

31 July, 2009

## MEMORANDUM

To: Division Safety Coordinators  
Division Liaisons  
All JHA Users

From: John Seabury  
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Subject: Job Hazard Analysis – Description of Work Rev 5  
Discussion, Requirements, Helpful Hints and Examples

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This memo updates and replaces a previous memo dated 5 May, 2009.

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- [Step-by-Step Instructions](http://www.lbl.gov/ehs/jha/jha_tutorials.shtml) ([http://www.lbl.gov/ehs/jha/jha\\_tutorials.shtml](http://www.lbl.gov/ehs/jha/jha_tutorials.shtml))

### **Discussion**

One of the major features about the required FY09 annual update to Work Group and Individual Job Hazards Analyses is the “Description of Work” that was added in October 2008. This memorandum serves to provide additional detail on the specifics required in the “Description of Work” in the JHA process, including some examples.

We anticipate that as the JHA program and tools undergo additional review in light of the recent HSS audit, some features and processes may change. However, it is not likely that fundamental change will come during the FY09 annual update cycle (ending 9/30/2009). ***The purpose of this guidance is to provide input as to where the JHAs should be now so that we can build upon these efforts in the future, and to provide examples.*** LBNL faces several contract compliance deadlines that require Descriptions of Work in the JHAs by the end of this fiscal year, September 30, 2009 so it is imperative that this be accomplished in a timely manner.

The elements of a Job Hazards Analysis parallel Integrated Safety Management:

- Define the Work (ISM Core Function #1)
- Analyze the Hazards (ISM Core Function #2)
- Determine the Controls (ISM Core Function #3)
- Perform the Work in accordance with the Controls (ISM Core Function #4)
- Review the Work and make improvements (ISM Core Function #5)

The Description of Work discussed here fits into Core Function 1 above. The balance of the JHA process fulfills Core Functions 2, 3 and 5.

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## Requirements

PUB-3000, Chapter 32, Section 32.c.1.a, provides the following:

*“The Description of Work statement is a critical element of the JHA. This statement describes the Work objectives, locations, materials used, processes employed, equipment used, and expected outputs. The Description statement is generally on the order of a few paragraphs in length, and is of sufficient detail that the tasks can be determined by a trained individual. The Description provides the basis for the further analysis of the tasks, hazards and controls: any Work performed and analyzed must be described in this statement.”*

There are five elements that must be included in the Description. The Description of Work and the Hazard Profile (the Tasks, Hazards and Controls) must be consistent with each other.

- **Work Summary** – provide a concise narrative summary of what the work entails, why it is being performed, and what you hope to accomplish with it. This statement defines the context for the further analysis.
- **Work Locations** – where is the work performed? Generally this is a building/room listing but can be broader if applicable (e.g., throughout the shop areas of B77; sitewide indoors, outdoors and on roofs). You can also break down the different materials and processes (see bullet below) by location if that makes sense.
- **Materials Used** – this description should be sufficiently detailed that the hazards associated with each material can be assessed. Where some members of a family of materials have unique hazards, then they should be specified (e.g., specify which types of acids are used, what are the typical compositions of welding rods employed, which hand or power tools are used, etc.)
- **Processes Employed** – the processes and techniques should be listed with sufficient detail that hazards and potential exposures of the work effort can be determined. For example, “Work with chemicals” is not specific enough, nor is “climb ladders” – neither provides enough detail to determine the hazards/exposures. Better would be “perform solvent-solvent extractions and acid-base titrations” and “climbs stepladders to reach and retrieve items up to 10 feet above the floor”. It may make sense to integrate the “Materials Used” and “Processes Employed” descriptions into one statement (e.g. “perform inert-gas arc welding on aluminum, mild carbon and stainless steels”).
- **Equipment Used** – be specific enough that hazards can be determined. Generally this means providing a list of each piece of equipment. Detail can be summarized (e.g., “vertical mill” is probably sufficient, manufacturer and model probably doesn’t add much to the description).

While the actual level of detail for each of these elements will vary depending upon the specific work described, all of the elements must be present and complete. *Descriptions of Work for Work Groups need to be updated by June 30, 2009 and for Individuals by September 30, 2009.*

## Helpful Hints

- It is critical that the Description of Work be consistent with the Hazards Profile (the Tasks, Hazards and Controls). The Description provides information on what the work encompasses, and the Hazards Profile describes the controls necessary to safely conduct that Work. If the Hazards Profile contains controls for tasks that are not included in the Description then there is an inconsistency that must be corrected. Similarly, if the Description implies hazards that are not adequately controlled, then that is also an inconsistency.
- Some who have developed Statements of Work have found that listing the five elements above in bullet form, and then completing them, is a helpful means of assuring that all points are covered.

Others have listed the general task statements found in the Hazards Profile and have discussed each of the five elements above (as applicable) for each task. There is no set format requirement; whatever system works best is the one you should use.

- If an element of work is covered in a formal authorization (e.g., RWA, BUA, AHD) then it is not necessary to duplicate the contents of that formal authorization in the Description of Work. Simply reference that authorization with a statement such as “Radioactive materials are used in Room XXX as described in RWA 1369” or similar. Be sure to include the components of that work that are NOT covered in the formal authorization, however.
- **Work Group Owners** develop and add the Descriptions of Work to their Work Groups. During the JHA review/reauthorization process (annual update cycle), **Individuals** review these Descriptions and supplement them, when necessary, with Individual Descriptions of Work in which they engage as an individual that is over and above the work described by the Work Group descriptions. **Work Leads** review the Descriptions of Work and change them to apply to the Individual.
  - To view the Descriptions of Work for assigned Work Groups, the **Individual** enters the JHA system, takes the JHA, and hovers the cursor over the name of the Work Group shown on the “Select your JHA Work Group” box.
  - If all the work is described in the Work Group descriptions, then the **Individual** enters “All work described by Work Groups above” in the Individual Description of Work box. If it isn’t, he/she enters a description of that work that is not described by the Work Groups.
  - It may be advantageous for an **Individual** to draft a Description of Work in a word processing program and review it with the **Work Lead** prior to cutting and pasting it into the JHA, as the JHA text editing tool is not very flexible.
- If the Descriptions of Work are not accurate, they can be (and are expected to be) modified by the **Work Lead** during his/her review of each individual’s JHA.
  - Updated Descriptions of Work from Work Groups ARE NOT automatically inherited by the Individual JHAs. They must be manually imported by the **Work Lead**, by clicking on the “Update Description of Work” buttons on the Individual’s JHA.
  - Any Description of Work (both Work Group and Individual) can be edited freely by the **Work Lead**, by clicking on the “Make Changes” buttons, making the changes to the text, then clicking on the “Save” button.

## Examples

The Descriptions of Work below, pulled from actual JHAs, provide examples of these expectations.

### 1. Description of Work (from a Work Group Hazards Profile)

*This JHA Work Group covers work in 70-158, 70-120, associated staff offices, and at the Advanced Light Source. Work at the ALS is further analyzed in the approved Experiment Summary Sheet for that experiment. Work at offsite locations (e.g., UCB campus, other US synchrotron labs) is analyzed by the safety systems in use at those facilities.*

*70-158 is a basic research laboratory specializing in the study of the geochemistry of naturally occurring nanoparticles. This research requires the synthesis of engineered nanoparticles that serve as analogs of natural materials, principally transition metal oxides and sulfides prepared and analyzed as suspensions in aqueous solutions.*

*Sample synthesis involves chemical handling, including the use of acids and bases. Oxygen-sensitive materials require handling in an anaerobic chamber under an inert (4% H<sub>2</sub> - N<sub>2</sub>) atmosphere maintained by compressed gas cylinders.*

*Sample analysis methods performed in this laboratory include dynamic light scattering (with enclosed laser), optical absorption spectroscopy and potentiometric titration. Additional sample analyses are performed at other locations at LBNL and on campus, and include x-ray diffraction, x-ray photoelectron spectroscopy, optical fluorescence spectroscopy and x-ray synchrotron methods performed at the Advanced Light Source.*

*In addition, computers are used for data analysis and manuscript preparation.*

**Analysis:** Overall, this is a pretty good Description of Work. Areas for improvement might be to describe 70-120 in the same level of detail that 70-158 is, and to provide more specifics on the exact chemical identities and concentrations of the acids and bases that are used.

- Work Summary - good
- Work Locations – apparently complete
- Materials Used – needs improvement
- Processes Employed – needs improvement
- Equipment Used – good

## 2. Description of Work (from a Work Group Hazards Profile)

*Working in laboratories 160 and 471 in Donner on basic research involving the determination of spatial 3D molecular organization of macromolecular machines in cells, tissues and microbial communities. Includes growing microbial cell cultures under aerobic and anaerobic conditions, labeling with a tag-specific reagent, followed by either chemical or cryo-fixation and subsequent workup for TEM, including water-organic solvent exchanges, resin infiltration and polymerization, sectioning and TEM analysis. Similarly, animals/tissues are fixed and subjected to TEM preparation. Chemicals handled include neutral salts, dilute acids and bases (below 0.1M) necessary to prepare buffers and nutrient media. Work also includes extensive computer work for research (3D volume reconstruction, inspection, visualization, and analysis), report, poster and presentation preparation and general communication.*

**Analysis:** Also a pretty good description. Could be improved by detailing more specifically the equipment used to grow the cell cultures or the cryo-fix. It is unclear whether the cryo-fixation requires the use of liquid cryogen or is performed by a machine. A more complete description of the use of animals (live? organs? tissues?) would also be helpful.

- Work Summary – good
- Work Locations – excellent
- Materials Used – needs improvement
- Processes Employed – needs improvement
- Equipment Used – needs improvement

## 3. Description of Work (from a Work Group Hazards Profile)

*Description of the Work that this Work Group performs and to which this analysis applies: There are three main tasks associated with this JHA. One is to make cables from superconducting wire. This requires that wire is re-spoiled from the manufactures spool onto special spools that are mounted on the cabling machine. Once the spools are on the machine the wire from the spools is run over pulleys, passed though guides and around brakes prior to entering the roller assemble that deforms the wire into a rectangular. For details of the cabling machine see AHD 123 (60 STRAND EXPERIMENTAL CABLING MACHINE).*

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*The second and third tasks requires the preparation of both metallographic samples to study the deformation of the strand due to cable and the measurement of critical properties of the wire that can change due to the cabling process. The critical current of the wire is measured at cryogenic temperatures between 4.2K and 77K.*

*General work objectives: There are two main objectives of this effort. One task is to take wire and fabricate rectangular cables that will be used in superconducting magnets. The other task is to characterize the cables, and the wire they are made from.*

*1. Work locations:*

*a. Bldg. 52 and Bldg. 46*

*2. Materials used*

*a. During cabling of wires:*

*i. Wires of Cu-Nb-Sn, Cu-Nb-Ti, Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8</sub>*

*ii. Wire lubricate: RichardsApex (V-4BR) vanishing oil (hydrotreated naphtha petroleum)*

*iii. Pb-Sn solder*

*iv. Palmitic acid*

*b. Materials used during critical current measurements*

*i. Liquid helium, liquid nitrogen,*

*ii. Pb-Sn solder, Bi-Sn, and silver solders*

*iii. Stycast epoxy and LV24 hardener*

*iv. Solvents to clean parts and samples: Acetone and ethanol*

*v. Formic acid to remove Stycast epoxy from materials*

*c. Metallographic sample preparation:*

*i. Epoxy mounting material, polishing paper, and polishing compounds.*

*3. Processes employed:*

*a. Cryogenic testing of materials*

*b. Use of mechanical equipment to process cable*

*4. Equipment used:*

*a. Cabling equipment:*

*i. Wire re-spooling bench, optical micrometer, lathe, roller housing (Turks head) to deform cable, roll grinder.*

*b. Critical current measurements:*

*i. 15T superconducting solenoid, two 1,000 A, 10V power supplies*

*ii. Sample mounting: soldering irons, hair driers,*

*c. Metallographic sample preparation:*

*i. Rotating dish polishing stations.*

*5. Expected outputs:*

*a. Rectangular (Rutherford style) cables from various wires.*

*b. Critical current data of superconducting wire.*

*c. Resistivity measurements of the Cu matrix of superconducting wire.*

*d. Photographs of cable and wire cross sections.*

**Analysis:** Although somewhat lengthy, this is a reasonably complete Description of Work. The description of “processes employed” is at too high of a level to adequately analyze the hazards and should have some additional detail provided . A description of what is meant by “cryogenic testing of materials” is necessary. Additionally, explanation of the steps by which “mechanical equipment” is used to wind cable would help to facilitate further analysis.

- Work Summary – excellent
- Work Locations – excellent
- Materials Used – excellent
- Processes Employed – needs improvement
- Equipment Used – excellent

4. Description of Work (from an Individual JHA)

*Using strong acids to prepare dilute solutions, digest samples, clean labware, and for other chemical reactions. The strong acids referred to here are the usual strong mineral acids, sulfuric, phosphoric, nitric, hydrochloric, hydrobromic, perchloric, and similar strong acids such as fluoboric, trifluoroacetic, triflic, and para-toluenesulfonic acids. This activity does not include either work with hydrofluoric acid or work with perchloric acid at temperatures above room temperature.*

**Analysis:** An excellent description of the work activities. The listing of materials included and excluded provides a good description of the “safety envelope” defining the further analysis. However this Description of work should include a listing of work locations.

- Work Summary – good
- Work Locations – needs improvement
- Materials Used – excellent
- Processes Employed – excellent
- Equipment Used – good

5. Description of Work (from an Individual JHA)

*All Work is described by the Work Groups above.*

**Analysis:** This is a perfectly acceptable Individual description provided that it reflects reality. However, in this specific example, the JHA showed that the individual has a Lockout-Tagout requirement at the individual level, which meant in fact that the work was ***not*** fully “... described by the Work Groups above”. The lesson here is, if additional hazardous tasks are added at the Individual level, then the Description of Work for the individual needs to support the additions.

- Work Summary – needs improvement
- Work Locations – needs improvement
- Materials Used – needs improvement
- Processes Employed – needs improvement
- Equipment Used – needs improvement

6. Description of Work (from an Individual JHA)

*Responsible for daily coordination of hazardous waste technician team for picking up waste and managing the waste at hazardous waste handling facility including waste pick up, inspection, sampling, packaging and shipment.*

**Analysis:** There is no discussion of work locations here – duties will differ depending upon whether the individual is at the Hazardous Waste Handling Facility or out in the field collecting waste. Also, the further analysis discusses a number of hazardous tasks (climbing ladders, working with engineered nanomaterials, driving forklifts among other), but there’s nothing in this description that

would logically point an analyst to those tasks. It definitely lays out the expected output via an expectation statement, but needs additional amplification.

- Work Summary - acceptable
- Work Locations – needs improvement
- Materials Used – needs improvement
- Processes Employed – needs improvement
- Equipment Used – needs improvement

JJS/jjs

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