Jeff Merrill

From: Chris Hagel
Sent: Monday, December 01, 2014 4:53 PM
To: Dan Moeller; Mike Amodeo; William Jemison
Cc: Jeff Merrill; Justin Cooley; Nathaniel Marquiss
Subject: JHA
Attachments: Metro - JHA #2 WCS.doc; Metro - JHA WCS.doc

Follow Up Flag: Follow up
Flag Status: Flagged

Team,

Attached are two Job Hazard Analysis. One is for removing the trash racks and the other is to install the boards. After completing both of them with Nathaniel and Justin we have come to the recommendation that we are in the need of some engineered solutions.

Our recommendations for this water control structure include:

1. Engineer the trash rack for automation. This will eliminate almost all the hazards in regards to installing and removing them from the structure. In the mean time, use a mobile crane.
2. Engineer-fall protection attachment points around the structure.
3. Purchase fall/climbing harnesses for staff
4. Reengineer the walking deck to cover lake side of the structure to allow access to the front where the boards can be removed and installed from above. This would prevent staff from frequently crawling down and inside the structure and reduce falling hazards.
5. Reengineer walking deck around fish latter to allow for manipulation of the boards from above.

As for continuing this process.... After conducting two of these it is clear that there are solutions to these safety issues. I think these solutions are very similar for the other tasks associated with this structure. We believe that these fixes would ultimately resolve the other issues with safety on the other tasks that we have not yet been done. For time sake we are not convince that proceeding with more JHA would gain us anything further on the Smith and Bybee structure. If we can all agree that these solutions would fix the problem we can move forward to engineer a final solution sooner than later.

As for the other structures we should look at them a little closer. I wouldn't mind doing a few JHA for those at Multnomah channel. They are different from Smith and Bybee in some ways but similar in others.

Thank you,

Chris Hagel
Lead Natural Resource Specialist

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Metro JOB HAZARD ANALYSIS

Installing boards in tide gate bays to hold water in the lake		
TITLE OF PERSON WHO DOES JOB:Natural Resource Tech	SUPERVISOR:Dan Moeller	ANALYSIS BY: Justin Cooley, Nathaniel Marquis, Chris Hagel
DIVISION/VENUE: Smith and Bybee water control structure	DEPARTMENT/LOCATION: Sustainability	REVIEWED BY:
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT: Hard Hat, High visibility vest, gloves, radios, fall harness, boots, and life vest.		

SEQUENCE OF BASIC JOB STEPS *Beware of being too detailed, record only the information needed to describe each job action. Rule of thumb, no more than 10 steps/task being evaluated*	POTENTIAL ACCIDENTS OR HAZARDS *HAZARD CLASSIFICATION CATEGORIES: Stuck By/Against, Caught In/Between, Slip, Trip, or Fall, Overexertion, Ergonomic (Awkward Postures, Excessive Force, Vibration, Repetitive Motion)*	RECOMMENDED SAFE JOB PROCEDURE *HAZARD CONTROL CATEGORIES: Engineer Out (New Way to Do, Change Physical Conditions or Work Procedures, Adjust/Modify/Replace Work Station Components/Tools, Decrease Performance Frequency), Personal Protective Equipment (PPE), Training, Improve Housekeeping*
1. Remove trash racks	1.a. To be analyzed under another JHA Trash racks must be removed for safety. If someone fell into the structure it prevents them from being trapped.	
2. Open catwalk access on the bay and chain catwalk to post to prevent it from falling.	2.a. Falling from catwalk into moving sometimes rushing water 2.b. Fingers getting smashed 2.c. Drowning	2.a.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 2.a.2. Engineered solution for; fall projection attachment points 2.a.3. Grate across entire surface so you can manipulate boards from grate from above. 2.a.4 Improved handrails. 2.b.1. Install handle on side of catwalk door. 2b.2. Grate across entire surface so you can manipulate boards from grate from above. 2.c.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 2.c.2. Engineered solution for; fall projection attachment points 2.c.3. Grate across entire surface so you can manipulate boards from grate from above. 2.c.3. Improved handrails.

3. This job takes two people-One person climbs down the rebar ladder and gets into position to receive boards.	3.a. Slipping and falling from ladder into water	3.a.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 3.a.2. Engineered solution for; fall projection attachment points 3.a.3. Grate across entire surface so you can manipulate boards from grate from above. 3.a.4. Improved handrails.
4. Second person on catwalk lowers boards to person on rebar ladder one board at a time.	4.a. Slipping and falling into rushing water 4.b. Catwalk falling on persons head 4.c. Boards falling on person in bay	4.a.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 4.a.2. Engineered solution for; fall projection attachment points 4.a.3. Grate across entire surface so you can manipulate boards from grate from above. 4.a.4. Improved handrails. 4.b.1 Replace chains 4.b.2 Grate across entire surface so you can manipulate boards from grate from above. 4.c.1. Grate across entire surface so you can manipulate boards from grate from above.

5. Person in bay installs boards into board slots	5.a Person in bay-Currently no fall protection, holding on with one hand and trying to put boards in slots. Falling into water. 5.b Moving water swinging boards around-twisting arm. 5.c Muscle strain from maneuvering heavy boards with 1 hand. 5.d Being struck by falling board or other objects	5.a.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 5.a.2. Engineered solution for; fall projection attachment points 5.a.3. Grate across entire surface so you can manipulate boards from grate from above. 5.a.4. Improved handrails. 5.b.1. Engineered solution for; fall projection attachment points 5.b.2 Grate across entire surface so you can Manipulate boards from grate from above. 5.c.1. Engineered solution for; fall projection attachment points 5.c.2 Grate across entire surface so you can Manipulate boards from grate from above. 5.a.1. Grate across entire surface so you can manipulate boards from grate from above.
6. Person in bay climbs out	6.a. Slips and falls into rushing water	6.a.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 6.a.2. Engineered solution for; fall projection attachment points 6.a.3. Grate across entire surface so you can manipulate boards from grate from above. 6.a.4 Improved handrails.
7. Close cat walk	7.a. Crushed fingers 7.b. Falling into rushing water.	7.a.1. Handle installed on grate. 7.a.2. Two people lower the catwalk door. 7.b.1. Wear fall protection or climbing harness-should keep you from going completely in the water. 7.b.2. Engineered solution for; fall projection attachment points 7.b.3. Grate across entire surface so you can manipulate boards from grate from above. 7.b.4 Improved handrails.

8. Install retaining hardware for boards	8.a. Access to hardware installation location has no catwalk - Falling into rushing water	8.a.1 Wear fall protection or climbing harness- should keep you from going completely in the water. 8.a.2. Engineered solution for; fall projection attachment points 8.a.3. Grate across entire surface so you can manipulate boards from grate from above. 8.a.4 Improved handrails.
9. Wash Hands	9.a. No hazard. Good to do anyways. Nasty water. Giardia.	

Recommendation discussion- Based on our job hazard analysis we have come to the conclusion that the structure needs to be outfitted with fall protection. Installing a grate across the entire structure would provide a safe working surface that would eliminate to need to enter the structure, reduce fall hazards and allow staff to install boards in an ergonomically correct manner.

Metro JOB HAZARD ANALYSIS

JOB TASK: Trash Rack Installation - Slough side		DATE:
TITLE OF PERSON WHO DOES JOB:Natural Resource Tech	SUPERVISOR:Dan Moeller	ANALYSIS BY: Justin Cooley, Nathaniel Marquis, Chris Hagel
DIVISION/VENUE: Smith and Bybee water control structure	DEPARTMENT/LOCATION: Sustainability	REVIEWED BY:
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT: Hard Hat, High visibility vest, gloves, radios, fall harness, boots, life vest.		

SEQUENCE OF BASIC JOB STEPS *Beware of being too detailed, record only the information needed to describe each job action. Rule of thumb, no more than 10 steps/task being evaluated*	POTENTIAL ACCIDENTS OR HAZARDS *HAZARD CLASSIFICATION CATEGORIES: Stuck By/Against, Caught In/Between, Slip, Trip, or Fall, Overexertion, Ergonomic (Awkward Postures, Excessive Force, Vibration, Repetitive Motion)*	RECOMMENDED SAFE JOB PROCEDURE *HAZARD CONTROL CATEGORIES: Engineer Out (New Way to Do, Change Physical Conditions or Work Procedures, Adjust/Modify/Replace Work Station Components/Tools, Decrease Performance Frequency), Personal Protective Equipment (PPE), Training, Improve Housekeeping*
1. Staging excavator and personnel to lift trash racks	1.a. Limited equipment operator visibility 1.b. Uneven terrain 1.c. Limited Communications due to equipment noise	1. a.1. Personnel to stand back out of way until equipment is in place. 1.a.2. Utilize a different piece of equipment. 1.a.3. Personnel to wear high vis outerwear 1.b.1.Use other equipment that doesn't need to move 1.b.2. Make sure road surface is graded and flat 1.c.1 Radio communications established between all personnel. 1.c.2. Hand signal training

2. Rig rack to excavator and attach tag lines	2.a. Finger or limb crushing hazards 2.b. Struck by rigging 2.c. Rigging capacity 2.d. inadequate attachment point on equipment for rigging 2.e. Being struck by excavator or crushed 2.f.Limited Communications due to equipment noise	2.a.1. Shut down equipment during rigging 2.b.1. Don't hook up rigging until equipment is in place and turned off. 2b.2. Personnel to stand back until equipment is in place. 2.c.1. Determine weight of rack, ensure appropriate rigging weight ratings. 2.c.2. Place label of weight on all racks 2.c.3. Training- Rigging/signal qualification program 2.d.1. Utilize equipment with appropriate attachment point. 2.e.1. Shut down equipment and don't start back up until personnel have cleared the area after rigging. 2.f.1. Radio communications established between all personnel. 2.f.2. Hand signal training

3. Lift and move rack to bay	3.a.Equipement at or beyond capacity 3.b.Crush hazard from falling or swinging rack 3.c. Tagline tending-uneven terrain tripping, snared in line 3.d. Unstable load movement during travel 3.e. Limited equipment operator visibility 3.f. Uneven walking terrain 3.g. Tipping hazard for equipment Limited Communications due to equipment noise	3.a.1. Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.a.2. Utilize remote crane lift 3.b.1 Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.c.1. Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.d.1. Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.d.2. Utilize remote crane lift 3.e.1. Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.e.2. Utilize remote crane lift 3.e.3. Radio Communication between all personnel 3.e.4. Know operator blind spots- identify safety zones for transport. 3.f.1. Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.f.2. Utilize remote crane lift 3.f.3. Working surface engineering solution-making it flat. 3.g.1 Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 3.g.2. Utilize remote crane lift 3.g.3. Working surface engineering solution-making it flat.

4. Get equipment and rack into position, slip into rack receiver, and lower.	4.a. Limited equipment operator visibility 4.b. Tipping hazard for equipment 4.c. Equipment at or beyond capacity 4.d. Crush hazard from falling or swinging rack 4.e Tagline tending-uneven terrain tripping, snared in line 4.f Finger or limb crushing hazards 4.g Falling into water hazard-hanging on or outside of rail 4.h. Accidently struck by moving equipment 4.i. Limited Communications due to equipment noise 4.j. Limited lift ability of equipement-often hits safety rails	4.a.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.a.2. Utilize a different piece of equipment. 4.a.3. Personnel to wear high vis outerwear 4.b.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.b.2 Overhead crane would eliminate equipment travel. 4.c.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.c.2 Overhead crane would eliminate equipment travel 4.d.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.d.2 Overhead crane would eliminate equipment travel. 4.e.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.e.2 Working surface engineering solution-making it flat. 4.f.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.f.2 Overhead crane would reduce this hazard 4.g.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5. 4.g.2 Personnel to wear fall protection harness hooked to engineered attachment point. 4.h.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.h.2. Overhead crane would eliminate equipment travel. 4.i.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.i.2 Radio communications established between all personnel. 4.i.3 Hand signal training 4.j.1 To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 4.j.2. Overhead crane would reduce this hazard

5. Unhook rigging and tagline	5.a Finger or limb crushing hazards 5.b Falling into water hazard-hanging on or outside of rail 5.c Accidently struck by equipment 5.d Struck by rigging 5.e Limited Communications due to equipment noise	5.a.1. Shut down equipment while removing rigging 5.b.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 5.b.2. Fall prevention harness with engineered attachment point 5.c.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 5.d.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 5.e.1. To eliminate hazard- Engineer overhead hoist system to eliminate steps 1,2,3,4,and 5 5.e.2 Radio communications established between all personnel. 5.e.3 Hand signal training
Recommendation discussion- Based on our job hazard analysis we have come to the conclusion that the crane operation is a good interim solution to the job hazards present at this time. Our recommended long term solution is an engineered overhead hoist system that will eliminate most if not all hazards in steps 1,2,3,4,and 5.		

WHERE TO PERFORM A JHA:
At the workplace, where the job is performed is the best place to perform a JHA. By doing the JHA on-site, no steps will be overlooked, and the workplace conditions (lighting, noise, layout, etc.) can be assessed. Recommendations for changes may be more readily implemented, as well. If possible, the team should watch the job being performed so they can understand the sequence of steps and the significance of each step (what is done, in what order, and why).

JHAs can be more limited in scope, as well, and jobs can be reviewed verbally. This is usually done only when the job cannot be performed first, it is not a "routine" job, if it is one part of a larger job sequence, or the workplace conditions are not conducive to observing the job (i.e. dark area, or small workspace).

JHAs can also be performed using video surveillance. By using video, there can be better visibility for team members and the task can be viewed many times, slowed down, or even paused for analyzing hazards. However, employees are frequently uncomfortable being videotaped and the video tape is only from one angle, so some hazards may be overlooked.

CONDUCTING THE JHA:
List the Basic Job Steps
Nearly every job can be broken down into steps. Each step should be observed by the JHA team. The steps should be discussed, so that everyone understands them, and the reasons the steps are included. The steps should be listed in order of performance. (The JHA form at the end of this module can be used for this, or another form of your choosing.) Action words should be used to describe the steps and they should be numbered sequentially.

Below is an example of making coffee using a drip brew machine. Each of the steps is recorded. There are typically between 3 and 12 steps in a JHA. If there are fewer, then the scope of the JHA is too broad and some hazards may be overlooked. If there are more than 12 steps then the JHA is too detailed, and the JHA team may get "bogged down" with more detail than they need. For example, in the example below, step 1 could be further broken down into 1) walk to the sink 2) Place carafe under faucet, 3) Turn cold water tap on ¼ turn.... That is too detailed and can be simply stated with "Fill carafe with water to the 10 cup line.

Basic Job Steps:

1. Fill carafe with water to the 10 cup line
2. Pour water into coffee maker reservoir
3. Place carafe under drip spout
4. Place a single filter in drip basket
5. Measure 10 tablespoons of coffee and place into filter
6. Place filter basket into coffee maker slot
7. Turn coffee maker ON

Determine the Potential Hazards:
Hazards are then determined by asking questions such as:

1. Can the operator receive a strain or sprain due to bending, twisting, lifting while performing any of the steps?
2. Can the operator receive a crushing injury to do be caught in, on or between equipment?
3. Can they receive a burn or irritation due to contact with chemicals, heat, or other physical or biological hazards?
4. Could a chemical or material release occur?

List The Existing and Potential Hazards:
In column 2 of the form, the existing a potential hazards of each step are listed. Each step was previously numbered and any identified hazards or potential hazards take a letter that corresponds to the process step. All hazards should be listed, even when they are repetitive from previous steps. All steps should be accounted for, even if there are no hazards associated with them (in such cases, "No Hazard Identified" can be listed).

Existing and Potential Hazards

1a) Laceration from sharp edge if dropped/broken
2a) Laceration from sharp edge if dropped/broken
2b) Slip from water spilled on floor
3a) Laceration from sharp edge if dropped/broken
3b) Burn/scald from coffee if brewing is started prematurely
4a) No hazards identified
5a) Laceration from coffee can (if can is used)
6a) Burn/scald from coffee if brewing is started prematurely
7a) Potential shock if coffee maker is faulty

Make Recommendations to Reduce/Eliminate or Control Hazards
Where possible, eliminate the hazard, or substitute a non-hazardous material or condition that will achieve quality results. Where hazards can not be eliminated, provide engineering controls (barriers, interlocks, tools, etc.) that can reduce or eliminate hazardous conditions. Administrative control (procedures, training, limit the exposure time, etc) should be applied to the task where elimination and engineering are not feasible. When all the previous controls can not provide hazard reduction, personal protective equipment (PPE) should be considered (i.e., gloves, respirators, specialized clothing, etc.). PPE should be the last control considered. Remember that PPE frequently requires specialized training, cleaning, or maintenance, and records may need to be kept.

Make recommendations for every hazard identified, beginning with the first hazard listed. You can make several recommendations for one hazard, bearing in mind that one or more may not be feasible, cost effective or timely. Number each recommendation in accordance with its hazard (i.e. 1a1, 1a2, 1a3, 2a1, 2a2, etc.).

Recommendations should be specific (what type of gloves, what specific material will be substituted, etc.). Existing controls may already control or eliminate some hazards, be sure to list these, so they do not get changed and make the hazardous situation worse. Where needed, consider that some regulations require specific types of controls to be put in place, and if they are prescribed they may not be the most feasible or economical to implement.

Recommended Corrective Measures:

1a1) Use piped in water delivery system
1a2) Use unbreakable or break resistant carafe
1a3) Use non-slip, cut proof gloves
2a1) Use piped in water delivery system
2a2) Use unbreakable or break resistant carafe
2a3) Use non-slip, cut proof gloves
2b1) Use piped in water delivery system
2b2) Place non-skid mats on the floor
2b3) Relocate coffee pot to area next to sink
3a1) Use piped in water delivery system
3a2) Use unbreakable or break resistant carafe
3a3) Use non-slip, cut proof gloves ....
3b1) Written procedure to assure coffee pot is unplugged or in OFF position
3b2) Interlock coffee pot so that brewing can not start without carafe in place
4a1) No corrective action
5a1) Use pre-ground coffee from bags rather than cans
5a2) Wear protective gloves when scooping coffee from can
5a3) Transpose canned coffee into sealable plastic container
6a1) Written procedure to assure coffee pot is unplugged or in OFF position
6a2) Interlock coffee pot so that brewing can not start without carafe in place
6b1) Have coffee pot inspected frequently for faulty wiring

The following is the completed JHA form for the "Making Coffee with a Drip Brew Maker" task.

JOB HAZARD ANALYSIS FORM

Job or Task being evaluated: ___Making Coffee with a Drip Brew Maker_____
Date of evaluation: __06/14/2004___ Page # _1__ of _1__
JHA Team participants: _Joe Cuppa, I.M. DeBoss

Steps	Potential or Existing Hazards	Corrective Action Recommendations
1) Fill carafe with water to the 10 cup line	1a) Laceration from sharp edge if dropped/broken	1a1) Use piped in water delivery system
		1a2) Use unbreakable or break resistant carafe
		1a3) Use non-slip, cut proof gloves
2) Pour water into coffee maker reservoir	2a) Laceration from sharp edge if dropped/broken	2a1) Use piped in water delivery system
		2a2) Use unbreakable or break resistant carafe
		2a3) Use non-slip, cut proof gloves
	2b) Slip from water spilled on floor	2b1) Use piped in water delivery system
		2b2) Place non-skid mats on the floor
		2b3) Relocate coffee pot to area next to sink
3) Place carafe under drip spout	3a) Laceration from sharp edge if dropped/broken	3a1) Use piped in water delivery system
		3a2) Use unbreakable or break resistant carafe
		3a3) Use non-slip, cut proof gloves ....
	3b) Burn/scald from coffee if brewing is started prematurely	3b1) Written procedure to assure coffee pot is unplugged or in OFF position
		3b2) Interlock coffee pot so that brewing can not start without carafe in place
4) Place a single filter in drip basket	4a) No hazards identified	4a1) No corrective action
5) Measure 10 tablespoons of coffee and place into filter	5a) Laceration from coffee can (if can is used)	5a1) Use pre-ground coffee from bags rather than cans
		5a2) Wear protective gloves when scooping coffee from can
		5a3) Transpose canned coffee into sealable plastic container
6) Place filter basket into coffee maker slot	6a) Burn/scald from coffee if brewing is started prematurely	6a1) Written procedure to assure coffee pot is unplugged or in OFF position
		6a2) Interlock coffee pot so that brewing can not start without carafe in place
7) Turn coffee maker ON	7a) Potential shock if coffee maker is faulty	7a1) Have coffee pot inspected frequently for faulty wiring

Metro JOB HAZARD ANALYSIS

JOB TASK:		DATE:
TITLE OF PERSON WHO DOES JOB:	SUPERVISOR:	ANALYSIS BY:
DIVISION/VENUE:	DEPARTMENT/LOCATION:	REVIEWED BY:
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:		

SEQUENCE OF BASIC JOB STEPS *Beware of being too detailed, record only the information needed to describe each job action. Rule of thumb, no more than 10 steps/task being evaluated*	POTENTIAL ACCIDENTS OR HAZARDS *HAZARD CLASSIFICATION CATEGORIES: Stuck By/Against, Caught In/Between, Slip, Trip, or Fall, Overexertion, Ergonomic (Awkward Postures, Excessive Force, Vibration, Repetitive Motion)*	RECOMMENDED SAFE JOB PROCEDURE *HAZARD CONTROL CATEGORIES: Engineer Out (New Way to Do, Change Physical Conditions or Work Procedures, Adjust/Modify/Replace Work Station Components/Tools, Decrease Performance Frequency), Personal Protective Equipment (PPE), Training, Improve Housekeeping*