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### **Prepare Your Plant for an Arc Flash Hazard Study**

An Arc Flash Hazard Study is a complicated engineering survey and analysis; however, preparing for the study in advance can make the process much easier and more accurate, thereby providing your personnel a higher level of safety. While an AF study can be demanding on your time, a correctly executed study can help improve plant safety by identifying where hazards are located and whether they can be corrected.

The Arc Flash Hazard Study will involve four phases:

- 1) Data Gathering
- 2) Engineering Analysis of the Data
- 3) Report Presentation, PPE Procurement, and Labeling
- 4) Training

Of these four phases, only the engineering analysis is done off site; the remainder of the process occurs within your plant.

### **Prepare Yourself**

In addition to preparing the plant for the study, facilities management personnel also need to prepare themselves for the process. As a facilities manager, it is important to remember that you are not conducting an Arc Flash Hazard Study to identify places where your electrical personnel will have to wear special Personal Protective Equipment (PPE), as the wearing of PPE is a last resort.

Whenever possible, circuits should be put in an electrically safe condition before work begins; however, circuits can't always be rendered safe, and it is for that reason that an Arc Flash Hazard Study is necessary. The study will identify the hazards so that you can remove as many of them as possible. When hazards cannot be removed and where circuits cannot be shut down, your personnel will have to wear special PPE while working on exposed live parts of the circuit. They will also be required to wear PPE when they are verifying that a circuit is safe during lockout/tag out procedures.

### **Utilizing Your Personnel**

The demands on plant personnel are greatest in phase one. In this phase, outside field technicians will come to your facility and collect data on your electrical distribution system, and you and your personnel will need to assist them. Field technicians will begin at your connection point(s) to your electric utility, recording transformer KVA, wire size, wire length, etc. From there, they will observe your main switchgear, where they will collect fuse and/or circuit breaker information and wire size and length, recording the information on the panels and equipment fed from the switchgear. They will then move to those loads and panels, repeating the process until they have gathered data on your entire system.

If your plant has a complete set of accurate one line drawings of your electrical distribution system, phase one could be eliminated, but very few plants retain accurate and updated drawings. Some facilities chose to do the data collection themselves, but allowing personnel who have not been trained in recognizing exposures to exposed conductors to do so presents significant safety risks. Allowing only trained professionals to collect data ensures that proper labels are created and appropriate safety procedures are followed.

Depending on the size of your facility, the data collection phase could take anywhere from half a day to several months, and someone from your plant should be available to assist the field personnel when needed. Consider the following example of how your personnel could provide the field technicians with valuable and time-saving information: A circuit breaker in a panel is labeled Press #16. The field person needs to know the location of Press #16 so conductor lengths can be recorded and the piece of equipment evaluated. Generally, the field technician will not be familiar with your plant and will have no idea where that machine is or how to find it. Your personnel will know where the machine is located, and whether you even still own it. Oftentimes, the assisting plant personnel will remember that the machine was removed two years ago, and that now Furnace #5 is sitting there. At that point, it must be determined what, if anything, this breaker is actually feeding and its location in the facility; otherwise the study will have inaccuracies.

The importance of confirming proper labeling prior to the start of the project cannot be emphasized enough. If panel labels are updated and confirmed prior to the arrival of the field technicians, the study will be much more accurate, and less rework will be needed.

## Preparing Your Personnel

As the field technicians arrive at your facility, your personnel are going to have some questions. It is best to prepare yourself for questions in advance, as the field technicians likely will be wearing PPE when they open panels, and some of this PPE might be foreign to your staff.

One of the common questions we get in the field from maintenance staff is, "Am I going to have to wear that gear?"

Our general answer is that we are wearing the PPE to protect ourselves as we identify hazards so that they don't have to wear all of the PPE on a regular basis. Let your people know what is happening and that there are changes coming.

## Planning

When planning for the Arc Flash Hazard Study it is important to consider who at your facility will need to be present for each phase of the study.

During the data collection phase, an experienced plant electrician or someone with similar knowledge will need to escort the field personnel to help them in equipment identification.

Phase three will require plant management, safety personnel, engineers, and select other personnel to be present and will last only a few hours.

Phase four, the training, will involve many people. Qualified and unqualified both need to be trained. Remember that procedures developed as a result of the study are not only a big change for your electrical staff but also for anyone working in the vicinity.

## Removal of Hazards

The removal of unidentified hazards is the final step in the process. Although not part of the study, this step is the most important in protecting your personnel from an arc flash. Money and time will have to be budgeted for these changes, which might involve changing fuses or adjusting trip settings on breakers or relays.

After the hazard removal recommendations have been carried out, new labels must be made, and your study needs to be updated.

## Safety Program

You are required to have a written Safety Program. Make your study part of it. Also write policies requiring anyone making modifications to your distribution system to record any changes they make so the study can be updated. Ensure that this policy goes into

effect before the study begins so that your system doesn't change between data collection and labeling, as this would create inaccuracies. Implementing the policy and making it common practice before the studies can help to prevent undocumented changes from rendering your study inaccurate. Most companies are making annual updates a part of their policies. In your Safety Program, you must include information about how the modifications will be handled between the time they are made and recorded and when the study is updated.

## Special Locations and Equipment

If the location of any panels or equipment is going to require special training, clearance, or equipment, it is important to make arrangements for field personnel to collect or obtain the necessary data. For example: During the course of an Arc Flash Hazard Study at a defense contractor, we discovered a panel that we needed was in a clean room that we did not have training or clearance to enter. Another instance occurred at a medical equipment manufacturer, where a rooftop panel serving air handlers for a clean room could not be opened without being shut down. The facility was unable to shut it down during our visit. In both cases, the plant personnel collected the data later and forwarded it to us. Plan for these events before the study to prevent delays.

An Arc Flash Hazard Study can be made less painful with proper planning and by preparing your plant and personnel before the study begins.

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