

# Strictly Private Information Deleted

## OCCURRENCE REPORT

Energy Research (PNNL)

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(Name of Facility)

Balance-of-Plant

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(Facility Function Involved)

### HANFORD SITE

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(Name of Laboratory, Site or Organization)

Name: [REDACTED]

Title: Manager, Facilities Operations

Telephone No.: [REDACTED]

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(Facility Manager/Designee)

Name: [REDACTED]

Title: Manager, Facilities Management Services

Telephone No.: [REDACTED]

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(Originator)

Name: Pollari, R. A. Date: \_\_\_/\_\_\_/\_\_\_ Time: \_\_\_\_\_ hrs.  Classified  Unclassified

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(Authorized Classifier (AC))

1. OCCURRENCE REPORT NUMBER: RL--PNNL-PNNLBOPER-2000-0004

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2. STATUS AND REPORT DATE:	<u>Date Due</u>	<u>Date Submitted</u>
<input type="checkbox"/> Notification Report	02/17/00	02/17/00
<input type="checkbox"/> Roll Up	03/13/00	03/13/00
<input type="checkbox"/> Update	05/26/00	05/22/00
<input checked="" type="checkbox"/> Final	06/16/00	06/16/00

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3. OCCURRENCE CATEGORY:

- Emergency
- Unusual
- Off-Normal

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4. NUMBER OF OCCURRENCES:

2 Original Occurrence Report: N/A

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**5. DIVISION OR PROJECT:**

Facilities & Operations

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**6. DOE SECRETARIAL OFFICE:**

SC – Office of Science

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**7. SYSTEM, BLDG. OR EQUIPMENT:    8. UCNI?:    9. PLANT AREA:**

#2 – EMSL	No	RCHN Area
#1 - 306W Building	No	300 Area

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**10. DATE & TIME DISCOVERED:    11. DATE AND TIME CATEGORIZED:**

#2 - 03/10/00 1445 hrs.	03/10/00 1530 hrs.
#1 - 02/16/00 1430 hrs.	02/16/00 1452 hrs.

**12. DATE & TIME OF DOE/HQ-EOC NOTIFICATION:**

**13. DATE & TIME OF OTHER NOTIFICATIONS:**

#2 - 03/10/00 1553 hrs.	Carlson, J. L.	RL/STO
#1 - 02/16/00 1555 hrs.	Burandt, M. B.	RL/STO

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**14. SUBJECT OR TITLE OF OCCURRENCE:**

Potential Asbestos Exposure to PNNL Staff Members (Roll-Up)

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**15. NATURE OF OCCURRENCE:**

10) Cross Category Items  
C. Potential Concerns/Issues

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**16. DESCRIPTION OF OCCURRENCE:**

**Occurrence #1 (306W)**

In early November 1999, a job was initiated to replace the fire sprinkler piping in the East/West corridor located on the south side of the second floor of the 306W Facility. The corridor serves as an egress route for both the 306W and 306E facilities and has no adjoining office or lab spaces. A “wet pipe” system was being converted to a “dry-pipe” system in a modification to mitigate potential freeze protection issues. Suspended metal ceiling tiles in the corridor were removed by a carpenter in mid-November in preparation for modification of the existing fire system piping. The piping modifications were completed and new sprinkler heads were installed. Upon

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completion of the acceptance test procedure and activation of the system, preparations were made to reinstall the ceiling tiles. While preparing to reinstall metal ceiling tiles (~100 tiles), the PNNL carpenter assigned to the task noticed a white powder substance (potential asbestos) on the backside of several of the tiles. The carpenter immediately stopped work and notified his supervisor.

Analysis results received on 2/15/00, of the white powdery material on the ceiling tiles that were taken down, showed that materials containing up to 18% asbestos were involved. Actual exposures to the workers are not available since personal monitoring during the potential exposure periods was not done.

### **Occurrence #2 (EMSL/Math)**

Over the course of two days, February 16 and 17, 2000, a carpenter used a hand-held jigsaw to enlarge access holes in 10 removable steel-backed floor tiles from a computer room pedestal floor. The tiles were from the Math Building, room 1316. The work was performed in the carpenter shop (room 1248) at the Environmental Molecular Science Laboratory (EMSL). After the carpenter completed his work, the tiles were returned to the Math Building.

On February 25, 2000, in a separate activity to update the hazards listing for the Math Building's Facility Use Agreement (FUA), tile samples from the pedestal floor in room 1316 were taken and sent to an analysis laboratory to evaluate the material content for asbestos. They had not previously been identified as asbestos containing material.

PNNL received the analysis results on March 10, 2000. The samples were reported to contain 5% asbestos fibers. The Building Manager related these results with the cutting activity that took place on February 16 & 17 and determined that the carpenter, and others who were exposed to his cutting operations (facility project manager, department manager, and janitor), were potentially exposed to asbestos fibers.

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### **17. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:**

N/A

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### **18. ACTIVITY CATEGORY:**

10 - Maintenance

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**19. IMMEDIATE ACTIONS TAKEN AND RESULTS:**

**Occurrence #1 (306W)**

Work was stopped immediately. The supervisor was notified of the finding. The supervisor called the Industrial Hygienist to evaluate the situation. Bulk samples of the white powdery substance were taken and sent off-site for evaluation.

The sample results were positive for the presence of asbestos. Ten staff members were involved with the project. All 10 have been notified of the findings. All staff went to Hanford Environmental Health Foundation (HEHF) for evaluation. Of the ten, just three were primarily involved in the completion of the tile removal and replacement tasks. The remaining seven staff included Supervision, Industrial Hygienist, Fire Protection Engineering, Work Control Specialist and additional Craft support (2) and the Building Manager.

The remainder of the ceiling tiles and the corridor were isolated and posted with a "danger" tape barricade. The carpenter's service truck, which had most of the tiles in it, was covered and taped off with Danger tape.

A recovery plan was developed to clean up the loose asbestos containing material in both the corridor and the carpenter's service truck.

A Timely Order was issued to emphasize provisions of the new Work Control Procedure that should prevent this condition from occurring. The New Maintenance Work Control Procedure was instituted in February 2000 to address needed improvements.

**Occurrence #2 (EMSL/Math)**

The Building Manager called the PNNL Single Point of Contact on March 10, 2000, at 1440 hours, to report his concern. The EMSL carpenter shop was locked and posted requiring the Building Manager permission for access. The Math Building Computer Room was posted to restrict further construction and maintenance activities. The exposed staff went to the Hanford Environmental Health Foundation (HEHF) for evaluation on March 13, 2000. A critique of the event was also held on March 13.

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**20. DIRECT CAUSE:**

- 2) Procedure Problem
  - a. Defective or Inadequate Procedure

**21. CONTRIBUTING CAUSE(S):**

- 6) Management Problem
  - e. Policy Not Adequately Defined, Disseminated, Enforced

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- 5) Training Deficiency
  - a. No Training Provided
- 2) Procedure Problem
  - a. Defective or Inadequate Procedure

## 22. ROOT CAUSE:

- 4) Design Problem
  - a. Inadequate Work Environment

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## 23. DESCRIPTION OF CAUSE:

Causal factors were developed using the herringbone method. Both events share the same root cause; however, each has various direct and contributing causes. Since ORPS is limited to one direct cause in Item 20 and just three contributing causes can be entered in Item 21; only the prominent ones are listed above, but all of the direct and contributing causes, developed through the independent causal factors analysis, are described below.

### **Root Cause: - 4)a. Design Problem: Inadequate Work Environment**

Hazard identification processes failed to identify the potential asbestos hazard for the planned work for both events.

#### **Occurrence #1 (306W)**

The space above the ceiling tiles is accessed infrequently. It was not well characterized for hazards. Adequate precautions were not taken to systematically identify hazards; e.g., the steam pipe had asbestos insulation around it - it is not tagged, posted or painted; the loose Asbestos Containing Material (ACM) on top of the ceiling tiles was generated during a job preceding 1987 and was not cleaned up; loose ACM was not expected for this work or identified; and heavier than expected concentrations of dust and dirt settled on the ceiling tiles (through a unsealed three-inch gap at the steam-pipe wall-skin penetration) masking the ACM.

Building Manager was not cognizant of the quantity, condition and location of asbestos containing material in the corridor ceiling area. Subject matter experts for industrial and occupational safety were not aware of the presence, location or quantity of asbestos containing material in the work area.

Good Faith Inspection Information for asbestos containing material is not readily available to staff. Results of historical sampling of hazards like asbestos is kept by subject matter experts and is not readily available to staff or Building Manager.

#### **Occurrence #2 (EMSL/Math)**

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The existing asbestos hazard information for the Math Building was not readily available to staff. The Building Manager who triaged the work as Dispatch Work, the Subject Matter Experts who advised the Building Manager and the Carpenter who performed the cutting work had no method to readily access existing asbestos hazard information like that found in the Good Faith Inspections or historical sample analysis results.

### **Direct Cause:**

#### **Occurrence #1 (306W) - 2)a. Procedure Problem: Defective/Inadequate Procedure**

The Job Planning Package did not address the dust hazard adequately and did not consider the asbestos hazard at all. Other hazards that were adequately covered, included: scaffolding, bump hazards, water on floor and slip hazards. No mitigating controls were added to the Job Planning Package (JPP).

Note: the carpenters performed the work by verbal direction and did not review the JPP. The job of removing the metal ceiling tiles required significant mechanical agitation of the tiles that resulted in dispersion of accumulated dust and dirt. Carpenters performing the work had to ask for dust protection.

Asbestos containing material was not identified as a possible hazard by staff involved with planning the work, including the Building Manager; Fire, Occupational, and Industrial Safety, the Work Control Specialist; Engineers; and other Modification Permit reviewers.

Workers who performed support or preparatory work like the carpenters who handled about 100 ceiling tiles were not included in the preparation of the Job Planning Package, the job-site walk-down, nor were they included in the formal pre-job briefing.

Although hazard information was available, it was not consulted, because the existence of these sources of information was not well known.

The new Maintenance Work Control Procedure was implemented in February 2000. The procedure includes requirements that emphasize: the entire job scope including support work, utilization of multiple information sources for hazard identification, involvement of the workers in the work planning, and involvement of the workers in the pre-job briefing. In addition, line management has instituted an aggressive self-assessment program on work control with emphasis on preparation of the work plan.

#### **Occurrence #2 (EMSL/Math) - 2)a. Procedure Problem: Lack of Procedure**

The floor-tile cutting work for the Math Building was triaged and performed by the Core Team as "Dispatch Work" which did not require a Job Planning Package (JPP) to be prepared. A JPP would have been required had asbestos hazard been identified. The JPP would have incorporated controls for working with the asbestos hazard.

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Note: prior to approving the floor-tile-cutting work to proceed, the Building Manager queried the subject matter experts, including the previous building manager, and the life cycle asset management program manager to see if the tiles were suspected to contain asbestos. Since the subject matter experts did not identify the tiles as a hazard, the Building Manager approved the work as dispatch.

## **Contributing Causes:**

### **Occurrence #1 (306W)**

#### **6)b. Management Problem: Work Organization/Planning Deficiency**

Approach to planning this work was not appropriate.

The job was planned as if it was known that no asbestos would be encountered during the job. A cautious approach should be taken for planning a job above the suspended ceiling where it is not well characterized (e.g., establish hold points for checks, samples or analysis).

In addition, there were multiple work control documents issued, which resulted in some confusion of work scope to be performed and charge code to be used. Furthermore, the temporary change to the fire protection sprinkler lines was not documented in a timely manner. And, work was started without proper planning packages, and continued after the Service Request was closed.

#### **5)a. Training Problem: No Training Provided**

Staff involved with the work did not see and/or recognize asbestos containing material on the ceiling tiles.

Resource Managers (direct line managers) and Facility Project Manager (matrixed supervisor) for the workers were not cognizant of potential hazards their staff encountered until after the work had started.

Asbestos awareness training is not consistently included in the training curricula for staff who may encounter material, but who would not disturb asbestos containing material in the field.

#### **4)b. Design Problem: Inadequate or Defective Design**

A design deficiency left the corridor without heat. The wet sprinkler pipe in the corridor above the ceiling froze and failed during extremely cold weather, which led to the need for the modification of the fire sprinkler pipe to dry system.

### **Occurrence #2 (EMSL/Math)**

## **2)a. Procedure Problem: Defective or Inadequate Procedure**

The Maintenance Work Control Procedure does not include criteria to control asbestos containing material consistent with the worker's level of training. Note that handling asbestos containing material (ACM) quantities that exceed 1 linear foot or 1 square foot of intact asbestos (non-friable) or any quantity of ACM that is not intact (friable), is prohibited without additional training.

## **5)d. Training Problem: Insufficient Refresher Training**

The laboratory training database was queried for core team members that may encounter asbestos containing material in the work place. The positions queried include Building Engineer, Building Manager, Work Control Specialist, and Facility Project Manager. Not all of the staff holding these positions have completed the recent version of this class that emphasizes caution for materials installed before 1980 that should be treated as potentially asbestos containing material.

## **6)a. Management Problem: Inadequate Administrative Control**

A process is not established to insure that materials used in certain applications like ceiling tiles, insulation and flooring installed before 1980 should be treated as potentially asbestos containing material.

## **6)e. Management Problem: Policy Not Adequately Defined, Disseminated or Enforced**

There are several different forms of hazard information (documents, databases, and files) that is not effectively disseminated to staff in a form that is readily usable. Workers who may encounter asbestos containing material in the work place are not aware of the existence of the information sources like the Good Faith Inspections.

Corrective action #3 from RL--PNNL-PNNLBOPER-1998-0026 required Good Faith Inspection information be provided to appropriate staff - which should have included the Building Manager. The Building Manager did not have a copy of the Good Faith Inspection for the Math Building. Therefore, the corrective action from the previous occurrence report was not effective. Although the Good Faith Inspection information did not specifically identify the pedestal floor tiles in Math/ 1316, the information may have caused the Building Manager to consider additional sampling before he approved the work to proceed as "dispatched work."

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## 24. EVALUATION (By Facility Manager/Designee)

PNNL Facilities management aggressively evaluated the conditions leading up to the potential exposure of staff to asbestos by convening a team to perform a management assessment and prepare a detailed report. The report was completed on 03/31/00, and updated with the additional information for the EMSL shop event. The content of this final occurrence report is based on the information and conclusions from the management assessment.

### **Occurrence #1 (306-W)**

Staff were potentially exposed to asbestos containing material. Actual exposures are not available since personal monitoring during the potential exposure periods was not done. Analysis results received on 2/15/00, of the white powdery material on the ceiling tiles that were taken down, showed that materials containing up to 18% asbestos were involved. The Occupational Safety and Health Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) and the Washington Industrial Safety and Health Act (WISHA) Permissible Exposure Limit (PEL) for asbestos is 0.1 fiber per cubic centimeter (f/cc) of air as an eight-hour Time-Weighted Average (TWA). Personal sampling results for the Certified Asbestos Workers, who cleaned up the asbestos in the corridor and truck, showed that they were exposed to less than 0.034 f/cc for the time period sampled. Personal sampling was conducted for the entire operation, and then equated to a TLV/PEL-TWA of 0.009 f/cc. This is below the TLV/PEL-TWA of 0.1 f/cc. After clean up, the asbestos clearance sample was less than 0.01 f/cc.

Environmental Management Services (EMS) staff with DOE input evaluated the circumstances of the disposal of the sweepings that were discarded by the carpenter. They considered the total volume of sweepings that was mostly dust and dirt, the fraction of tiles with visible white powder, and the analysis results of the white powder. They concluded that amount of asbestos containing material “would be immeasurable if existent at all”. No actions were required with regard to the disposed of sweepings.

### **Occurrence #2 (EMSL/Math)**

This work also resulted in potential exposure of a carpenter to asbestos containing material in the EMSL carpenter shop - performed as dispatch work. The building manager approved the work as “dispatch work” after queries of subject matter experts revealed no hazard requiring a job planning package. The floor tiles were being modified as part of a project to move Battelle’s main telephone distribution frame (telephone switch) from the PSL to the Math Building.

An unrelated walk-down of the Math Building by an industrial hygienist and facility management, after the floor tile cutting work was completed, resulted in identification of the suspect materials; i.e., the pedestal floor tiles in the Math Computer room. Analysis results of samples taken from the floor tiles showed that the floor tiles were homogenous off-white fibrous mineral mixture, 5% Chrysotile asbestos.

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The carpenter cut the tiles using a hand held jigsaw. The cutting required two days (2/16 & 2/17/00). The carpenter swept up about .5 liters of granular cuttings and other debris present in the shop. The sweepings were disposed of in the shop trash receptacle. Environmental Management Services staff evaluation of the sweepings in the carpenter shop required no actions.

### Summary

The new Work Control Procedure, implemented in February, requires more in depth assessment of potential hazards present. A Timely Order was issued to raise awareness of the provisions of the Work Control Procedure. The timely order specifically listed asbestos and beryllium as hazards to be addressed. The provisions of this Timely Order have been included in the work Control Procedure.

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**25. IS FURTHER EVALUATION REQUIRED?:**                      **Yes[ ]**    **No[X]**

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### **26. CORRECTIVE ACTIONS:**

- 1) Revise the Maintenance Work Control Procedure to: a) contain appropriate criteria for performing work on material that may contain asbestos that is consistent with the workers level of asbestos training, b) contain appropriate controls to insure that work on uncharacterized materials that were installed/manufactured before 1980 considers the material as suspect for asbestos, c) include reference to appropriate asbestos hazard information sources that are available, and d) incorporate the provisions of the Timely Order TO-00-05: Unanticipated Hazards Awareness. (Ref: 3211.1.1 & 3211.1.2 & 3211.1.6 & 3211.1.7 -- "d" is the only part of this action not completed yet)

**ACTION OWNER:** Manager, Operations Support Group (Buckley, GD)

**TARGET COMPLETION DATE:** 10/01/00    **COMPLETION DATE:** //

- 2) Develop a process like the Map Information Tool to provide asbestos hazard information like the Good Faith Inspection information to staff.

As an interim action, the Good Faith Inspection information was distributed to the applicable building managers and work control specialist, until the information provided in a readily available form as addressed in this corrective action.

Core Team members involved with this job were not aware that Good Faith Inspection information was available. This condition is a repeat deficiency reported in a similar incident in 1998. Additionally, Environmental Safety and Health (ES&H) Subject Matter Experts (SME) maintain historical sample analysis results, but this information for 306W was not located. The historical information from the Good Faith Inspections and continuing sample analysis results is not maintained in a readily available format for staff to refer to. The

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Assessment Team recommends that a method should be implemented to make the historical information available to staff and provide for the continued update of the information. With the historical information available for asbestos, the entire core team will have the ability to identify it as a potential hazard. (Ref: 3211.1.3)

**ACTION OWNER:** PM, Facility Life Cycle Management (Bruce, AR)

**TARGET COMPLETION DATE:** 10/01/00    **COMPLETION DATE:** //

- 3) Provide resources to maintain the baseline information in the Good Faith Assessment for asbestos is current with cleanup activities and analysis results. (Ref: 3211.1.4)

**ACTION OWNER:** Manager, IH & OSO (Pease, MO)

**TARGET COMPLETION DATE:** 10/01/00    **COMPLETION DATE:** //

- 4) The design modification process should be verified to require a comprehensive review for impacts on each space for a modification that affects the entire facility; e.g., evaluate every space to insure heating impacts are addressed. (Ref: 3211.1.5)

**ACTION OWNER:** Chief Engineer, F&O (Olson, ME)

**TARGET COMPLETION DATE:** 04/15/00    **COMPLETION DATE:** 04/14/00

- 5) Staff who have the potential to encounter materials in spaces not routinely accessed and not well characterized should attend asbestos awareness training. (Ref: 3211.1.9)

**ACTION OWNER:** Manager, Facility Management (Maples, LE)

**TARGET COMPLETION DATE:** 04/30/00    **COMPLETION DATE:** 04/13/00

- 6) Evaluate the need for core team members to attend Asbestos Awareness Training. For applicable positions revise the Staff Development and Training Plan to include the training. (Ref: 3211.1.10)

**ACTION OWNER:** Sr. Advisor, ED&CR (Sadesky, RE)

**TARGET COMPLETION DATE:** 08/01/00    **COMPLETION DATE:** //

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### 27. IMPACT ON ENVIRONMENT, SAFETY, AND HEALTH:

None

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**28. PROGRAMMATIC IMPACT:**

None

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**29. IMPACT UPON CODES AND STANDARDS:**

None

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**30. LESSONS LEARNED:**

Good Faith Inspection Information should be available to staff to identify potential asbestos containing material that may be encountered by workers. Workers who may come in contact, but do not disturb asbestos containing material in the work place should have current asbestos awareness training. Hazard information should be readily available to workers who will perform work where asbestos containing material is present.

The value of "process knowledge" can decrease with time and less credence should be placed on using "old" process knowledge in making project decisions. And more caution should be applied when accessing a space that is infrequently entered and has little characterization.

The Occurrence Reporting and Processing System (ORPS) was queried and seven similar events were identified: two involved the Facilities and Operations organization, and five research and development activities. All seven are listed in Item 31. The common thread is the failure to identify the hazard or perform an adequate analysis of the hazard prior to performing work. Inadequate controls were implemented as a result.

The new Maintenance Work Control Procedure included requirements for hazard identification, analysis and control. The procedure was reviewed in light of these events and some improvements were made. Management held briefings with the core teams to communicate the expectations contained in the procedure for work planning processes. Line managers assess the Job Planning Packages in the field on a bi-monthly basis. The results of these continuing assessments have driven further improvements to the process. A Laboratory Initiative is underway to develop a laboratory tool that improves the hazard identification and analysis process for research and development activities.

And lastly, building managers should be aware that when potential is high for exposure of staff to unknown hazards that the incident should be called in to the Single Point Contact (375-2400) to ensure it is categorized by the event classifier in a timely manner (ref: ATS 3211.1.8).

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**31. SIMILAR OCCURRENCE REPORT NUMBERS:**

RL--PNNL-PNNLBOPER-1999-0010  
RL--PNNL-PNNLBOPER-1998-0022  
RL--PNNL-PNNLBOPER-1998-0023  
RL--PNNL-PNNLBOPER-1998-0001  
RL--PNNL-PNNLBOPER-1997-0032  
RL--PNNL-PNNLNUCL-1999-0005  
RL--PNNL-PNNLNUCL-1999-0007

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**36. APPROVAL SIGNATURES:**

306-W \_\_\_\_\_ Date \_\_\_\_\_  
McMullin, K. E., Building Manager  
Facilities Management Services

EMSL \_\_\_\_\_ Date \_\_\_\_\_  
Rojas, P. H., Building Manager  
Facilities Management Services

Originator \_\_\_\_\_ Date \_\_\_\_\_  
Maples, L. E., Manager  
Facilities Management Services

Assessment Lead \_\_\_\_\_ Date \_\_\_\_\_  
Buckley, G. D., Manager  
Operations Support Group

Facility Manager \_\_\_\_\_ Date \_\_\_\_\_  
Alvarez, J., Manager  
Facility Operations