

Occurrence Report

After 2003 Redesign

SNL Division 2000

(Name of Facility)

Laboratory - Research & Development

(Facility Function)

Sandia National Laboratories - SS

Sandia National Laboratories

(Site)

(Contractor)

Name: Mike D. Olbin**Title:** ES&H Coordinator**Telephone No.:** (505) 845-9876

(Facility Manager/Designee)

Name: LUCERO, JEWELEE A**Title:** REPORTING ADMINISTRATOR**Telephone No.:** (505) 845-4727

(Originator/Transmitter)

Name: Rudolph G. Jungst**Date:** 06/09/2009

(Authorized Classifier (AC))

1. Occurrence Report Number: NA--SS-SNL-2000-2009-0004

Interlocks Bypassed on Rofin Laser Welder in Bldg. 894

2. Report Type and Date: FINAL

	Date	Time
Notification:	05/06/2009	15:56 (ETZ)
Initial Update:	05/20/2009	11:04 (ETZ)
Latest Update:	06/17/2009	13:07 (ETZ)
Final:	06/17/2009	13:07 (ETZ)

3. Significance Category: 3**4. Division or Project:** 2000/Power Sources**5. Secretarial Office:** NA - National Nuclear Security Administration**6. System, Bldg., or Equipment:** Rofin Laser Welder/Bldg. 894, Rm. 132D

7. UCNI?: No

8. Plant Area: Tech Area I

9. Date and Time Discovered: 05/05/2009 13:45 (MTZ)

10. Date and Time Categorized: 05/05/2009 15:10 (MTZ)

11. DOE HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

12. Other Notifications:

Date	Time	Person Notified	Organization
05/05/2009	13:45 (MTZ)	Mike Olbin	2501
05/05/2009	15:15 (MTZ)	Anthony Medina	2500
05/05/2009	15:15 (MTZ)	Steve Rottler	2000
05/05/2009	15:15 (MTZ)	Michael Brown, FR	DOE/SSO
05/05/2009	13:50 (MTZ)	Rudy Jungst	2548
05/05/2009	15:15 (MTZ)	Tom Wunsch	2540
05/05/2009	15:15 (MTZ)	Nita Estes	2012

13. Subject or Title of Occurrence:

Interlocks Bypassed on Rofin Laser Welder in Bldg. 894

14. Reporting Criteria:

10(2) - An event, condition, or series of events that does not meet any of the other reporting criteria, but is determined by the Facility Manager or line management to be of safety significance or of concern to other facilities or activities in the DOE complex. One of the four significance categories should be assigned to the occurrence, based on an evaluation of the potential risks and the corrective actions taken. (1 of 4 criteria - This is a SC 3 occurrence)

15. Description of Occurrence:

On May 5, 2009, at 13:45, while following up on a lessons learned involving intentional bypassing of optical interlocks on a laser welder in Building 700/1054, members of the Center 2500 ES&H team inspecting similar welders in Building 894/132D Power Sources dry room discovered the same condition.

The laser is a Rofin Laser Welder with a Class IV laser located within the welder's chamber. The purpose of the interlock is to ensure that the operator's hands are positioned properly before allowing operation of the welder and to mitigate inadvertent exposure to the laser. During the inspection of the welder, the optical interlock was found to be intentionally covered with yellow sticky paper which would allow the laser to be operated without regard to the user's hand/arm position.

There were no injuries or exposure to the laser as a result of this occurrence.

16. Is Subcontractor Involved? No

17. Operating Conditions of Facility at Time of Occurrence:

Normal Operations

18. Activity Category:

12 - Research

19. Immediate Actions Taken and Results:

Work with welder halted pending investigation.

20. ISM:

- 2) Analyze the Hazards
 - 3) Develop and Implement Hazard Controls
 - 4) Perform Work Within Controls
-

21. Cause Code(s):

A3B2C02 - Human Performance Less Than Adequate (LTA); Rule Based Error; Signs to stop were ignored and step performed incorrectly
-->couplet - A1B4C01 - Design/Engineering Problem; Design Verification / Installation Verification LTA; Independent review of design/documentation LTA
A3B3C01 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Attention was given to wrong issues
-->couplet - A4B2C08 - Management Problem; Resource Management LTA; Means not provided for assuring adequate equipment quality, reliability, or operability

22. Description of Cause:

Critique/Fact Finding Performed 5/5/09

A simplified systemic factors analysis based on an SNL-developed approach documented in MN471001-Att. 22b-1 using an in-depth fishbone was performed to identify the causes that led to the occurrence. Identification and prioritization of significant causes were accomplished through assignment of techniques (prevent, detect, mitigate, no effect) to eliminate or minimize causal effects, with priority given to prevention for best course of corrective action. Finally, causes were mapped to causal codes defined by DOE M 231.1-2 to assure consistency in communication of results to other parties and for future analysis for corrective actions.

Analysis:

A1B4C01 Design / Installation Verification LTA. Independent review of design / documentation LTA: Lack of planning and executing of an independent process / hazard analysis review of the laser operation would have identified

technologist's concerns about the laser interlock tripping issues.

The laser weld system was modified to allow for the laser to be used for seam welding. Seam welding was accomplished by defeating the cavity interlocks which allowed arms/hands to manipulate the device within the laser cavity without shutting the laser system down. In this state of operation, laser light could not leave the system; however, interlocks were left in the defeated state after the laser weld was completed, creating a potentially unsafe condition for future users. An independent review of the continuous weld process would have identified the laser interlock issue, thus enabling a solution to properly use the laser weld system.

A3B2CO2 Rule Based Error. Signs to stop were ignored and step performed incorrectly: Technologists performed welding operations without regard to the clearly defined operating procedure, "OP for Baasel Lasertech StarWeld Performance Microwelders," interlock guidelines.

The laser welding operating procedure clearly identifies the safety interlocks and verification of their operation prior to any laser welding. All technologists were trained for performing laser welds in accordance with the operating procedure, and associated work instructions. Interviews with the technologists confirmed they understood how to properly use the laser welder. Evidence suggests that the laser was used on multiple occasions where interlocks were defeated to perform a seam weld on certain components. The technologist believed he performed seam weld operations in a safe manner even though interlocks were defeated. It was noted that the laser system cavity sensors were left in a defeated state for an unknown time prior to discovery during a lessons learned initiated inspection.

A3B3CO1 Knowledge Based Error / Attention was given to wrong issue: Technologists performed welding operations without regard to the clearly defined operating procedure, "OP for Baasel Lasertech (AB) StarWeld Performance Microwelders", in performing a continuous weld activity while defeating interlocks in a "safe" condition.

A4B2CO8 Resource Management. Means not provided for assuring adequate equipment quality: A technologist believed seam weld operations were performed in a safe manner even though interlocks were defeated. The technologist indicated that the team leader and others were aware of this situation and did not act on the need to fix the "problem". Hence, welding operations work was performed to meet project objectives while executing the work in what was believed to be a "safe mode" rather than raising the issue to line management.

23. Evaluation (by Facility Manager/Designee):

EOC #1114

UPDATE 5/20/09

Re-categorization (to SC3 from SC4) will better define the amount of rigor which is being applied to the Occurrence Report causal analysis and corrective actions.

END OF UPDATE

The corrective actions should abate further occurrences with the laser welder.

24. Is Further Evaluation Required?: No

25. Corrective Actions

(* = Date added/revised since final report was approved.)

- | | |
|----|--|
| 1. | Department 2500 - Hold a management review meeting with Power Sources staff to discuss issues and concerns in regards to critical work and expectations for rigor and compliance. (A3B2C02, A3B3C01) |
| | Target Completion Date: 05/26/2009 |
| | Completion Date: 05/26/2009 |

2.	Department 2548 - Evaluate modifying the rotary stage adjustment knob on the laser welder to bring the operator's arms inline with the laser when performing rotary welds; conduct an ES&H review of the modifications performed and update the Operating Procedure to reflect the modifications. (A1B4C01, A3B2C02, A3B3C01, A4B2C08)	Target Completion Date: 09/25/2009	Completion Date: 09/16/2009
3.	Department 2548 - Evaluate transforming the Power Sources Work Planning and Control Process to improve management's engagement in review of critical work. (A1B4C01, A3B2C02, A4B2C08)	Target Completion Date: 09/25/2009	Completion Date: 06/30/2009
4.	Department 2548 - Evaluate the Power Sources On-the-Job training program to meet elements of the Work Planning and Control Process. (A3B2C02, A3B3C01)	Target Completion Date: 09/25/2009	Completion Date: 08/14/2009
5.	Department 2548 - Revise the laser welder Operating Procedures and strengthen the information on interlocks, interlock functions, operator responsibilities and safety. (A1B4C01, A3B2C02, A3B3C01)	Target Completion Date: 09/25/2009	Completion Date: 06/09/2009
6.	Department 2548 - Develop a laser welder operations log book for laser use. The log book will require co-signature by the operators and Laser Safety Officer or manager to obtain the welder keys and to authorize using the welder. (A3B2C02, A3B3C01)	Target Completion Date: 08/03/2009	Completion Date: 06/09/2009

26. Lessons Learned:

Title:
Interlock Bypassed on Rofin Laser Welder

Lesson Learned Statement:
Unauthorized bypassing of interlocks is never recommended and can lead to safety and health issues and injuries.

Discussion of Activities:
On May 5, 2009, at 13:45, while following up on a lessons learned involving intentional bypassing of optical interlocks on a laser welder in Building 700/1054, members of the Center 2500 ES&H team inspecting similar welders in Building 894/132D Power Sources dry room discovered the same condition.

The laser is a Rofin Laser Welder with a Class IV laser located within the welder's chamber. The purpose of the interlock is to ensure that the operator's hands are positioned properly before allowing operation of the welder and to mitigate inadvertent exposure to the laser. During the inspection of the welder, the optical interlock was found to be intentionally covered with yellow sticky paper which would allow the laser to be operated without regard to the user's hand/arm position.

There were no injuries or exposure to the laser as a result of this occurrence.

Analysis:
Through simplified systemic factors analysis the following information was concluded.

-Design / Installation Verification LTA. Independent review of design / documentation LTA: Lack of planning and executing of an independent process / hazard analysis review of the laser operation would have identified technologist's concerns about the laser interlock tripping issues.

The laser weld system was modified to allow for the laser to be used for seam welding. Seam welding was accomplished by defeating the cavity interlocks which allowed arms/hands to manipulate the device within the laser cavity without shutting the laser system down. In this state of operation, laser light could not leave the system; however, interlocks were left in the defeated state after the laser weld was completed, creating a potentially unsafe condition for future users. An independent review of the continuous weld process would have identified the laser interlock issue, thus enabling a solution to properly use the laser weld system.

-Rule Based Error. Signs to stop were ignored and step performed incorrectly: Technologists performed the welding operation without regard to the clearly defined operating procedure, "OP for Baasel Lasertech StarWeld Performance Microwelders," interlock guidelines.

The laser welder operating procedure clearly identifies the safety interlocks and verification of their operation prior to any laser welding. All technologists were trained for performing laser welds in accordance with the operating procedure and associated work instructions. Interviews with the technologists confirmed they understood how to properly use the laser welder. Evidence suggests that the laser was used on multiple occasions where interlocks were defeated to perform a seam weld on certain components. A technologist believed he performed seam weld operations in a safe manner even though interlocks were defeated. It was noted that the laser system cavity sensors were left in a defeated state for an unknown time prior to discovery during a lessons learned initiated inspection.

-Knowledge Based Error / Attention was given to wrong issue: Technologists performed welding operations without regard to the clearly defined operating procedure, "OP for Baasel Lasertech (AB) StarWeld Performance Microwelders," in performing a continuous weld activity while defeating interlocks in a "safe" condition.

A technologist believed seam weld operations were performed in a safe manner even though interlocks were defeated. The tech indicated that the team leader and others were aware of this situation and did not act on the need to fix the "problem". Hence, the work was performed to meet project objectives while executing the work in what was believed to be a "safe mode" rather than raising the issue to line management.

Recommended Actions:

Hold a management and staff review meeting and discuss issues and concerns in regards to critical work and expectations for rigor and compliance.

-Modify the rotary stage adjustment knob on the laser welder to bring the operator's arms inline with the laser when performing rotary welds; conduct an ES&H review of the modifications performed and update the Operating Procedure to reflect the modifications.

-Evaluate transforming the Work Planning and Control Process to improve management's engagement in review of critical work.

-Evaluate the On-the-Job training process to meet elements of the Work Planning and Control process.

-Insure that Operating Procedures address information on interlocks, interlock functions, operator responsibilities and safety.

-Develop a laser welder operations log book. The log book will require co-signature by the operators and Laser Safety Officer or manager to obtain the welder keys and to authorize using the welder

27. Similar Occurrence Report Numbers:

NA--SS-SNL-2000-2009-0005

NA--SS-SNL-2000-2009-0006

28. User-defined Field #1:**29. User-defined Field #2:**

30. HQ Keyword(s):

01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
01F--Inadequate Conduct of Operations - Training Deficiency
01G--Inadequate Conduct of Operations - Inadequate Procedure
01N--Inadequate Conduct of Operations - Inadequate Job Planning (Other)
01Q--Inadequate Conduct of Operations - Personnel error
01R--Inadequate Conduct of Operations - Management issues
01T--Inadequate Conduct of Operations - Willful Violation
08C--OSHA Reportable/Industrial Hygiene - Industrial Hygiene Exposure
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
12B--EH Categories - Conduct of Operations
14B--Quality Assurance - Training and Qualification Deficiency
14C--Quality Assurance - Quality Improvement Deficiency
14D--Quality Assurance - Documents and Records Deficiency
14E--Quality Assurance - Work Process Deficiency

31. HQ Summary:

On May 5, 2009, while following up on a lessons learned involving intentional bypassing of optical interlocks on a laser welder in another Lab building, the same bypassed condition was discovered by workers on a Building 894 laser welder. The laser welder has a Class IV laser that is located within the welder's chamber. During the inspection of the laser welder, the optical interlock was found to be intentionally covered with yellow sticky paper. The purpose of the interlock is to ensure that the operator's hands are positioned properly before allowing operation of the welder and to prevent inadvertent laser exposure. There were no injuries or laser exposure as a result of this occurrence. Welding activities were stopped pending an investigation.

32. DOE Facility Representative Input:

33. DOE Program Manager Input:

34. Approvals:

Approved by: Mike D. Olbin, Facility Manager/Designee

Date: 06/17/2009

Telephone No.: (505) 845-9876

