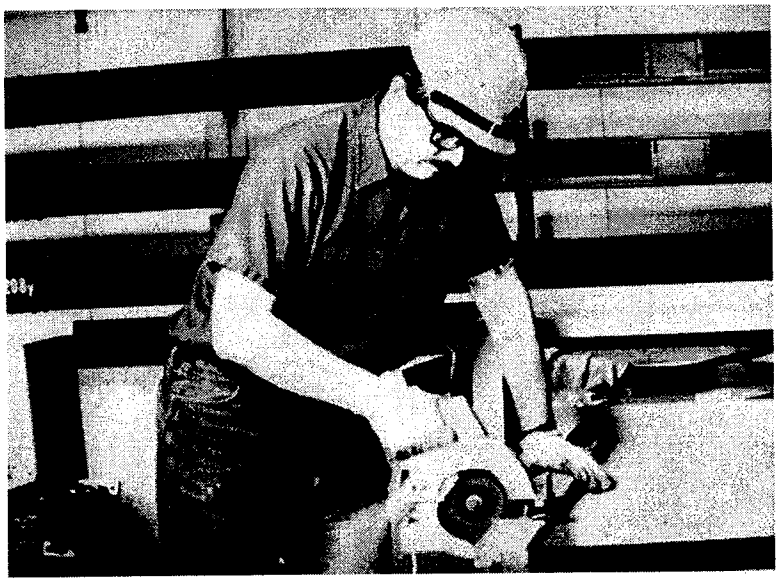
MODULE NUMBER 9
OF
INSTRUCTION GUIDE NUMBER 40

ON-THE-JOB TRAINING
FOR THE
SAND, GRAVEL, AND CRUSHED STONE INDUSTRY

ELECTRICAL PROCEDURES FOR NON-ELECTRICIANS



This module describes the basic job steps, potential hazards and accidents, and recommended safe job procedures for maintaining and adjusting electrical equipment.

A great variety of electrically powered equipment is operated, partially maintained, and adjusted by workers who are not electricians. Equipment ranges in size from large milling machines, to water pumps, and heat guns used to thaw pipes.

Detailed instructions for operating each type of equipment is beyond the scope of this module. Representative equipment will only be discussed to the extent that hazards may be related, or procedures adapted, to other equipment and specific devices.

Electrical burn and shock hazards are present for all electrically powered or controlled equipment. For non-electricians, these hazards exist primarily during mechanical repair and adjustment of equipment. Electrically powered equipment must be either unplugged at the receptacle, or the supplying power source must be disconnected or switched off, locked out, and tagged.

Mechanical hazards should also be recognized by operators of the equipment. These hazards are described, and safe procedures are discussed, in other training modules in this guide. Relevant sections of this Instruction Guide should be reviewed, along with any manufacturer's literature for specific tools, in order to conduct on-the-job training in the use of hand tools.

Boots and gloves should be kept clean and dry at all times when working with electrically powered equipment or electrical supply apparatus (outlets, disconnect switches, etc). Otherwise, severe burn, or shock, may occur if the equipment develops a fault. Mining equipment that uses higher voltages and currents can yield more severe electrical shocks and burns.

The following safe job procedures will help to minimize incidents that may cause injuries and adversely affect production.

REQUIRED OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:
HARD HAT, STEEL-TOED BOOTS (RUBBER BOOTS RECOMMENDED), SAFETY GLASSES OR GOGGLES, RUBBER GLOVES

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. Operate electrically powered portable tools and other portable equipment.	1. A) Arcing at receptacle may burn fingers and/or damage receptacle and plug.	1. A) Move power switch to "off" - if plug is inserted with switch "on," arcing may occur.
	B) Damage, rust, or wear may cause short to case.	B) Inspect equipment for damage, rust, and wear on case, and for damage and wear on insulation of electrical wires.
	C) Wet or greasy equipment may cause short to case, or cause equipment to slip from hands.	C) Dry damp equipment - clean greasy equipment.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
	D) Electrocution hazard due to alteration of equipment plug.	D) Examine the electrical plug to be sure that it has not been altered by someone cutting off ground prong, filing the polarizing prong, or by inserting three-wire plug into two-wire ("cheater") adapter. If case is labeled "double insulated UL," inspect the two prongs for polarity and general condition. Do not use equipment that has been altered. Notify electrician if any corrections are required.
	E) Electrocution hazard due to damaged or improper receptacle.	E) Examine receptacle. If receptacle is cracked, dirty, or burned, ask electrician to check. Make sure receptacle matches plug - check shape and number of holes, and indicated voltage.
	F) Damage to extension cord, and possible fire from overheating, if extension cord is too small.	F) Find a power outlet near job site. If extension cord is necessary, make sure it is in good shape and is suitable for needed voltage and amperage.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
	G) Electrocution hazard due to water on floor and/or floor of metal, earth, or other conductive material.	G) Examine work site to determine that work platform is dry. If workplace is not dry, non-conductive material; place energized tool on floor, such that metal case is in contact with floor. If circuit breaker trips due to short through the case to the floor, tool must be unplugged and repaired.
	H) Arcing at receptacle.	H) When work is completed, turn switch on tool to "off" position before pulling plug from receptacle.
	I) Damage to cord.	I) Pull plug from receptacle by grasping the plug - not the cord.
2. Operating water pump.	2. A) Electrocution hazard in vicinity of water.	2. A) Use lock-out procedure, as described in Module #8 of this I.G., while cleaning or repairing pump. Do not rely on a grounded electrical system to protect against shock.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. Operate truck or other mobile equipment.	3. A) High voltage electrical wires near, or across, path of equipment may contact metal parts and start fires, or electrocute driver or nearby worker.	3. A) Elevated parts of vehicles must not come within 10 feet of energized high voltage lines. Minimum distance is greater for high voltage cross-country lines.
4. Operate circuit breaker or disconnect switch.	4. A) Burns and electrocution.	4. A) Be sure, by label or location, that switch handle controls desired equipment. Make sure boots and gloves are clean and dry. Stand on dry, non-conductive platform. Touch handle with gloved fingers before grasping high voltage - shock will often cause a finger to recoil, but a grasping hand to hold.

GENERAL INFORMATION

This module is part of an Instruction Guide that was developed to assist the sand, gravel, and crushed stone industry in conducting effective on-the-job training (OJT) of new employees, or employees reassigned to different jobs. The use of training materials, such as this module, is an important part of an effective, systematic, OJT program.

This Instruction Guide uses a generic Job Safety Analysis (JSA) of jobs common to the industry. The JSA format facilitates uniform basic training in safe job procedures, while requiring only a minimum of time and effort on the part of the trainer. This material is generic to the industry; therefore, each company using this guide will need to tailor the material somewhat to fit their particular requirements. In some cases, the material must be general in nature, and will not include specific details of procedures or equipment that must be taught by the trainer.

Recommendations for an overall OJT program are contained in the Mine Safety and Health Administration (MSHA) guide: "Structuring Effective On-The-Job Training Programs"

TRAINING RECOMMENDATIONS

On-the-job training is usually best done by the employee's immediate supervisor. If the supervisor relies on another employee to do certain parts of the training, the supervisor should be present to monitor the training. OJT is conducted at the actual job site, where the work will be done.

The supervisor/trainer should use the training materials (this module, or other materials) while the training is being done, to help ensure that all job steps are covered, and that no important safety precautions are omitted. Effective OJT should begin with an explanation (lecture and/or discussion) of the safe job procedure. The explanation should be followed by a hands-on demonstration of the proper job procedure. A good demonstration is, perhaps, the most important part of OJT. The demonstration is followed by supervised practice, during which the supervisor/trainer coaches (corrects and encourages) the employee, and evaluates when the employee is ready to do the job without direct supervision.

The first step - explaining the job to the employee - can be done in different ways. The supervisor/trainer and the employee can sit down and go through the training materials together. It may be advantageous to provide the employee with a copy of the training modules that are applicable to his/her job. The fact that most of the training is conducted at the job site does not preclude the use of a classroom, or a quiet office, for the first part of the training. Any general theory, or knowledge training, as well as the initial explanation of the job procedure, may be best done in an office/classroom setting; especially when noise levels, or other conditions at the job site, make communication difficult. A complete series of job steps could be presented through the use of slides developed at the mining operation.