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**Annual Assessment of the DOE  
Unusual Occurrence Reports  
Program for FY 1988**

W. L. Cooper, Jr.  
S. D. Jennings

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ENGINEERING TECHNOLOGY DIVISION  
PERFORMANCE ASSURANCE PROJECT OFFICE

ANNUAL ASSESSMENT OF THE DOE UNUSUAL  
OCCURRENCE REPORTS PROGRAM FOR  
FY 1988

W. L. Cooper, Jr.  
S. D. Jennings

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ANNUAL ASSESSMENT OF THE DOE UNUSUAL OCCURRENCE  
REPORTS PROGRAM FOR FY 1988

W. L. Cooper, Jr.

S. D. Jennings

SUMMARY

To meet the objectives of the Department of Energy (DOE) Environment, Safety, and Health (EH), Office of Safety Compliance funded programs, the Performance Assurance Project Office (PAPO) administers an unusual occurrence reporting (UOR) system program.

The policy for this effort, as set forth in DOE Order 5000.3, *Unusual Occurrence Reporting System*,<sup>1</sup> is that unusual occurrences be promptly reported, UORs be critically reviewed, and information of generic significance be disseminated to interested DOE organizational elements.

This report presents an assessment of the DOE UOR program for FY 1988 and covers only the activities of the PAPO. There were 508 UORs processed during the year and these include Initial, Initial-Final, Interim, and Final reports. There was a total of 316 occurrences; therefore, the number of UORs processed was larger than the number of occurrences. There was a 12% decrease in UORs processed relative to FY 1987. There is a continuing trend of declining numbers of reported occurrences since FY 1984, and there was a 7% decrease in the number of occurrences in FY 1988 relative to FY 1987.

Five operations offices issued 88% of the occurrences. The Operation Offices are Albuquerque (AL), Chicago (CH), Idaho (ID), Oak Ridge (OR), and Richland (RL). The number of occurrences reported each year by AL and CH have remained fairly constant. The occurrences reported by ID since FY 1985 have decreased 33%, and the occurrences reported by OR since FY 1986 have decreased 40%. There has been a 71% decrease in occurrences reported by RL since FY 1984.

Thirty-five percent of the 316 occurrences in FY 1988 were issued within 10 calendar days of the occurrence, and 32% were issued within 20 calendar days. Approximately 67% of the occurrences reported met the requirement to issue an Initial (or Initial-Final) UOR within a period of time not to exceed 10 working days. In addition, the PAPO received 64% of the UORs within 30 calendar days of report issuance.

A total of 283 UORs was closed (i.e., final reports issued on previously open UORs and Initial-Final reports for FY 1988) during FY 1988. The UORs remained open an average of 613 days in FY 1988 compared with 780 days in FY 1987. The UORs from ID and OR continue to remain open longer than those UORs from the other operations offices.

The occurrences have been grouped into 32 types. During the period FY 1984-1988, 63% of the occurrences were within seven types. The occurrence type Violation, Procedure, Specification or Requirement

continues to account for 17% of the occurrences during FY 1984-1988 and 22% in FY 1988.

The apparent causes Design, Material, Personnel, Procedures, and Other were analyzed with respect to occurrences. The data reveals that the causes have not changed significantly for the five-year period FY 1984-1988. Also, the subcause Inadequate or Defective Design contributed 75% to the Design cause; Equipment Failure, Malfunction contributed 31% to the Material cause; Operator Error contributed 35% to the Personnel cause; Procedure, Defective contributed 55% to the Procedure cause; and Weather or Ambient Conditions contributed 64% to the Other cause.

The total number of UORs requested by 16 organizations was 696, a 13% increase over FY 1987.

Seventeen suggested Unusual Occurrence Information Notices were furnished to the DOE.

## 1. INTRODUCTION

This report presents an assessment of the Department of Energy (DOE) unusual occurrence reporting (UOR) program for the period October 1, 1987, through September 30, 1988 (FY 1988). The report covers only the activities of the Performance Assurance Project Office (PAPO). A total of 508 UORs were processed during the year and include Initial, Initial-Final, Interim, and Final reports. There was a total of 316 occurrences; therefore, the number of UORs processed was larger than the number of occurrences. Table 1 shows the distribution of UORs by type.

Table 1. Distribution of UORs for FY 1988

Type of report	Number of UORs		
	Processed	Occurrences	Closed
Initial	173	200	
Interim	46		
Final	152		157
Initial-Final	137	116	126
Total	508	316	283

There was a decrease of 12% in UORs processed over the previous fiscal year.

In FY 1988 there was a 7% decrease in the number of reported unusual occurrences compared with that for FY 1987. This decrease continues a downward trend in reported occurrences since FY 1984. Figure 1 is a trend-line analysis on the number of reported occurrences.

There was a 32% decrease in reported unusual occurrences from FY 1984 through FY 1988. If this trend continues, there will be an approximate 11% decrease in reported unusual occurrences in FY 1989.

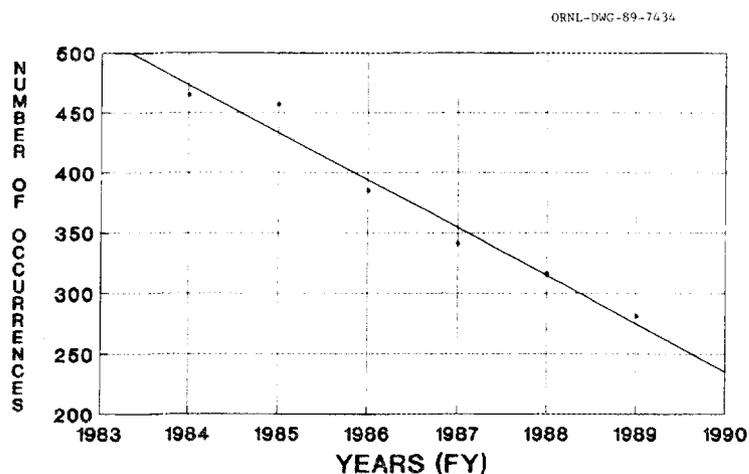


Fig. 1. Trend-line analysis of the number of occurrences for FY 1984-1989.

The decrease in the number of reported unusual occurrences by program is shown in Fig. 2.

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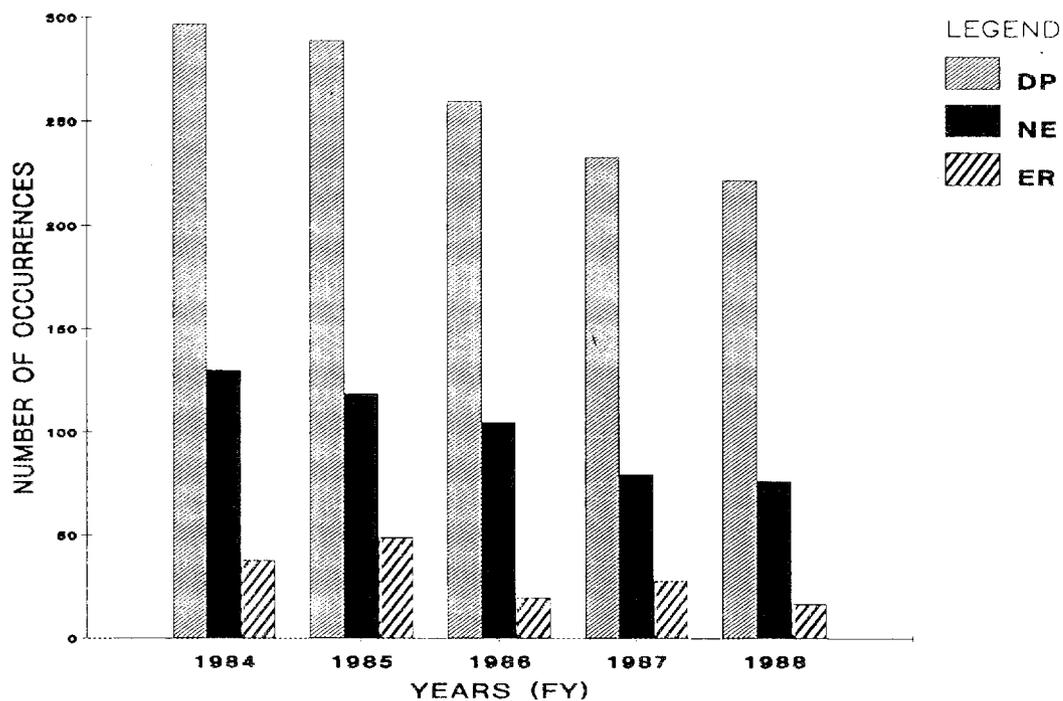


Fig. 2. Total occurrences by program from FY 1984-1988.

The Defense Programs (DP) reported unusual occurrences have decreased by 25% in four years, and the Nuclear Energy (NE) reported unusual occurrences have decreased by 41% during the same period. The unusual occurrences reported by Energy Research (ER) remained fairly stable during a five-year period.

The total number of reported unusual occurrences per six-month period are shown in Fig. 3.

Figure 4 shows the  $3\sigma$  (99.5%) control limits for a constant occurrence rate. Because the points for September 1984, September 1985, and September 1988 are outside of the control limits, the initial increase in March 1984 through September 1984 and subsequent decrease in September 1985 through September 1988 are real and not due to chance.

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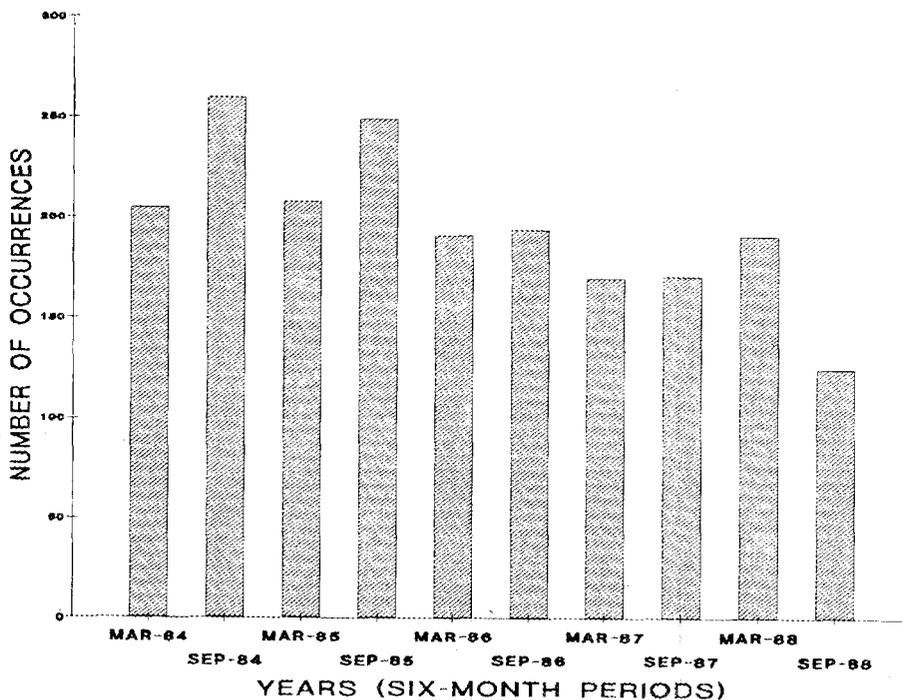


Fig. 3. Total occurrences for all organizations FY 1984-1988.

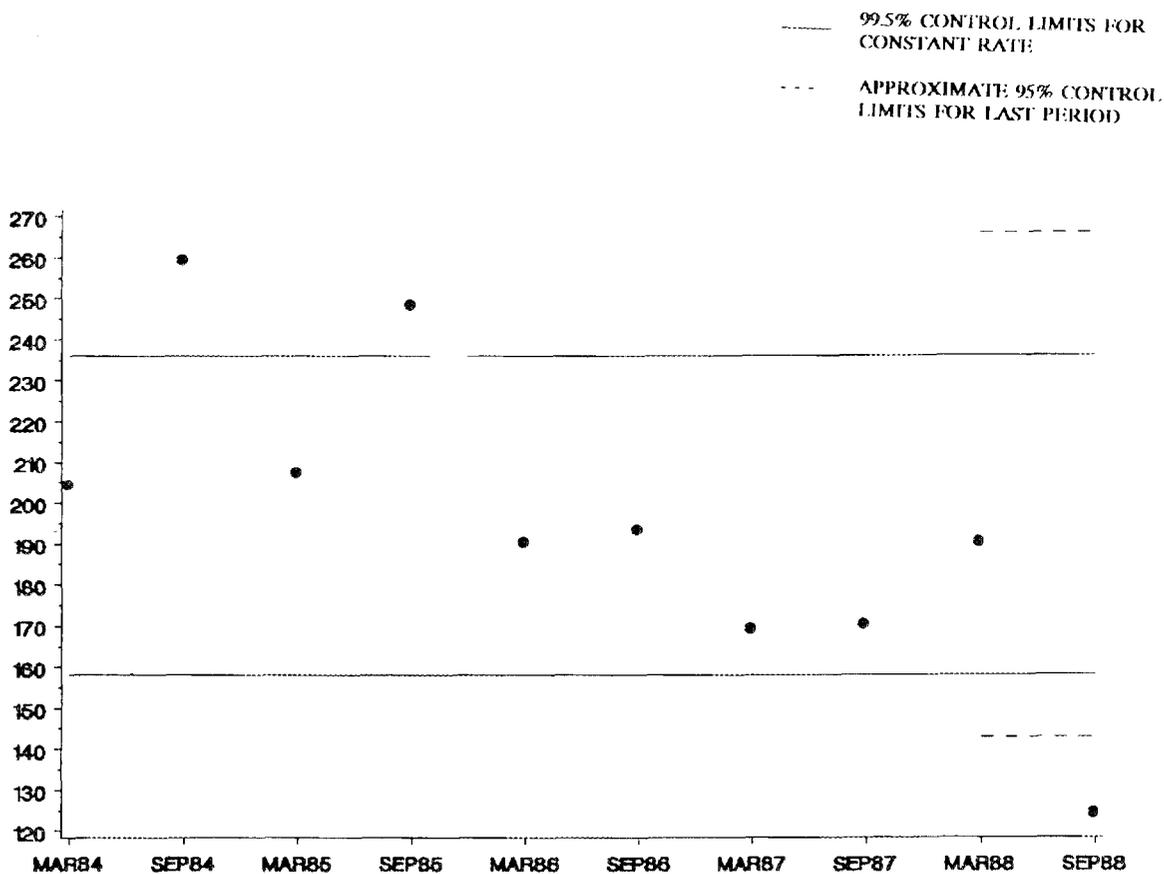


Fig. 4. Total occurrences for all organizations for FY 1984-1988, including control limits.

In particular, because 2 of 3 points in September 1984 through September 1985 are above the  $3\sigma$  and September 1988 is below minus  $3\sigma$ , there is an indication of a real decrease in reported occurrences.

The total number of occurrences reported in FY 1984 was 465, which is a 34% increase from FY 1983. Fig. 5 shows the decrease in reported occurrences during FY 1985, 1986, 1987, and 1988.

The decrease in reported unusual occurrences is attributed to the reduction of UORs submitted by DP and NE. The probable causes of this

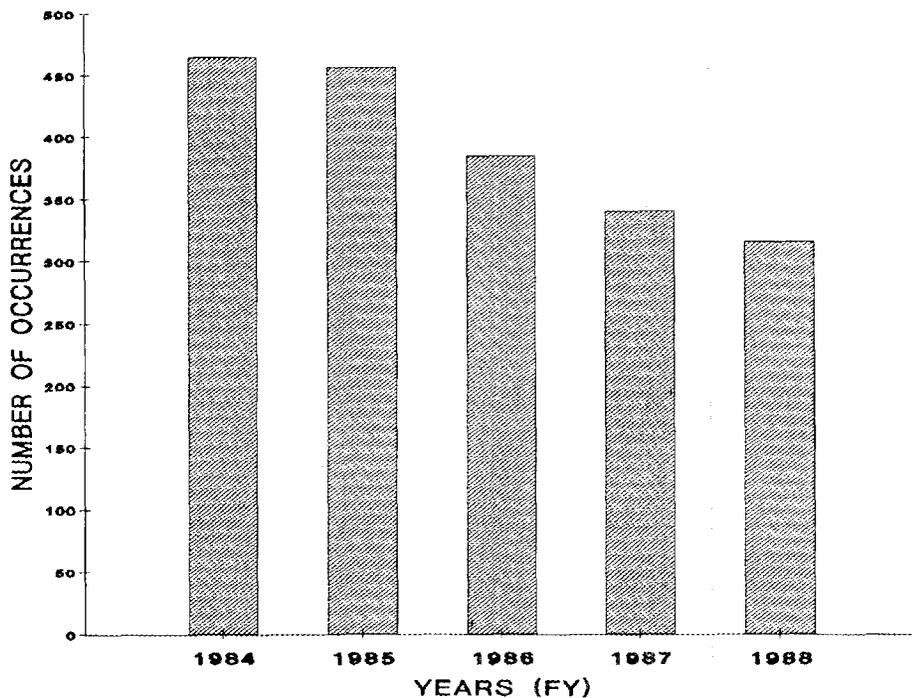


Fig. 5. Number of occurrences by year (total FY 1984-1988).

reduction are the cancellation of the Clinch River Breeder Reactor Program, management of UORs removed from the guidance of the Program Secretarial Offices, placing of UORs under the award fee system at some laboratories and contractors, and perceived use of UORs as a performance indicator and less as lessons-to-be-learned.

## 2. DISTRIBUTION OF OCCURRENCES BY OPERATION OFFICES

The DOE system is composed of UORs under the guidance of the operation offices. Currently eight Operation Offices are issuing UORs received by the PAPO. From FY 1984-1988 five Operation Offices issued the majority of UORs; therefore, for the purpose of this discussion, we will limit the analysis to these five offices. The operation offices are Albuquerque (AL), Chicago (CH), Idaho (ID), Oak Ridge (OR), and Richland (RL); they contributed 88% of the UORs during FY 1984-1988. The remaining occurrences (12%) were reported by three Operation Offices: Nevada (NV), 1%; San Francisco (SAN), 6%; and Savannah River (SR), 5%. The numbers of occurrences for FY 1984-1988 by the five Operation Offices are shown in Fig. 6.

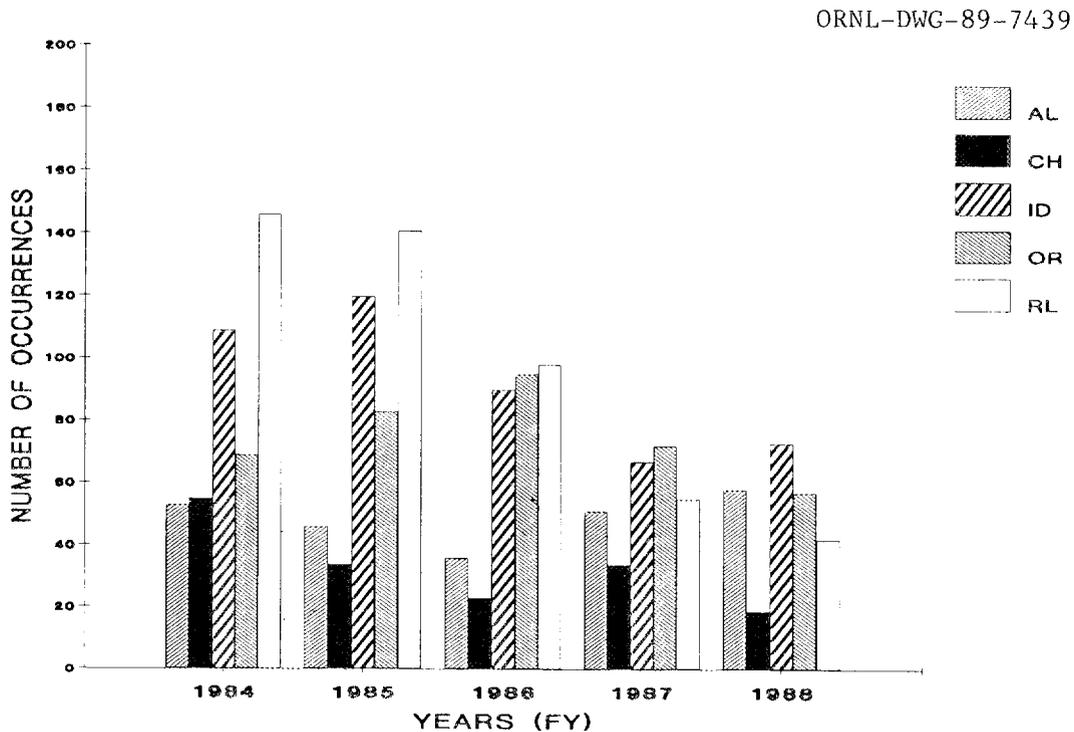


Fig. 6. Number of occurrences for operation offices for FY 1984-1988.

The number of occurrences reported each year by AL and CH remains fairly constant. The occurrences reported by ID since FY 1985 have decreased 33%, and the occurrences reported by OR since FY 1986 have decreased 40%. The occurrences reported by RL have decreased 71% since FY 1984. During the period FY 1984-1988, both SAN and SR have shown slight increases in reported UORs.

### 3. DELAYS IN ISSUING UORs

DOE Order 5000.3 (Ref. 1) requires that UORs be issued within a period not to exceed 10 working days of an incident. Of the 316 occurrences in FY 1988, 111 (35%) were issued within 10 calendar days of the occurrence and 101 (32%) were issued within 20 calendar days. The delay in issuing a UOR within 10 calendar days in FY 1988 (35%) is greater than FY 1987 (41%) and FY 1986 (52%). The combined 10 and 20 calendar days delay in issuing a UOR in FY 1988 is greater than that for FY 1987 and FY 1986. If one considers that 10 working days could be a maximum of 14 calendar days, then the 70% rate in FY 1986 and FY 1987 of issuing a UOR within 20 calendar days of the occurrence is very good; however, the 67% rate in FY 1988 is not very good. It is apparent that UOR lessons-to-be-learned are not being disseminated in a timely manner. Figures 7a and 7b are a comparison between delays for issuing UORs.

Based on the UORs received (i.e., Initial, Initial-Final, Interim, and Final) in FY 1988 by the PAPO, 23% were received within 10 calendar days of report issuance; 26% were received within 20 calendar days; and 17% were received within 30 calendar days. Only 66% of FY 1988 UORs were received within one month of issuance compared with 71% in FY 1987. There is approximately a three month lag from the time of the occurrence until the time a monthly summary is issued to appropriate technical elements for review of lessons-to-be-learned.

Table 2 gives the delay times by percentage for the eight operation offices. The greatest delay in receiving issued UORs is experienced from AL, where 95% of the issued UORs are received after 30 calendar

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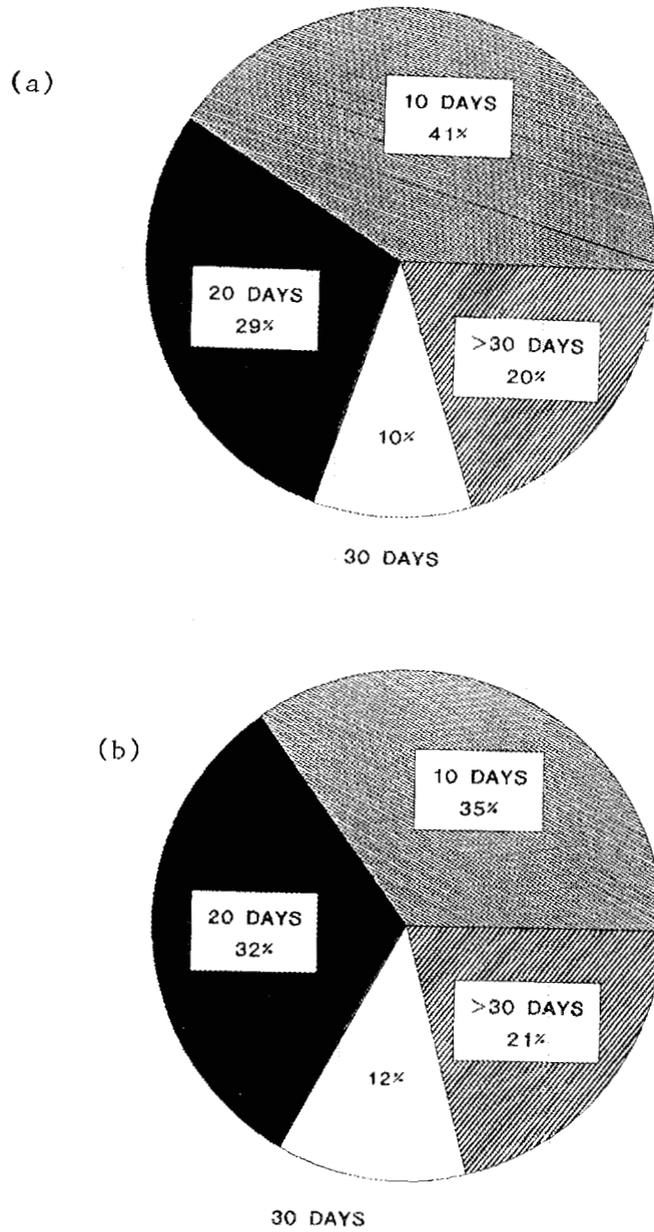


Fig. 7. Comparison between delays for issuing UORs: (a) FY 1987 and (b) FY 1988.

Table 2. Delays in receiving issued UORs by percentage for operation offices, FY 1988

Operation offices	Calendar Days			
	10	(%) 20	30	>30
AL	2	0	3	95
CH	26	43	13	18
ID	33	45	14	8
NV	0	0	0	0
OR	19	11	29	41
RL	53	28	12	7
SAN	9	23	23	45
SR	9	33	33	25

days. Delays greater than 30 calendar days in receiving UORs from RL and OR are experienced 45% and 41% of the time, respectively.

## 4. TIME UORS ARE OPEN

A total of 283 UORs were closed (i.e., Final reports issued on opened UORs and Initial-Final reports) during FY 1988. There were 126 Initial-Final reports issued. The distribution of FY 1988 UOR close-outs is shown in Table 3. The UORs remained open an average of 613 days (20 months) in FY 1988 compared with 654 days (22 months) in FY 1986 and 780 days (26 months) in FY 1987. The decrease in close-out time is a change from the increased close-out time in the previous two fiscal years. The UORs at ID continue to remain open approximately 27% above the average for the past two fiscal years. The number of days for close-out time of UORs at OR has shown a 27% increase since the FY 1987 report,<sup>2</sup> whereas during the same period of time, the UOR average close-out time has decreased by approximately 21%.

Table 3. Distribution of UOR days open, FY 1988

Organization	Number of UORs closed	Number of Initial-Final reports	Total days <sup>a</sup>	
			between initial and Final reports	Average Days <sup>a</sup> UORs remain open
AL	44	29	5,036	336
CH	26	9	5,704	336
ID	58	8	39,052	781
NV	0	0	0	0
OR	47	18	21,611	745
RL	47	17	18,289	610
SAN	31	18	5,177	398
SR	30	27	1,428	476
Total	283	126	96,297	613

<sup>a</sup>Does not include Initial-Final report.

## 5. REQUESTS FOR UORS

A major objective of the DOE-UOR program is that DOE and contractor personnel use the experience of others to prevent the occurrence of similar happenings in their organizations. The only way we currently have of getting a feel for the extent UORs are being utilized is to monitor the number of UORs requested. These numbers for a three-year period are listed in Table 4.

Table 4. Requests for UORs, FY 1986-1988

Period (FY)	No. of organizations requesting UORs	No. of requests	No. of UORs requested
1986	14	54	288
1987	17	68	615
1988	16	64	696

The increasing number of requests for copies of UORs over the three-year period suggests an increasing awareness of the program by organizations, and the number of UORs requested suggests an increasing utilization of the program. By comparing the number of UOR requests with the number of UORs processed during the three-year period (i.e., the number of UORs brought to the attention of users via the UOR Monthly Summary and UOR KWIC Index), use factors can be developed that may be usable for comparing program utilization from report period to report period. Table 5 presents these factors for the three-year period.

The factors thus determined are subject to considerable variability because of the variability in (1) the number of UORs processed and (2) the number of truly significant occurrences that are reported in the

Table 5. UOR use factors

Period (FY)	UORs processed	Ratio, of requests to UORs processed
1986	600	0.09
1987	577	0.12
1988	508	0.13

system during the period of concern. However, the use factors tend to reinforce the suggestion that program awareness is increasing, and these UORs were requested by 16 organizations. Table 6 gives a breakdown, by organization, of requests for UORs received and honored in FY 1988.

Table 6. Requests for UORs received and honored in FY 1988

Organization	Number of requests
DOE (including Operation Offices)	18
Argonne National Laboratory	9
Brookhaven National Laboratory	3
EG&G Idaho, Inc.	4
Energy Technology Engineering Center	1
Lawrence Livermore National Laboratory	2
Mound Facility	1
National Academy of Science	1
Nuclear Regulatory Commission	1
Oak Ridge National Laboratory	9
Rocky Flats Plant	1
Sandia National Laboratory	5
Savannah River Plant	1
Westinghouse Hanford Company	3
Westinghouse Idaho Nuclear Company	1
West Valley Nuclear Services Company	4
Total	64

## 6. OCCURRENCES

An "occurrence" is any unusual or unplanned event having programmatic significance such that it adversely affects or potentially affects the performance, reliability, or safety of a facility.<sup>1</sup> Occurrences have been grouped into 32 categories. During the five-year period FY 1984-1988, 63% of the occurrences have occurred within seven types. Table 7 gives the percentage of total occurrences for FY 1984-1988 and for FY 1988.

Table 7. Occurrence types for FY 1984-1988 and FY 1988

Occurrence types	FY 1984-1988 (%)	FY 1988 (%)
Violation, Procedure, Specification or Requirement	17	22
Equipment Failure, Malfunction, and Anomalies	10	10
Spills and Leaks, Nonradioactive	9	11
Radiation Exposure or Hazard	8	7
Safety Hazard, Personal Injury, Accident	7	10
Fire or Explosion	7	7
Damage or Defects, Equipment Parts, and Material	<u>5</u>	<u>7</u>
	63	74

The occurrence type Violation, Procedure, Specification or Requirement, continues to be the leading occurrence and has shown an increase of 6% from FY 1987<sup>2</sup> through FY 1988. This occurrence type was assessed in a previous report.<sup>3</sup> Additionally, the occurrence type Spills and Leaks, Nonradioactive, has moved from fourth to third place during the five-year period FY 1984-1988 and has moved into second place in FY 1988 from third place in FY 1987.

Further analyses of occurrences shows that in the leading type, Violation, Procedure, Specification or Requirement, 82% fall within six groups. Although the title of each group is different, the majority of these occurrences have to do with criticality. The differences lie within the reporting by different facilities, organizations, or operation offices. For example, one organization might report a violation of criticality requirement as just that, whereas another organization might report the occurrence as a violation of technical specification, another as a violation of safety requirement, and another as a violation of operating requirement. The six groups are shown in Table 8.

Table 8. Occurrence groups for occurrence type Violation, Procedure, Specification or Requirements, FY 1984-1988 and FY 1988

Occurrence Groups	FY 1984-1988 Percentage	FY 1988 Percentage
Violation, Criticality Requirement	24	3
Violation, Technical Specification	19	34
Violation, Safety Requirement	16	15
Violation, Operating Requirement	9	8
Violation, Operating Limit	8	7
Error, Material Handling	<u>6</u>	<u>14</u>
	82	81

The reporting of occurrences that violate criticality requirements has dropped drastically to 3% in FY 1988 from 14% in FY 1987.<sup>2</sup> Technical Specification, Violation, is the leading occurrence group (34%) in FY 1988, increasing from 26% in FY 1987. The occurrence group Violation, Safety Requirement, decreased from 28% in FY 1987 to 15% in FY 1988.

## 7. CAUSES

The apparent causes of unusual occurrences are classified into five types: Design, Material Personnel, Procedure, and Other. Each occurrence may have one or more causes; therefore, the total number of causes exceeds the total number of occurrences. The distribution of UOR apparent causes as reported by type from FY 1984-1988 is shown in Fig. 8.

A cursory review of Fig. 8 would probably lead to conclusions that the apparent causes Design, Material and Procedure were on a downward trend from FY 1985 and that the apparent causes Personnel and Other have

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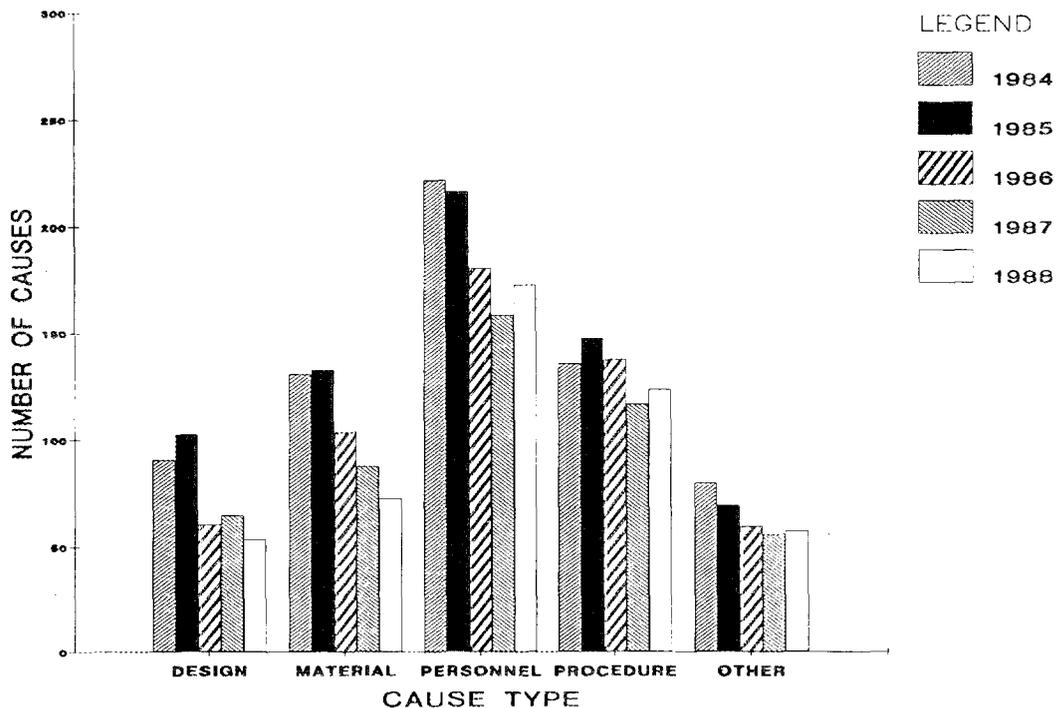


Fig. 8. Distribution of causes by apparent cause type, FY 1984-1988.

been on a downward trend since FY 1984. By normalizing the apparent causes with the total occurrences (Fig. 5), we can see that there has not been a significant change for the five-year period FY 1984-1988. The data reveals that the causes have remained stable. The percentages of apparent cause types of total occurrences from FY 1984-1988 are shown in Fig. 9.

An analysis of UORs from October 1, 1983, through September 1988 (FY 1984-1988) was conducted on subcauses (Keyword Group) to determine the reasons for the the occurrence. The analysis of subcauses is presented below as percentage of occurrence in the related apparent cause type.

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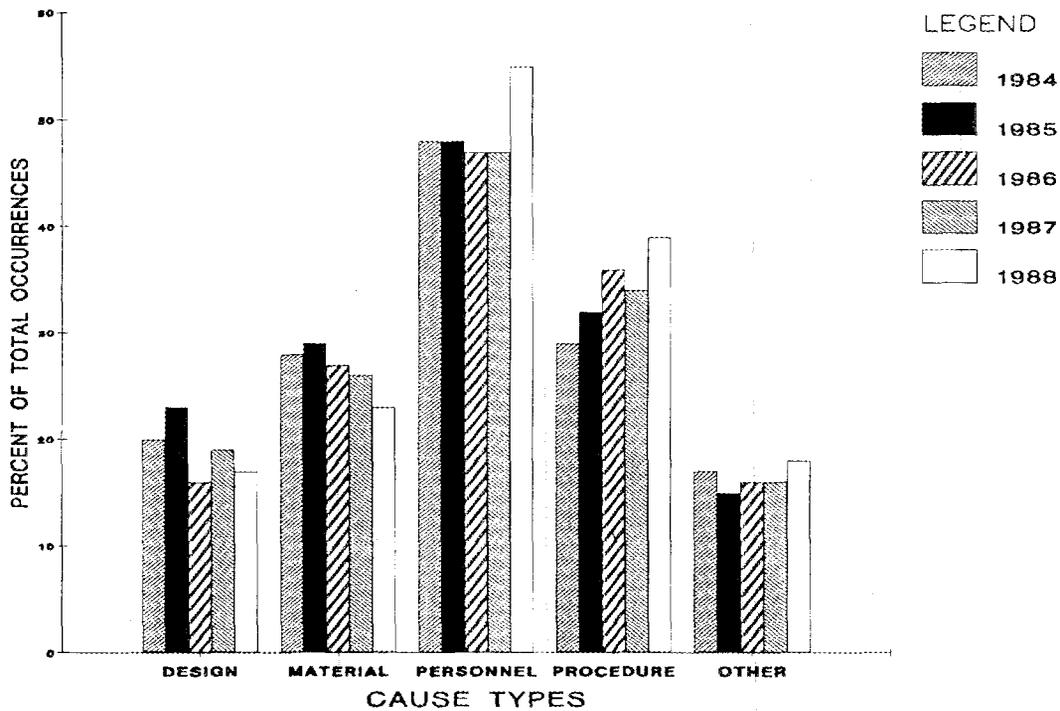


Fig. 9. Percentages of total occurrences by apparent cause types, FY 1984-1988.

Design: The apparent cause Design shows that there are three subcauses, inadequate or defective design, drawing specification and data errors, and errors in equipment or material selection. Inadequate design indicates that the design is not sufficient for a specific requirement. Defective design indicates that the design is lacking something essential. Drawing specification and data errors encompass documents that do not portray actual conditions. Errors in equipment or material selection is self explanatory.

	<u>%</u>
Inadequate or defective design	75
Design, defective	8
Error, engineering	4
Design, inadequate	28
Drawing, defective	5
Equipment, inadequate	18
Error, design	10
Error, equipment, or material selection	17
Error, materials selection	4
Material, inadequate	5
Equipment, incorrect	7
Drawing, specification, data errors	7
Error, calculation	7

Material: This apparent cause has nine groups.

	<u>%</u>
Defective, failed material	28
Material, defective	4
Chemical Reaction, materials	2
Corrosion	5
Deterioration, material-normal	3
Failure, material	10
Equipment failure, malfunction	31
Failure, safety device	4
Failure, part	4
Failure, equipment	3
Failure, power-equipment	3
Leak, piping	3
Leak, valve	3

Instrument failure, malfunction	13
Failure, instrument	5
Circuit, short	2
Error, manufacturing, shipping, marking	5
Defective part or equipment	6
Defective weld, braze, or soldered joint	3
Obstruction, misalignment, binding	2
Miscellaneous	13

Personnel: This apparent cause has many aspects; however, for the purpose of this report, these aspects have been grouped into eight subcauses. The violation of requirement or procedure subcause includes items such as violation of safety requirement, of specification requirement, and of operating requirement. The subcause for handling or rigging errors includes errors in radwaste handling and in material handling. Another subcause is operator error, which is some form of purely human error.

	<u>%</u>
Operator error	35
Error, personnel	22
Improper operation, equipment	3
Error, equipment operation	4
Training, inadequate	3
Maintenance, stores, receiving error	5
Error, Maintenance	5
Handling or rigging error	4
Violation of requirement or procedure	19
Violation, procedure	12
Violation, requirement-operating	3
Installation error	3
Error, construction	3
Administrative or supervisory error	19
Error, administrative	13
Error, supervision	6

Quality assurance or inspection error	10
Quality assurance, inadequate	10
Communications error	5
Failure, communication	4

Procedure: This cause of occurrences can be traced to an error in a procedure or a deficiency or inadequacy of a procedure (which may or may not have been previously recognized). A violation of procedure is not included in these subcauses because it is considered a personnel error.

	<u>%</u>
Inadequate or Defective Procedure	100
Procedure, defective	55
Procedure, inadequate	45

Other: This apparent cause is not easily broken down into subcauses because it includes external factors such as weather or ambient conditions not under the control of the organizations or designers, causes that truly cannot be determined or identified, or factors that cannot be attributed to any of the other four apparent causes. There are six general groupings that are labeled subcauses.

	<u>%</u>
Electrical or instrument noise	12
Fault, random	6
Transient, electrical	5
Noise, electrical	2
Contamination or foreign item	17
Foreign item	5
Contamination, equipment	5
Foreign material, crud or dirt	2
Weather or ambient conditions	64
Ambient condition, heat or cold	11
Weather, electrical storm	6
Weather, wind	11
Ambient condition, radiation	7
Environmental conditions	27

Hypersensitive instrument or system	4
Fire, explosion	3

## 8. SYSTEM OR EQUIPMENT

The System or Equipment (component) comprises 49 separate and distinct types. To identify the system or equipment involved in an occurrence is very difficult because the concept varies among the different reporting organizations. For this reason, a concise definition of component failure is necessary. The definition of failure is a reduced functional efficiency or effectiveness of the system or component in performing its intended function. The system or component is considered to be failed if it is operating outside its given technical specification range of operation. The components analyzed meet these criteria.

Approximately 40% of the System and Equipment types associated with occurrences in FY 1984-1988 are in the five categories of Instrumentation and Instruments (9%); Building, Containment, Laboratories, Storage Facilities, and Clean Rooms (8%); Pipe and Tubing, Related Equipment (8%); Procedures and Functions (nonequipment) (7%); and Processes (6%). The systems and equipment for FY 1984-1988 are shown in Fig. 10.

Note:

51 - Instrumentation and Instruments

74 - Building, Containment, Laboratories, Storage Facilities, and Clean Rooms

52 - Pipe and Tubing, Related Equipment

77 - Procedures and Functions (nonequipment)

99 - Processes

Figure 11, the breakdown of system and equipment types by fiscal year, shows that the leading system and equipment type in FY 1988

## Department of Energy FY 1984-1988

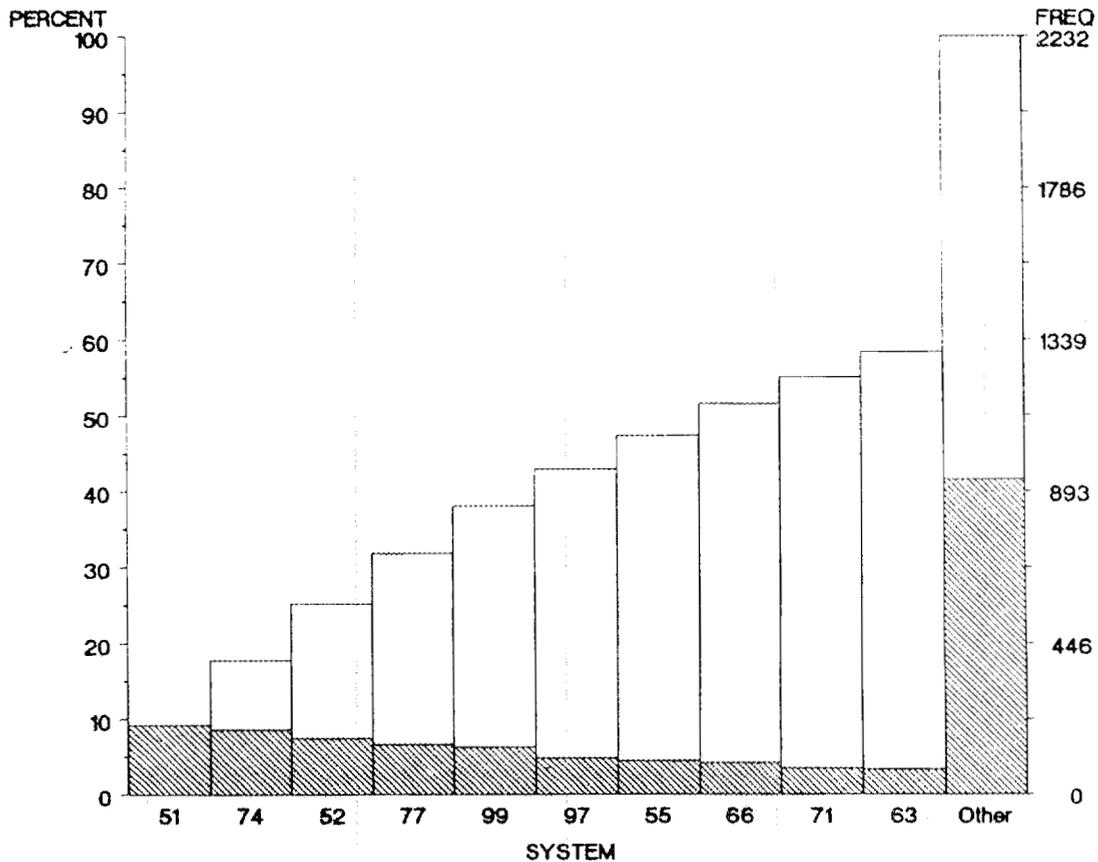


Fig. 10. Percentages by systems and equipment types, FY 1984-1988.

continues to be Building, Containment, Laboratories, Storage Facilities, and Clean Rooms. There has been a reduction of 57% in Pipe and Tubing related equipment involved in occurrences during FY 1988.

A comparison of the operation offices (Figs. 12, 13, and 14) shows that ID, RL, and SAN reported the highest system and equipment type of Building, Containment, Laboratories, Storage Facilities, and Clean Rooms of the other five operation offices.

- 51 Instrumentation and instruments
- 52 Pipe, tubing, related equipment
- 74 Buildings, containment, labs, etc.
- 77 Procedures and functions (nonequipment)
- 99 Processes

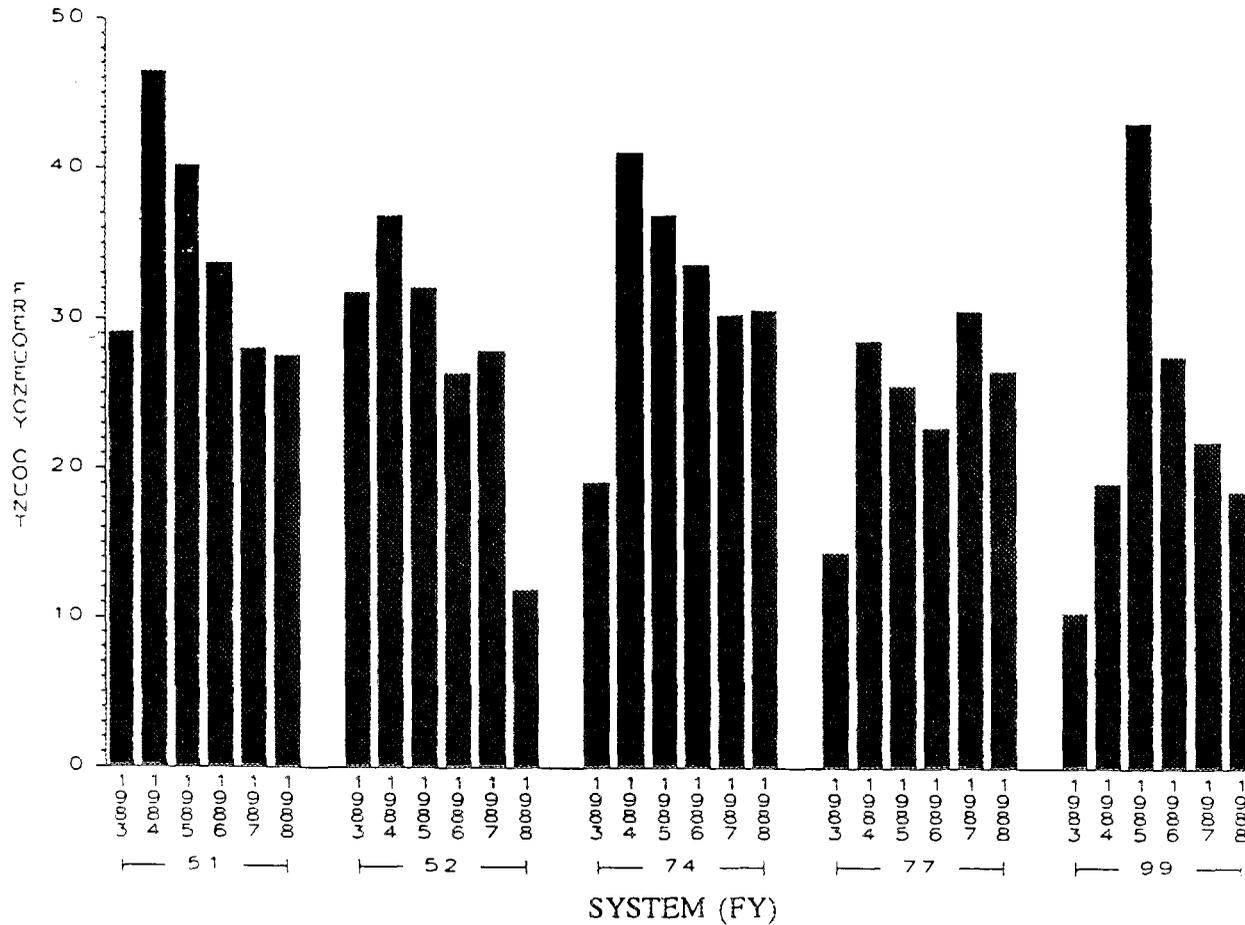


Fig. 11. A breakdown of system and equipment types by fiscal years (1984-1988).

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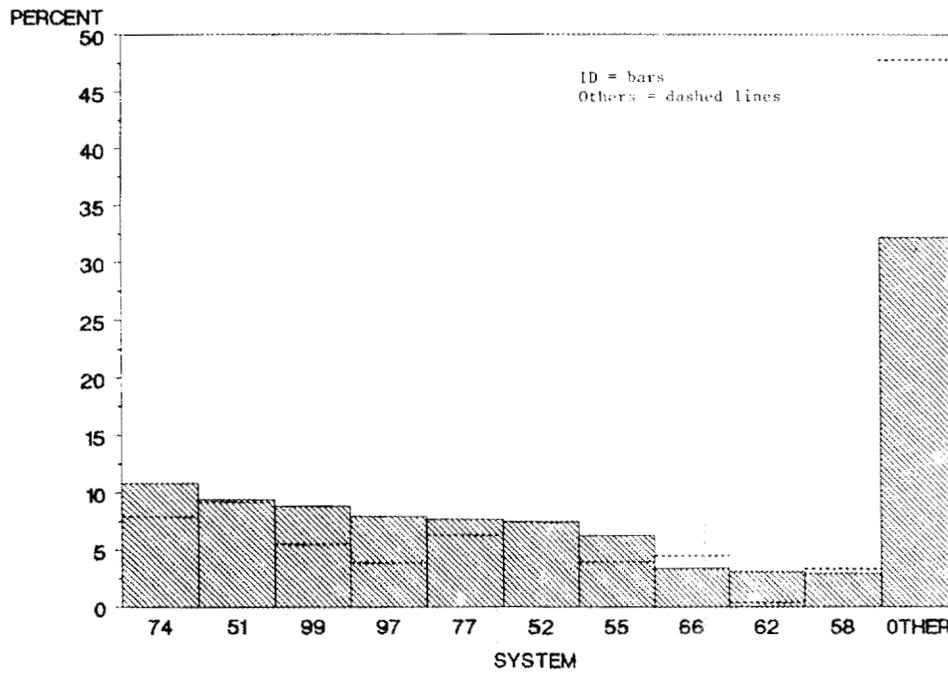


Fig. 12. System and equipment occurrences for ID vs all other operations offices, FY 1984-1988. Probability of differences resulting from chance = <0.0001.

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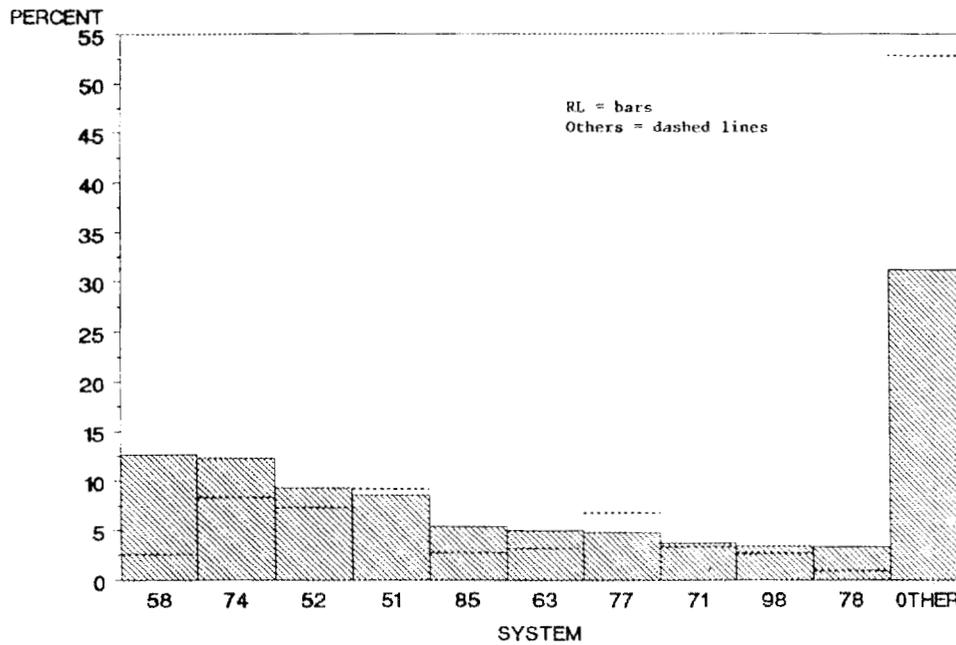


Fig. 13. System and equipment for RL vs all other operations offices, FY 1984-1988. Probability of differences resulting from chance = <0.0001.

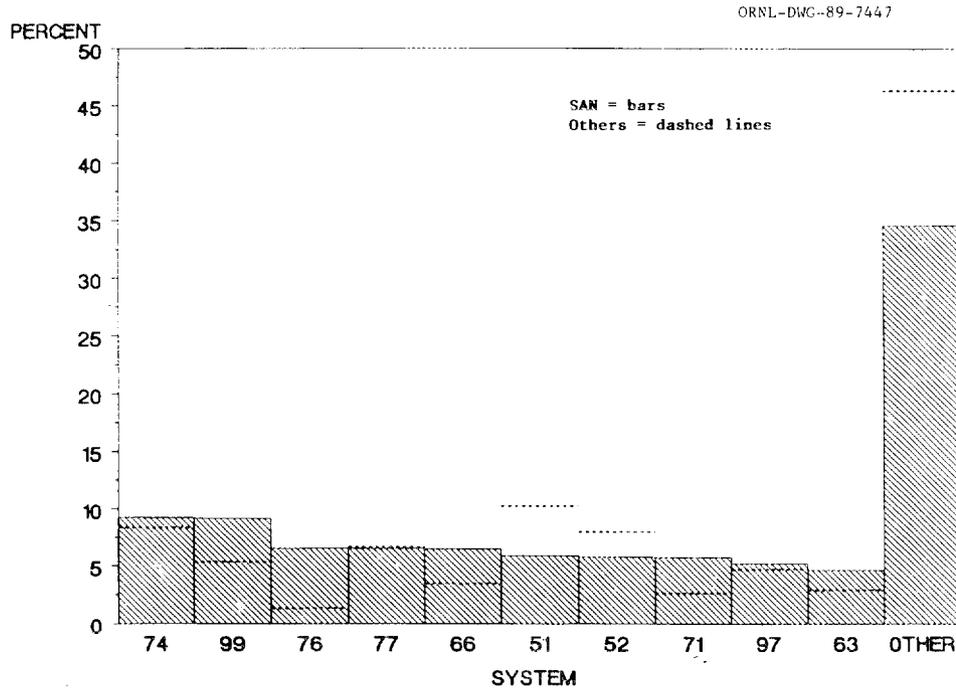


Fig. 14. System and equipment occurrences for SAN vs all other operations offices, FY 1984-1988. Probability of differences resulting from chance =  $<0.0001$ .

## 9. UNUSUAL OCCURRENCES INFORMATION NOTICES

One responsibility of the DOE is to provide results of generic evaluations as Unusual Occurrence Information Notices (UOINs). One sub-task for the PAPO is to assist DOE-Environment, Safety, and Health by providing suggested UOINs for use as lessons-to-be-learned. During FY 1988, the PAPO reviewed UORs, Nuclear Regulatory Commission (NRC) Information Notices, NRC Information Bulletins, and NRC Licensee Event Reports to provide 17 suggested UOINs to the DOE. To our knowledge, there were no UOINs published in FY 1988. The subjects of suggested UOINs provided by the PAPO follow.

Containment Filter Degradation

Deficiencies in the Testing of Nuclear-Grade Activated Charcoal

Skin Contamination from Glovebox Failure

Nuclear Container Deterioration and Disintegration

Electric Shock

Respirator Malfunction

Inadequate Latch Relay Engagement

Series 80 Ammunition Malfunction

Proper Storage of Polyethylene Carboy's Containing Hazardous Waste

Personnel Radiation Exposure to X-Ray

Electrical Relays

Personnel Radiation Exposure to X-Ray (additional information)

Nonconforming Materials Supplied by Piping Supplies, Inc.

Fire Alarm Manual-Pull-Station Failure

Containment Isolation System Breaker Failure

TWAMCO Trailer Suspension System Failure

Maintenance Personnel Working on Equipment

In Violation of Lock and Tag Procedures

Inadequate Qualification and Documentation of Fire-Barrier  
Penetration Seals

## 10. CONCLUSIONS

Evaluations of the available data and trend analysis methods for the UOR system show the following:

1. The total number of reported occurrences show a marked decrease since FY 1984, when the reported occurrences were the highest. The decrease in FY 1988 was 7% from FY 1987 and 32% from FY 1984.
2. The occurrences reported by Defense Programs and Nuclear Energy have decreased by 25% and 41%, respectively, during the past four fiscal years.
3. Three Operation Offices, CH, OR, and RL, had the largest decrease in reported occurrences during FY 1988.
4. Sixty-seven percent of Initial and Initial-Final UORs were issued within 20 calendar days after the occurrence in FY 1988. Seventy percent were issued within 20 calendar days in FY 1987. Therefore, the issuance time of UORs in FY 1988 is not very good and does not come close to meeting the requirements of DOE Order 5000.3.<sup>1</sup>
5. The UORs remained open an average of 20 months in FY 1988, compared with 26 months in FY 1987. The UORs of ID and OR remain open more than 27% and 21%, respectively, longer than the average.
6. Management's awareness of significant technical and operational problems is one of the principal objectives of the DOE. One of the ways we currently have to measure the extent that UORs are being utilized for this objective is by keeping track of the number of requests and the number of requesting organizations. During FY 1986-1988, the number of requests for UORs increased, and during FY

1988, the number of UORs requested also increased. These use factors tend to reinforce the suggestion that program awareness and utilization are increasing. The primary reason for this increased awareness is the UOR Monthly Summary Report.

7. The leading occurrence type is Violation, Procedure, Specification or Requirement, which accounted for 17% of the occurrences in FY 1984-1988 and 22% in FY 1988. There are six leading groups of occurrences that fall into this type of occurrence and they account for 82% of the total. Five of these groups are criticality related and account for 76%. One group, Violation, Technical Specification accounts for 34%.
8. There has not been a change for the five-year period FY 1984-1988 in the apparent cause of a UOR when compared with the total occurrences. The data reveals that the average percentages of apparent causes with respect to total occurrences for FY 1984-1988 (FY 1988) are: Design - 19% (17%), Material - 27% (23%), Personnel - 48% (55%), Procedures - 34% (39%), and Other - 16% (18%).
9. The leading system and equipment type associated with occurrences in FY 1988 continues to be Building, Containment, Laboratories, Storage Facilities, and Clean Rooms.
10. Generic evaluations in the form of UOINs were not published in FY 1988.

## 11. RECOMMENDATIONS

A considerable amount of work is needed to develop improved reporting and guidance for the UOR system. To reach that goal, the following are recommended:

1. Emphasis should be placed on reporting of occurrences for dissemination of lessons-to-be-learned and not on any possible bad reflection on the reporting organization issuing the UOR.
2. The distribution of UORs and their use should be monitored and a plan or procedure developed to make greater use of the UORs as lessons-to-be-learned.
3. The use of generic evaluations as UOINs can improve guidance to Operations Offices and contractors.
4. Remove the UOR system from the contractor award fee system.
5. Those organizations in the 33 percentile taking longer than 20 calendar days to issue a UOR should be urged to comply with the DOE Order 5000.3 requirement for issuing UORs within a period of time not to exceed 10 working days.<sup>1</sup> This is a reasonable requirement, and 67% of the UORs apparently meet the requirement.
6. The length of time a UOR remains open is excessive. These open UORs should be monitored, and the time a UOR remains open should be reduced.
7. Closer attention should be paid to the apparent causes of the occurrences. An effort should be made to reduce at least one cause, the selection of which should be made on the basis of cost-effectiveness.

8. The reporting of a violation in criticality requirement should be standardized so that all organizations report the occurrence under the same occurrence group, Violation, Criticality Requirement.

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