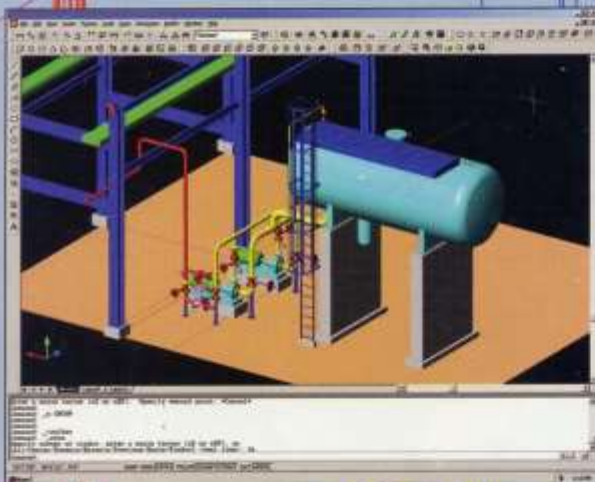


# Hydrocarbon Processing®



## Plant Design and Retrofitting

- *Centralized control room*
- *Capital investment decisions*
- *Fieldwork survival guide*



# Survival guide for a fieldwork assignment

Here are practical tips to help prepare for a journey to the real world of process plants

J. L. Gay, D&C Works, Houston, Texas

**M**any HPI operating companies today are concentrating on unit expansions, retrofits and revamp work to increase productivity and comply with increasingly stringent environmental regulations—both domestic and international. While most of an engineer's or designer's work on such projects will take place in the office, there will inevitably be some field assignments.

These could range from a simple site visit to performing physical verification that your design has been implemented (a mechanical punch). Whatever the scope of work for the field, your primary objective as an engineer or designer is to gather usable information—safely and efficiently. There are many types of field assignments, but here are some general guidelines for helping bring the project to a successful completion.

Let's say that a revamp/expansion job has come into the engineering construction and contracting (ECC) office where you are employed. Your assignment is at a grassroots unit that would have to connect and tie in to other existing units at the plant. In the scope-of-work for this job, you and your crew will be locating tie-ins, verifying existing drawings, issuing demo drawings, making as-built drawings, routing new systems and taking photographs for the project. You have a lot of work to do. To perform this work, you will need some basic office supplies, tools and safety items.

**Safety comes first . . .** no ifs, ands or buts. Basic items that you should have would include a white (the traditional color designation for engineering/management personnel) hard hat, safety glasses with side shields, hearing protection, proper clothing, gloves and work shoes with a defined heel.

Should additional safety equipment be required (respirators, Nomex clothing, climbing harness, chemical badge detectors, licenses to operate special equipment, etc.), it and the necessary training will be supplied to you either by your company or the client.

**Work shoes.** Let's talk briefly about work shoes. The current fashions are casual exercise shoes. They are comfortable and ideal for being on your feet for long periods and long walks. You can even get them with steel toes. That would satisfy most working environments.

However, if there is any need to climb fixed ladders, your shoes must have a sharp angle heel: not a rounded separation between the sole and heel, but a sharp, flat, vertical separation. The simple reason is that when you are using a fixed, vertical ladder, your foot could slip through the rungs while climbing it. Most of the time, this slipping is only

an annoyance; but there have been times when serious injuries have occurred. It's a common accident. A shoe with a defined heel will normally prevent this.

**Essential office supplies.** When you leave the office and head to the plantsite, you will need a complete set of the drawings, specs, client standards and tie-in tags. If possible, bring both full-size prints as well as a set of shot downs (11 × 17) of all drawings. The smaller-sized drawings are more convenient, easily photocopied and the wind doesn't catch them as readily. If CAD systems have been used to create the drawings, bring a disk of the latest files and the programs (via laptop or tower) to open them.

A generous supply of office materials such as highlighters, sketch and note pads, pens and pencils, paper clips, staples, time sheets, expense reports, etc., are required as well. It is much easier to bring these items with you than it is to find them at the jobsite.

To locate tie-ins, route piping systems, verify existing drawings and make as-built drawings, you will need some key tools. These include a 30-ft. tape measure, a small flashlight, pencils, clipboard, a string level with a good length of nylon string, wire clippers and pliers.

Should taking photos be part of your assignment, you might want to bring a reference stick. This could be almost anything—perhaps a folding carpenter's rule—as long as it gives you a solid reference. I like to use a wood board that is 3-in. wide and 5-ft long painted with contrasting colors at 12-in. intervals. It's more visible and clearly seen in photos. Also, a small dry-erase board comes in handy. You can mark on it to identify instrumentation and codes in the body of a photograph. It also provides a handy, flat writing surface.

**Safety training.** You have your supplies and the scope of work. Now you need the official paperwork to work onsite. Normally, you take a safety and plant orientation training class. The client should provide this.

During this orientation, you will learn where "safe areas" are. These are designated meeting places in case of emergency. It's where you go should an alarm sound. It might be the front gate or control room. It depends on the facility. Learning the siren codes is also vital. These are varying tones and sequences to signal an emergency or an all clear. These siren codes are also plant-specific. In some facilities, a neighboring plant may be located within hearing distance of your jobsite. You could potentially hear another site's alarm. Thus, you need to learn which codes are applicable to your work situation.

*Continued*



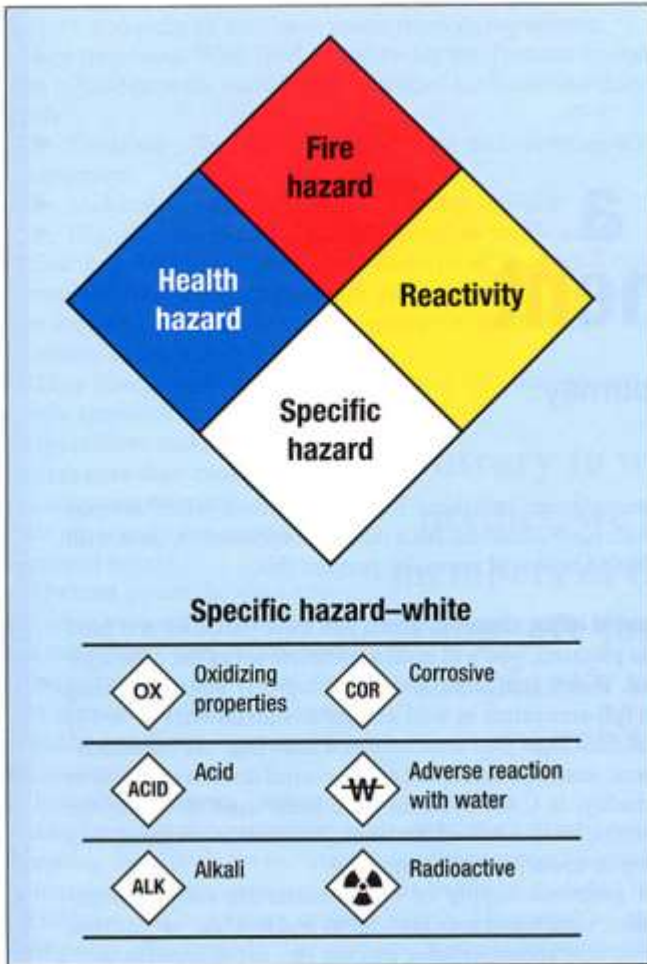


Fig. 1. The National Fire Protection Association developed a color-coded system to identify safety and health hazards. This is a representative portion of that important standard.

Orientation will also provide you with the locations of “Material Safety Data Sheets,” also known as MSDSs. These identify and give specifics on the health hazards posed by the chemicals present at the plant. The National Fire Protection Association has a color-coded system for identifying hazards associated with specific materials (Fig. 1). The diamond-shaped signal is widely used and provides a recognizable system for classifying health and physical hazards. You’ll see it on trucks, storage tanks and throughout the plant.

You will also learn about the “Hazardous Material Identification System.” It assigns numeric ratings indicating the degree of a hazard and uses alphabetical codes to designate the appropriate personal protective equipment to wear in specific environments (Fig. 2). When you see these signs posted and you are not wearing the proper protection, do not enter that area—even if you plan on only walking through it as a shortcut to another area. Remember: if you are not authorized to be in a particular area, your presence is personally hazardous and reflects negatively on your company. At the very least, your boss will be notified of your carelessness and asked to explain it.

When you have successfully completed these training sessions, the client company will issue you a safety/security clearance and I.D. If photos of the jobsite are going to be taken, you will have to get a written release from the client. At last, you are prepared to enter the facilities.

**At the physical site.** When you get to the jobsite, you and the team will take a tour of the facilities. The client will normally

Hazardous Materials Identification System	
<b>Hazard index</b>	
4 Severe hazard	* An asterisk (*) or other designation corresponds to additional information on a data sheet or separate chronic effects notification.
3 Serious hazard	
2 Moderate hazard	
1 Slight hazard	
0 Minimal hazard	
<b>Personal protection index</b>	
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
X	Ask your supervisor for specialized handling directions
	Safety glasses
	Splash goggles
	Face shield
	Airline hood or mask
	Gloves
	Synthetic apron
	Dust respirator
	Vapor respirator
	Combination dust and vapor respirator
	Full protective suit
	Boots

Fig. 2. Standard system ranks the degree of a material’s hazard and designates the appropriate protective equipment workers must wear.

give the tour. Members of this tour may include the project manager, project engineer and the supervisors of departments involved with the job from your company.

The client will show the crew the scope of work for the project and important areas—such as your office location. Experience shows that you can’t automatically assume you’ll be informed of where your trailer might be! It may be close to your scope-of-work unit, it may not. In addition, someone in your team should be taking notes and have a Plot Plan to highlight the areas that you will be working in.

Although the safety training that you have already received was probably very good, typically some basic lessons are overlooked. So don’t worry about asking questions. Sometimes this basic information is omitted because it is considered to be “common sense”. Beware: this is one of those ambiguous terms.



Have you ever bought a "How To" or "Do It Yourself" book and actually tried to use it? Often, they are packed with information by people with a good deal of experience on the subject. As a result, there might be something that is so basic, commonplace and second nature to the writer that it is not included in the text. However to you, it is an unknown, critical bit of information needed for your do-it-yourself project. The concept of safety is the same. Here's an example.

**A cautionary tale.** One day we were taking a tour of our new work area in a petrochemical plant. Several projects by a number of different contractors were ongoing simultaneously throughout the plant. A busy turnaround was happening in one unit, an expansion in another. Our team was locating tie-ins and designing a new truck-loading station.

During the course of the walk down, the project engineer needed some additional drawings and asked one of the junior engineers to get them from the trailer. Shortly after he left on this mission, the oddest thing happened: We noticed that the welders, pipe fitters and other contractors had started running to the safe areas, although no alarms or sirens had sounded. Naturally, we ran to a safe area as well. After a while and several rumors later, the all clear was given; people went back to work. What had happened?

Well, this was the first real job for our junior engineer, and he wanted to make a good impression. So at some point on his way to the trailer to retrieve the asked-for drawings, common sense dictated that the quicker he returned with the drawings, the sooner a problem would be solved. Thus, he started *running* to the trailer. The other contractors saw an engineer *running from* something. Well, their commonsense dictated that something major was about to go wrong and alarms were soon to follow.

After we found out what had happened, the project engineer made it very clear that the only time you run at the plant is during emergencies. By the way, for the rest of that job, any assignment that the junior engineer was given had the phrase "but don't run" tacked on. It almost became his nickname.

**Leave it to operations.** While working at the jobsite, you will sign in at the control room before you enter any area. When you are finished with what you are doing in that area, you will sign out. You are required to do this every time that you need to be in the plant.

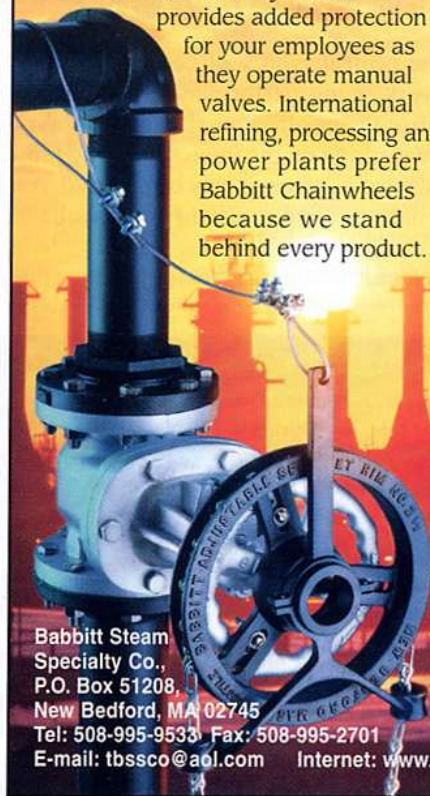
Never, under any conditions, work or operate any valve, instrument or anything else. This could be very dangerous; the consequences could be tragic. Working the equipment is the job of the operators.

Often, you will be working in offsite areas including tank farms, pipe racks, sleeper ways, loading stations, flares and other areas that interconnect the production units. While working in these areas, you may on occasions notice a leaking valve or a loose bolt on a flange. Most often, that happens on utility systems. You should note the location and, if possible, highlight it on the P&ID or plan drawing. When you sign out, you should inform plant operations about it.

**Other safety issues.** Always be aware of your surroundings. The jobsite is not a place for practical jokes or horseplay. If you act up, in most plants, you will be asked to leave the site and not return. Another thing to remember is that should something go wrong, nature has never cared about status. Whether the top supervisor or the most common laborer, we are all subject to the same ills. If there's an incident and subsequently the people you are with need treatment, so do you.

## Safer Valve Actuation

The Babbitt Safety Wheel\* provides added protection for your employees as they operate manual valves. International refining, processing and power plants prefer Babbitt Chainwheels because we stand behind every product.



Babbitt Steam Specialty Co.,  
P.O. Box 51208,  
New Bedford, MA 02745  
Tel: 508-995-9533 Fax: 508-995-2701  
E-mail: tbssco@aol.com Internet: www.babbittsteam.com

Circle 86

**Tagging.** In your (hypothetical) workplace assignment, I previously had noted that one of your project objectives is to locate tie-ins. To do this, you need the current P&IDs, some tie-in tags and stainless steel wire. Stainless steel wire is preferred to common steel because it will not bleed on the tag.

The tags that you use need to be weather-resistant and a standout color, and you need to use a permanent marker. The ideal tag should be about 3-in. × 6-in., have your company logo on it, tie-in number, reference P&ID drawing and contract code, and on the reverse a place for notes. If your company does not stock its own tags, then getting some vinyl tags at the local office supply store and putting this information on the tag will work.

Several different contracting companies may be at work in the same jobsite, so tie-in tags need to be easily recognizable. On rare occasions, another contractor could locate its tie-in tag at the same location as yours. When that happens, it could be that they located their tag at the wrong location (you would not have done that!), or there might actually be several users of the same line, especially if that line is a cooling water or other utility system. If this should happen, you need to notify the client rep with whom you're working. Do not remove the tag.

When you locate a tag, you should position it at a secure place. An example would be at tying into a flange. Do not put the tag on the flange, instead place it on the pipe and wrap it with stainless steel wire. Always be sure that the number on the tag matches the number on the P&ID.

When practical, you want to tie-in at a flange. Should hot taps be used, there must be ample room for the equipment needed. Several conditions may apply when choosing a tie-in location.



Among them would be the system's commodity, the method of tying into it, client preference and location.

After locating the tie-in, you next need to verify the routing. The design may have already been completed, so you should check to see if the routing presents any problems. Should there be any corrections, this is the best time to make them.

**Photos.** Throughout the project, you will be coordinating your fieldwork with work being performed in the office. There might be a team from your office working on a grass-roots unit, while you are working on the interconnecting piping systems. To clarify the work, pictures may be required. As stated earlier, you will have to get clearance from the client to take them.

Several types of cameras are useful; the most popular are the

35-mm film and digital cameras. Remember that these are not vacation shots, nor are they visual art. They need to convey information.

When taking photos, you will have to write a brief description of the subject and sometimes draw a sketch. These will be coded with the film number so when you get the pictures developed, you can match them. There are several ways to do this. With 35-mm, using a small dry-erase board to mark the code within the photo is very convenient. When I take pictures with a 35-mm camera, the first photo would be that of my return address on the dry-erase board. This is just in case the photo lab misplaces your prints. It has happened.

If you are using a digital camera, you can start working with the photos that day, provided you can download them into a computer or laptop. This way, you can place your notes with the image and e-mail them to the office.

The first photos you take could be thought of as an elevation or section drawing. In the photo, it is nice to have an easily seen solid reference. This is where that reference stick I talked about earlier is used. It can be placed vertically or horizontally. Pictures are often deceptive; scale is a concern. Having a solid reference will help to clarify the subject area.

**Finishing up.** Your fieldwork assignment is almost finished. You are starting to wrap it up. You have located the tie-ins, verified the design and routing of new piping systems, and have taken photos of questioned areas and of the tie-in location. So before you leave, you need to do a walk down of the work that was performed. This includes making sure that your tie-in tags have not been damaged or are missing. If they are, replace them.

Now you are ready to give the client and operations as well as members from your office detailed reports of the work that was accomplished. This should not take very long to do because you have exchanged a steady flow of information and ideas between various groups since the beginning of the job, right? When everything has been approved, your work is done and construction can start. You can return home to start work on a new project. ■

Announcing...

## the perfect blend

for world class sulfur recovery design/build services.



*Never before has there been such a perfect blend of sulfur recovery talent, expertise, experience, technology, services and financial strength.*

### The Westfield Engineering/Ford, Bacon & Davis alliance...

Westfield Engineering and Ford, Bacon & Davis now have an alliance that will help you solve virtually any sulfur removal/recovery problem. We have 55 years cumulative Sulfur Recovery Unit (SRU) experience. We've completed over 160 SRUs worldwide. Plants that operate efficiently and trouble-free. We've developed design enhancements that add to the longevity, flexibility and productivity of new plants and retrofits.

### An easy single source, one-stop shop...

This new alliance gives you a convenient single source with proven high performance solutions for Claus SRUs including high impurity designs (NH<sub>3</sub>, HCN, and Hydrocarbons), proprietary thermal reactors, oxygen enrichment & direct oxidation. We make it AEAIG (As Easy As It Gets) for any size project (SRUs from less than 2 LTPD to over 500 LTPD). We also provide complete fabrication and construction services whether you require conventional construction or modular for fast track projects.

Call Westfield today for more information on our new—and perfect—blend of services.

**Westfield**  
ENGINEERING & SERVICES



an S&B Affiliated  
Company

8310 McHARD ROAD, HOUSTON, TEXAS 77053

PHONE: 281-438-2047 FAX: 281-438-0459

E-MAIL: info@westfieldengineering.com WEB: www.westfieldengineering.com



**John L. Gay** is a senior piping designer, with over 25 years of experience in the hydrocarbon processing industry, from conception through field installation. He has worked for many engineering and construction contractors—from the major international players to small-to-medium-sized companies. His fieldwork assignments have taken him to locales within the U.S., West Indies and Middle East. Mr. Gay is active in the Autodesk Users Group and the Society of Piping Engineers and Designers.