



PROJECT SPECIFIC HEALTH AND SAFETY PLAN (HASP)

FOR

TUTU WELLS SUPERFUND SITE
EPA WORK ASSIGNMENT NUMBER: 031-RICO-021D
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ST. THOMAS, U.S. VIRGIN ISLANDS

Effective Dates:

SEPTEMBER 2015 THROUGH FEBRUARY 2019



HDR ENGINEERING
ONE INTERNATIONAL BOULEVARD
10TH FLOOR SUITE 1000
MAHWAH, NEW JERSEY 07495

PROJECT NUMBER
147-254794

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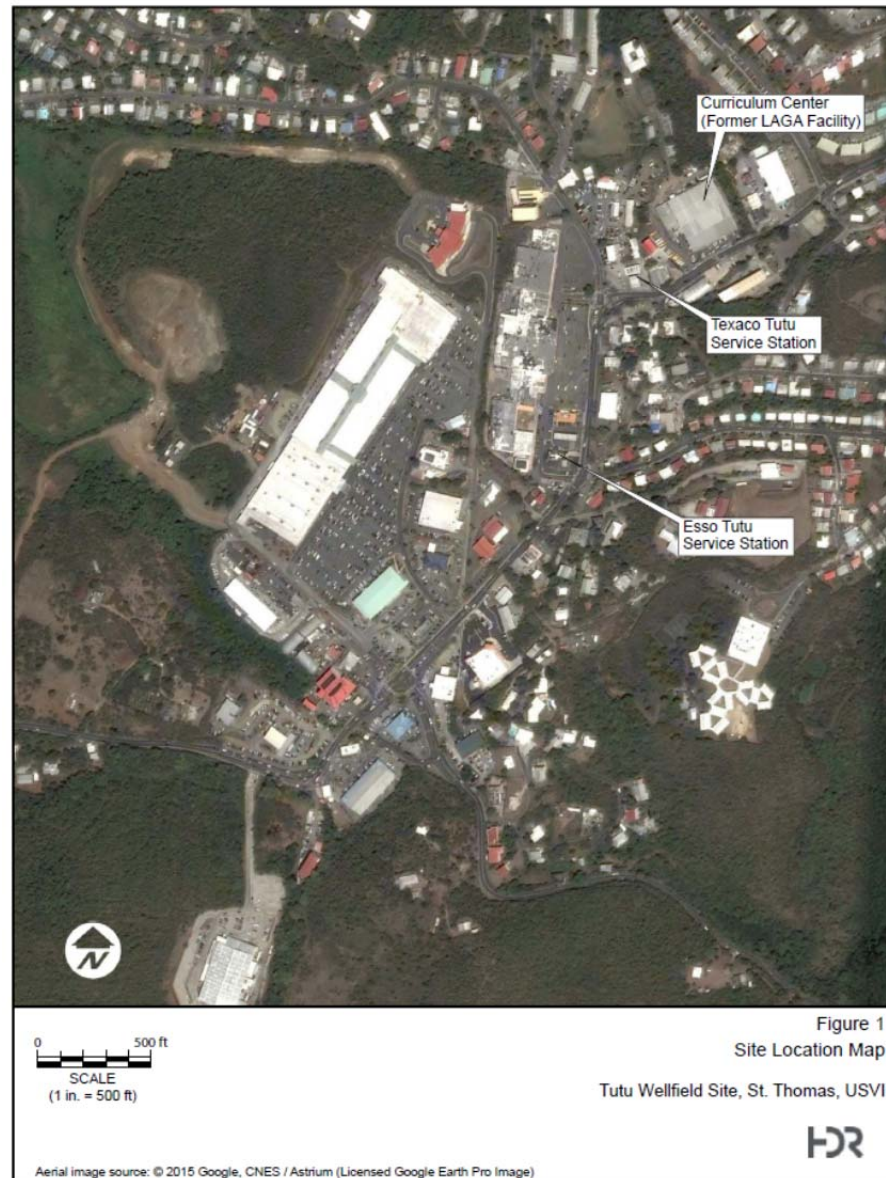
- Appendix A: Incident Report Form
- Appendix B: Deviations and Additions Form
- Appendix C: Visitors Log

List of Attachments

- Slip, Trip, and Fall Prevention (HDR H&S Procedure #3)
- Hazard Communication (HDR H&S Procedure #6)
- Traffic Safety (HDR H&S Procedure #17)
- Personal Protective Equipment (HDR H&S Procedure #21)
- Noise (HDR H&S Procedure #26)
- Portable Fire Extinguishers (HDR H&S Procedure #27)
- Heat Stress (HDR H&S Procedure #28)
- First Aid and CPR (HDR H&S Procedure #30)
- Biological Hazards (HDR H&S Procedure #34)
- Drill Rig Safety (HDR H&S Procedure #37)
- Additional procedures to be added as necessary



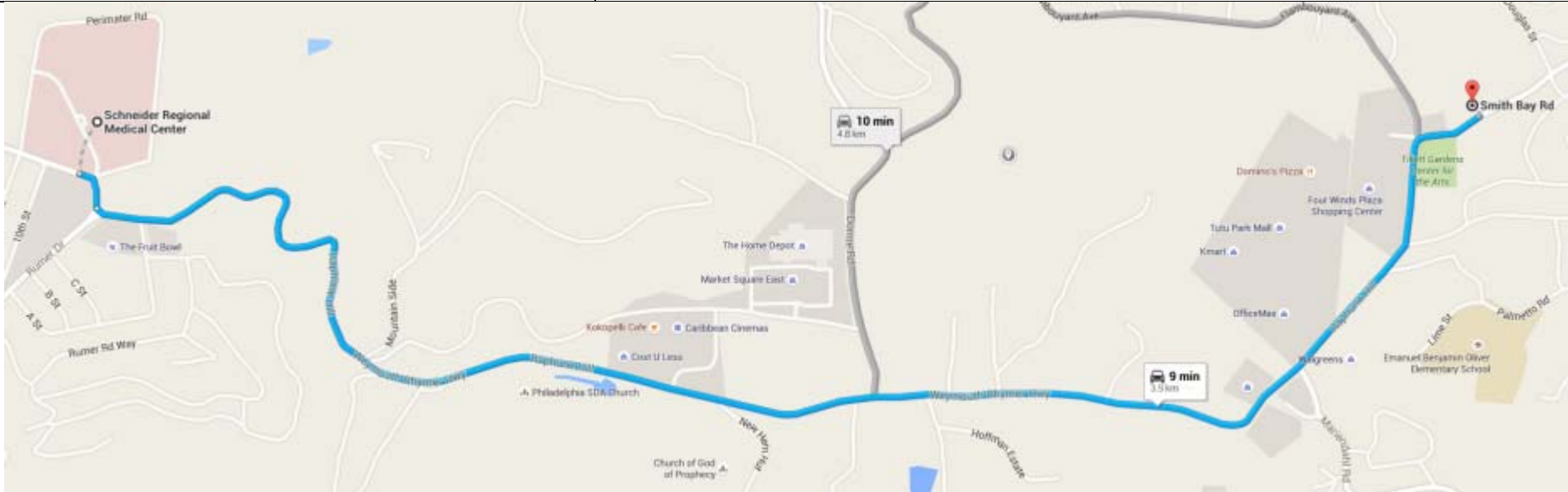
SITE SPECIFIC HEALTH AND SAFETY PLAN			TITLE PAGE
PROJECT NAME	TUTU WELLS SUPERFUND SITE FSRI/FS	PROJECT COMPANY	HDR ENGINEERING
SITE ADDRESS	VARIOUS SAMPLING LOCATION IN THE ANNA’S RETREAT SECTION, ST. THOMAS, UNITED STATES VIRGIN ISLANDS	JOB NUMBER	147-254794
PROJECT MANAGER	DEMETRIOS KLERIDES (HDR)	PHONE NUMBER	1-212-542-6012
SITE CONTACT(S)	CAROLINE KWAN (USEPA)	PHONE NUMBER:	1-212-637-4275
NOTE:			
☐ AMENDMENT NO. _____ TO EXISTING APPROVED HASP – DATE EXISTING APPROVED HASP _____			
OBJECTIVES OF FIELD WORK:		SITE TYPE (CHECK ALL THAT APPLY)	
Preliminary Investigation Objectives: To characterize conditions at the source area. Objectives: Further characterize the source area using focused field investigations to describe the groundwater plume and aquifer, investigate potential contamination sources, close any remaining data gaps, refine the conceptual site model (CSM), complete risk assessments and prepare focused RI/FS reports.		☒ ACTIVE☐ LANDFILL☐ NATURAL ☒ INACTIVE☐ UNCONTROLLED☐ MILITARY ☐ SECURE☒ INDUSTRIAL☐ OTHER (SPECIFY) ☒ UNSECURED☐ RESIDENTIAL ☐ ENCLOSED SPACE☐ WELL FIELD	
SITE DESCRIPTION <i>Summarize below. Include principal operations and unusual features (i.e. containers, buildings, dikes, power lines, hills/slopes, rivers, etc...)</i> The Tutu Wellfield site is located on the eastern end of St. Thomas, U.S. Virgin Islands (USVI), in the Anna’s Retreat section. The site is situated within the upper Turpentine Run surface drainage basin. This basin, which covers approximately 2.3 square miles, trends roughly north-south and is bounded by the steep slopes of the surrounding hills. During the investigation, the field work will consist of water level monitoring, surface geophysical surveys, borehole drilling/coring, monitoring well installations, borehole geophysics, packer testing, and groundwater sampling to determine the nature and extent of groundwater contamination at the source area and to support the preparation of a focused RI and a FS.			
SURROUNDING POPULATION: ☒ RESIDENTIAL ☒ INDUSTRIAL ☐ RURAL ☒ URBAN ☒ COMMERCIAL ☐ OTHER:			

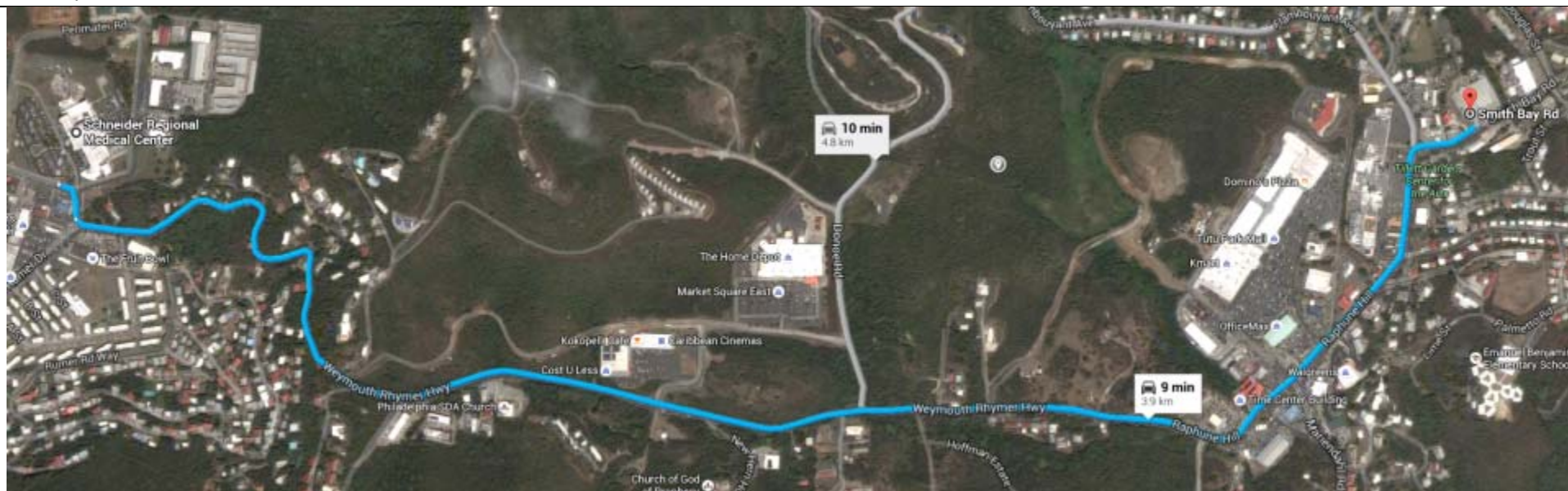




SITE SPECIFIC HEALTH AND SAFETY PLAN			EMERGENCY CONTACTS & APPROVAL		
EMERGENCY CONTACTS					
TITLE	NAME	PHONE	TITLE	NAME	PHONE
EPA Region II	Caroline Kwan	(212) 637-4275	HDR Project Manager	Demetrios Klerides	1-212-542-6012 (Cell)
State EPA Office	Region II, 290 Broadway, NYC	(212) 637-3000	Office Safety Coordinator	Ed Armendariz	402-548-5045 (Direct)
National Poison Control Ctr.	N/A	1-800-222-1222	Site Health & Safety Officer	Christoph Stannik	1-484-325-1937 (Cell)
Work Care (Occupational H&S)	Shelia Nghe	1-714-978-7488 x243	Fire Departments		911
National Response Center	USEPA/US Coast Guard	1-800-424-8802	Police Departments		911
			Emergency Medical Services	Schneider Regional Medical Center	911 or 1-340-776-8311
OTHER INFORMATION			HOSPITAL CONTACT INFORMATION		
1. Evacuation routes will be specified by the Site Health & Safety Officer (HSO) and communicated to all personnel on Site. 2. Personnel will evacuate under conditions as specified by air monitoring requirements or as directed by the HSO. 3. An INCIDENT REPORT form shall be completed for ALL ACCIDENTS (see Appendix A) including any near miss incidents.			NEAREST HOSPITAL EMERGENCY DEPARTMENT PHONE NUMBER:	Schneider Regional Medical Center 9048 Sugar Estate, St. Thomas, VI, USA, 00802 Main: (340) 776-8311	
			24-HOUR EMERGENCY SERVICES NUMBER:	911	
QA REVIEW: <u>John M. Guezinich</u> DATE: <u>9/30/15</u> HDR OFFICE SAFETY COORDINATOR					
HEALTH AND SAFETY PLAN APPROVALS			Route to Hospital is described with a map on the following page		
PROJECT MANAGER: <u>Demetrios Klerides</u> DATE: 9/30/15					
SITE HEALTH & SAFETY OFFICER: <u>John M. Guezinich</u> DATE: 9/30/15					



SITE SPECIFIC HEALTH AND SAFETY PLAN		PRIMARY HOSPITAL ROUTE
ADDRESS		MAP TO HOSPITAL
<u>Nearest Hospital:</u> Schneider Regional Medical Center Schneider Regional Medical Center 9048 Sugar Estate, St. Thomas, VI, USA, 00802		Shown below.
E.D. PHONE:	(340) 776-8311	
ROUTE		
<u>Directions to Schneider Regional Medical Center from the site:</u> 1. Head southwest on Smith Bay Rd/Rte 38 toward Fisher St/Flambouyant Ave/Rte 384 (3.7 km) 2. Turn right to stay on Rte 38 (85m) 3. Hospital is on right. Follow signs to the Emergency Department. Directions to hospital acquired from http://maps.google.com/ on 8/27/2015.		
		



TRAFFIC SAFETY

Important Note:

In the Virgin Islands, they drive on the left side of the road; however, most vehicles in the USVI are from the US and have the steering wheel on the left side of the car. Nearly ALL of the roads in the USVI are two-lane, very narrow roads with little or no shoulder areas and few guardrails even in hilly areas. It is often very difficult to pass a vehicle safely in the USVI (especially since you are driving on the left side with the steering wheel on the left side of the car. Follow all traffic safety laws on the Island when driving.



SITE SPECIFIC HEALTH AND SAFETY PLAN		HISTORY AND WASTE CHARACTERIZATION														
HISTORY: The northern CVOC plume, which originates at the Curriculum Center, was identified in the 1995 RI to extend approximately 1,600 feet south, in the direction of the groundwater flow, to a point just southeast of Four Winds Plaza, and was estimated to be 500 feet wide. The highest concentrations of total CVOCs occurred in shallow zone monitoring wells near the source, where CVOC concentrations greater than 1,000 microgram/liter (ug/l) were detected. Concentrations of VOCs in the northern part of the northern plume had not decreased with time, nor had the shape or general extent of VOC contamination changed in this area. This pattern suggested the presence of a continuing source of VOCs to groundwater in the vicinity of the Curriculum Center. Deeper groundwater zones (> 150 feet below ground surface (bgs)) at the Curriculum Center were not investigated during the RI. The principal CVOCs detected in the northern plume were cis-1,2- dichloroethene (DCE), PCE, and trichloroethene (TCE). Vinyl chloride was also detected at high concentrations in the northern plume, but its detection was restricted to the immediate vicinity of the Curriculum Center. The maximum concentrations detected in the northern plume during the RI were DCE at 2,100 ug/l, vinyl chloride at 1,300 ug/l, PCE at 360 ug/l and TCE at 78 ug/l, all of which exceeded their respective MCLs.																
WASTE TYPES: ☒ LIQUID ☐ SOLID ☐ GAS ☐ UNKNOWN ☒ OTHER: Drill cuttings (soil and bedrock) and groundwater from well installation, rock coring, and sampling.																
WASTE CHARACTERISTICS (CHECK ALL THAT APPLY): <table><tr><td>☐ Corrosive</td><td>☐ Flammable</td><td>☐ Radioactive</td></tr><tr><td>☐ Toxic</td><td>☒ Volatile</td><td>☐ Reactive</td></tr><tr><td>☐ Inert Gas</td><td>☐ Unknown</td><td>☐ Other:</td></tr></table>		☐ Corrosive	☐ Flammable	☐ Radioactive	☐ Toxic	☒ Volatile	☐ Reactive	☐ Inert Gas	☐ Unknown	☐ Other:	WORK ZONES (Describe how the exclusion, contamination reduction, and support zones will be delineated in terms that on-site personnel will recognize. Depict on Work Zone Map Page) Work zones will be delineated by traffic safety cones and/or additional safety devices (e.g., caution tape) as determined by the Site HSO. Because several work zones with different types of work will be set up over time (soil & groundwater sampling, well installation/testing, etc.), a standard work area with representative zones cannot be depicted.					
☐ Corrosive	☐ Flammable	☐ Radioactive														
☐ Toxic	☒ Volatile	☐ Reactive														
☐ Inert Gas	☐ Unknown	☐ Other:														
HAZARDS OF CONCERN (Check all that apply): <table><tr><td>☒ Heat Stress (H&S Proc. #28)</td><td>☒ Noise (H&S Proc. #26)</td></tr><tr><td>☐ Cold Stress (H&S Proc. #29)</td><td>☐ Inorganic Chemicals</td></tr><tr><td>☐ Explosives/Flammables</td><td>☒ Organic Chemicals</td></tr><tr><td>☐ Oxygen Deficient Atmospheres</td><td>☒ Motorized Traffic</td></tr><tr><td>☐ Radiological Hazards</td><td>☒ Heavy Machinery</td></tr><tr><td>☒ Biological Hazards (H&S Proc. #34)</td><td>☒ Slips/Trips/Falls (H&S Proc. #3)</td></tr><tr><td colspan="2">☐ Other: <u>CONFINED SPACES WILL NOT BE ENTERED!</u> If confined spaces are to be entered, a specific confined space entry plan will be developed and implemented in accordance with HDR H&S Policies.</td></tr></table>		☒ Heat Stress (H&S Proc. #28)	☒ Noise (H&S Proc. #26)	☐ Cold Stress (H&S Proc. #29)	☐ Inorganic Chemicals	☐ Explosives/Flammables	☒ Organic Chemicals	☐ Oxygen Deficient Atmospheres	☒ Motorized Traffic	☐ Radiological Hazards	☒ Heavy Machinery	☒ Biological Hazards (H&S Proc. #34)	☒ Slips/Trips/Falls (H&S Proc. #3)	☐ Other: <u>CONFINED SPACES WILL NOT BE ENTERED!</u> If confined spaces are to be entered, a specific confined space entry plan will be developed and implemented in accordance with HDR H&S Policies.		PRINCIPAL DISPOSAL METHODS AND PRACTICES (Summarize site specific procedures below): - Investigation-derived waste (IDW) (monitoring well development and purge water, residual drilling fluids, decontamination fluids consisting of wash/rinse water and decontamination chemicals, soil cuttings, and contaminated debris, PPE, plastic sheeting and consumable sampling equipment) will be containerized (drummed) and analyzed for proper off-site disposal. - Non-Hazardous solid wastes (not IDW) will be disposed of through a disposal service to be arranged by HDR.
☒ Heat Stress (H&S Proc. #28)	☒ Noise (H&S Proc. #26)															
☐ Cold Stress (H&S Proc. #29)	☐ Inorganic Chemicals															
☐ Explosives/Flammables	☒ Organic Chemicals															
☐ Oxygen Deficient Atmospheres	☒ Motorized Traffic															
☐ Radiological Hazards	☒ Heavy Machinery															
☒ Biological Hazards (H&S Proc. #34)	☒ Slips/Trips/Falls (H&S Proc. #3)															
☐ Other: <u>CONFINED SPACES WILL NOT BE ENTERED!</u> If confined spaces are to be entered, a specific confined space entry plan will be developed and implemented in accordance with HDR H&S Policies.																

**HAZARDOUS MATERIAL SUMMARY****SITE SPECIFIC HEALTH AND SAFETY PLAN**

HAZARDOUS MATERIAL SUMMARY (Check all that apply and estimate quantify by category if possible):

CHEMICALS	SOLIDS	SOLVENTS	OILS	MISCELLANEOUS	SLUDGES
AMOUNT:	AMOUNT:	AMOUNT: Unknown	AMOUNT:	AMOUNT:	AMOUNT:
☐ Acids ☐ Pickling Liquors ☐ Caustics ☐ Pesticides ☐ Dyes/Inks ☐ Cyanides ☐ Phenols ☐ Halogens ☐ Dioxins ☐ Other:	☐ Fly ash ☐ Asbestos ☐ Millings/ Mine Tailings ☐ Ferrous Smelter ☐ Non-Ferrous Smelter ☐ Metals ☐ Other:	☒ <u>Chlorinated Solvents</u> ☐ Hydrocarbons ☐ Alcohols ☐ Ketones ☐ Esters ☐ Ethers ☐ Other:	☐ Oily Wastes ☐ Gasoline ☐ Diesel Fuel/Oil ☐ Lubricants ☐ PCBs ☐ PAHs ☐ Other:	☐ Laboratory Wastes ☐ Pharmaceuticals ☐ Hospital Waste ☐ Radiological Waste ☐ Municipal Waste ☐ Construction Debris ☐ Munitions ☐ Other:	☐ Paint ☐ Pigments ☐ Metal Sludges ☐ POTW Sludges ☐ Aluminum ☐ Distillation Bottoms ☐ Other:
OVERALL HAZARD EVALUATION:	☐ HIGH ☐ MEDIUM ☒ LOW (groundwater& soil)	☐ UNKNOWN (soil) (For tasks where the hazards are different, evaluate each one)			
JUSTIFICATION:	Limited exposure to contaminated media. Field crew will wear personal protective equipment (PPE) as outlined in this HASP.				
FIRE/EXPLOSION HAZARD:	☐ HIGH ☐ MEDIUM ☒ LOW ☐ UNKNOWN				
BACKGROUND REVIEW:	☒ COMPLETED ☐ INCOMPLETE HDR is continuing to review information for potential source areas.				



SITE SPECIFIC HEALTH AND SAFETY PLAN					CHEMICAL HAZARD TABLE				
CONTAMINANT	HIGHEST OBSERVED CONCENTRATION (Specify units and matrix)	OSHA PEL / ACGIH TLV	IDLH	SYMPTOMS/ EFFECTS OF ACUTE EXPOSURE	PHYSICAL PROPERTIES				
Cis-1,2-Dichloroethylene (DCE) CAS:	2,100 ug/L (ppb) in GW	PEL: 200 ppm TLV: 200 ppm	1,000 ppm	Irritation to eyes, respiratory system, and central nervous system depression.	Colorless liquid, usually a mix of the cis- and trans- isomers, with a slightly acrid, chloroform-like odor.				
					IP: 9.65 eV	Fl.P: 36 – 39°F			
					LEL: 5.6%	UEL: 12.8%			
					VP: 180-265 mmHg				
Vinyl chloride CAS: 75-01-4	1,300 ug/L (ppb) in GW	PEL: 1 ppm TLV: 1 ppm	Ca ND-	Weakness, exhaustion, Abdominal pain, Gastrointestinal bleeding	Colorless liquid with a pleasant odor at high concentrations				
					IP: 9.99 eV	Fl.P: NA			
					LEL: 3.6%	UEL: 33.0%			
					VP: 3.3 atm				
Tetrachloroethylene (PCE) CAS: 127-18-4	360 ug/L (ppb) in GW	PEL: 100 ppm TLV: 25 ppm	150 ppm	Irritation to eyes, nose, and throat; nausea; flush face; skin redness; vertigo; dizziness; incoherence; headache; central nervous system impairment.	Colorless liquid with mild chloroform like odor.				
					IP: 9.32 eV	Fl.P: NA			
					LEL: NA	UEL: NA			
					VP: 14 mmHg				
Trichloroethylene (TCE) CAS: 79-01-6	78 ug/L (ppb) in GW	PEL: 100ppm TLV: 50ppm	1,000 ppm	Irritation to eyes, nose, and throat; nausea; flush face; neck; vertigo; dizziness; incoherence; headache; central nervous system impairment.	Colorless liquid with mild chloroform like odor.				
					IP: 9.45 eV	Fl.P: NA			
					LEL: 8%	UEL: 10.5%			
					VP: 14 mmHg				
SOURCES: ACGIH Threshold Limit Values and Biological Exposure Indices (2014); NIOSH Pocket Guide to Chemical Hazards (2007)									
NA = Not Available NE = Not Established A = Air S = Soil SW = Surface Water		GW = Groundwater T = Tailings SL = Sludge W = Waste D = Drums		SD = Sediment U = Unknown OFF = Offsite		IP = Ionization Potential eV = electron volts LEL = Lower explosive limit UEL = Upper explosive limit		VP = Vapor Pressure mmHg = milligrams of mercury Fl.P = Flashpoint	

**SITE SPECIFIC HEALTH AND SAFETY PLAN****CHEMICAL HAZARD TABLE (CONTINUED)****HAZARD COMMUNICATIONS STANDARD**

A notebook or binder containing this Site Specific Health and Safety Plan will be taken in the field with the crew and kept in the vehicle.

As part of the investigation activities, chemicals expected to be on-site include:

- Calibration gasses in small, disposable cylinders
 - Isobutylene
 - Multi-Gas (Hydrogen sulfide, Methane, Oxygen, Carbon Monoxide, and Oxygen balance)
- Sample preservatives contained within pre-preserved sample containers. Quantities are small but sufficient for proper sample preservation.
 - Hydrochloric Acid (HCl)
 - Sodium Hydroxide (NaOH)
 - Nitric Acid (HNO₃)
- Decontamination Chemicals
 - Non-Phosphate Detergent (i.e. Alconox or similar)
- Fuels and Oils
 - Gasoline
 - Motor Oil

A complete and current inventory of chemicals to be brought on-site and their appropriate Safety Data Sheets (SDS, formerly known as Material Safety Data Sheets – MSDS) will accompany these chemicals. The SDSs will be kept in the field office and on-site in the vehicle used for the investigation activities.



SITE SPECIFIC HEALTH AND SAFETY PLAN				TASK DESCRIPTION		
FIELD ACTIVITIES COVERED UNDER THIS PLAN – ATTACH ACTIVITY HAZARD ANALYSIS FOR EACH TASK						
TASK DESCRIPTION	TYPE	PRIMARY	CONTINGENCY	HAZARD SCHEDULE		
1 Site Reconnaissance (Site survey; land surveying)	☐ Intrusive ☒ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
2 Mobilization / Demobilization of Personnel and Equipment	☐ Intrusive ☒ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
3 Hydrogeologic Assessment/Monitoring Well Installation, Development, and Testing	☒ Intrusive ☐ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
4 Monitoring Well Installation, Development and Testing (i.e. Soil Boring, Drilling, and Testing, Monitoring Well Installations, Rock Coring)	☒ Intrusive ☐ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
5 Environmental Sampling (i.e. groundwater, surface soil, subsurface soil, surface water, potable water, sediment, vapor/air)	☒ Intrusive ☐ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
6 Ecological Characterization	☐ Intrusive ☒ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
7 Geotechnical Survey	☐ Intrusive ☒ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW
8 Investigation Derived Wastes (IDW) Characterization and Disposal	☐ Intrusive ☒ Non-Intrusive	☒ <u>LEVEL D</u> Modified	☒ <u>EXIT AREA</u> Modified	☐ HIGH	☐ MED	☒ LOW

PERSONNEL AND RESPONSIBILITIES (Include subcontractors if applicable). Responsibilities and the reporting organizational structure are described on the following page.						
NAME	PHONE	DATE OF LAST TRAINING	DATE OF LAST HEALTH CLEARANCE	RESPONSIBILITIES	ON-SITE (YES/NO) List Task Numbers	
DEMETRIOS KLERIDES	1-212-542-6012	JANUARY 2015	NA	PROJECT MANAGER	NO	NA
CHRISTOPH STANNIK	1-484-325-1937	JANUARY 2015	OCTOBER 2014	SITE COORDINATOR, FIELD TEAM LEADER, SITE HEALTH & SAFETY OFFICER	YES	1-8
TBD	TBD	TBD	TBD	FIELD TEAM MEMBER	YES	1-8
TBD	TBD	TBD	TBD	FIELD TEAM MEMBER	YES	1-8
TBD	TBD	TBD	TBD	FIELD TEAM MEMBER	YES	1-8
TBD	TBD	TBD	TBD	FIELD TEAM MEMBER	YES	1-8
TBD	TBD	TBD	TBD	FIELD TEAM MEMBER	YES	1-8



SITE SPECIFIC HEALTH AND SAFETY PLAN

DESCRIPTION OF RESPONSIBILITIES AND ORGANIZATIONAL STRUCTURE

1. Site Safety and Health Personnel:

The Site Health and Safety Officer (HSO), in conjunction with the Site Coordinator, ensure that the provisions of this HASP are adequate and implemented effectively in the field. The Project Manager is to take all necessary actions to guarantee Site Safety. Changing field conditions may require decisions to be made concerning adequate protection programs and may require deviations and/or additions to this HASP. All deviations and/or additions must be documented and approved by the HSO on the DEVIATIONS AND ADDITIONS form located in Appendix B. Personnel assigned to the role of HSO must be experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120 and this HASP. The HSO is also responsible for conducting site inspections on a regular basis in order to ensure the effectiveness of this plan.

2. Organizational Structure and Responsibilities:

1. Project Manager (PM)
 - Overall responsible for project schedule;
 - Develop cost estimates for work identified;
 - Identify scope of work and estimate schedule for work;
 - Determine the technical and field teams.
2. Site Coordinator / Field Lead (Reports to “1” – Project Manager when PM is onsite, otherwise in charge)
 - Enforce disciplinary action when unsafe acts or practices occur;
 - Grant permission for site access (including visitors, see Appendix C);
 - Designate site security;
 - Enforce the buddy system;
 - Attend all pre-entry Site Safety Briefings
 - Serve as the facilitator of communications in emergencies.
3. Site Health and Safety Officer (HSO) (Reports to “2” – Site Coordinator)
 - Maintain daily field log book and health and safety file for the project;
 - Conduct safety meetings;
 - Monitor on-site hazards and conditions;
 - Enforce safety procedures;
 - Designate facilities and equipment for health and safety;
 - Select, dispense, and ensure availability of Personal Protective Equipment (PPE)
 - Maintain copies of instrument operation manuals and maintain records of usage and calibration;
 - Periodically inspect PPE and sure proper storage and maintenance;
 - Monitor for heat stress;
 - Set up decontamination lines, control decontamination; prepare decontamination solutions; and monitor;
 - Train employees on site-specific emergency procedures, and evacuation routes;
 - Control entry and exit at site access control points;
 - Confirm an employee’s suitability for work based on physician’s recommendation.
4. Other On-Site Personnel (Report to “2” – Site Coordinator)



SITE SPECIFIC HEALTH AND SAFETY PLAN												PERSONAL PROTECTIVE EQUIPMENT BY TASK											
PROTECTIVE EQUIPMENT: Specify by task. Indicate type and/or material(s) as necessary.																							
SITE RECONNAISSANCE AND MOBILIZATION												MONITORING WELL INSTALLATION, DEVELOPMENT AND TESTING											
TASKS:		1	2	3	4	5	6	7	8	☒ PRIMARY		TASKS:		1	2	3	4	5	6	7	8	☒ PRIMARY	
PPE LEVEL:		A	B	C	D	MODIFIED				☐ CONTINGENCY		PPE LEVEL:		A	B	C	D	MODIFIED				☐ CONTINGENCY	
RESPIRATOR ☒ Not Needed ☐ SCBA or Airline: ☐ APR: ☐ Cartridge: ☐ Escape Mask: ☐ Other:												PROTECTIVE CLOTHING ☒ Not Needed ☐ Encapsulated Suit: ☐ Splash Suit: ☒ Apron: <u>Optional</u> ☒ Disposable Coverall: <u>Optional</u> ☐ Saranex Coverall: ☐ Cloth Coverall: ☒ Other: Shorts; <u>Optional; See Below</u>											
HEAD AND EYE PROTECTION ☒ Safety Glasses: ☐ Face Shield: ☐ Goggles: ☒ Hard Hat: ☐ Other:												GLOVES ☐ Not Needed ☐ Under Gloves: ☒ Gloves: <u>See Below</u> ☐ Over Gloves: ☐ Other:											
BOOTS / FOOT PROTECTION ☐ Not Needed ☒ Boots: <u>See Below</u> ☐ Over boots: ☐ Rubber:												OTHER PPE ☒ Hi-Visibility Safety Vest: <u>See Below</u> ☐ ANSI Rated ear plugs											
ADDITIONAL COMMENTS: ▪ VESTS: Crews will wear hi-visibility safety vests (Class II) when conducting work in the vicinity of active roadways, where heavy machinery is being operated, and/or when visibility increases safety of workers. ▪ GLOVES: Crews will wear disposable nitrile gloves whenever handling potentially contaminated materials or equipment; whenever handling potentially hazardous substances (i.e. pre-preserved sample jars with acids); and/or whenever performing sampling. Gloves should be changed as necessary and disposed of properly. ▪ BOOTS: ASTM rated safety-toe work boots (must meet ASTM F 2413). ▪ CLOTHING: Crews can wear light summer clothing to allow for free air movement and sweat evaporation. If splash protection is required, disposable coveralls or aprons can be worn.												ADDITIONAL COMMENTS: ▪ VESTS: Crews will wear hi-visibility safety vests (Class II) when conducting work in the vicinity of active roadways, where heavy machinery is being operated, and/or when visibility increases safety of workers. ▪ GLOVES: Crews will wear disposable nitrile gloves whenever handling potentially contaminated materials or equipment; whenever handling potentially hazardous substances (i.e. pre-preserved sample jars with acids); and/or whenever performing sampling. Gloves should be changed as necessary and disposed of properly. ▪ BOOTS: ASTM rated safety-toe work boots (must meet ASTM F 2413). ▪ EAR PLUGS or EAR MUFFS: To be worn whenever working near heavy machinery (i.e. drill rigs) or whenever the individual is exposed to elevated noise levels as described in HDR H&S Policy #26. ▪ CLOTHING: Crews can wear light summer clothing to allow for free air movement and sweat evaporation. If splash protection is required, disposable coveralls or aprons can be worn.											



SITE SPECIFIC HEALTH AND SAFETY PLAN		AIR MONITORING BY TASK	
MONITORING EQUIPMENT: Specify by task. Indicate type as necessary. Attach additional sheets as necessary.			
INSTRUMENT	APPLICABLE TASKS	ACTION GUIDELINES	COMMENTS (Include schedule of use)
Portable Gas Monitor / Multi-Gas Monitor (i.e. RAESystems MultiRAE or similar device) NOTE: If multi-gas monitor also contains a Photoionization Detector (PID) sensor and a separate PID is not used, follow the information and procedures provided under the PID equipment information.	3, 4, 5	LEL 0 – 10% LEL No explosion hazard. 10-25% LEL Potential explosion hazard; Notify HSO <u>>25% LEL</u> <u>EXPLOSION HAZARD;</u> <u>Interrupt task/ Evacuate;</u> <u>Notify HSO</u> OXYGEN (O2) 20.9% O2 Normal oxygen level. <20.5% O2 Oxygen deficient; Notify HSO <u><19.5% O2</u> <u>Interrupt task / Evacuate;</u> <u>notify HSO</u> HYDROGEN SULFIDE (H2S) 0 – 1 ppm < 1 ppm Use caution and continue with increased monitoring. <u>< 5 ppm</u> <u>H2S Hazard; Notify HSO;</u> <u>Interrupt Task/Evacuate.</u>	
Photoionization Detector (i.e. MiniRAE 3000 or similar device) Lamp: ☐ 11.7 eV ☒ 10.6 eV ☐ 9.8 eV ☐ Other:	3, 4, 5	If TOTAL VOCs ≥ 5ppm above background in the breathing zone and sustained for 5 or more minutes then all personnel shall evacuate the site / work area. Contact the HSO and re-evaluate the site after 30 minutes. The HSO will re-enter the site from the upwind direction and monitor with the PID. Once the volatile levels are below 1ppm work may resume. PID monitoring will be conducted continuously to ensure concentrations do not exceed safe levels.	If it is determined that VOC concentrations are often ≥ 5ppm during investigation activities, intrusive work activities will not resume until the chemical(s) causing the elevated readings are identified and the appropriate respiratory protection has been selected and is made available. If such a deviation from the original HASP is necessary, an amendment to the HASP will be made.



SITE SPECIFIC HEALTH AND SAFETY PLAN		DECONTAMINATION INFORMATION
DECONTAMINATION PROCEDURES		
ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES AS PAGE TWO OF THIS SECTION		
NOTE: Due to the size of the site and the relatively limited area generally impacted during intrusive investigation work such as advancing soil borings and installing wells, exclusion zones will be limited to the area immediately around the monitoring well and/or soil boring location and delineated by the field crew using visible demarcation devices such as, but not limited to, traffic cones, saw-horse style barricades, and/or caution tape as necessary. Decontamination and support zones will be similarly marked by the field crew. Should elevated PPE Levels (levels beyond Level D) be required, additional measures will be determined at such time by the HSO and Project Management personnel and amendments to the HASP will be made if necessary before work continues.		
PERSONNEL DECONTAMINATION Summarize below and/or attach diagram; discuss use of work zones. Only disposable personal PPE will be used, and personnel decontamination is not anticipated to be needed. ☒ Not Needed	SAMPLING EQUIPMENT DECONTAMINATION Summarize below and/or attach diagram; discuss use of work zones. Non-disposable sampling equipment such as soil augers and groundwater sampling pumps will be decontaminated using wash water with Liquinox™/Alconox™ detergent, followed by rinsing with potable water. Pumps will run in containers with wash water and potable water, and soil sampling equipment will be cleaned in trays or buckets containing these liquids. ☐ Not Needed	HEAVY EQUIPMENT DECONTAMINATION Summarize below and/or attach diagram; discuss use of work zones. Heavy equipment (drill rig and down-hole tools that have come into contact with potentially contaminated soil, rock, or groundwater) will be decontaminated by the respective contractor using decontamination solutions (generally, wash water with Liquinox™/Alconox™ detergent, followed by rinsing with potable water), which will be applied using suitable methods such as manual scrubbing, pressure washers, etc. ☐ Not Needed
CONTAINMENT AND DISPOSAL METHOD Gloves and disposable clothing will be placed in sealed plastic bags and disposed of as municipal waste.	CONTAINMENT AND DISPOSAL METHOD Decontamination fluids (wash/rinse water and decontamination chemicals) will be containerized (drummed) at the point of generation and transported to the designated IDW staging area (TBD - either the City of Orange water department complex on Beech Street or the Department of Works garage on Center Alley) and analyzed for proper off-site disposal. Following proper characterization, the drummed waste will be transported and disposed of by the designated IDW contractor.	CONTAINMENT AND DISPOSAL METHOD Decontamination fluids (wash/rinse water and decontamination chemicals) will be containerized (drummed) at the point of generation and transported to the designated IDW staging area (TBD - either the City of Orange water department complex on Beech Street or the Department of Works garage on Center Alley) and analyzed for proper off-site disposal. Following proper characterization, the drummed waste will be transported and disposed of by the designated IDW contractor.



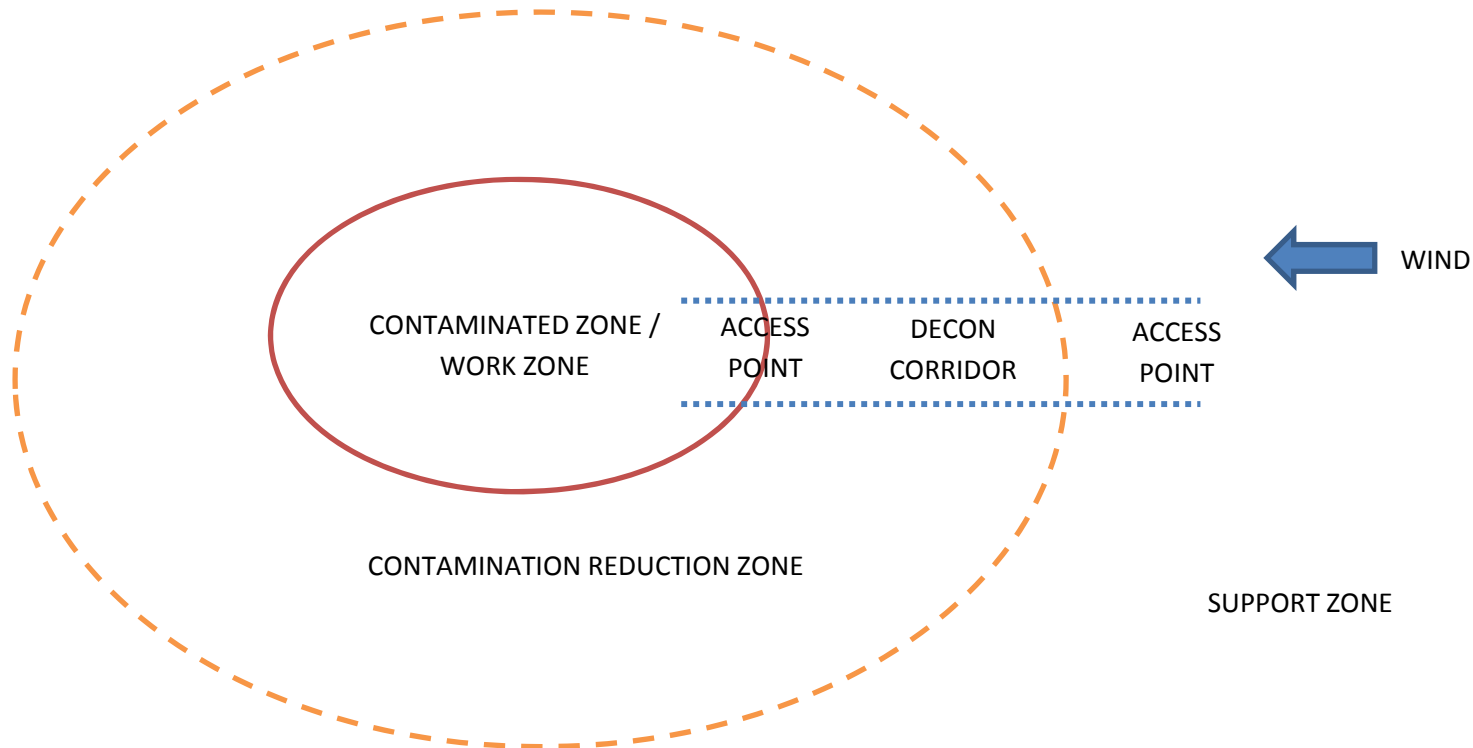
WORK ZONE SITE MAP

NOTE: Due to the size of the site and the relatively limited area generally impacted during intrusive investigation work such as advancing soil borings and installing wells, exclusion zones will be limited to the area immediately around the active work zone (i.e. soil boring or monitoring well) and delineated by the field crew using visible demarcation devices such as but not limited to traffic cones, saw-horse style barricades, and/or caution tape as necessary. Decontamination and support zones will be similarly marked by the field crew. Should elevated PPE Levels (levels beyond Level D) be encountered, additional measures will be determined at such time by the HSO and Project Management personnel and amendments to the HASP will be made if necessary.

Unauthorized personnel and the general public shall be kept at a safe distance and will be prevented access to the active work zone (Exclusion Zone).

Staging areas for heavy equipment and for temporary IDW storage will be determined with assistance from USEPA and appropriately protected and marked.

CONCEPTUAL WORK ZONE LAYOUT





SITE SPECIFIC HEALTH AND SAFETY PLAN

POLICY ACKNOWLEDGEMENT PAGE

The following personnel have read and fully understand the contents of this Site Health and Safety Plan and the referenced HDR Health & Safety Procedures and further agree to all requirements contained herein. Furthermore, the individuals are fully trained and have the required clearances in accordance with HDR Health & Safety Procedure #20.

ATTACH ALL COPIES OF CURRENT HTRW AND FIRST AID TRAINING, MEDICAL CLEARANCE, AND RESPIRATORY FIT TEST RECORDS AS NECESSARY.

NAME	AFFILIATION	DATE	SIGNATURE
DEMETRIOS KLERIDES	HDR ENGINEERING		
CHRISTOPH STANNIK	HDR ENGINEERING		



APPENDIX A ACCIDENT REPORTING

All accidents, injuries, and illnesses which occur from performing project related activities in this HASP require that the injured person(s) and the Site Health & Safety Officer (HSO) complete an INCIDENT REPORT. If access to the HDR Health & Safety portal is available the report can be submitted online; if access to the HDR Health & Safety portal is not available an hard copy version will be filled out and forwarded to the Corporate Director of Safety or a representative in the corporate Health & Safety Department:

Mr. Jim Woolcott
8404 Indian Hills Drive
Omaha, NE 68114-4098

Tel: (402) 399 - 4823



ACCIDENT / INCIDENT REPORTING FORM

Part 1 – Incident Details	
Name of Exposed/Injured Employee	
Name of Employee Completing Form	
Incident Date	Incident Time AM or PM (circle one)
Did incident occur within working hours?	
☐ YES ☐ NO (occurred during break or before or after shift)	
Location (Check applicable box and enter information as appropriate.)	
☐ Active Mine Site (Enter MSHA Mine ID Number) _____	
☐ Client Office (Enter Name of Client) _____	
☐ Field or Construction Site (Enter Project Name) _____	
☐ HDR Office	
☐ Parking Lot or Roadway	
☐ Other	
Locale (Indicate state/province where incident occurred.)	
Witnesses (indicate name of any HDR or non-HDR witness to the incident)	
Incident Type	
☐ YES injury/illness occurred (Go to Part 2) ☐ NO injury/illness put potential for it (Go to Part 3)	
Part 2 – Incidents with Injury/Illness	
Medical Care	
☐ No Medical Care Needed (Go to Part 3) ☐ First Aid Given at Work Site (Go to Part 3)	
☐ Off-Site Medical Care Required (indicate provider name and address)	
Transitional Duty Evaluation (for injuries that impact your ability to return to your normal job duties)	
Did you contact your HR Rep for a Transitional Duty Evaluation Form? (If not, do so ASAP!)	
☐ Yes ☐ No ☐ Not Applicable	
Workers Compensation (for injuries that require medical care beyond first aid and/or impact your ability to work)	
Did you contact your HR Rep to file a Workers' Compensation claim? (If not, do so ASAP!)	
☐ Yes ☐ No ☐ Not Applicable	
Work Impact	
☐ No Missed Time or Restricted Duties	
☐ One or More Full Work Days Missed (indicate dates not including date of incident) _____	
☐ One or More Partial Work Days Missed (indicate dates not including date of incident) _____	
☐ Restricted Duties (indicate dates not including date of incident)	

**Medication**

- | | |
|---|--|
| ☐ No Medication Needed | ☐ Prescription Medication |
| ☐ Over the Counter Medication (regular strength) | ☐ Over the Counter Medication (prescription strength) |
| ☐ Prescription Written But Not Filled | |

Description of Medical Treatment (indicate the type of treatment received and the body party affected (e.g., ER visit, hospitalization, physical therapy, MRI/x-Ray/CT scan; stitches/glue; hand splint/brace; soft splint/brace; etc.))

Prognosis and Follow Up (describe doctor's orders and indicate if follow up care/appointments are needed)

Part 3 – Incident Description, Causative Factors, and Suggestions for Prevention

Incident Description (Describe in detail what happened and where.)

Causative Factors (Describe circumstances contributing to the incident.)

Suggestions for Prevention (Describe changes that could prevent the circumstances from reoccurring.)

[When you are finished with this report, enter it into HDR's online reporting system or give it to your local OSC for entry.](#)



APPENDIX B

DEVIATIONS AND ADDITIONS FORM

Deviations from and additions to this HASP are permitted and sometimes required based on additional information obtained since the preparation date of this HASP. The DEVIATIONS AND ADDITIONS form shall be used to authorize and record all deviations and additions that occur after any one individual has signed this document. Changes in this HASP are only permitted with the following:

1. Written documentation of what the deviation and/or addition is and reference to the appropriate section of this HASP;
2. Written justification for the change;
3. Verbal communication of the change to all personnel who are directly affected by the deviation and/or change and answering all questions regarding the change(s) to the satisfaction of those same individuals; and
4. Signatures from all personnel who are affected by the change prior to commencing project activities on Site with an approval signature from the Site Health and Safety Officer (HSO).



HEALTH AND SAFETY PLAN DEVIATIONS AND ADDITIONS FORM

CHANGE #: _____

SECTION: _____

EFFECTIVE DATE: _____

AUTHOR & ROLE: _____

DESCRIPTION OF CHANGE

JUSTIFICATION

SAFETY IMPACT

SIGNATURES OF ACKNOWLEDGEMENT

NAME	AFFILIATION / ROLE	DATE	SIGNATURE
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APPENDIX C

VISITORS LOG

Visitors to the Site may be permitted entrance into the exclusion and contamination reduction zones based upon the approval of the Site Coordinator or they must otherwise remain in the support zone. The Site Coordinator will be responsible for documenting the identity (including name, company/agency, purpose, areas to be entered, date and time of arrival, and who checked the individual in) of all visitors on this VISITORS LOG.

NAME	COMPANY / AGENCY	PURPOSE OF VISIT	AREA(S) TO BE ENTERED	DATE AND TIME ON SITE	CHECKED IN BY



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**Slip, Trip, and Fall Prevention
Health & Safety Procedure #3**

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Slip, Trip, and Fall Prevention Health & Safety Procedure #3

1.0 OBJECTIVE

Each year, physical injuries due to common slips, trips, and falls from the same level surface account for a significant percentage of all reportable accidents in the USA. Most of these accidents are preventable through proper housekeeping, correct walking surfaces, and proper precautions. It is the objective of HDR to prevent injuries or “near misses” occurring from slip, trip, or fall hazards by the identification, elimination, and/or control of these hazardous conditions.

2.0 PURPOSE

This Procedure describes work practices that will reduce or eliminate slips, trips, and falls and thereby reduce or prevent the injuries associated with these types of accidents. The intent is to prevent injuries, maintain a safe workplace, and a healthy workforce.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	09/10/1998
1	Revisions	05/04/2002
2	Revisions	12/22/2006
3	Revisions	01/30/2007
4	Revisions	05/05/2008
5	Re-Formatting	06/11/2013

4.0 APPLICABILITY

The HDR Slip, Trip, and Fall Prevention Program implemented in this Procedure, applies to all HDR personnel at HDR client sites and at all HDR facilities working on horizontal surfaces. All employees, regardless of HDR Department, will be impacted by this Program. Fall hazards due to climbing or working on elevated surfaces are addressed in the following HDR H&S Procedures: #12 – *Fall Protection*, and #2 – *Portable Ladders*.

5.0 PROGRAM IMPLEMENTATION

This Program will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC).

Director of Safety. The Director of Safety shall:

- Periodically review, at least annually, the effectiveness of this Program, identify any deficiencies, and ensure they are corrected; and

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Approvals:	Jim Woolcott, Judy Webster	Revision No.:	5



- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

Office Safety Coordinators. The OSCs shall:

- Provide initial training on this Procedure to their respective office staff, and make sure that this Procedure is readily available in each office, and
- Interface with the Director of Safety regarding any unsafe office or project site conditions that have been discovered, and need addressing or interpretation.

6.0 REQUIREMENTS

The following requirements detail a number of rules and methods to prevent slips, trips, and falls. These requirements shall be implemented at all HDR offices where we control the physical environment. Employees should also be alert for these hazards at project sites, where the hazardous conditions are not usually created by HDR, nor under our control. HDR employees at these sites should look for, and avoid, these potential hazards to prevent suffering an injury.

6.1 General Housekeeping. Personnel shall keep the working area clean and orderly. Tools must not be left lying on floors, walkways, or decking where they present tripping hazards.

6.2 Debris. Small, loose items such as pop cans, rope, trash or other small objects and debris shall not be left lying around in any place, particularly in areas where personnel walk.

6.3 Walkways and Grating. Walkways and grating must be kept free of obstacles that could cause trips. Openings in walkways and grating are very hazardous and should never be left unattended – either close, repair, or cover before leaving them. If not immediately repaired, the openings must be roped or barricaded off until corrected. Also, be alert for raised portions of walkway surfaces, such as sidewalk section edges, which create trip hazards. If necessary, bank the raised portion with wood or sandbag to cover the abrupt raised edge and provide a gradual transition to the upper walkway surface.

6.4 Access Points. Access points or holes in gratings must be covered or surrounded by an adequate guard rail.

6.5 Spills. Oil spills, water (including ice cubes in break areas), and spills of other slippery materials must be cleaned up immediately. Tracking through even a small spill will significantly reduce the friction coefficient between your shoes and any hard floor material, making a slip more likely. Not only are oil spills a slip hazard, but combustible oils also present a fire hazard.

6.6 Steel Decks. Personnel shall take extra precautions when walking on steel decking or catwalks during wet weather, such as establishing firm hand holds, wearing suitable footwear, and walking slowly. If possible, spread sand across the flooring to increase traction.

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- 6.7 Jumping.** Personnel shall not jump from elevated places, the backs of trucks, or equipment. Employees should also refrain from jumping laterally across any excavation, even a shallow one. If excessive width prevents a normal stepping motion, find another route of access.
- 6.8 Tools.** Personnel using hand and mechanical tools must position themselves properly to avoid slipping, considering required leverage, as well as anticipating likely consequences if the tool suddenly moves or gives way. This pre-planning becomes even more critical when working at heights.
- 6.9 Climbing Surfaces.** Personnel shall not walk or climb on piping, valves, fittings, diagonal cross-bracing, or any other equipment not designed as walking or climbing surfaces. When ascending ladders or fixed vertical stairs, do not carry tools, notebooks, etc. by hand – this is dangerous! Pre-plan prior to site arrival and either place these items in a backpack/fanny pack, or else ascend to the upper working surface and then hoist them by means of a rope and bucket.
- 6.10 Stairways, Walkovers, and Ramps.** Stairways, walkovers, or ramps shall be installed where personnel must walk or step over equipment in the course of their normal duties. In client facilities where these crossovers exist, use them! In our office buildings, it is particularly important to keep stairways and landings clear of any obstacles. **DO NOT USE STAIRWAYS OR LANDINGS AS STORAGE AREAS!**
- 6.11 Extension Cords.** Electrical extension cords and electrical wiring must be kept clear of walking and working areas and/or covered, elevated, buried or otherwise secured. Exposure to loose extension cords is one of the most common causes of trips in the office environment. (By definition, an extension cord is for temporary power only; it is not to be used as a substitute for permanent wiring.) If an extension cord must be left across a walkway, tape it in place or cover it with a non-conductive (e.g., rubberized) mat to prevent dislodgment.
- 6.12 Winter Conditions.** Walking and working surfaces must be properly maintained during inclement winter weather. Ice on sidewalks/parking lots account for many falls. Either physically remove the ice, or apply a chemical de-icer to traveled pathways to remove the ice. As an immediate (but less effective) alternative, sand or cinders may be thrown over the ice to improve traction. Hard-packed snow can also reduce the traction of walkers and should be removed by physical or chemical means. **Never walk on any elevated surface (scaffold, outside fixed stairway, ladder) when ice is present!**
- 6.13 Running.** Running is prohibited on job sites unless under emergency conditions.
- 6.14 Lunch Areas.** Lunch areas should be kept clear of empty bottles, containers, and papers. Trash receptacles should be provided and used.
- 6.15 Lighting.** Adequate lighting allows employees to see potential obstructions and prevents many falls. Make sure that all halls, passageways, and stairs have adequate illumination; replace all burned out bulbs or defective receptacles.

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6.16 Elevated Work Platforms. When working on scaffolds, stairwells, unfinished floors, or any area presenting restricted body movement, place all tools to one side/corner of the area to prevent stepping on or kicking them during site activities.

6.17 Windy Conditions. Be aware of the hazards when working in high winds. Sudden gusts can cause a loss of balance, or blow tools, papers, hardhats, etc., causing a distraction and corresponding quick body movement that could result in falls. When preparing for site activities in windy conditions, secure hardhats with chin straps and use notebooks that will hold papers securely, eliminating the distraction caused by flapping papers. Also, preplan each body movement, anticipating sudden gusts and their effects on your body.

7.0 FALL PROTECTION

Fall hazards of four feet or more should be evaluated to determine what fall preventative steps might be implemented. Fall protection is required at heights of six feet or greater. Please read Procedure #12 – *Fall Protection*, for more information.

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Appendices

APPENDIX A	Chemicals/Products not covered by the Hazard Communication Standard
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Hazard Communication Health & Safety Procedure #6

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1.0 OBJECTIVE

A Hazard Communication (Employee Right-to-Know) Program will be instituted at all HDR (HDR) facilities and project sites. A complete program consists of employee training, availability of Safety Data Sheets (SDS) for the chemicals that HDR employees use, proper labeling of all chemical containers, and the development of a written plan which presents the HDR program. This procedure serves as the HDR written Hazard Communication Plan. A copy of this Hazard Communication Plan, with appropriate SDS, will be maintained at all HDR offices & project sites (as appropriate).

2.0 PURPOSE

The purpose of Hazard Communication (“HazCom”) is to ensure that the hazards of all chemicals covered in the program are communicated to (1) all HDR office personnel, (2) all HDR project site employees, and (3) all affected project contractors, when HDR performs activities on a multi-employer project site. This program was developed to comply with all applicable provisions of the Occupational Safety and Health Administration’s (OSHA) Hazard Communication Standard(s), 29 CFR 1910.1200 & 29 CFR 1926.59.

Note: OSHA has incorporated the *Globally Harmonized System of Classification and Labeling of Chemicals (GHS)* into the 2012 revision of the Hazard Communication Standard (HAZCOM 2012). Significant changes to hazard classification, labeling, and safety data sheets will be fully implemented by June 1, 2016. This procedure was updated in accordance with HAZCOM 2012 and it is expected that HDR offices that possess chemicals purchased before this implementation date will replace all existing chemical labels with GHS compliant labels (or properly discard of any chemicals with outdated labels), and replace existing Material Safety Data Sheets with updated GHS compliant SDS. HDR will also provide any additional training required for any newly identified hazards based on revisions to the labels and SDS.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	10/01/1998
1	Revisions	06/18/2007
2	Revisions	12/01/2008
3	Re-Formatting	06/05/2013
4	GHS requirements added and MSDS references changed to SDS	11/18/2013

4.0 APPLICABILITY

This Hazard Communication program applies to all HDR personnel at HDR offices and HDR project sites. This program covers all HDR employees who use, or are impacted by the use of, commercial chemicals (including the evolution of chemicals as the result of mechanical processes, e.g., grinding, sandblasting, sanding). All employees, regardless of HDR Department, exposed to these chemicals during their HDR workday will be impacted by this program.

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Additionally, HDR is responsible for transmitting this information to outside contractors & consultants when their project activities expose them to HDR chemical usage. It is the responsibility of HDR field professionals using chemicals on project sites to maintain a written copy of this plan and accompanying SDS on the project site, and to inform outside employers potentially impacted by HDR activities of its existence and location. If client Hazard Communication requirements differ from the HDR guidelines presented herein, the more stringent requirements shall apply.

5.0 PROGRAM IMPLEMENTATION

This program will be administered by the HDR Director of Safety, and locally by the Office Safety Coordinator(s).

The Director of Safety shall:

- Review, at least annually, the effectiveness of the program, identify any deficiencies, and ensure that they are corrected;
- Provide guidance to OSCs and HDR professionals concerning HazCom issues;
- Assist OSCs in selecting personal protective equipment (PPE), when chemicals requiring specialized protection (acids, bases, etc.) are to be used;
- Provide initial training to the OSCs.

The Office Safety Coordinator(s) shall:

- Monitor the overall effectiveness of the HazCom program in their office;
- Compile a list of the chemicals present and used in their respective office(s), cross-indexed to the corresponding SDS, and keep this with this written plan;
- Provide training to their respective staff(s) on office/project chemicals;
- Interface with Corporate Safety on HazCom questions, and when guidance is necessary;
- Provide office technical assistance on HazCom issues.
- Additionally, HDR project professionals shall:
 - Be aware of the multi-employer requirements of this plan, and transport a copy of the written plan/pertinent SDS and provide chemical information to other site employers, when HDR activities will generate chemical hazards;
 - Request information from other project site employers on the chemical usage planned by that employer, and document this request (field log).

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6.0 AVAILABILITY

Each office will maintain a copy of their Hazard Communication Plan, including SDS, in a known location that is readily accessible to all employees during all working hours. If requested, this plan shall also be made available to any representative of OSHA.

7.0 GENERAL PROGRAM REQUIREMENTS

HDR employees are prohibited from bringing chemical products, including over-the-counter commercial products, into the workplace without first notifying the OSC, and receiving their approval.

Outside sales vendors are also prohibited from providing “free” samples of commercial/industrial office chemical products, unless such products are accompanied by an SDS, and approved for office use by the OSC.

7.1 Office Chemical Inventory

- Initial Survey. Each OSC will survey their office area to identify existing chemicals that pose a hazard to HDR and/or contract employees. The OSC will refer to the criteria presented in 29 CFR 1910.1200 (especially 1910.1200(b)(6), included as Appendix A to this Plan) to make the determination as to which chemical or mixture should be included. If there is any question, the chemical should be included.
- Discarding Unwanted or Outdated Chemical Products. During the initial survey, the OSC may discover office chemicals that are no longer used, outdated, etc. The OSC should collect these chemical products, and in agreement with the Department Manager, properly dispose of them, either by using them in the manner for which they were marketed, or in accordance with the disposal methods recommended by the manufacturer or State solid waste agency.
- New Chemical Products. Before new products are purchased, an SDS must be obtained from the supplier or manufacturer and reviewed by the OSC. Items to be addressed include:
 - A) Is this chemical really necessary for our operation? Is the quantity appropriate? Are there any hazards identified in Section 2 of the SDS that indicates the chemical ingredients are extremely toxic, flammable or explosive?
 - B) Is the product stable at room temperature, or will it degrade into a more hazardous substance?
 - C) Would a less toxic/hazardous commercial product equally serve our needs?
 - D) If not completely used up, is disposal of the residue an environmental problem?

7.2 Cross-Indexed Written List

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Upon completion of the inventory, the OSC will then make a written list of the retained office chemicals and request an SDS from the manufacturer or distributor.

Once all the SDS have been acquired, the OSC shall cross-index each SDS to the list in a manner that will allow a reader of the list to quickly find the corresponding SDS. **The list and SDS are considered part of the written plan.**

7.3 Container Labeling

All containers of chemicals must be labeled, in English with the following information (at a minimum):

1. Product Identifier
2. Signal Word, "Danger" or "Warning" (there may be non-hazardous chemicals that do not require a signal word).
3. Hazard Statements
4. Precautionary Statements
5. Hazard Pictograms
6. Name, address and telephone number of manufacturer, importer, or other responsible party.
7. Supplementary Information (optional)

Note: If non-English speaking employees will be using chemicals, information shall be presented in their language as well.

The OSC will examine each office container and verify that each has an appropriate label. HDR will rely on the manufacturer's accuracy as to label contents and does not have to verify that the label information is correct.

HDR employees shall not remove or deface labels on incoming containers of chemicals. The purpose of these labeling requirements is to ensure that any employee using, or affected by the use of a chemical, can identify the chemical and learn any safety precautions and health hazard information in an expedited manner. This is critically important when an employee is exposed to a corrosive chemical (e.g., acid, base), and needs to quickly determine the proper washing, flushing or medical treatment necessary for minimization of injury.

Transference of chemicals If chemicals covered by this program are purchased in bulk and later transferred to smaller temporary individual containers, labels must be affixed to the individual containers presenting the same label information as required on the label from the manufacturer, or the product identifier and words, pictures, symbols or a combination thereof, which in combination with other information immediately available to employees, provide

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specific information regarding the hazards of the chemicals. For small temporary containers where the complete listing of the label information is impractical (due to container space restrictions), it is permissible to mark both the temporary container and the original bulk source container with a common referencing name or number, as long as all affected employees are trained on this identifying system.

7.4 Safety Data Sheets (SDSs)

Office A hard-copy SDS for each hazardous chemical present in the office will be maintained. All office SDS will be collected in a dedicated binder (separate from the Safety Program binder), which will be clearly labeled and maintained in a conspicuous location in the office. Additionally, each HDR employee may access the safety Intranet web site, at any time, and retrieve or review any SDS maintained in the SDS Databank.

Whenever a new SDS is received in the office, the OSC shall place it into the office SDS binder, and mark and enter it on the cross-indexing list. If the SDS corresponds to a product or chemical already in use, the OSC should substitute the new SDS for the older version. The old SDS shall be filed away for indefinite storage; it shall not be destroyed or discarded and shall be marked and entered on the cross-indexing list.

When a new product or chemical is received, the OSC should review the accompanying SDS and determine the degree of training necessary. If identical or similar in chemical hazards, routes of exposure, health effects and medical treatment, the OSC may only need to reference past training. If, however, the new chemical has unique or significantly different exposure, affected or treatment characteristics, then new training to all affected employees must be conducted, and documented (See Safety Program, Part 1, Section 4.4), prior to use.

Project Site When HDR project personnel take chemical products to a site, they are to carry the corresponding SDS with them, along with a copy of this plan, and a temporary cross-indexing list. It is not necessary to maintain the full office plan and SDS collection at every project site; only those SDS corresponding to the actual chemicals used on-site need be included in the on-site HazCom plan. In the rare case that HDR employees need to transport hazardous substances, 49 CFR Part 171 will be followed accordingly.

8.0 EMPLOYEE INFORMATION AND TRAINING

8.1 Location

Office Environment HDR will provide training to its employees through formal training sessions, which will be documented. Corporate Safety will develop and initially provide this training to the OSCs; it is anticipated that as OSCs develop the knowledge and expertise regarding their office projects and chemical usage, they will be qualified to provide HazCom training to their office staff and new employees.

Project Site Chemical hazards will be communicated to HDR employees through daily safety meetings (“tailgate” safety meetings) held at HDR field projects and during an initial site

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orientation ("Project kickoff") meeting. Information on HDR chemical use should also be transmitted to outside contractors during these meetings.

8.2 Training Content

HDR employees will be instructed on the following:

- Contents of 29 CFR 1910.1200, 29 CFR 1926.59, and if applicable 49 CFR Part 171
- Chemicals and their hazards in the work area
- Location of SDS and written plan
- Chemical routes of exposure (inhalation, skin contact, ingestion)
- How to prevent exposure to the hazardous chemicals
- Procedures to follow if they are exposed to the chemicals
- How to read and interpret labels and SDSs for hazardous substances
- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced into the work area (either office or project site), each HDR employee will be given information and training in the same manner as during the initial safety training sessions. In the office, the OSC will be responsible for providing this training; at project sites, the lead on-site project professional will make sure that this training is provided, and be responsible for seeing that the SDS on each new chemical is present and reviewed.

9.0 HAZARDOUS NON-ROUTINE TASKS

Occasionally, employees at HDR may be required to perform tasks which are considered to be non-routine, and which may present new chemical contact or usage hazards. Examples include the manipulation of unlabeled piping in new construction or during renovation activities, or the entry into a vessel, pit or tank that formerly contained chemicals. As project personnel identify non-routine tasks, they shall discuss the situation with the Department Manager and OSC in a safety briefing. This safety briefing shall include all possible hazards an employee may encounter while completing the task, including:

- Hazard recognition
- Chemicals involved and their hazardous properties
- Physical hazards – Fire/Explosion

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- Methods of avoiding hazards (monitoring instruments, proper personal protective equipment, etc.)
- Location of medical facilities and proper response actions

The following is a list of some of the non-routine tasks that may occur on HDR project sites. It is most likely that these tasks will be performed by other employers (contractors), rather than by HDR employees. If, however, these activities expose HDR employees to the generated chemicals, then they must be addressed by HDR.

Confined Space Entry – Also reference HDR H&S Procedure #1, *Permit Required Confined Spaces*

Spills

High-Pressure Washer Operation

Line Entry Procedures (e.g., pressurized pipelines)

Hot Work (welding, torch cutting, etc.)

Decontamination of Equipment

10.0 MULTI-EMPLOYER WORKSITE INFORMATION TRANSMISSION

10.1 When HDR Brings Chemicals on the Project Site

It is the responsibility of HDR to provide all outside contractor employees with information on the chemicals that HDR uses on any particular project site. It shall be the responsibility of the HDR senior project professional on-site to provide subcontractors with the following information.

(NOTE: Subcontractors are responsible for training their own employees):

- Location of the HDR Site Hazard Communication program, which includes the following:
 1. SDS for project work area
 2. HDR Hazard Communication Program (this plan)
 3. Other relevant safety material such as Project Health and Safety Plan (HASP), if developed for that site
- Labeling system employed (if unique).

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- Any special precautionary measures to be employed by the outside contractor to protect their employees from chemical and/or physical hazards posed by HDR chemical usage.
- Location of nearest necessary emergency equipment (fire extinguisher, eyewash, shower, phone, first-aid kit, etc.)
- Emergency evacuation signals and evacuation rally locations (if applicable).

On the initial visit by a contractor to an HDR project site (where the contractor's employees could be impacted by HDR use of chemicals), the contractor shall be provided with the above information, and the HDR employee providing this information should document that it occurred. The most appropriate place to record this documentation would be in the field notes, or in written minutes of the initial project kickoff, or daily tailgate safety meeting.

10.2 When Another Contractor Uses Chemicals that Impact HDR Employees

Any contractor using a chemical or compound covered by this program on a project site, where contact or exposure to HDR employees is possible, must provide information to HDR. The lead project-site HDR employee is to contact the other contractor's foreman, supervisor or safety officer at the site, and request that site HDR employees be provided this information. This may be performed during an initial tailgate safety session, during a project kickoff meeting, special safety session, etc. The HDR lead employee should note in his/her field notes that this was conducted, by whom, and location and attending HDR employees.

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APPENDIX A**29 CFR 1910.1200(b)(6)****Chemicals/Products not covered by the Hazard Communication Standard****“(6)**

This section does not apply to:

- (i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
- (ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)(42 U.S.C. 9601 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
- (iii) Tobacco or tobacco products;
- (iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);
- (v) Articles (as that term is defined [following] this section);
- (vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;
- (vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);
- (viii) Cosmetics, which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;
- (ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical

manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

- (x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;
- (xi) Ionizing and nonionizing radiation; and,
- (xii) Biological hazards.”

29 CFR 1910.1200(c)

"Article" means a manufactured item other than a fluid or particle:

- (i) Which is formed to a specific shape or design during manufacture;
- (ii) Which has end use function(s) dependent in whole or in part upon its shape or design during end use;
- (iii) Which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

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Traffic Safety
Health & Safety Procedure #17

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1.0 OBJECTIVE

A significant portion of HDR business involves studying, designing, and observing the construction of vehicle roadways. This often exposes HDR employees to moving traffic hazards when performing these services. Additionally, HDR employees from all business classes have the potential to be exposed to moving traffic hazards when providing services on construction sites or performing other field services. It is the objective of HDR to raise the awareness of our employees on the hazards associated with moving traffic, the techniques used to control the hazards, and to provide guidelines for HDR employees to assure their safety.

2.0 PURPOSE

The purpose of this procedure is to identify the hazards associated with working near moving traffic, identify HDR services which potentially expose employees to traffic hazards, and to provide safety guidance to prevent injury. This procedure is not intended to give guidance for the design and development of traffic control plans. Traffic control plans must be designed by qualified professionals familiar with the standards contained in the latest version of the Manual on Uniform Traffic Control Devices (MUTCD) and/or other applicable local, state, or provincial guidelines.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	07/07/2003
1	Revision	12/26/2007
2	Revisions	08/16/2011
3	Re-Formatting	11/22/2013
4	Added HDR logo requirements for safety vests and minimum Class 2 safety vest requirement for HDR field activities	4/29/2014

4.0 APPLICABILITY

The HDR Traffic Safety Program implemented in this Procedure applies to all HDR personnel performing traffic-related activities along traveled roadways or exposed to traffic hazards at HDR client sites. All HDR personnel subjected to moving traffic while performing their work duties shall comply with this Procedure. This Procedure does not supersede, but should be used in conjunction with, site-specific Project Guides and contract documents.

5.0 PROGRAM IMPLEMENTATION

This program will be administered nationally by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC).

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Approvals:	Jim Woolcott, Judy Webster	Revision No.:	4

Director of Safety. The Director of Safety shall:

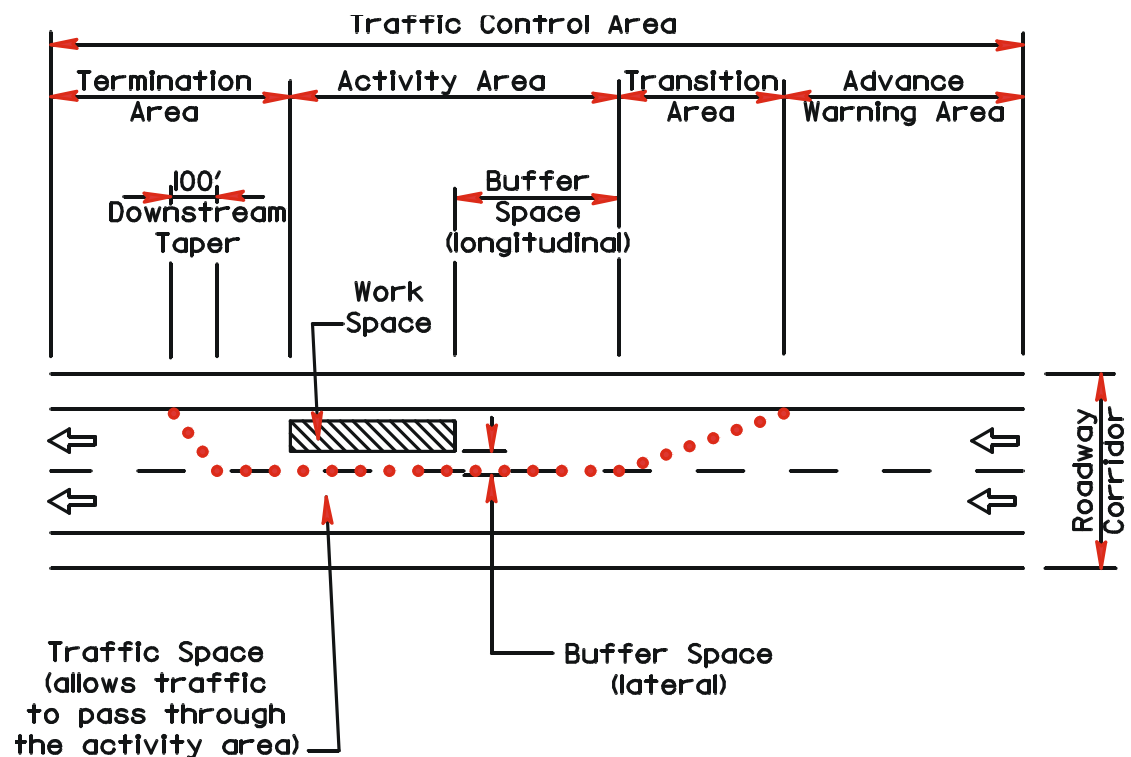
- Periodically review, at least annually, the effectiveness of this program, identify any deficiencies, and ensure that they are corrected, and
- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

Office Safety Coordinators. The OSCs shall:

- Provide initial training on this Procedure to their impacted office staff, and make sure that this procedure is readily available in each office;
- Interface with the Director of Safety regarding any unsafe project site conditions that have been discovered, and need addressing or interpretation;
- Obtain and maintain a copy of the “Guide to Temporary Traffic Control in Work Zones”, for reference by office personnel (if that office is impacted by this Procedure).

6.0 DEFINITIONS

Typical Roadway Project Diagram



NOTE: Several definitions provided here are not used in this procedure, but are provided for informational purposes.

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Activity Area – Where workers may be actively engaged in project activities, includes the Work Space and Buffer Space.

Advanced Warning Area – The space between the warning signs and the transition section; tells motorists what to expect ahead.

Barricade – A channeling device consisting of a horizontal panel or panels with orange stripes (orange and black stripes in Canada) and optional light. The stripes on the barricade should slope downward in the desired direction of traffic flow. Barricades are described by their number of horizontal panels, such as Type I (one panel), Type II (two panels), and Type III (three panels). In most applications, Type I barricades should be used as needed during the day, or at night with a warning light attached.

Buffer Space – The space between the transition area and the workspace which provides an additional margin of safety for both motorists and workers.

Cone – A traffic-channeling device used to guide the motorist around the work area. Standard cones are 28 inches (70 cm) high. Local requirements may require the addition of orange flags and/or reflective collar to cones.

Drum - A traffic-channeling device made of plastic with two horizontal orange and white stripes, at least 3 feet in height and at least 18 inches in diameter. (Canadian drums typically measure 100 cm in height, minimum 55 cm diameter at base and 33 cm diameter at top. Drums have alternating orange and black stripes.) Drums are typically used in places where they will remain in place for a prolonged period of time.

Flagger (Traffic Control Person) – A worker whose sole job function is to alert motorists to the need to stop/slow down as they approach a temporary work area, or to direct vehicles through the work zone.

Flashing Arrow Panel – A sign panel with a matrix of lights capable of showing either flashing or sequential displays. A flashing arrow panel is intended to supplement other traffic control devices. The panel may be either trailer or truck mounted.

Flashing Vehicle Lights – A required or optional traffic control measure for vehicles within a work area.

High Speed Street or Highway – Any street or highway whose posted speed limit is greater than 35 mph (56 kph).

Low Speed Street or Highway – Any street or highway whose posted speed limit is 35 mph (56 kph) or less.

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Roadway – That portion of a highway improved, designed, or ordinarily used for vehicular travel, exclusive of the berm or shoulder.

Roadway Corridor – Defines the entire property that is owned by the entity building a roadway or maintaining the existing roadway, which includes the roadway itself, the shoulder, and any adjacent buffer properties.

Termination Area – The space beyond the work area, which allows the motorist to resume normal driving.

Traffic Control Area – The space between the first advance warning sign and the end of the termination area.

Traffic Control Plan – A written plan/layout of traffic control devices (signs, barricades, etc.) that are typically used for permitting the safe movement of traffic through a construction work zone.

Transition Area – The space between the advance warning area and the buffer space, which allows the motorist to move out of the normal traffic path.

Vehicle – As used here refers to any wheeled, mobile car, truck, van, trailer, or other means of conveyance, which could cause injury by impact. Does not include trains.

Work Space – The portion of the roadway closed to traffic, which is set aside for equipment and material.

7.0 CLASSIFICATIONS OF EXPOSURE

7.1 General Guidelines

This procedure details guidelines and methods to prevent traffic accidents and/or personal injury to HDR employees caused by moving vehicles. HDR provides a wide variety of services which expose employees to the hazards of moving traffic. The at-risk services performed by HDR employees may be categorized into three major classifications, each of which presents unique moving vehicular exposure scenarios:

- **Construction zones**
- **Field visits along roadways**
- **Surveying**

The general guidelines presented below are to be followed whenever HDR employees are exposed to moving traffic, regardless of the classification of the service being provided. Additionally, classification-specific guidelines (Sections 7.2, 7.3, 7.4, and 7.5) shall also be reviewed and followed, as applicable.

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- The project manager will appoint an HDR “employee in charge” to supervise HDR employees, sub-contractors, and sub-consultants during the activity exposing the project team to moving traffic hazards. The employee in charge must have a working knowledge of all guiding documents (relevant Federal and State directives such as the MUTCD, contract documentation such as the Traffic Control Plan, and HDR H&S Procedure #17). The employee in charge must conduct a job briefing at the beginning of each shift and as required during the shift. At a minimum, the job briefing must address work to be performed, individual responsibilities, and pertinent health and safety issues to include remaining out of the flow of traffic at all times unless specifically addressed in paragraphs 7.3, 7.4, and 7.5 of this Procedure.
- Any state/provincial/municipality and/or Manual of Uniform Traffic Control Devices (MUTCD) guidelines should be reviewed and followed prior to going into the field.
- Those HDR employees that are subjected to traffic on a project shall follow the approved Traffic Control Plan that has been designed (by HDR, the responsible agency or the contractor) for the project.
- Barricades/signs located within construction zones shall not be tampered with, removed, or relocated.
- All HDR employees should take a course to become certified in Traffic Safety when it is required by the local agency.
- If the placement of traffic control devices by HDR employees is required based on local municipality guidelines, the devices should remain in the field only while HDR employees are present.

7.2 Safety Vest Guidelines

“Safety or Traffic vests” are lightweight high visibility vests, sporting reflective striping, worn when proximity to moving traffic mandates that workers wear a high visibility garment. The vest design criteria are specified in the ANSI/ISEA Standard 107-2004 (or later) - American *National Standard for High-Visibility Safety Apparel* and Canada Standards Association Standard Z96-09 (or later), *High Visibility Safety Apparel*. These standards establish 3 different classes of high-visibility safety vests. Class 1, 2, or 3 garments are selected based on the traffic speed, visual conditions, and proximity of the worker to the hazard (see Tables 1 and 2 below).

HDR employees exposed to moving traffic shall wear a Class 2 or Class 3 safety vest (or Class 2 or Class 3 rain jacket), as appropriate, with the HDR logo¹. Class 1 safety vests are not allowed for HDR field activities. Note that you may always step up in protection, e.g., wearing a Class 3 where a Class 2 is mandatory. While most vests have traditionally been manufactured using the color orange, some vests are now being made with other colors – lime, etc. HDR typically uses an orange vest, but will accede to local requirements or our client’s wishes if they mandate a particular color.

¹ Safety vests without the current HDR logo can be used **until** December 31, 2014. After which, they shall be removed from service, disposed of, and replaced with vests carrying the HDR logo.

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Traffic Safety Health & Safety Procedure #17

Table 1
Classes of Safety Vests (from ANSI/ISEA 107 - 2004)

Parameter	Class 1 ^a	Class 2	Class 3
Speed of Traffic	0-25 mph	25-50 mph	Above 50 mph
Volume of Site Activity	Low, with good separation from traffic	Medium	High
Minimum Area of Background/ Retroreflective Material	217 in ² /155 in ²	775 in ² /201 in ²	1,240 in ² /310 in ²
Minimum Width of Bands	1 inch	1.375 inches	2 inches

^a. Class 1 vests not allowed for HDR field activities in proximity to moving traffic.

Table 2
Classes of Safety Vests (from CAN/CSA Z96-09)

	Class 1 ^a	Class 2	Class 3
Description of Minimal Coverage	Basic harness or stripes/ bands over the shoulder(s) and encircling the waist.	Full coverage of upper torso (front, back, sides and over the shoulders ^b). Minimum side coverage of 50% from bottom edge of garment to shoulder point.	Class 2 apparel plus bands encircling both arms and both legs. These bands shall be composed of combined performance stripes/bands or a combination of retro-reflective and background material.
Background material minimums	0.14 m ² (minimum) (217 in ²)	See Above	See Above
Retroreflective or combined performance material used in conjunction with background material	0.10 m ² (155 in ²)	0.13 m ² (202 in ²)	0.20 m ² (310 in ²)

^a. Class 1 vests not allowed for HDR field activities in proximity to moving traffic.

^b. As a special case, bib style overalls are recognized as Class 2. Bib-style overalls are not required to have retroreflective material over the shoulders, but may include retroreflective or combined-performance material around the legs.

7.3 Construction Zones

The guidelines listed herein are intended for those HDR employees that work within or in the vicinity of construction zones. Employees within this category may be exposed to impact hazards from wheeled construction equipment and/or vehicular traffic while performing their work duties. At a minimum, the following actions shall be followed:

- **Class 2 or 3 safety vests** and **hard hats** shall be worn during visits to construction zones. Hard Hats may require reflective tape for night work.
- Employees should take extra care when near heavy construction equipment, since operator visibility is often restricted. HDR operated vehicles within construction zones, where traffic control devices are utilized, shall be equipped with a yellow revolving light.
- In case of an accident involving yourself or others within the construction zone, notify your Department Manager and OSC as soon as possible. The OSC shall be responsible for completing an *Accident/Incident Report* (see HDR H&S Manual, Section 7). Regardless of the type or severity of the accident, always obtain a copy of the police report (or case number). **Do not discuss the accident with outside personnel.**

7.4 Field Visits Along Roadways

Field visits may consist of driving or walking the roadway corridor and noting items such as entrances, culvert locations, observing traffic flow, conducting environmental surveys or performing similar tasks. At a minimum, the following actions shall be followed:

- Employees should park their vehicle off the traveled roadway and walk to their intended destinations whenever possible. Driveways and/or entrances in the project area should be used, if available. If the vehicle must be parked in the roadway, it shall be parked as far as possible from the edge of the traffic lanes.
- If the vehicle will be on the shoulder for less than two hours (see Ontario requirement below), it should be equipped with a yellow revolving light. Where allowed by local jurisdiction and client, installation/use of strobe lights in the hazard warning light sockets, in lieu of an overhead light bar is permissible. The strobes must be visible at all points (360 degrees) around the vehicle. Additionally, if the vehicle will be on the shoulder for greater than two hours, advance signing should be used. The layout of the signing devices should be consistent with applicable guidelines.

Ontario OHS Regulation 213/91, Section 67(11), *Work on Freeway Shoulders* states:
“If work on a shoulder of a freeway is expected to take less than 30 minutes to complete, a vehicle with four-way flashers and a 360-degree beacon light shall be provided.”

- **Class 2 or 3 safety vests** must be worn during field visits located along traveled roadways.
- If any measurements or other work tasks within the traveled roadway will be conducted (e.g., measurements along the roadway, sewer measurements, etc.), a minimum of two

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employees should be used, such that one employee is available to monitor the traffic flow along the roadway within the vicinity of the fieldwork. The need for two employees is a prudent safety consideration to be observed in all circumstances.

7.5 Surveying Crews

Those HDR employees that are classified as surveyors have a significant level of exposure to moving traffic. Surveyors may be required, based on local guidelines, to set up traffic control devices alerting moving traffic of their presence in the roadway. Applicable local requirements shall be adhered to when setting up traffic control devices. If it is deemed necessary for HDR surveyors to work within the vicinity of moving traffic (whether in the roadway or along the roadway) the following actions shall be taken:

- If closure of a travel lane is required for performing surveying duties, the roadway owner or responsible agency shall be notified in advance to provide any necessary traffic control devices that HDR cannot directly provide.
- Any permits required for work within the roadway should be obtained and filed with the office OSC.
- If a flagger is needed to complete the required traffic control, only those HDR employees trained in proper flagging techniques will be permitted to perform these duties.
- **Class 2 or 3 safety vests** must be worn when working in the traveled roadway or along traveled roadways. Hard hats must be worn in active construction zones.
- The survey vehicle shall be equipped with yellow revolving light/strobes when it is being used to help perform surveying duties.

8.0 TRAINING REQUIREMENTS

HDR will provide exposed employees general awareness training on the hazards of moving traffic, and the safety measures and actions specified in this Procedure. In addition, Traffic Control for Construction Personnel training will be provided to employees assigned to work in construction zones where traffic control devices (as defined in the Manual of Uniform Traffic Control Devices) are used.

Currently, HDR does not authorize employees to act as flaggers or traffic control persons, except during temporary emergency conditions. The flagging activities shall only be conducted by an HDR employee during an emergency until a qualified flagger is present. Qualified flaggers must obtain training from a certified or recognized trainer, acceptable to the project client and/or appropriate state agency.

All training shall be documented in writing, with a copy forwarded to Corporate Safety.

9.0 REFERENCES

The following references were used in the development of this Procedure:

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- *Manual On Uniform Traffic Control Devices (MUTCD) – United States and Canada Versions*
- **Alberta** Occupational Health and Safety Code Part 12 General Safety Precautions, Section 194, *Vehicle Traffic Control*
- **British Columbia** Occupational Health and Safety Regulation, Part 18, *Traffic Control* and Part 8, *Personal Protective Clothing and Equipment*
- **Manitoba** Occupational Health and Safety Regulation, Part 20, *Vehicular and Pedestrian Traffic* and Part 6, *Personal Protective Equipment*
- **Newfoundland and Labrador** Occupational Health and Safety Regulation, 70/09, Part VII, s. 81, *High Visibility Apparel* and Part XVI, *Traffic Control*
- **Ontario** Occupational Health and Safety Regulations for *Construction Projects*, RRO 213/91, s.67-69, *Traffic Control* and s. 106, *Protective Clothing*
- **Saskatchewan** OHS Regulations 1996, compiled through 2009, PART IX, Section 13, *Risk from Vehicular Traffic*
- *Part VI of the U.S. MUTCD – Revision 3 September 3, 1993 (or latest edition)*
- *Iowa Dept. of Transportation Standard Road Plan RS 1-2 & RS 61-62*

Corporate Safety encourages each department to acquire a copy of the “Guide to Temporary Traffic Control in Work Zones” for reference. This document should be reviewed for purposes related to this Procedure when no state/local guidelines can be identified. This document includes 17 typical applications from the MUTCD.

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Attachment

[ATTACHMENT #1](#)..... General Guidelines for Choosing Personal Protective Equipment



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**Personal Protective Equipment
Health & Safety Procedure #21**

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1.0 OBJECTIVE

HDR personnel frequently perform services at sites that present hazards requiring the use of Personal Protective Equipment (PPE) to prevent bodily harm. PPE is necessary for body protection when engineering or administrative controls are not feasible or effective in eliminating hazards. It is the objective of HDR to provide training and access to personal protective equipment for HDR employees when PPE use is required.

Personal protective equipment is not a substitute for good engineering or administrative controls or good work practices, but should be used in conjunction with these controls to ensure the safety and health of HDR employees. When necessary, PPE will be provided, maintained, and used to lessen the likelihood of occupational injury and/or illness.

2.0 PURPOSE

This Procedure details the design, selection, and use requirements for specific types of PPE that may be required. This Procedure addresses eye, face, head, foot, and hand protection and is in accordance with the following Occupational Safety and Health Administration (OSHA) standards:

PPE for General Industry

- 1910 Subpart I
 - App A - References for further information (Non-mandatory)
 - App B - Non-mandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment Selection.
- 1910.132 - General requirements.
- 1910.133 - Eye and face protection.
- 1910.135 - Head protection.
- 1910.136 - Occupational foot protection.
- 1910.137 - Electrical protective devices.
- 1910.138 - Hand Protection.
- 1910.151(c) - Emergency eyewash/shower.

PPE for Construction

- 1926 Subpart E
- 1926.95 - Criteria for personal protective equipment.
- 1926.96 - Occupational foot protection.
- 1926.100 - Head protection.

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- 1926.102 - Eye and face protection.
- 1926.104 - Safety belts, lifelines, and lanyards.
- 1926.106 - Working over or near water.

Additional Related HDR H&S Procedures

Respiratory, Hearing Protection requirements, and ergonomic wrist supports are contained in separate HDR Procedures (#9, #26 and #16, respectively), since the need for participation in these Programs is established through industrial hygiene monitoring. Additionally, OSHA Standard 29 CFR 1910.120 outlines specific PPE requirements for Hazardous Waste Site Work. These requirements are addressed in the HDR H&S Procedure #20 - *Hazardous and Toxic Waste*. Also, PPE required for employees working on elevated work areas are addressed in either HDR H&S Procedure #12 - *Fall Protection* (all general construction, highway bridge inspection), or Procedure #14 – *Railroad Safety* (specific to railroad bridge work, see Section 12.4). Additionally, HDR H&S Procedure #18 – *Water and Boating Safety* covers the requirements for personal flotation devices and life rings. The selection of high-visibility traffic vests is discussed in HDR H&S Procedure #17 – *Traffic Safety*.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	07/14/2003
1	Revision	01/01/2007
2	Revision	09/21/2012
3	Re-Formatting	06/14/2013
4	Addition of “(or later)” to ANSI References	11/06/2013
5	Section numbers under 10.0 were revised to “6.”	12/18/2013
6	Addition of PPE acquisition information and hardhat logo and service life requirements	4/29/2014

4.0 APPLICABILITY

The HDR PPE Program implemented in this Procedure applies to all HDR personnel at HDR client sites and at HDR facilities. All employees, regardless of HDR Department, will be impacted by this Program if their job duties require the use of PPE.

5.0 PROGRAM IMPLEMENTATION

This Program will be administered corporately by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC) and project managers.

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Director of Safety. The Director of Safety shall:

- Periodically review, at least annually, the effectiveness of this Program, identify any deficiencies, and ensure they are corrected;
- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations; and
- Provide guidance to OSCs and project managers on the selection and purchase of approved PPE.

Office Safety Coordinators. The OSCs shall:

- Understand this Procedure and implement this PPE Program for their office.
- Make sure that this Procedure is readily available in each office;
- Coordinate with project managers on PPE needs and make appropriate PPE available to employees;
- Ensure employees are trained on the proper use, care, and cleaning of PPE, and
- Interface with the director of safety regarding any unsafe site conditions that have been discovered, and need addressing or interpretation.

Project Managers. Project Managers shall:

- Provide information and training to project personnel on the required PPE for each project, it's care, limitations and use;
- Seek assistance from the OSC to evaluate hazards; and
- Ensure, through coordination with the OSC, that defective or damaged equipment is replaced.

Project Professionals. HDR personnel performing services within the scope of this Procedure shall:

- Understand this Procedure and, in cooperation with project managers, identify equipment that is needed to safely perform their duties, in accordance with this Procedure and the specialized training provided.
- Interface with their OSC and project manager regarding any unsafe site conditions that they discover, and offer suggestions (as experience allows) on improvements or alterations in this Procedure that would address the unsafe condition.

6.0 GENERAL PROGRAM COMPONENTS

The OSHA PPE Standard requires that each general industry employer that exposes employees to eye, face, head, foot, and/or hand hazards during the performance of assigned duties shall perform the following tasks:

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1. Perform a hazard assessment of the workplace to determine if hazards are present, or likely to be present, which necessitate the use of PPE.
2. For all hazards identified, the employer shall select, and have each exposed employee use the type of PPE that will protect the employee from the identified hazard(s).
3. Upon issuance of the PPE, the employer shall instruct the employee on the purpose and proper use of the PPE, its limitations, and ensure that the PPE fits each affected employee properly.
4. Additionally, the employer must verify that the hazard assessment has been performed through a written certification that identifies **a)** the workplace evaluated; **b)** the person certifying that the evaluation has been performed; **c)** the date(s) of the hazard assessment, and **d)** identifies the document as a certification of hazard assessment.

6.1 Hazard Assessment

HDR is a mobile workforce employer; therefore, employees provide services in a variety of settings, which may be classified as general industry (e.g., wastewater treatment plants), or construction (e.g., field design & oversight, environmental assessments, surveying). OSHA requires that employers performing general industry activities perform the above tasks, including a hazard assessment for each repetitive work task. OSHA does not place this same requirement on construction activities, because of the transitory nature of the tasks. Since the very nature of our project tasks is typically non-repetitive and varied, it is not possible to complete a formal, permanent hazard assessment for every task that any employee may perform. When working in an industrial setting, the Project Manager (PM) will consult with the client on the hazards associated with the workplace, and ensure employees are aware of and comply with the client requirements for PPE. Documentation of the hazards associated with the project site and any client requirements for PPE is included in the *Project Guide*, which is completed prior to work on any project.

It is the policy of HDR that all employees requiring PPE for the performance of any task, whether general industry or construction, be adequately trained in the proper use and limitation of that PPE. Additionally, HDR will provide training on the different classes of common hazards present throughout our business universe, and raise our employees' understanding of when, why, and what type of PPE is needed. HDR will further ensure that this PPE is provided to the employee.

6.2 Equipment Selection/Availability/Acquisition

6.2.1 Selection

The selection of all PPE is based on the potential hazards. Once the hazards of a worksite have been identified, the project manager will determine the suitability of the PPE presently available and, if necessary, select new or additional equipment necessary to provide adequate protection (see Attachment 1).

Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards will be provided or recommended for purchase.

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6.2.2 Availability

HDR will provide all necessary PPE. General PPE such as HDR hardhats, hearing-protective equipment, safety vests, and life jackets will be available for checkout from HDR equipment stores located in each office. If possible, the cost of any other special safety equipment shall be included in projects as a direct cost eligible for reimbursement, or prior approval obtained from the department manager if the equipment is to be purchased.

If an employee wishes to use his or her own purchased PPE, the project manager shall be informed. Upon confirming the adequacy of the equipment for the assigned task, the project manager will ensure that the equipment is subject to the same procedures and requirements contained herein for maintenance, inspection, and sanitation.

6.2.3 Acquisition

MidContinent Safety is HDR's sole provider for safety apparel with the HDR logo. Items can be selected and ordered from an online catalog accessible from the H&S portal. Purchases are billed to Corporate for payment and then charged to the ordering department. For other all other safety equipment and supplies, with the exception of safety footwear and prescription safety glasses, MidContinent is our preferred provider and orders should be made through the online catalog accessible from the H&S portal. HDR does not have a specific provider for safety footwear but discount programs are available from various vendors and are posted on the H&S portal.

6.3 Protective Devices

All personal protective clothing and equipment will be of safe design and construction for the work to be performed, and shall be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH (National Institute of Occupational Safety and Health) or ANSI (American National Standards Institute) standards will be procured or accepted for use. Newly purchased PPE must conform to the updated ANSI standards (if applicable), as follows:

- a. *Eye and Face Protection* ANSI Z87.1-1989 (or later)
- b. *Head Protection* ANSI Z89.1-1997 (or later)
- c. *Foot Protection* ANSI Z41.1-1999 (or later) or new ASTM F2413 standard(s)
- d. *Emergency Eyewash/Shower* Z359.1-1990 (or later)
- e. *Hand Protection.* There are no current ANSI standards for gloves; selection must be based on the performance characteristics of the glove in relation to the tasks to be performed.

Careful consideration must be given to comfort and fit of PPE in order to ensure that it will be used. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected. Under no circumstances will defective or damaged PPE be used, it should be disposed of promptly.

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6.3.1 Eye and Face Protection

6.3.1.1 Overview

Prevention of eye injuries requires that all persons who may be exposed to eye injury wear protective eyewear. This includes HDR employees and HDR visitors passing through an identified eye-hazard project or office area. ANSI approved goggles and/or plastic eye protectors that afford the maximum amount of protection possible are available for checkout from local HDR equipment stores. If personnel wear prescription glasses, they shall be provided with a suitable eye protector to wear over them.

Appropriate eye/face protection is required when an employee is exposed to flying particles, molten metal, liquid chemical contact (including acids or caustics), harmful chemical gasses or vapors, bioaerosols, or potentially injurious light radiation. Whenever there is a hazard from flying objects, affected employees must be provided eye PPE with attached side protection, either fixed as part of the PPE or manufacturer provided detachable components. Further, all eye/face PPE must be distinctly marked with the identification of the manufacturer.

Following the requirements of §1910.133, "Eye and Face Protection", any selected PPE described in this section must meet/exceed the following requirements:

Protective eye and face protective devices shall comply with ANSI Z87.1-1989 (or later), *American National Standard Practice for Occupational and Educational Eye and Face Protection*.

6.3.1.2 Faceshield

A faceshield is a clear plastic/Plexiglas curved shield that extends down from a circular headband, and is worn in front of the face. They are worn to protect the eyes and face from **frontal liquid splash**. They are not acceptable for flying particulates.

Face shields shall only be worn over primary eye protection (safety glasses or goggles), and never as the only eye protection.

Faceshield Components and Characteristics

Material	Scratch Resistance	Chemical Resistance	Impact Resistance	Temperature Resistance	Optical Quality	Price \$
Acetate/Propionate	Moderate	High	Moderate	Moderate	High	Moderate
Polycarbonate	Moderate	Low	High	High	High	High
Polyester	Moderate	Low	Low	Low	High	Low
Mesh	High	None	Low	High	Low	Moderate

6.3.1.3 Safety Glasses

These are lightweight glasses, generally constructed of one-piece PVC. These one-piece units have molded side protection as an integral part of their construction. May also be prescription for employees with optical deficiencies, however, these may or may not have side protection. Safety Glasses are designed to prevent **direct particulate impaction**.

6.3.1.4 Safety Glasses with Sideshields

These are glasses as described above, with either fixed, permanent safety sideshields, or detachable sideshields. Both may be acceptable, as long as the requirements listed at the beginning of this section are met. The purpose of the sideshield(s) is to stop flying projectiles, such as **particulates, from entering the eye from the side**.

6.3.1.5 Goggles

Goggles are one-piece molded eye protection that fit snug to the skin surrounding the eye orbits (forehead and cheeks), and employ a flexible band behind the head to maintain the snug fit. Generally constructed of vinyl, goggles are usually vented to aid in heat dissipation. These offer the best protection to the eyes from **all forms of eye hazards**, but may fog somewhat during extended exertion. Goggles may be clear or tinted (personal preference). One advantage of goggles is that some models fit over prescription glasses, whereas safety glasses may not.

6.3.1.6 Prescription Safety Eyewear

Each HDR employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses (goggles, faceshields) without disturbing the proper position of the prescription lenses or the protective lenses.

Reimbursement of Prescription Safety Glasses

Employees who are exposed to eye hazards for extended periods of time and who need to wear **prescription** lenses shall be reimbursed for the cost of one (1) pair of prescription safety glasses, with sideshields, per each two-year period, as needed. The employee shall be reimbursed for the cost of the glasses, up to a maximum of \$170.00. All safety glasses shall either be equipped with permanently installed sideshields, or rigid removable shields. All glasses shall comply with the design requirements specified in ANSI Z87-1989 (or later).

Reimbursement of Prescription Respirator Eyeglass Inserts

Employees who need to wear a respirator shall be reimbursed for the cost of one (1) pair of prescription respirator eyeglass inserts per each two-year period, as needed. Employees must visit their eye specialist to check fitting and ensure that the respirator insert provides acceptable vision. Insert frames must be returned to the approved vendor for installation of new or replacement lenses.

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HDR will not reimburse the employee for prescription or non-prescription safety glasses for those employees who need protection for only brief or intermittent periods of time. In these cases, employees can check out safety glasses or safety goggles, to be worn over their personal eyewear, from HDR equipment stores.

Note: To be eligible for reimbursement, all personal protective equipment shall meet specifications of the American National Standards Institute (ANSI), where these standards exist. All receipts for purchases of glasses should indicate that the item purchased meets these criteria. In addition, supervisor approval is required prior to purchase, as the cost of this reimbursement is borne by the local office safety budget.

6.3.1.7 Emergency Eyewash Facilities

Emergency eyewash facilities meeting the requirements of ANSI Z358.1-1998 (or later) will be provided in all areas where the eyes of any employee may be exposed to corrosive materials. Emergency eyewashes should not be confused with portable squeeze rinse bottles. By definition, an eyewash must be so designed as to deliver 0.4 gallons per minute, for 15 minutes minimum, of potable water in a steady stream (therefore, a minimum capacity of 6 gallons). These units may be plumbed (fixed facilities), or portable (construction sites). Commonly used portable units have a poly tank holding 6 gallons and is set up near the hazardous operation, then filled with water. The eyewash flow should flush both eyes simultaneously, with a velocity low enough not to be injurious to the user. Also, the activating control valves on all units must be designed so that the water flow remains on without the use of the operator's hands.

Eyewashes should be located as near to the hazard as possible, but should be within 10 feet, or as close to the hazardous operation as possible, given floor layout. The path leading to the eyewash must be unobstructed. The only exception to this is on hazardous waste sites, where the eyewash unit is located in the contamination reduction zone. Routine maintenance requirements are presented in Table 5-1, below.

**Table 5-1
Eyewash Maintenance Requirements**

	Flush Schedule	Freeze Protection	Anti-Bacterial	Sign Required
Plumbed Units	Weekly	No	No	Yes
Portable Units	Per mfg. inst.	Maybe	Maybe	Yes

The above requirements are also applicable for combination eyewash/quick drench showers.

(A) Eyewash Sanitation

Remember that all users of eyewashes have injured eyes-this means the protective surface of the eye has been compromised in some way, and a pathway for infection may

now exist. If any eyewash unit is unused for extended periods, pathogenic bacteria may grow in the dead-water pipe, and infect the eye(s) of the user. Plumbed units are required to be flushed weekly, to prevent the proliferation of bacteria in the dead-water zone, but this issue is more complicated for portable units. There are only two options for portables-either change out the water weekly (which is usually not feasible, due to the weight of these units, and the difficulty of transportation), or use a commercially prepared anti-bacterial additive. Many inexpensive, ophthalmic approved agents are now sold in safety supply houses.

All eyewash nozzles must be protected from worksite contamination by keeping the nozzle caps on the nozzles when not in use. Contaminated nozzles can introduce microbial agents into the injured eye, resulting in serious eye infections.

(B) Freeze Protection

When portable units are used in cold weather, they may freeze. There are now two classes of cold-weather eyewash/shower portable units available: *freeze-resistant* and *freeze-protected*. Neither type is necessarily water tempering-that is, the water being dispensed will be at ambient temperature. Freeze-resistant systems are designed to withstand sub-freezing temperatures for brief periods only, are plumbed units, and are not generally recommended. Freeze-protected units are electrically heat-traced, and therefore can be used throughout extreme, long-duration, cold periods. Freeze protection for portable units can be accomplished by installing a heating core into the reservoir tank, which electrically heats the water to above freezing.

Note: The warmer the water (within limits), the more acceptable it will be to the user, and the easier it will be to keep the victim flushing for 15 minutes.

6.3.2 Head Protection

Protective helmets (hardhats) will be furnished to, and used by, all HDR employees on project sites when hazards from falling or flying objects or electrical shock/burns are present. Hardhats will also be worn at all times by employees working on construction sites unless they are inside the cab of a vehicle, a trailer, or a substantially complete building.

Hardhats are specified by type and class and must meet the design requirements specified in ANSI Z89.1-1986 (or later):

- **Type I** – Helmets intended to reduce the force of a blow to the top of the head only.
- **Type II** – Helmets intended to reduce the force of a blow to the top of the head or off center.
- **Class G** – General. Reduces danger of contact to low voltage conductors (up to 2,200 volts).
- **Class E** – Electrical. Reduces danger of contact to high voltage conductors (up to 20,000 volts).

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- **Class C** – Conductive. Not intended to provide protection against electrical hazards.

The standard HDR hardhat is a Type 1, Class G hat with an embossed/silk screened HDR logo¹. **Although ANSI approved, HDR does not currently approve the use of “cowboy” style hardhats.** Employees may select from a hardhat with a front brim only or a hardhat with a full brim (provides added sun protection for employees working outside). Any add-ons employed to extend the protective cover of the brim are acceptable as long as attachment does not mar or penetrate the hat surface.

Bump caps/skull guards may only be worn for protection against scalp lacerations from contact with sharp objects. They will not be worn as substitutes for hardhats because they do not afford protection from high impact forces or penetration by falling objects.

HDR issued hardhats must include the current HDR logo and have a maximum expiration date (useful life) of five years² from the month of purchase (includes outer shell and inner suspension apparatus). A small adhesive sticker must be placed inside the hardhat shell to indicate the month and year of purchase. Any hardhat without a legible dated sticker shall be deemed to have been put into service April 2014.

6.3.3 Foot Protection

Safety shoes or boots with toe-impact protection (typically “steel toed”, but the protection may also be made of non-metal material, as long as it carries the old ANSI or current ASTM approval) are required to be worn in work areas where carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet. Toe-protective boots, mid-ankle or higher variety shall be worn by employees working on construction sites, with the exception of employees not working in the vicinity of on-going construction activities (e.g. an employee going to a trailer for a meeting). Additionally, all employees working within the foul zone on railroad property shall also wear toe-protective, over-the-ankle leather boots.

Non-toe protective work boots are only acceptable where the only hazard to the foot comes from tripping or lateral contact with sharp or rough objects, but where no puncture potential from underneath the foot exists. Therefore, it is HDR policy that all boots purchased for reimbursement, be of the toe-protective, mid ankle or higher variety, lace-up variety, and meet the old ANSI or current ASTM design and performance requirements.

Metatarsal (top of foot) Protection

¹ Hardhats that do not include the current HDR logo can be used **until** December 31, 2014. After which, they shall be removed from service, disposed of, and replaced (see Section 6.2.3). Covering up of old logos with stickers bearing the new logo is not acceptable.

² The maximum lifespan of five years shall apply to all HDR issued hardhats unless regular inspection determines that it be replaced sooner or local regulations specify a shorter time frame, in which case the most stringent timespan shall apply.

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When the top of the foot is exposed to impact from (dropped) heavy materials (foundries, etc.), an add-on device, called a metatarsal guard, may be either built into the boot by the manufacturer, or later added as a slip-on by the wearer. They feature a leather enclosed metal shield, which lays parallel with the foot top, absorbing impact and distributing the blow over a wider area. While offering additional protection to the top of the foot, ANSI does not allow for the use of these add-on metatarsal shields to substitute for protective footwear. In other words, where protective footwear is required, an approved ANSI/ASTM boot is needed, and slipping on metatarsals over non-safety boots or shoes will not meet this requirement. Metatarsals may be added to protective boots at any time.

Boot Reimbursement Policy

Employees who are assigned to the field essentially full time and where foot protection is frequently required shall be reimbursed for the cost of one (1) pair of approved safety boots, per each two-year period, as needed. The employee shall be reimbursed for the cost of the boots, up to a maximum of \$125.00. All safety boots shall comply with the old ANSI or current ASTM design requirements. Approval from their supervisor is required prior to purchasing the boots as the cost of this reimbursement is borne by the local office safety budget.

Note: To be eligible for reimbursement, all receipts for purchases of boots should indicate that the item purchased meets either the ANSI or ASTM criteria.

6.3.4 Hand Protection

Office

It is HDR policy that anyone using X-Acto knives must don a cut-resistant ambidextrous glove on their non-knife wielding hand while cutting. These gloves have been distributed throughout the company in a variety of sizes. It is also recommended that users of knife-arm paper cutters also wear the glove, to prevent severe lacerations or amputations.

Chemical/Field Hazards

Suitable gloves shall be worn when hazards from chemicals, cuts, lacerations, abrasions, punctures, burns, biological, and harmful temperature extremes are present. Glove selection shall be based on performance characteristics of the gloves, conditions, duration of use, and hazards present. One type of glove will not work in all situations.

The first consideration in the selection of gloves for use against chemicals is to determine, if possible, the exact nature of the substances to be encountered. Read instructions and warnings on chemical container labels and MSDSs before working with any chemical. Recommended glove types are often listed on the MSDS, and should be followed whenever possible.

Chemicals eventually permeate all glove materials. However, they can be used safely for limited time periods if specific use and other characteristics (i.e., thickness and permeation rate and time) are known. The Corporate Safety Office can assist in

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determining the specific type of glove material that should be worn for a particular chemical (see also Attachment 1).

There currently are no ANSI performance requirements for work gloves; selection should be based on functionality and protection for the tasks anticipated.

6.3.5 Extreme Weather and Temperatures

If ordinary weather gear is not sufficient to protect an HDR employee, and special equipment or extraordinary clothing is needed to protect the employee from unusually severe weather conditions, HDR will provide such equipment to the employee at no cost. For example, employees working in extreme cold for extended periods of time, which may include overnight stays in the field, shall be provided with a sleeping bag designed for such conditions at no cost to the employee. Employee reimbursement for ordinary items such as winter coats, jackets, gloves, and parkas will NOT be provided by HDR.

There currently are no ANSI performance requirements for clothing and equipment required when working in extreme weather and temperatures, so selection should be based on functionality and protection specific to the conditions and tasks anticipated. See Procedure #29, *Cold Stress*, for additional information on working in extremely cold conditions.

6.4 Selection and Use of PPE in Laboratories.

On occasion, HDR employees may be engaged in work activities at laboratory settings. At such locations, PPE may be required to reduce the risk of exposure of an employee by contact, inhalation, or ingestion of an infectious agent, toxic substance, or radioactive material. For biological agents, the project manager, in conjunction with the Lab Supervisor will determine the Biosafety Level for the lab and the appropriate type of PPE required to be worn while working in the lab.

7.0 CLEANING AND MAINTENANCE

It is important that all PPE be kept clean and properly maintained. It is the responsibility of the user to regularly clean and maintain their issued PPE, and to clean all loaned PPE before returning it to the equipment stores. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. Personal protective equipment shall not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible.

It is also important to ensure that contaminated PPE, which cannot be decontaminated, is disposed of in a manner that protects employees from exposure to hazards.

8.0 TRAINING

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Any worker required to wear PPE shall receive training in the proper use and care of PPE. The local OSC, or his/her qualified designee, shall conduct this training. Periodic retraining shall be offered as needed. The training shall include, but not necessarily be limited to, the following subjects:

- When PPE is necessary to be worn
- What PPE is necessary
- How to properly don, doff, adjust, and wear PPE
- The limitations of the PPE
- The proper care, maintenance, useful life and disposal of the PPE

After the training, the employees shall demonstrate they understand the components of the PPE Program, and how to use PPE properly, or they shall be retrained.

9.0 RECORD-KEEPING

Written records shall be kept of the names of persons trained, the type of training provided, and the dates when training occurred. Training records should be forwarded to HDR Corporate Safety in Omaha, Nebraska, Attention Bob Schimpf. The HDR Corporate Training office shall maintain employees' training records for at least 3 years.

10.0 PAYMENT OF PPE

In general, HDR departments will bear the cost of providing required PPE for their employees. Exceptions to this requirement include safety-toe footwear, prescription safety eyewear, ordinary clothing, and ordinary weather related clothing. Under certain conditions, HDR will reimburse employees to a maximum amount for safety-toe footwear and prescription safety eyewear (see Sections 6.3.3 and 6.3.1.6 respectively for more details). The cost of ordinary clothing and ordinary weather related clothing will be borne by the employee. If cold weather gear beyond ordinary clothing is required, the employees department will cover the cost (see Section 6.3.5 for additional details).

HDR Departments will also pay for replacement PPE, except when an employee has intentionally lost or damaged the PPE.

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ONE COMPANY
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**Personal Protective Equipment
Health & Safety Procedure #21**

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General Guidelines for Choosing Personal Protective Equipment

1. Description and Use of Eye/Face Protectors

- a. **Safety Glasses.** Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Safety glasses are also available in prescription form for those persons who need corrective lenses.
- b. **Single Lens Goggles.** Vinyl framed goggles of soft pliable body design provides adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles, provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.
- c. **Welders/Chippers Goggles.** These goggles are available in rigid and soft frames to accommodate single or two eyepiece lenses.
 1. Welder goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.
 2. Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eyecups house impact resistant clear lenses with individual cover plates.
- d. **Face Shields.** These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance, and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection, and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.
- e. **Welding Shields.** These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to workers, to protect eyes and face from infrared or radiant light burns, flying sparks, metal spatter, and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.

Eye and Face Protection Selection Chart		
Source	Assessment of Hazard	Protection
IMPACT - Chipping, grinding, machining, drilling, chiseling, riveting, sanding, etc.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, face shields. For severe exposure, use face shield over primary eye protection.
CHEMICALS - Acid and chemicals handling	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield over primary eye protection Special-purpose goggles
	Irritating mists	
DUST - Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types.
LIGHT and/or RADIATION Welding - electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14
Welding - gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4
Cutting, torch brazing, torch soldering	Optical radiation	Spectacles or welding face shield. Typical shades: 1.5-3
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable.

2. Head Protection

Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protectors, in the form of protective hats, must resist penetration, and absorb the shock of a blow. The shell of the protective hat is hard enough to resist the blow and the headband and crown straps keep the shell away from the wearer's skull. Protective hats can also protect against electrical shock.

Protective hats are made in the following types and classes:

- **Type I** – Helmets intended to reduce the force of a blow to the top of the head only.
- **Type II** – Helmets intended to reduce the force of a blow to the top of the head or off center.
- **Class G** – General. Reduces danger of contact to low voltage conductors (up to 2,200 volts).
- **Class E** – Electrical. Reduces danger of contact to high voltage conductors (up to 20,000 volts).
- **Class C** – Conductive. Not intended to provide protection against electrical hazards.

3. Foot Protection

There are many types and styles of protective footwear and it is important to realize that a particular job may require additional protection other than listed here. Footwear that meets established safety standards will have an American National Standards Institute (ANSI) or an American Society of Testing Materials (ASTM) label inside each shoe.

- a. **Steel-Reinforced Safety Shoes.** These shoes are designed to protect feet from common machinery hazards such as falling or rolling objects, cuts, and punctures. The entire toe box and insole are reinforced with steel, and the instep is protected by steel, aluminum, or plastic materials. Safety shoes are also designed to insulate against temperature extremes and may be equipped with special soles to guard against slip, chemicals, and/or electrical hazards.
- b. **Safety Boots.** Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present:
 - When working with corrosives, caustics, cutting oils, and petroleum products, neoprene or nitrile boots are often required to prevent penetration.
 - Foundry or "Gaiter" style boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself.
 - When working with electricity, special electrical hazard boots are available and are designed with no conductive materials other than the steel toe (which is properly insulated).

4. Hand Protection

Skin contact is a potential source of exposure to toxic materials; it is important that the proper steps be taken to prevent such contact. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or any combination thereof.

Gloves should be replaced periodically, depending on frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.

Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The types of glove materials to be used in these situations include leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.

Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect hands from injury due to contact with moving parts, it is important to:

- Ensure that guards are always in place and used.
- Lockout machines or tools then disconnect the power before making repairs.
- Treat a machine without a guard as inoperative; and
- Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

The following is a guide to the most common types of protective work gloves and the types of hazards they can guard against:

- a. **Disposable Gloves.** Disposable gloves, usually made of lightweight plastic, can help guard against mild irritants.
- b. **Fabric Gloves.** Made of cotton or fabric blends are generally used to improve grip when handling slippery objects. They also help insulate hands from mild heat or cold.
- c. **Leather Gloves.** These gloves are used to guard against injuries from sparks or scraping against rough surfaces. They are also used in combination with an insulated liner when working with electricity.
- d. **Metal Mesh Gloves.** These gloves are used to protect hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.
- e. **Aluminized Gloves.** Gloves made of aluminized fabric are designed to insulate hands from intense heat. These gloves are most commonly used by persons working molten materials.
- f. **Chemical Resistance Gloves.** These gloves may be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. The gloves protect hands from corrosives, oils, and solvents. The following table is provided as a guide to the different types of glove materials and the protection they provide you against certain chemicals. When selecting chemical resistance gloves, be sure to consult the manufacturers' recommendations, especially if the gloved hand will be immersed in the chemical.

Glove Chart

Type	Advantages	Disadvantages	Wear for Protection Against
Natural rubber	Low cost, good physical properties, dexterity	Poor vs. oils, greases, organics. Frequently imported; may be poor quality	Bases, alcohols, dilute water solutions; fair vs. aldehydes, ketones.
Natural rubber blends	Low cost, dexterity, better chemical resistance than natural rubber vs. some chemicals	Physical properties frequently inferior to natural rubber	Same as natural rubber
Polyvinyl chloride (PVC)	Low cost, very good physical properties, medium cost, medium chemical resistance	Plasticizers can be stripped; frequently imported may be poor quality	Strong acids and bases, salts, other water solutions, alcohols
Neoprene	Medium cost, medium chemical resistance, medium physical properties	NA	Oxidizing acids, anilines, phenol, glycol ethers
Nitrile	Low cost, excellent physical properties, dexterity	Poor vs. benzene, methylene chloride, trichloroethylene, many ketones	Oils, greases, aliphatic chemicals, xylene, perchloroethylene, trichloroethane; fair vs. toluene
Butyl	Specialty glove, polar organics	Expensive, poor vs. hydrocarbons, chlorinated solvents	Glycol ethers, ketones, esters
Polyvinyl alcohol (PVA)	Specialty glove, resists a very broad range of organics, good physical properties	Very expensive, water sensitive, poor vs. light alcohols	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers
Fluoro-elastomer (Viton)	Specialty glove, organic solvents	Extremely expensive, poor physical properties, poor vs. some ketones, esters, amines	Aromatics, chlorinated solvents, also aliphatics and alcohols
Norfoil (Silver Shield)	Excellent chemical resistance	Poor fit, easily punctures, poor grip, stiff	Use for Hazmat work

Glove Type and Chemical Use

Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile Latex
*Acetaldehyde	VG	G	VG	G
Acetic acid	VG	VG	VG	VG
*Acetone	G	VG	VG	P
Ammonium hydroxide	VG	VG	VG	VG
*Amyl acetate	F	P	F	P
Aniline	G	F	F	P
*Benzaldehyde	F	F	G	G
*Benzene	F	F	F	P
Butyl acetate	G	F	F	P
Butyl alcohol	VG	VG	VG	VG
Carbon disulfide	F	F	F	F
*Carbon tetrachloride	F	P	P	G
Castor oil	F	P	F	VG
*Chlorobenzene	F	P	F	P
*Chloroform	G	P	P	E
Chloronaphthalene	F	P	F	F
Chromic Acid (50%)	F	P	F	F
Citric acid (10%)	VG	VG	VG	VG
Cyclohexanol	G	F	G	VG
*Dibutyl phthalate	G	P	G	G
Diesel fuel	G	P	P	VG
Diisobutyl ketone	P	F	G	P
Dimethylformamide	F	F	G	G
Diethyl phthalate	G	P	F	VG
Dioxane	VG	G	G	G
Epoxy resins, dry	VG	VG	VG	VG
*Ethyl acetate	G	F	G	F
Ethyl alcohol	VG	VG	VG	VG
Ethyl ether	VG	G	VG	G
*Ethylene dichloride	F	P	F	P
Ethylene glycol	VG	VG	VG	VG
Formaldehyde	VG	VG	VG	VG
Formic acid	VG	VG	VG	VG
Freon 11	G	P	F	G
Freon 12	G	P	F	G
Freon 21	G	P	F	G
Freon 22	G	P	F	G
*Furfural	G	G	G	G
Gasoline, leaded	G	P	F	VG
Gasoline, unleaded	G	P	F	VG

Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile Latex
Glycerine	VG	VG	VG	VG
Hexane	F	P	P	G
Hydrochloric acid	VG	G	G	G
Hydrofluoric acid (48%)	VG	G	G	G
Hydrogen peroxide (30%)	G	G	G	G
Hydroquinone	G	G	G	F
Isooctane	F	P	P	VG
Isopropyl alcohol	VG	VG	VG	VG
Kerosene	VG	F	F	VG
Ketones	G	VG	VG	P
Lacquer thinners	G	F	F	P
Lactic acid (85%)	VG	VG	VG	VG
Lauric acid (36%)	VG	F	VG	VG
Lineoleic acid	VG	P	F	G
Linseed oil	VG	P	F	VG
Maleic acid	VG	VG	VG	VG
Methyl alcohol	VG	VG	VG	VG
Methylamine	F	F	G	G
Methyl bromide	G	F	G	F
*Methyl chloride	P	P	P	P
*Methyl ethyl ketone	G	G	VG	P
*Methyl isobutyl ketone	F	F	VG	P
Methyl methacrylate	G	G	VG	F
Monoethanolamine	VG	G	VG	VG
Morpholine	VG	VG	VG	G
Naphthalene	G	F	F	G
Naphthalene, aromatic	G	P	P	G
*Nitric acid	G	F	F	F
Nitromethane (95.5%)	F	P	F	F
Nitropropane (95.5%)	F	P	F	F
Octyl alcohol	VG	VG	VG	VG
Oleic acid	VG	F	G	VG
Oxalic acid	VG	VG	VG	VG
Palmitic acid	VG	VG	VG	VG
Perchloric acid (60%)	VG	F	G	G
Perchloroethylene	F	P	P	G
Petroleum distillates (naphtha)	G	P	P	VG
Phenol	VG	F	G	F
Phosphoric acid	VG	G	VG	VG
Potassium hydroxide	VG	VG	VG	VG
Propyl acetate	G	F	G	F
Propyl alcohol	VG	VG	VG	VG



Chemical	Neoprene	Natural Latex or Rubber	Butyl	Nitrile Latex
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Stryene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65%)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
*Toluene	F	P	P	F
Toluene diisocyanate	F	G	G	F
*Trichloroethylene	F	F	P	G
Triethanolamine	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
*Xylene	P	P	P	F

* = Limited Service

VG = Very Good

G = Good

F = Fair

P = Poor (not recommended)



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Appendix

APPENDIX A.....	Pile Driving Noise Reduction Program
APPENDIX B.....	Contracted Aircraft Noise Reduction Program



ONE COMPANY
*Many Solutions*SM

Noise (Hearing Conservation)
Health & Safety Procedure #26

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1.0 OBJECTIVE

Many operations and equipment encountered at project sites produce noise. Exposure to prolonged excessive levels of noise can result in a permanent loss of hearing acuity, development of tinnitus (i.e., ringing of the ears), a possible increase in blood pressure, and stress-related problems. Noise may also cause difficulty in communicating or working effectively and safely. It is the objective of HDR to provide proper training, protective equipment, and (if necessary) audiometric monitoring to prevent permanent and temporary occupational hearing loss resulting from noise exposure.

2.0 PURPOSE

The purpose of this information is to assist HDR employees in recognizing and avoiding noise hazards encountered at project work sites, thereby preventing hearing loss due to workplace noise exposures. It is the goal of this HDR Noise Program to prevent employees from being subjected to noise exposures in excess of 85 dBA, as a daily, time-weighted average.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	09/01/1999
1	Revisions	08/11/2000
2	Revisions	11/03/2008
3	Revisions	07/12/2011
4	Re-Formatting	07/15/2013
5	Added Attachment B (Contracted Aircraft Noise Reduction Program); removed reference in Attachment A to cost of noise cancelling ear muffs; replaced figure in Attachment A with table	10/06/2014

4.0 APPLICABILITY

This Procedure applies to occupational exposure to noise hazards and applies to all HDR personnel at HDR client sites and at HDR facilities. Depending on assigned tasks, all employees, regardless of HDR department, may be impacted by this Program. The standards set forth in this Procedure for preventing hearing loss are based on OSHA 29 CFR 1910.95, 29 CFR 1926.52 and the Threshold Limit Values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH).

5.0 PROGRAM IMPLEMENTATION

This plan will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC) and project-specific Site Health and Safety Officer.

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Director of Safety. The Director of Safety shall:

- Periodically review, at least annually, the effectiveness of this Program, identify any deficiencies, and ensure that they are corrected; and
- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

Office Safety Coordinators (OSCs) and Site Health and Safety Officers (HSOs). The OSCs and HSOs shall:

- Provide initial training on this Procedure to their respective office staff, and make sure this Procedure is readily available in each office;
- Interface with the Director of Safety regarding any unsafe office or project site conditions that have been discovered, and need addressing or interpretation;
- Assist employees exposed to noise levels that exceed the Action Limit to become enrolled in the HDR Hearing Conservation Program (HCP), as outlined in this Procedure, and
- Enforce the use of hearing protectors where required.

6.0 DEFINITIONS

Action Level - A routine daily exposure to an 8-hour time-weighted average noise level in excess of 85 decibels, when measured with a dosimeter or sound-level meter on the A-scale at slow response. The action level is the criterion for instituting employee participation in the Hearing HCP, which includes audiometric testing.

Administrative Control - Any procedure that limits the noise dose by limiting the time or intensity of exposure, such as changes in the work schedule, increasing the distance between the noise source and the worker, or reducing exposure time through job rotation.

Audiogram - Charts, graphs, or tables that result from an audiometric test. An audiogram shows an individual's hearing threshold level as a function of frequency (Hz). The HDR HCP consists of a baseline, or initial audiogram, and annual audiograms thereafter. Annual audiograms detect shifts in an individual's threshold of hearing by comparison to their baseline audiogram.

Decibel (dB) - A unit of measurement of sound-pressure level. The decibel level of a sound is related to the logarithm of the ratio of sound pressure to a reference pressure. The dB has meaning only when the reference is known. The internationally accepted reference pressure is 20 micropascals.

Decibels, A-Weighted (dBA) - A sound level reading in decibels made on the A - weighted network of a sound-level meter at slow response. The "A" scale mimics the auditory response of the human ear.

Decibels, Peak (dBp) - A unit used to express peak sound-pressure level of impact noise.

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Engineering Control - Any mechanical device, barrier, enclosure, or other design procedure that permanently reduces the sound level at the source of noise generation, or along the path of travel.

Hertz (Hz) - A unit of measurement of frequency; equal to cycles per second.

Impact Noise - Variations in noise levels that involve peaks of intensity that occur at intervals greater than one second. If the noise peaks occur at intervals of one second or less, the noise is considered *continuous*.

Common project impact noises occur during drill rig auger hammering, hammer forge operations, sheet pile installation, etc.

“Loudness” – An individual’s perception of the intensity of sound pressure level. Arbitrary and without scientific meaning.

Noise - Unwanted sound. Considered a physical contaminant.

Noise Dose - A measure of cumulative noise exposure over a stated period, which takes into account both the intensity of the sound and the duration of the exposure.

Noise Dosimeter - An electronic instrument that integrates cumulative noise exposure over time and yields a noise dose, expressed as a time-weighted average in decibels.

Noise Hazard Area - Any work area with a continuous noise level of 85 dBA or greater.

Representative Exposure - The measurements of an employee's noise dose, which is representative of the exposure of an employee in a work area or job classification.

Standard Threshold Shift (STS) - An average hearing threshold shift of 10 dB or more at 2000, 3000, and 4000 Hz in either ear. A threshold shift can be temporary or permanent. *Temporary threshold shift* is a change in hearing threshold, primarily due to exposure to short-term, high-intensity noise that is usually recovered in 14 to 72 hours after exposure ceases. Any loss that remains after an adequate recovery period is termed *permanent threshold shift*.

Sound-pressure level - The term used to identify the intensity of sound (expressed in decibels), commonly perceived as “loudness.”

Sound-Level Meter (SLM) - An electronic, hand-held portable instrument used to measure sound pressure levels, conforming to the requirements for a Type II sound-level meter as specified in ANSI S1.4. Battery powered, SLMs are used for area surveys, and to determine the sound pressure levels generated by specific, point-source machines or processes.

Time-Weighted Average (TWA) Sound Level - The accumulated, average sound level over a defined period, usually 8 hours. Thus, it is normally referred to as an “8 hr TWA.” OSHA standards for maximum permissible noise exposures are given in 8 hr TWA decibels. **OSHA requires that HDR employees exposed to an average, daily noise level of > 85 dBA (8 hr TWA) wear hearing protection, and participate in our HCP.**

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7.0 CHARACTERISTICS OF SOUND

Sound is generated by the reception of airborne pressure waves caused by any vibrating source. The ear receives this mechanical energy, and transforms it to electrochemical impulses that are transmitted to the brain, resulting in the perception of sound. When exposed to high pressure levels for long periods of time, the receiving transmitters in the inner ear become deadened, resulting in a permanent reduction of hearing ability. **The intensity of sound pressure levels varies inversely with distance, so moving a short distance away from a source can greatly reduce the dose.**

8.0 REGULATORY NOISE LIMITS

8.1 Time-Weighted Average Exposure Limits.

The OSHA action level for an 8-hour, time-weighted average exposure is 85 dB of sound pressure measured on the A-weighted scale (dBA). If an employee's daily noise exposure level, averaged over 8 hours, exceeds 85 dBA, they must be enrolled in HDR's Hearing Conservation Program and must be provided hearing protection.¹ For single exposures of shorter or longer duration, the exposure limit must be adjusted. Elements of the HDR Hearing Conservation Program include audiometric testing and training.

Since the functions of our project staff generally afford them the option of moving freely about the project site, there are few reasons for HDR employees to ever be exposed to excessively loud noises for extended periods of time (exceptions are when operating boats/motorized specialty vehicles; during observation of pile driving activities, where we are required to remain near the point of noise generation; and when traveling on contracted aircraft).

If a nearby process generates high noise levels, our employees should move a short distance away, until normal conversations can be understood (administrative control). This will preclude the possibility that we will receive noise doses in excess of the OSHA Action Level.

Thus, because of the inherent mobility afforded most of our project personnel, it is our goal that employees never exceed the OSHA TWA Action Level of 85 dBA.

HDR has also adopted a three decibel exchange rate (also adopted in Europe) which decreases the allowed exposure time by half for every 3-decibel increase in sound pressure level. Note that every 3-decibel increase is a doubling of the sound pressure level. This means the HDR exposure limits are more stringent than the outdated OSHA noise exposure limits, which are based on a 5-decibel exchange rate.

HDR exposure limits are shown in Table 1. Protection against the effects of noise exposure shall be provided at no cost to the employee, and must be worn, whenever sound levels exceed those in Table 1.

¹ For purposes of the HCP, employee noise exposures shall be computed without regard to any attenuation provided by the use of personal protective equipment.

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**Table 1
HDR Exposure Limits for Continuous/Impact Noise**

Duration Per Day (Hours)	Action Level (dBA) ¹
16	82
8	85
4	88
2	91
1	94
0.5 (=30 minutes)	97
0.25 (=15 minutes)	100 ²
0.125 or less (< 7.5 minutes)	103

¹ Measured on the A-scale of a standard sound-level meter set at slow response.

² When sound pressure levels exceed 100 dBA on a time weighted basis, both plugs AND muffs must be worn simultaneously. To calculate combined protection factor, when both are worn, add 5 to the half-value NRR of the higher published NRR to obtain the combination protection afforded. For example, if the NRR for the plugs is 24 and the muffs is 20, then the actual reduction in noise decibels afforded by wearing both is $24/2 + 5 = 17$.

8.2 Speech Interference and Annoying Noise

In some cases, noise may not exceed standards established to protect hearing, but still interferes with speech or causes annoyance, either of which can reduce productivity. Although there are no mandatory standards for nuisance noise in the occupational setting, these guidelines and recommendations should be followed to protect employees from exposure to this type of noise.

Speech Interference

Most of the information conveyed through speech is in the mid-frequencies --from about 500 to 2000 Hz. Thus, noise in these frequencies often interferes with speech recognition. Mid-frequency range levels below 50 dB are desirable in a typical conference room; those above 70 dB often present a problem in such settings. Background mid-range noise levels above 60 dB make telephone conversation difficult. If elimination and/or reduction of this noise is infeasible, ear protection designed to filter some of the noise in the mid-ranges may make speech easier to understand.

Annoying Noise

Noise may be annoying because of its level, frequency, or aspects of its modulation. A noise may not be very "loud", but its frequency may be high enough to cause headaches in susceptible individuals. Alternatively, a noise may not be loud but may start and stop suddenly. This can disturb concentration or frighten exposed personnel. Annoyance caused by irregular noises can sometimes be masked by running an appliance, such as a fan, that generates a low constant "white" noise.

9.0 CONTROL OF NOISE EXPOSURE

The three ways to reduce employee noise exposure are through the use of:

- Engineering controls - Best option
- Administrative controls - Good option
- Hearing protectors – Worn when other controls fail

9.1 Engineering Controls

Engineering controls are defined as a permanent reduction in noise through any modification, insulation, isolation or replacement of the noise source. Examples include replacing old, noisy equipment; increasing sound dampening around equipment; or improving muffler design. Engineering controls should be formally considered before other types of controls are implemented. This is the best, and only permanent, option to eliminate the hazards posed by excessive noise. Unfortunately, HDR employees do not typically control noisy operations or mechanical noise sources, so we will rarely be able to implement engineering controls.

Any reduction in employee noise exposure is beneficial. However, if engineering controls are infeasible, or fail to reduce sound levels to within the limits of Table 1, administrative controls or usage of hearing-protective equipment must be used.

9.2 Administrative Controls

Administrative controls are changes in work schedules or operations to reduce the employees total noise dose. Common administrative controls include increasing the distance between the noise source and the worker, or reducing exposure time through job rotation. **Because our workers are not tied to one project site location, this will be the most simple, inexpensive, and frequently implemented form of noise exposure control for HDR project personnel.**

9.3 Hearing Protectors

Hearing protection should only be used as a last resort when feasible engineering and administrative measures have been implemented, and further protection is still needed. Hearing protection must be worn by HDR personnel when the workplace noise levels are:

- Greater than the Action Level(s) shown in Table 1, or
- When working within 120 feet of pile driving activities. See Appendix A – *Pile Driving Noise Reduction Program*, or
- When flying on contracted aircraft. See Appendix B - *Contracted Aircraft Noise Reduction Program*

Hearing protectors must reduce employee noise exposure, inside the ear, to a level of 85 dBA or below. Each hearing protector will state, on the package, a "noise-reduction rating" (NRR) number, which is the level of noise reduction (in decibels) the protector will provide if it is fitted and worn properly. The larger the NRR value, the better protection is afforded. In real practice, however, the advertised NRR is rarely achieved (especially for plugs); because of variability in workers ear canal size, improper installation, etc. Therefore, OSHA assigns a real-world

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attenuation value by dividing the advertised NRR rating in half. So a plug with an NRR of 24 would actually reduce the “noise level” inside the ear by 12 decibels. **HDR will use this “half-value” safety factor when determining the adequate protection needed.**

Although typically rated at lower NRR values, muffs (which can be attached to the hardhat) often provide superior protection to plugs, since there is less error in fitting and use. They also are more hygienic. HDR employees may select any plug or muff they prefer, as long as it has a sufficient NRR “half-value” rating to reduce the environmental noise below 85 dBA inside the ear. Select plugs with a minimum rating of 24 (Half-value = 12 dB); good muffs will carry a rating of at least 20 (Half-Value = 10).

Types of Hearing Protective Devices (Ear PPE)

a. Insert Type Earplugs

Hearing protection is provided at no cost to HDR employees. These devices are designed to provide an air-tight seal with the ear canal. There are three types of insert earplugs - premolded, formable and custom earplugs.

1. Premolded Earplugs

Premolded earplugs are pliable devices of fixed proportions. These are available in two standard styles, single flange and triple flange, come in various sizes, and will fit most people. While premolded earplugs are reusable they may deteriorate, and should be replaced periodically.

2. Formable Earplugs

Formable earplugs come in one standard size. Most are made of material which, after being compressed and inserted, expands to form a seal in the ear canal. After insertion, each earplug must be held in place while it expands enough to remain firmly seated. When properly inserted, they provide noise attenuation values that are similar to those from correctly fitted premolded earplugs. These are typically considered disposable after one day's use; some manufacturers, however, may authorize longer periods of use.

3. Custom Molded Earplugs

A small percentage of the population cannot be fitted with standard premolded or formable earplugs, due to small ear canals, ear injury, etc. In these cases, custom earplugs can be made to fit the exact size and shape of the individual's ear canal. These plugs are expensive, and muffs should be tried before ordering custom plugs. The HDR Director of Safety should be consulted prior to purchase. Individuals needing custom earplugs will be referred to an audiologist.

b. Earmuffs

Earmuffs are cup devices worn over both ears to reduce the level of noise that reaches the ear. Their effectiveness depends on an air-tight seal between the cushion and the head. Because of seal interference, large earrings should not be worn with muffs. Generally, earmuffs are more likely to be worn correctly than are earplugs; thus, the actual noise

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reduction provided by earmuffs in the field is closer to the stated value. Additional advantages are: (1) it is easier to verify that employees are wearing muffs in noise hazard areas than plugs, (2) muffs provide insulative protection in cold weather, and (3) it is easier to momentarily remove muffs to converse than to remove plugs, and more hygienic, since the user does not have to handle the skin-muff surface area. One brand of muff highly recommended is Peltor™, available through safety catalogs, or from most local safety suppliers.

10.0 NOISE MONITORING

Noise is measured through the use of two instruments – **Sound Level Meters (SLM)** and **Noise Dosimeters**. SLMs measure instantaneous, integrated-average and dose/TWA sound levels. They are typically used to survey an area or operation.

Dosimeters are personal sized monitors that are worn by the employee with a microphone that is clipped to an employee's shirt lapel. The dosimeter is usually worn for an entire shift or all day, providing a cumulative average noise exposure value (dose) representing the period sampled (any employee sampled must be notified of the results). Dosimeters incorporate all continuous, intermittent and impulsive sound levels from 80 to 130 dBA into the TWA dose value. These are used to determine personnel exposures, and to verify compliance with the limits presented in Table 1.

On construction sites, since project conditions change constantly, dosimeter personnel sampling is rarely performed. Potential noise levels are more frequently estimated by use of an SLM or by assuming overexposure, and enrolling project personnel in the HDR Hearing Conservation Program.

As a general guideline, if employees are unable to converse with each other, in a normal tone and volume, at a distance of 3 feet or less, ambient noise levels will generally exceed 85 decibels.

11.0 MEDICAL SURVEILLANCE

NOTE: Employee noise exposure shall be determined without regard to any sound attenuation provided by the use of hearing protectors.

If any HDR employee is, or is expected to be, routinely occupationally exposed to continuous noise at or above the Action Level (regardless of whether ear protection is worn), the employee shall be enrolled in HDR's Hearing Conservation Program, which complies with the requirements of 29 CFR 1910.95 and includes:

- Annual education on the health effects of noise exposure and instructions on how to fit and wear hearing protectors;
- A baseline audiogram and annual follow-up audiometric testing.

To enroll in the HDR's HCP, contact the Corporate Health & Safety Department.

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The Health & Safety Department will direct the employee to contact an approved clinic in the employee's locale. The employee shall receive initial information concerning the effects of noise, the purpose of audiometric testing, and a survey of any pre-existing medical conditions that may adversely impact the audiometric test. The employee shall provide information regarding their work history to document past noise exposures, and possible nonoccupational noise exposures.

The employee must have no apparent or suspected ear, nose, or throat problems that might compromise the validity of the audiogram. If an employee is determined to be suffering from an acute disease, which may compromise the validity of the test, the baseline audiogram will be delayed until the condition has abated.

When it is discovered that employees have been working where they encounter hazardous noise or incur exposures that exceed the Action Level and have not had a baseline audiogram, one shall be conducted within 30 days. The audiogram must follow at least 14 hours of no known exposure to sound levels in excess of 85 dBA. This "quiet time" interval will allow recovery from a noise-induced temporary threshold shift, should one have occurred.

Standard Threshold Shift - If any annual audiogram result indicates that a standard threshold shift has occurred, the affected employee shall be notified of this fact, in writing, within 21 days of the determination. A retest shall be conducted within 30 days of the first audiogram, with that result considered the annual audiogram. The physician may request further medical evaluation, and the affected employee shall be either removed from the high-noise environment or required to wear hearing protection.

Existing Ear Disease - Personnel who suffer from acute diseases of the ear shall not be placed in hazardous noise areas until the condition has abated, particularly if such diseases preclude the wearing of hearing protectors, cause a hearing impairment or produce tinnitus.

Exit Audiogram - All HDR employees participating in the HCP shall receive a final audiometric examination before termination of employment with HDR or after job changes that would alter noise exposure.

12.0 EMPLOYEE TRAINING

Each employee who participates in the HCP shall receive annual training. The OSC is responsible for providing this training. This information may be presented through the use of videos, available from corporate safety. The training program will provide information about the adverse effects of noise and how to prevent noise-induced hearing loss. At a minimum, all training will cover the following topics:

- a. Noise-induced hearing loss
- b. Recognizing hazardous noise
- c. Symptoms of overexposure to hazardous noise
- d. Hearing protection devices - advantages and limitations
- e. Selection, fitting, use, and maintenance of ear PPE

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- f. Explanation of noise measurement procedures
- g. Hearing Conservation Program requirements

Employees will also be provided access, through our H&S Intranet site, to the OSHA noise standard (29 CFR 1910.95) and this Procedure.

HDR employees are also encouraged to use hearing protective devices when they are exposed to hazardous noise during activities at home; e.g., from lawn mowers, chain saws, etc.

13.0 RECORD KEEPING

Audiograms and noise-exposure records shall be maintained as a permanent part of employee medical records. If noise exposure measurement records are representative of the exposures of other employees participating in the HCP, the range of noise levels, and the average noise dose will additionally be made a permanent part of the medical records of the other employees.

In addition to audiometric test data, each medical record will, at a minimum, identify:

- The audiometric reference level to which the audiometer was calibrated at the time of testing.
- The date of the last calibration of the audiometer.
- The name, the social security number and job classification of the employee tested.
- The employee's most recent noise exposure assessment.
- The date(s) Hearing Conservation Training was received.
- Accurate records of the background sound-pressure levels in the audiometric test rooms, and data and information concerning calibration and repair of sound-measuring equipment and audiometers (as well as all audiometric test data) will be maintained for the duration of the affected employee's employment.

14.0 REFERENCES

1. Occupational Noise Exposure, 29 Code of Federal Regulations (CFR) 1910.95 [General Industry], and § 1926.52 [Construction].
2. American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices for Physical Agents in the Work Environment, Noise, current edition.
3. NIOSH, A Practical Guide to Effective Hearing Conservation Programs in the Workplace, September 1990.
4. Video, "Sound Advice: Hearing Conservation on the Jobsite", HDR #0020.

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Appendix A

Pile Driving Noise Reduction Program

OVERVIEW

The HDR Health and Safety Department has developed a Pile Driving Noise Reduction Program to address noise exposures experienced by employees required to work within close proximity of pile driving activities. Pile Driving operations and equipment encountered at project sites produce noise levels that exceed the OSHA Permissible Exposure Limits and Canadian OHS Exposure Limits for continuous and impact noise. Exposure to these excessive noise levels may result in a permanent loss of hearing acuity, development of tinnitus (i.e., ringing of the ears), a possible increase in blood pressure, and stress-related problems if not mitigated. It is the objective of HDR to provide proper training, protective equipment, and audiometric monitoring to staff that are exposed to pile driving operations to prevent occupational hearing loss resulting from excessive noise exposure.

PURPOSE

The purpose of this Program is to protect HDR employees from excessive noise hazards encountered at pile driving work sites, thereby preventing hearing loss due to workplace noise exposures. **It is the goal of this Pile Driving Noise Reduction Program to prevent employees from being subjected to noise exposures in excess of 85 dBA, as a daily, time-weighted average.**

Due to the nature of the pile driving inspection activities, HDR does not have the ability to reduce the noise hazard through engineering design or administrative controls, such as limiting duration of exposure or employee distance from the noise source. Therefore, HDR employees must rely on personal hearing protection equipment.

GUIDANCE

The H&S department has developed a guide for determining the level of protection required within specified distances of pile driving activities. Table A-1 summarizes the distances and corresponding action required to reduce noise exposures to levels that do not exceed the OSHA PEL or Canadian OHS Exposure Limits.

Table A-1
Protection Requirements for Assignments Near Pile Driving

Distance from Pile Noise Source	Enrollment in Hearing Conservation Program	Dual Hearing Protection ¹	Noise Canceling Earmuffs	Earplugs with minimum 32 dB NRR
0 – 10 feet (0 – 3 meters)	Exclusion Zone – HDR employees are not allowed this close.			
10 – 25 feet (3 – 8 meters)	✓	✓	✓	✓
25 – 45 feet (8 – 14 meters)	✓		✓	
45 – 80 feet (14 – 24 meters)	✓			✓
80 – 120 feet (24 – 37 meters)				✓

¹ Dual hearing protection requires noise canceling earmuffs worn in tandem with earplugs with a minimum NRR of 32 dB.

PROGRAM REQUIREMENTS

All Affected Employees are required to comply with the Program requirements set forth in the Pile Driving Noise Reduction Program.

No HDR employee shall work within the exclusion zone while the pile is actively being driven.

All employees **working within 80 feet (24 metres)** of the pile driving activities must be enrolled in HDR's Hearing Conservation Program. (See Section 10, Medical Surveillance).

All HDR employees **working within 25 feet (8 metres) of the pile** must wear NRR32 or higher rated disposable ear plugs (See Section 8.3(a)(2) Hearing Protectors/Formable Ear Plugs) and 3M/Peltor Electronic Noise Cancelling Ear muffs.²

All HDR employees **working between 25 and 45 feet (8 and 14 metres) of the pile** must wear 3M/Peltor Electronic Noise Cancelling Ear muffs as a minimum level of protection.¹

² Electronic Noise Cancelling Ear Muffs equivalent to the 3M/Peltor brand may be used with authorization from the Health and Safety Department.



All HDR employees **working between 45 and 120 feet (14 and 37 metres) of the pile** must wear NRR32 or higher rated disposable ear plugs as a minimum level of protection. (See Section 8.3(a)(2) Hearing Protectors/Formable Ear Plugs)

EARMUFF ACQUISITION

After comparing the different noise cancelling earmuffs available on the market and testing different styles and types on HDR project sites, HDR has selected the **Peltor™ Tactical Pro** Muff as our preferred model. A complete ready-to-use kit (one Peltor™ Tactical Pro Muff housed in a Pelican™ storage/shipping case, with a hygiene kit) is available through Mid-Continent Safety. Replacement parts and accessories contained in the unit can also be purchased separately through Mid-Continent Safety.

To place an order, call Mid-Continent Safety at 402-593-7974, and reference part number #MTACPRO-KIT along with the number of muffs desired. All costs are to be borne by each department; you will need to provide your department's shipping/billing information at time of order. Do not bill to corporate safety. Note: The cost of this equipment, as specialized PPE, may (and often should) be a "billable item" to a project if included in the project budget.

Receipt of muffs can take from 10-14 days, depending on the number of kits ordered, so please plan accordingly.

For additional information or help in ordering, please contact:

Jim Baker, HDR Construction Safety Manager

james.f.baker@hdrinc.com

Office: 402-399-4937 Cell: 402-850-4575

Appendix B**Contracted Aircraft Noise Reduction Program****OVERVIEW**

The HDR Health and Safety Department has developed a Contracted Aircraft Noise Reduction Program to address noise exposures experienced by employees required to travel on small contracted aircraft (non-commercial) for work assignments. These aircraft may expose HDR employees to noise levels that exceed occupational exposure limits.

PURPOSE

The purpose of this Program is to protect HDR employees from excessive noise hazards encountered while traveling on small contracted aircraft. **It is the goal of this Contracted Aircraft Noise Reduction Program to prevent employees from being subjected to noise exposures in excess of 85 dBA, as a daily, time-weighted average.**

PROGRAM REQUIREMENTS

The following employee actions are required when traveling on small contracted aircraft.

Step 1. Notify OSC of scheduled flights.

Employees must notify their OSC of all travel plans involving contracted aircraft.

Step 2. Complete Flight Detail Tracking Form.

Documentation of flight details (including flight duration and type of aircraft) must be submitted on the Health & Safety portal within two weeks of completed travel (accessible from this [link](#)). This information is critical for complying with OSHA regulations and will be used by Corporate H&S to determine the need for enrollment in HDR's HCP.

Step 3. Enroll in HDR's Hearing Conservation Program if applicable.

If the flight duration is long enough that OSHA's occupational noise action level (as specified in OSHA 29 CFR 1910.95) could be exceeded, exposed employees will be enrolled in HDR's HCP. Enrollment may occur prior to the employee's first flight or could occur following the flight (OSHA allows up to 6 months from an employee's first exposure at or above the action level for completion of a baseline audiogram).

Table B-1 summarizes predicted flight durations that could exceed OSHA's action level and thus require enrollment in HDR's HCP.

Table B-1
Flight Durations for a Single Work Shift Requiring Enrollment in HDR's HCP

	Type of Aircraft			
	Float Planes	Fixed Wing Aircraft Other than Float Planes	Rotary (Helicopter) Aircraft	Flights in Multiple Aircraft
Predicted Flight Durations^{1, 2} that Could Exceed OSHA's Action Level	Greater than 1-hour	Greater than 3-hours	Greater than 4-hours	Contact Corporate H&S to Calculate

¹ If aircraft-specific monitoring has been conducted and indicates exposure levels are below the OSHA action level, enrollment in HDR's HCP is not required. Contact Corporate H&S to review and confirm the adequacy of such monitoring.

² These durations were determined through noise monitoring conducted by Corporate Health & Safety. We will continue to measure exposures on future flights and will update and communicate any changes to these values if additional data indicate this is warranted.

Step 4. Complete HDR's Noise and Hearing Conservation training.

This self-directed online training is available on HDR University and is required for all employees traveling on contracted aircraft. Employees enrolled in HDR's HCP must repeat the training annually.

Step 5. Wear assigned hearing protection.

Regardless of flight duration, when in contracted aircraft with the engine running, employees must wear inflight communication ear muffs provided by the carrier. In addition, on fixed wing aircraft and float planes, employees must also wear disposable ear plugs with a Noise Reduction Rating of 25 or higher. These must be worn in combination with the inflight communication ear muffs provided by the carrier.



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Appendix

APPENDIX A.....	Portable Fire Extinguisher Checklist
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ONE COMPANY
Many SolutionsSM

**Portable Fire Extinguishers
Health & Safety Procedure #27**

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1.0 OBJECTIVE

HDR has installed portable fire extinguishers of the appropriate type, size, and quantity for incipient stage fire fighting. In the event of a fire, most employees will evacuate. Certain trained and designated employees will evaluate the fire scene and, if the fire is small and conditions are appropriate, use a portable fire extinguisher to fight the fire. It is the objective of HDR to provide proper training for the designated employees on the use of these portable fire extinguishers. **If the fire is large or conditions are unsafe, all employees will evacuate.**

2.0 PURPOSE

A portable fire extinguisher is a "first aid" device and is very effective in suppressing small fires. The use of an appropriate fire extinguisher by a trained person can save both lives and property. The purpose of this Procedure is to describe requirements for the selection, maintenance, use, and inspection of portable fire extinguishers in the HDR workplace, whether it be the office, project site or in a vehicle.

3.0 REVISION HISTORY

Rev	Description of Change	Date
0	Initial Release	10/26/2004
1	Revisions	12/26/2006
2	Re-Formatting	07/15/2013
3	Clarification made regarding fire extinguishers in project vehicles.	09/17/2014
4	Minimum fire extinguisher rating for project vehicle updated.	10/20/2014

4.0 POLICY

Using fire extinguishers or any method to suppress fires is an inherently dangerous activity, requiring an understanding of the mechanics of fire initiation and propagation, proper use and limitations of the extinguisher, correct body placement and escape routes. The simultaneous integration of all these factors, combined with the panic situation present, makes proper application of fire fighting techniques much more difficult than most employees assume. **It is the absolute policy of HDR that designates only trained employees to engage in incipient stage fire fighting on fires considered within the ability of the employee and capacity of the fire extinguisher. In all other cases, evacuation is the specified action.**

5.0 PROGRAM IMPLEMENTATION

This Program will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC).

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Director of Safety The Director of Safety shall:

- Periodically review, at least annually, the effectiveness of this Program, identify any deficiencies, and ensure that they are corrected, and
- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

Office Safety Coordinators The OSCs shall:

- Initially locate and identify all extinguishers in their offices, and record this information on the Fire Extinguisher Checklist (Appendix A);
- Perform monthly inspections (unless performed by an outside source);
- Provide initial training on this Procedure to their respective office staff, and arrange annual training for individuals designated as Authorized Fire Fighters;
- Make sure that this Procedure is readily available in each office, and
- Interface with the Director of Safety regarding any unsafe office or project site fire hazard conditions that have been discovered, and need addressing or interpretation.

Project Professionals HDR project personnel shall:

Understand this Procedure, and how it interfaces with their Office Emergency Action Plan, and in cooperation with Project Managers, identify fire extinguishing equipment that is needed to safely perform their duties in accordance with this Procedure.

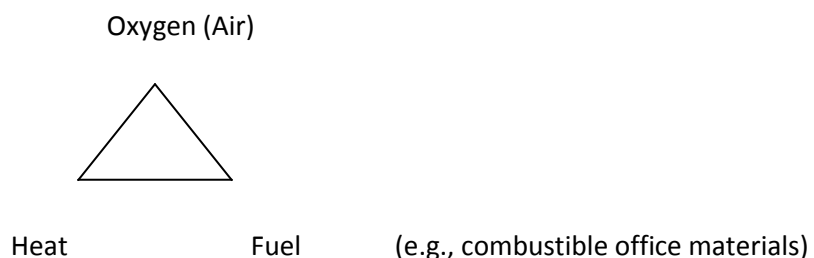
6.0 REGULATORY REQUIREMENTS

This Procedure complies with the OSHA requirements contained in 29 CFR 1910.157 (HDR offices, interior settings), 1926.150 - .152 (construction sites, exterior settings), as well as the guidance contained in the National Fire Protection Association Publication #10, *"Portable Fire Extinguishers."*

7.0 OVERVIEW OF FIRE

Fire is a process of combustion. To initiate any fire, three environmental components must be present, and in the proper ratio. As depicted in Figure 1, these are heat, fuel, and oxygen.

Figure 1 – "Fire Triangle"



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Without the presence and proper concentrations of all three components, a fire will not occur, or if already initiated, the fire will become extinguished. Although fire extinguisher agents vary in their method of operation, all work by eliminating one or more of these components – by smothering the combustion (elimination of oxygen), removal of heat (quenching - water), chemical alteration of the fuel to render it non-combustible, etc.

Some of the early agents employed were subsequently found to be hazardous to the user (carbon tetrachloride, chlorobromomethane) and have been banned; data has indicated that the current extinguishing agents contained in the units in our offices do not pose health risks when used correctly.

8.0 TYPES OF FIRE EXTINGUISHERS

Fire Extinguishers are categorized by two factors: the class of fire and the size of fire they are designed to suppress. These factors are discussed below.

8.1 Classes of Fires and Extinguisher Labeling

The class of fire is determined by what material is burning – paper, wood, grease, oils, electrical, metal, etc. NOT ALL EXTINGUISHING AGENTS WORK ON ALL FIRES! There are four classes of fires, assigned the letters A, B, C, D¹. All fire extinguishers are labeled, using these letters, for the classes of fires on which they can be used. Some extinguishers are rated for two or more classes (ABC), and can be used on fires of all these classes. A slash through any of the symbols indicates the extinguisher cannot be used on that class of fire. A missing symbol signifies only that the extinguisher has not been tested for a given class of fire, but may be used if an extinguisher labeled for that class of fire is not available. A description of each class follows:

- **Class A – Ordinary combustibles** such as wood, cloth, paper, and trash having glowing embers. These are the most common combustibles in our office settings. Tap water may also serve as a Class A extinguishing agent. It is very dangerous, however, to use water or an extinguisher labeled only for Class A fires on a cooking-grease (Class B) or electrical (Class C) fire.
- **Class B – Flammable liquids** such as solvents, gasoline, oil, and oil-based paints. Common on project sites, but rarely present in HDR offices.
- **Class C – Electrical equipment** including wiring, fuse boxes, circuit breakers, machinery, and appliances. Found in both HDR office complexes, vehicles and on project sites/trailers.
- **Class D – Combustible metals** such as magnesium or sodium. It is not anticipated that these will ever be present in either our offices or on our project sites.

The most commonly used extinguishers in HDR offices are multi-purpose ABC units, which contain a stored pressure dry chemical.

¹ Another specialty class, Class K, exists on the market. These are specific to combustible grease fires, common in commercial kitchens, but not appropriate for HDR spaces and will not be discussed further.

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8.2 Server Room Extinguishers

Class ABC fire extinguishers are designed to put out ordinary combustibles, flammable liquids, and electrical fires, but will leave a residue on electrical components which ruins the equipment. Historically, Halon was the fire extinguisher chemical used for these applications; however, Halon is a chlorofluorocarbon and is suspected to cause damage to the earth's ozone layer. Halon also poses an asphyxiation risk to humans since it will rapidly displace the oxygen within a small room. Halon extinguishers are still in use but are no longer being manufactured or sold.

Fire extinguishers charged with FE-36[®] are the preferred alternate to Halon fire extinguishers. CleanGuard, a portable fire extinguisher manufactured by Ansul, and other similar fire extinguishers utilize an extinguishing agent (DuPont FE-36[®]) that is clean (does not leave a residue on electrical components), electrically nonconductive, and environmentally friendly. Use of this agent to extinguish a fire should not damage sensitive computer components.

HDR offices which have server rooms, computer centers, electronic data storage areas, etc., shall procure a FE-36[®] containing fire extinguisher for these areas. The (as of 2006) approximate cost of the CleanGuard Brand FE-36[®] fire extinguisher varies dependent on the size of the unit as follows:

- 5 lbs – BC rated (\$240)
- 9 lbs – ABC rated (\$410)
- 13 lbs –ABC rated (\$580)

These extinguishers are expensive, but are much cheaper than the cost of both downtime AND replacing vital computer components with equally valuable data stored on them.

Offices that currently have Halon fire extinguishers do not need to immediately replace them. These extinguishers can be phased out over time in conjunction with the annual testing of the devices. If the Halon extinguisher is scheduled for hydrostatic testing as part of the annual inspection or if the chemical has been discharged, then the extinguisher should be replaced with an FE-36[®] extinguisher.

8.3 Extinguisher Size

Portable extinguishers are also rated for the size ("quantity") of fire they can handle. This rating is expressed as a number from 1 to 40 for Class A fires, and from 1 to 640 for Class B fires. This rating will appear on the label – 2A:10B:C for example. The larger the numbers, the larger the fire of a specific class on which the extinguisher can be used.

No number accompanies an extinguisher's Class C rating. The C on the label indicates only that the extinguisher is safe to use on electrical fires.

Extinguishers for Class D fires must match the type of metal that is burning. These extinguishers do not use numerical ratings. Extinguishers for Class D fires are labeled with a list detailing the metals that match the unit's extinguishing agent.

Often, extinguishers will also be labeled as to the weight of extinguishing agent they contain – 5 lb., 10 lb., etc. While these weight references are helpful in discussing extinguisher needs with

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safety supply houses, do not confuse weight classifications with size ratings; weights will vary with the type of agent contained; ratings are consistent for the size of fire they will suppress.

Table F-1, reprinted from the OSHA standard 29 CFR 1926.157, is included on the following page as an aid in identifying the different types of extinguishers.

Table F-1 FIRE EXTINGUISHERS DATA

	WATER TYPE				FOAM	CARBON DIOXIDE	DRY CHEMICAL			
	STORED PRESSURE	CARTRIDGE OPERATED	WATER PUMP TANK	SOA-ACT			SODIUM OR POTASSIUM BICARBONATE	MULTI-PURPOSE ABC		
										
CLASS A FIRES WOOD, PAPER, TRASH HAVING GLOWING EMBERS 	YES	YES	YES	YES	YES	NO (BUT WILL CONTROL SMALL SURFACES FIRES)	NO (BUT WILL CONTROL SMALL SURFACES FIRES)	NO (BUT WILL CONTROL SMALL SURFACES FIRES)	YES	YES
CLASS B FIRES FLAMMABLE LIQUIDS GASOLINE, OIL, PAINTS, GREASE, ETC. 	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
CLASS C FIRES ELECTRICAL EQUIPMENT 	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
CLASS D FIRES COMBUSTIBLE METALS 	SPECIAL EXTINGUISHING AGENTS APPROVED BY RECOGNIZED TESTING									
METHOD OF OPERATION	PULL PIN, SQUEEZE HANDLE	TURN UPSIDE DOWN AND BUMP	PUMP HANDLE	TURN UPSIDE DOWN	TURN UPSIDE DOWN	PULL PIN, SQUEEZE LEVER	RUPTURE CARTRIDGE, SQUEEZE LEVER	PULL PIN, SQUEEZE HANDLE	PULL PIN, SQUEEZE HANDLE	RUPTURE CARTRIDGE, SQUEEZE LEVER
RANGE	30' - 40'	30' - 40'	30' - 40'	30' - 40'	30' - 40'	3' - 8'	5' - 10'	5' - 10'	5' - 10'	5' - 10'
MAINTENANCE	CHECK AIR PRESSURE GAUGE MONTHLY	WEIGH GAS CARTRIDGE, ADD WATER IF REQUIRED ANNUALLY	DISCHARGE AND FILL WITH WATER ANNUALLY	DISCHARGE ANNUALLY, RECHARGE	DISCHARGE ANNUALLY, RECHARGE	WEIGH SEAL ANNUALLY	WEIGH GAS CARTRIDGE, CHECK CONDITION OF DRY CHEMICAL ANNUALLY	CHECK GAS PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	CHECK GAS PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	WEIGH GAS CARTRIDGE, CHECK CONDITION OF DRY CHEMICAL ANNUALLY

9.0 EXTINGUISHER USE

NOTE: As stated in your office Emergency Action Plan, whenever any fire is discovered in the workplace, all area employees must be immediately evacuated (except for authorized fire fighters, at their discretion), and the local fire department notified.

- Before using a portable fire extinguisher, be sure you have an unobstructed escape route should you fail to extinguish the fire. This is critical! Know what materials are burning and be sure the extinguisher you are using is capable of fighting the fire. Consider the possible danger posed by nearby toxic or highly flammable materials being impinged by the fire.



2. Keep your back to an exit.
3. Stand 8 to 20 feet away from the fire, depending on the size of the fire. Many times people will approach to within a few feet and begin extinguisher application, and the force of the projected agent will scatter the burning material, spreading the fire.

It is always better to begin application too far away and then approach, than the opposite.

4. To discharge the extinguisher, follow the four-step **PASS** Procedure:

PULL

AIM

SQUEEZE

SWEEP

PULL the pin: This unlocks the operating lever and allows you to discharge the extinguisher. The pin will be tied in place with a plastic tie which can make pulling the pin out difficult. Trick: Twist the pin, using your wrist, to break the plastic tie as you pull. This makes removal considerably easier.

AIM low: Point the extinguisher hose (or nozzle) at the **base** of the fire. Hold the extinguisher canister in a vertical position during use.

SQUEEZE the handle lever: This discharges the extinguisher agent. Squeeze the lever ALL the way down. Do not worry about “saving” your extinguishing agent - you actually want to empty the extinguisher as rapidly as possible. Fully discharge the unit. During use, releasing the lever will stop the discharge.

SWEEP from side to side: Moving carefully toward the fire, keep the extinguisher aimed at the base of the fire and sweep back and forth until the flames appear to be out. Watch the fire area. If the fire reignites, repeat the process.

If the fire does not begin to go out immediately, leave the area at once!

WARNING: Portable fire extinguishers discharge faster than most people think. A 10 lb. ABC unit will completely discharge within 15-17 seconds.

VERIFY. Always be sure the fire department inspects the fire site, even if you think you have extinguished the fire. They will record the incident, which may prove necessary for insurance purposes.

10.0 EXTINGUISHER SELECTION

Offices

For HDR office protection, combination ABC extinguishers are generally recommended; however, a local fire specialist company should inspect the premises and recommend a specific size and class. For many of our offices, this has already been performed by specialists contracted to the building owner. The specialist can also specify the number of extinguishers necessary to provide adequate coverage.

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Server Rooms

A portable fire extinguisher containing FE-36®, such as those sold by CleanGuard shall be located outside of or just inside of the entrance to a server room. The size of the fire extinguisher will be dependent on the size of the server room. A local fire specialist company will provide a recommended size and class for the fire extinguisher. The following guidance is offered, based on past HDR experience in supplying server rooms:

In general, if the room only contains computer equipment a 5 pound BC rated FE-36® portable fire extinguisher should be sufficient. If the room also contains “ordinary combustibles” including paper or cloth, then a 9 pound ABC rated FE-36® portable fire extinguisher should be utilized. Large server rooms may require a 13 pound ABC rated FE-36® portable fire extinguisher, with this determination made after considering the recommendations by a local fire equipment supply firm.

In situations outside the office, the following guidance applies:

Project Vehicles

Although there is no regulatory requirement for the presence of extinguishers in vehicles, HDR owned or leased vehicles used for off-road project activities (e.g., vehicles driven off of paved and/or otherwise maintained roads to conduct project activities) shall be equipped with a portable fire extinguisher, rated at not less than 1A:10 BC, with the operators adequately trained in the use of extinguishers. HDR does not require extinguishers in owned/leased vehicles that are used solely on paved/maintained roads or in rental vehicles.

Project Use or Storage of Flammable/Combustibles

Use - At least one fire extinguisher, rated at 10B or more, shall be maintained within 50 feet of wherever more than 5 gallons of *flammable* or *combustible* liquids (or 5 lbs. of flammable gas) are being used.

Outdoor Storage – At least one extinguisher with a rating of 20B or more shall be located not less than 25 feet, nor more than 75 feet, from any *flammable* liquid storage area located outside.

Indoor Storage - At least one extinguisher with a rating of 20B or more shall be located outside of, but not more than ten feet from, the door opening into any room where more than 60 gallons of *flammable* or *combustible* liquids are stored.

11.0 LOCATION OF EXTINGUISHERS

The locations of fire extinguishers for each individual HDR office should be specified in each office’s Emergency Action Plan (HDR H&S Procedure #24 - *Emergency Action Plan*).

Mounting & Identification All fire extinguishers in HDR offices are to be mounted vertically and identified by signs or equivalent means on walls, upright structures or in specially designed

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cabinets. (At least one ten pound ABC extinguisher must be kept in each project trailer, and these may be set upright on the floor in a protected corner).

Extinguishers may be placed wherever convenient, but must be readily accessible, with the top of the extinguisher no more than five feet above the standing surface, and within easy reach without the need for ladders, stepstools, or other climbing aid.

Accessibility The 36-inch radius surrounding each mounted fire extinguisher (three feet on each side and in front) must be kept free of obstructions.

Inventory An inventory of all fire extinguishers is to be maintained for each HDR office by the OSC. Each extinguisher should be recorded on an Inventory Checklist (example included as Appendix A), and retained in their office safety files. A waiver of this inventory requirement applies to very small office spaces, where two or less extinguishers are housed.

Functionality All fire extinguishers must be maintained in a fully charged and operable condition and kept in their assigned places, except during use.

Deficient Fire Extinguishers Any fire extinguisher not meeting inspection criteria shall be removed from service and replaced until the deficiencies are corrected. If the extinguishers within an HDR lease space are provided by an office building owner, the owner should be notified, and the notification details recorded on the Inventory Checklist.

12.0 INSPECTION, MAINTENANCE, AND TESTING

The following section details inspection and maintenance procedures required to ensure that extinguishers maintain their effectiveness.

12.1 Annual Maintenance Check

An annual maintenance check will be conducted by an approved third party trained in fire extinguisher maintenance. This third party is typically the fire specialist company who supplied the extinguishers. A record and certification of the annual check will be attached to the neck of each extinguisher. The year printed on the tag indicates the year that the annual check was performed; that is, it is valid until the month of the following year. So a tag indicating March 2006 indicates the annual inspection must be repeated in March 2007. While the owner of the building may have a contract with the supplier to provide this service, it is still the occupant's (e.g., HDR) responsibility to ensure that these inspections have been performed, and that each extinguisher has a current certification tag attached. The OSC shall check these tags to ensure annual inspections have been performed.

All fire extinguishers used in outside service or on project sites will have hard (plastic, metal, or laminated) annual inspection tags, to prevent environmental deterioration.

12.2 Monthly Inspection Procedure

Unless provided by the building owner or outside contract, Office Safety Coordinators, or their designees, are responsible for monthly inspections of all portable fire extinguishers maintained

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in their office to ensure that they are in proper working condition and have not been tampered with or physically damaged (see Appendix A). Extinguishers maintained on project sites/vehicles shall be inspected by the assigned project H&S officer, or other designated worker. Monthly inspection of a portable fire extinguisher is simple, and does not require specialized knowledge. It consists of verifying that the following five conditions are present:

- The pin and seal are in place;
- Pressure gauge (if present) indicates acceptable pressure;
- Extinguisher hose or nozzle are in good condition and free from obvious cracks, deficiencies or obstructions;
- Annual inspection tag is attached and indicates inspection within the past 12 months, and
- Access to the extinguisher is not blocked or obstructed.

It is preferable that the OSC date and initial the tag, as verification that this inspection occurred; alternatively, however, the OSC may indicate the monthly entries on the Portable Fire Extinguisher Checklist included as Appendix A.

13.0 **TRAINING**

HDR employees who may use fire extinguishers for incipient stage fire fighting will be designated in the office Emergency Action Plan (HDR H&S Procedure #24), and will be provided training covering the following subjects:

- Fire triangle (Figure 1)
- Fire classes (A, B, C, D)
- Fire evaluation – incipient, escape routes
- Capacity, range, and correct use of fire extinguishers (the PASS method)
- Evacuation procedures
- Notification requirements

It is the responsibility of each OSC/safety committee to determine which employees will receive training on the use of fire extinguishers, arrange such training, and have each attendee sign a sign-in sheet, appropriate to the training. Sample sign-in templates are available on the HDR H&S intranet website. It is the policy of HDR that, whenever possible, all such employees will be volunteers, and that any employee not wishing to assume the responsibility or participate in the training will be excused.

Training may be provided by internal resources, if knowledgeable employees are available, or through the use of other resources – local fire department personnel, safety supply personnel, etc. Training shall be provided to all personnel authorized to use extinguishers to fight incipient stage fires on an annual basis.

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Formal Training

HDR shall strive, where local conditions permit, to conduct “hands on” extinguisher training on a bi-annual basis (every two years). This formal training will afford the participants an opportunity to use an extinguisher to extinguish a fire. Because of local fire restrictions, this training shall not be conducted by internal staff, but shall be contracted with local resources that have the necessary equipment and burn permits. Where local codes or conditions do not allow for the initiation of an open flame (i.e., building code restrictions, drought warnings, presence of combustible materials, etc.), the training will be restricted to the classroom presentation type described as “refresher training.”

Refresher Training

On alternate years in between the bi-annual formal training cycle, the training presented shall be considered “refresher”, and consist of a review of our Program requirements contained in this Procedure, as well as the presentation of available video/PowerPoint visual teaching aids.

Recordkeeping

Sign-in verification that training has been received will be retained in each office, with a copy forwarded to Corporate Safety for retention. The top portion of the sign-in sheet should describe the method used in the training presentation, and whether the training was formal or refresher in scope.

Corporate Resources

Video – “Fire Extinguisher Training”, Tape #0068, (available from Corporate Safety).

National Fire Protection Association Pub. #10 – *Standard for Portable Fire Extinguishers (1998 or most recent version)*.

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Portable Fire Extinguisher Checklist

Office Location _____

INVENTORY

Serial No.	Location	Serial No.	Location
_____	_____	_____	_____

Inspection Points

1. Fire extinguisher is in assigned location
2. Access is not obstructed
3. Fire extinguisher is fully charged
4. Lock-pin in place
5. Test tag attached and current

INSPECTIONS COMPLETED

<u>Month</u>	<u>Initials</u>	<u>Month</u>	<u>Initials</u>
January	_____	July	_____
February	_____	August	_____
March	_____	September	_____
April	_____	October	_____
May	_____	November	_____
June	_____	December	_____



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Attachment

ATTACHMENT #1.....	HDR Heat Stress Log
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ONE COMPANY
Many SolutionsSM

Heat Stress Health & Safety Procedure #28

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1.0 **OBJECTIVE**

HDR employees frequently perform services in high temperature/humidity areas, where extended exposure could result in heat-related disorders. This Procedure describes the hazards associated with exposure to high thermal temperatures, and the proper responses that will prevent or minimize adverse health effects.

The guidelines contained in this Procedure are in conformance with both the Occupational Safety and Health Administration's (OSHA) 5(a)(1) General Duty Clause, and the recommendations presented in the publication, *Threshold Limit Values for Chemical Substances and Physical Agents (latest year)*, published by the American Conference of Governmental Industrial Hygienists (ACGIH).

2.0 **PURPOSE**

The purpose of this Procedure is to present information regarding the hazards and physiological effects of exposure to high temperatures, and the recommended work practices to avoid illness due to heat strain.

3.0 **REVISION HISTORY**

Rev	Description of Change	Date
0	Initial Release	10/01/1998
1	Revisions	01/04/2007
2	Re-Formatting	07/15/2013

4.0 **APPLICABILITY**

The HDR Heat Prevention Program implemented in this Procedure applies to all HDR personnel at both HDR client sites and all HDR facilities, when faced with exposure to hot environments. All employees, regardless of HDR Department, could be impacted by this Program.

5.0 **PROGRAM IMPLEMENTATION**

This Program will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC).

Director of Safety. The Director of Safety shall:

- Periodically review, at least annually, the effectiveness of this Program, identify any deficiencies, and ensure that they are corrected, and
- Assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

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Office Safety Coordinators. The OSCs shall:

- Provide initial training on this Procedure, as applicable, to office staff, and make sure that this Procedure is readily available in each office, and
- Interface with the Director of Safety regarding any high-heat office or project site conditions that have been discovered, and need addressing or interpretation.

Project Health and Safety Officers. Project Health and Safety Officers (HSO) shall:

- Verify that initial training on this Procedure has been received by their respective project staff, if applicable, and make sure that this Procedure is available at the project site, and
- Interface with the OSC and/or Director of Safety regarding any heat stress project site conditions that are present (with the potential for generating heat strain) and need addressing or interpretation.

6.0 **DEFINITIONS**

Aural – The external, visible ear structure (pinnae).

Heat Stress – The terms "heat stress" and "heat strain" are erroneously used interchangeably, when in fact there is a distinct difference. Heat Stress is any external environmental heat stimulus that causes your body to react outside its normal range of activities. Put another way, heat stress is the cumulative environmental condition (hot outside temperatures, high humidity, winds, etc.) that cause your body to react. Heat stress is a necessary precursor to heat strain. Each individual may react differently to heat stress, depending on individual susceptibility to heat, age, physical condition, alcoholic intake, etc. Heat stress does not necessarily result in adverse health effects.

Heat Strain – Heat strain is the human body's physiological response to heat stress. Excessive heat strain results in a heat-related disorder.

Environmental Monitoring – Determines the degree of heat stress. Determined by the use of a WBGT monitor, with the numerical result compared against the ACGIH developed limits presented in Table 1. Used by OSHA to substantiate overexposures to heat stress. General indication of the potential for exposed employees to suffer heat strain.

Physiological Monitoring – Measurement of the individual employees' physical response to the heat stress conditions; a specific measure of the degree of heat strain.

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WBGT – Acronym, means “Wet Bulb Globe Temperature.” A numerical reading, in Fahrenheit (F°) or Celsius (C°), developed by integrating the following 3 parameters:

- ✓ **Ambient temperature – Dry Bulb Thermometer**
- ✓ **Wind & Humidity – Static Wet Bulb Thermometer**
- ✓ **Radiant Heat – Globe Thermometer**

Usually determined through the use of a WIDGET™ integrated monitor or equivalent (available through rental companies).

7.0 GENERAL DISCUSSION

7.1 The Body – Heat Evolution and Dissipation

Overview

Human beings are warm-blooded, or homeothermic. We produce heat, through the chemical breakdown of food, to supply our internal body environment. In order for the metabolic processes to operate, to break down food into energy, to utilize oxygen and to get rid of wastes, the internal environment within the body must be kept within a very narrow temperature range (“homeostasis”). All of the hundreds of thousands of chemical reactions that occur each second in our body are only designed to operate within this narrow temperature range. Outside this range, these metabolic processes cannot proceed efficiently. Thus, it is critical to our well being that we maintain a uniform, constant internal temperature. The average human deep body temperature (referred to as the "core body temperature") is 37.7° Celsius or 99.6° Fahrenheit. The average body temperature that we are all familiar with, 98.6° F is the "oral" temperature.

Heat Gain and Loss

The metabolic heat generated by the average person sitting quietly is about equal to that of a 100-watt incandescent light bulb. We also acquire, or gain, heat from outside sources, such as the sun or from exposure to radiant heat sources, such as molten metal in a foundry. A small percentage of this heat, whether generated internally or acquired externally, is used to maintain our critical, narrow body temperature range. The excess heat is transported by our blood to the skin surface as well as our lungs, where it is transferred to the air within. This unneeded excess heat is then shed by breathing it out, by losing it to cool wind currents or cool objects that contact our skin, or by the process of sweating.

Sweating is Heat Loss

When our body has excess heat present, nerve messages from the brain automatically start the process of sweating. Remember that it takes the input of energy to raise matter from a dense (low) matter state to a less dense (higher) state. In order for water (sweat) on your skin surface to change into water vapor (evaporate), energy must be added. Approximately 80 calories of energy are required to evaporate 1 gram of water. That energy is in the form of body heat, because heat is energy. Therefore, as you sweat, and the sweat evaporates, you lose heat.

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Humidity Effects on Heat Gain/Loss

We have all heard of the weather term "relative humidity (RH)". Relative humidity is a ratio of the amount of water in the air, at a specific temperature, compared to the maximum absolute amount that it could hold. Warm air can hold more water than cold air (So when warm, moist air cools down, it rains). The human body can only lose heat through sweat evaporation if the air can accept the water vapor. Sweat will rapidly evaporate and cool the body when a low relative humidity is present. But if the RH is high, sweat will sit on the skin, and no benefit (heat loss) will be gained from sweating. The body will continue to sweat in an attempt to shed heat, and dehydration is a dangerous possibility. If the RH is 100%, the body cannot lose any heat through sweating.

Now that we understand how the body loses heat, let's look at the effect that clothing has on this process.

7.2 Effects of Protective Clothing (PPE)

All clothing affords some protection from exposure to the elements, and therefore, retards the efficient circulation of air. This reduction of air movement reduces the evaporation of sweat (transpiration), the loss of heat through direct air movement (convection) and to a lesser degree, the loss through direct contact with cooler surrounding objects (conductance). Conversely, clothing will prevent conductance through contact with hotter objects, as well as radiant heat gain from sunshine and hot nearby objects.

Normal work clothing, which allows some (although restricted) passage of air and sweat from the skin to the environment, is considered *permeable*. The restriction of air circulation is not usually of significant health concern, unless the volume of clothing worn is great.

Some personal protective equipment and clothing (PPE), such as Tyvek™ coveralls, respirators, etc. are designed to prevent air/liquid environmental contaminants from passing through the clothing and contacting the skin. Unfortunately, the *impermeable nature of this fabric also prevents* heat and sweat from passing through the PPE and escaping the suit. Additionally, the extra weight of this equipment and clothing, and the restriction of body motions that bulky PPE imposes, causes the wearer to work harder than normal, and more heat is generated. Thus, when impermeable PPE is worn, more metabolic heat than usual is generated, and the heat cannot readily escape the clothing. Cool outside air temperatures do not help significantly, since the PPE is impermeable. So wearing this PPE is equivalent of wearing a sauna around the body, and the body responds by producing more sweat. Therefore, use of impermeable protective clothing can greatly increase the potential for heat-related illnesses, even in relatively benign ambient temperatures.

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8.0 HEAT-RELATED ILLNESSES

There are four typical types of heat-related illnesses (result of heat strain) resulting from prolonged exposure to high thermal environments (stressor which causes the strain). These are described below:

8.1 Heat Rash (Prickly Heat)

Heat rash is a painful temporary condition caused by clogged sweat pores, typically from hot sleeping quarters.

Commonly observed in tropical climates, heat rash is caused by the plugging of sweat ducts due to the swelling of the moist keratin layer of the skin which leads to inflammation of the sweat glands. Heat rash appears as tiny red bumps on the skin, and can impair sweating, resulting in diminished heat tolerance. It is not a common concern in North American employment.

Treatment: Heat rash can usually be cured by providing cool sleeping quarters; body powder may also help absorb moisture.

8.2 Heat Cramps

Heat cramps are characterized by painful intermittent spasms of the voluntary muscles following hard physical work in a hot environment. Heat cramps usually occur after heavy sweating, and often begin at the end of the workday. The cramps are caused by a loss of electrolytes, principally salt. This results in fluids leaving the blood and collecting in muscle tissue, resulting in painful spasms.

Treatment: Increase ingestion of commercially available electrolytic “sports” drinks (because of individual sensitivity, it is best to double the amount of water required by package directions, or add water to the liquid form).

8.3 Heat Exhaustion

This condition is characterized by profuse sweating, **weakness**, low blood pressure, rapid pulse, dizziness, and frequently nausea and/or headache. The skin is cool and clammy, and appears pale. The body core temperature is normal or depressed. Victim may faint and/or vomit.

Treatment: Move victim to a cool area, loosen clothing, place in a head-low (shock prevention) position, and provide rest and plenty of fluids.

This is the most common form of serious heat illness encountered during employment activities.
Any worker who is a victim of heat exhaustion may not be exposed to a hot working

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environment for an absolute minimum of 24 hours, and if fainting has occurred, the victim should not return to work until authorized by a physician.

8.4 Heat Stroke

This is the most serious heat disorder, and is life-threatening. Heat stroke is a true medical emergency. This results when the body's heat dissipating system is overwhelmed and shuts down (thermoregulatory failure). Heat stroke results in a continual rise in the victim's deep core body temperature, which is fatal if not checked. The symptoms are hot, dry, flushed skin, elevated body core temperature, convulsions, delirium, unconsciousness, and possibly, death.

Treatment: First aid consists of immediately moving victim to a cool area; cool the body rapidly by immersion in cool (not cold) water or sponging the body with cool water; treat for shock and obtain immediate medical assistance. Treatment response time is critical when assisting a victim of heat stroke! Do not give coffee, tea or alcoholic beverages.

9.0 HEAT MONITORING

There are two methods of monitoring for the detection of heat-related illnesses – environmental monitoring (monitoring heat stress) and physiological monitoring (monitoring heat strain).

9.1 **Environmental Monitoring (Heat Stress Monitoring)**

9.1.1 **Description**

Typical industrial control of heat **strain** is accomplished by reducing the heat stress through environmental/administrative controls, such as cooling the work area, installation of fans, shielding radiant heat sources such as furnaces, elimination of steam leaks, or rotating employees to reduce exposure time. These control methods are practical and feasible for workers wearing normal permeable work clothing in inside, fixed-location facilities.

OSHA currently does not have a promulgated health standard on heat (or cold) stress. When inspecting the typical industrial workplace, OSHA compliance officers verify that workplace environmental conditions are acceptable for the work being performed by using the WBGT Heat Stress Index (Table 1). To determine the numerical enforcement value (permissible exposure limit), OSHA utilizes a WBGT monitor that incorporates real-time readings for ambient temperature, radiant heat load, and humidity (wind speed is factored indirectly). This method of monitoring the ambient environmental conditions in the workplace, and making assumptions about its effect on every exposed worker is termed "**environmental**" monitoring. OSHA utilizes this type of monitoring because it is non-invasive to the employee, and generates a single value that can be compared against a standardized numerical exposure limit, shown in Table 1. Overexposures are cited under the OSHA General Duty Clause. The WBGT heat stress index, while not correlating especially well with heat strain, has been used for many years by the

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military and has the official sanction of the American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH).

9.1.2 Procedure

In using this method, frequent readings (every 15 minutes is recommended, every half-hour is minimally acceptable) should be taken and averaged at the end of the workday. If the final value exceeds the Index Table value, an overexposure has occurred.

9.1.3 Limitations

This method of monitoring is appropriate for monitoring inside or outside areas, but only when the workers are wearing permeable, normal work clothes (jeans, dress attire, etc.)

One problem with this method is the fact that work in naturally hot outside environments, such as in southern states during the summer, will consistently yield WBGT readings in excess of the Index Table limits, often before 10 a.m. Strict adherence to these values would prevent work at these locations for several months each year, while not proving heat-induced illness has occurred. Therefore, since this method only measures the environmental conditions, not the employee response to these conditions, it is not typically used when performing outside site activities. In these situations, physiological monitoring is more appropriate.

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Table 1

**Screening Criteria for TLV[®] (Threshold Limit Values) and
Action Limit for Heat Stress Exposure**

Allocation of Work in a Cycle of Work and Recovery	TLV [®] [(WBGT values in °C and (°F))]				Action Limit [(WBGT values in °C and (°F))]			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75% to 100%	31.0 (87.8)	28.0 (82.4)			28.0 (82.4)	25.0 (77.0)		
50% to 75%	31.0 (87.8)	29.0 (84.2)	27.5 (81.5)		28.5 (83.3)	26.0 (78.8)	24 (75.2)	
25% to 50%	32.0 (89.6)	30.0 (86.0)	29.0 (84.2)	28.0 (82.4)	29.5 (85.1)	27.0 (80.6)	25.5 (77.9)	24.5 (76.1)
0% to 25%	32.5 (90.5)	31.5 (88.7)	30.5 (86.9)	30.0 (86.0)	30.0 (86.0)	29.0 (84.2)	28.0 (82.4)	27.0 (80.6)

Notes to Table 1:

- See Table 2 for work demand categories.
- WBGT values are expressed to the nearest 0.5°C
- The thresholds are computed as a TWA-Metabolic Rate where the metabolic rate for rest is taken as 115 W and work is the representative (mid-range) value of Table 2. The time base is taken as the proportion of work at the upper limit of the percent work range (e.g., 50% for the range of 25% to 50%).
- If work and rest environments are different, hourly TWA WBGT should be calculated and used. TWAs for work rates should also be used when the work demands vary within the hour, but note that the metabolic rate for rest is already factored into the screening limit.
- Because of the physiological strain associated with Heavy and Very Heavy work among less fit workers, regardless of WBGT, criteria values are not provided for continuous work, and for up to 25% rest in an hour for Very Heavy work. The screening criteria are not recommended, and a detailed analysis and/or physiological monitoring should be used.

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Table 2**Metabolic Rate Categories and the
Representative Metabolic Rate with Example Activities**

Category	Metabolic Rate [W]*	Examples
Rest	115	Sitting
Light	180	Sitting with light manual work with hands or hands and arms, and driving. Standing with some light arm work and occasional walking.
Moderate	300	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking.
Heavy	415	Intense arm and trunk work, carrying, shoveling, manual sawing; pushing and pulling heavy loads; and walking at a fast pace.
Very Heavy	520	Very intense activity at fast to maximum pace.

* The effect of body weight on the estimated metabolic rate can be accounted for by multiplying the estimated rate by the ratio of actual body weight divided by 70 kg (154 lb).

9.2 Physiological Monitoring (Heat Strain)**9.2.1 Description**

Heat strain results in an increase in heart rate, as the cardiovascular system works harder to bring heat from the deep parts of the body to the skin surface. Since heat is being generated faster than it can be shed, the body temperature also rises. So heat strain can be measured by comparing a worker's temperature and pulse rate against his/her normal "resting" values.

Physiological monitoring is the method adopted by OSHA to monitor employees who are wearing impermeable clothing while performing services. A thorough presentation of the components of a good **Physiological** Monitoring Program (written for Hazardous Waste Site workers, but the principles remain the same) is presented in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, produced by NIOSH/OSHA/USCG/EPA, October 1985 (available from corporate safety).

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The HDR physiological monitoring protocol, presented below, incorporates the core features of these recommendations (with improvements, based on experience and current ACGIH information).

9.2.2 When to Institute Physiological Monitoring

The necessity to conduct heat strain monitoring is site-specific, and no definite “absolute” answer can be given. The following factors should be warning flags that may require the initiation of monitoring:

- Performing extended outside services during **summer months**. Begin monitoring when ambient temperature are consistently (greater than ½ the workday) above 80° F (26.7° C), especially when relative humidity exceeds 80%;
- Performing extended outside services on project sites located in the **deep south**;
- Performing extended services in the proximity of **radiant heat sources** (foundries, etc.);
- Presence on-site of an employee with a **history of heat illness**;
- Requirement to wear **impermeable PPE at any temperature**.

While ambient temperatures in the southwest routinely exceed 80° F, relative humidity levels are typically very low. This, combined with the acclimatization of the HDR employees accustomed to the climate and the employees’ ability to access cool shelter when desired, will minimize the necessity to monitor on many project sites. Again, each project site and set of employee tasks is different; project personnel should consult their OSC or the Director of Safety if guidance is needed.

9.2.3 Procedures

The HDR Physiological Monitoring Program consists of monitoring each affected employee by the simultaneous monitoring of the following two parameters:

1. **Heart rate** - Each individual will count his/her radial (wrist) pulse upon arriving at the site, prior to work each morning. This will be considered the “background”, or resting pulse. This information will be provided to the project Health & Safety Officer (HSO). This provides the HSO with the “normal” resting pulse of that employee, since people exhibit a natural variability in pulse rates. Then each employee will monitor his/her pulse for 30 seconds as early as possible at the beginning of each rest period (breaks, lunch, end of workday). If the heart rate of any individual exceeds 110 beats per minute at the beginning of a rest period, then the subsequent work cycle will be decreased by one-third. The rest period length will remain the same.
2. **Aural temperature** - Each individual will measure his/her aural (ear) temperature with an electronic ear clip/scan thermometer at the same time, and on the same schedule, as the pulse readings. Past use has shown a close correlation between oral and aural temperatures (oral temperature collection by use of thermometers is allowed, but

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discouraged, due to the invasiveness of the Procedure and the issue of hygiene). This temperature is also correlated with the deep core body temperature, which is what is important. If the aural temperature exceeds 99.6° F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. At no time will any employees aural temperature be allowed to exceed 100.4° F (38° C); if exceedance occurs, the employee shall not be permitted to continue to work in the hot environment, but must rest in a cool location, be provided cool drinks (non-caffeinated, non-alcoholic), and not return to the hot work environment until the following day. (NOTE: The new battery-powered ear scan digital thermometers, which read the temperature of the eardrum, are recommended for project work. They cost about \$50 and are readily available through any national chain discount store. Individual-use covers are placed over the scanner probe, and discarded between users, thus avoiding any hygiene concerns. An adequate number of covers should be maintained on-site.)

The project or designated HSO shall record all monitoring results on the HDR Heat Stress Log (see example, Attachment A). The designated HSO shall have a minimum of current Red Cross first-aid certification (which includes training to recognize the symptoms of heat-induced illness). **NOTE: If initial results indicate that the site acclimatized workers are not suffering any symptoms of heat induced strain, then the HSO may contact the HDR Director of Safety and request to reduce the level of future monitoring.**

10.0 PREVENTION OF HEAT DISORDERS

It is interesting to note that if a person works continually, for about a week, in a hot environment, he/she tolerates much hotter conditions than initially. This process of adjustment is termed "acclimatization", and it has been intensively studied and is well known. Acclimatization is essential if work is to be frequently performed in hot environments. Essentially, in acclimatized workers, their core body temperatures and heart rates are slower than non-acclimatized workers, and they sweat more but with less salt loss. Acclimatization to heat can, however, be lost almost as rapidly as it is acquired, if the worker is removed from the hot environment for a few days.

In order to prevent the onset of heat-related disorders, HDR employees should rely on the physiological monitoring methods described above, and practice the following good health measures.

10.1 Provision of Water (or other drinking fluids)

Fluids are a key preventative measure to minimize the risk of heat related illnesses. HDR employees shall have access to potable drinking water or other non-alcoholic beverages (drinking fluids). Where the supply of water is not plumbed or otherwise continuously supplied, drinking fluids shall be provided in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for the entire shift. Employees may begin the shift with smaller quantities of drinking fluids if they are able to replenish their supply during the

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shift. The beverages should be cool (50 to 60° F), and readily available (as close as possible to employees). Coffee, Tea and other warm beverages should be avoided.

Employees are encouraged to maximize daily fluid intake and realize that thirst is not an adequate indicator of sweat loss. Drinking fluids should be consumed at a target rate of one cup every 20 minutes at a minimum.

If drinking fluid containers are being shared by employees disposable/single use drinking cups need to be provided, or employees may use their own cup. In addition, a supervisor or designated employee shall be assigned to monitor the quantity and condition of the drinking fluids. When drinking fluid levels within a container drop below 50%, the fluids need to be replenished.

10.2 Access to Shade (Rest Area)

Access to rest and shade or other cooling measures are important preventative steps to minimize the risk of heat related illnesses. At or below 85 °F, employees shall have timely access to a rest area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes. Such access to shade shall be permitted at all times.

For temperatures at or above 85 °F, one or more areas with shade shall be provided at all times while employees are present. Shade shall accommodate at least 25% of employees of shift at any one time.

Air conditioned construction offices, trailers and work vehicles make good rest areas. When possible, rest areas should be readily accessible and near supplies of drinking fluids.

10.3 Additional Health Measures

To help prevent the onset of heat-related disorders, HDR employees should practice additional good health measures, such as

1. The workers should be as physically fit as possible. This is especially important concerning hot work. Obesity predisposes individuals to heat disorders;
2. Older workers are at a disadvantage in hot work because the aging process results in a sluggish response of sweat glands, resulting in a less effective control of body temperature;
3. A victim of a heat-related disorder is permanently predisposed to suffering a recurrence;
4. Every worker is unique in his/her ability to handle heat. Work/rest periods should be based on the individual's capacity to safely handle the heat, not on a predetermined or inflexible time length;
5. Alcohol has been commonly associated with the occurrence of heat-related disorders. Alcohol reduces heat tolerance;
6. Inform female workers of the possible adverse consequences of hot work while pregnant, due to elevated core body temperatures.

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10.4 High-Heat Procedures

Because of extreme environmental conditions during high heat (i.e., temperatures exceeding 95°F), employees' physical and mental condition can change even more rapidly into a serious medical condition. The onset of heat illness may be confused with other problems and may not always be obvious before it becomes life-threatening. Therefore, extra measures may be required to prevent and/or respond to heat illness during high heat. These extra measures include the following to the extent practicable:

1. Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
2. Observing employees for alertness and signs or symptoms of heat illness.
3. Reminding employees throughout the work shift to drink plenty of water.
4. Close supervision of a new employee by a supervisor or designee for the first 14 days of the employee's employment by the employer, unless the employee indicates at the time of hire that he or she has been doing similar outdoor work for at least 10 of the past 30 days for 4 or more hours per day.

11.0 EMERGENCY ASSISTANCE PROCEDURE

Employees are directed to immediately report to their field supervisor, symptoms or signs of heat illness in themselves, or in co-workers. Employees should not delay in reporting these observations.

To help ensure proper medical care is provided with minimal delay, supervisors shall take the following steps:

- Providing First Aid: Should an HDR employee exhibit signs of possible heat illness, the treatment Procedures described in Section 7.0 should be implemented.
- Contacting EMS: If Emergency Medical Service (EMS) is required the HDR field supervisor (or a designee) shall contact EMS (dial 911) using a land line or cell phone. Once contact is established, stay on the phone with EMS to provide clear and precise directions to the work site. If a land line and cell phone coverage are not available, prior to initiating field work, arrangements (satellite phone, two way radio, etc.) shall be made to contact EMS with minimal delay.
- Directions to Site: Prior to beginning field work, the directions from the nearest medical facility to the site should be written down and test driven. These directions should be kept immediately available, and will be reviewed by on-site HDR employees at least weekly.
- Remote Locations: If potential heat stress victims will be working at remote locations where EMS cannot physically reach, provisions should be made for transporting the victims to a point where they can be reached by an EMS provider.

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12.0 TRAINING

Training will be provided to employees and supervisors who may be exposed to conditions which could lead to heat related illnesses during the course of their work. Training will be conducted prior to potential exposure and will include:

- Environmental and personal risk factors for heat illness
- Heat stress prevention techniques including employee monitoring, fluid intake, access to shade (rest areas), and acclimatization
- Different types of heat illness and the common signs and symptoms of heat illness
- Treatment methods, and
- Emergency Assistance Procedures

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HDR HEAT STRESS LOG

Name	Date & Time	Air Temp. °F/% Sunshine	Resting Heart Rate (IF OVER 110 BPM, REDUCE WORK PERIOD)	Aural/Oral (circle one) Temperature (if over 100.4 F, remove from heat)



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Attachments

ATTACHMENT #1	First Aid & Emergency Medical Services
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**First Aid/CPR
Health & Safety Procedure #30**

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1.0 **OBJECTIVE**

HDR, Inc. (HDR) recognizes that serious accidents may occur at any time, and that when prompt medical care is distant, the timely accessibility to First Aid and/or Cardiopulmonary Resuscitation (CPR) may often minimize the severity of the injury. The objective of this Procedure is to present information on HDR's First Aid/CPR Program, including the providing of training and the requirements for the availability of first aid supplies at both office and project sites.

2.0 **PURPOSE**

This Procedure presents HDR's Program for providing the ready availability of Emergency Medical Services for treatment of injured employees. This Program is in full compliance with the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR 1910.151 and 29 CFR 1926.50, *"Medical Services and First Aid."*

Additionally, this Procedure conforms with the first aid provisions included in the following OSHA standards: Shipyard (CFR 1915.98), Longshoring (CFR 1918.96), Diving (CFR 1910.410), Hazardous Waste and Emergency Response (CFR 1910.120 & 1926.65), Temporary Labor Camps (CFR 1910.142), and First Aid and Lifesaving Facilities (CFR 1917.26). In some cases this Procedure incorporates specific HDR requirements, which may be more stringent than OSHA regulations.

3.0 **REVISION HISTORY**

Rev	Description of Change	Date
0	Initial Release	02/01/1999
1	Revisions	07/16/2003
2	Revisions	01/22/2004
3	Revisions	11/21/2008
4	Revisions	02/18/2010
5	Re-Formatting	07/16/2013
6	Addition of "or later" to ANSI Standards	11/20/2013

4.0 **APPLICABILITY**

This First Aid/CPR Procedure applies to all HDR personnel, either at HDR client sites or at HDR facilities. All employees in offices or on project sites, not in "near proximity" (see discussion in Section 9.1) to medical assistance may be impacted by this Procedure. HDR field professionals are responsible for evaluating project sites and work locations to determine which aspects of this Procedure apply.

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5.0 PROGRAM IMPLEMENTATION

This Program will be administered by the HDR Director of Safety, and locally by the Office Safety Coordinator(s).

Director of Safety. The Director of Safety shall:

- Review, at least annually, the effectiveness of the Program, identify any deficiencies, and ensure that they are corrected;
- Provide guidance to OSCs and HDR professionals concerning first Aid/CPR Training issues;
- Assist OSCs in locating appropriate training instructors.

Office Safety Coordinators (OSCs). The Office Safety Coordinator(s) will:

- Determine medical and first aid requirements for their respective office location and assign first aid responsibilities as necessary;
- Be responsible for ensuring necessary first aid supplies are available within the office;
- Provide assistance to Project Managers during project planning and proposal preparation and to Project Health and Safety Officers during project implementation;
- Interface with Corporate Safety on First Aid/CPR Training when guidance is necessary;
- Provide office technical assistance to project personnel, as possible.

Health and Safety Officers. Project designated Health and Safety Officers (HSO) will:

- Determine medical and first aid requirements for project sites and, if necessary, serve as a designated first aid responder;
- Be responsible for ensuring necessary first aid supplies are available at the project site (confirm contents of project first aid kit(s) at the start of the project and replace expended items and supplies at least weekly);
- Interface with Corporate Safety on First Aid/CPR Training when guidance is necessary.

Project Personnel. All project personnel shall:

- Read, understand and follow the contents of this Procedure when working in locations remote from medical facilities.

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6.0 FIRST AID KITS AND SUPPLIES

All OSCs must evaluate their office workplace and all HSOs must evaluate their project work sites to determine medical and first aid requirements. If no infirmary, clinic, or hospital is within near proximity of their work locations, then a first aid kit must be maintained. The type of first-aid kit selected will depend on its intended use. First-aid kits are classified as Type I, Type II, or Type III as follows:

Type I

Type I first aid kits are intended for use in stationary, indoor settings where the potential for damage of kit contents due to environmental factors and rough handling is minimal. Typical applications for Type I first-aid kits may include, but are not limited to the following: general indoor use, an office setting, or a manufacturing facility. First-aid cabinets would generally fall into the Type I classification. Type I first aid kits are required to have a means for mounting in a fixed position and are generally not intended to be portable.

Type II

Type II first aid kits are intended for use in portable, indoor settings where the potential for damage of kit contents due to environmental factors and rough handling is minimal. Typical applications for Type II first aid kits may include, but are not limited to, the following: general indoor use, an office setting or a manufacturing facility. Type II containers shall have a carrying handle, and shall be subjected to the drop test described in ANSI Z308.1-1998 (or later).

Type III

Type III first aid kits are intended for portable use in the mobile industries and/or outdoor settings where the potential for damage to kit contents due to environmental factors and rough handling is significant. Typical applications for Type III first aid kits may include, but are not limited to, the following: the transportation industry, the utility industry, the construction industry, and the armed forces. Type III containers shall be subjected to the conditions, and drop tests described in ANSI Z308.1-1998 (or later) and shall also:

- a) be moisture resistant
- b) have a carrying handle
- c) provide a means to be mounted in a fixed position
- d) be corrosion resistant

Contents of the first aid kit, irrespective of the type of kit, should be applicable for the types of injuries reasonably anticipated, based on the project or office setting and specific project activities. At a minimum, the contents should meet the requirements specified by the American

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National Standards Institute (ANSI) standard Z308.1-1998 (or later), *Minimum Requirements for Workplace First-Aid Kits* (available from Corporate Safety) and must include the following:

**Table 1
Minimum Contents of First-Aid Kit**

Item and Minimum Size*	Minimum Quantity
Absorbent Compress, 32 sq. in., with no side smaller than 4 in. (81.3 sq. cm, with no side smaller than 10 cm)	1
Adhesive Bandages, 1 x 3 in. (2.5 x 7.5 cm)	16
Adhesive Tape, 5 yd. (457.2 cm) total	1
Antiseptic, 0.5 g (0.14 fl. oz.) application	10
Burn Treatment, 0.5 g (0.14 fl. oz.) application	6
Medical Exam Gloves	2 pair
Sterile pad, 3 x 3 in. (7.5 x 7.5 cm)	4
Triangular Bandage, 40 x 40 x 56 in. (101 x 101 x 142 cm)	1

* See ANSI Z308.1 – 1998(or later), Section 5.2, for additional description of each item.

It is also recommended that each kit contain a CPR barrier. The CPR barrier should be a single-use, disposable medical device for CPR use, listed with the FDA. The device should provide protection from direct contact with bodily fluids by means of its construction and the use of a one-way valve, filter medium or other equivalent method. Each barrier should be packaged in a tamper-evident, easily opened container, clearly labeled with the name of the device, together with comprehensive instructions for use.

In addition to the items listed in Table 1, optional items and sizes may be needed to augment a kit based upon the specific hazards existing in a particular work environment.

Information that should be considered in determining contents of the kit includes the following:

- Types of accidents that could reasonably occur at the workplace or project site.
- Response time for external emergency services.
- Number and locations of employees at the workplace or project site.
- If corrosive materials are in use in the workplace.

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- If there are any industry-specific requirements.

Any additional over-the-counter drug product (aspirin, etc.) included in a first aid kit should be packaged in a single dose, tamper evident packaging, with full labeling as required by FDA regulations, and should contain no ingredients which are known to cause drowsiness. Items other than those listed in Table 1 and those approved by a health care professional, or by a person competent in first aid, should not be stored in the kit.

All employees should know where the first aid kit is located. The location must be easily accessible to employees.

First aid kits for specific projects shall be checked by the Health & Safety Officer before being sent out on the project and at least weekly to ensure that any expended items are replaced. First aid kits for office locations shall be checked regularly by the responsible OSC to ensure that any expended items are replaced. The OSC is responsible for acquiring the replacement supplies, and, in consultation with their respective Department Manager, may determine the most cost-effective manner of purchasing these supplies.

7.0 AUTOMATED EXTERNAL DEFIBRILLATORS (AED)

Automated external defibrillators have become increasingly common for use in resuscitating a victim experiencing sudden cardiac arrest. Due to the number and varying sizes of permanent and project offices, HDR does not authorize the purchase of AEDs, nor is able to provide AEDs for each work location. However, HDR recognizes that there may be individual employees whose medical condition is such that maintaining an AED at hand while at work is prudent. HDR encourages these employees to consider purchasing a personal AED, and carrying it with them each day while at work. While not required, it is recommended that these employees alert co-workers about their condition and notify them of the location and functional operation of the AED.

8.0 FIRST AID NOTIFICATION AND TRANSPORTATION

As necessary, proper equipment for prompt transportation of an injured person to a physician or hospital, or a communication system for contacting necessary ambulance service shall also be provided at each project site (by the HSO) and office location (by the OSC). In most cases, a telephone (regular, cellular, or satellite) is the best method of communication. In areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.

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9.0 CORROSIVES - EYEWASH/SHOWER

Where the eyes or body of any person may be exposed to injurious corrosive materials, it should be confirmed prior to initiation of project activities that suitable facilities for quick drenching or flushing of the eyes and body are available within the work area for immediate emergency use. (Corrosive materials are typically labeled as such, and the corresponding MSDS will state “corrosive” on it). OSHA considers “immediately available” to be accessible within 100 feet or 10 seconds from the point of exposure. Therefore, use (and subsequent potential exposure) of corrosive chemicals should be limited to areas immediately adjacent to eyewash/body flush facilities.

10.0 FIRST AID/CPR TRAINING REQUIREMENTS

10.1 Acceptable First Aid Response Times

OSHA requires that whenever an employee is not in “near proximity” to adequate medical treatment, then the employer has an obligation to provide first aid/CPR, whenever the reasonable likelihood of injury is present. “**Near Proximity**” is defined as:

- 3 - 4 minutes, when the result of likely injury is life-threatening or severe;
- 15 minutes, when the result of likely injury is not severe.

Following this guidance, in areas where accidents resulting in suffocation, severe bleeding, or other life threatening injury or illness can be expected, a response time by medically trained personnel of 3 to 4 minutes (from notification until initiation of first aid) is acceptable. Examples of HDR project activities that may incur such types of accidents include permit-required confined space entry into IDLH atmospheres (see HDR H&S Pro #1 – Permit-Required Confined Spaces), field work at sites with heavy machinery such as drill rigs or demolition equipment, rappelling and field work in close proximity to rotating equipment. In other circumstances, i.e., where a life-threatening injury is an unlikely outcome of an accident, a longer response time, such as 15 minutes, is acceptable.

When these response times cannot be met by outside medical personnel, HDR workers shall be trained and available to provide First Aid/CPR. These trained workers shall be able to reach accident victims within the aforementioned acceptable response time in order to render appropriate first aid.

10.2 Training Recipients

If HDR offices or project sites are located such that the applicable response time cannot be met, first aid and CPR training must be provided to at least one employee at the office location or

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project site.¹ Employees must receive training as specified in Section 9.3, and have a valid certificate from the U.S. Bureau of Mines or the American Red Cross (or equivalent training that can be verified by documentary evidence).

Department Managers of HDR **offices** located outside the acceptable response time (that is, offices located further than 15 minutes from outside medical personnel) will be responsible for designating First Aid Responders for their office.

Project Managers of **projects** located more than three minutes or 15 minutes from medical support (as applicable, see Section 9.1) will be responsible for designating First Aid Responders for the project. Designated First Aid Responders and other means of providing and summoning services for medical attention must be identified at the start of the project. Designated First Aid Responders shall be given the appropriate training, and will be responsible for administering first aid/CPR if needed.

In addition, designated First Aid Responders shall be offered the Hepatitis B vaccination and provided formal training in the HDR Bloodborne Pathogen Exposure Control Plan. This Plan, presented in HDR's H&S Procedure #8, follows the requirements specified in 29 CFR 1910.1030.

10.3 Training Elements.

The level of training for first-aid providers should be based on a workplace hazard assessment. At a minimum, personnel shall be trained in basic first aid and CPR. The hazards of the site or its remoteness from advanced medical care may dictate a need for further training. Additional training topics should be hazard-specific (e.g., a site where exposure to corrosive substances is likely should include training on First Aid Procedures for chemical burns). Training must be repeated annually for CPR Certification and every three years for First Aid Certification (unless the approved certifying agency has another established schedule). At a minimum, basic first aid and CPR training shall consist of the following:

- The definition of first aid.
- Legal issues of applying first aid (Good Samaritan Laws).
- Basic anatomy.
- Patient assessment and first aid for the following:
- Respiratory arrest.
- Cardiac arrest

¹ Please note that the U.S. Army Corps of Engineers mandates a minimum of two First Aid/CPR trained employees per site.

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- Hemorrhage
- Lacerations/abrasions
- Amputations
- Musculoskeletal injuries
- Shock
- Eye injuries
- Burns
- Loss of consciousness
- Extreme temperature exposure (hypothermia/hyperthermia)
- Paralysis
- Poisoning
- Loss of mental functioning (psychosis/hallucinations, etc.). Artificial ventilation or drug overdose
- CPR
- Application of dressings and slings
- Treatment of strains, sprains, and fractures
- Immobilization of injured persons
- Handling and transporting injured persons
- Treatment of bites, stings, or contact with poisonous plants or animals (see HDR H&S Procedure #34 – Biological Hazards)

10.4 Retention of Training Records

Training records will be maintained by the HDR Training Department. **Individuals** are responsible for ensuring that a copy of their training certificate is forwarded to the Health & Safety Dept., HDR Safety Training, at 8404 Indian Hills Drive, Omaha, NE 68114-4049.

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11.0 EMPLOYEE AWARENESS

Provisions for medical car Signs should be prominently displayed at all office locations and project sites informing employees of the availability of first aid and emergency medical services (see Attachment A).

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+ **EXAMPLE POSTER**
FIRST AID & EMERGENCY MEDICAL SERVICES
First Aid Person on Duty

Name	Phone
_____	_____
_____	_____
_____	_____
_____	_____

Locations of First Aid Kits

_____	_____
Hospital	Ambulance
_____	_____

Office Safety Coordinator	Police	Fire
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Appendices

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APPENDIX B	Working in Proximity to Bears
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**Biological Hazards
Health & Safety Procedure #34**

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1.0 **OBJECTIVE**

Biological hazards include snakes, spiders, mites, insects, animals, noxious plants, bacteria, viruses, fungi, and any other living organism that can cause injury or illness. It is the objective of HDR to provide proper training and equipment to workers who may be exposed to biological hazards when conducting project-related field activities.

2.0 **PURPOSE**

The purpose of this Procedure is to provide information to HDR employees to assist them in recognizing and avoiding biological hazards encountered at project work sites.

3.0 **REVISION HISTORY**

Rev	Description of Change	Date
0	Initial Release	10/22/2004
1	Revisions	09/19/2007
2	Revisions	06/06/2012
3	Re-Formatting	07/17/2013

4.0 **APPLICABILITY**

This Procedure covers occupational exposure to biological hazards and applies to all HDR personnel. NOTE: Biological hazards associated with human body fluid contact are addressed in H&S Procedure # 8 - *Bloodborne Pathogens*. All employees, regardless of HDR Department, may be impacted by this Program.

5.0 **PROGRAM IMPLEMENTATION**

This Program will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC) and project-specific Site Health and Safety Officer.

Director of Safety. The Director of Safety shall:

- Periodically review the effectiveness of this Program, identify any deficiencies, ensure that they are corrected, and
- Assist OSCs and project professionals, as requested, in the implementation of this Program.

Office Safety Coordinators. The OSCs will:

- Provide initial training on this Procedure to any impacted office staff, make sure that this Procedure is readily available in each office, and
- Interface with the Director of Safety regarding any biological hazards that have been discovered and need addressing.

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Site Health and Safety Officers. The Site Health and Safety Officers will:

- Provide initial training on this Procedure to their impacted project staff, make sure that this Procedure is readily available, and
- Interface with the Director of Safety regarding any unsafe biological site conditions that have been discovered as necessary.

6.0 SOURCES OF BIOLOGICAL HAZARDS

Sources of biological hazards include insects, mites, arachnids, animals, plants, and microbial agents present in the air, water, and soil. These hazards can cause a variety of health effects, including skin irritation, allergies, infections, or illness. Due to the nature and location of many HDR project assignments, exposure to biological hazards is unavoidable.

This Procedure provides information on the types of hazards that employees may reasonably be expected to encounter, the potential health effects associated with exposure, protective measures that should be taken to reduce risks, and actions to be taken by employees if an exposure or suspected exposure occurs.

7.0 DEFINITIONS

Feral – Refers to any formerly domesticated animal that is now living as a wild animal. They are particularly dangerous because (1) their appearance as a familiar pet causes people to assume they will act like one, and (2) former association with people often causes feral animals to act without fear of humans. Term most frequently applied to dogs and cats.

Necrosis – Pathological death of a living plant or animal tissue.

Pathogen – A microbial agent capable of causing disease in humans.

Vector – Carrier or transmitter of a pathogen.

8.0 INSECT BITES & STINGS

Noxious insects are ubiquitous, and will be encountered in a variety of outdoor project settings. Their presence in the field is temperature dependent – they are not present in the cold seasons. Table 1 presents descriptions and habitat information for various types of stinging or biting insects, as well as protective measures that can be taken to avoid injury. In addition to the information presented in Table 1, the following preventative measures should always be taken to minimize the chances of experiencing an insect bite or sting:

- Do not wear perfumes or colognes when performing field activities as they often attract stinging insects.

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- Use an insect repellent with N,N-diethyltoluamide (DEET) (unless prevented by medical sensitivity).
- Wear protective clothing (long sleeves, long pants, and gloves).

The two greatest risks from most insect stings are allergic reaction (which can be fatal) and infection. General guidelines to follow if you experience an insect sting are as follows:

- For bee stings, remove the stinger by gently scraping it out with a blunt-edged object, such as a credit card or dull knife. Don't try to pull it out; this may release more venom.
- For all types of stings, wash the area carefully with soap and water. Do this two to three times a day until skin is healed.
- Apply a cold pack, an ice pack wrapped in a cloth.
- Apply a paste of baking soda and water for 15 to 20 minutes.
- Over-the-counter acetaminophen products may reduce pain.
- Another remedies for pain and itching is to applying a small amount of household ammonia to the bite area. There are also over-the-counter products for insect stings that contain ammonia.
- Some over-the-counter antihistamines advertise that they alleviate pain/swelling.
- Any employee who receives multiple stings should seek immediate medical attention.
- **Any employee who knows that they are allergic to insect stings/bites should consult their own physician concerning the prudence of carrying self-administered anti-toxin injectable medicine.**
- A sting in the mouth or nose warrants immediate medical attention, because swelling may block airways. You should also seek emergency care if you see any of the following symptoms, which may indicate an allergic reaction:
 - large area of swelling
 - abnormal breathing
 - tightness in throat or chest
 - dizziness
 - hives

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- fainting
- nausea or vomiting
- persistent pain or swelling (over 72 hours)

8.1 Mite Infestations – Chiggers (aka “Red Bug”)

The only mite that causes a real problem to field staff is the parasitic larvae stage of the harvest mite, *Trombicula alfreddugesi*, commonly referred to as a “chigger”. These arachnids, related to spiders, ticks, and scorpions, are virtually invisible to the naked eye, measuring only 1/16 of an inch in length. Chiggers feed on low vegetation, but need vertebrate (including humans!) tissue as a source of protein. Chiggers are very mobile, moving quickly onto passersby’s feet. Once on a person’s skin, chiggers will move to confined areas where the skin is thin and moist – ankles, wrist, behind the knee, thighs, groin, armpit or waistline. Sitting on mite-infested ground will frequently result in severe chigger attacks around the crotch and under the beltline. Contrary to popular opinion, chiggers do not burrow into the skin, but rather attach themselves to the opening of a hair shaft and inject saliva into the skin, which prevents blood clotting and liquefies tissue, on which the chigger feeds. The immediate skin area around the bite becomes inflamed (an allergenic reaction to the chigger saliva), with a hard white center. The inflamed tissue camouflages the tiny red chigger. The mite will remain in this area, feeding, from one-to four days, or until physically removed by washing. The bite area will redden (mild inflammation) and begin to itch (reaction to injected fluids) a short time following the initial bite. Sweat and heat increase the itching sensation. Symptoms are transitory, generally abating without treatment in about one week, with no long-term complications unless physical scratching of the inflamed area results in infection. In rare individuals, a high density of chigger bites combined with a hyper-allergenic response could require medical attention.



Chiggers are a real menace to HDR staff in the southern sections of the country, becoming active in the late spring, with chigger “bites” beginning in early June and reaching the most severe frequency around the 4th of July. Chigger populations are especially dense in old-field sucessional areas with high moisture and shade, where high (2-3 ft) annuals such as Queen Anne’s Lace grow. Another favorite plant species harboring chiggers is Sericia Lespedeza, grown to improve game bird habitat. They are sparsely present in forested areas. Most people report chigger bites to be the most irritating and long-lasting bites made by all the summer arthropod pests!

Removing clothes and washing immediately after field work will reduce the probability of chigger bites, as chiggers generally move about the body for some time before settling down to feed. A DEET-containing repellent sprayed around the ankles and waist will deter chiggers for a limited time. One folk remedy that alleviates the itching of chigger bites is applying fingernail polish over the red inflamed area. Clear top-coat polish is best; otherwise, you may appear to co-workers to be covered in measles!

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Table 1
Stinging & Biting Insects & Mites

Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black. Many species.	Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.	Sting. One nest may contain up to 100,000 hornets, which may attack in force at the slightest provocation.	Severe pain, <u>allergic reactions similar to bees</u> . Can be fatal.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to ¼ inch long. Actually a species of fly.	Wherever water is available for breeding. Common throughout arable U.S., very bad in North Central US, Canada and Alaska.	Bites and sucks blood. Itching and swelling result. Disease vector.	Can transmit encephalitis, malaria and other <u>diseases</u> . Scratching causes secondary infections.	Use plenty of insect repellent and wear gloves. Stay in windy areas. Topical application of toothpaste may relieve itching. Ultrasound devices or Vitamin B <u>do not</u> prevent mosquito bites.
Wasp	Very thin waist. Many species. Color can be black, yellow or orange with stripes.	Underground nest; also paper-like honeycomb nest in abandoned buildings, hollow trees, etc.	Stings. Some species will attack en masse if you disturb or even closely approach the nest.	Severe pain, <u>allergic reactions similar to bees</u> . Can be fatal.	Avoid Nest. Do not swat at them.

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Organism	Description	Habitat	Problem	Severity	Protection
Bee	Variable in size and color, many species ranging in size from microscopic to Bumblebee. European Honey Bee most familiar. Has two pair of wings.	Hollow logs, underground nest, and old buildings.	Stings when annoyed. Honey Bee leaves venom sac in victim. The ripping away of the venom sac kills the individual bee.	<u>If person is allergic</u> , nausea, shock, and constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.
Flies	One pair of wings; Variable in size and color; some species microscopic (biting Midges), others (Horse flies) bumblebee size.	Variable, may range far from wetland breeding areas. Common around rural farmlands, swamps, very bad in northern latitudes (e.g., Alaska).	Bites. Bloodsucking. Black Flies, Horse flies and Yellow Flies, in particular, can be vicious biters.	Very painful bites. Often more inhibiting during daytime lowland work than mosquitoes.	Wear thick protective clothing. Use plenty of insect repellant.
Fire Ant	Small reddish to brown ant. Imported from South America. Identify by presence of large visible colony mounds. Mounds appear after heavy rains overnight in areas where presence was not suspected.	Rural or residential, prefers sandy soils, limited to southern US (VA, TN southward). Cold weather intolerant.	Sting. Highly aggressive, attacks en masse. Multiple stings almost always occur.	Severe pain, <u>allergic reactions possible similar to bees</u> . Can be fatal.	Avoid disturbing mounds; wear boots when in sandy, coastal plain habitats. Individual colonies can be eliminated (temporarily) with pesticide application.



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Organism	Description	Habitat	Problem	Severity	Protection
Chigger	Microscopic parasitic mite larvae (not an insect)	Old fields with high weeds, especially abundant in stands of Sericea Lespedeza and Queen Anne's Lace. Common throughout, very common in SE.	Injects anti-clot fluid into tissue and feeds, causing redness, swelling and intense itching. Locates around top of ankles, waistline, under arms.	Not serious or fatal, but temporarily irritating, due to itching sensation. Allergenic response to injected saliva causes itch.	Avoid walking in high weed fields, cover exposed skin. Apply DEET. Tuck pants inside socks. Shower promptly. Application of clear fingernail polish over welt will decrease itching.

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8.2 Diseases Transmitted By Mosquitoes.**8.2.1. West Nile Virus**

West Nile Virus is a mosquito transmitted viral disease that causes a serious, potentially life-threatening inflammation of the brain in people, horses, many species of birds, and possibly other animals. It spreads through the bite of a mosquito carrier, but there is no evidence that it can be spread from person to person or animal to person. Originally an African disease, it has recently spread to the United States and Europe, with the first U.S. case reported in 1999.

At this time, human infection is rare, and the most impacted animals have been birds and horses. However, by the end of 2002, human cases have been reported from all U.S. states east of the Rocky Mountains, plus California.

Most people who become infected with West Nile virus will either have no symptoms, or very mild ones. Symptoms appear 3 to 14 days following infection. The CDC estimates that 20% of those infected develop clinical symptoms. Symptoms include fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands.

Rarely, however, the infection can result in severe and fatal illnesses. Symptoms of severe infection (West Nile encephalitis or meningitis) include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease.

Prevention

- Be on the lookout for dead birds, as a biological indicator of the area presence of West Nile. While over 110 species of birds may contract the disease, Jays and Crows are particularly susceptible and may die in large numbers in an infected area. Report the observation of multiple dead birds in an area to your local health department, unless instructed not to do so.
- Avoid outside activity in these areas at dawn and dusk, the periods when mosquitoes are most active.
- Wear a DEET-containing repellent to minimize the possibility of a mosquito bite.
- Wear maximum protective clothing – long pants and sleeves, hat, etc. to reduce the available mosquito target areas on the body.

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8.2.2 Encephalitis (General)

Encephalitis is a serious but very rare viral illness transmitted by a species of swamp breeding mosquito, which acquires the virus by feeding on the blood of infected wild birds. In most years, the virus is limited to these birds and bird-biting mosquitoes, but occasionally the virus is transmitted to other mosquito species known to bite humans and horses. The virus transmission by mosquitoes ends with the first heavy frost.

Encephalitis can affect the brain. The symptoms, which appear 5 to 15 days after being bitten, include high fever, headache, stiff neck, and decreased consciousness. One in three infected individuals will come down with the serious disease, while in two-thirds the effects disappear and the victim recovers. Where serious symptoms appear, however, encephalitis is fatal in 30-50% of cases. Individuals with symptoms suggestive of encephalitis should contact a physician immediately.

8.2.3 Malaria

Malaria is caused by a protozoan parasite (*Plasmodium sp.*) that is transmitted from person to person by the bite of an infected female *Anopheles sp.* mosquito. These mosquitoes are present in almost all countries in the tropics and subtropics, and all 48 continental states in the U.S. Although thought to have been eradicated by the mid-1950s, recently several cases have occurred. The threat is most probable during **hot** summers.

While there is no vaccine, malaria can often be prevented by the use of anti-malarial drugs prior to, during, and after, traveling into malarial areas, and the use of personal protection measures against mosquito bites (e.g., use of mosquito netting over sleeping areas, application of insect repellent to exposed skin and to thin clothing). Anopheles mosquitoes bite during nighttime hours, from dusk to dawn. Therefore, anti-malarial drugs are only recommended for employees who will have exposure during evening and nighttime hours in malaria endemic areas. At risk HDR employees will be those traveling or working in tropical & sub-tropical foreign countries. Employees at risk should contact their private physician about the need to begin an anti-malarial medical Program.

Symptoms of malaria include fever, chills, headache, muscle ache, and malaise. Early stages of malaria may resemble the onset of the flu. Individuals who become ill with a fever during or after work in a malaria risk area should seek prompt medical attention and inform the physician of their recent travel history. Malaria symptoms can develop as early as 6-8 days after being bitten by an infected mosquito or as late as several months or years (dormancy) after departure from a malarious area, after anti-malarial drugs are discontinued. Malaria can be treated effectively in its early stages, but delaying treatment can have serious consequences.

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8.3 SPIDER BITES

While all spiders are venomous, only the few listed here are capable of biting humans and pose a risk to field personnel.

8.3.1 Black Widow

The black widow is a moderately large, glossy black spider with very fine hairs over its body that gives it a silky appearance. On the abdomen is a characteristic red, crimson or yellow marking in the form of an hourglass. Only the female is poisonous; the male, which is smaller, is harmless.

Black widow spiders can be found almost anywhere in the Western Hemisphere in damp and dark places. Favored haunts are woodpiles, tree stumps, trash piles, storage sheds, bathhouses, fruit and vegetable gardens, stone walls, and under rocks. When in structures, they will go to dark places like closets or garages. They are non-aggressive and bite only when roughly handled or sat on. A person bitten by a black widow spider may be unaware, since the bite may feel like a pinprick and go unnoticed. In about 30 to 40 minutes, the area of the bite will swell and pain appears.

If you have any reason to suspect you have been bitten by a black widow spider, go to the hospital emergency room. Symptoms include:

- a deep blue or purple area around the bite, surrounded by a whitish ring and a large outer red ring
- body rash
- muscle spasms, tightness, and stiffness
- abdominal pain
- headache or fever
- general "sick" feeling
- lack of appetite
- joint pain
- signs of infection around the bite (swelling and redness)
- pink or red urine

Black widow spider bites rarely result in death, but it's important to get medical attention as soon as possible. Wash the bite well with soap and water. If being transported, the victim should apply an ice pack to the bite to slow down the spread of the spider's venom. Try to elevate the area and keep still to retard the spread of venom.

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If it's safe to do so, catch and bring the spider to the medical facility with you - this is important because it is sometimes hard to diagnose a spider bite correctly. The spider can be killed first; just be sure not to disfigure it so much that species identification is impossible.

8.3.2 Brown Recluse.

The brown recluse spider has long, skinny legs and is about one-half inch in length. Its entire body is brown, except for a dark mark in the shape of a violin on its head. Its poisonous relatives may be gray, orange, reddish-brown, or pale brown.

Brown recluse spiders are most commonly found in the Midwestern and Southern states, and they are usually found in dark places. In the outdoors, they inhabit piles of rocks, wood, or leaves. If they come inside, they will go to dark closets, attics, or basements. Brown recluse spiders are non-aggressive and bite only when disturbed.

The venom of the brown recluse causes a limited destruction of red blood cells, tissue necrosis and may cause other blood changes. The victim may develop chills, fever, joint pains, nausea, or vomiting. A person who gets bitten by a brown recluse spider may not notice it or may only feel a little prick. After about four to eight hours, the bite will start to hurt a little more. It might look like a bruise or might form a blister surrounded by a bluish-purple area. Without treatment, the local tissue will continue to die, and the discolored area will enlarge. Brown recluse spider bites rarely kill people, but the tissue necrosis can be disfiguring and lead to serious medical consequences.

If you have any reason to suspect you have been bitten by a brown recluse spider, seek immediate medical treatment. As with Black Widow bites, wash the bite well with soap and water, and apply ice to the area, elevate it, and keep it still. If safe to do so, bring the spider to the medical facility with you.

8.3.3 Tarantulas

A tarantula is a black, hairy spider about two to three inches long. They live in nests in the ground and are timid, avoiding contact with humans. Those found in the southwestern United States are not highly poisonous, but occasionally a victim will have an allergic reaction to the injected venom. Other tarantula species brought into the country in imported fruit shipments may have more toxic venom. Their bites may cause marked pain and local redness with swelling. Death from a tarantula bite is extremely rare.

If a person gets bitten by a tarantula, the bite will probably feel and looks like a bee sting, with pain, redness and swelling in the area of the bite. Because of the tarantula's weak venom, it's unusual to have severe reactions involving other parts of the body.

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If you think you've been bitten by a tarantula, wash the bite with soap and water. Mix up some meat tenderizer and water, and rub the bite with a cotton ball that's been soaked in the solution. If you have no meat tenderizer, hold an ice cube against the bite.

8.4 Scorpions

Scorpions are brown arachnids, ranging in size from 1 to 8 inches long, with eight legs and a front pair of prominent lobster-like claws. U.S. species are less than three inches long. A scorpion's stinger, supplied by a pair of poison glands, is at the end of its long tail, which is curved upward and forward over the back. Scorpions prefer shaded dry places, and HDR field personnel may encounter them under fallen wood, rocks and junk piles. They are primarily nocturnal and are more active when it rains.

There are 1400 species of scorpions worldwide, and about 40 species are found in the Southern and Southwestern United States. Scorpions inject a neurotoxin, which attacks the nervous system. Most species of scorpions in this country inject a toxin that, while painful, is not especially dangerous to humans (although stings of the U.S. species *Centruroides sculpturatus* has proved fatal to young children, and is potentially fatal to adults). The sting results in localized swelling and discoloration, similar to a wasp sting, and, like other stinging animals, may sometimes cause serious allergic reactions. More severe reactions from the venom involving other parts of the body can also occur.

If you think you've been stung by a scorpion, seek immediate medical treatment. Because of the possibility of allergenic reaction, and the possibility that the sting was that of *Centruroides sculpturatus*, all scorpion stings should be treated by a doctor. Put an ice pack on the sting immediately to help retard the spread of venom.

8.5 Ticks

A tick is a tiny brown mite that attaches itself to the skin of a mammal, bird or reptile and sucks blood. Ticks range in size from one to four millimeters, but may greatly enlarge as they consume blood. There are hundreds of species of ticks, and they can be found almost everywhere.

Ticks inhabit woods or grasslands in various regions of the U.S. Lacking wings, ticks climb onto small bushes or tall grass usually close to the ground, and wait for an animal or person to pass near them. They are attracted by carbon dioxide, which is generated during respiratory exhalation. As a host animal or human passes by, they latch on to the skin with their legs, use their "nose" to secure themselves, and cut a hole into the skin by means of a pair of sharp mandibles that saw back and forth. Blood is then sucked into their abdomen until fully engorged, at which time they drop off. During the ingestion of blood, ticks may transmit any disease agent present in their system, causing the host animal, if susceptible, to contract the disease. Various species of U.S. ticks are vectors for serious human diseases (See Section 11.2). A person who gets bitten by a tick usually won't feel it; there may be some redness around the area of the bite, but no pain. Medical attention is generally not required.

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8.5.1 Tick Avoidance and Treatment.

In areas where ticks are found, outdoor workers should take the following precautions to protect themselves:

- Wear protective light-colored clothing to prevent ticks from getting access to your skin. This includes long sleeve shirts that fit tightly around the wrist, and long-legged pants tucked into stockings or boots. The light color assists in seeing small ticks on your clothing.
- Use insect repellants that effectively repel ticks (such as those containing DEET), unless prevented due to sensitivity. Apply the repellent to pant legs, socks, shoes, and the skin.
- Always check for ticks on and under clothing after working in tick-infested areas. A daily total-body skin inspection greatly reduces the risk of infection since ticks may take several hours to two days to attach to the skin and feed. Pay special attention to your head, back, neck, armpits, and groin area.

If ticks are found on your body, take the following actions:

- Carefully remove ticks found attached to the skin. Gently use tweezers to grasp head and mouth parts of the tick close to the skin as possible. Pull slowly to remove the whole tick. Try not to squash or crush them since this can squeeze ingested blood, contaminated with disease agents, back into your body.
- Wash affected area with soap and water or disinfect after removing ticks. This minimizes the possibility of having the puncture infected from tick excrement, which is known to harbor disease agents.
- Contact a doctor immediately if you have an illness that resembles Lyme disease or Rocky Mountain Spotted Fever (see Section 11.2), especially when you have been in areas supporting high tick populations.

8.5.2 Tick Transmitted Diseases

8.5.2.1 Lyme Disease

Lyme disease was first recognized in North America in 1975 when doctors discovered an unusual number of people with arthritis in the town of Lyme, Connecticut. The disease is caused by a bacterium, *Borrelia burgdorferi*, which resides in some ticks. In about 75 percent of reported cases of Lyme disease, the victims develop a rash around or near the tick bite usually within one week. In many cases, a peculiar, bright red, circular rash develops. It soon expands to form a ring-shaped "bull's-eye" that can grow to the size of a dinner plate. Often, however, a more mild, general rash appears anywhere on the

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body. The rashes fade after several weeks. Some victims, however, never develop a rash, yet experience more advanced symptoms of the disease.

Lyme disease is an occupational concern for HDR personnel who work outdoors in certain geographical regions supporting dense populations of ticks. It affects people differently, often going unnoticed but may cause serious health problems in others. If this disease is treated at its onset, it's rare for there to be any permanent effects to a person's health. If left untreated, it can cause disability.

8.5.2.2 Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever affects about 800 people in the U.S. each year. The disease usually occurs in the eastern U.S. from New York to Florida, and from Alabama to Texas.

Disease symptomology typically appears 3 to 12 days following a tick bite. During the bite, a rickettsiae parasite is transmitted to the human victim, which causes the fever. The most common symptoms are fever, headache, rash, nausea and vomiting. If untreated, death, while rare, is possible.

There is no current vaccine for Rocky Mountain Spotted Fever. If you get a high fever, rash or nausea within two weeks of a tick bite, get immediate medical care.

9.0 SNAKES

Every state but Maine, Alaska, and Hawaii is home to at least one of 20 poisonous snake species. A bite from one of these, in which the snake may inject varying degrees of toxic venom, should always be considered a medical emergency. Because victims can't always positively identify a snake, they should seek prompt care for any bite, though they may think the snake is nonpoisonous. Even a bite from a so-called "harmless" snake can cause an infection or allergic reaction in some people. Two groups of venomous snakes are native to the United States: pit vipers and coral snakes.

9.1 Pit Vipers

The pit vipers, belonging to the family Crotalidae, include rattlesnakes, copperheads, and cottonmouths (a.k.a. "water moccasins"). While copperheads and rattlesnakes are fairly distinctive, the many species of harmless watersnakes are often mistaken for cottonmouths. Pit vipers all have a small "pit" between the eye and nostril that allows the snake to sense prey at night. Most are thick, heavy-bodied snakes, and have vertical pupils (like a cat's) that are easily seen from a safe distance. They deliver venom through two long retractable fangs that swing outward when the mouth is opened. About 99 percent of all venomous snakebites in the U.S. are from pit vipers. Individual pit viper species vary in the toxicity of their venom. All inject a venom that is principally haemotoxic in nature – it destroys red blood cells and tissue. Some species – Mojave rattlesnakes or canebrake rattlesnakes, for example—deliver a highly toxic

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venom dose. Copperheads, on the other hand, deliver weaker, less dangerous venom that sometimes may not require antivenin treatment. Refer to Appendix A for range maps of common pit vipers.

9.2 Coral Snakes

The other U.S. family of poisonous snakes is Elapidae, which includes two species of coral snakes, *Micrurus fulvius* spp. Coral snakes have a thin form and have small mouths with short fixed fangs, which give them a less efficient venom delivery than pit vipers. Because of their small mouths, fingers and toes are most frequently bitten and the bite is often difficult to detect.

Because of the coral snake's reclusive nature and docile temperament, coral snakebites are rare in the United States—only about 25 a year by some estimates—but if bitten, the snake's neurotoxin venom (affects the nervous system) is very dangerous. Several victims have experienced respiratory paralysis, one of the hazards of neurotoxin venom. Coral snakes inhabit the coastal plain regions of the southern U.S., from North Carolina through central Texas. The U.S. range of coral snakes is presented in Appendix A.

9.3 Non-poisonous “Mimics”

Some nonpoisonous snakes, such as the scarlet king snake *Lampropeltis triangulum elapsoides* and the scarlet snake *Cemophora coccinea*, mimic the bright red, yellow and black coloration of the coral snake and inhabit the same general range. This potential for confusion underscores the importance of seeking care for any snakebite (unless positive identification of a nonpoisonous snake can be made). Table 2 presents the field identifying characteristics of the coral snake and its mimics.

Table 2 – Identification of Coral Snake and “Mimics”

SPECIES	COLOR OF SNOUT	BODY PATTERN
Coral Snake	<u>Black</u> Snout	Red & Yellow body rings touch
Scarlet Snake	<u>Red</u> Snout	Red rings touch black rings
Scarlet King Snake	<u>Red</u> Snout	Red rings touch black rings

9.4 Snakebite First Aid

The bites of both pit vipers and coral snakes can be effectively treated with antivenin. But other factors, such as part of body bitten, time elapsed prior to treatment and care taken before arriving at the hospital, also are critical. The American Red Cross recommends the following first aid measures:

- Wash the bite with soap and water.

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- Immobilize the bitten area and keep it lower than the heart.
- Get medical help.
 - If a victim is unable to reach medical care within 30 minutes, a bandage, wrapped two to four inches above the bite, may help slow venom. The bandage should not cut off blood flow from a vein or artery. A good rule of thumb is to make the band loose enough that a finger can slip under it.
 - A suction device may be placed over the bite to help draw venom out of the wound without making cuts. Suction instruments often are included in commercial snakebite kits.

Recommendations of **what not to do** if bitten by a snake include the following:

- **No ice** or any other type of cooling on the bite. Research has shown this to be potentially harmful.
- **No tourniquets.** This cuts blood flow completely and may result in loss of the affected limb.
- **No electric shock.** This method is under study and has yet to be proven effective. It could harm the victim.
- **No incisions in the wound.** Such measures have not been proven useful and may cause further injury.

Some bites, such as those inflicted when snakes are accidentally stepped on or encountered in wilderness settings, are nearly impossible to prevent. But the following precautions can lower the risk of being bitten:

- **Leave snakes alone.** Many people are bitten because they try to kill a snake or get a closer look at it.
- **Stay out of tall grass** unless you wear thick leather boots, and remain on hiking paths as much as possible.
- **Keep hands and feet out of areas you can't see.** Don't pick up rocks or firewood unless you are out of a snake's striking distance. (A snake can strike half its length.)
- **When turning over rocks or logs, always lift them towards your body,** thus shielding yourself from any snake hiding beneath.

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- **Be cautious and alert when climbing rocks, especially during early spring and fall,** as venomous snakes will be moving to or from communal denning sites, and their local densities around these favored areas may be quite high.

If you encounter a snake when working, just walk around the snake. Give it a little berth, six feet is plenty, leave it alone and don't try to catch it.

10.0 ALLIGATORS (Information also generally applies to American Crocodile)

The American Alligator, *Alligator mississippiensis*, is a very common large reptile across the Southeast U.S., ranging from Georgia to Texas, and especially Florida. It inhabits fresh water of any size and kind, from ditches and ponds to sloughs, marshes, rivers, and reservoirs. In suburban areas they wander onto golf courses and into family swimming pools or conveyance canals.

This reptile grows to lengths in excess of 12 feet, and feeds on a wide variety of animals, including fish, turtles, ducks and any mammal that it can grasp, subdue and drag under the water and drown. Domestic dogs are an especially attractive prey item.

While human attacks are rare, given the frequency of human-gator contact, and humans are not normally viewed as a prey “item” by alligators, attacks do occur. HDR staff working in and around suitable gator habitat should take the following precautions:

- Never encourage the approach of alligators. Never, ever feed alligators, as it is illegal – they will eat almost anything, and once fed, will return for more handouts, quickly losing their fear of humans. Once this fear has subdued, they will begin to charge humans due to the association with food. This dooms the alligator to an eventual death, as “habituated” gators, like bears, they become a threat and have to be killed by authorities for public safety reasons.
- Never take any pet, such as dogs or cats, in a boat in alligator areas. Alligators won’t view you as food, but the dog or cat certainly will be. Any pet jumping into the water will most certainly be attacked, and any boat or canoe capsized by the attack of a large alligator will throw the human occupants in the water along with the intended prey animals, and humans may be seized during the ensuing confusion.
- Don’t walk dogs on the edge of lakes, rivers, canals, or ponds likely to harbor alligators – you are inviting attack by walking a “meal”.
- Alligators spend a lot of time sunning on the banks of open water, and appear lazy, but are aware of intruders and can run very fast for short distances. Don’t approach to look or yell, taunt, or throw anything in their direction.

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- Female alligators make large nest mounds out of plant materials – don't knowingly walk on or around these.
- If an aggressive alligator is sighted, try to get GPS Coordinates or photos to document its location and call the local Fish and Wildlife Commission for handling or relocation.

11.0 BEARS

All species of bears are dangerous and should be avoided if possible. Specific guidance on the hazards of working around bears, and the actions to take if confronted by a bear are presented in Appendix B – *Working in Proximity to Bears*, of this Procedure, and should be referenced as pertinent to field operations.

12.0 FERAL HOGS

Feral hogs are generally domestic hogs that either escaped or were released for hunting purposes. With each generation, the hog's domestic characteristics diminish and they develop the traits needed for survival in the wild. In general, a feral hog looks like its domestic counterpart. Coat coloration patterns can vary from solid black, brown, blond, white, or red to spotted (various combinations of black, white, red, and brown) or belted. A belted hog has a white band across the shoulder and forelimbs. A feral hog can reach four feet in height and weigh over 400 pounds; however, the average sow weighs approximately 110 pounds and the average boar weighs 130 pounds.

Because feral hogs are intelligent omnivores with one of the highest reproductive rates on the planet, their populations are exploding. Feral hogs are physiologically capable of having as many as three litters a year, but one and in some cases two is more likely, with an average of four to six pigs per litter. In 1982, these animals were present in approximately 17 states. By 2004, they had spread to 28 states but are now known to exist in at least 39 states including Alaska, as well as four Canadian provinces. In Texas, feral hogs are present in 225 of the state's 254 counties. The estimated feral hog population in Texas alone is 2.6 million, roughly half of the estimated U.S. population.

Feral hogs are found and can thrive in a variety of habitats. They prefer bottomlands such as rivers, creeks, and drainages when available. Hogs are generally found in dense vegetation cover often associated with water, but also do well in drought prone environments. During hot weather, feral hogs enjoy wallowing in wet, muddy areas and are never far from dense protective cover. They will concentrate in areas of food availability, especially where there are nut – and bean – producing trees, agricultural crops, and deer or other animal feeders.

Because feral hogs are largely nocturnal, the visible signs they leave behind are often all there is to indicate their presence. These signs include wallowing, rooting, rubs, crossings, trails and scat (droppings). If you see any of these signs, take heed. Wallows are found in muddy areas and

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are made where hogs root and roll in the mud. They do this to cool off and also the mud protects their skin from the sun and insects. Rooting is easily recognized because it looks as if the soil has been plowed. Most often rooting takes place over a large area. Rubs are then made when hogs scratch or rub themselves on tree trunks, telephone poles, fence posts, and rocks leaving a noticeable sign with mud and hair often left clinging. The height of the rub often indicates the size of the hog. Often, you will smell or hear hogs in an area before you see them.

Feral hogs generally travel in family groups called 'sounders', comprised normally of two sows and their young. Mature boars are usually solitary, only joining a herd to breed. All wild animals have the potential of being dangerous, especially when wounded or cornered. In a natural state, feral hogs will prefer to run and escape danger, but have also been known to charge intruders. They have a keen sense of hearing and smell. Extreme caution should be maintained when encountering sows (and boars) with their young. Young may be born throughout the year with peak production in the early spring. Similar to most mammals, they are fiercely protective of their young and can be quick to attack an intruder. Their razor sharp tusks combined with their lightning speed can cause serious injury or death.

A boar has four continually growing tusks that can be extremely sharp, and may reach five inches before they are broken or worn from use. Tusks are used for defense and to establish dominance during breeding. A boar also develops a thick, tough skin composed of cartilage and scar tissue, referred to as a shield, from the shoulder area to the back of the rib cage. This shield develops continually as the hog ages and through fighting. If a firearm is being considered for personal protection (see H&S Procedure #31, Firearm Safety), proper shot placement with large caliber ammunition is necessary for a quick kill. Hogs have been known to continue charging and attack hunters even after being shot several times.

Increasingly, drivers are being forced to contend with the presence of feral hogs. Unlike deer, which tend to go over a vehicle in a collision, hogs go under, causing much more costly damage. Auto accidents involving feral hogs are also more likely to be life-threatening. This is due to the greater chance of losing control of the vehicle as the dense hog "rolls" beneath and causes the wheels to be lifted off the ground. Rollover accidents are a common result of a feral hog strike. One advantage drivers have in watching for and avoiding deer is that the animals' eyes are reflective and flash in the headlights. Drivers in states where deer exist in dense numbers instinctively watch the sides of the road for that reflective flash. Hog eyes, however, do not reflect light, making them virtually invisible at night. Additionally, hogs are dark in coloration and are short in stature, hugging the ground and further decreasing their visibility. Reducing vehicle speed at night is the best defense against a potential hog strike.

13.0 OTHER ANIMALS

Employees conducting work at landfills, abandoned buildings, or urban project locations may encounter feral animals. Do not feed, chase, act threatening or call to these animals, or try to pet them. These animals should be left alone unless they interfere with project activities or act in an unusual or threatening manner; in this case, back away from the immediate area while

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facing the animal. **Feral dogs can become pack oriented, very aggressive, and represent serious risk of harm to unprotected workers.**

Avoidance and protection protocols include watching for animal dens, using good housekeeping to discourage foraging, and using repellents (visual-wear bright clothing, audio-announce your approach or presence with loud whistling, talking, radios, etc., and chemical – mace, etc.).

Animal transmitted diseases include rabies and hantavirus.

13.1 **Rabies.**

The major risk of rabies comes from contact with the saliva, body fluids, or tissue of infected animals. Animals that can be infected with rabies include all mammals, but in particular:

- wild mammals--primarily foxes, skunks, bats, and raccoons
- livestock--mostly cattle but occasionally horses, sheep, goats, and pigs
- domestic cats and dogs
- wolves, coyotes and other meat-eating mammals

13.1.1 **Disease Progression**

In humans, the incubation period (the time between initial virus contact and onset of the overt symptoms) is dependent on dose and species of animal vector, but generally ranges from two to eight weeks. In rare cases, it can vary from 10 days to 2 years. Rabies progresses through several stages. Initially, a person who is bitten may notice unusual feelings or tingling around the wound. Soon afterwards, there is a period of tiredness with lack of appetite, and usually accompanied by headache, fever, cough, sore throat, abdominal pain, nausea, vomiting, and diarrhea. A period of extreme worry, irritability, inability to sleep, and depression follows, possibly with hallucinations. "Furious rabies" may follow, for which the signs are strange behavior including biting other people. At this stage, victims have an uncontrollable fear of water. This is why rabies has sometimes been called "Hydrophobia." Alternatively, "Paralytic rabies" may develop where the muscles gradually become paralyzed, starting at the site of the bite or scratch. A coma slowly develops, with eventual death.

Workers who may have been exposed to rabies must never wait until they develop symptoms of the disease. Once the symptoms appear, the disease is almost inevitably fatal. It is important to recognize the signs of rabies in animals and take precautions immediately following bites, scratches, or other potentially infectious contact.

In **animals**, rabies appears in two different forms. It may appear as *furious rabies* in which the animal changes behavior, becomes restless, wanders aimlessly, and bites any

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animal, person, or object in its way. Eventually the animal becomes paralyzed in the throat and hind legs, and dies. Or it may appear as "*dumb rabies*" in which an animal changes behavior, becomes withdrawn or more affectionate, tries to hide, has difficulty swallowing, and dies after a few days without ever becoming violent.

All animals **do not** behave in the same manner when they have rabies.

- Foxes and skunks may lose their shyness and fear of people, pets, or livestock. Back away from any wild mammal that is acting unafraid.
- Cattle usually become restless and aggressive, bellow loudly, drool, may show weakness in the hind legs, and appear to be choking.
- Cats can often become extremely vicious.
- Dogs usually become excitable, wander aimlessly, and may be vicious and bite for no reason.

If an animal is threatening and dangerous and cannot be scared away, or is suspected of having rabies, withdraw, call 911, request the services of local police or animal control personnel, and continue to observe its movements (if possible). If an animal must be killed, try to avoid damaging its head. An undamaged brain is important for a rapid, accurate laboratory diagnosis. Do not handle the animal or carcass (but if necessary, for any reason, wear protective gloves, masks, and goggles).

13.1.2 Action to Take if Exposed or Potentially Exposed

Workers who have come into contact with saliva, body fluids, or tissue of animals suspected of having rabies must take the following steps without delay:

- Immediately clean the wound with soap or detergent and flush the wound to full depth with water for several minutes. Washing the wound is probably the most effective Procedure in the prevention of rabies. While this is being done, shield the eyes, nose, and mouth from spray from the wound.
- Apply a household antiseptic, 70 percent alcohol (ethanol), tincture or aqueous solution of iodine, or 0.1 percent quaternary ammonium compound such as benzalkonium chloride.
- Remove any clothing that may be contaminated, place it in a plastic bag properly labeled and wash it promptly and separately from other clothing.

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- Call a doctor or hospital emergency room and contact the police, the local humane society, or a local veterinarian. If possible, provide the following information:
 - 1) the name and address of all persons attacked or exposed to the animal's saliva, body fluids or tissues,
 - 2) the time and place of the incident, and
 - 3) any other information to help find and identify the offending animal.

People who have had contact with the rabies virus require both the rabies immune globulin and the rabies vaccine as soon as possible. Only a single dose of rabies immune globulin is necessary. In previously vaccinated people, two doses of the vaccine are required after a biting incident, one immediately and another three days later.

13.2 Hantavirus

Hantavirus is a virus present in the urine, saliva, or droppings of infected deer mice, *Peromyscus sp.*, and some other wild rodents. Unfortunately, deer mice are very common and widespread across the continental U.S. Hantavirus causes a rare but serious lung disease called Hantavirus Pulmonary Syndrome (HPS). This disease is extremely serious since 50-60% of the people who get the disease die.

People can contract the Hantavirus infection through inhalation of respirable droplets of saliva or urine, or through the dust of feces from infected wild rodents. Transmission can also occur when contaminated material gets into broken skin, or possibly, ingested in contaminated food or water.

The disease begins as a flu-like illness. In the early stage, a worker may experience fever, chills, muscle aches, headaches, nausea, vomiting, and shortness of breath. However, the disease progresses rapidly and infected people experience an abnormal decrease in blood pressure and their lungs will fill with fluid. Workers experiencing any of these symptoms within 45 days after their last potential exposure should seek medical attention immediately and tell their physician of possible Hantavirus exposure.

When working in areas where the disease has been reported, the following precautions should be taken to reduce the likelihood of exposure to potentially infectious materials:

- Avoid coming into contact with rodents and rodent burrows or disturbing dens (such as rat nests).
- When performing project work that requires entry into confined spaces, where obvious signs of rodent infestation are present, wear disposable gloves and a fit-tested respirator

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with HEPA filter to prevent inhalation of fecal dust (Reference HDR H&S Procedure # 9 – *Respiratory Protection*).

- Do not dwell in areas that are in proximity to rodent droppings or burrows or near areas that may shelter rodents or provide food for them (e.g., woodpiles, large supplies of birdseed).
- Keep food, birdseed, etc. in rodent-proof containers.

14.0 **PLANTS**

Toxic plants are found among trees, shrubs, vegetables, and vines. The largest number of plant poisonings occur from ingestion. However, the largest concern for HDR field workers comes from contact with plants that can cause a skin rash due to allergic reaction. Poison ivy, poison oak, poison sumac, and wild parsnip are the most common plants that cause a skin rash.

POISON IVY, *Rhus radicans*, can be found in every region of the United States except the Southwest, Alaska and Hawaii. It grows in the form of a vine (and shrub in its early growth) along riverbanks, rocky fields, pastures, thickets, woods, and waste places and often climbs trees, fences, and dwellings. The plant is identified by having shiny green leaves grouped in threes, and the woody vine generates a proliferation of aerial rootlets, which resemble a reddish beard. The leaves turn red in fall. Another feature used to identify poison ivy is its small waxy globe-shaped, white, berry-like fruits. **All HDR field personnel should become familiar with the appearance of poison ivy!**

POISON OAK, *Rhus diversiloba*, is found on the west coast (CA, OR, WA). Poison oak is a perennial shrub with slender stems, which are erect and woody, with one or a few erect branches. It does not climb nor does it have aerial roots. The leaves are similar in number (3), arrangement and coloration to poison ivy. The leaves are oblong (resembling oak leaves), are hairy on the top surface and velvety beneath. The fruit is a small pale green to whitish-tan berry. Poison oak grows in dry barrens, sandy wastes, pinewoods, and sandy woods.

POISON SUMAC grows abundantly along the Mississippi River and swamps of eastern North America, but is far less common in other regions. It grows as a shrub to approximately 25 feet in height. Each stem contains seven to thirteen leaves arranged in pairs. The leaf and leaflet stalks are reddish with clustered whitish fruits, which resembles those of poison ivy. **In autumn, all three poisonous species produce whitish berries, whereas all other members of the Sumac family produce red berries (and are harmless).**

14.1 **Exposure, Symptoms, and Treatment**

Each of the plants described above contain an oil, which when in contact with the skin causes a rash. All parts of the plant contain this oil – leaves, vines and berries. This oil is present in the woody parts of the plant even in winter.

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Not everyone is allergic to these plants, but immunity seems to be transitory – individuals may seem to be immune to the effects of poison ivy for years, and then suddenly develop the rash upon the next exposure. Exposure, and symptom development, can occur when they:

- Touch poison ivy, poison oak, or poison sumac.
- Touch clothing or shoes that have the sap on them.
- Touch the skin or clothing of an exposed person.
- Touch pets or animals that have the sap on them.
- Come in contact with the smoke of these burning plants, or of logs that still have the poison ivy vine attached.

Symptoms usually appear within several hours to 3 days of exposure, but may appear as long as three weeks later and include the following:

- Redness and extreme itching are the first signs.
- Rash erupts on areas that were exposed, often in the pattern of streaks or patches consistent with where the plant touched the skin.
- Rash is in the form of red pimples and may form large, weeping blisters.
- The worst stage of the rash is experienced four to seven days after exposure.
- The rash may last for one to two weeks.
- Reactions can vary from very mild in some individuals to very severe in highly sensitive individuals, sometimes even requiring hospitalization.

General first aid for exposure includes the following:

- The skin should be washed with soap and warm water as soon as possible following exposure. After ten minutes, the oils have penetrated the skin and cannot be washed off.
- Scrub under the fingernails with a brush to prevent spreading of the oils to other parts of the body by touching or scratching.
- Wash the clothing and shoes of the exposed person with soap and water. Oils can linger on these surfaces for several days.

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- Body heat and sweating can aggravate itching. Keep the victim cool and apply cool compresses to the skin.
- Calamine lotion (not Caladryl) may be applied to the skin to decrease itching.
- 1% hydrocortisone cream may be applied four times per day to relieve inflammation and itching.
- In cases of severe or extensive rash, especially around the face or genitals, your physician may prescribe oral steroids.

Call immediately for emergency medical assistance if:

- The rash covers more than one quarter of the body.
- The victim is suffering a severe allergic reaction such as swelling and/or difficulty breathing or has had a severe reaction to a past exposure.
- The victim is coughing following exposure to the smoke of burning plants.

Call a physician if:

- The itching is severe and cannot be controlled.
- The rash affects the face, lips, eyes or genitals.
- The rash shows signs of infection such as pus, yellow fluid leaking from blisters, odor or increased tenderness.

14.2 Prevention

Species identification and avoidance is the only truly effective preventative. All field personnel should learn to recognize poison ivy/oak, in two different habit's of growth - as a woody climbing vine, and as a free standing bush. Additionally, personnel should wear long pants, long sleeves, and gloves to minimize the possibility of exposure. **There are also barrier creams that, when applied to the exposed skin, offer good protection for a limited time, and have been used by field personnel with success.**

- 14.3 Wild Parsnip, *Pastinaca sativa*,** is a noxious, non-native member of the mustard family that grows more than 5 feet tall and has a yellow, umbrella-shaped cluster of flowers. Common in the North Central US, the plant contains juices that when smeared on human skin and activated by the presence of natural sunlight, causes nasty chemical burns ("phyto-photo-dermatitis") about 24-48 hours after exposure. The sap contains photosensitive chemicals; unlike poison ivy/oak, there is apparently no natural immunity. The sap is lipid-soluble, meaning it is rapidly absorbed into the skin, so washing is effective only if done immediately after contact. However,

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the potency of the sap seems to diminish over time, so the exposed skins sensitivity to UV light appears to peak 30-120 minutes post contact.

In mild cases, the skin reddens and appears sunburned for a day or so. In severe cases, blisters form and eventually erupt. In some cases, may leave a brownish pigmentation that can persist for years.

Wild Parsnip grows in clusters, and aggressively invades soils found in roadside ditches and other areas of recent disturbance where the natural vegetation is spars or missing. Unlike poison ivy, just brushing against the plant doesn't produce the symptoms – you must get the crushed leaf or stem juice on your skin, and then it must receive direct ultra violet radiation found in sunlight. Cases may be misdiagnosed as poison ivy.

Like poison ivy, the only truly effective preventative is to avoid contact with the plant – learn what it looks like in all its growing stages, and beware open disturbed edge-habitat and pasture areas.

15.0 WATERBORNE PATHOGENS

Water-borne pathogens can be present in various types of water bodies encountered at project sites. Two more common water-related pathogens are *giardia* and *cryptosporidium*, which cause gastrointestinal illness when ingested. These microorganisms are present in human and animal fecal matter, and enter water-bodies through point and non-point sources. Combined sewer overflows may, during times of high rainfall, be a primary source of pathogens entering water-bodies. Runoff from ground spreading of septage, sludge, and manure, as well as discharges from malfunctioning septic systems, may also be sources of these pathogens.

The most common means of contracting these pathogens is by drinking contaminated water, and through accidental ingestion while swimming and/or performing sewer inspection services (splash hazard). Avoidance consists of not drinking from, and minimizing body immersion into streams, lakes, ponds, etc., regardless of how clear the water may appear. If immersion is necessary, wear waders and other appropriate apparel to prevent skin contact, and avoid hand-to-mouth contact.

16.0 AIRBORNE PATHOGENS

Several infectious diseases are transmitted through the air by inhalation of contaminated material - Legionnaires' disease, Valley Fever, and Histoplasmosis.

Legionnaires' Disease

The bacterium responsible for Legionnaires' disease belongs to the genus *Legionella*. There are approximately 35 *Legionella* species known to produce the disease. *Legionella* species are commonly found in any aquatic environment. They can survive for several months in a wet environment and multiply in the presence of algae and organic matter.

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HDR employees most at risk from the disease are those with job assignments involving inspection of water cooling towers in air conditioning systems. The published literature suggests that some outdoor job assignments may additionally be at risk - where soil is disturbed by bulldozing, and areas where surface or aerosolized water discharge occurs.

Legionnaires' disease usually begins with a headache, pain in the muscles and a general feeling of unwellness. These symptoms are followed by high fever (up to 40°-40.5°C or about 104°-105°F) and shaking chills. Nausea, vomiting, and diarrhea may occur. On the second or third day, dry coughing begins and chest pain might occur. Difficulty with breathing is often reported.

The prevention of *Legionella* infection can be best achieved by good engineering practices in the operation and maintenance of air and water handling systems.

Valley Fever

Valley Fever is primarily a disease of the lungs that is common in the southwestern United States and northwestern Mexico. It is caused by the fungus *Coccidioides immitis*, which grows in soils in areas of low rainfall, high summer temperatures, and moderate winter temperatures. Resistant spores, produced by this fungus, become airborne when the soil is disturbed by winds, construction, farming and other activities. These spores are the infective agent.

Valley Fever is prevalent in the San Joaquin and Central Valleys of California, and in the hot, desert regions of southern Arizona (especially in the Phoenix and Tucson areas), southern Nevada, southern Utah, southern New Mexico, western Texas (especially around El Paso), Mexico (in the states of Sonora and Chihuahua), and in semiarid and arid areas in Central and South America.

Employees with potential risk of exposure are those assigned duties involving disturbance of desert soils, particularly around rodent burrows, Indian ruins and burial grounds. In these settings, infections are more likely to be severe because of intensive exposure to a large number of spores. Exposure to windstorms or recently disrupted soils may increase the chances of infection. Valley Fever infections are more prevalent during certain seasons. In Arizona, the highest incidence of infection occurs during June and July, and October through November. In California, the risk of infection is highest from June through November, without the late summer break.

Valley Fever symptoms generally occur within three weeks of exposure. Most cases are very mild. It is thought that over 60% of infected people have either no symptoms or experience flu-like symptoms and never seek medical attention. Of those patients seeking medical care, the most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches. Some victims develop painful red bumps on their shins or elsewhere that gradually turn brown (the medical term for these is "erythema nodosum"). Since the common symptoms are not unique to Valley Fever, positive identification of Valley Fever as the cause of illness requires specific laboratory tests.

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Otherwise healthy people generally have complete recovery within six months following the onset of Valley Fever. In about five percent of cases of Valley Fever, pneumonia results. In another five percent of Valley Fever patients, apparently benign lung cavities develop after their initial infection. These cavities occur most often in older adults, usually without symptoms, and about 50% of them disappear within two years. Occasionally, these cavities rupture, causing chest pain and difficulty breathing, and require surgical repair.

Of the Valley Fever patients that seek medical attention, one to two percent develops disease that has spread to other parts of the body. The most common site of dissemination is the skin in the form of lesions. Bones and joints (especially the knees, vertebrae, and wrists) are other frequent sites of dissemination.

Histoplasmosis

Histoplasmosis is an infectious disease of the lungs caused by inhalation of a fungus, *Histoplasma capsulatum*. The infection sometimes can spread to other parts of the body. *Histoplasma c.* thrives in moderate temperatures and moist environments. Droppings from chickens, pigeons, starlings, blackbirds, and bats support its growth. Birds are not infected with it because of their high body temperatures, but they can carry it on their feathers. Bats can be infected and can excrete the organism in their droppings. The symptoms of the infection appear within 5 to 18 days after exposure, most commonly in ten days. There are five different forms of infection, as follows:

- **Asymptomatic** is when the victim does not show any symptoms and is unaware of the infection.
- **Acute disseminated** involves short-term affects to organs other than the lungs. It is usually confined to young children and is marked by fever, cough, exhaustion and enlargement of the liver and spleen.
- **Acute benign respiratory** is produced by a heavy exposure and marked by weakness, fever, chest pains, and cough. The severity of the symptoms depends upon the magnitude of the exposure.
- **Chronic disseminated** is of long duration (chronic) and it involves other organs outside of the lungs. It occurs in people with a reduced capacity to fight disease, such as patients with leukemia and persons being treated with drugs that suppress the body's immune system. The chronic disseminated form is marked by fever, anemia, hepatitis, pneumonia, inflammation of the lining of the heart cavity, meningitis, and ulcers of the mouth, tongue, nose and larynx. Disabling.
- **Chronic pulmonary** occurs in persons with pre-existing lung diseases such as emphysema. It resembles tuberculosis and is more common in males over 40 years of age.

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Most patients who develop histoplasmosis do not require treatment. Some may only require supportive treatment that relieves the symptoms of the disease. Severe symptoms with a large involvement of the lungs require treatment with specific antifungal drugs.

HDR employees at potential risk for exposure are those whose job duties involve contact with soil enriched with bird and bat droppings. Prevention of histoplasmosis relies on avoiding exposure to soil/dust in a contaminated environment. Spraying with water is advisable to reduce dust.

Decontamination with 3% formaldehyde has been shown to be effective. However, formaldehyde solutions should be used with caution since this chemical may cause adverse health effects following inhalation, ingestion, or skin or eye contact.

Persons working in known contaminated areas should use protective clothing such as gloves and coveralls, and a respirator equipped with a high efficiency particulate air (HEPA) filter (for spore-laden dusts). If formaldehyde is concurrently applied, a HEPA combination cartridge, suitable for also absorbing formaldehyde vapor may be required. For major soil clean up operations of prolonged exposure, a Powered Air Purifying (PAPR) or supplied air respirator (ASR – airline or SCBA) may be necessary. Refer to HDR H&S Procedure #9 - Respiratory Protection, for information on these respirators.

17.0 SOIL PATHOGENS

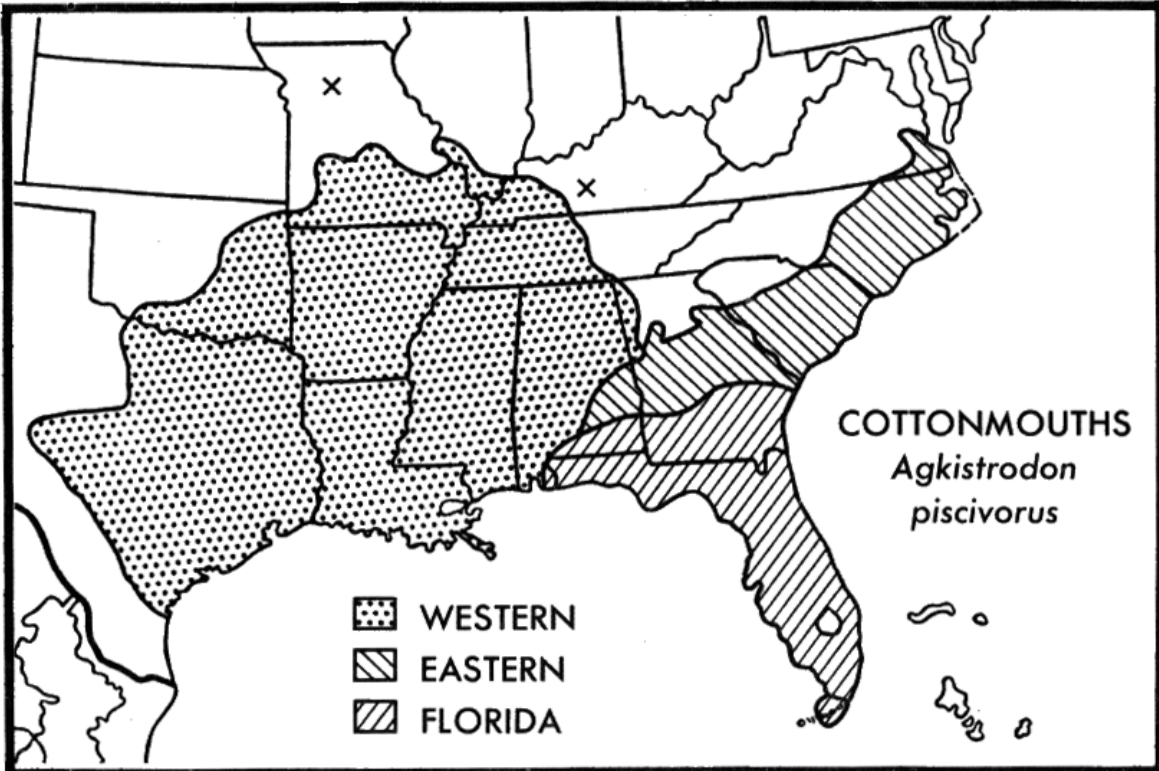
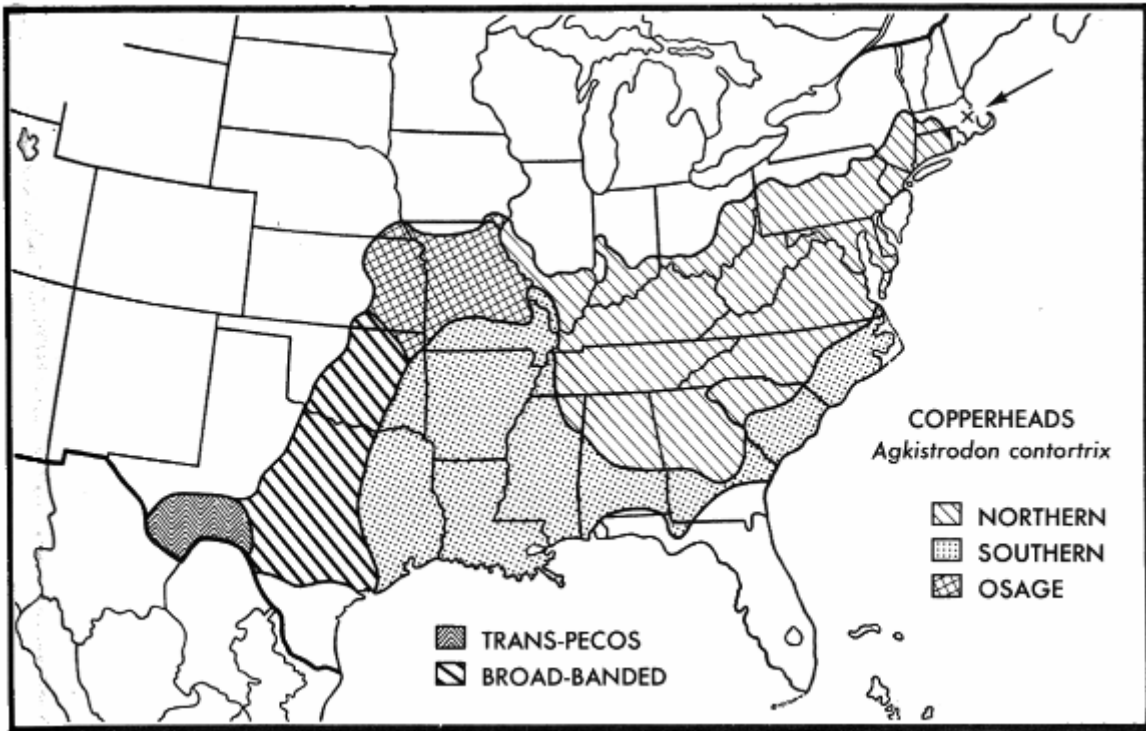
Tetanus

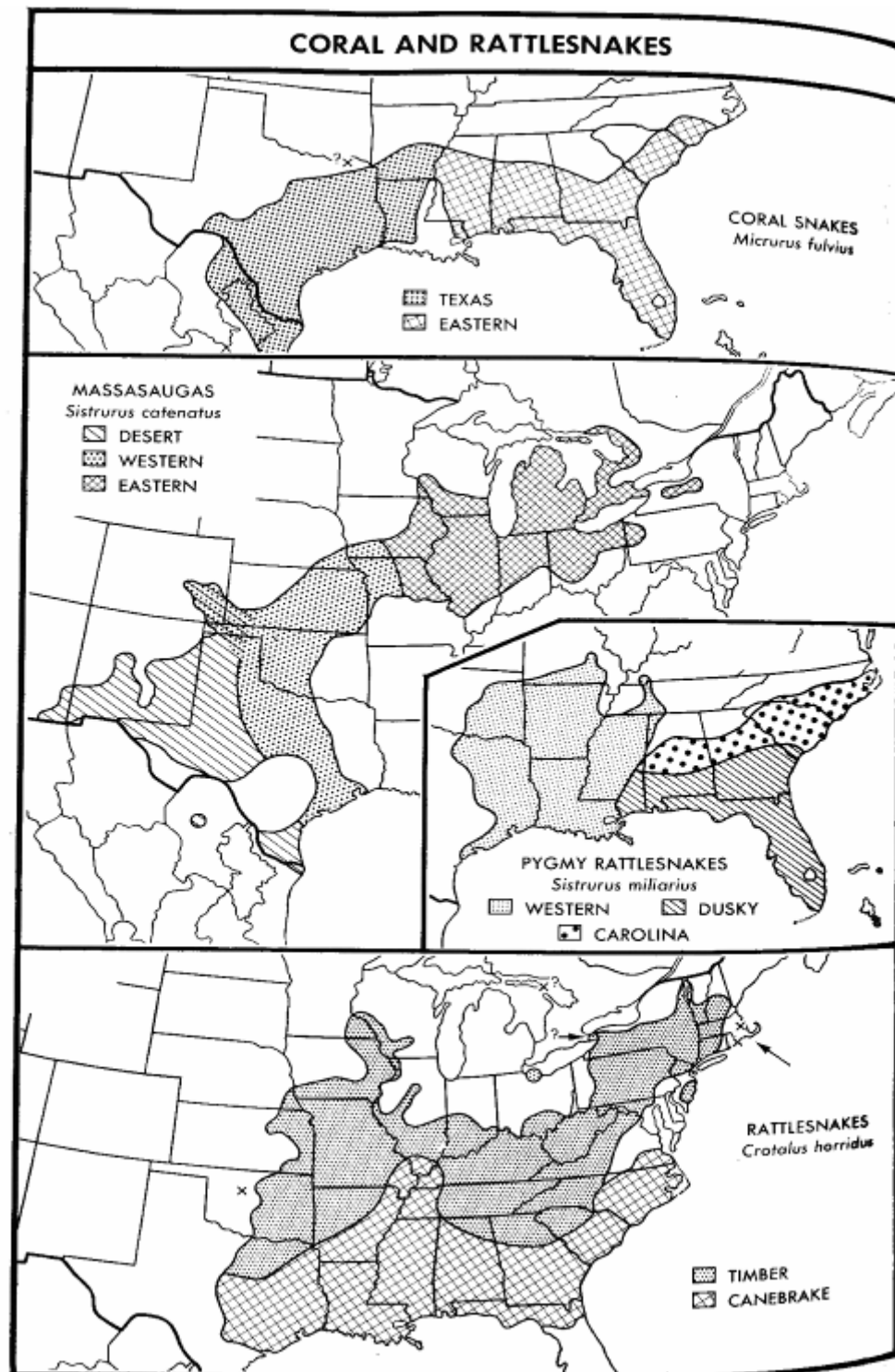
Tetanus is a bacteria common in soil and can infect the cells in open wounds. Any open skin that comes into contact with tetanus spores from the soil can become infected. Symptoms of tetanus include the following:

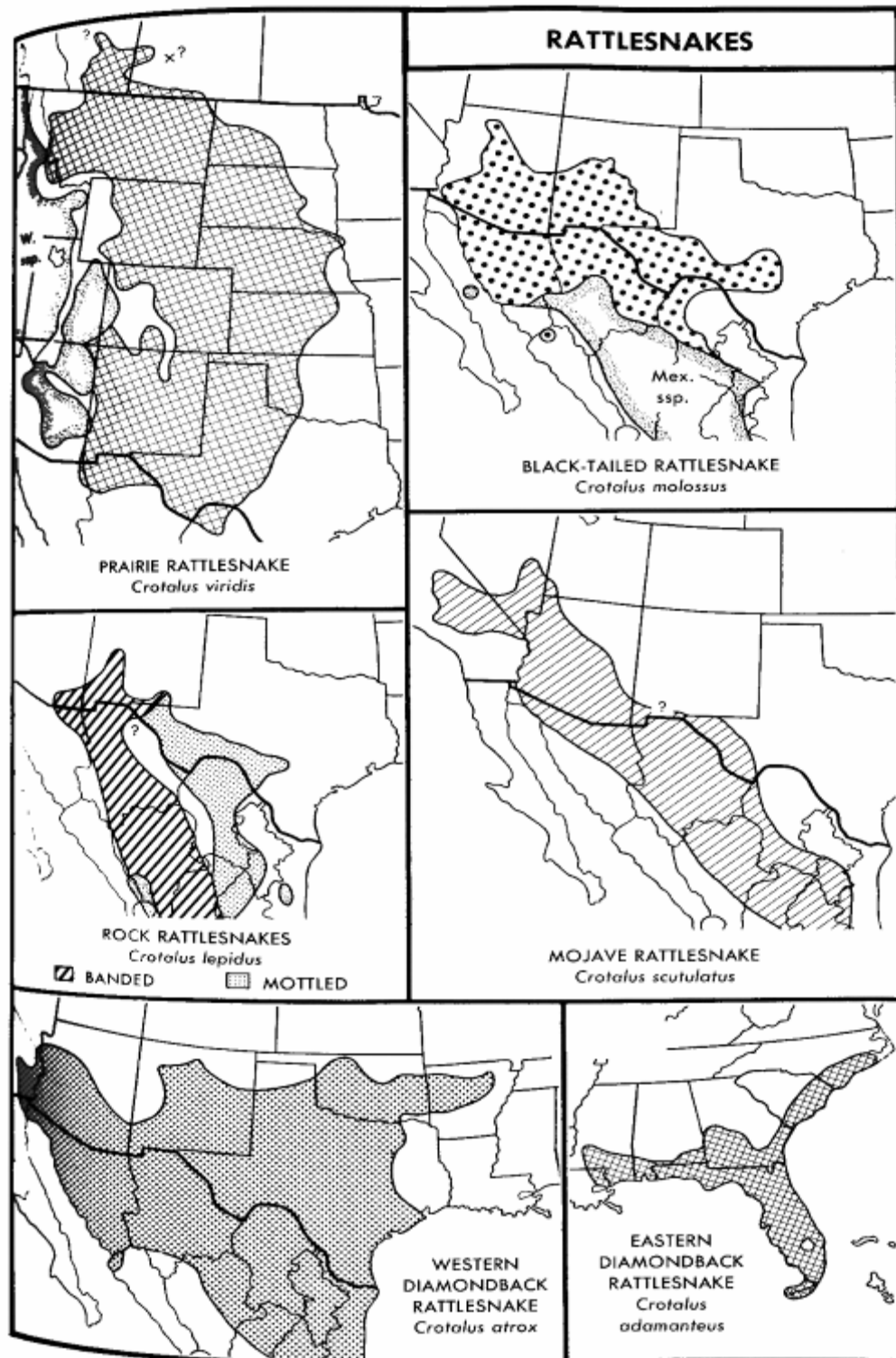
- Violent muscle spasms,
- "lockjaw" spasms of jaw muscles which keep the mouth from opening,
- difficulty breathing

Immunization is the best way to prevent tetanus. Immunization is generally given in childhood and should be repeated every 10 years throughout adulthood. Booster shots can be given to trauma victims who are at risk of having been exposed. If any HDR employee suffers a puncture wound, they should complete an accident report and consult with the HDR physician (see HDR H&S Procedure #35 – Medical Monitoring) regarding the prudence of receiving a tetanus booster.

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Appendix B**Working in Proximity of Bears**

This addendum is applicable to HDR employees who perform work in areas where bears may be present in medium to high densities such as Alaska, Canada, and northern and western regions of the United States. Employees required to work in these regions should be trained to work safely in bear country and be positively protected against a bear attack.

1.1 Bear Characteristics

Brown (including Grizzlies) and black bears are the two species of bears expected to be encountered most often by HDR employees while working in the United States and Canada.

<u>Characteristic</u>	<u>Black Bear, <i>Ursus americanus</i></u>	<u>Brown Bear ("Grizzly"), <i>Ursus arctos horribilis</i>, <i>Ursus arctos middendorffi</i></u>
<u>Color</u>	<u>Black, brown or bluish gray</u>	<u>Dark blonde to brown to black</u>
<u>Muzzle Markings</u>	<u>Tan or brown</u>	<u>None</u>
<u>Face profile</u>	<u>Straight or "Roman"</u>	<u>Slightly concave</u>
<u>Average Weight Female</u>	<u>100 to 250 lbs.</u>	<u>250 to 600 lbs.</u>
<u>Average Weight Male</u>	<u>200 to 400 lbs.</u>	<u>600 to 1000 lbs.</u>
<u>Average Shoulder Height</u>	<u>3 Feet</u>	<u>5 Feet</u>
<u>Average Standing height</u>	<u>6 Feet</u>	<u>9 feet</u>
<u>Claws</u>	<u>Short, curved</u>	<u>Long and straight</u>
<u>Other</u>		<u>Pronounced hump between shoulders</u>

1.2 Bear Activity Patterns

Bears leave their dens in April or May and begin their search for food which may be scarce during the spring months. Mating, which typically occurs from mid-May through the end of July creates movement of the bears throughout their home ranges. During this period, if one bear is observed in the area, there is a good chance that another bear is nearby. During the summer months the bears tend to localize near food sources such as ripe vegetation and streams. In the Fall, bears tend to move between food sources such as areas with ripe berries and well stocked Salmon rivers. In late fall the bears begin to prepare dens for winter hibernation. During hibernation, bears may still react quickly if they are disturbed.

1.3 Bear Behavior

Bears typically exhibit predictable behavior regarding humans, opting to avoid humans unless forced to react when they feel threatened, startled, or required to protect their food or young. Bears spend much of their time feeding and will protect their food sources from other bears, animals and humans. NEVER disturb a feeding bear.

Bears will also react to new situations in their environment and if scared off initially, may return to investigate. Bears are social and non-territorial; however they will defend their personal space if threatened. Also, bears are often not aware of their surroundings if focused on food trails or looking for mates and may blunder into an unsuspecting person. For these reasons HDR employees must be aware of their surroundings at all times when they are working in bear country. Specific examples of what to be aware of include:

- Wind direction. Traveling with the wind at your back allows bears to smell you and leave the area prior to your arrival.
- Noise. Areas with high background noise levels such as along streams do not allow bears to hear you approaching until it becomes startled by your appearance.
- Smells. Odors such as dead/rotting animals (e.g., moose carcass) may indicate a bear in the area protecting its food.
- Visuals. Torn up insect-infested logs, fresh scat, or fresh tracks may indicate the nearby presence of a bear.

1.4 Bear Communication

Bears will often use threats and displays of action as an alternative to fighting.

- Subordinate displays – moves away, sits or lies down
- Dominant displays – approaches by walking or running, typically with ears cocked forward
- Head and mouth actions – carries head high as it circles the adversary, dropping head and beginning short series of short open-mouthed lunges showing aggression
- Flattened ears – about to make contact

Although a bear standing on its hind legs has commonly been considered a threatening display, it is often a non-threatening action where the bear is just trying to get a better look at its surroundings.

Bears also use vocalizations to show apprehension and an agitated bear may salivate and yawn.

- Black bears – low guttural noise, blowing sounds

- Brown bears – low level vocalizations, popping sounds

1.5 **Bear Reactions to Human Encounters**

An encounter with humans may trigger threat displays or may be predatory in nature.

Threat Displays may include:

- Communication such as huffing, panting, hissing or growling
- Looking at you directly with lowered head and ears laid back
- Turning sideways to display its size
- Walking with stiffened front legs
- Charging to within 4 to 5 feet then stopping suddenly or veering to the side
- Slapping one or both front feet on the ground or swatting vegetation; or
- Jaw popping by rapidly opening and closing its mouth

Some threats will lead to a charge intended to make physical contact while others may end with the bear walking or running away.

Predatory Behavior:

Although unprovoked bear attacks on humans is very rare, a few cases have been cited where the bear considers humans to be potential prey and stalks or attacks them. The predatory behavior does not trigger threat displays but rather the bear makes a direct approach at a fast walk or run, follows or circles you. The predatory bear shows no fear, but rather an intense interest.

1.6 **General Bear Safety Training**

Standard industry bear safety training should be provided for any employee required to work in bear country, especially in areas where bears are present in medium to high densities. The training should include an introduction to bear behavior, biology and body language, bear avoidance, use of deterrents, and bear encounter scenarios including how to react in case of an attack.

An awareness level video titled *"Staying Safe in Bear Country"* presented by the Safety in Bear Country Society (in co-operation with the International Association for Bear Research and Management) is available through the HDR Anchorage office. Many live instructor courses are also available in Alaska, Western Canada, and in the lower 48 United States. Courses may be found in listings on the Internet or by contacting local agencies, such as the U.S. Forest Service.

1.7 Protection from Bears

HDR employees should be positively protected from a bear attack while working in bear country by the presence of trained personnel carrying either (a) firearms capable of stopping an attacking bear or (b) an industry accepted chemical bear deterrent, i.e., Bear Spray. Under no circumstances, should an HDR employee work alone in bear prone areas.

The method of positive protection chosen for each project will vary depending on the project location, type of work, bear population and risk of attacks, project logistics, and the client's Policies and Procedures. It is recommended that the method of protection be chosen prior to the project start and that this choice and all associated requirements be communicated to all team members and the client. This will help to ensure that all employees affected by the decision are aware of and agree with the method selected.

A "Bear Guard" should be assigned to accompany a group of workers for any field work performed in medium to high density bear areas, where the number of workers and/or the worker experience is not adequate to provide the positive protection needed. The designation of "Bear Guard" is assigned only to trained individuals whose sole responsibility is to provide positive protection against bears for the group of workers they are accompanying. HDR employees, whose primary responsibility is to perform field work, are not considered "Bear Guards" even if carrying a firearm or bear deterrent.

The project manager or team leader is responsible for verifying that the assigned Bear Guard is competent to perform the job duties through completion of the required firearm safety course and any additional training course completion, past experience or certification by an independent third party.

All bear guards, whether HDR or third party, must be included in their employer's random drug and alcohol testing Program. All third party bear guards must have passed a pre-employment drug and alcohol test prior to serving as bear guard for HDR personnel.

1.8 Firearms and Bear Guarding

Firearms may be carried by HDR employees, an independent third party, or the client; whoever is carrying the firearms shall have successfully completed the following:

- A formal training class (and refresher training, as required) on firearm safety, sponsored by the National Safety Council, National Rifle Association or other nationally recognized safety organization, and has provided a copy of the training records to the project manager or OSC for retention. (HDR Anchorage staff recommends that Bear Guards trained through the "Learn to Return" Program receive a minimum rating of 3 to be eligible for a "Bear Guard" position); and
- A formal training class on bear awareness and response, sponsored by a recognized organization in the field of bear safety.

HDR employees must also review and demonstrate compliance with HDR Procedure #31, Firearm Safety.

1.9 **Firearm Recommendations**

The choice of weapon and ammunition combinations for protection against bears should be based on each carrier's experience with firearms and comfort with weapon size, weight, and recoil. Weapon type and size in combination with ammunition should be tested prior to use in the field to ensure that the carrier can accurately shoot the weapon in an attack situation with confidence.

Guidance on weapons and ammunition should be obtained during bear safety training. Additional resources include the Alaska Department of Natural Resources, who recommend a minimum of a 12-gauge shotgun or .300 magnum rifle, and the United States Department of Agriculture document, *Safety in Bear Country: Protective Measures and Bullet Performance at Short Range. (1983)*

1.10 **Bear Spray**

HDR encourages each individual to carry a bear deterrent such as pepper spray when working in bear prone areas. The spray canister should be carried in a holster on a belt, shoulder strap or pack to allow quick response if needed.

Caution must be used when discharging the spray to make sure that the individual is upwind from the spray to avoid exposure to the irritating and possibly disabling effects of the deterrent. Training for the use of Bear Spray should be obtained through bear safety classes or live training presented by experienced HDR employees.

Please note: Bear Spray products are considered hazardous materials for ground and air common carrier transport. Each product should be handled according to applicable regulations and transportation providers should be alerted about its presence. Prior to shipping Bear Spray, contact Lonnie Fredrickson, HDR Mailroom Supervisor, @ (402) 399-1245 for manifest preparation. Privately commissioned air transport does not fall under the air common carrier regulations and therefore does not require a formal manifest.

1.11 **Personal Protective Equipment**

All employees should wear orange or orange/yellow vests when working alongside a team member or Bear Guard who is carrying a firearm, and during any hunting seasons that are occurring near the project area.

Since bear attacks are sudden and without warning, it will probably not be possible to install ear hearing protection prior to the discharge of a weapon. In the case that it is essential, it should be of a type that can be worn at all times (allows passage of normal frequency sounds) while performing the bear guard service.

1.12 References and Resources

"Staying Safe in Bear Country" presented by the Safety in Bear Country Society (in co-operation with the International Association for Bear Research and Management)

U.S. Department of Agriculture, *Safety in Bear Country: Protective Measures and Bullet Performance at Short Range*, General Technical Report PNW-152, 1983.

National Audubon Society, *Living in Harmony with Bears*, 2000.

Herrero, Stephan, *Bear Attacks – Their Causes and Avoidance*, Nick Lyons Books, New York, NY, 1985.

Smith, David, *Backcountry Bear Basics, A Definitive Guide to Avoiding Unpleasant Encounters*, The Mountaineers, Seattle WA, 1997.

"Learn to Return" Training Systems, Inc., Anchorage, Alaska



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ONE COMPANY
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Drill Rig Safety
Health & Safety Procedure #37

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1.0 **OBJECTIVE**

This Procedure addresses the hazards associated with the use of mobile drilling equipment, and the safety requirements to be implemented to avoid these hazards. Although it is not anticipated that HDR employees will ever operate mobile drilling equipment, HDR employees may often work near or with drilling teams and are exposed to the associated hazards. Several other HDR Health and Safety Procedures may also be pertinent and should be reviewed by HDR employees when working on these sites. These include:

HDR H&S Pro #3	Slip, Trip and Fall Protection
HDR H&S Pro #4	Electrical Safety
HDR H&S Pro #9	Respiratory Protection
HDR H&S Pro #12	Fall Protection
HDR H&S Pro #20	Hazardous and Toxic Waste
HDR H&S Pro #21	PPE

2.0 **PURPOSE**

The purpose of this Procedure is to ensure the safety of HDR personnel when working near mobile drill rigs. **Activities in many States are regulated by State OSHA plans, which may have certain requirements which differ, and are more stringent than, the requirements presented here. When performing services in these State plan areas, HDR will comply with the State promulgated OSHA regulations (reference the HDR Corporate H&S Program, Part 1, Section 8.0, for a listing of the State Plan States).**

3.0 **REVISION HISTORY**

Rev	Description of Change	Date
0	Initial Release	09/08/1999
1	Revisions	04/30/2008
2	Re-Formatting	07/17/2013

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4.0 **APPLICABILITY**

The HDR Drilling Operations Safety Program implemented in this Procedure applies to all HDR personnel at HDR project sites. This Program will impact all employees, regardless of HDR Department.

5.0 **PROGRAM IMPLEMENTATION**

This Program will be administered by the HDR Director of Safety and locally by the Office Safety Coordinator (OSC).

Director of Safety. The Director of Safety shall:

- Periodically review at least annually, the effectiveness of this Program, identify any deficiencies, and ensure that they are corrected; and assist OSCs and project professionals, as requested, in the implementation of this Procedure and regulatory interpretations.

Project Manager (PM). The Project Manager will:

Determine if any project will require the use of a mobile drill rig, and verify that all field personnel scheduled to work in proximity to the rig operation have read this Procedure, and understand its contents.

Office Safety Coordinators. The OSCs will:

Provide initial training on this Procedure to their respective office staff who work on drilling sites, make sure that this Procedure is readily available in each office, and interface with the Director of Safety regarding any unsafe office or project site conditions that have been discovered, and need addressing or interpretation.

6.0 **DEFINITIONS**

Cathead - A smooth drummed winch used to raise the drill string or drop hammer by hand wrapping the lifting rope around the spinning drum.

Catline - The rope that is wrapped around the cathead to provide a means of lifting loads.

Cribbing - A system of timbers, arranged in a rectangular pattern, used to support and distribute the weight of equipment.

Drilling Fluid - Fluid that is pumped into a drilled hole and used to wash cuttings from the hole.

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Drilling Mud - Drilling mud is a type of drilling fluid made of clay and water slurry which is used to coat and support the sides of the drill hole and seal off permeable strata.

Hammer - 140-pound weight, dropped 30 inches, which generates the force that drives the sample tube into the soil.

Float - The bearing pad at the end of the rig support leg. The float distributes the rig weight over a larger surface area, and should sit level on the ground.

7.0 SAFE PRACTICES FOR RIG OPERATION

The drill rig operator always has the primary responsibility for rig safety and maintenance. While it is not anticipated that HDR personnel will ever serve as drill operators, it is important to understand the **safety equipment** that the drill rig should be equipped with, and the **safe operational practices** that should be employed by the rig operator. Whenever HDR personnel work around mobile drill rigs, it is important that they attend a safety meeting with the drill rig operator, where personnel responsibilities and safety features of the drill rig are explained. **It is the responsibility of all HDR employees to stay clear of all moving parts!** Although HDR employees do not have direct responsibility for safe rig operation, if potentially unsafe conditions are observed the HDR employee shall immediately move to a safe location and immediately advise the drill rig operator of the reason for the relocation. If, in the opinion of the HDR employee, the unsafe condition is not corrected adequately, the HDR employee shall document the potentially unsafe condition using the *Potentially Unsafe Condition Report*, provide the original copy of the report to the senior drilling supervisor on-site, and contact the HDR Project Manager for resolution with the drilling company and/or client. The following are drill rig safety features and safe operation practices that should be followed by the drill rig operator:

- Before being placed into service at a site, a competent person, normally the rig operator, should **conduct an inspection** of the rig in accordance with the manufacturer's requirements. The manufacturer's operating manual should be kept with the rig, and available for reference, at all times.
- All drill rigs should be equipped with at least one emergency shutdown device, (two, if working on a U.S. Army Corps of Engineers project) often called the "**kill switch**." Typically, this will either be a red push button, or a line that can be pulled to stop the rig. The kill switch should be tested at the beginning of all rig operations.
- Prior to starting or engaging equipment, the operator should **verbally alert** employees and **visually ensure** employees are clear from dangerous parts of equipment.
- The **operating area around the auger** must be kept free of obstructions, soil cuttings, drill fluids, and tools.

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- All **guards** and safety devices must be maintained and in proper operating condition and configuration.
- **Fire extinguishers** shall be maintained on or near drill rigs for extinguishing small, incipient stage fires.
- Before a drill rig is positioned to drill, the area on which the rig is to be positioned should be cleared of removable obstacles and vegetation and the **rig should be leveled**. The mast should not be raised until the rig has been leveled.
- Outriggers, if used, shall be extended per the manufacturer specifications.
- Hoists should be used only for their intended purpose and not loaded beyond rated capacity. If the hoist appears to be straining to lift a load, due to friction or weight, HDR personnel shall clear the area.
- Loads should be picked up by the hoists slowly to prevent kickout hazards.
- When using the "Cathead," the operator must be positioned attentively at the rig controls. This device and the associated rope ("catline") present **entanglement hazards**. Care must be taken to ensure that the user and adjacent personnel do not become entangled and that hands are kept clear of the winch.
- Catlines should only be used on a revolving cathead. Wire rope is susceptible to kinking and wears grooves into the cathead, so should never be wound around the cathead. Loads requiring more than six turns around the cathead should not be lifted by this means.
- Only natural fiber (e.g., hemp) rope should be used with the cathead, since synthetic rope will melt when overheated.
- The cathead should not be used when the rope is wet (rain) since wet natural rope tends to grab or stick on the cathead drum, causing the operator to lose control of the hammer.
- Auger guides shall be used when drilling through hard surfaces. Controls, such as a water spray, should be employed if excessive dust is being generated.
- Drill rod tool joints shall not be made up, tightened, or loosened while the rod column is supported by a rod slipping device.
- The discharge of drilling fluids from the borehole shall be channeled away from the work area to prevent slipping hazards and ponding of water.

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8.0 SAFE PRACTICES FOR WORKING ON A DRILLING TEAM

- HDR employees should employ the following safe work practices whenever working as part of a drilling team or near mobile drill rigs:
- Never wear loose-fitting clothes or have long hair exposed that could get caught in moving parts.
- Keep the work areas and walkways clear of obstructions to provide unimpeded access and egress and eliminate tripping hazards.
- Drilling in streets, parking lots, or other areas of vehicular traffic requires definition of the work zones with cones, warning tape, etc., and compliance with local requirements. All HDR personnel working on or immediately adjacent to a roadway shall wear orange safety vests with reflective striping.
- Work should cease and HDR personnel should seek shelter during **lightning storms, severe weather, and extremely high winds**.
- HDR Personnel are prohibited from climbing onto the drilling mast at any time.
- Drilling and associated activities often require the use of bagged material (e.g., bentonite, concrete, gravel, etc.). When manually handling these materials, proper positioning and lifting techniques must be implemented to minimize the potential for strains and sprains.
- Cap and flag open boreholes.
- If methane or other flammable/explosive gases are suspected in the area, a combustible gas instrument (CGI) shall be used to monitor the air near the borehole. All work must stop, and the hole ventilated, if the CGI indicates flammable gas concentrations at or above ten percent of the Lower Explosive Limit (LEL).

9.0 BURIED AND OVERHEAD UTILITIES

The location of overhead and buried utility lines must be determined before drilling begins, and the locations should be noted on boring plans. When working near overhead power lines, the drill rig mast should not be raised until the distance between the rig and the nearest power line has been determined and the utility company has been contacted to determine the voltage in the line. If overhead electric lines are not to be deenergized, minimum clearance distances in accordance with HDR H&S Procedure 4 - Electrical Safety must be followed. The drill rig operator or assistant should walk completely around the rig to make sure that the overhead equipment does not have the capability of coming within the required clearances. Be aware that hoist lines

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and power lines can be moved towards each other by wind; additional clearance should be maintained to guard against this possibility.

10.0 Safe Handling of Drill Stem and Augers

- Never place hands or fingers under the bottom of an auger flight or drill stem when hoisting the augers or rods over the top of another auger or drill stem in the ground or other hard surfaces, such as the drill rig platform.
- Never allow feet to get under the auger or drill rod while they are being hoisted.
- When the drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Move auger cuttings away from the auger with a long-handled shovel or spade; **never use hands or feet.**
- Never clean excess soils from an auger attached to the drill rig unless the transmission is in neutral, the engine is idled down, the auger has stopped rotating and the operator is stationed attentively at the controls.

11.0 OPERATION OF HIGH-PRESSURE WASHERS

High-pressure washers are often used in conjunction with environmental drilling operations for decontamination operations. Whenever operating high-pressure washers, whether HDR owned, rented or property of separate entity, HDR employees should review and comply with the operating manual for the unit. Additionally, the following safety rules apply when using high-pressure washers:

- Before use, the operator should inspect the pressure washer, the hoses and the lance to ensure that all equipment is in acceptable operating condition. The operator should carefully inspect the relief device to ensure proper functioning.
- No modifications can be made to the equipment except those authorized by the manufacturer. **Do not modify the lance!** The lance barrel, from trigger block to the tip, should not be less than 48 inches as recommended by manufacturers of hydroblasting equipment. This is to prevent the operator from inadvertently directing the lance at himself. The lance must always be pointed at the work area and never at the operator or other personnel. Additionally, HDR employees should only use lances made of seamless stainless steel (identify by shiny surface free of corrosion). Do not use lances made of carbon steel, which can corrode and result in weakening of the lance.

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- The operator should ensure that the work area is free of slip, trip and fall hazards and maintain good footing at all times.
- The operator must have an assistant to aid in moving the hose to different areas and backing up the operator. The assistant must remain behind the operator at all time, should monitor the operating pressure and be ready to shut down the equipment if necessary.
- Non-operators should remain at least 25 feet from the operator.
- The operating pressure should never exceed that which is necessary to complete the job.
- Equipment should be cleaned often to avoid oil or dirt build-up, especially around the trigger and guard area.
- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- A serious risk of infection and further complications is possible from a hydroblasting laceration. If an injection injury is suspected, the injured employee must be examined or treated by a physician or other licensed health care professional.

12.0 PERSONAL PROTECTIVE EQUIPMENT

When working near mobile drilling equipment or any rotating machinery, jewelry and loose fitting clothing should not be worn. The following personal protective equipment (PPE) listed below should be worn by HDR employees **at all times** while engaged in drilling activities.

1. Hard hat
2. Safety goggles or glasses with sideshields
3. Safety boots with steel toes
4. Appropriate work gloves

Additional PPE may be required depending on the hazards present at the site. The following additional PPE that may be required and the conditions that may warrant their use:

- Orange safety vests with reflective striping, when exposed to traffic hazards.
- Personal flotation devices, when on or near water where the potential for drowning exists.
- Respiratory protection, when exposed to inhalation hazards.

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- Chemically resistant clothing, when exposed to dermal hazards associated with chemical contact.
- Barricading and/or fall protection devices, when large diameter borings are being drilled and the potential exists for personnel falling into and being engulfed in the borehole. Where fall protection devices are used, precautions must be taken to ensure entanglement hazards are not increased. During boring operations, the in-place auger may be used to prevent personnel from falling into the hole.

When using high pressure washers, the following additional PPE is mandatory:

- Goggles and a face shield.
- Heavy duty PVC rain suit or equivalent.
- Heavy chemical resistant gloves.
- Hearing protection.

13.0 Working on Hazardous Substance/Waste Sites

When working around drill rigs on hazardous waste/substance sites, chemical and respiratory protective equipment is often required. When utilizing this equipment, a heightened level of awareness must be exhibited. For PPE use, the following considerations must be addressed:

- Use of loose fitting over boots especially those with “flap-over closures” (i.e., Tingley’s) should be avoided or flaps secured.
- Loose fitting gloves should be avoided.
- Where any of the above cannot be avoided, the loose clothing should be taped down to reduce the hazard.
- Use of respiratory protective devices reduces the field of vision and increases the exertion required to perform the work. Additional care must be exercised to ensure safe operations.
- Use of airline-Level B PPE impedes the ability of personnel and introduces an additional entanglement hazard. Precautions must be implemented to ensure that these hazardous are properly managed.

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14.0 TRAINING

All HDR employees will be trained prior to working on drill teams or working in close proximity to mobile drill rigs, via a safety meeting to be held with the drill rig operator prior to the commencement of drilling activities. This training should include the following elements:

- The operation, inspection, and maintenance of the equipment;
- The safety features and procedures to be used during the operation, inspection, and maintenance of the equipment (including the location of all kill switches), and
- Overhead electrical line and underground hazards.

Additionally, HDR employees who are engaged in working on drill teams or in close proximity to mobile drill rigs shall be informed of the existence of this Procedure, and be provided an opportunity to review the Procedure prior to field mobilization.

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