SOCIETY OF EXPLORATION GEOPHYSICISTS

Guidance on Personal Protective Equipment (PPE) for Field Activities

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Document History and Control

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DISCLAIMER

This document is provided purely for guidance for individuals and organizations involved in field activities that might involve some safety risks. This guidance is therefore not mandatory for SEG sponsored activities, but is just an example of the duty of care that an organization should follow when safety risks exist. The SEG can provide no financial assistance for the provision of personal protective equipment (PPE).

TABLE OF CONTENTS

1 INTRODUCTION

This document is designed to provide guidance on Personal Protective Equipment (PPE) to participants in SEG sponsored geophysical and related geoscience field activities including faculty and student members. This guidance should also apply to visitors to a field activity, and not just participants in the activity.

PPE is defined as all equipment that is intended to be worn while working, which protects a person against one or more occupational health and safety risks. In this definition "equipment" includes clothing such as items providing protection against the weather.

PPE can be one kind of control (to help prevent an accident occurring) and/or a mitigation measure (to reduce the severity of an incident that does occur). PPE forms part of the Hierarchy of Controls which will be discussed in more detail in a later section, but PPE typically forms the last line of defense against an accident. PPE should not be considered a front line control, and consideration should be taken to eliminate, substitute, or reduce a risk initially.

2 SELECTION OF APPROPRIATE PPE

- The determination of appropriate PPE should be made by performing a Hazard Identification exercise for the activities, location, equipment, etc. involved, along with a Risk Assessment. This will identify the hazards that can be encountered and help determine what types of PPE are needed, along with other controls.
- A senior member of the staff organizing the field activity should be designated as the Responsible Person for safety and ensure the Risk Assessment and PPE selection are appropriate.
- At a minimum, protection for the following should be considered, as part of the Hazard Identification and Risk Assessment exercise:
    - Head
    - Face and eyes
    - Hearing
    - Feet and legs
    - Hands and arms
    - Body
    - Personal flotation devices (PFDs) on water.
- The selection of appropriate PPE should be governed by any applicable law or regulation (e.g. OSHA in the USA).

- Any PPE should conform to applicable local standards (e.g. ANSI in the USA, EN in Europe, CSA in Canada, etc.).
- Be aware in some cases fake or counterfeit PPE has been seen (such as ineffective hard hats) which do not meet established quality criteria. One give-away is that sub-standard PPE is usually much cheaper than PPE that meets the local standards. Usually PPE will include marks by the manufacturer concerning the standards met, but even these can be counterfeited. If in doubt, contact the manufacturer.

3 UTILIZATION OF PPE

- All PPE should be used in accordance with any manufacturer's instructions and recommendations.
- All PPE utilized should be fitted to the individual using it.
- Any PPE that is damaged or defective should not be used, and should be properly discarded and replaced. For example a hard hat that has been subjected to a heavy impact should be replaced with a new one.
- Where different risks necessitate the wearing of multiple pieces of PPE simultaneously, they should be compatible and remain effective.
- PPE should not be tampered with or modified. If worksite conditions change or the required PPE presents a risk itself, the Risk Assessment should be updated and actions taken to address the risk the PPE poses to the user.

4 CARE AND MAINTENANCE OF PPE

- All PPE should be maintained in accordance with the manufacturer's instructions and recommendations.
- This includes honoring expiration dates, PPE being kept in a clean and reliable condition, and appropriate storage.
- Users are responsible for inspecting re-usable equipment after use and report any deficiencies.
- One some items, such as hard hats, it is advisable to label with the users name, both inside and out, if this meets with the manufacturers specifications, to help ensure the PPE is cared for by the user.

5 PPE TRAINING

- PPE Training should include how to use the equipment properly and how to maintain and care for it, including storage.

- Training should include how to put on, adjust, wear and remove the PPE.
- The limitations of the PPE in preventing injury should be included in PPE training.
- All training for PPE should be documented.
- Regular training refreshers should be scheduled if use of PPE is sporadic.
- Re-training should be performed if personnel show lack of knowledge in how to use PPE, and also when the type of PPE changes.
- PPE training should also include, but not be limited to:
    - How the PPE will limit risks.
    - Why PPE should be of the correct size and fit.
    - How the materials used in the PPE manufacturing provide protection.
    - Fault detection in the PPE.
    - A demonstration of practical PPE use and a fit test where applicable (e.g. self-contained breathing apparatus).

6 HIERARCHY OF CONTROLS

In designing controls or mitigations to reduce the chance of an incident occurring, or reduce its consequences, a hierarchy of controls is normally used in industry. PPE forms the last line of defense in this hierarchy and is the least preferred way to control hazards.

Below is an example of a hierarchy of controls table, with the most preferred or most reliable control type at the top, and the least preferred at the bottom. This has been extracted from the IAGC Land Geophysical Safety Manual (2012).

Table 1: Hierarchy of controls (after IAGC, 2012)

Control	Discussion
Elimination (get rid of)	Job is redesigned or the hazardous substance is eliminated so as to remove the hazard.
Substitution (change)	Replace the material or process with a less hazardous one (e.g. use vibroseis as the source instead of dynamite).
Engineering controls (make something new)	Install or use additional machinery e.g. exhaust ventilation to control the risk. Use machinery guarding, or screens.
Administrative controls	Reduce the time a person is exposed to a hazard. Develop procedures or provide training. Perform risk assessments, increase safety awareness signage, or supervision.

Personal protective equipment and clothing	Applied as the last line of defense and a backup in case previous measures fail in controlling the hazard.

7 ADDITIONAL CONSIDERATIONS

Head protection

- Head protection should be appropriate to the activity. A rock climbing helmet, would not be appropriate for working on a drilling rig floor for example.
- Factors taken into account in head protection design are: Impact level, impact direction, electrical conductivity, flammability, etc.
- Hard hats need to resist penetration (deflect the object) and absorb the shock of a blow.
- Chin straps should be used where appropriate.

Face and eye protection

- This can take the form of safety glasses, goggles, side shields, impact goggles, a visor, a helmet, all the way up to respiratory protection.
- Numerous hazards call for eye protection: sandstorms, dust, cutting or tying cable or wire rope, spraying chemicals or risk of splattering/splashing with a hazardous substance/material, use of compressed air, etc.
- Participants with visual acuity defects engaging in activities requiring eye protection should use prescription safety lenses or safety glasses/goggles, etc. capable of being worn over their prescription lenses.
- All eye safety spectacles should have side shields.
- Contact lenses do not provide eye protection; they actually increase the need for supplemental eye protection as particles may become trapped under the lenses causing damage, or chemicals splashed in the eyes may become trapped under the lenses, preventing flushing.

Hearing protection

- Ensure the ear protection is clean before use.
- Ensure the ear protection is appropriate for the type and level of noise.
- Ear plugs are not a preferred choice as they may introduce dirt to the ear canal if improperly used. If ear plugs are selected they should only be employed for single, once-only use.

Feet and legs protection

- As with other PPE categories footwear should be appropriate to the hazards encountered.
- Sturdy walking boots are not steel toed boots, but are appropriate in some scenarios.
- Steel toe/shank boot when there is a risk of falling or dropped objects.
- Laced boots with ankle support where there is a risk of steep or uneven terrain.
- High boots where there is a risk of snake bites. In high risk snakebite areas gaiters or knee-high boots are recommended.
- Sandals or over the ankle cloth or fabric shoes do not provide sufficient support or protection from falling or dropped objects.
- Change into clean dry socks daily.
- Long trousers provide better protection than shorts (e.g. against the sun, against mosquitos, etc.). In many organizations the requirement is for long trousers to be worn at all times (except for accommodations and mess facilities).

Hand and arms protection

- Appropriate hand protection should be worn to protect from splinters, burns, cuts, chemicals, etc. but still allow the person to perform assigned tasks.
- Long sleeved shirts provide better protection than short sleeved clothing (e.g. against the sun, against insects, etc.). In many organizations the requirement is for long sleeves to be worn at all times (except for accommodations and mess facilities).
- Barrier cream should not be used as a substitute for gloves.

Body protection

- High-visibility reflective clothing when working near vehicles, equipment or the roadside.
- Sensitive activities such as handling fuel or other hazardous material might require fire retardant clothing.
- For weather protection several layers are recommended rather than one thick garment.
- Use sunscreen for protection against UV (ultra violet) radiation.
- Again PPE should be appropriate to the hazards assessed (e.g., for snakes, or plants, insects, etc.).
- Fall prevention and protection PPE should be considered if there is any working at heights.

General guidance

- Do not wear loose clothing (or ripped or torn) near moving machinery (e.g. engines, vibrators, drills, etc.).
- Wear appropriate clothing for the environment (temperature, precipitation, etc.).
- Scarves, ties, sweat-rags and other neckwear should not be worn when working near machinery.
- Restrain long hair under appropriate headgear. Some industry sites with extreme HSE risks (such as hydrogen sulphide) may require a haircut and/or removal of facial hair before entering the site, to ensure PPE properly seals.
- Do not wear any jewelry including rings, necklaces, earrings, or other body piercings when working in the field near equipment.
- Insect repellent is an appropriate measure in areas where mosquitoes can transmit diseases, as well as mosquito netting in sleeping accommodations.

Personal Flotation Devices

- Personal Floatation Devices should be worn by everyone (regardless of whether they can swim), who are working in, over, through or on water, and where there is a risk of drowning.
- For details on the types of PFDs available and recommended in the geophysical industry the IAGC Land Geophysical Safety Manual or Marine Geophysical Safety Manual should be consulted. These manuals can also be used as a starting point for guidance on survival suits if these are required.

8 MINIMUM RECOMMENDED PPE STANDARDS

- It is recommended that each organization develop its own PPE requirements based on the hazards faced in field activities at their selected sites and with equipment used.
- For comparison purposes, Appendix 1 highlights the AAPG's PPE Guidelines for geologic fieldwork, found in the AAPG Field Trip Safety Process.

9 REFERENCES

IAGC Land Geophysical Safety Manual, 10th Edition, 2012.

IAGC Marine Geophysical Safety Manual, 10th Edition, 2012.

AAPG/ExxonMobil Field Trip Safety Process, 20140414 version.

10 APPENDICES

Appendix 1 - AAPG PPE Guidelines for geologic fieldwork (as an example)

Table 2: Example of a recommended PPE guideline for a specific set of hazards (after AAPG/ExxonMobil, 2014)

Activity	Required PPE	Recommended PPE
Hiking - outcrops, trails, desert environment, and loose rock.	Appropriate sturdy footwear (i.e. Hiking boots with sturdy uppers and Vibram-type non-slip soles), emergency whistle	Long pants and long sleeve shirts, sun glasses, sun screen, wide brimmed hat, water canteen, hiking stick, insect repellent, two-way communications
Roadside Activities Outcrop, road-cuts, and access to outcrops.	Safety vest (high visibility), traffic warning markers ("cones")	Traffic warning lights
Sampling with rock hammers (chipping) - outcrops, hand specimens	Safety Glasses	Sturdy, non-slip gloves
Sampling with digging tools - slopes, outcrops, pits ***(no deeper than knee height!)***	Safety glasses; sturdy, non-slip gloves; sturdy boots	Steel toed work boots
Activities near semi-stable cliff faces or under overhangs - outcrops, sampling	Rock climbing helmets (or other appropriate head protection), safety glasses	
Boating	PFD, Type I or II (Life vest), Footwear with non-slip soles	Sun screen, sun glasses, water canteen, wide brimmed hat, gloves if rowing, paddling, or sailing
Cold weather activities - Arctic sampling, outcrops	Thermal footwear and outerwear, gloves, safety glasses, two-way communication, personal survival kit	Water proof footwear, Thermal underwear, hand warmers, vehicle survival kit