violations. However, a simple comparison of the overall numbers of permit violations over the past three years indicates that permit violations have been declining over the past year and a half.
- Wally then turns to the possibility that the fish kills are resulting from contaminants released to the lakes through undetected violations. He therefore decides to focus on the compliance inspection process.
- To gain a better understanding of the compliance inspection process, he decides to develop a flowchart of the compliance inspection processes used in the four states bordering Lake Hemos.
- In order to construct the flowchart, he conducts telephone interviews with the heads of the inspection divisions of the four states' environmental agencies.
- He learns that the four states have compliance inspection processes that involve the same general steps, probably because all the states' inspection programs are based on U.S. EPA guidance for NPDES inspections.
- After a brief presentation on constructing flowcharts, we will divide into breakout groups to construct a flowchart: The permit compliance inspection process.

TALKING POINTS FOR FLOW CHARTS

1. WHAT IS A FLOW CHART?

- A flow chart is a step-by-step representation of the sequence of events involved in a process:
- Every step in the process is represented by a symbol (for example, square or triangle), each signifying a different type of event (for example, an action or a decision). The actual event is described inside the symbol.

2. WHAT CAN A FLOW CHART DO FOR YOU?

- A flow chart breaks down a process to its component parts. By doing this it serves several important functions:
 - It is a tool that helps you understand what the real work is.
 - It gives you the ability to determine what's really going on. Often, the perception of what takes place in a process is far different from reality, and different people can have different understandings of the same process. Constructing a flow chart can get you closer to the reality.
 - It can help you to compare differences in processes that serve similar purposes.
 - It can help identify who and what is involved in the process.
 - It can focus attention on the time required to perform various steps in the process.
 - It can help identify areas where the process can be improved.

3. WHEN DO YOU USE A FLOW CHART IN PROBLEM SOLVING?

- When you want to understand, in detail, how the work gets done.
- It may be the first step in many projects because the flow chart educates those involved and it targets those areas where improvement (and further analysis) may be needed.

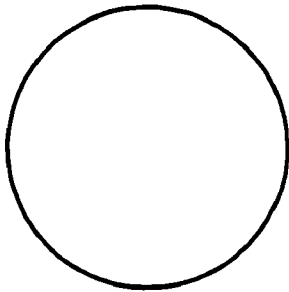
4. WHAT TYPE OF DATA IS APPROPRIATE FOR A FLOW CHART?

- A detailed description of the process is necessary. This description can be written or oral.
- The sequence of events in the process must be specified.
- The players involved and the time required for each step may be important information.
- There are many different types of symbols that can be used when constructing a flow chart.

5. HOW DO YOU CONSTRUCT A FLOW CHART?

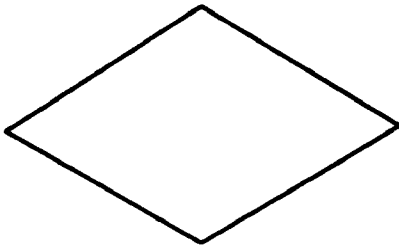
- Identify the process you want to describe.
- Identify all steps involved in the process. It is often desirable to consult several people who play different roles in the process, and compare their descriptions.
- Determine the sequence of events.
- Determine the nature of each step (for example, a decision, an action, or a delay).
- Plot the steps sequentially, representing each step with the appropriate symbol.
- If appropriate to the problem at hand, identify who performs each step, and how long (on average if necessary) each step takes.

FLOW CHART SYMBOLS



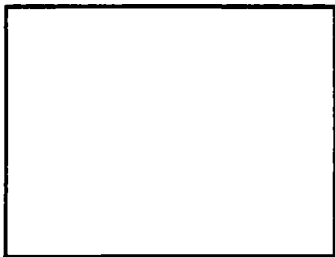
OPERATION

- Conducting a site investigation
- Writing a document



DECISION (Yes/No Question)

- Is the site an emergency?
- Is the work assignment over 500 hours?



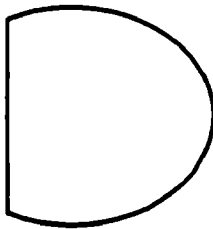
CONTROL/INSPECTION

- Proofreading a document
- Checking travel requests

FLOW CHART SYMBOLS

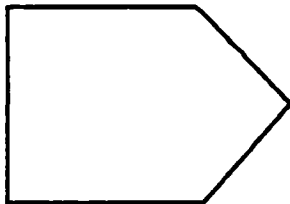
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DELAY



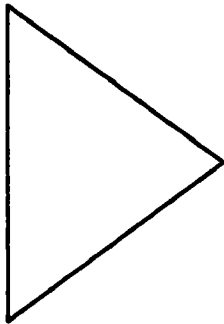
- **No computers available – waiting to type document**
- **Memo sits on desk waiting to be signed**

MOVEMENT/TRANSFER



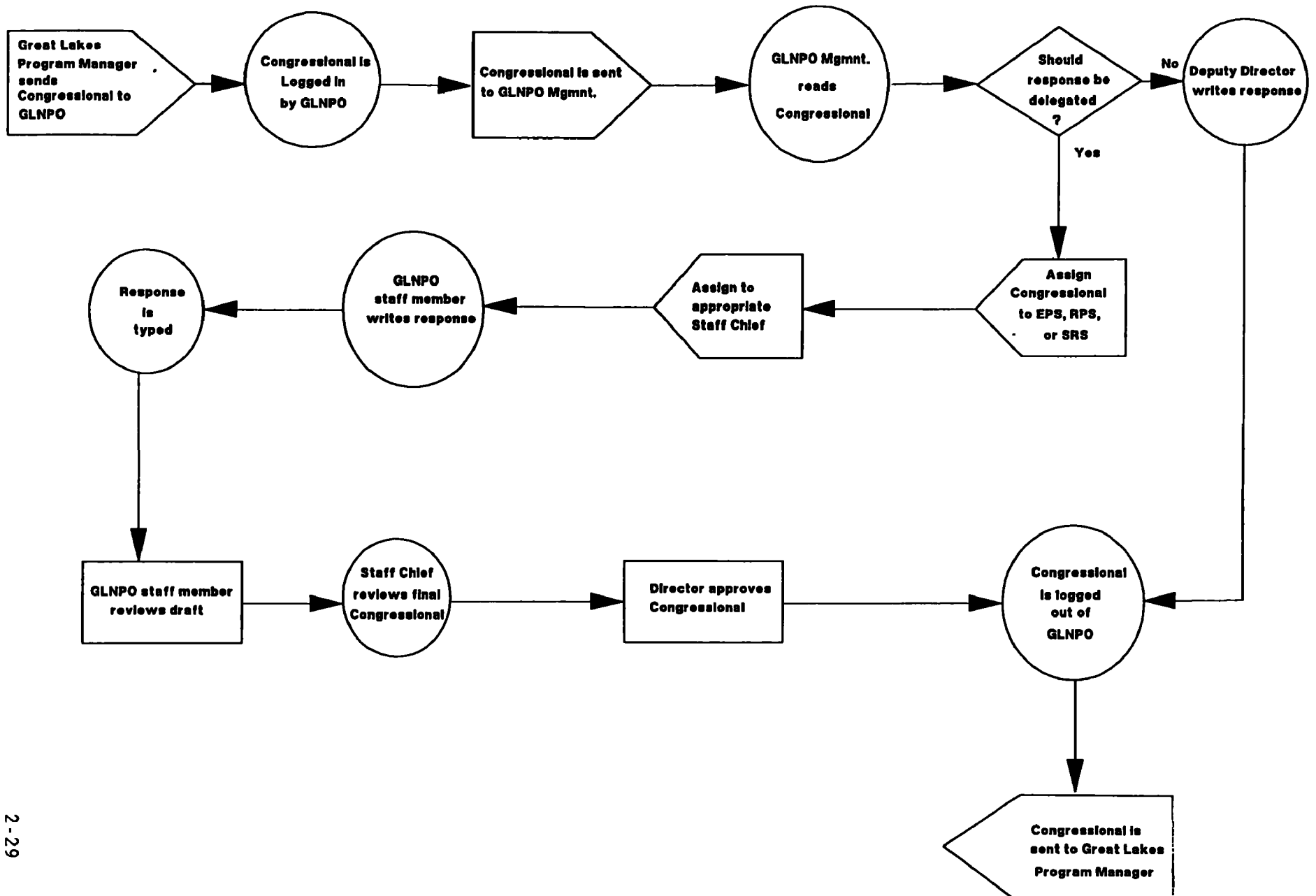
- **Mailing a document**
- **Transferring a file**

FILE



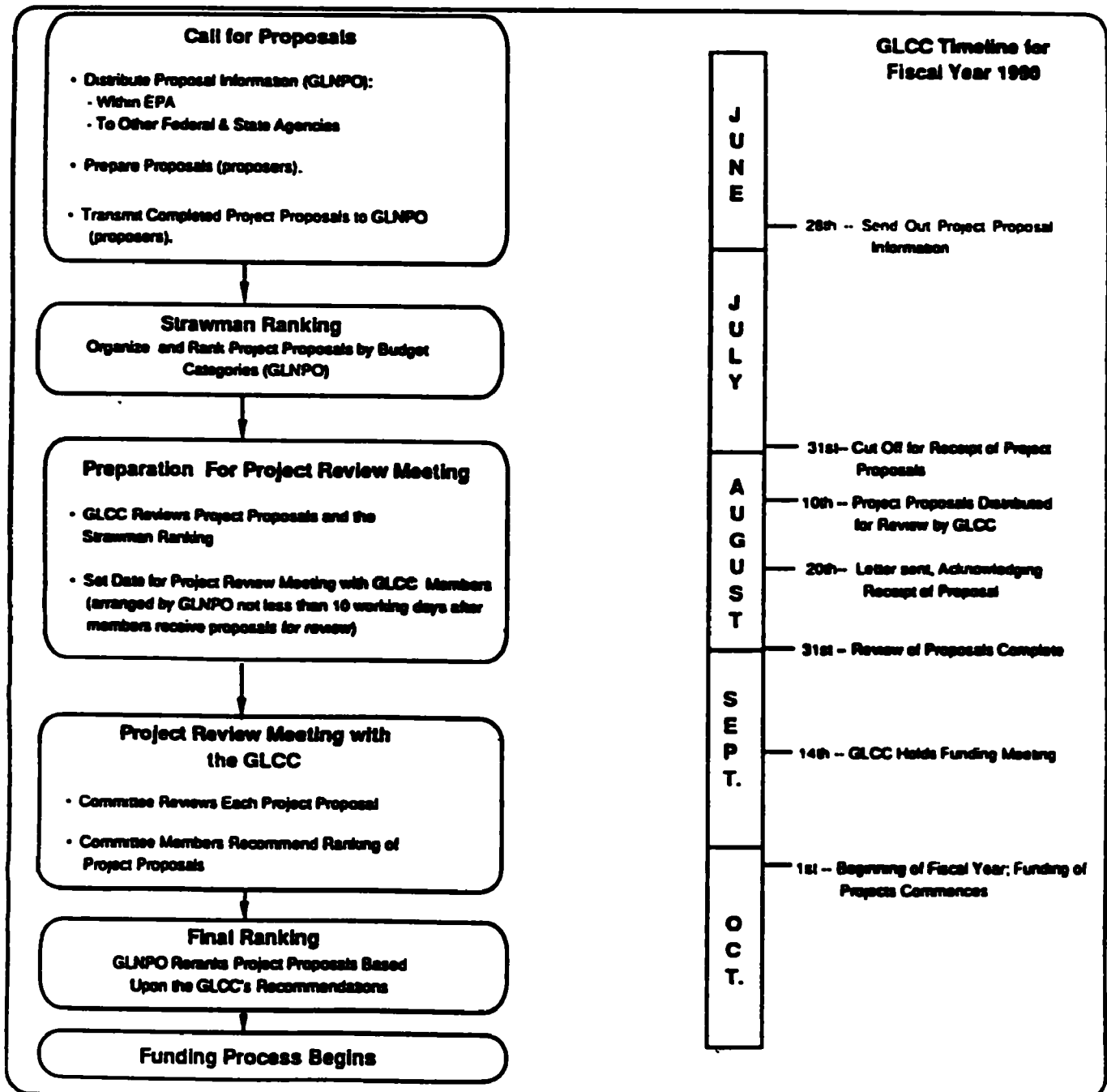
- **File document**
- **Copy computer disk**

HOW GLNPO RESPONDS TO A CONGRESSIONAL REQUEST



Great Lakes National Program Office
Process for Evaluating Project Proposals for Fiscal Year 1990

The Great Lakes Coordinating Committee (GLCC) provides advice to GLNPO on workplan development and project selection. Membership of the GLCC is composed of representatives of the following EPA offices: GLNPO (Chair); Regions II, III, and V (Air, Environmental Sciences, Waste, Planning and Management, and Water Divisions); the Office of International Activities; and the Office of Water. The committee reviews GLNPO and other EPA office workplans and evaluates project proposals which support GLNPO Great Lakes initiatives. Proposals are reviewed for technical merit and priority.



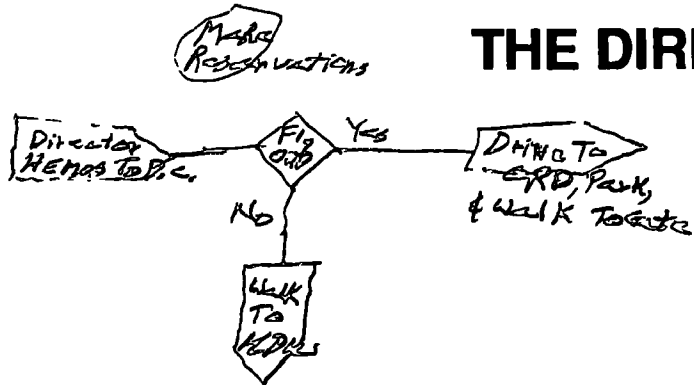
THE OFFICE DIRECTOR GOES TO WASHINGTON

The Director of the Hemos Program Office must travel frequently from the program's office on the shores of Lake Hemos to EPA Headquarters on the shores of the Potomac. When the need for such travel arises, the Director must first decide whether to drive to O'Hare airport, park, then walk to the gate, or to walk from home (in Lincoln Park) to the gate at Midway airport. In either event, the walking distance is about the same. Regardless of which airport the director chooses, the first step is to contact the reservation department of the airline to reserve a seat: center, aisle, or window. Normally, all of the reservation specialists are busy when you call, and you have the opportunity to listen to music for a while -- things like "101 Strings plays Aaron Copland's Fanfare for the Common Man." When the ticket arrives, the Director has learned that it is important to check to see whether the dates and destinations for the flight are as requested.

If the Director chooses to fly out of O'Hare, then two hours before flight time, the Director calls for a cab to come to the office immediately. An hour before flight time, the cab arrives. Upon arrival at the airport, the Director pays the cab driver, collects the receipt, and files it for later. The director then checks the nearest monitor to see which gate to run for. When passing through the tunnel to B Concourse, the Director is faced with a difficult decision: run down the main walkway, or run down the moving walkway. Running down the moving walkway is clearly faster, but there is the constant risk that a family of eight with ten pieces of luggage and a stroller will somehow appear on the moving walkway in front of you. Upon arrival at the gate, the Director checks in at the desk, receives a boarding pass, proceeds to board the plane, and waits about an hour for takeoff.

If the Director chooses to fly out of Midway, the director walks to the airport, proceeds to the gate, receives a boarding pass, boards the plane, and waits about fifteen minutes for takeoff.

THE DIRECTOR GOES TO WASHINGTON



MEANWHILE, BACK AT LAKE HEMOS

- Using the information provided in the telephone interview summaries in the four pages that follow, construct flowcharts of the permit compliance inspection process in each of the four states. Blank shells have been provided for your use.

PERMIT COMPLIANCE INSPECTION PROCESS

State 1

State 1 conducts on-site inspections for the NPDES permit program as a regular enforcement activity. They may be scheduled in advance or unannounced. The first step undertaken by the inspector is to conduct background research of the facility: the permit that is currently held, any changes in the status of the permit, records of previous inspections and history of violations, and any other factors which may indicate the existence of a problem. Using this information, the inspector prepares an inspection plan of specific issues that need to be addressed during the visit.

Once at the facility, the inspector identifies him/herself and states the intention of the visit. Refused entry is noted in the inspection report, and further steps are taken by the inspector to obtain access. The first review that takes place is a records verification and analysis. The permit information on file at the facility is verified, records are examined to assure completeness, and the recordkeeping process is reviewed to determine that all significant information is being tracked correctly.

The remaining steps involve the analysis of the facility's wastewater monitoring equipment. The sampling procedures for pollution discharge detection are examined, as well as sampling and lab analysis equipment. If the inspector feels that an independent sample analysis is necessary, then an effluent sample can be taken. Flow measurement equipment and procedures are then examined.

After completing the inspection, the inspector prepares a report outlining the findings and recommending any further enforcement action which may need to be taken. The inspection report is reviewed by the inspector's supervisor, revised if necessary, and then sent to the Office Director, who is responsible for the final decision on follow-up activities.

PERMIT COMPLIANCE INSPECTION PROCESS

State 2

On-site inspections for the NPDES permit program are regular enforcement activities of the program in State 2, with each facility scheduled for a visit about once every two years. Inspections may be scheduled with the site owner in advance or they may be unannounced. The first step undertaken by the inspector is to conduct background research of the facility: its permit, records of previous inspections and history of violations, and other factors which may indicate the existence of a problem. An inspection plan of specific issues that need to be addressed during the visit is prepared.

Once at the facility, the inspector identifies him/herself and states the intention of the visit at an opening conference with the site owner or the owner's representative. Refused entry is noted in the inspection report, and further steps are taken by the inspector to obtain access. The first review that takes place is a records check. The permit information on file at the facility is verified, records are examined to assure completeness, and the recordkeeping process is reviewed to determine that all significant information is being tracked correctly.

The remaining steps involve the analysis of the facility's wastewater monitoring equipment. The sampling procedures for pollution discharge detection are examined, as well as sampling and lab analysis equipment. If the inspector feels that an independent sample analysis is necessary, then a sample can be taken. A review is also done of flow measurement equipment and procedures.

After completing the inspection, the inspector conducts a closing conference to complete the visit. A report outlining the findings and recommending any further enforcement action which may need to be taken is prepared. The inspection report is reviewed by senior inspectors and the inspecting supervisor, revised if necessary, and then sent to the Office Director, who makes the final decision on follow-up activities.

PERMIT COMPLIANCE INSPECTION PROCESS

State 3

On-site inspections in State 3 for the NPDES permit program are regular enforcement activities of the program, but a number of inspections also take place in response to complaints from citizens, employees, or local officials. They are generally unannounced. The first action is a background check of the facility. The inspector examines the permit that is currently held, any changes in its status, records of previous inspections and history of violations, and any other factors which may indicate the existence of a problem. Using this information, an inspection plan is prepared detailing the specific issues that need to be addressed.

Once at the facility, the inspector informs the owner of the site the intention of the visit. If an inspection was instigated by a complaint, the source is not revealed. Refused entry is noted in the inspection report, and further steps are taken by the inspector to obtain access. The first examination that takes place is a records review. The permit information on file at the facility is verified, records are examined to assure completeness, and the recordkeeping process is reviewed to determine that all significant information is being tracked correctly.

Other steps involve analyzing wastewater monitoring equipment at the site. Sampling procedures for pollution discharge detection are examined, as well as sampling and lab analysis equipment. Samples of effluent are taken as needed, and a similar process is undergone for flow measurement equipment and procedures.

After completing the inspection, the inspector prepares a report outlining the findings and recommending any further enforcement action which may need to be taken. The inspection report is reviewed by the inspector's supervisor and then sent to the office.

PERMIT COMPLIANCE INSPECTION PROCESS

State 4

Due to staffing limitations and an overwhelming caseload, State 4 conducts most on-site NPDES permit inspections in response to complaints. These inspections are unannounced. Upon receiving a complaint file, the inspector reviews the background of the facility to determine possible causes of the problem and obtain a better understanding of the regulatory history of the site. Using this information, the inspector prepares an inspection plan of specific issues that need to be addressed during the visit.

Once at the facility, the inspector identifies him/herself and states the intention of the visit. Refused entry is noted in the inspection report, and further steps are taken by the inspector to obtain access. The first review that takes place is a records verification and analysis. The permit information on file at the facility is verified, records are examined to assure completeness, and the recordkeeping process is reviewed to determine that all significant information is being tracked correctly.

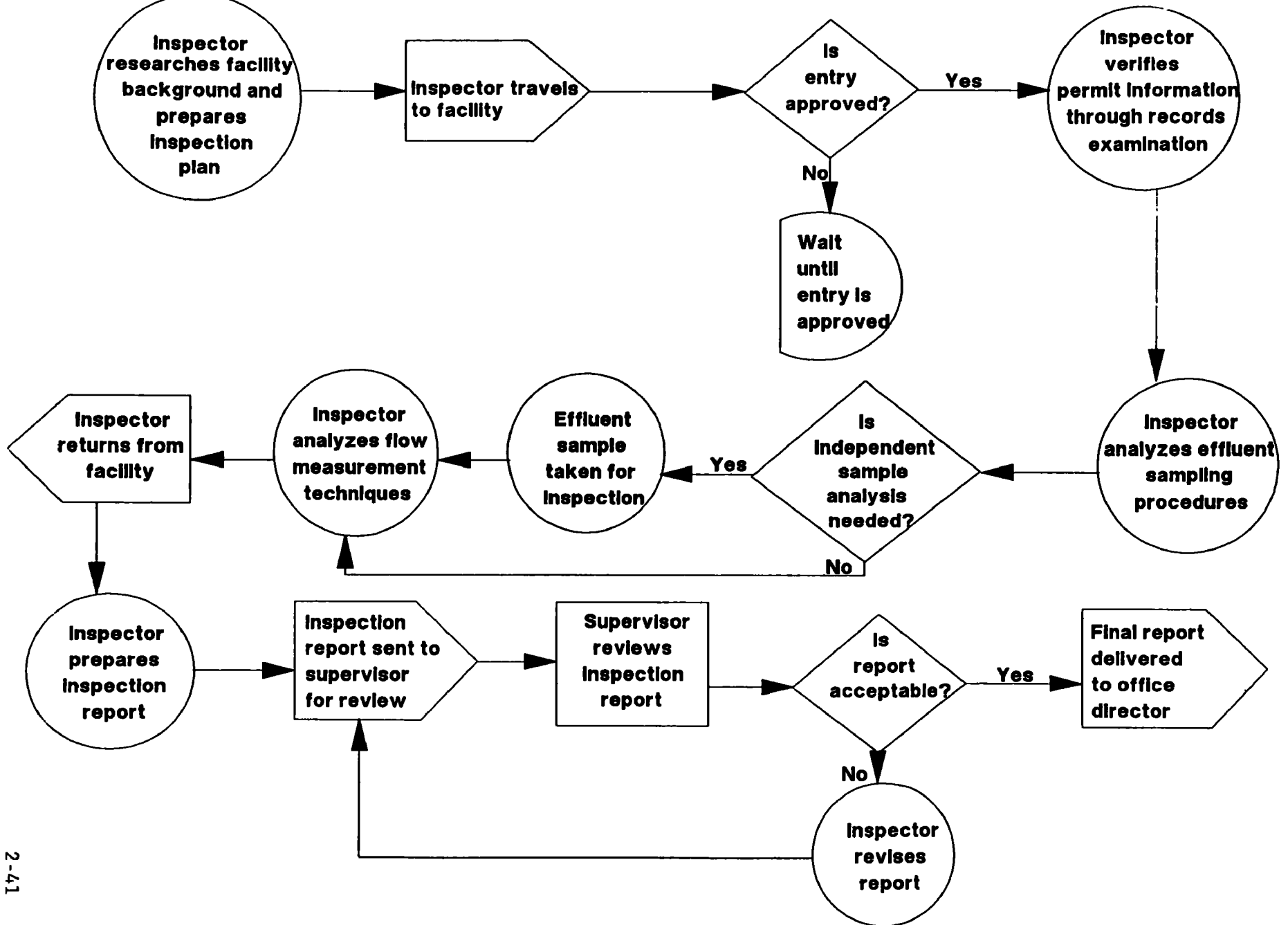
The remaining steps involve the analysis of the facility's wastewater monitoring equipment. The sampling procedures for pollution discharge detection are examined, as well as sampling and lab analysis equipment. If the inspector feels that an independent sample analysis is necessary, then a sample of effluent is be taken. Finally flow measurement equipment and procedures are examined.

After completing the inspection, the inspector prepares a report outlining the findings and recommending any further enforcement action which may need to be taken. The inspection report is reviewed by the inspector's supervisor, revised if necessary, and then sent to the Office Director, who is responsible for the final decision on follow-up activities.

PERMIT COMPLIANCE INSPECTION PROCESS

PERMIT COMPLIANCE INSPECTION PROCESS

PERMIT COMPLIANCE INSPECTION PROCESS



- Wally realizes, from his conversation with the heads of the state inspection divisions, that although the inspection processes are generally similar, they differ in the frequency with which various steps in the process are conducted.
- To obtain a better understanding of the nature and extent of these differences, he is able to obtain from the four state agencies data from the reports prepared by the states' inspectors after each site visit.
- To highlight the differences these data represent, he employs a bar chart.
- After a brief presentation on constructing bar charts and histograms, we will divide into breakout groups to construct a bar chart: Frequency of conducting major steps in the compliance inspection process.

TYPES OF PERMIT INSPECTIONS CONDUCTED IN 1988

STATE 1

Analyze Sampling Procedures	2
Records Examination	8
Effluent Sampling	10
Analyze Flow Measurement Techniques	4
Other	3
TOTAL PERMIT INSPECTIONS	27

STATE 2

Analyze Sampling Procedures	3
Records Examination	12
Effluent Sampling	8
Analyze Flow Measurement Techniques	3
Other	3
TOTAL PERMIT INSPECTIONS	29

STATE 3

Analyze Sampling Procedures	1
Records Examination	9
Effluent Sampling	2
Analyze Flow Measurement Techniques	5
Other	3
TOTAL PERMIT INSPECTIONS	20

STATE 4

Analyze Sampling Procedures	2
Records Examination	11
Effluent Sampling	2
Analyze Flow Measurement Techniques	1
Other	2
TOTAL PERMIT INSPECTIONS	18

2.4 Histograms/Bar Charts

TALKING POINTS FOR HISTOGRAMS AND BAR CHARTS

1. WHAT IS A HISTOGRAM OR BAR CHART?

- A type of chart that shows how frequently different events, factors, or values occur.

2. WHAT CAN A HISTOGRAM OR BAR CHART DO FOR YOU?

- Shows how frequently one event or measurement occurs compared to others.
- Shows a range of events or measurements.
- Provides information that a single statistic such as an average may hide.

3. WHEN DO YOU USE HISTOGRAMS OR BAR CHARTS IN PROBLEM SOLVING?

- To summarize data obtained from a number of incidents or events.
- To identify variation in process that single measures, such as averages, may hide.

4. WHAT TYPE OF DATA IS APPROPRIATE FOR HISTOGRAMS OR BAR CHARTS?

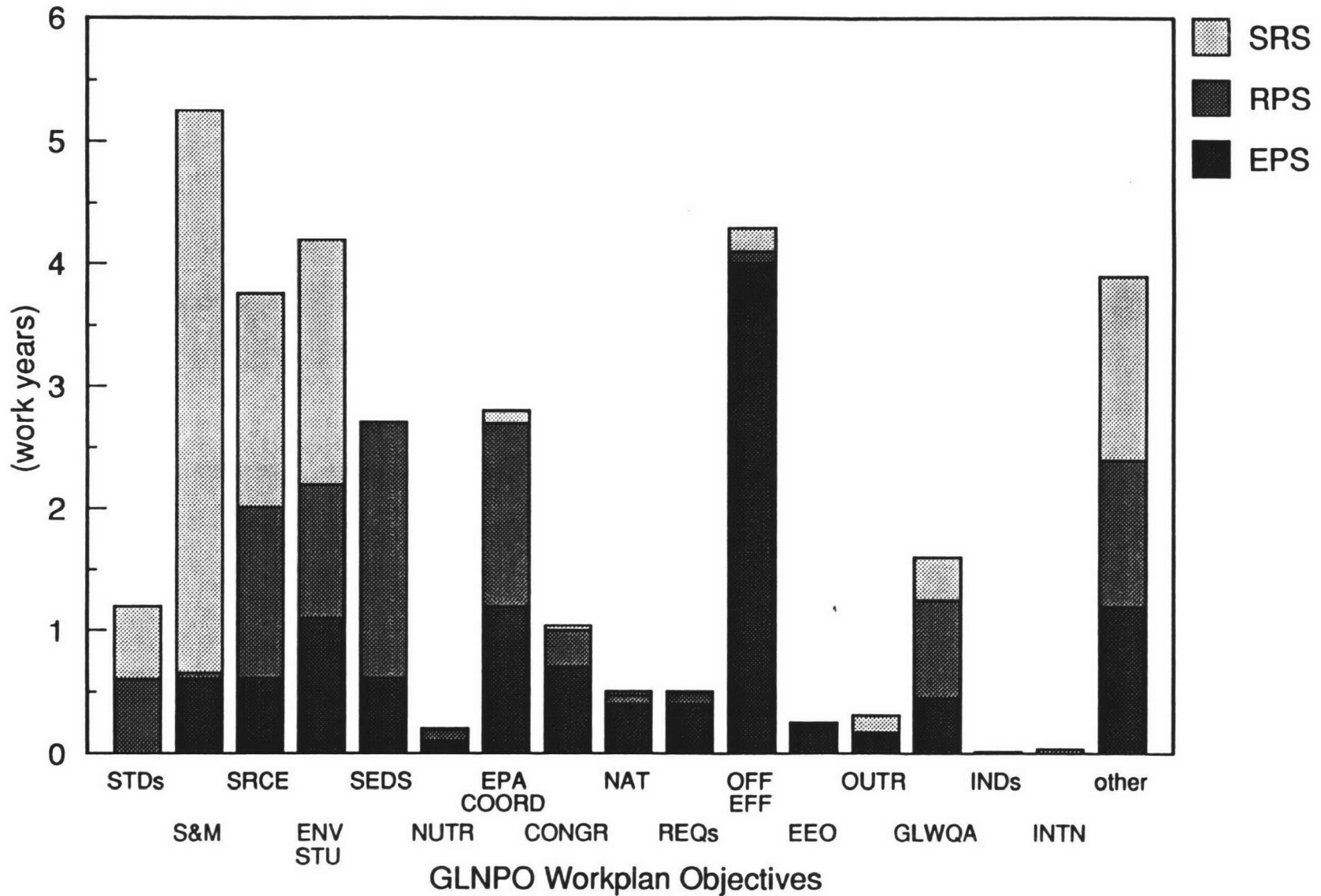
- A histogram is used with numerical data that can be grouped into intervals.
- A bar chart is used with data that can be represented as categories.

5. HOW DO YOU CONSTRUCT A HISTOGRAM OR BAR CHART?

- Select a variable.
- Collect data: obtain existing data or set up an experiment.
- Establish intervals or categories, then go through data and group incidents by interval or category.
- Count number of incidents or cases in each category or interval (counts can be converted into percents if desired).
- Place the categories or intervals on the horizontal axis and the number of incidents (or percents) on the vertical axis.

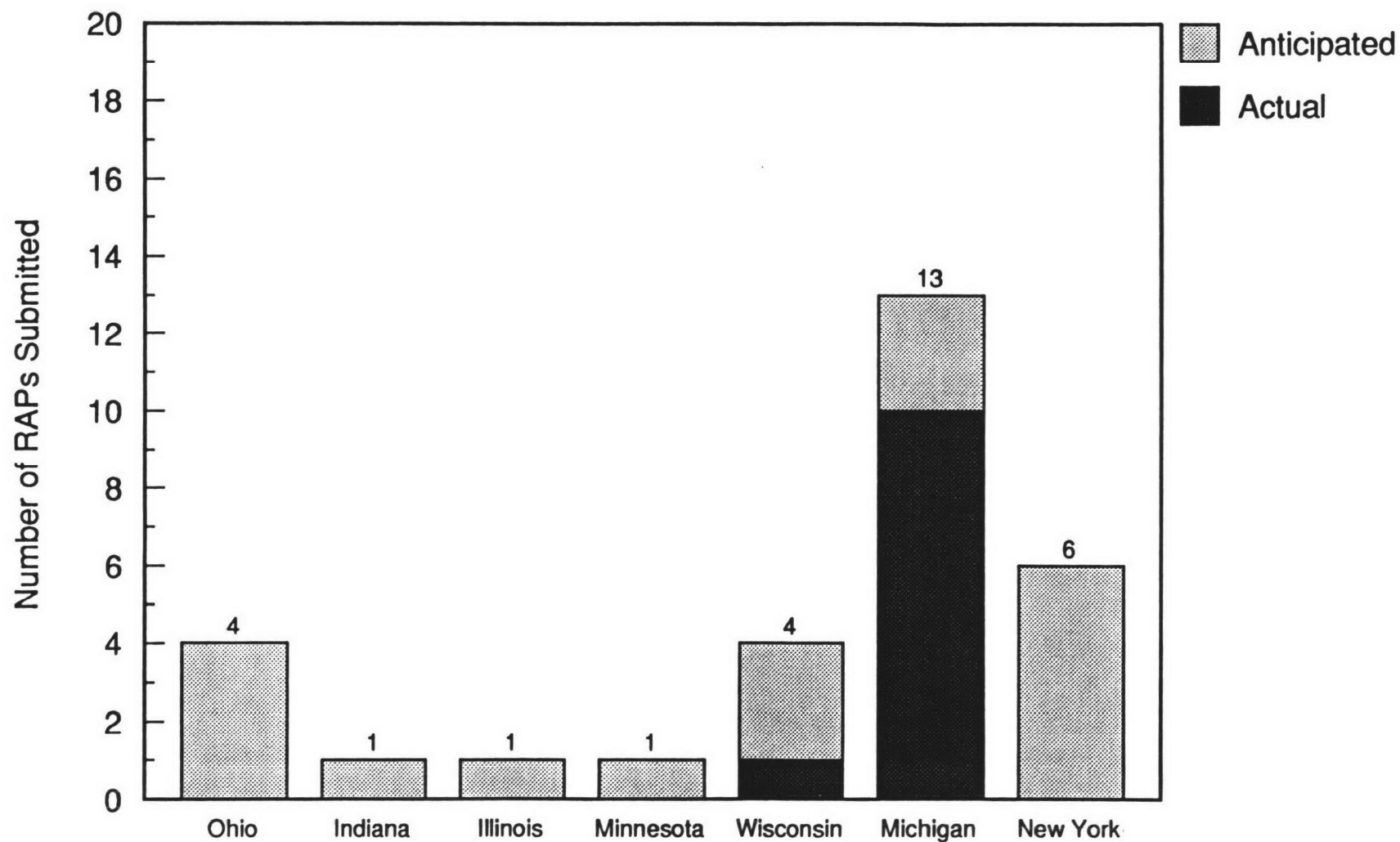
REQUIRED GLNPO STAFF INPUT

By Workplan Objective



STATUS/SCHEDULE FOR SUBMISSION GREAT LAKES AOC REMEDIAL ACTION PLANS

(Stage 1)

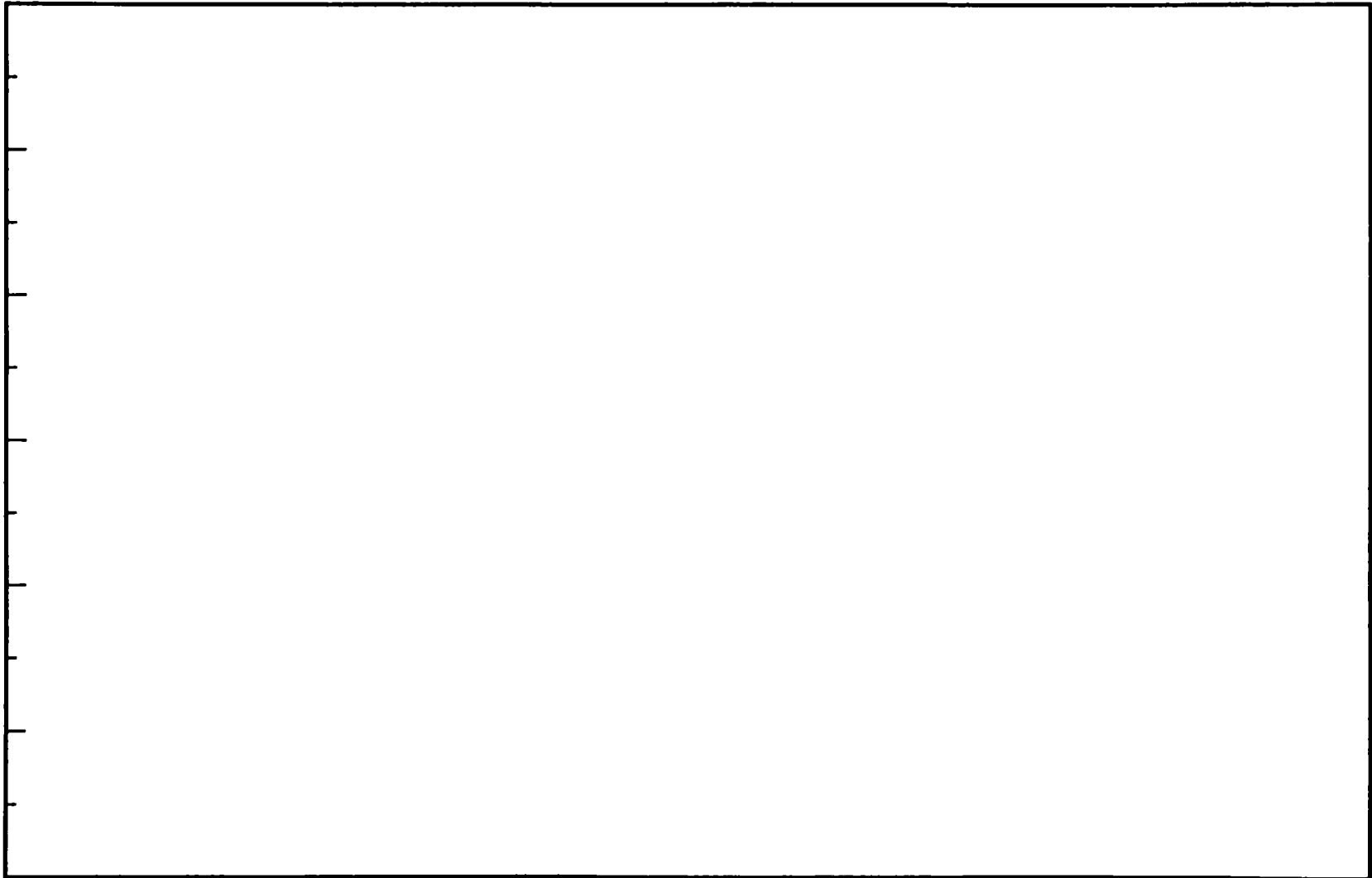


PCB CONCENTRATIONS IN COHO SALMON IN THE GREAT LAKES IN 1986

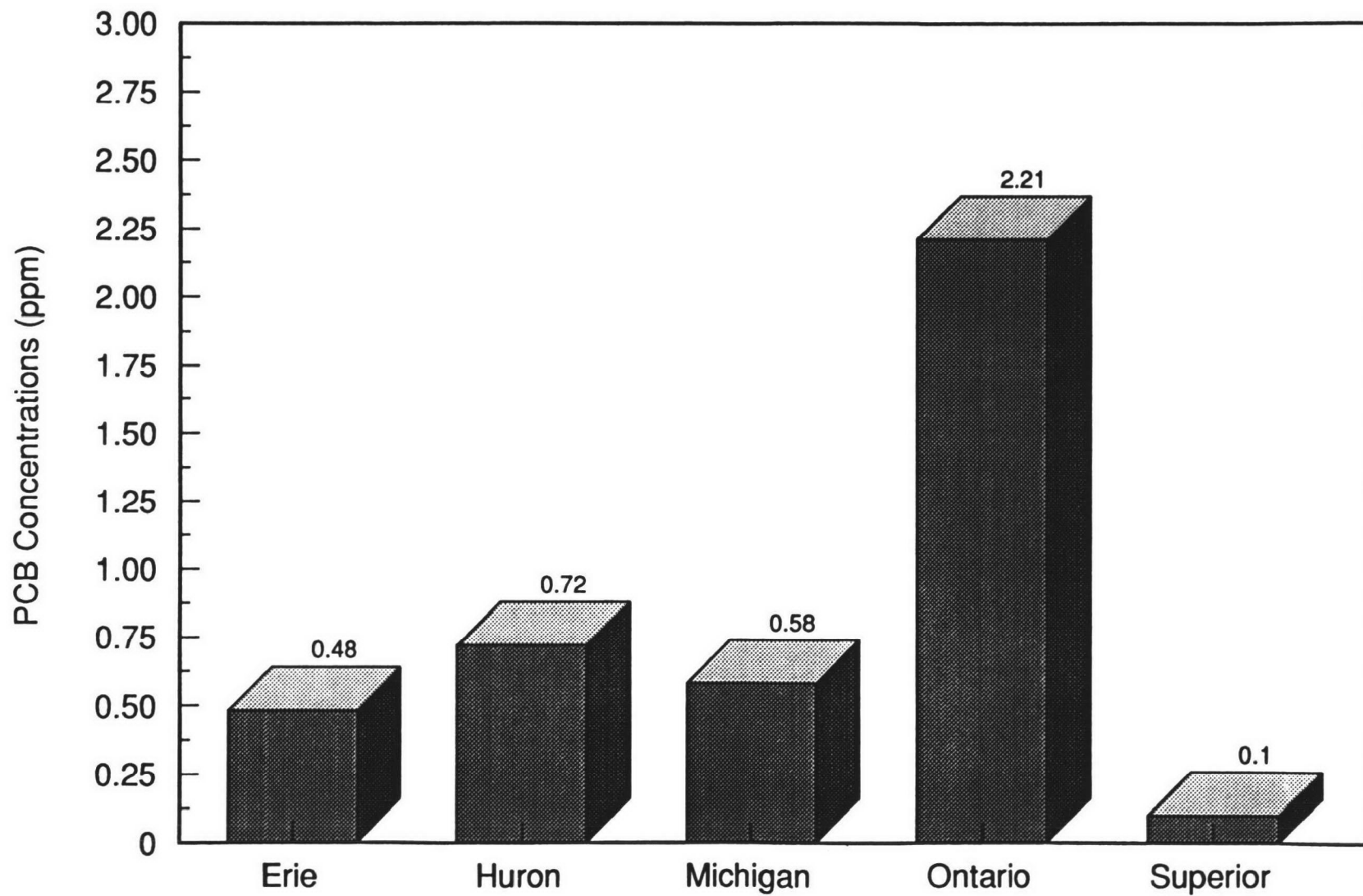
<u>LAKE</u>	<u>PCB CONCENTRATIONS</u> <u>(PPM) *</u>
ERIE	0.48
HURON	0.72
MICHIGAN	0.58
ONTARIO	2.21
SUPERIOR	< 0.10

* SALMON TISSUE SAMPLES WERE TAKEN FROM MULTIPLE SITES IN EACH LAKE -- CONCENTRATIONS ARE MEANS OF ALL SAMPLES.

PCB CONCENTRATIONS IN COHO SALMON IN THE GREAT LAKES IN 1986



PCB CONCENTRATIONS IN COHO SALMON IN THE GREAT LAKES IN 1986



MEANWHILE, BACK AT LAKE HEMOS

TYPES OF PERMIT INSPECTIONS CONDUCTED IN 1988

STATE 1

Analyze Sampling Procedures	2
Records Examination	8
Effluent Sampling	10
Analyze Flow Measurement Techniques	4
Other	3
TOTAL PERMIT INSPECTIONS	27

STATE 2

Analyze Sampling Procedures	3
Records Examination	12
Effluent Sampling	8
Analyze Flow Measurement Techniques	3
Other	3
TOTAL PERMIT INSPECTIONS	29

STATE 3

Analyze Sampling Procedures	1
Records Examination	9
Effluent Sampling	2
Analyze Flow Measurement Techniques	5
Other	3
TOTAL PERMIT INSPECTIONS	20

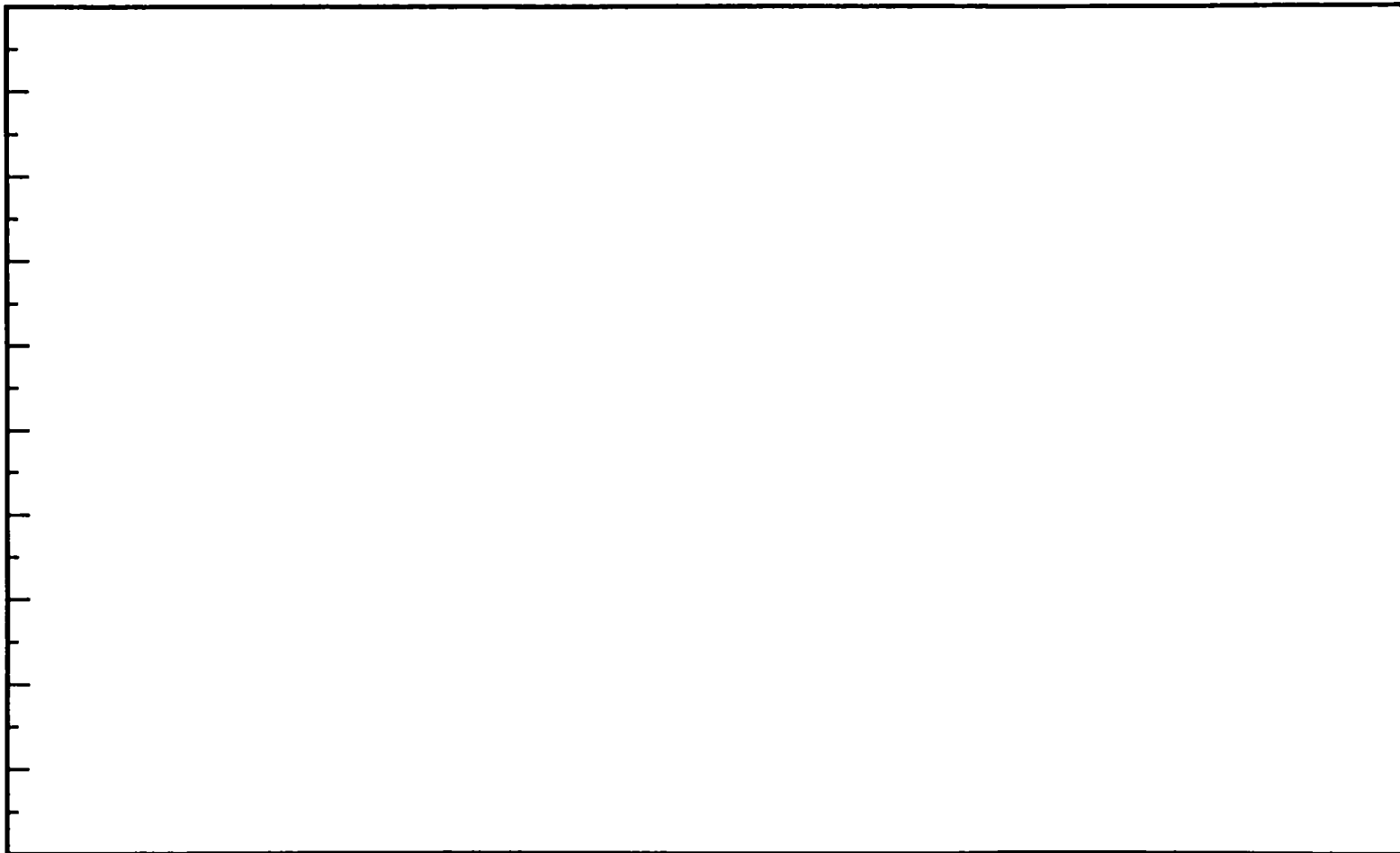
STATE 4

Analyze Sampling Procedures	2
Records Examination	11
Effluent Sampling	2
Analyze Flow Measurement Techniques	1
Other	2
TOTAL PERMIT INSPECTIONS	18

Using the data presented in the table above, construct a bar chart for each State on the types of permit inspections and a bar chart that compares the differences between States. Blank shells have been provided for your use.

FREQUENCY OF PERMIT INSPECTION ACTIVITIES

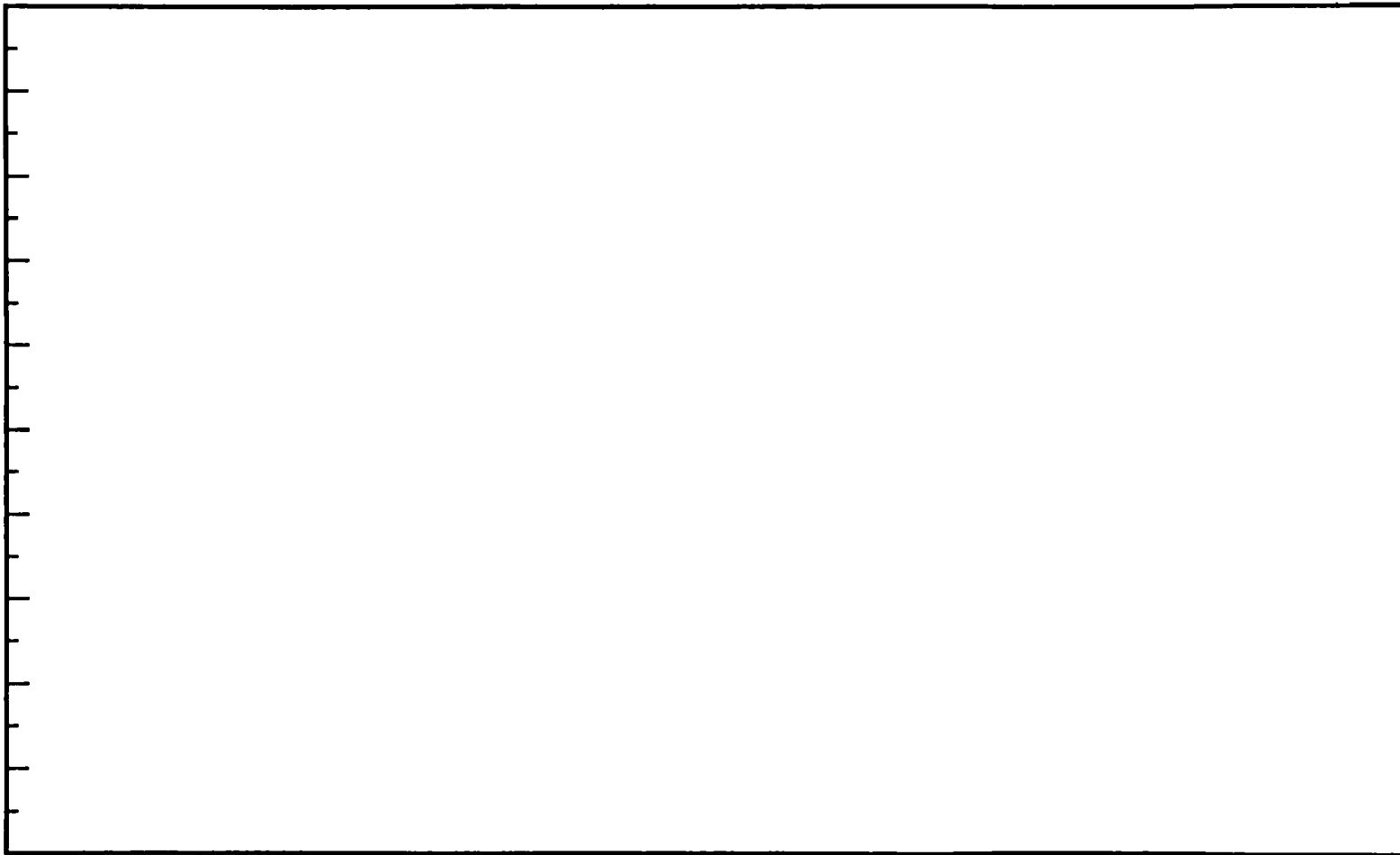
State 1
(1988)



FREQUENCY OF PERMIT INSPECTION ACTIVITIES

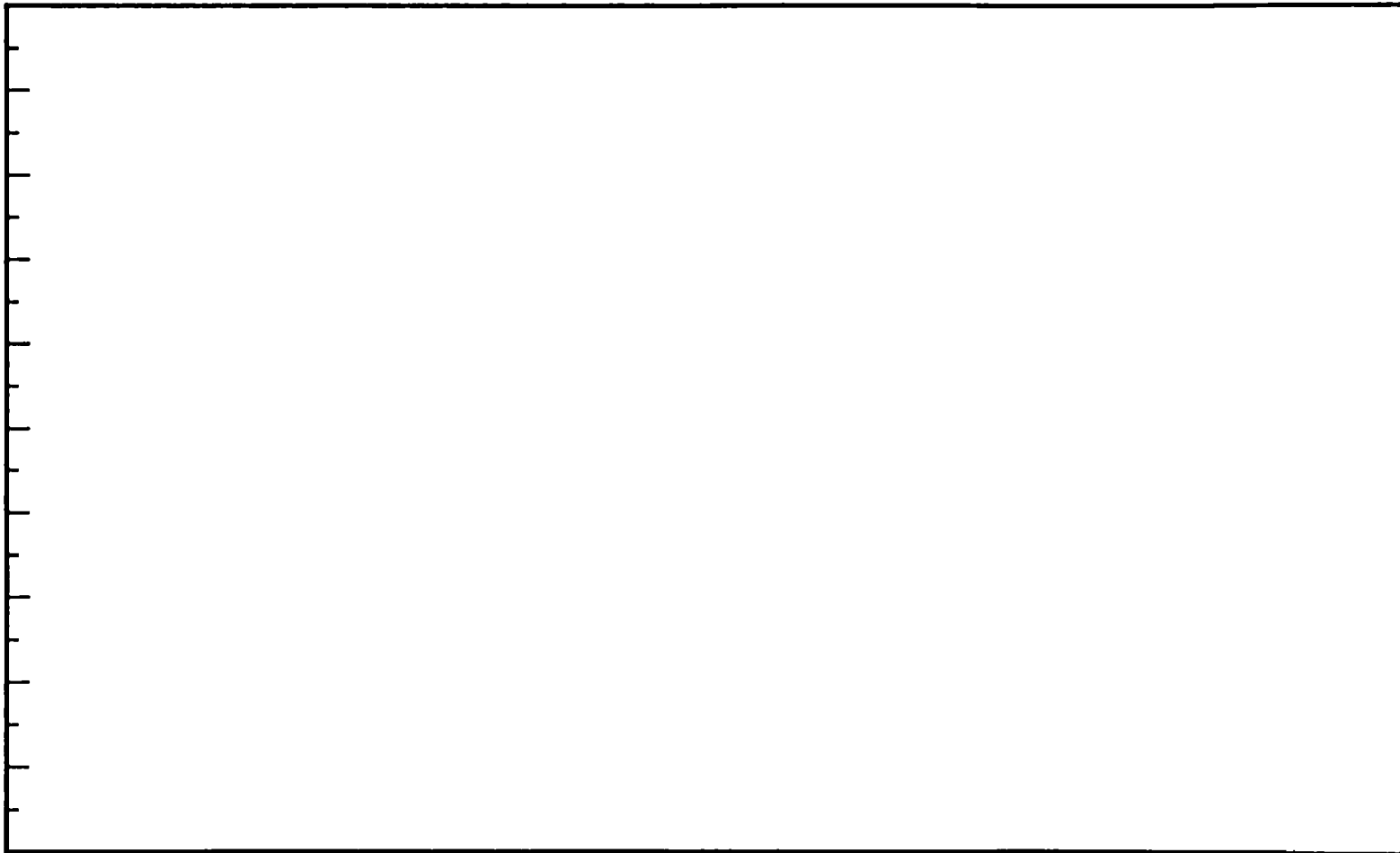
State 2

(1988)



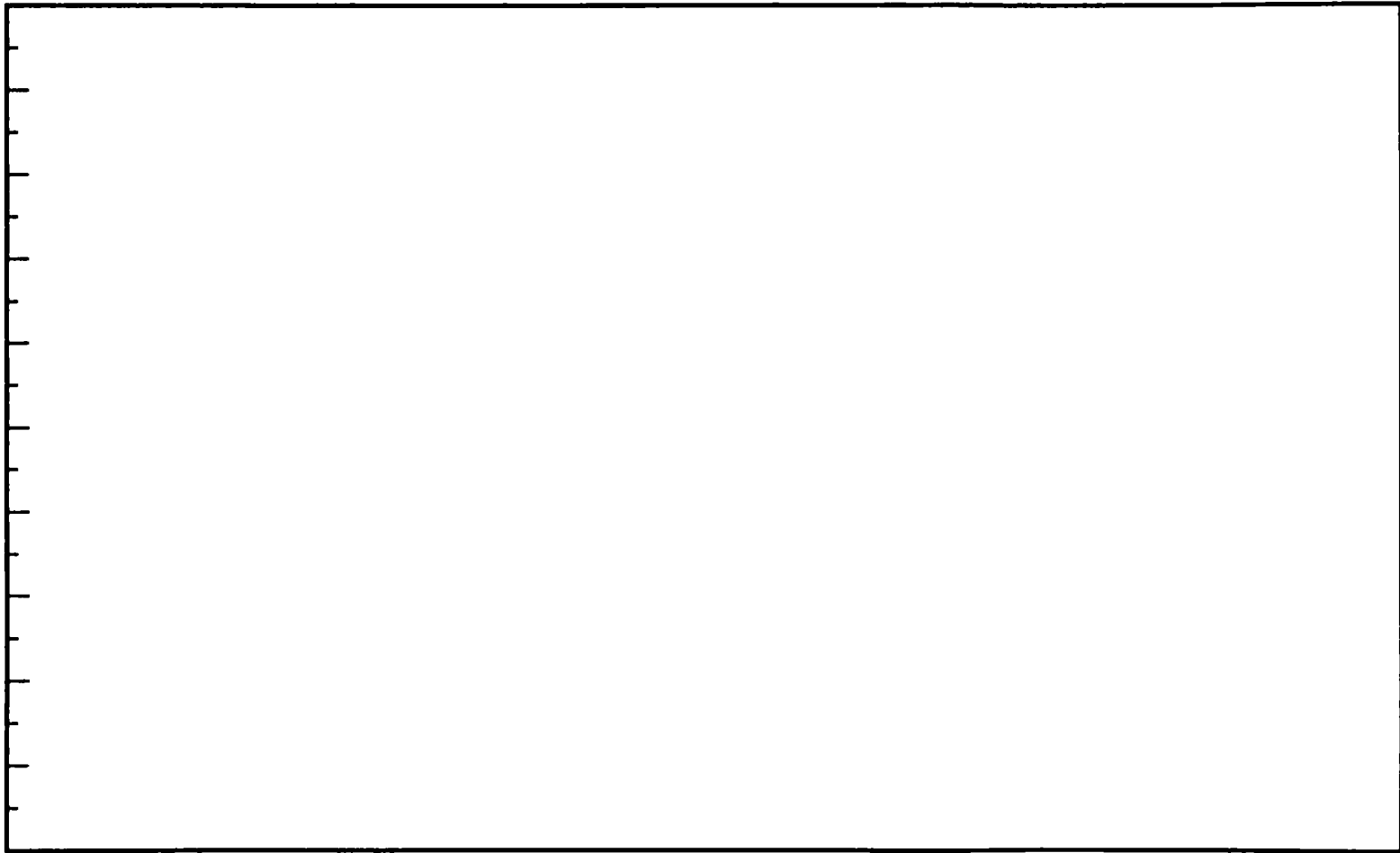
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 3
(1988)



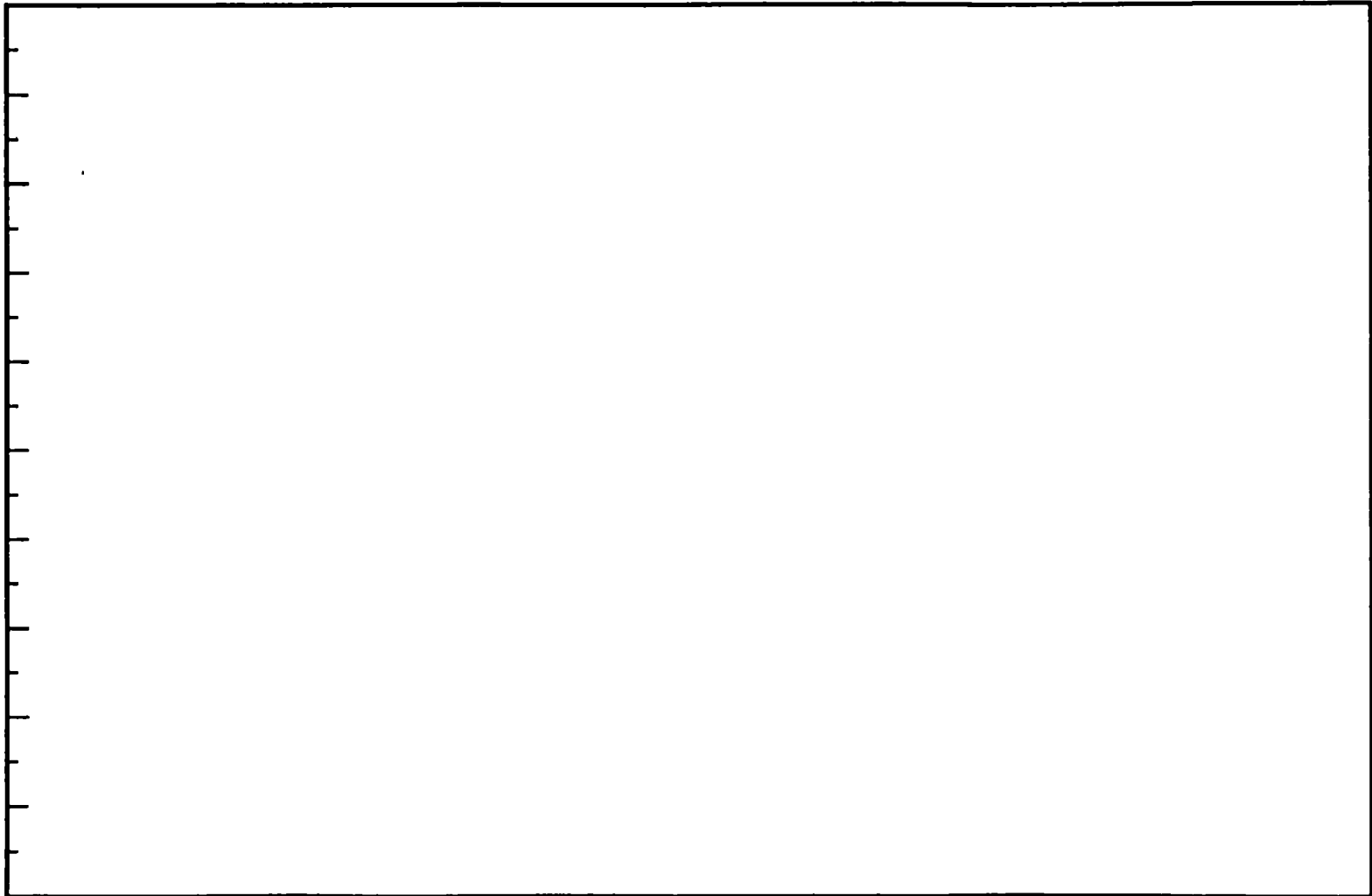
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 4
(1988)



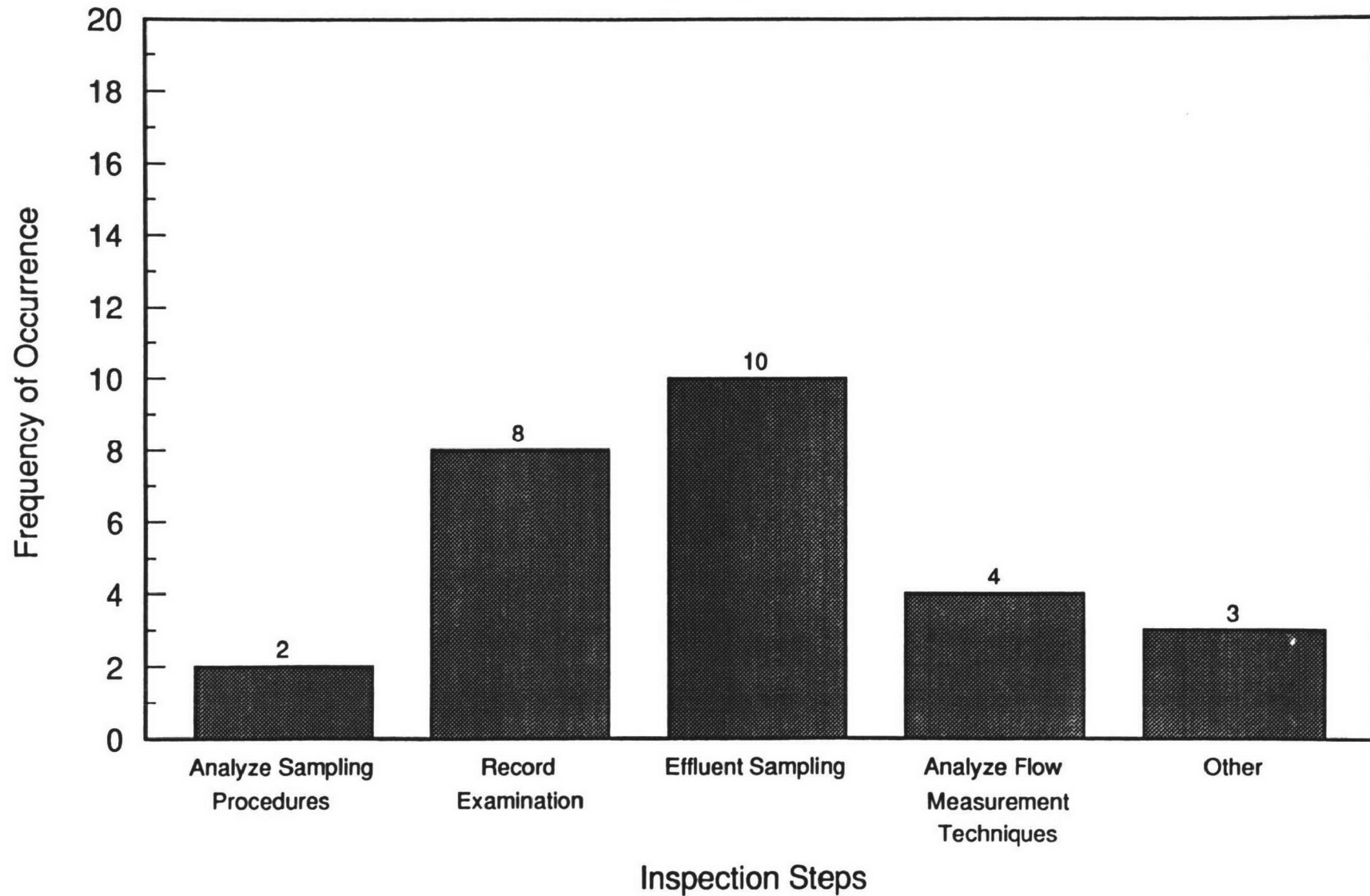
STATE COMPARISON OF PERMIT INSPECTIONS

(1988)



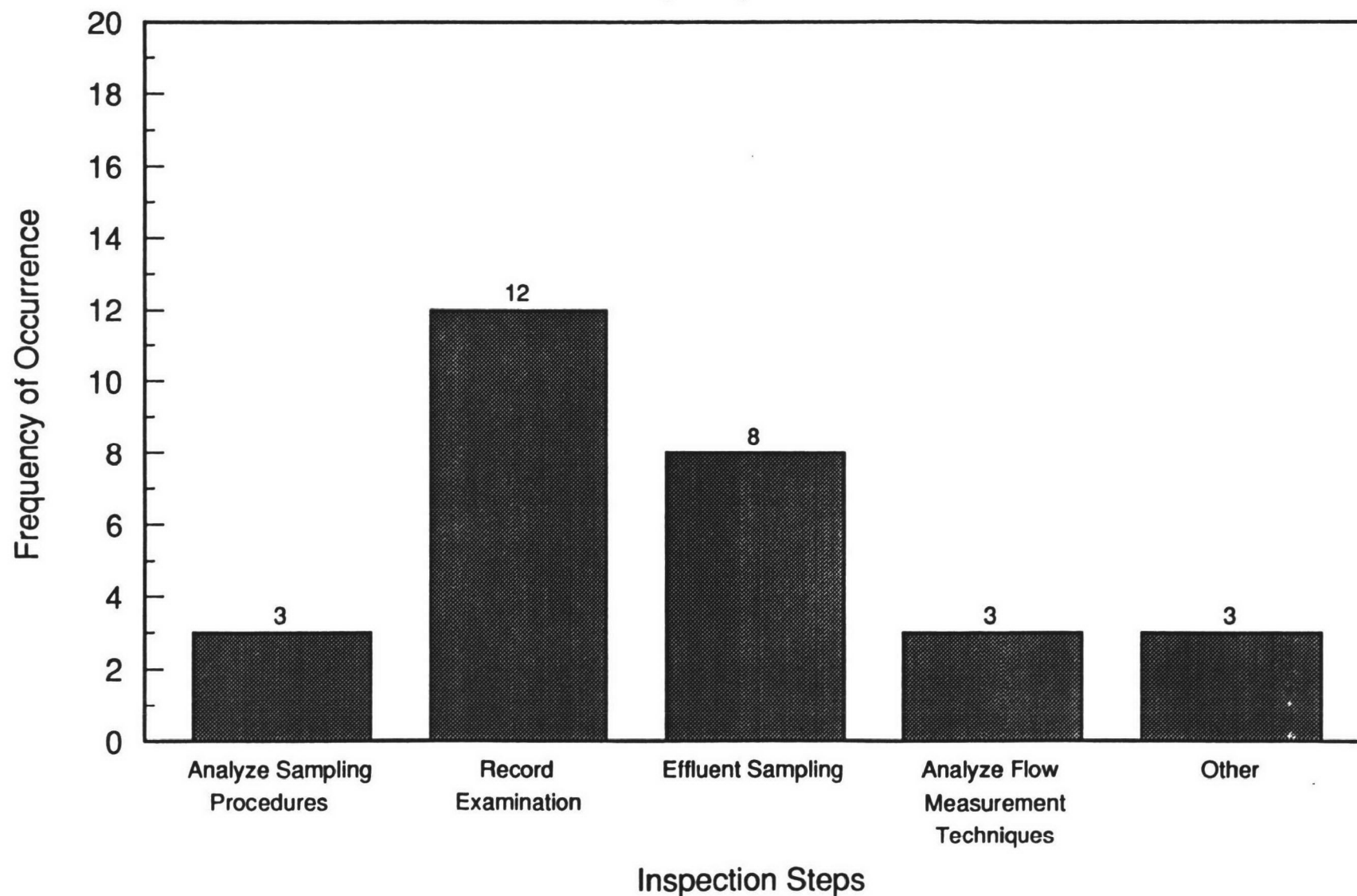
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 1
(1988)



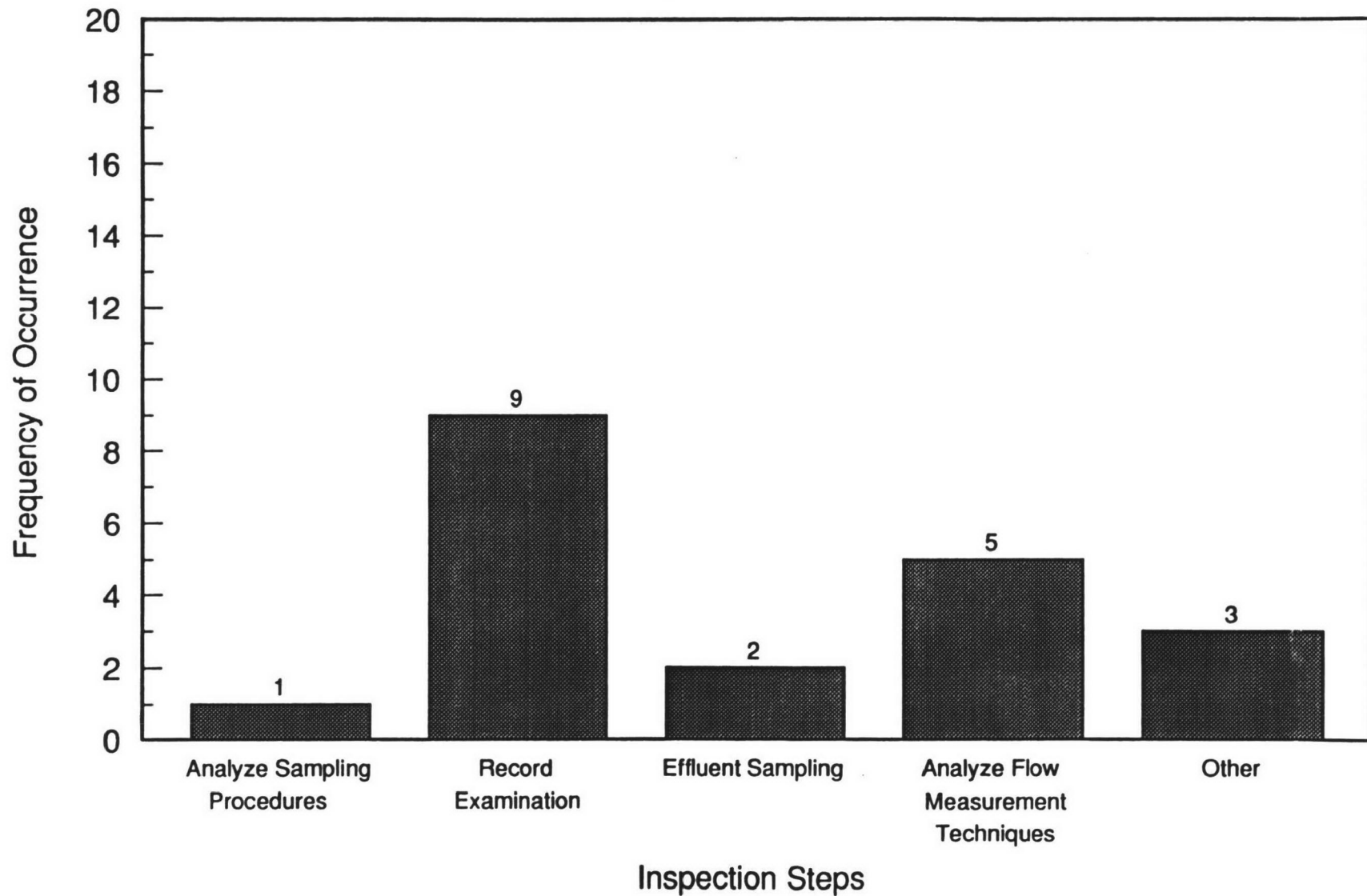
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 2
(1988)



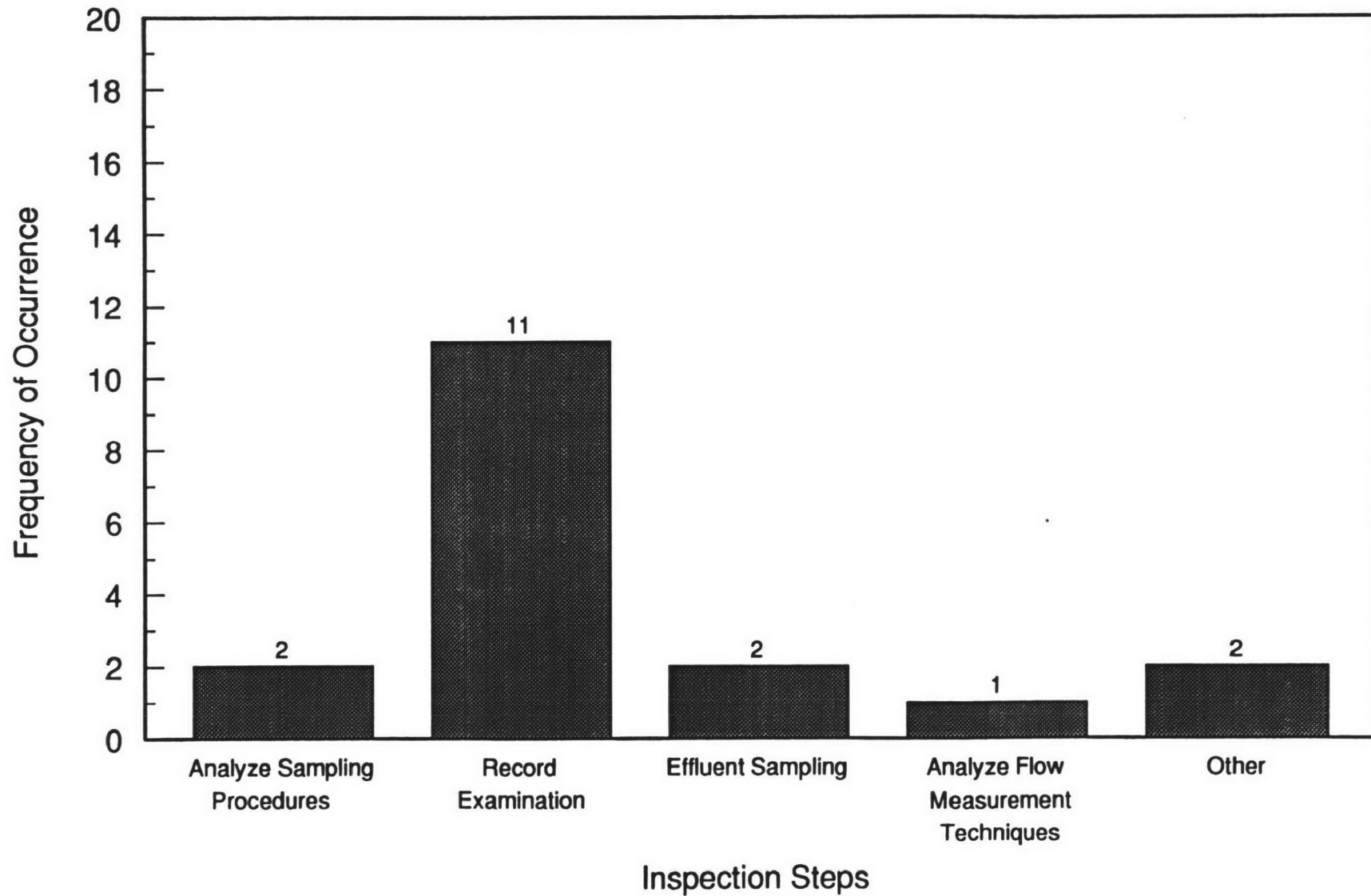
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 3
(1988)



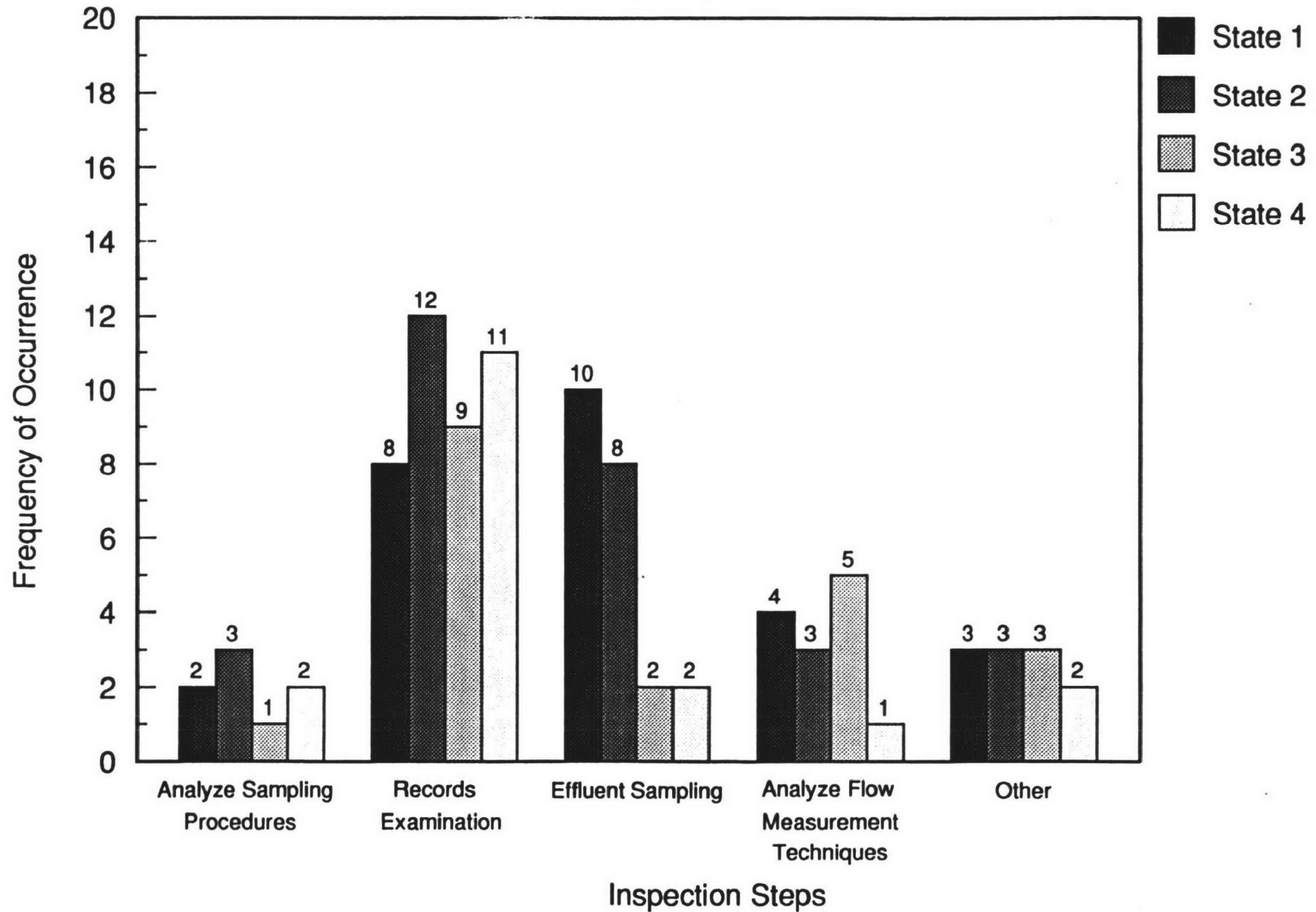
FREQUENCY OF PERMIT INSPECTION ACTIVITIES

State 4
(1988)



STATE COMPARISON OF PERMIT INSPECTIONS

(1988)



- Having now focused his efforts more clearly, Wally undertakes a project to improve the inspection process in the four states, focusing especially on the two that were doing little effluent sampling.
- Wally convenes a project team to conduct a project planning process.
- After a brief presentation on project planning, we will divide into breakout groups to complete a plan for an improvement project to improve the compliance inspection process.

2.5 Systematic Project Management

TALKING POINTS FOR PROJECT MANAGEMENT

1. WHAT IS SYSTEMATIC PROJECT MANAGEMENT?

- Systematic project management is a planning process used to apply the tools and techniques of continuous improvement to actual projects managed by GLNPO staff.
- It lays out a series of steps to develop the tasks, schedule, assignments, and budget for a quality improvement project.

2. WHAT CAN SYSTEMATIC PROJECT MANAGEMENT DO FOR YOU?

- At the start of a new assignment, it can help identify the concrete steps needed to begin and complete a project.
- Systematic project management can help project the time and resources needed to complete a project.
 - A project plan summary can be used to brief management on a project's costs, schedules, and expected deliverables or outputs.

3. WHEN DO YOU USE SYSTEMATIC PROJECT MANAGEMENT IN PROBLEM SOLVING?

- When you are at the stage in solving a problem that you have identified a specific set of questions that should be addressed or tasks that should be performed.
- When the questions you seek to address or tasks that must be performed will require a significant outlay of funds, staff, time, or management attention.
- When important work has been stalled, needs greater focus, or requires an infusion of attention and energy.

4. WHAT TYPES OF INFORMATION IS NEEDED FOR SYSTEMATIC PROJECT MANAGEMENT?

- A description of the problem being addressed and the tasks we anticipate undertaking.
 - Where possible, the focus of our project has been identified through the use of the techniques of statistical process control: an analysis of the way we presently perform work.
- Information on staff and contractor availability and costs, equipment and other than personnel costs, and management review procedures.

5. HOW DO YOU CONSTRUCT A PROJECT MANAGEMENT PLAN?

- Complete the following worksheets:
 1. **Problem parameters:** Typically, the result of a brainstorming session designed to identify the elements of a problem (e.g., through the development of a "fishbone" diagram by a project team).
 2. **Problem definition:** On which aspect of the problem (identified through brainstorming) will the quality improvement project seek to focus? What is the performance we are seeking to improve? Typically, this is based upon an analysis of variation in certain levels of performance, and selection of specific aspects of work targeted for improvement.
 3. **Assignment Summary:** What is the assignment's objective(s)? Who is the customer? Who will complete the assignment? When is it due? What is the expected output?
 4. **Task Breakdown:** What are the specific, discrete tasks that must be performed to complete the project?
 5. **Schedule Planning:** What are the start and end dates for each task and subtask? What are the key outputs or deliverables associated with each task?
 6. **Deliverable Summary:** What are the steps and interim products necessary to produce each deliverable?

7. **Review Steps for Each Product:** Who is likely to be affected by this output? Who is the customer? Who has an interest in the development of this project? Who are the required reviewers, both internal to GLNPO and external?
8. **Resource Estimation by Task:** How much staff time, contractor time, and other expenditures will be required to complete each task?
9. **Resource Estimation by Project:** A compilation of task estimates.

I. PROBLEM PARAMETERS

1. What is the general problem that has been identified?
2. Without judging their importance or even correctness, list all the factors that your group identified as causes of the problem:

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

I. _____

J. _____

K. _____

L. _____

M. _____

N. _____

O. _____

P. _____

Q. _____

R. _____

S. _____

T. _____

I. PROBLEM PARAMETERS (continued)

3. Of the problem elements listed in worksheet I, use data, or best professional judgement (vote by secret ballot if necessary) to identify the five most important factors contributing to the problem:

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____

II. PROBLEM DEFINITION

1. Briefly describe the process by which you identified the best target for improvement. _____

2. What is the specific performance we will be trying to improve? _____

3. What is the definition of success for this project? _____

4. Who are the customers for this improvement?

External: _____

Internal: _____

III. ASSIGNMENT SUMMARY

1. **Assignment Title:** _____
2. **Assignment Description:** _____

3. **Assignment Objective(s):** _____

4. **Audience for this Project:** _____
5. **Date Assigned:** _____
6. **Date Due:** _____
7. **Final Product Due:** _____
8. **Contractor Assigned:** _____
9. **EPA Staff Assigned:** _____

IV. TASK BREAKDOWN

Tasks:

Task 1.0: _____

Task 2.0: _____

Task 3.0: _____

Task 4.0: _____

Task 5.0: _____

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 1.0: _____	_____	_____
Subtask 1.1: _____ _____	_____	_____
Subtask 1.2: _____ _____	_____	_____
Subtask 1.3: _____ _____	_____	_____
Subtask 1.4: _____ _____	_____	_____
Subtask 1.5: _____ _____	_____	_____
Key Deliverables for This Task:		
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

	<u>Start Date</u>	<u>End Date</u>
Task 2.0: _____	_____	_____
Subtask 2.1: _____ _____	_____	_____
Subtask 2.2: _____ _____	_____	_____
Subtask 2.3: _____ _____	_____	_____
Subtask 2.4: _____ _____	_____	_____
Subtask 2.5: _____ _____	_____	_____
Key Deliverables for This Task:		
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 3.0: _____	_____	_____
Subtask 3.1: _____ _____	_____	_____
Subtask 3.2: _____ _____	_____	_____
Subtask 3.3: _____ _____	_____	_____
Subtask 3.4: _____ _____	_____	_____
Subtask 3.5: _____ _____	_____	_____
Key Deliverables for This Task:		
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 4.0: _____	_____	_____
Subtask 4.1: _____ _____	_____	_____
Subtask 4.2: _____ _____	_____	_____
Subtask 4.3: _____ _____	_____	_____
Subtask 4.4: _____ _____	_____	_____
Subtask 4.5: _____ _____	_____	_____

Key Deliverables for This Task:

1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 5.0: _____	_____	_____
Subtask 5.1: _____	_____	_____

Subtask 5.2: _____	_____	_____

Subtask 5.3: _____	_____	_____

Subtask 5.4: _____	_____	_____

Subtask 5.5: _____	_____	_____

Key Deliverables for This Task:

1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
1.	a)	
	b)	
	c)	
	d)	
<hr/>		
2.	a)	
	b)	
	c)	
	d)	
<hr/>		
3.	a)	
	b)	
	c)	
	d)	
<hr/>		

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
------------------------	-------------------------------	------------------

4.	a)	
	b)	
	c)	
	d)	

5.	a)	
	b)	
	c)	
	d)	

6.	a)	
	b)	
	c)	
	d)	

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
7.	a) b) c) d)	
8.	a) b) c) d)	
9.	a) b) c) d)	

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
------------------------	-------------------------------	------------------

10.	a)	
	b)	
	c)	
	d)	

11.	a)	
	b)	
	c)	
	d)	

12.	a)	
	b)	
	c)	
	d)	

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
13.	a) b) c) d)	
<hr/>		
14.	a) b) c) d)	
<hr/>		
15.	a) b) c) d)	
<hr/>		

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2
- 3

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

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- 2.
- 3.

Within Headquarters

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- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

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- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____

Reviewers:

Within GLNPO

- 1.
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VIII. RESOURCE ESTIMATION: TASKS

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 1.0:

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
1.1					
1.2					
1.3					
1.4					

Totals for Task 1.0

Staff Work Days:

Contractor Work Days:

Other Costs:

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 2.0:

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
2.1					
2.2					
2.3					
2.4					

Totals for Task 2.0

Staff Work Days:

Contractor Work Days:

Other Costs:

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 3.0:

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
3.1					
3.2					
3.3					
3.4					

Totals for Task 3.0

Staff Work Days:
Contractor Work Days:
Other Costs:

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 4.0:

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
4 1					
4 2					
4 3					
4 4					

Totals for Task 4.0

Staff Work Days:

Contractor Work Days:

Other Costs:

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 5.0:

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
5.1					
5.2					
5.3					
5.4					

Totals for Task 5.0

Staff Work Days:

Contractor Work Days:

Other Costs:

IX. RESOURCE ESTIMATION: PROJECT LEVEL

Project:

<u>Task</u>	<u>EPA Staff Work Days</u>	<u>Contractor Work Days</u>	<u>Other Costs</u>
1 0:			
2.0:			
3.0:			
4 0.			
5 0:			
TOTALS:			

I. PROBLEM PARAMETERS

1. What is the general problem that has been identified?
 - A. *Why is travel funding always tight in the fourth quarter?*
2. Without judging their importance or even correctness, list all the factors that your group identified as causes of the problem:
 - A. *Inflation in travel costs.*
 - B. *Emergency trips.*
 - C. *Response to management fire drills.*
 - D. *Poor tracking of travel expenditures.*
 - E. *Inadequate travel budget for the mission of the office.*
 - F. *Too much unnecessary travel*
 - *too many people on the same trips*
 - *too many PR trips*
3. Of the problem elements listed in worksheet I, use data, or best professional judgement (vote by secret ballot if necessary) to identify the most important factors contributing to the problem:
 - A. *Inadequate travel budget.*
 - B. *Poor tracking of travel expenditures.*

II. PROBLEM DEFINITION

1. Briefly describe the process by which you identified the best target for improvement.

Focus on travel expense tracking since we cannot get more money, but we might be able to plan our spending better by keeping track of expenditures.

2. What is the specific performance we will be trying to improve?

Tracking of travel spending.

3. What is the definition of success for this project?

A practical, low-cost method for tracking travel spending.

4. Who are the customers for this improvement?

External: The National Program Manager, EPA's Budget Office

Internal: Carol, the Staff Chiefs

III. ASSIGNMENT SUMMARY

1. **Assignment Title:** *Improving tracking of travel expenditures.*
2. **Assignment Description:** *Develop a simple system for tracking travel funds.*
3. **Assignment Objective(s):**
 - 1) *Identify process for projecting travel spending, identifying travel plans, and recording travel spending.*
 - 2) *Provide weekly reports on travel expenditures.*
4. **Date Assigned:** *9/15/89*
5. **Date Due:** *10/30/89*
6. **Final Product Due:** *10/30/89*
7. **Contractor Assigned:** *Arthur O. Little*
8. **EPA Staff Assigned:** *Riley*

IV. TASK BREAKDOWN

Tasks:

Task 1.0: *Describe present tracking system*

Task 2.0: *Identify possible improvements*

Task 3.0: *Develop project tracking system*

Task 4.0: *Pilot test system*

Task 5.0: *Train staff*

Task 6.0: *Implement*

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 1.0: <i>Describe Present System 9/15</i>	9/26	
Subtask 1.1: <i>Flowchart system</i>	9/15	9/20
Subtask 1.2: <i>Check flowchart with staff</i>	9/20	9/22
Subtask 1.3: <i>Revise and finalize flowchart</i>	9/25	9/26
Subtask 1.4: <i>Develop text description of present system</i>	9/25	9/26
Key Deliverables for This Task:		
1. <i>Flowchart 9/15</i>	9/24	
2. <i>Text description</i>	9/23	9/24

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 2.0: <i>Identify Possible Improvements</i>	9/26	10/5
Subtask 2.1: <i>Discuss flowchart with staff from offices with better systems</i>	9/26	9/28
Subtask 2.2: <i>Develop list of possible changes</i>	9/29	10/2
Subtask 2.3: <i>Discuss changes with GLNPO staff</i>	10/3	10/4
Subtask 2.4: <i>Finalize improvement list</i>	10/4	10/5
Key Deliverables for This Task:		
1. <i>List of possible improvements</i>	9/29	10/5

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 3.0: <i>Develop Revised System</i>	<i>10/4</i>	<i>10/11</i>
Subtask 3.1: <i>Draft new flow diagram of system</i>	<i>10/4</i>	<i>10/5</i>
Subtask 3.2: <i>Draft new SOPs for tracking expenditures</i>	<i>10/5</i>	<i>10/6</i>
Subtask 3.3: <i>Develop program for GPC-based system</i>	<i>10/6</i>	<i>10/10</i>
Subtask 3.4: <i>Test and modify program</i>	<i>10/10</i>	<i>10/11</i>
Key Deliverables for This Task:		
1. <i>Flow diagram</i>	<i>10/4</i>	<i>10/5</i>
2. <i>New tracking SOPs memo</i>	<i>10/5</i>	<i>10/6</i>
3. <i>New tracking program</i>	<i>10/6</i>	<i>10/11</i>

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 4.0: <i>Pilot Test System</i>		
Subtask 4.1: <i>Load all fy 90* data into new system</i>	<i>10/11</i>	<i>10/13</i>
Subtask 4.2: <i>Produce report for the 1st 2 weeks of October</i>	<i>10/13</i>	<i>10/13</i>
Subtask 4.3: <i>Provide reports to management and obtain comments</i>	<i>10/13</i>	<i>10/13</i>
Subtask 4.4: <i>Revise reports on software as needed</i>	<i>10/16</i>	<i>10/16</i>
Key Deliverables for This Task:		
1. <i>1st report tracking spending</i>	<i>10/13</i>	<i>10/13</i>

* This would be expenditures from 10/1-10/13.

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 5.0: <i>Train Staff</i>		
Subtask 5.1: <i>Develop guide to tracking system (explaining SOPs)</i>	<i>10/12</i>	<i>10/13</i>
Subtask 5.2: <i>Hold briefings on the new system</i>	<i>10/18</i>	<i>10/19</i>
Key Deliverables for This Task:		
1. <i>Guide to using the system</i>	<i>10/12</i>	<i>10/13</i>

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 6.0: <i>Implement system</i>	<i>10/20</i>	
Subtask 6.1: <i>Operate system and produce weekly reports</i>	<i>10/20</i>	
Subtask 6.2: <i>Circulate reports</i>	<i>Weekly</i>	
Key Deliverables for This Task:		
1. <i>Weekly reports</i>	<i>Weekly</i>	

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
1. <i>Flowchart</i>	a) <i>Draft flowchart</i>	<i>9/20</i>
	b) <i>Final flowchart</i>	<i>9/24</i>
2. <i>List of possible improvements</i>	a) <i>Draft list</i>	<i>10/2</i>
	b) <i>Final list</i>	<i>10/15</i>
3. <i>New flowchart and new SOPs</i>	a) <i>Draft</i>	<i>10/5</i>
	b) <i>Final</i>	<i>10/6</i>
4. <i>New tracking software</i>	a) <i>Pilot test</i>	<i>10/10</i>
	b) <i>Final program</i>	<i>10/11</i>
5. <i>1st report</i>		<i>10/13</i>
6. <i>Weekly reports</i>		<i>Weekly</i>

VII. REVIEW STEPS FOR EACH PRODUCT

Product: _____ 1-4

Reviewers:

Within GLNPO

1. *Staff Chiefs*
2. *Deputy Director*
3. *Director*

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product: *1st report of the new tracking system and subsequent reports*

Reviewers:

Within GLNPO

1. *Staff Chiefs*
2. *Deputy Director*
3. *Director*

Within the Office of the National Program Manager

1. *National Program Manager*
- 2.
- 3.

Within Headquarters

1. *Budget Office*
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 1.0: *Describe Present System*

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
1.1 <i>Flowchart system</i>	<i>Flowchart</i>	<i>6 days</i>	<i>1.0</i>	<i>2.0</i>	
1.2 <i>Check with staff</i>		<i>3 days</i>	<i>1.0</i>	<i>.5</i>	
1.3 <i>Revise and finalize chart</i>	<i>Flowchart</i>	<i>2 days</i>	<i>.5</i>	<i>1.0</i>	
1.4 <i>Develop text and description</i>	<i>Test of system</i>	<i>2 days</i>	<i>.1</i>	<i>1.0</i>	<i>\$100 - Printing</i>
			<i>2.6</i>	<i>4.5</i>	<i>\$100</i>

Totals for Task 1.0

Staff Work Days: 2.6
Contractor Work Days: 4.5
Other Costs: \$100

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 2.0: *Identify Possible Improvements*

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
2.1 <i>Discuss flow externally</i>		<i>3 days</i>	<i>1.5</i>	<i>3.0</i>	
2.2 <i>List of changes-draft</i>	<i>Improvement list</i>	<i>4 days</i>	<i>.5</i>	<i>1.5</i>	
2.3 <i>Discuss internally</i>		<i>2 days</i>	<i>1.0</i>	<i>1.0</i>	
2.4 <i>Finalize improvement list</i>	<i>Improvement final</i>	<i>2 days</i>	<i>1.0</i>	<i>1.0</i>	
			<i>4.0</i>	<i>6.5</i>	

Totals for Task 2.0

Staff Work Days: 4.0
Contractor Work Days: 6.5
Other Costs: 0

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 3.0: *Develop Reused Expenditure Tracking System*

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
3.1 <i>Draft new flow</i>	<i>Flow diagram</i>	<i>2 days</i>	<i>.5</i>	<i>1.0</i>	<i>\$100 - Printing</i>
3.2 <i>Draft new SOPs</i>	<i>Memo</i>	<i>2 days</i>	<i>.5</i>	<i>1.5</i>	
3.3 <i>Develop software</i>	<i>MW Program</i>	<i>3 days</i>	<i>.2</i>	<i>3.0</i>	<i>\$500 - Computer cost</i>
3.4 <i>Test and modify</i>		<i>2 days</i>	<i>.2</i>	<i>3.0</i>	
			<i>1.4</i>	<i>8.5</i>	<i>\$600</i>

Totals for Task 3.0

Staff Work Days: 1.4
Contractor Work Days: 8.5
Other Costs: \$600

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 4.0: Pilot Test System

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
4.1 Load data		3 days	.5	.5	
4.2 Produce 1st report	Report	1 day	.0	.2	
4.3 Circulate reports for comment		1 day	.5	.1	
4.4 Revise report software	Software revising	1 day	.2	.5	\$500 - computer cost
			1.2	1.3	\$500

Totals for Task 4.0

Staff Work Days: 1.2
Contractor Work Days: 1.3
Other Costs: \$500

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 5.0: Train Staff

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
5.1 <i>Develop guide to system</i>	<i>Training guide</i>	<i>2 days</i>	<i>.2</i>	<i>.8</i>	<i>100 - Printing</i>
5.2 <i>Hold briefings</i>	<i>Briefings</i>	<i>2 days</i>	<i>2.0</i>	<i>3.0</i>	<i>\$100 - Viewgraphs</i>
			<i>2.2</i>	<i>3.8</i>	<i>\$300</i>

Totals for Task 5.0

Staff Work Days: 2.2
Contractor Work Days: 3.8
Other Costs: \$300

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 6.0: *Implement System*

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
6.1 <i>Produce weekly reports</i>	<i>Reports</i>	<i>52 weeks</i>	<i>.1 per week</i> <i>5.2 per year</i>	<i>.5 per week</i> <i>26 per year</i>	<i>\$30 per week</i> <i>\$1560 per year (Printing)</i>
6.2 <i>Circulate reports</i>			<i>.05 per week</i> <i>2.6 per year</i>		
			7.8	26	\$1,560

Totals for Task 6.0

Staff Work Days: 7.8
Contractor Work Days: 26
Other Costs: \$1,560

IX. RESOURCE ESTIMATION: PROJECT LEVEL**Project: *Travel Expenditure Tracking System***

<u>Task</u>	<u>EPA Staff Work Days</u>	<u>Contractor Work Days</u>	<u>Other Costs</u>
1.0: <i>Describe present system</i>	2.6	4.5	\$ 100
2.0: <i>Identify improvements</i>	4.0	6.5	0
3.0: <i>Develop revised system</i>	1.4	8.5	600
4.0: <i>Pilot test</i>	1.2	1.3	500
5.0: <i>Train staff</i>	2.2	3.8	300
6.0: <i>Implement (one year)</i>	<u>7.8</u>	<u>26.0</u>	<u>1,560</u>
TOTALS:	19.2	50.6	\$3,060

MEANWHILE, BACK AT LAKE HEMOS

**INSTRUCTIONS FOR WALLY PIKE'S SYSTEMATIZED
PROJECT MANAGEMENT EXERCISE**

Wally and his project team have already begun the process of planning the project to improve permit compliance inspections. They have utilized fishbones, paretos, flowcharts and bar charts and focused on the specific performance to be improved. They have already:

- 1) Identified the problem parameters
- 2) Defined the problem
- 3) Summarized the assignment
- 4) Completed a task breakdown
- 5) Scheduled the project
- 6) Summarized the deliverables

Each group should now complete the remaining worksheets:

- 7) Review steps (already partially filled out)
- 8) Resource estimates: tasks (partially filled out)
- 9) Resource estimates: Project

I. PROBLEM PARAMETERS

1. What is the general problem that has been identified?
 - A. Compliance inspections do not always detect violators.*
2. Without judging their importance or even correctness, list all the factors that your group identified as causes of the problem:
 - A. Insufficient inspection staff.*
 - B. Corporations hiding violations.*
 - C. Inadequate procedures for checking records.*
 - D. Inadequate effluent monitoring equipment.*
 - E. Inconsistent effluent monitoring procedures.*
 - F. No effluent monitoring.*
3. Of the problem elements listed in worksheet I, use data, or best professional judgement (vote by secret ballot if necessary) to identify the most important factors contributing to the problem:
 - A. Inconsistent effluent monitoring procedures.*
 - B. No effluent monitoring.*

II. PROBLEM DEFINITION

1. Briefly describe the process by which you identified the best target for improvement.

Fishbone on fishkills; Pareto on significant causes; flowchart of permit compliance inspection process; bar chart of time involved in each step of the inspection process.

2. What is the specific performance we will be trying to improve?

Detecting permit violations.

3. What is the definition of success for this project?

Fewer undetected permit violations. Fishkill reductions that approach projections.

4. Who are the customers for this improvement?

External: Congress, the President, the media, the Administrator, A.A. Water, The National Program Manager, the public, EPA's Budget Office

Internal: Carol, the Staff Chiefs

III. ASSIGNMENT SUMMARY

1. Assignment Title: *Improving Permit Compliance Inspections*
2. Assignment Description: *Developing a handbook and training workshop for permit compliance inspectors.*
3. Assignment Objective(s):
 - 1) *Reducing undetected violations; and*
 - 2) *Increasing effluent monitoring.*
4. Date Assigned: *9/15/89*
5. Date Due: *12/13/89*
6. Contractor Assigned: *Indiana University*
7. EPA Staff Assigned: *Wally Pike (leader) and Project Team*

IV. TASK BREAKDOWN

Tasks:

Task 1.0: *Convene workgroup of state inspectors.*

Task 2.0: *Develop inspection procedures handbook.*

Task 3.0: *Develop workshop to train inspectors,*

Task 4.0: *Pilot test workshop on new procedures.*

Task 5.0: *Implement new procedures.*

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 1.0: <i>Convene Workgroup</i>		
Subtask 1.1: <i>Identify potential participants</i>	9/15	9/18
Subtask 1.2: <i>Obtain clearance from management</i>	9/18	9/20
Subtask 1.3: <i>Secure travel funds and arrange travel</i>	9/18	9/22
Subtask 1.4: <i>Develop reference package for workgroup sessions</i>	9/15	9/23
Subtask 1.5: <i>Hold meetings</i>	10/2	10/20

Key Deliverables for This Task:

1. <i>List of Participants</i>	9/18
2. <i>Memos Inviting Participants</i>	9/22
3. <i>Reference Package</i>	9/23

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 2.0: <i>Develop Inspection Handbook</i>		
Subtask 2.1: <i>Review workgroup notes</i>	10/2	10/27
Subtask 2.2: <i>Develop handbook outline and abstract</i>	10/25	10/30
Subtask 2.3: <i>Draft Handbook</i>	10/31	11/10
Subtask 2.4: <i>Circulate for comments and revise</i>	11/10	11/27
Subtask 2.5: <i>Finalize, print</i>		

Key Deliverables for This Task:

1. <i>Outline and Abstract</i>	10/30
2. <i>Draft Handbook</i>	11/10
3. <i>Final Handbook</i>	12/15

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 3.0: <i>Develop Inspector Workshop</i>	<i>10/25</i>	<i>11/14</i>
Subtask 3.1: <i>Develop Course Outline</i>	<i>10/25</i>	<i>10/26</i>
Subtask 3.2: <i>Develop Course Materials</i>	<i>10/26</i>	<i>11/3</i>
Subtask 3.3: <i>Review and revise course materials</i>	<i>11/3</i>	<i>11/10</i>
Subtask 3.4: <i>Workshop Logistics</i>	<i>10/25</i>	<i>11/3</i>
Subtask 3.5: <i>Conduct workshop</i>	<i>11/13</i>	<i>11/19</i>

Key Deliverables for This Task:

- | | |
|---------------------------|--------------|
| 1. <i>Course outline</i> | <i>10/26</i> |
| 2. <i>Course workbook</i> | <i>11/10</i> |

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 4.0: <i>Pilot Test New Procedures</i>	<i>10/2</i>	<i>11/27</i>
Subtask 4.1: <i>Identify 10 facilities in four states for test</i>	<i>10/2</i>	<i>10/27</i>
Subtask 4.2: <i>Provide Handbook to participants</i>	<i>11/10</i>	<i>11/10</i>
Subtask 4.3: <i>Conduct workshop on procedures</i>	<i>11/13</i>	<i>11/14</i>
Subtask 4.4: <i>Conduct inspectors^{ions}</i>	<i>11/15</i>	<i>11/22</i>
Subtask 4.5: <i>Evaluate and revise handbook procedures and workshops</i>	<i>11/22</i>	<i>11/27</i>

Key Deliverables for This Task:

- | | | |
|----|-----------------------------------|---------------------|
| 1. | <i>List of inspection targets</i> | <i>10/27</i> |
| 2. | <i>Inspection reports</i> | <i>11/22</i> |

V. SCHEDULE PLANNING

	<u>Start Date</u>	<u>End Date</u>
Task 5.0: <i>Implement New Procedures</i>	<i>12/15</i>	
Subtask 5.1: <i>Schedule and hold additional workshops</i>	<i>Quarterly</i>	
Subtask 5.2: <i>Circulate handbook</i>	<i>12/15</i>	<i>As needed</i>
Subtask 5.3: <i>Revise handbook</i>		<i>As needed</i>
Subtask 5.4: <i>Evaluate inspector performance</i>	<i>Periodically</i>	
Subtask 5.5: <i>Continue to track fishkill data</i>		

Key Deliverables for This Task:

None

VI. DELIVERABLE SUMMARY

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
1. <i>List of workgroup participants</i>	a) <i>Identify</i>	9/18
	b) <i>Obtain clearances from management</i>	9/20
2. <i>Memos seeking participants</i>	a) <i>Draft</i>	9/19
	b) <i>Obtain management approval</i>	9/20
	c)	
	d)	
3. <i>Reference package for workgroup</i>	a) <i>Draft</i>	9/20
	b) <i>Obtain management approval</i>	9/22
	c) <i>Duplicate</i>	9/24
	d)	
4. <i>Handbook</i>	a) <i>Outline and abstract</i>	10/30
	b) <i>Draft</i>	11/10
	c) <i>Review and revise</i>	11/27
	d) <i>Print</i>	12/15
5. <i>Course workbook</i>	a) <i>Outline</i>	10/10
	b) <i>Draft</i>	11/3
	c) <i>Review and revise</i>	11/10
	d) <i>Duplicate</i>	11/15

VI. DELIVERABLE SUMMARY (continued)

<u>Key Deliverable</u>	<u>Interim Products/Steps</u>	<u>Due Dates</u>
6. <i>List of inspection targets</i>	a) <i>Draft</i>	<i>10/10</i>
	b) <i>Review and approve</i>	<i>10/27</i>
	c)	
	d)	
<hr/>		
7. <i>State inspection reports</i>	a) <i>Conduct inspections</i>	<i>11/22</i>
	b) <i>Draft and file reports</i>	<i>11/22</i>
	c)	
	d)	

VII. REVIEW STEPS FOR EACH PRODUCT

Product 1: *List of Workshop Participants*

Reviewers:

Within GLNPO

1. Staff Chief
2. Deputy Director
3. Director

Within the Office of the National Program Manager

- 1
- 2
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions).

- 1.
- 2
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT**Product 2: *Memos Seeking Participants*****Reviewers:****Within GLNPO**

1. Staff Chief
2. Deputy Director
3. Director

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1
- 2.
- 3

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1 State Program Directors
- 2 Chief of Inspection Sections
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT

Product 3: *Reference Package for Workshop*

Reviewers:

Within GLNPO

1. Staff Chief
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT**Product 4: *Handbook*****Reviewers:****Within GLNPO**

1. Staff Chief
2. Deputy Director.
3. Director

Within the Office of the National Program Manager

- 1.
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

1. State Program Directors
2. Inspection Chiefs
3. Inspectors

VII. REVIEW STEPS FOR EACH PRODUCT**Product 5: *Course Workbook*****Reviewers:****Within GLNPO**

1. Staff Chief
- 2.
- 3.

Within the Office of the National Program Manager

- 1.
- 2.
- 3

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, I.J.C., Congress, news media, public, interest groups)

- 1.
- 2.
- 3.

VII. REVIEW STEPS FOR EACH PRODUCT**Product:6 LIST OF INSPECTION TARGETS**

(No Review for Product 7)

Reviewers:**Within GLNPO**

1. Staff Chief
2. Deputy Director
3. Director

Within the Office of the National Program Manager

1. National Program Manager
- 2.
- 3.

Within Headquarters

- 1.
- 2.
- 3.

Within EPA Regions (Identify Regions):

- 1.
- 2.
- 3.

External

(e.g., OMB, White House, Canadian Federal Government, Canadian Provincial Government, States, IJC, Congress, news media, public, interest groups)

1. State Program Director
2. Inspection Section Chief
- 3

VIII. RESOURCE ESTIMATION: TASKS

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 1.0: Convene Workgroup

From worksheet #5 (p2-129)

Estimate

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
pp 129 1.1 Identify Potential Participants	List of participants	4 Days	1.0	0	0
1.2 Obtain Management Approval	Memo inviting participants	3 days	.3	0	0
1.3 Secure & Arrange Travel	—	5 Days	1.0	0	\$8,000—
1.4 Develop Reference Packages	Reference Package	9 Days	3.0	10.0	500—
1.5 Hold Meetings		19 Days	6.0	3.0	0
			11.3	13	\$8,500 ⁰⁰

Totals for Task 1.0

Staff Work Days: 11.3
 Contractor Work Days: 13.0
 Other Costs: \$8,500

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

Task 2.0: Develop Inspection Handbook

Subtask	From Worksheet 5 (p.2-130)		Estimate		
	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
2.1 Develop Workgroup Notes		26 Days	2.0	4.0	0
2.2 Outline and Abstract Handbook	outline/abstract	6 Days	.5	2.0	0
2.3 Draft Handbook	Draft Handbook	11 Days	3.0	10.0	\$200.00
2.4 Circulate/Revise		18 Days	2.0	2.0	0
2.5 Finalize and Print	Final Handbook	—	—	—	\$2,500.00
Totals for Task 2.0			7.5	18.0	2700.00

Staff Work Days: 7.5
 Contractor Work Days: 18.0
 Other Costs: \$2700.00

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

From Worksheet # 5
(P. 2-131)

Estimates

Task 3.0: Develop Inspector Workshop

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
3.1 Outline	outline	22 Days	.3	.5	
3.2 Develop Materials	Draft Workbook	8 Days	1.0	4.0	Printing 200
3.3 Review and Revise	Final Workbook	8 Days	1.5	2.5	500
3.4 Logistics	—	9 Days	.2	1.5	
3.5 Conduct Workshop	—	7 Days	6.0	8.0	
			9.0	16.5	700

2-13/

Totals for Task 3.0

Staff Work Days: 9.0
Contractor Work Days: 16.5
Other Costs: \$700.00

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

From Worksheet # 5-
(P. 2-132)

Estimates

Task 4.0: Pilot Test New Procedures

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
4.1 Identify Targets	List of Targets	26 Days	6.0	0	0
4.2 Circulate Handbook	—	1 Day	0	.1	—
4.3 Conduct Workshop	(covered under Task 3.5)	—	—	—	—
4.4 Conduct Inspections	Inspection Results	8 Days	1.0	0	0
4.5 Evaluate and Revise Handbook	Revised Handbook	6 Days	2.0	4.0	—
			9.0	4.1	cost

Totals for Task 4.0

Staff Work Days: 9.0
Contractor Work Days: 4.1
Other Costs: 0

VIII. RESOURCE ESTIMATION: TASKS (Continued)

Elapsed time is the number of days, weeks, or months between the start and end dates. In estimating work days (either EPA or contractor staff) it may help to think of percentages of time multiplied by the number of days of work on this task. Also factor in the roles and time needed of different EPA staff. "Other Costs" refers to any travel, printing, or equipment costs. Refer to the Estimated Price List (included in Reference Materials) for estimates of Other Costs.

From Worksheet 5 (p. 2-133)

Estimates

Subtask	Product(s) (if any)	Elapsed Time	EPA Staff Work Days	Contractor Work Days	Other Costs
5.1 Schedule and Hold Workshops		1 yr	6.0	8.0	\$6,000 ⁰⁰ Travel
5.2 Circulate Handbook		1 yr	.5	1.0	
5.3 Revise Handbook			3.0	5.0	
5.4 Evaluate Inspection			2.0	4.0	
5.5 Track Fishkills			1.5	0	

Totals for Task 5.0

Staff Work Days: 13.0
 Contractor Work Days: 18.0
 Other Costs: \$6,000⁰⁰

IX. RESOURCE ESTIMATION: PROJECT LEVEL
(From Worksheet # 8)

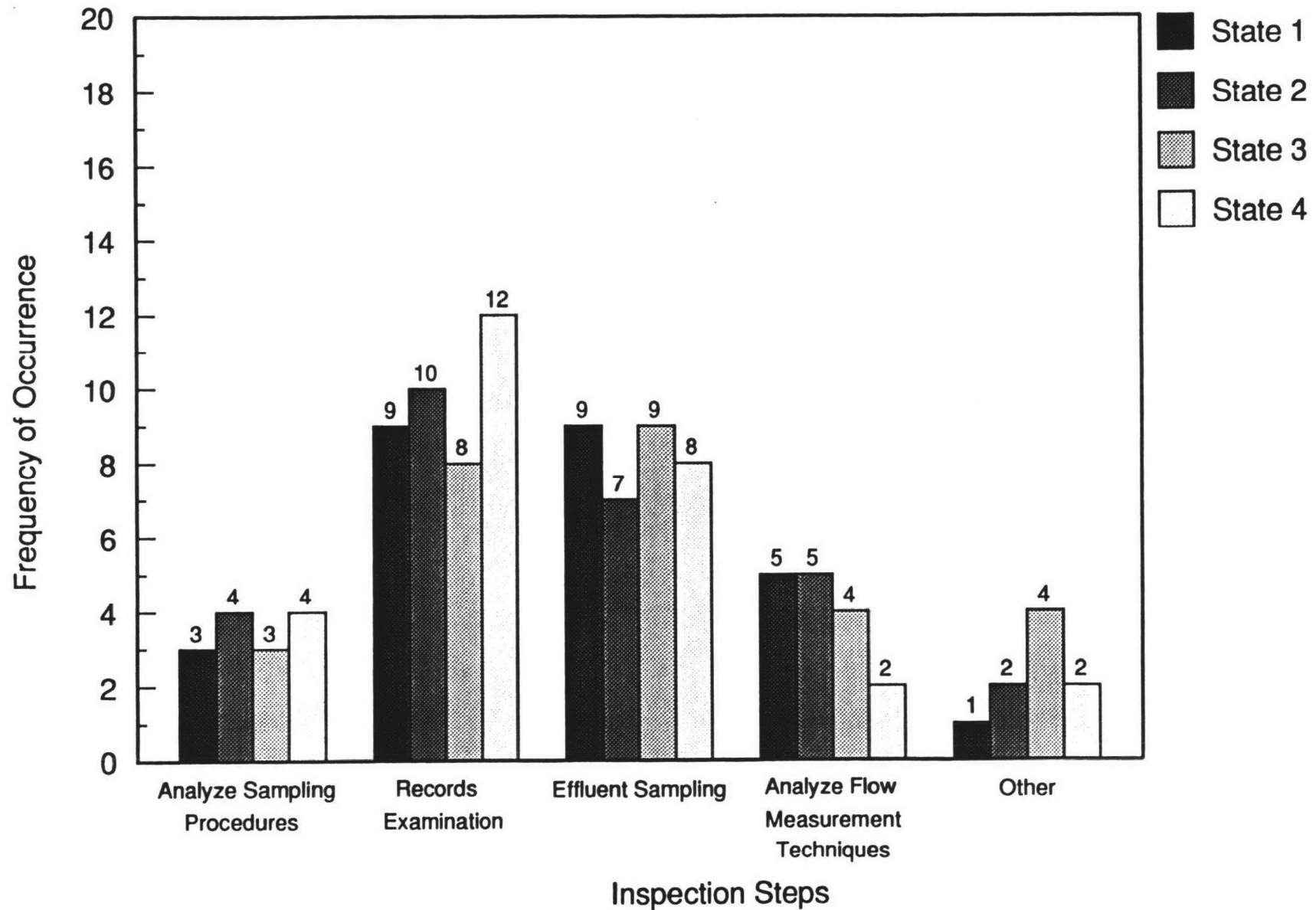
Project:

<u>Task</u>	<u>EPA Staff Work Days</u>	<u>Contractor Work Days</u>	<u>Other Costs</u>
1.0: (P. 2-141)	11.3	13.0	\$ 8500 ⁰⁰
2.0: (P. 2-142)	7.5	18.0	2700 ⁰⁰
3.0: (P. 2-143)	9.0	16.5	700 ⁰⁰
4.0: (P. 2-144)	9.0	4.1	0
5.0: (P. 2-145)	13.0	18.0	6000 ⁰⁰
TOTALS:	49.8	69.6	\$ 17,900 ⁰⁰

- In order to evaluate the effectiveness of the improvement project, Wally collects data over the next year on both compliance inspections and fish kills.
- As the bar chart on the following page shows, the two states that had been doing little effluent sampling before the project are now doing such sampling at about the same frequency as the other two states.

STATE COMPARISON OF PERMIT INSPECTIONS

(1989)



- To effectively present the data on fish kills, he decides to construct a run chart that compares fish kills before and after the improvement project.
- After a brief presentation on run charts, we will divide into breakout groups to construct a run chart: Number of fish kills in Lake Hemos, 1986 - 1989.

2.6 Run Charts

TALKING POINTS FOR RUN CHART

1. WHAT IS A RUN CHART?

- A plot of measurements taken at regular intervals of time.

2. WHAT CAN RUN CHARTS DO FOR YOU?

- Illustrate trends.
- Identify the degree of variation of performance levels over time.
- Identify short term abnormalities or long term changes.
- A run chart can be used to compare the progress of two or more different activities over time.

3. WHAT TYPE OF DATA IS APPROPRIATE FOR RUN CHARTS?

- Data that can be measured over time.
- Look for data that tell you:
 - how often an activity takes place,
 - how much of a product is produced,
 - how long a process takes,
 - how many errors are made.

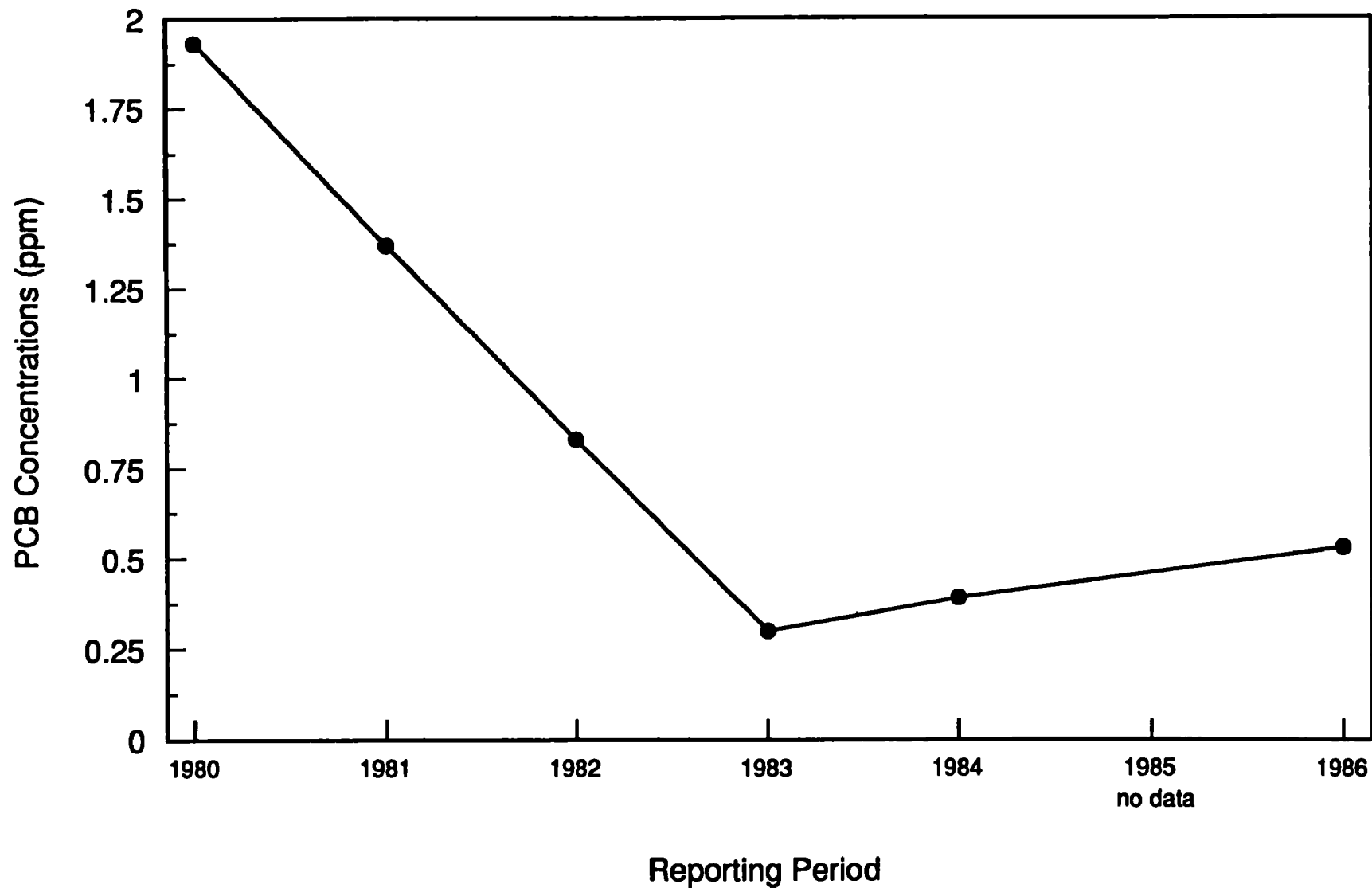
4. WHEN DO YOU USE RUN CHARTS IN PROBLEM SOLVING?

- Use it early in the problem solving process when you are trying to understand the level of performance or to identify variation in performance.
- Use it after implementing a program to improve a process, to monitor changes, and to compare results before and after the improvement effort.

5. HOW DO YOU CONSTRUCT A RUN CHART?

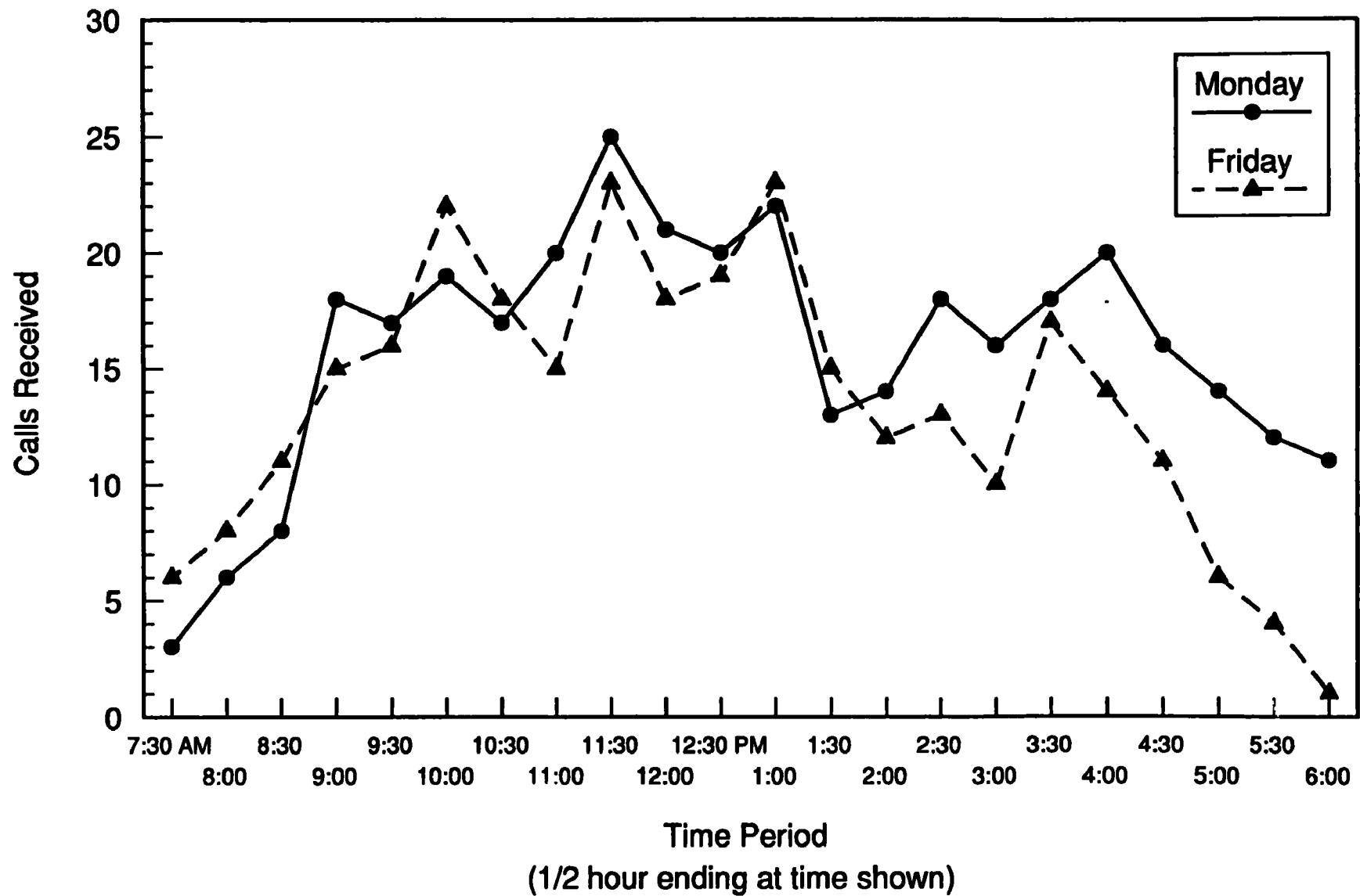
- Select a variable: an activity, process, or other event of concern.
- Select an appropriate interval of time for recording the measurement of the activity, process or event.
- Define the time intervals on the horizontal axis, and the range of values of the variable on the vertical axis.
- Plot the value for the variable for each time interval.

PCB CONCENTRATIONS IN COHO SALMON IN LAKE MICHIGAN (1980-1986)



INCOMING PHONE CALLS PER HALF HOUR

(Monday and Friday)

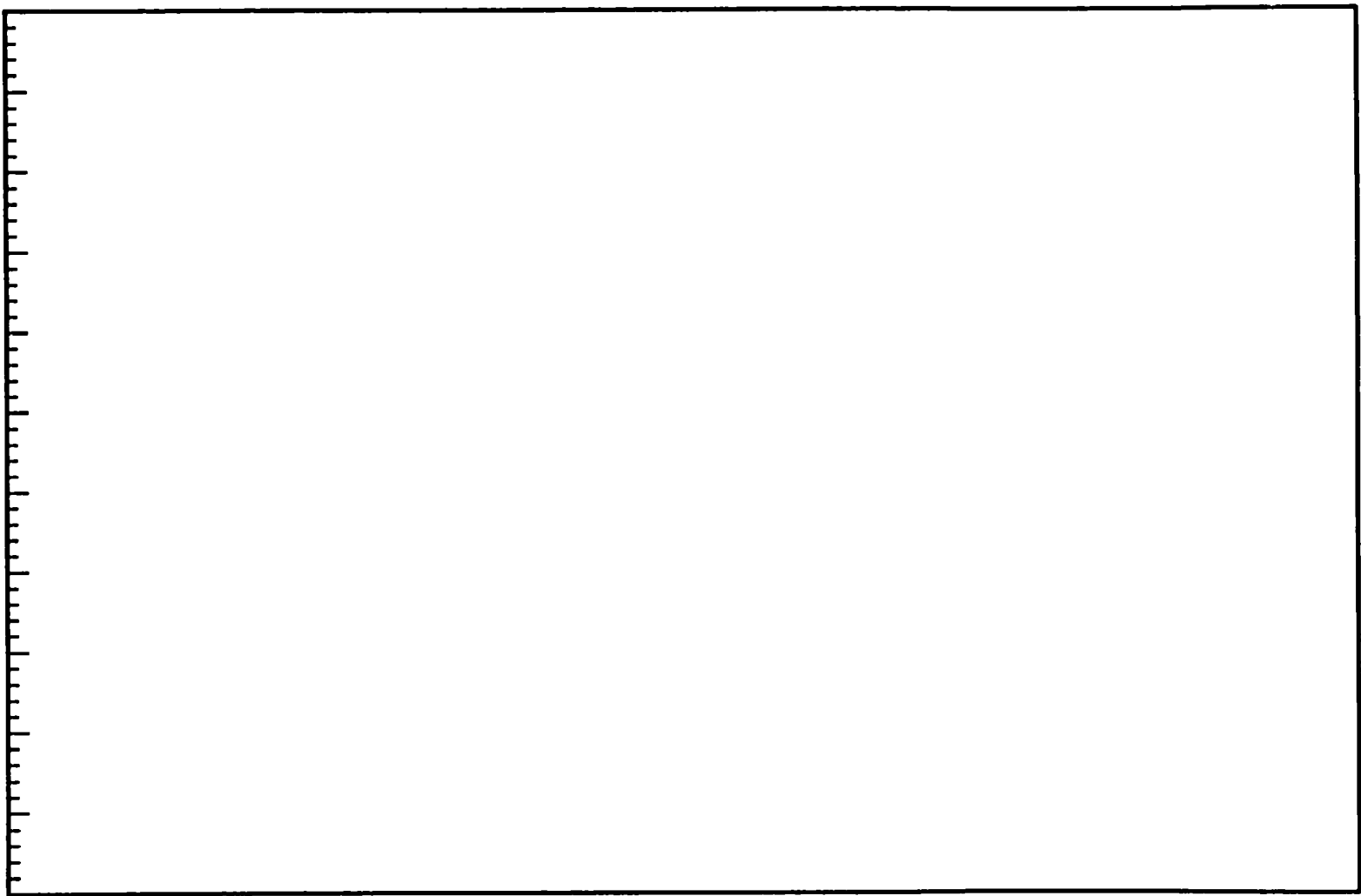


GRANTS AWARDED BY MONTH (FY 1988)*

<u>MONTH</u>	<u>GRANTS AWARDED</u>	<u>MONTH</u>	<u>GRANTS AWARDED</u>
10/87	0	4/88	9
11/87	0	5/88	7
12/87	2	6/88	11
1/88	5	7/88	18
2/88	6	8/88	23
3/88	7	9/88	51

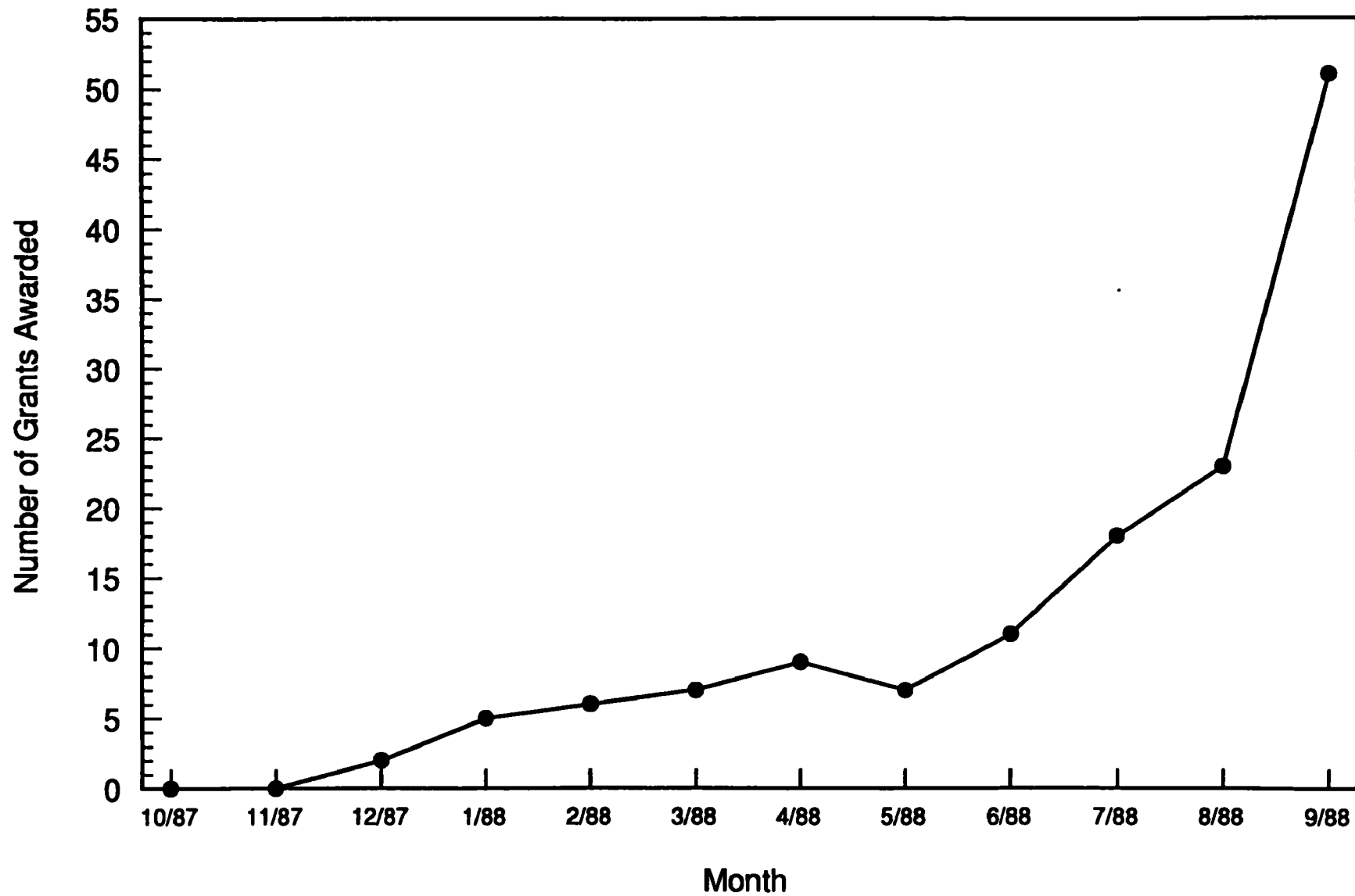
* DATA FROM GLNPO FY 1988 "B" MONEY
TRACKING SYSTEM.

GRANTS AWARDED BY MONTH
(FY 1988)



GRANTS AWARDED BY MONTH

(FY 1988)



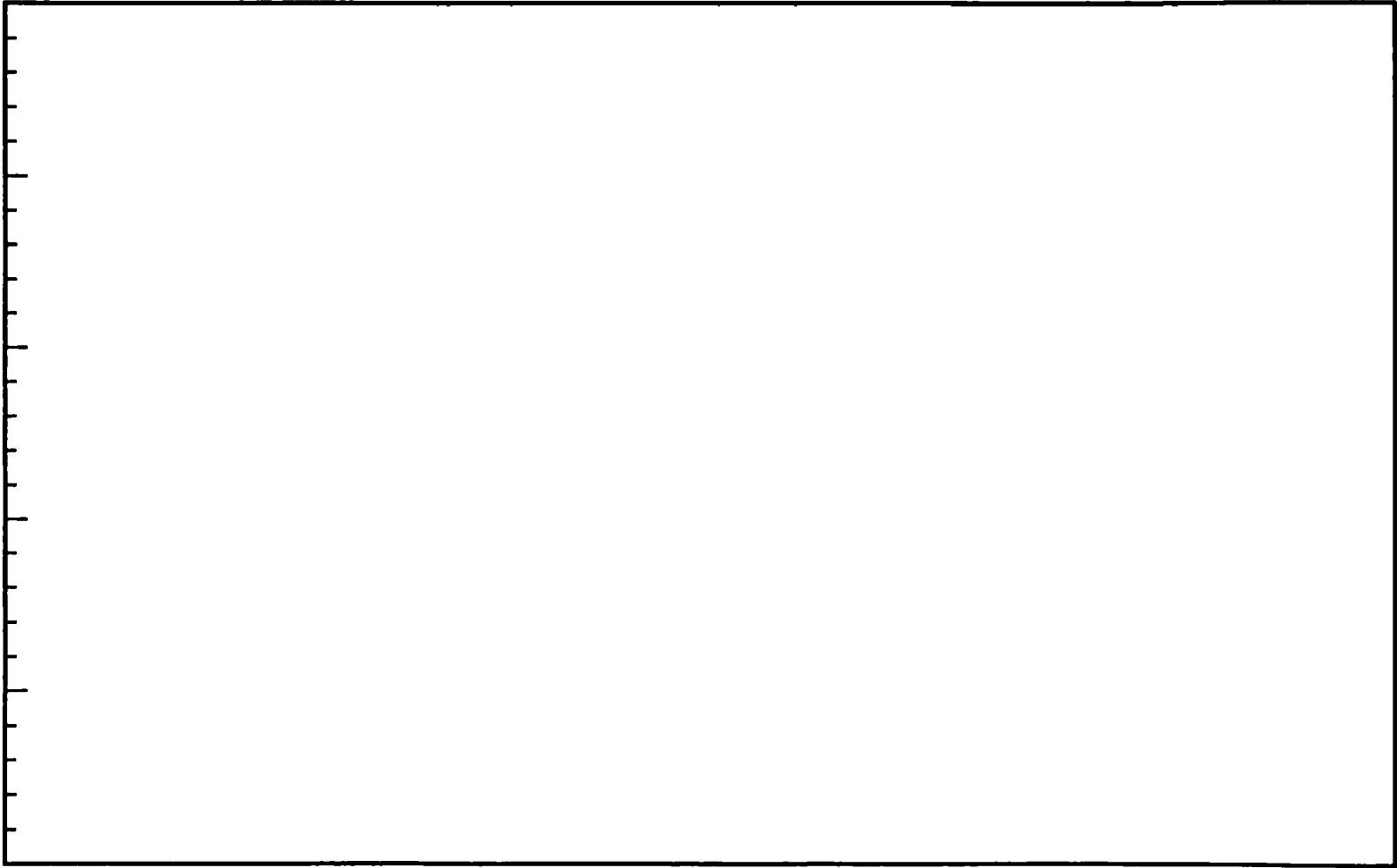
MEANWHILE, BACK AT LAKE HEMOS

**NUMBER OF FISH KILLS IN LAKE HEMOS
(1986 - 1989)**

<u>Qtr/Yr</u>	<u># Fish kills</u>	<u>Qtr/Yr</u>	<u># Fish Kills</u>
1/86	20	1/88	15
2/86	18	2/88	14
3/86	17	3/88	14
4/86	17	4/88	13
1/87	18	1/89	12
2/87	17	2/89	10
3/87	16	3/89	8
4/87	15	4/89	6

Using the data in the table above, construct a run chart of fish kills. Blank shells are provided.

NUMBER OF FISH KILLS IN LAKE HEMOS
(1986-1989)



CONTINUOUS QUALITY IMPROVEMENT

Focus on the customer

Rely on the experts

Improve productivity by improving quality

Continuously improve your work processes

THE PROCESS

Identify a Problem

Describe the Dimensions of the Problem

Analyze the Causes

Narrow the Focus of Attention

Develop Improvement Project

Monitor Effectiveness

**THE CASE OF FISH KILLS IN THE HEMOS LAKES:
WALLY PIKE'S QUEST TO REDUCE FISH KILLS**

Data has been collected on Hemos' rate of fish kills. While kills are being reduced, reductions are not meeting expectations.

QUESTION #1: WHAT ARE THE CAUSES OF FISH KILLS?
METHOD: FISHBONE

QUESTION #2: WHAT ARE THE MOST SIGNIFICANT CAUSES OF FISH KILLS?
METHOD #1: BEST PROFESSIONAL JUDGEMENT SURVEY
#2: A PARETO OF THE EXPERT SURVEY DATA ON CAUSES OF FISH KILLS

QUESTION #3: WHAT ARE THE STEPS INVOLVED IN INSPECTING FOR PERMIT COMPLIANCE?
METHOD: FLOW DIAGRAM OF PERMIT INSPECTION PROCESS.

QUESTION #4: HOW FREQUENTLY ARE THE PRINCIPAL TYPES OF INSPECTION ACTIVITIES CONDUCTED?
METHOD #1: STUDY OF INSPECTION ACTIVITIES IN EACH OF THE FOUR STATES.
#2: VISUAL DISPLAY OF DATA ON INSPECTION ACTIVITIES WITH FIVE BAR CHARTS

QUESTION #5: WHY DOES THE LEVEL OF INSPECTION ACTIVITY VARY BY STATE?
METHOD: INFORMED GUESS CONFIRMED BY DISCUSSIONS WITH COLLEAGUES IN THE FIELD

QUESTION #6: WHAT CAN BE DONE TO IMPROVE INSPECTION PERFORMANCE?
METHOD: PROJECT PLAN FOR IMPROVING INSPECTION PROCESS.

QUESTION #7: IF THE INSPECTION PROCESS IS IMPROVED, WILL FISH KILLS BE REDUCED?
METHOD #1: ANNUAL REPORTS ON INSPECTION ACTIVITIES
#2: RUN CHART DISPLAYING 1989 DATA ON FISH KILLS

PROJECT: Develop means to improve communication and information sharing
within the office.

TEAM: Paul Bertram, Team Leader

GLNPO CQI PROJECTS

The Project Leaders Role

In Meetings:

- Review project or problem, and expectation for meeting.
- Discuss ground rules (participation, conversational courtesy, "Amnesty," schedule).
- Assign facilitator (may be project leader).
- Assign timekeeper (may be same as facilitator).
- Assign recorder (should not be facilitator or timekeeper).
- Assign person to present briefing(s) (may be project leader).

Between Meetings:

- Serve as contact point between the group and the rest of the organization, including clerical services.
- Serve as keeper of the group's records.
- Prepare agendas for meetings.
- Set meeting logistics (time, location, notification)

GLNPO CQI PROJECTS

The Group's Role

In Today's Meeting:

- **Apply problem-solving techniques to the group's project.**
(Use fishboning, flow charting, Pareto charts, systematic project management, or whatever methods seem appropriate.)

- **Summarize results of your efforts.**

Prepare simple overheads that include:

- **Tools/Approaches you used**
- **Major conclusions/insights thus far**
- **Problems you encountered**
- **Next steps - (What more could your group or another group do?
What should management consider doing?)**

Following Today's Meeting:

- **Do what you can to make yourself available for Team meetings; keep schedules that you agree to.**
- **Play specialized roles (facilitator, timekeeper, recorder) in Team meetings as requested.**
- **Be a constructive meeting participant: participate actively, but don't monopolize the discussion; exercise "conversational courtesy"; grant "amnesty" to fellow team members to encourage frank discussion.**
- **Complete between-meeting assignments you commit to.**

ESTIMATED PRICE LIST
(Government Rates)

A. Roundtrip Travel Costs (\$)

<u>From Chicago:</u>	<u>Plane*</u>	<u>Per Diem</u>
Buffalo	\$344	\$ 76
Cleveland	\$154	\$ 93
Detroit	\$ 64	\$100
Duluth	\$231	\$ 70
New York City	\$276	\$141
Philadelphia	\$232	\$110
Washington, D.C.	\$268	\$121

*Prices assume no advanced booking and unrestricted fares.

B. Printing/Artwork:

1. Brochure (4 pages, 8-1/2 x 5-1/2; black ink only; 60 lb. paper; includes typesetting)

-- 100 printed copies: \$190 + \$14 per photo

-- 1,000 printed copies: \$220 + \$14 per photo

2. Poster (3' x 2' on 1/4" posterboard; black ink only; simple picture and minimal text)

-- 1 poster, with EPA-supplied artwork: \$100

-- 1 poster, with artwork part of the purchase: \$150

1989

January 1989						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

May 1989						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September 1989						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

February 1989						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

June 1989						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

October 1989						
S	M	T	W	T	F	S
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

March 1989						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

July 1989						
S	M	T	W	T	F	S
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

November 1989						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

April 1989						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

August 1989						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

December 1989						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						