United States Department of Agriculture

Animal and Plant Health Inspection Service

APPENDIX D-1 - INSTRUCTIONS FOR CONDUCTING AND COMPLETING JOB HAZARD ANALYSES (JHAS)

A Job Hazard Analysis (referred to as a JHA) is a tool to assist in insuring that a task is performed safely. The JHA sheet is a summation of all the individual acts involved in a task and the analysis of each act. When completed, the JHA is an excellent training aide and an easy reference. The following are the basic steps involved in completing a JHA.

1. If possible, JHAs should be completed by an employee who performs or oversees the task being analyzed. In lieu of this, the person writing the JHA will seek out the employees who perform the task and base it on their comments and observations.

2. The task to be analyzed should be broken down into the individual acts that are involved.
   For Example:
   Fixing a cup of coffee would entail:
   a. Going to the coffee maker
   b. Reaching for a cup
   c. Picking up the coffee pot and pouring the coffee into the cup
   d. Adding milk and sugar
   e. Going back to desk

3. Next, analyze what are the possible sources of injuries/accidents involved with each step.
   For Example:
   a. Tripping or slipping on the way to the coffee maker
   b. Scrapping hand against forks or knives stored near cups
   c. Hand contacting hot coffee or pot
   d. Spilling milk or sugar onto table top or floor
   e. Same as “a” and also spilling hot cup of coffee

4. For each step analyze what factors would contribute to each hazard.
   For Example:
   a. Slippery floor, items on floor, water or fluid on floor
   b. Knives and forks stored near forks
   c. hot coffee, hot pot
   d. milk or sugar
   e. Same as “a” and also hot coffee

5. Determine what type of injury/accidents these factors may cause.
   For Example:
   a. Contusions, bone fractures (from slipping or tripping)
   b. lacerations
   c. Burns
   d. slipping hazard
   e. Same as “a” and also burns

6. Now, determine how the task is to be performed by eliminating or negating the hazards:
   Example:
   a. Be aware of the condition of the floor. Look for wet spots.
   b. If forks and knives are stored near cups, move to a safer location.
   c. Use care when pouring coffee, and do not overfill cup.
   d. Clean up any spilled milk or sugar so as not to create a slipping hazard.
   e. Same as “a” and also partially empty cup if over filled, only handle amount of coffee which can be transported safely.

7. Combine steps onto a JHA sheet.

8. When JHAs are being completed, prior accidents and near-misses should be taken into account. Hazard elimination should be based on the experience of workers performing the task.
   For example:
   - A coffee pot burst when the empty pot was placed on a working heating pad.

   A step is added to the JHA (i.e.: if the last cup is removed from pot turn heater off and under hazard elimination, explain why).

9. Have employees who perform the task review and comment on JHA. Make appropriate changes.

The form included at the end of this Appendix should be used in creating a JHA.

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The following is intended to assist in assessing potential hazards associated with field activities that may be conducted during a response to an incident. Field operations are likely to include the following activities:

- Visual reconnaissance.
- Media sampling (soil, surface water, sediment, groundwater).
- Geophysical surveys.
- Soil and air gas surveys.
- Personnel and equipment decontamination.
- Containerizing, characterizing, and disposing of investigation-derived wastes (IDW).

Potential hazards associated with the field work may include physical (including radiological), biological, chemical, and hazards. Specific hazards that may be encountered while conducting these activities are identified and described below.

- Physical hazards are associated with equipment operation, noise, flooding, structurally unstable buildings, damaged utility lines, exhaustion, psychological stress, physical injuries, lacerations, slips, trips and falls, and heat and cold stress. Physical hazards also include radiological hazards that may be present at areas where radioactive materials were used or disposed.
- Biological hazards are related to the presence of potentially harmful plants, insects, animals, pathogens, inadequate sanitation, tetanus, and dysentery.
- Chemical hazards associated with environmental contaminants may be encountered during invasive site operations, or from uncontrolled releases.

Physical Hazards

Equipment and Motor Vehicle Operation

Many of the hazards encountered during investigations relate to the operation of motor vehicles and the use of hand tools.

Good, common-sense safety practices and personal awareness will be necessary to reduce the possibilities for injuries.

Good housekeeping conditions will be observed in and around the work area.

Hand tools will be stored out of the way in tool boxes to prevent tripping.

All tools will be maintained in good working condition or will be replaced.

Pipe, drill rods, etc., will be stacked on solid level soils and secured or blocked to prevent spreading or falling.

Motor vehicles will not be driven faster than the posted speed limit, or at a maximum safe speed for site conditions no greater than 30 mph if there is no posted speed limit.

Noise

All equipment that generates noise levels above 85 decibels (dB) will be identified and appropriate hearing protective devices will be provided.

Double hearing protection will be provided if the noise levels exceed 104 dB.

Protection from worker exposure to onsite noise will be provided (heavy equipment operations, etc.), and will comply with OSHA occupational noise exposure requirements (29 CFR 1910.95). Other high noise areas (in excess of 85 dB) will be designated as necessary, and hearing protective devices in the form of ear plugs will be worn by workers in the high noise areas.

Heat Stress

Environmental factors contributing to heat stress include air temperature, humidity, radiant heat exchange, and wind.

Physical work also contributes to the total heat stress by producing metabolic heat in the body, proportional to the intensity of work.

Heavy physical labor can greatly increase the likelihood of heat fatigue, heat exhaustion, and heat stroke, the latter being a life-threatening condition.

Personnel monitoring for heat stress will commence when the ambient temperature is 80°F (70°F if chemical protective clothing is worn) or above.

Frequency of monitoring will increase as the ambient temperature rises.

Various control measures will be employed if heat stress becomes a problem, including:

- Providing liquids to replace lost body fluids.
- Establishing a work regimen that allows for personnel rest periods to cool down. (15 minutes rest for every 45 minutes of work).
- Training workers to recognize and prevent heat stress.

All site workers are to be alert to the possibility and symptoms of heat stress.

Should the worker experience extreme fatigue, cramps, dizziness, headache, nausea, profuse sweating, or pale, clammy skin, the site worker and the SSO will take control measures.

If the symptoms do not subside after a reasonable rest period, the SSO will seek medical assistance.

All site workers should be familiar with the signs of heat stress disorders:

- Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet, and abdomen.
- Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; and fainting.
- Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. During heat stroke, the body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Signs and symptoms of heat stroke include:
    - Red, hot, unnaturally dry skin.
    - Lack of, or reduced, perspiration.
    - Nausea.
    - Dizziness and confusion.
    - Strong, rapid pulse, and confusion.
    - Coma.

To prevent heat stress, the following practices will be implemented:

- Site workers will be encouraged to drink plenty of water throughout the day. They will be advised to slightly increase their salt intake by lightly salting their food.
- Onsite drinking water will be kept cool (50 to 60°F) to encourage workers to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All site workers will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Site workers will be instructed to monitor themselves and coworkers for signs of heat stress and to take additional breaks, as necessary.
- A shaded rest area will be provided. All breaks will take place in the shaded rest area.
- Site workers will not be assigned to other tasks during breaks.
- Site workers will remove impermeable garments during rest periods.
- All site workers will be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

Cold Stress

Cold and/or wet environmental conditions can place workers at risk of cold-related illness.

Site workers should be protected from exposure to cold so that the central (core) body temperature does not fall below 97°F.

Lower body temperatures will likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of death.

To prevent such occurrences, the following measures will be implemented:

- Site workers will wear warm clothing (e.g., gloves and heavy socks) when the air temperature is below 45°F.
- Protective clothing, such as insulated coveralls or other winter-weight coveralls, may be used to shield employees from the wind.
- When the air temperature is below 35°F, site workers will wear the following warm clothing: insulated suits, such as whole-body thermal underwear; wool socks or polypropylene socks to keep moisture off of the feet; insulated gloves; insulated boots; insulated head cover, such as a hard hat, winter liner, or knit cap; and an insulated jacket, with a wind- and water-resistant outer layer.

At air temperatures below 35°F, the following work practices must be implemented:

- If the clothing of a site worker might become wet on the job site, the worker will wear an outer layer of clothing that is water impermeable.
- If a site worker's underclothing becomes wet in any way, the worker will change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is not uncomfortable), the employee may finish the task before changing into dry clothing.
- Site workers will be provided with a warm (65°F or above) break area.

The buddy system will be practiced at all times onsite.

Any site worker observed shivering severely will leave the work area immediately.

Site workers will dress in layers, with thinner, lighter clothing worn next to the body.

Site workers will avoid overdressing when going into warm areas or when performing strenuous activities.

Hypothermia can occur whenever temperatures are below 45°F, and is most common during wet, windy conditions, with temperatures between 30° and 40°F.

- The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture, coupled with heat loss due to wind and evaporation of moisture on the skin.
- Hypothermia is defined as a lowering of the central (core) body temperature.
- General hypothermia, the most life-threatening cold injury, affects the entire body system.

Once the body temperature is lowered to 95°F, thermal control is lost and the body is no longer in thermal balance.

Coma occurs when the core temperature reaches approximately 79°F.

Death can occur within 2 hours of the first signs and symptoms.

The general symptoms of hypothermia are usually exhibited in five stages:

- Shivering.
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body.
- Unconsciousness, glassy stare, and slow pulse and respiratory rate.
- Freezing of the extremities.
- Death.

Frostbite, the other illness associated with cold exposure, is the freezing of body tissue, which ranges from superficial freezing of surface skin layers, to deep freezing of underlying tissue. Frostbite will only occur when ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and wind speed increases.

Slips, Trips, and Falls.

Where uneven surfaces, unseen holes, storm debris, and other physical hazards may be present, the potential for injury resulting from slips, trips, and falls is heightened.

- In the event of an injury, the victim will be stabilized and provided onsite first aid in a "clean area."
- If an injury involves a potential trauma to the spinal cord, the victim will remain where injured, if safely possible, and be moved by trained emergency medical technicians only.
- Minor injuries, such as small lacerations, cuts, and strains, will be initially treated onsite by the first-aid qualified member of the field team.

- Ambulance and hospital support will be provided for all major injuries, such as head wounds, broken bones, and deep lacerations.

Radiation Hazards

Radiation exposure to humans has been shown to cause three major classes of effects: (1) cancer and leukemia, (2) other radiation effects resulting from significant cellular damage, and (3) genetic defects.

It has been shown that high radiation doses increase the likelihood that certain individuals may eventually develop health effects such as cancer or leukemia. Since a lower threshold radiation dose equivalent limit has not been statistically established for cancer and leukemia, a conservative assumption that there is no lower threshold is commonly made by regulatory authorities. If this assumption is made, the implication is that any dose of radiation, no matter how small, may cause cancer or leukemia.

Effects caused by significant cellular radiation damage are usually characterized by organ atrophy and fibroses. It should be understood that there is no unique disease associated with the effects of radiation exposure. These effects are seen merely as an increase in previously existing conditions, such as cancer of organs or systems. Generally only higher radiation doses can produce observable effects, thus establishing a practical threshold range for a given effect for the majority of people. Unborn children are especially susceptible to cellular damage from both major classes of radiation effects, especially during the first and second trimester of pregnancy. A radiation dose to the unborn child may also increase the chances of the eventual development of cancer or leukemia at some point in that child's life.

The objective of radiation protection is to limit the risk of radiation exposure to a level that is no more dangerous than other risks encountered in daily life. Radiation limits have therefore been established in an effort to limit the threat of radiation injury to the worker to a level comparable to or less than other dangers deemed to be acceptable by the general public.

Background levels of radiation throughout the United States will typically range between 5 and 100 µR/hr. The Nuclear Regulatory Commission (NRC) limits the radiation level in an unrestricted area, i.e., an area accessible to members of the general public, to no greater than 2 mR/hr. Therefore, while operating the radiation survey meter during field work, **if a reading in excess of 2 mR/hr is observed, the area will be immediately evacuated until further guidance is received from the Field Team and APHIS personnel.**

Biological Hazards

The following biological hazards may be encountered during field activities: insects, snakes, rodents, poisonous plants, and pathogenic bacteria and viruses.

Ticks and Tick-borne Illnesses

Particular caution will be exercised to prevent site workers from being bitten by ticks (in particular, lone star ticks) and potentially contracting tick-borne illnesses.

Lyme disease can also be contracted by bites from a deer tick.

- Site workers will take the same precautionary practices as for Lyme disease, among others:
- Cover their bodies as much as possible, by wearing long pants and long-sleeved shirts. Light color clothing makes spotting ticks much easier.
- Try to eliminate possible paths by which the lone star tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. Duct tape may be used to help seal cuffs and ankles. If heavy concentrations of ticks or other insects are anticipated or encountered, Tyvek® coveralls may be used for added protection.
- Conduct periodic and frequent (e.g., hourly) surveys of clothing for the presence of ticks. Remove any ticks and insects that become attached to clothing.
- Use insect and tick repellents that contain the chemical n,n-diethyltoluamide (DEET). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF® and Maximum Strength
- OFF®. Check the ingredients of the repellent since the higher the concentration of DEET, the longer the effectiveness of the repellent.
- If a tick is detected on an individual, but not yet attached, it will be removed immediately.
- If an attached tick is detected on an individual's skin, it will be carefully removed after the application of Tick Release™ which will loosen the tick's hold on the skin. After the application of Tick Release™, the tick will be gently removed with a pair of Tick Nippers™. Tick Nippers™ are more effective in completely removing the entire tick than conventional tweezers, and include a small magnifying glass to inspect the bite to ensure complete removal of the head.

Site personnel should be aware of the early symptoms of Lyme disease, in the event no ticks are discovered on an individual and he/she becomes ill. These indicators include a skin rash, fever, and flu-like symptoms. Any

individual with one or more of these symptoms must seek medical help immediately.

Rocky Mountain spotted fever is spread to humans by ixodid (hard) ticks. Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of rash. The disease can be difficult to diagnose in the early stages, and without prompt and appropriate treatment with antibiotics it can be fatal.

Field personnel are encouraged to check with the Incident Safety Officer and Field Team Leader to ensure that the use of insect repellent will not interfere with sample collection procedures.

Ants, Bees, Wasps, Hornets, and Yellow Jackets

Nests and hives for ants, bees, wasps, hornets, and yellow jackets often occur in ground, trees, and brush. The field team will be aware of these possibilities and, if a nest or hive is found, site workers will avoid activities that might provoke an attack. If a nest or hive must be disturbed in order to accomplish site work, appropriate insect sprays will be used to kill the insects before their nest is disturbed and an attack is invited. Bites and stings can be painful and may elicit an allergic reaction. If an individual is known to be allergic to bites and/or stings, that individual must carry an anti-venom kit prescribed by their personal physician. Personnel will be trained in use of the anti-venom kit by the allergic individual. If simple first-aid measures or use of an anti-venom kit do not alleviate the symptoms, the victim will be taken to the nearest medical center. An attempt will be made to kill the offending insect and take it to the emergency room with the victim, if this can be done quickly and without endangering personnel.

Hybrid and Africanized Bees. Field personnel should be familiar with how an Africanized honey bee behaves and to act accordingly. Africanized bees look like any other honey bee to the naked eye but behave in a more aggressive manner when threatened.

Fire Ants. Caution should be taken due to the research on fire ants. Researchers should accompany the Field Team into areas where fire ants have been identified or are suspected to be present.

Snakes

To minimize the threat, all personnel walking through the brush will be aware of the potential for encountering snakes and will avoid actions that may increase the possibility of encounters (e.g., turning over logs). In the event of a snake bite, first determine, if possible, if the snake is venomous or non-venomous. If the snake is non-venomous, cleanse the wound and apply a clean dressing from the first-aid kit. If the snake is venomous or

suspected venomous, cleanse the wound and transport the victim to the nearest hospital within 30 minutes. If possible, kill the snake and bring it to the hospital with the victim. Apply a constriction band above the wound only if deemed absolutely necessary. Refrain from cutting and sucking the wound, unless medical care cannot be obtained within 30 minutes.

Rodents and Other Animals

Rodents and other mammals may be present in many locations during a response action, including both outdoors and inside facilities. Rabies is a particular concern; wildlife may also harbor other infectious agents. Personnel are advised to avoid such animals if at all possible. If bitten or severely scratched, the victim should be taken to the nearest medical facility. If possible, kill the offending animal and bring it to the hospital with the victim.

Poison Ivy and Poison Sumac

All personnel will be familiar with and be able to recognize poison ivy and poison sumac in the field. A reaction to poison ivy can be prevented if the exposed skin is washed with Technu Poison Oak-N-Ivy Cleanser™ (alkane and alcohol) or an alkaline-based soap and water within 10 minutes of contact. Contact can be prevented by site workers wearing appropriate clothing. Site workers should remove contaminated clothing and wash their hands and faces before leaving the site, or the exclusion zone, as appropriate.

Pathogenic Bacteria and Viruses

Pathogenic bacteria and viruses may be present at some sites where field activities are conducted. USDA-APHIS has traditionally conducted research with may contain pathogenic materials. Bacterial and viral research may have been conducted at laboratories and in the field. Since some pathogens can lay dormant in soils for many years, these bacteria and/or viruses may be present in subsurface media which may be disturbed during sampling activities. Prior to conducting field work at personnel will confirm the potential presence of pathogenic bacteria and viruses with APHIS employees. If the potential for their presence exists, specific health and safety protocols will be developed as an agent-specific JHA.

Chemical Hazards

The contaminants likely to be encountered include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, PCBs, petroleum constituents, metals, and radionuclides.

The toxic hazards to site personnel associated with the suspected site contaminants can be assessed through comparison of actual exposures with several established occupational exposure limits. Permissible exposure limits (PELs) are established by OSHA. Threshold limit values (TLVs) are established by the American Conference of Governmental Industrial Hygienists (ACGIH). Immediately dangerous to life or health (IDLH) values are established by the National Institute of Occupational Safety and Health (NIOSH). The occupational exposure limits are described as follows:

- PELs may be expressed as an 8-hour time-weighted average (TWA), a short-term exposure limit (STEL), or a ceiling limit. Ceiling limits may not be exceeded at any time. PELs are enforceable by law. STELs are allowable exposure limits for durations ranging from 5 to 15 minutes, without causing the 8-hour TWA to be exceeded. The PELs will be expressed as 8-hour TWAs.

- The ACGIH TLV is defined as the TWA concentration for a substance to which nearly all workers (8 hours/day, 40 hours/week) may be repeatedly exposed, day after day, without experiencing adverse health effects. For some substances, the overall exposure to a substance is enhanced by skin, mucous membrane, or eye contact.

- The IDLH values represent the maximum concentrations which pose an immediate threat to life or health, or conditions that pose an immediate threat of severe exposure to contaminants which are likely to have adverse cumulative or delayed effects on health.

If previous information or if the field team identifies major contaminants, exposure standards and associated characteristics will be developed. These standards and characteristics will be used to establish the appropriate action levels, PPE, monitoring equipment, and safety equipment needed to safely conduct the specific field work for that site.

Volatile Organic Compounds (VOCs)

VOCs present the greatest potential for exposure to field personnel. Due to high vapor pressures of many of these chemicals, inhalation becomes the primary route of exposure. Skin absorption is also a possible route of exposure, leading to the same symptoms as inhalation overexposure. Aromatic hydrocarbons are generally local irritants and blood vessel dilators. These compounds are potent narcotics and may cause central

nervous system (CNS), lung, and blood vessel damage. Chlorinated hydrocarbons generally have a depressant effect on the CNS, and may cause liver and kidney damage and personality changes. These compounds have a synergistic effect when combined with alcohol. Some VOCs are confirmed and suspected human carcinogens.

Semi-volatile organic compounds (SVOCs)

SVOCs, which include aromatic alcohols and waste oils, may be present at some sites. Although the inhalation potential of these compounds is less than volatile compounds, the possibility of inhalation overexposure may exist. Skin absorption is also a possible route of exposure. Overexposure to these compounds may produce symptoms similar to overexposure to volatile organics.

Priority Pollutant (PP) Metals.

Metals in site soils may cause toxic effects through inhalation of dust or ingestion of soil. General adverse health effects associated with PP metal overexposure include increased respiratory cancers, mental disturbances, loss of coordination, respiratory irritation, and metal fume fevers. PP metals have the potential for bioaccumulation within the body. Arsenic and chromium are human carcinogens. Chronic exposure to lead may cause the following symptoms: anemia, dullness, restlessness, irritability, headaches, muscle tremors, ataxia, and loss of memory. Acute exposure to some metals may cause permanent CNS damage.

Pesticides

Pesticides are grouped according to their chemical nature or use as organic phosphates, carbamates, fungicides, herbicides, fumigants, and a few other miscellaneous characteristics. The most common route of exposure is via ingestion. Other routes of exposure include inhalation and skin and eye absorption. The health effects vary greatly dependent upon their mechanism of toxic action. Organophosphates and carbamates are enzyme inhibitors. Chlorinated hydrocarbons, herbicides, and rodenticides are CNS depressants or stimulants. Most are skin and eye irritants. Some compounds cause gastroenteritis, liver and kidney damage, encephalopathy, neuritis, ataxia, and alopecia.

APPENDIX D-1 - INSTRUCTIONS FOR CONDUCTING AND COMPLETING JOB HAZARD ANALYSES (JHAS)

JOB HAZARD ANALYSIS (JHA)	Date:	New JHA Revised JHA
		Page of

Task Overview:	
Task Elements:	
Personal Protective Equipment:	
Tools and Equipment:	

OCCUPATIONAL HEALTH CONCERNS		
Physical Agents:	**Biological Agents:**	**Chemical Agents:**
Activity/Sequence of Job Steps	**Potential Hazards/ Injury sources**	**Safe Action or Procedure**