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Occurrence Reporting and Processing System (ORPS) Lessons Learned: Tools to Improve Workplace Performance

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Sharon L. Commander
Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Management Information Systems Unit
P. O. Box 1625
Idaho Falls, Idaho 83415-3405
(208) 526-3842

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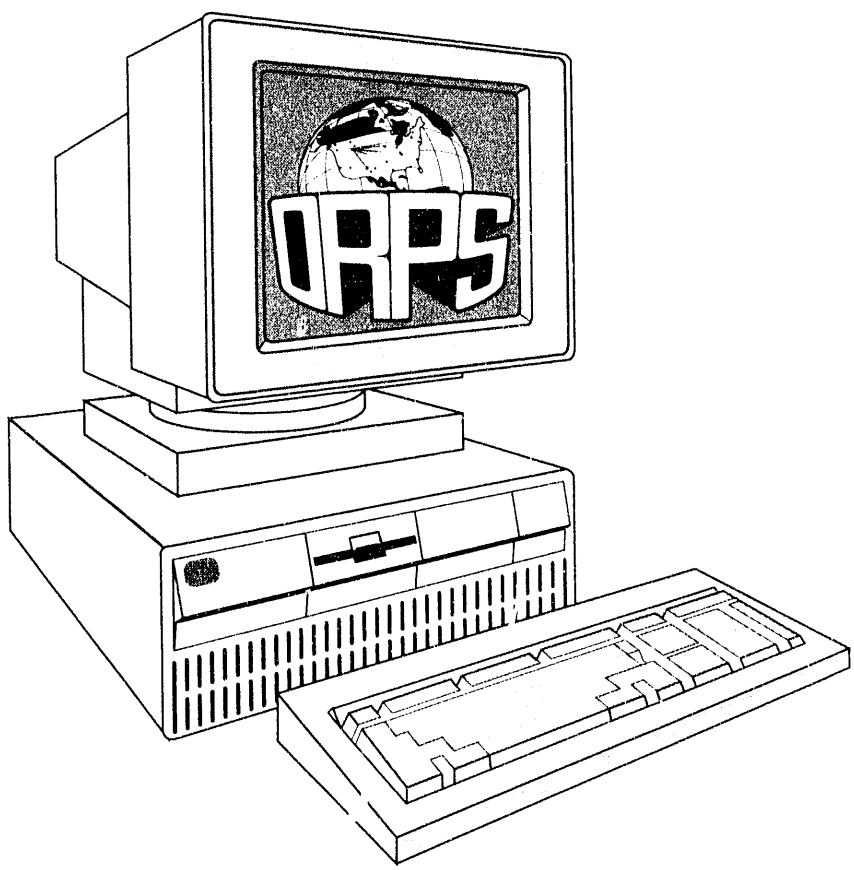
Tools to Improve Workplace Performance



Occurrence Reporting and Processing System (ORPS) Lessons Learned: Tools to Improve Workplace Performance

Various Department of Energy (DOE) orders require DOE and DOE contractor personnel to review abnormal events to gain lessons learned information. The term "event" is used to mean a real-time occurrence (e.g., pipe break, valve failure, loss of power, environmental spill). When reviewing events data, it must be possible to determine what happened and why (including root causes), the impacts, the appropriate corrective actions, and any lessons learned that might be applicable to activities of other operations or contractors. Merely obtaining the information will not prevent occurrence of a similar event; contributing conditions must be corrected.

It is important for managers, trainers, and others to learn from the events of others so that they may apply these experiences to their own activities. Reports of events must be analyzed to determine possible applicability to other facilities and/or job functions. Relevant information can then be used to correct defects and improve facilities and operations, thus making them more efficient and safer for all employees. Lessons learned information is particularly helpful in planning employee training and in developing training curriculum and programs.

Lessons learned information can be obtained from many sources. It can be found in the Safety Performance Measurement System's Computerized Accident/Incident Reporting System (CAIRS) module, the S&H Publications module, the Unusual Occurrence Reports module, and the Office of Nuclear Safety "Operating Experience Weekly Summary." One important source of lessons learned information is the Occurrence Reporting and Processing System (ORPS) database, which contains event data from September 1, 1990, to the present.

Background

On April 1, 1991, the ORPS database became operational in support of DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations Information." The purpose of the order was "to establish a system for reporting of events related to DOE-owned or operated facilities and processing of that information to provide for appropriate corrective action. . . ."

ORPS is a computerized way to submit, collect, update, and sign occurrence reports required by the DOE Order. ORPS provides the DOE community with a readily accessible database that contains information about occurrences at DOE facilities, causes of those occurrences, and corrective actions. This information can, therefore, be used to identify and analyze trends in occurrences.

The ORPS database resides on a host computer located at the Idaho National Engineering Laboratory (INEL) in Idaho Falls, Idaho. The database can be accessed from any DOE site via computer terminals or personal computers that are set up to access ORPS. Access to ORPS is available to the staff of all DOE organizations and

contractors. There is no charge (except for telephone charges) to these users for registration or use of the system.

One of the stated policies in the DOE Order is to share events throughout the DOE community. The dissemination and review of event information provides operations personnel and trainers with tools to improve facility conditions and provide an operating envelope that is safe for the worker, the public, and the environment.

Obtaining Lessons Learned Data

No two government-owned, contractor-operated (GOCO) facilities are the same. Differences are probably greater than similarities. Thus, an event reported from one facility may be unique in terms of equipment, personnel, function, etc. Nevertheless, root causes and lessons learned may be applicable to another very dissimilar activity. For example, violation of lockout/tagout programs are applicable throughout the DOE community. Lockout/tagout violations were chosen as the subject of events to obtain lessons learned data from ORPS. The data used in this demonstration were extracted from the ORPS database on October 5, 1992. Because the ORPS database is constantly updated, the results from the same search today would be different.

The ORPS Search and Reports menu displays the search options that are available. This option allows authorized ORPS users to perform a variety of searches of occurrence reports residing on the ORPS database.

```
**************************************************
*          O R P S   Search and Reports          *
**************************************************

            *** S E A R C H   M E N U ***
    Total number of occurrences in the database is: 13583
         Current number of occurrences selected is: 13583

 1. Create Search Profile              13. Report Date
 2. Execute Search Profile             14. Report Year of OR Number
 3. DOE Program Office                 15. Root Cause
 4. Field Office                       16. Direct Cause
 5. Area Office                        17. Contributing Cause
 6. Contractor                         18. Activity Category
 7. Facility                           19. Nature of Occurrence
 8. Facility Function Involved         20. Narrative Search
 9. Occurrence Report Number           21. Perform a New Search
10. Category Type                      22. Print/View Reports
11. Report Type                        23. Quit Search and Reports
12. Discovery Date

Type "HELP" for general info. or "HELP" and an item #, ie. "HELP 3".
Choose number 23 to end selection or pick a number
```

After selecting Option 20, Narrative Search, I searched the ORPS database for all occurrence reports that contain forms of the words "lockout" or "tagout" as part of the descriptive information.

```
Now enter your Narrative Search
For help on this field, type "HELP"
Press 'RETURN' only for previous prompt
LOCKOU@+TAGO@+LOCK-OU@+TAG-O@+LOCK/@+TAG/LO@+LOCKED-O@

20

You have already used Narrative Search
Using this field a second time may cause retrieval of zero
records.  Do you wish to continue using this field (Y/N) [N] y

Now enter your Narrative Search
 Press 'RETURN' only for previous prompt
 +LOCKED/@+TAGGED-OUT+TAGGED/LO@+TAGGEDO@
```

There are 381 reports residing in the ORPS database that meet the search criteria.

```
                *** S E A R C H   M E N U ***
      Total number of occurrences in the database is: 13583
           Current number of occurrences selected is: 381

 1. Create Search Profile            13. Report Date
 2. Execute Search Profile           14. Report Year of OR Number
 3. DOE Program Office               15. Root Cause
 4. Field Office                     16. Direct Cause
 5. Area Office                      17. Contributing Cause
 6. Contractor                       18. Activity Category
 7. Facility                         19. Nature of Occurrence
 8. Facility Function Involved       20. Narrative Search
 9. Occurrence Report Number         21. Perform a New Search
10. Category Type                    22. Print/View Reports
11. Report Type                      23. Quit Search and Reports
12. Discovery Date

Type "HELP" for general info. or "HELP" and an item #, ie. "HELP 3".
Choose number 23 to end selection or pick a number
```

Next, I selected Option 11, Report Type, to search for all final reports. I entered an "F" for final. There are 190 reports residing in the database that meet the search criteria.

```
                *** S E A R C H   M E N U ***
      Total number of occurrences in the database is: 13583
           Current number of occurrences selected is: 190

 1. Create Search Profile                13. Report Date
 2. Execute Search Profile               14. Report Year of OR Number
 3. DOE Program Office                   15. Root Cause
 4. Field Office                         16. Direct Cause
 5. Area Office                          17. Contributing Cause
 6. Contractor                           18. Activity Category
 7. Facility                             19. Nature of Occurrence
 8. Facility Function Involved           20. Narrative Search
 9. Occurrence Report Number             21. Perform a New Search
10. Category Type                        22. Print/View Reports
11. Report Type                          23. Quit Search and Reports
12. Discovery Date

Type "HELP" for general info. or "HELP" and an item #, ie. "HELP 3".
Choose number 23 to end selection or pick a number
```

To obtain current year lockout/tagout violations, I selected Option 14, Report Year of OR Number, and entered the year "1992." There are 42 reports that meet the search criteria. To view this information, I selected Option 22, Print/View Reports.

```
                *** S E A R C H   M E N U ***
      Total number of occurrences in the database is: 13583
           Current number of occurrences selected is: 42

 1. Create Search Profile                13. Report Date
 2. Execute Search Profile               14. Report Year of OR Number
 3. DOE Program Office                   15. Root Cause
 4. Field Office                         16. Direct Cause
 5. Area Office                          17. Contributing Cause
 6. Contractor                           18. Activity Category
 7. Facility                             19. Nature of Occurrence
 8. Facility Function Involved           20. Narrative Search
 9. Occurrence Report Number             21. Perform a New Search
10. Category Type                        22. Print/View Reports
11. Report Type                          23. Quit Search and Reports
12. Discovery Date

Type "HELP" for general info. or "HELP" and an item #, ie. "HELP 3".
Choose number 23 to end selection or pick a number
```

From the Reports Options menu, I selected Option 5, OR Subject Report.

```
            *** R E P O R T   O P T I O N S ***

1. Lag Report (Notification)          7. Distribution Reports
2. Lag Report (10 Day)                8. Download
3. Lag Report (Final)                 9. Corrective Action Status Report
4. OR Summary Report                 10. Occurrence Status Report
5. OR Subject Report                 11. Return to Search Menu
6. Occurrence Report(s)              12. Quit Search and Reports


For general help, type "HELP"
For help on any field, type "HELP", followed by
a number between 1 ard 12
Enter 12 to end selection criteria or
Enter Report field choice number
 5
```

This report provides the report number, occurrence category, report type, discovery date, report date, facility name, and occurrence report title.

```
09/28/92              Occurrence Title/Subject Report                PAGE  1
                     Sorted by Occurrence Report Number
================================================================================
Occurrence Report Number/       Occurrence  Report       Discovery  Report
  Facility Name                  Category    Type           Date       Date
------------------------------ ---------- ------------ --------- -------
ALO-DA-EGGM-EGGMAT04-1992-0003  Off-Normal  Final        01/29/92  05/01/92
  All Other Facilities
    TITLE: Energized unconnected electrical cable in COS Tape Facility

ALO-KC-AS-KCP-1992-0009         Off-Normal  Final        04/14/92  07/30/92
  Kansas City Plant
    TITLE: Misuse of LOTO equipment

ALO-KO-SNL-TA1ALBQ-1992-0025    Off-Normal  Final        07/21/92  09/28/92
  Tech. Area I, Balance
    TITLE: Unplanned Electrical Power Outage

ALO-KO-SNL-TA3COYOTE-1992-0002  Off-Normal  Final        03/20/92  07/31/92
  Tech. Area III & Coyote Canyon
    TITLE: Spill of Jet Engine Fuel
```

From the titles of the occurrence reports, I selected five reports that refer to lockout/tagout violations. The following examples of events are taken from these five occurrence reports:

Description of events:

- A maintenance craftsman performed work identified on an approved work order, after the power had been isolated but before the lockout and tagout procedure had been completed.

- A contractor removed a section of pipe containing a red tagged valve prior to having the tags removed in accordance with established lockout/tagout procedures. The section of pipe had been a supply line to a site propane distribution service which was previously taken out of service by being disconnected, purged and capped.

- A lock, seal, and "Hold Danger" sticker were found to have been removed from an electrical circuit by a person other than the one authorized to do so.

- Wires with exposed conductors were observed hanging from the ceiling, further indicating that required procedures were not followed.

- While locking out, tags on two of the breakers were inadvertently switched. The specialist hanging the tags did not verify that the correct tags were hung on the proper breakers.

Root causes:

- Personnel Error—inattention to detail.

- Personnel Error—violation of requirement or procedures.

- Training Deficiency—inadequate content.

- Management Problem—other management problem.

- Personnel Error—inattention to detail.

Lessons Learned:

- Personnel working on machinery must read and be aware of all the requirements listed on work orders and hazardous work permits and follow them to the letter. If it is impossible to follow or understand, work should stop until all requirements are fulfilled or redefined.

- It is important that employees fully understand the purpose of the lockout/tagout program, in order that they do not violate same. During training for the lockout/tagout program it is stressed that no one is authorized to remove tags under any circumstances except as outlined in the procedure. We should also make sure employees understand that they are not to evaluate the reason for the tag.

- Subcontractor personnel had not been adequately trained in lockout/tagout procedures and requirements to supervise their vendors in lockout/tagout situations.

- This incident need not have occurred, had established standards been followed by staff members. An important lesson to be learned from this experience is to know who is working in your area. Staff members must be knowledgeable of/or trained in the accepted procedures for working with electrical power supplies.

- Attention to detail is essential when performing all aspects of the lock, try, and tag procedures. Although no safety issues were involved with this event, inattention to detail when hanging lockouts has serious potential for safety of personnel and equipment.

What do the lessons learned tell us? Do existing training programs address these problems? Training was found to be the root cause in one of the five selected occurrence reports. Is additional training the answer?

Distribution reports are another tool to help us in the decision process. The distribution reports provide a fast and accurate way to view trends in the data. To view some of the trends in this data, I selected Option 7, Distribution Reports.

```
            *** R E P O R T   O P T I O N S ***

1. Lag Report (Notification)          7. Distribution Reports
2. Lag Report (10 Day)                8. Download
3. Lag Report (Final)                 9. Corrective Action Status Report
4. OR Summary Report                 10. Occurrence Status Report
5. CR Subject Report                 11. Return to Search Menu
6. Occurrence Report(s)              12. Quit Search and Reports

For general help, type "HELP"
For help on any field, type "HELP", followed by
a number between 1 and 12
Enter 12 to end selection criteria or
Enter Report field choice number
 7
```

From the ORPS Distribution Reports menu, I selected Option 3, Root Cause.

```
     *** O R P S   D I S T R I B U T I O N   R E P O R T S ***

      1. Direct Cause                  8. Field Office
      2. Contributing Cause            9. Contractor Organization
      3. Root Cause                   10. Occurrence Category
      4. Facility Function            11. Activity Category
      5. Facility                     12. Nature of Occurrence
      6. Year/Quarter                 13. Report Type (Status)
      7. DOE Program Office           14. Return to Report Menu

For general help, type "HELP"
For help on any field, type "HELP", followed by
a number between 1 and 12
Enter 12 to end selection criteria or
Enter Report field choice number
 3
```

```
09/28/92                OR Distribution by Root Cause                PAGE 1
                          Sorted by Root Cause Code
================================================================================
 Code  Description                                                  Count Total
 ----------  ---------------------------------------------------------------

1. EQUIPMENT/MATERIAL PROBLEM
   1A. Defective or Failed Part                                          1

                                   TOTAL ..................................  1
2. PROCEDURE PROBLEM
   2A. Defective or Inadequate Procedure                                 7
   2B. Lack of Procedure                                                 1

                                   TOTAL ..................................  8

3. PERSONNEL ERROR
   3B. Inattention to Detail                                             4
   3C. Violation of Requirement or Procedure                             8
   3D. Verbal Communication Problem                                      2
   3E. Other Human Error                                                 2

Press <ENTER> to continue; <CTRL-Y> to exit report.
```

09/28/92 OR Distribution by Root Cause (Continued) PAGE 2
Sorted by Root Cause Code

Code	Description	Count	Total
	TOTAL		16
4.	DESIGN PROBLEM		
4B.	Inadequate or Defective Design	1	
4D.	Drawing, Specification, or Data Errors	1	
	TOTAL		2
5.	TRAINING DEFICIENCY		
5A.	No Training Provided	1	
5C.	Inadequate Content	1	
5D.	Insufficient Refresher Training	2	
	TOTAL		4

Press <ENTER> to continue; <CTRL-Y> to exit report.

09/28/92 OR Distribution by Root Cause (Continued) PAGE 3
Sorted by Root Cause Code

Code	Description	Count	Total
6.	MANAGEMENT PROBLEM		
6A.	Inadequate Administrative Control	3	
6B.	Work Organization/Planning Deficiency	4	
6E.	Policy Not Adequately Defined, Disseminated, or Enforced	3	
6F.	Other Management Problem	1	
	TOTAL		11
	GRAND TOTAL		42

What does the Distribution by Root Cause Report tell us?

- "Personnel Error" was the highest, with 16 reports claiming it as the root cause. "Violation of Requirements or Procedures" is the major cause of personnel error, followed by "Inattention to Detail."

- "Management Problem" was the root cause for 11 of the occurrence reports. The category of "Policy Not Adequately Defined, Disseminated, or Enforced" could mean that training was not supported by management. "Inadequate Administrative Control" and "Work Organization/Planning Deficiency" could be indications that we need to evaluate the effectiveness of current programs.

- Eight of the 42 reports cited "Procedure Problem" as the root cause. Seven of the eight indicated the procedures were defective or inadequate.

- "Training" cannot be overlooked. There were four reports indicating training as the root cause, of which two indicated "Insufficient Refresher Training."

Another way to look at this information is by selecting Option 12, Nature of Occurrence, on the Distribution Reports menu. Nature of Occurrence is the reporting requirements defined in Attachment 1 of DOE Order 5000.3A.

```
10/01/92          OR Distribution by Nature of Occurrence          PAGE 1
                    Sorted by Nature of Occurrence Code
================================================================================
 Code  Description                                                 Count Total
--------------------------------------------------------------------------------
1. Facility Condition
   1C. Safety Status Degradation                                        2
   1D. Loss of Control of Radioactive Material                          2
   1E. Vital System/Component Degradation                               6
   1F. Violation/Inadequate Procedures                                 17
   1I. Operational Occurrence                                           2

                              TOTAL .....................................29

2. Environmental
   2A. Radionuclide Release                                             1
   2B. Hazardous Substances/Regulated Pollutants/Oil Releases           1

                              TOTAL ..................................... 2


Press <ENTER> to continue; <CTRL-Y> to exit report.
```

10/01/92 OR Distribution by Nature of Occurrence (Cont.) PAGE 2
Sorted by Nature of Occurrence Code

Code	Description	Count
3.	Personnel Safety	
	3A. Occupational Illness/Injury	1
	3B. Vehicular/Transportation Accident	1
	3C. Miscellaneous	3
	TOTAL	5
6.	Transportation	
	6. Transportation	1
	TOTAL	1
9.	Cross-Category Items	
	[illegible]B. Near Miss Occurrences	2
	[illegible]C. Potential Concerns/Issues	4
	TOTAL	6

Press <ENTER> to continue; <CTRL-Y> to exit report.

10/01/92 OR Distribution by Nature of Occurrence (Cont.) PAGE 3
Sorted by Nature of Occurrence Code

Code	Description	Count
	GRAND TOTAL	43

End of Report. Press [ENTER] or [RETURN] to continue.

"Facility Condition" is very high with 29 of 43 citing this as the nature of the occurrence. Again, "Violation/Inadequate Procedures" stands out with a count of 17. This is another indication that we need to evaluate the current programs. Are these procedure concerns or are they training concerns? Perhaps, they are both.

A third way to view this information is by the Activity Category, Option 10, from the Distribution Report menu.

09/28/92 OR Distribution by Activity Category PAGE 1
Sorted by Activity Category Code

Code	Description	Count Total
01	Construction	5
02	Maintenance	9
03	Normal Operations	16
04	Startup	1
05	Shutdown	
06	Facility/System/Equipment Testing	1
08	Transportation	1
10	Inspection/Monitoring	1
11	Facility Decontamination/Decommissioning	1
	GRAND TOTAL	42

We need to consider that these problems are throughout the DOE community, not just one facility. Questions we need to contemplate include:

- How can these problems be corrected?
- What can we learn from this data?
- How can this information be used in our training programs?

DOE Order 5480.19 "Conduct of Operations Requirements for DOE Facilities," states "if there is potential for equipment damage or injury during equipment operation, servicing, maintenance, or modification activities due to inadvertent activation of equipment, a facility Lockout/Tagout program should be established and used." The DOE Order also states, "It is important that the lessons learned from an event investigation be shared with all appropriate personnel who could benefit from the lessons learned."

Conclusion

Improving the quality and quantity of information available to prevent events within DOE depends upon finding solutions and communicating those solutions to all who will benefit from the information. One of the best ways to disseminate event information is through ORPS. ORPS makes data available to all authorized users so that all facilities within DOE can benefit from the lessons learned and use this information as a tool to improve workplace performance.

End Notes

1. DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations Information."

2. DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities."

3. National Safety Council, *Accident Prevention Manual for Industrial Operations*, 9th ed., Chicago: National Safety Council, 1988.

END

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3/5/93