TD-5811M, Rev. 1

Damage Prevention Handbook

Gas Transmission and Distribution

"Zero In On Safety"

For Reference Use

Publication Date: March 2014

Pacific Gas and Electric Company
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Codes and Standards Department, Damage Prevention Standards Engineer

Use Corrective Action Program (CAP) to improve documents and procedures.

Notify document contact if you identify an opportunity to improve this procedure.

This damage prevention handbook is in compliance with TD-5811S, which fulfills the regulatory requirements for pipeline operators of Title 49 Code of Federal Regulations (CFR) Section §192.614 – Damage Prevention Program.

Safety, the driving force behind everything we do at PG&E, is the reason for you picking up this handbook today – thank you. A lot of what you'll see in this handbook comes directly from the suggestions submitted by our locate and mark team members.

If you've been on the scene of a dig-in, you know the potential life safety threat is very real. But if we continue to do our job of correctly locating and marking the lines for excavators, we stand a greater chance of avoiding damage to our pipelines. Most importantly, in being the best at what we do, we help protect our communities from harmful incidents.

Use this handbook as your everyday guide. It was created for you by you and your colleagues, and it serves the needs of the people that mean the most to us: our crews, the public, and our communities.

Noteworthy features of this handbook:

- Written from a locate and mark user perspective
- Easy to follow step-by-step instructions
- Supportive job aids
- Helpful color pictures
- User friendly references

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TABLE OF CONTENTS

Publication Date: March 2014

Section **Tab Color**

Instrument Procedures (Continued)

* *Document is not available in the printed version of handbook. Document is located online in the Technical Information Library (TIL).*

Job Aids

Forms

Publication Date: March 2014

Section **Tab Color**

Publication Date: March 2014

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Zero in on Safety

Reference

Safety is about protecting PG&E facilities, the public, and ***you!***

Any time you feel unsafe or identify a possible unsafe situation, immediately proceed to a safe location and contact your supervisor for assistance.

Table of Contents

Gas Safety Excellence

Our Vision

PG&E will become the safest, most reliable gas company in the United States

Our Focus

All work must contribute to building a safer, more reliable, and more affordable gas system.

Our Path

We will get there with Gas Safety Excellence, PG&E's safety management system.

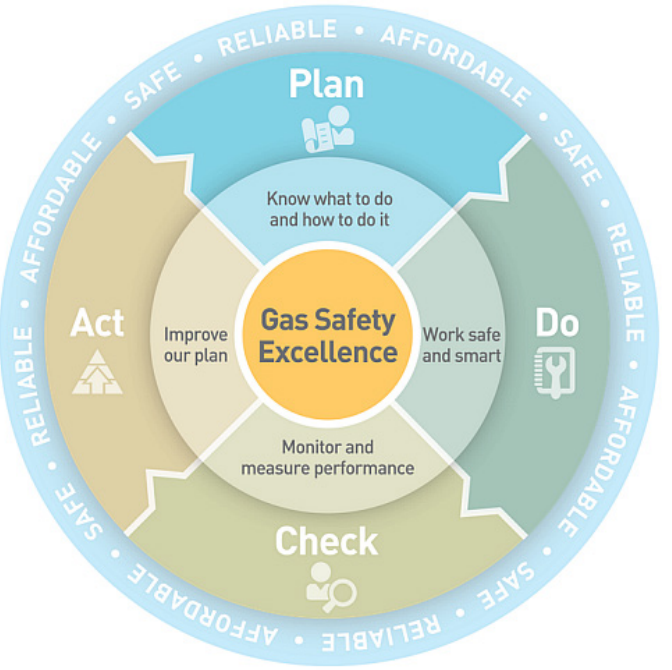
Publication Date: March 2014

What does **Gas Safety Excellence** mean in practice?

- We put safety first with the ultimate goal to have **zero** incidents.
- We know the health and condition of our assets.
- We understand the risks of our assets across life cycle stages.
- We plan and execute work efficiently, check for quality, and improve continuously.

How will we make **Gas Safety Excellence** reality?

- We create a safety-first culture over time.
- Our culture will encourage personnel to speak up if they identify an issue or have ideas for improvement.
- We will engage with local and national stakeholders to help achieve our goals.



Stretch and Flex

Perform stretch and flex to minimize the stress on the body. Stretching during the workday may also relieve muscular tension and pain from prolong sitting, driving, cold weather, etc.

Publication Date: March 2014

Driving and Vehicular Safety

Whether you drive to perform work described in this handbook or to wherever your destination may be, driving should never be considered routine.

Always:

- Walk around your vehicle to visually inspect it.
- Maintain good housekeeping.
- Obey all laws while driving.
- Adhere to PG&E standards while operating vehicle.
- Use the **Smith 5 Keys™** to safe driving:
  1) Aim high in steering.
  2) Get the big picture.
  3) Keep your eyes moving.
  4) Leave yourself an out.
  5) Make sure they see you.
- Do not use your phone or electronic devices while you are driving except for answering a call using a hands-free device.
- Ensure all items in the vehicle are properly stored and secured.
- Park in a safe location.
- Cone vehicle.

See Motor Vehicle Safety Standard (SAFE-1002S) for more information.

Cone Your Vehicle

Cone your vehicle when arriving to a job site AND working in a work-protected area:

- Use a minimum of two cones.
- Place the first cone in front of your vehicle.
- Place the second cone in the back of your vehicle.

Publication Date: March 2014

Wear Personal Protective Equipment (PPE)

The PPE was designed for your safety.

You must wear your PPE and any additional safety equipment your supervisor may require when working in the field or performing a specific task. See Table 1, “Required PPE.”

Table 1. Required PPE

PPE	TYPE	WHEN TO WEAR
Traffic vest	Class II (no-sleeve)	Traffic speed less than 50 mph
	Class III (short-sleeve)	Traffic speed at or above 50 mph Working at night
Gloves	Rubber gloves with approved leather protector (Class 00–Type II)	Entering secondary electric enclosure
	Regular PPE	As needed
Hard hat	PG&E approved	In construction zone
Long sleeve shirt		At all times (*flame resistant [FR] clothing when required)
Long pants		
Safety glasses	PG&E approved	As needed
Proper footwear	Leather and above ankle	At all times
**FR clothing is required at all time for electric locate.*		

Aware of Job Site Safety Hazards

Safety hazards vary depending on the specific task you are performing. Hazards that impact your work include, but are not limited to:

- Traffic conditions
- Tripping and slipping hazards
- Dangerous animals and insects

Publication Date: March 2014

- Dangerous surroundings
- Electrical shock
- Construction activities
- Pressurized equipment
- Poisonous vegetation
- Explosion or ignition of escaping gas
- Toxic gases

Maintain and Safely Operate Equipment

Properly maintain and operate your locating instruments, equipment, and accessories to prevent:

- Inaccurate locating
- Mismarks
- Damage to underground facilities
- Unsafe situations that may affect your and the public's safety

See instrument operating instructions for more details.

Maintain Operator Qualifications (OQ)

PG&E locate and mark personnel, hiring hall, and contract personnel are required to be current with their Operator Qualifications (OQ) before conducting any work on PG&E gas facilities.

For details, see Operator Qualifications (OQ) section of this handbook.

Self-Checking (STAR)

Stop, Think, Act, and Review

Self-Checking is an expected standard of performance for all personnel. This process helps you to ensure that the action you are about to take is correct before using any equipment.

Stop

1. Take the time to pause and focus on the task you are about to perform.
2. Eliminate distractions.

Think

1. Think about the task to be performed.

Publication Date: March 2014

2. Understand what is to be done.
3. Know the expected response and indications of that action.
4. Determine if the task is appropriate for the given conditions.
5. Identify the correct component.
6. Plan the actions to take if the response is not as expected.

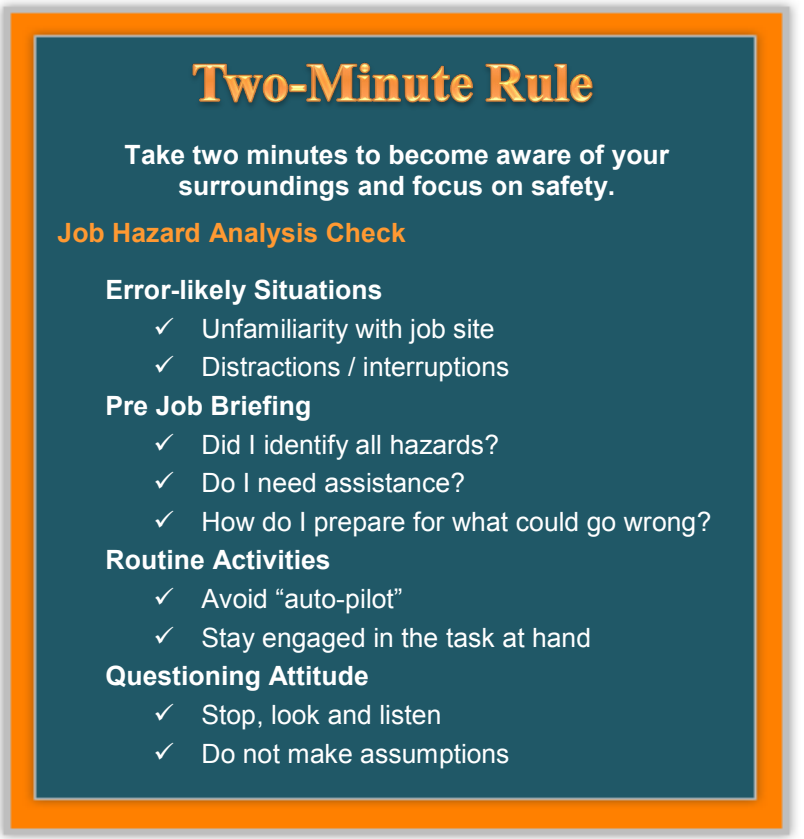
Act

1. Perform the task.

Review

1. Evaluate the results of your action.
2. Verify the correct, expected response.
3. Take pre-planned actions if the response is not as expected.

Understand the Two-Minute Rule



Publication Date: March 2014

Using Three-way Communication Method

The three-way communication method helps to ensure that information passing between multiple people is transferred and understood reliably.

Use the three-way communication method in sound-alike systems, high noise areas, and poor reception during radio or telephone communications to:

- Ensure that the correct actions are performed
- Communicate alphanumeric information of facility equipment names (see Table 2, “Phonetic Alphabet” and Table 3, “Phonetic Numeral”)

To use the three-way communication method:

1. The **speaker states** (enunciates) a message. Avoid using slang terms.
2. The **listener repeats** back the message to verify understanding.
3. The **speaker confirms** to acknowledge the message heard.

Table 2. Phonetic Alphabet

LETTER	WORD	LETTER	WORD
A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

Table 3. Phonetic Numeral

NUMBER	PRONOUNCED
0	Zeero
1	Wun
2	Too
3	Tree or Thr-ree
4	Fower
5	Fife
6	Siks
7	Seven
8	Ate
9	Niner

Operator Qualifications (OQ)

For Standby and Locate and Mark

Reference

Summary

Pacific Gas and Electric Company (PG&E) locate and mark personnel, hiring hall, and contract personnel are required to be current with their Operator Qualifications (OQ) before conducting any work on PG&E gas facilities.

Target Audience

Personnel performing standby or locate and mark tasks.

Table of Contents

Publication Date: March 2014

1 What is OQ?

PG&E created the OQ process to ensure a qualified workforce and to reduce the probability and consequence of incidents caused by human error.

The required OQ methods are varied depending on the type of evaluation, and may include any or all of the following:

- Oral evaluation
- Written evaluation
- Physical evaluation
- A combination of written, oral, and physical evaluation.

2 Why is OQ Required?

The Federal Government Department of Transportation (DOT) enforces the Code of Federal Regulations (CFR). The CFR requires pipeline operators to develop and maintain a written qualification program for individuals performing covered tasks on pipeline facilities.

CFR 192.801:

1. This subpart prescribes the minimum requirements for operator qualification of individuals performing covered tasks on a pipeline facility.

2. For the purpose of this subpart, a covered task is an activity, identified by the operator, that:

   A. Is performed on a pipeline facility;

   B. Is an operations or maintenance task;

   C. Is performed as a requirement of this part; and

   D. Affects the operation or integrity of the pipeline.

Publication Date: March 2014

3 Who is Responsible for OQ?

- PG&E is responsible for:
  1) Providing program, requirements, and criteria for OQs.
  2) Ensuring all personnel conducting work on PG&E gas facilities are qualified.
- Supervisor is responsible to:
  - Know which covered tasks his or her personnel are operator qualified to perform, and assigning them work only for which they are qualified.
  - Ensure that personnel are responsible for having current OQs, and informing the qualification organization prior to a lapse in OQ status.
  - Know span of control requirements for each task assigned to their personnel.
- Personnel are responsible to:
  - Know what OQs they hold.
  - Know and understand PG&E Company guidance documents for the covered task they are qualified to perform.
  - Perform tasks unsupervised **only** if they have the necessary knowledge, skill, and qualifications for their own safety and that of the general public.
  - Inform their supervisor or job lead if they are assigned any covered tasks for which they are not OQ qualified or no longer have the knowledge and skill to perform.
  - Notify their supervisor of any additional training, equipment, or resources needed to perform a task they are qualified to do.

4 Which Task Requires OQ?

1. See Table 1, "Tasks That Require OQ."

Table 1. Tasks That Require OQ

TASK	OQ TO PERFORM
Production locate	OQ 05-01
Non-production locate	OQ 05-04
Standby	*OQ 05-02 **OQ 05-01 or OQ 05-04 AND **OQ 03-05 and OQ 05-02
Using the Jameson Gas Line Tracer	OQ 05-03
**Current requirement* ***Effective January 1, 2015*	

5 What is Initial Qualification?

An initial qualification is an evaluation of individuals who have not yet been qualified to perform a particular task. Initial qualification is supported by the appropriate knowledge and skill through:

- Required formal training by PG&E Academy
  - GAS-0210, "Locate & Mark" (OQ 05-01)
  - GAS-0213, "Non-Production Mark and Locate" (OQ 05-04)
  - GAS-0231, "Perform Standby" (OQ 05-02)
  - GAS-0095, "Operating the Jameson Gas Line Tracer" (OQ 05-03)
- Structured on-the-job training (OJT)
  - GAS-0227, "Locate & Mark Ride-Along" (OQ 05-01)
- OJT mentoring by a qualified person.

Publication Date: March 2014

6 What are Subsequent Qualifications?

Subsequent qualifications are evaluations of an individual who previously acquired initial qualification. Subsequent qualifications are done at 3-year intervals and may be different for each covered task.

7 What is Span of control?

Span of control is the number of personnel-in-training who can perform a covered task under the continuous supervision AND in the line-of-sight of a qualified person. All locate and mark related tasks are 1:1 span of control.

For example, one trainee can work under direct supervision of one qualified locator until the trainee is operator qualified.

8 Prepare for OQ 05-01 "Locate and Mark Facilities"

The OQ task includes locating underground pipelines, utilizing maps, simulating marking and operating locating equipment. The task is associated with USA (production locates).

1. Review the following documents:

   A. **Instrument Operating Instructions**:

      - See **the instrument-specific procedures in this handbook**.

   B. **Procedures**:

      - TD-5811P-102, "Determining Scope of Locate"
      - TD-5811P-103, "Identifying the Proper Location"
      - TD-5811P-104, "Proper Markings"
      - TD-5811P-105, "Responding to a Ticket"
      - TD-5811P-201, "Conductive Locate"
      - TD-5811P-205, "Verifying Instrument Calibration"

   C. **Job Aids**:

      - TD-5811P-105-JA02, "Submitting a Map Correction Form"
      - TD-5811P-105-JA03, "Corrective Work Form"

Publication Date: March 2014

- TD-5811P-105-JA04, “Identifying the Need for a Site Visit, Field Meet, and Standby”
- TD-5811P-301-JA01, “Handling Excavators Working Unsafely”
- TD-5811P-301-JA02, “Issuing a Record of Warning”

D. **Reference**:

- M-60.4, “Approved Locating Instruments”
- TD-5811P-205-F01, “Calibration Verification Form”
- Gas Map Symbols

2. Know how to perform the following tasks:

A. **Handling Abnormal Operating Conditions (AOC)**:

- Recognize AOCs
- Take appropriate corrective actions to AOCs

B. **Using Gas Map**:

- Explain or interpret gas map symbols
- Take appropriate corrective actions to mapping errors

C. **Checking Equipment**:

- Inspect instrument.
- Check instrument batteries.
- Check out procedures using conductive, inductive with coupler, and inductive methods.
- Troubleshoot procedures.
- Perform calibration verification.
- Verify EMS calibration (for Vivax vLocML instrument users only).
- Complete Calibration Verification Form.

D. **Performing Conductive Locate**:

- Perform visual inspection of excavation area.
- Use maps and documents to support locate.
- Perform a non-contact voltage test.
- Setup transmitter for conductive locate.
- Ensure and understand proper grounding.
- Locate conductively

Publication Date: March 2014

- Interpret the signal readings on the receiver.
- Identify directional changes.
- Properly mark facilities.
- Successfully locate all facilities identified by evaluator.
- Determine when standby is required.
- Respond to an unsafe situation.

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9 Prepare for OQ 05-02 "Standby Pipeline"

The OQ task includes ensuring performance of standby responsibilities during excavation activities.

1. Review the following documents:

   A. **Procedures**:

   - TD-5811P-301, "Performing a Standby"
   - TD-5811P-401, "Dig-In First Responder"

   B. **Job Aids**:

   - TD-5811P-105-JA02, "Submitting a Map Correction Form"
   - TD-5811P-105-JA03, "Corrective Work Form"
   - TD-5811P-105-JA04, "Identifying the Need for a Site Visit, Field Meet, and Standby"
   - TD-5811P-301-JA01, "Handling Excavators Working Unsafely"
   - TD-5811P-301-JA02, "Issuing a Record of Warning"

   C. **References**:

   - TD-5811P-401-F01, "Dig-In First Responder Form"
   - Gas Map Symbols

2. Know how to perform the following tasks:

   A. **Handling Abnormal Operating Conditions (AOC)**:

   - Recognize AOCs
   - Take appropriate corrective actions to AOCs

   B. **Using Gas Map**:

   - Explain or interpret gas map symbols

Publication Date: March 2014

- Take appropriate corrective actions to mapping errors

C. **Standby Responsibilities**:

- Understand:
  - A standby person's roles and responsibilities
  - Hand dig requirements
  - Backfill process
- Perform pipe inspection
- Take appropriate actions in response to:
  - Marking discrepancies
  - Excavators working unsafely
  - An emergency situation

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10 Prepare for OQ 05-03 "Location of Facility without Wire"

The OQ task includes installing the Jameson unit onto a gas riser and simulating inserting line tracer tape into facilities for locating without wire.

1. Review the following documents:

   A. **Procedures**:

   - TD-5811P-201, "Conductive Locate"
   - TD-5811P-605, "Jameson Gas Line Tracer"

   B. **Job Aids**:

   - TD-5811P-105-JA02, "Submitting a Map Correction Form"
   - TD-5811P-105-JA03, "Corrective Work Form"
   - TD-5811P-605-JA01, "Installing an EMS"

   C. **Reference**:

   - M-60.4, "Approved Locating Instruments"
   - Gas Map Symbols

2. Know how to perform the following tasks:

   A. **Handling Abnormal Operating Conditions (AOC)**:

   - Recognize AOCs
   - Take appropriate corrective actions to AOCs

Publication Date: March 2014

B. **Operating a Gas Line Tracer Tool**:

- Test for stray voltage
- Inspect tool
- Attach stuffing box assembly
- Insert rod into stuffing box assembly
- Establish static ground
- Simulate pressurizing stuffing box
- Simulate installation of EMS markers
- Simulate completion of map correction form

11

Prepare for OQ 05-04 "Non-Production Mark and Locate"

The OQ task includes locating underground pipelines, utilizing maps, simulating marking and operating locating equipment (for PG&E crew locating).

1. Review the following documents:

A. **Instrument Operating Instructions**:

- See **the instrument-specific procedures in this handbook**.

B. **Procedures**:

- TD-5811P-103, "Identifying the Proper Location"
- TD-5811P-104, "Proper Markings"
- TD-5811P-201, "Conductive Locate"
- TD-5811P-205, "Verifying Instrument Calibration"

C. **Job Aids**:

- TD-5811P-105-JA03, "Corrective Work Form"
- TD-5811P-105-JA02, "Submitting a Map Correction Form"
- TD-5811P-105-JA04, "Identifying the Need for a Site Visit, Field Meets, and Standby"

D. **References**:

- M-60.4, "Approved Locating Instruments"
- TD-5811P-205-F01, "Calibration Verification Form"

Publication Date: March 2014

- Gas Map Symbols

2. Know how to perform the following tasks:

   A. **Handling Abnormal Operating Conditions (AOC)**:

   - Recognize AOCs
   - Take appropriate corrective actions to AOCs

   B. **Using Gas Map**:

   - Explain or interpret gas map symbols.
   - Take appropriate corrective actions to mapping errors.

   C. **Checking Equipment**:

   - Inspect instrument.
   - Check instrument batteries.
   - Check out procedures using conductive, inductive with coupler, and inductive methods.
   - Troubleshoot procedures.
   - Perform calibration verification.
   - Verify EMS calibration (for Vivax vLocML instrument users only).
   - Complete Calibration Verification Form.

   D. **Performing Conductive Locate**:

   - Perform visual inspection of excavation area.
   - Use maps and documents to support locate.
   - Perform a non-contact voltage test.
   - Setup transmitter for conductive locate.
   - Ensure and understand proper grounding.
   - Perform a conductive locate.
   - Interpret the signal readings on the receiver.
   - Identify directional changes.
   - Properly mark facilities.
   - Successfully locate all facilities identified by evaluator.
   - Determine when standby is required.

END OF REFERENCE

Publication Date: March 2014

Preparing for Daily Work

Procedure

Summary

This procedure provides step-by-step instructions to prepare for your daily work.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Check your electronic tablet to ensure it works properly. Contact TSC and your supervisor for assistance (if needed).

Table of Contents

Publication Date: March 2014

1 Preparing Your Vehicle

1. Stock your vehicle with all necessary tools and equipment needed for locate and mark.

   See Job Aid TD-5811P-101-JA01, "Standard Vehicle Checklist."

2. Confirm that your locating instrument calibration has been verified and documented.

   For instructions, see Procedure TD-5811P-205, "Verifying Instrument Calibration."

3. Perform an instrument daily checkout.

   For instructions, see the instrument-specific procedures in this handbook.

2 Pre-screening USA Tickets

1. Sync Utilisphere™ at the start of each day to update your folder.

   For instructions, see Job Aid TD-5811P-102-JA01, "Using Utilisphere™ on Tablet."

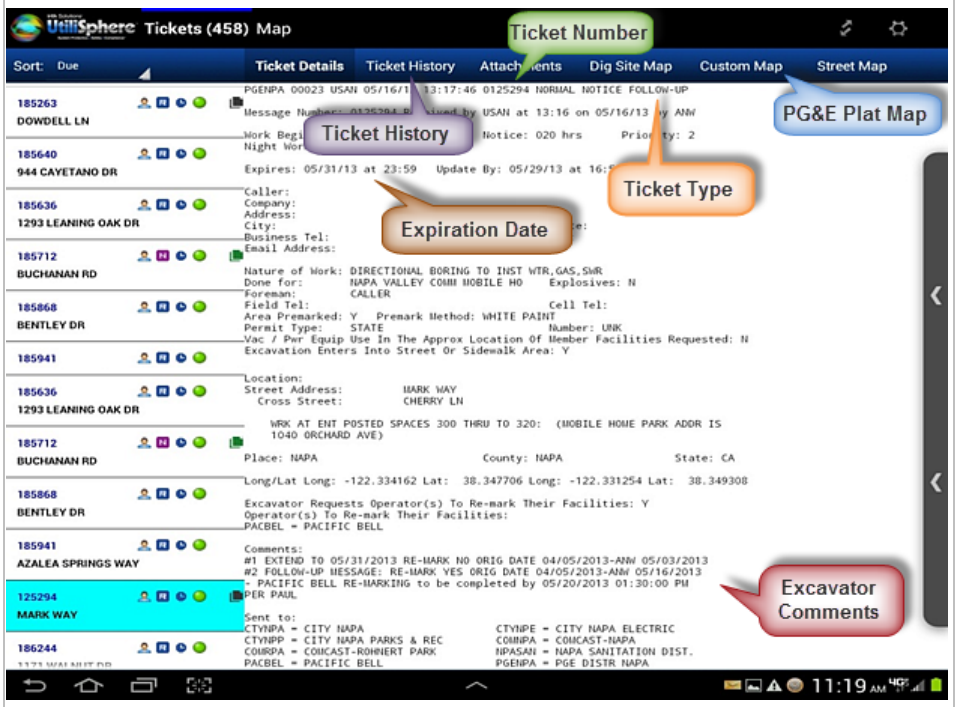
2. Review all tickets in your assigned Utilisphere™ folder. See Figure 1, "Ticket Details Screen," below.

3. Look for tickets you can close without a site visit. These tickets may include the following:

   - Canceled
   - Follow-up
   - Extension
   - Renewal
   - Expired
   - Misplaced
   - No-conflict
   - Design locate request

Publication Date: March 2014

Figure 1. Ticket Details Screen



3 Screening Canceled Tickets

1. Review tickets in your folder.
2. Visually search for **canceled ticket icon**. A ticket is canceled when the excavator cancels the USA ticket request.

Canceled Ticket Icon

3. IF your folder has any canceled tickets,

   THEN do the following:

   A. Select a canceled ticket to view ticket details.

   B. Make a note of the ticket number.

   C. Visually browse your folder for other tickets that have the same ticket number.

Publication Date: March 2014

D. Close all versions of the same ticket number using the **Canceled Ticket** response.

For instructions, see Job Aid TD-5811P-105-JA01 "Choosing the Correct Utilisphere™ Response."

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4 Screening Follow-up, Extension, and Renewal Tickets

1. Look for the ticket types identified by the version icons:

   - **Normal Notice Follow-up**. This is a follow up of an existing ticket. Multiple versions of the same ticket ID can exist at the same time.
   - **Normal Notice Extension**. This is an extension of a ticket that is older than 28 days.
   - **Normal Notice Renewal**. This is a renewal of a ticket that is older than 6 months. Ticket is issued a new ID number.

Current Version Icon

Previous Version Icon

2. IF your folder has any tickets of the above mentioned types,

   THEN do the following for each ticket:

   A. IF excavator comments are **for Pacific Gas and Electric Company (PG&E) or All Members**,

   THEN contact excavator to request more information AND document conversation.

   B. IF excavator comments **do not identify PG&E or All Members**,

   THEN close ticket using PG&E Response Not Required response. This follow-up request is for other facility owners and does not affect PG&E facilities.

   For instructions to select a ticket response, see Job Aid TD-5811P-105-JA01 "Choosing the Correct Utilisphere™ Response."

Publication Date: March 2014

5 Screening Expired and Misplaced Tickets

1. Sort tickets by creation date.
2. Look for **expired tickets**. An expired ticket is older than 28 days, has an expiration date that has passed, but has not been extended or renewed.

   A. IF your folder has an expired ticket,

   THEN do the following:

   1) Inform excavator to submit a renewal or extension ticket.

   2) Document conversation with excavator in the **Notes** section of ticket.

   3) Close the expired ticket.

3. Look for **misplaced tickets**. A misplaced ticket is one that was placed in your folder by mistake.

   A. IF your folder has any misplaced tickets,

   THEN IMMEDIATELY notify your supervisor to have tickets reassigned.

   For instructions to select a ticket response, see Job Aid TD-5811P-105-JA01 "Choosing the Correct Utilisphere™ Response."

6 Screening No Conflict Tickets

Section 6 has been removed.

Section 6 has been removed.

7 Screening Tickets Requested for Design Purposes

1. Review tickets in your folders.
2. Look for tickets requested for **design purposes**. The USA ticket process is not to be used for design purposes. Design purpose tickets may include any combination of the following characteristics:
   - A company submits multiple tickets with the same start dates.
   - Multiple companies submit tickets for the same location.
   - Company name identified that it is an “engineering” company.
   - Excavator comments for descriptions of work lack details.
3. IF you suspect that a ticket may be for design purposes,

   THEN confirm your suspicion by asking excavator for the following information:
   - City or county permit number for excavation area. Except for during an emergency situation, all excavations require permits. No permit means request may be for design purposes.
   - Specific plans for excavation. Request is for design purposes if excavator is unsure where to dig until after PG&E has responded.
   - Confirm excavation start date. Request may be for design purposes if start date is greater than 14 calendar days. Excavator can submit request only up to 14 calendar days in advance [CGC law 4216.1.(a)(1)].

Publication Date: March 2014

4. IF you can confirm that ticket is for design purposes,

   THEN do the following:

   A. Provide excavator with area Division PG&E Service Planning phone number to request PG&E maps for their project design plans.

   B. Explain that USA requests are not utilized for design purposes.

   C. IF further explanation is needed,

      THEN refer excavator to call USA at 811 for more details and law specifics.

   D. Close ticket.

      For instructions to select a ticket response, see Job Aid TD-5811P-105-JA01 "Choosing the Correct Utilisphere™ Response."

8 Syncing USA Tickets

1. Sync Utilisphere™ application to:

   - Send responses to excavators.
   - Receive new tickets that may have been created recently.

9 Working with Large or Complicated Ticket Requests

1. Call excavator to:

   A. Introduce yourself. Provide your name, company name, and the reason why you are calling. This is an opportunity to build a positive working relationship with excavator. **Seize** this opportunity and build a strong foundation for future USA requests.

   B. Discuss the proposed excavation to collect information that may help you to prioritize your work, determine the scope of work, and prevent over marking the area. Discussion topics may include:

      - When does excavator plan to start?

Publication Date: March 2014

- Where does excavator plan to start?
- How far to excavate each day? This information can help you to phase ticket later if needed.
- How deep does excavator plan to dig?
- Which side of the street does excavator plan to dig?
- Does the nature of work in the USA ticket contain all types of excavation planned for the project? For example, does excavator also plan to bore, but USA ticket indicates only trenching?
- Site visit. This is an opportunity meet excavator.

C. IF information excavator provided DOES NOT match USA ticket request,

   THEN inform excavator to call USA to update ticket.

D. Document all communications with excavator in ticket's **Notes** section (see Figure 2, "Example of Proper Notes") and include the following:

   - Name and phone number of person you contacted
   - Discussion details (specify date)
   - Agreed action plan to complete ticket

Figure 2. Example of Proper Notes

NOTE

Spoke with John Doe 8/20/13. He plans on starting excavation 8/22/13 at 8am. We agreed to phase ticket to stay ahead of the excavation efforts. Will locate/mark the south side of Main street to First street 8/21/13 and return 8/22/13 at 8am to locate the south side of Main street to Second street. Field meet is scheduled for 8/21/13.

John Doe 555-567-5309.

Publication Date: March 2014

10 Prioritizing Tickets

1. First priority is **emergency or damaged facility ticket**.

Emergency Ticket Icon

Damaged Facility

   A. An emergency status:

      - Is a situation that puts human life or property at risk (e.g. a downed power line, ruptured water line).
      - Has a zero hour notice that requires an immediate response.

   B. IF you have any ticket that is an **emergency or damaged facility ticket**,

      THEN do the following:

      1) IMMEDIATELY contact excavator to confirm emergency status.

         a. IF:

            − Excavator cannot be contacted AND the nature of work on ticket description **does not** constitute an emergency status,

            OR

            − Ticket is confirmed as non-emergency,

            THEN document actions and prioritize ticket according to due date and time.

      2) IMMEDIATELY visit site to respond if ticket status is confirmed as an emergency.

2. Second priority is for tickets by **due date and time**.

3. Third priority is for all remaining tickets including **short notice**. Short notice requests a response in less than 48 hours.

Short Notice Ticket Icon

   A. IF tickets are not due right away,

      THEN prioritize tickets based on routing convenience.

Publication Date: March 2014

11 Identifying the Need for Assistance

1. IF an excavation is in a known heavy traffic area or unsafe neighborhood,

   THEN discuss with supervisor to have another person assist.

2. IF assistance from a qualified electrical worker (QEW) is needed (to open enclosures above 600 volts),

   THEN notify your area electric department to request assistance.

12 Planning Your Route

1. Plan your route by:

   - Location
   - Priority
   - Multiple tickets
   - Job size

2. Touch the **map tab** from the Utilisphere™ screen to display all tickets in your folder on one map. See Figure 3, “Map Overview.”

   - Identify tickets (by green dots) in close proximity to your location.
   - Tap on a green dot to view ticket number.
   - Tap on ticket number to view ticket details.

3. Touch the **ticket tab** to return to ticket details screen.

Publication Date: March 2014

Figure 3. Map Overview

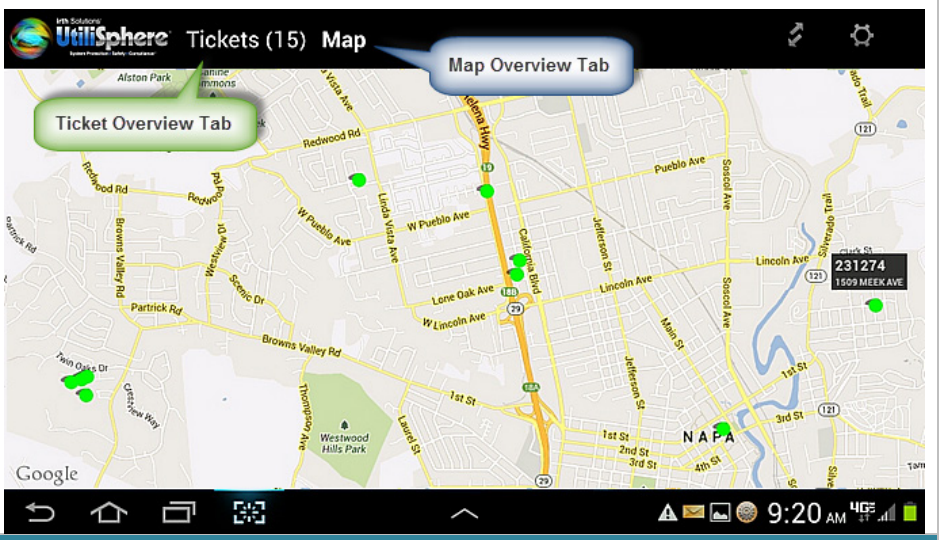


Figure 3 shows all tickets in your folder on the same map. Each ticket is a green dot.

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Electronic Tablet is a PG&E issued device for locate and mark personnel to use in the field to complete a USA ticket.

Publication Date: March 2014

USA Ticket is generated by USA 811 at the request of an excavator to notify member utilities of planned excavations near their assets for the purpose of locate and mark.

Supplemental References

TD-5811P-101-JA01, “Standard Vehicle Checklist”

TD-5811P-102-JA01, “Using Utilisphere™ on Tablet”

TD-5811P-105-JA01 “Choosing the Correct Utilisphere™ Response”

TD-5811P-205, “Verifying Instrument Calibration”

Publication Date: March 2014

Determining Scope of Locate

Procedure

Summary

This procedure provides step-by-step instructions for evaluating the scope of a USA ticket request and determining the required response.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.

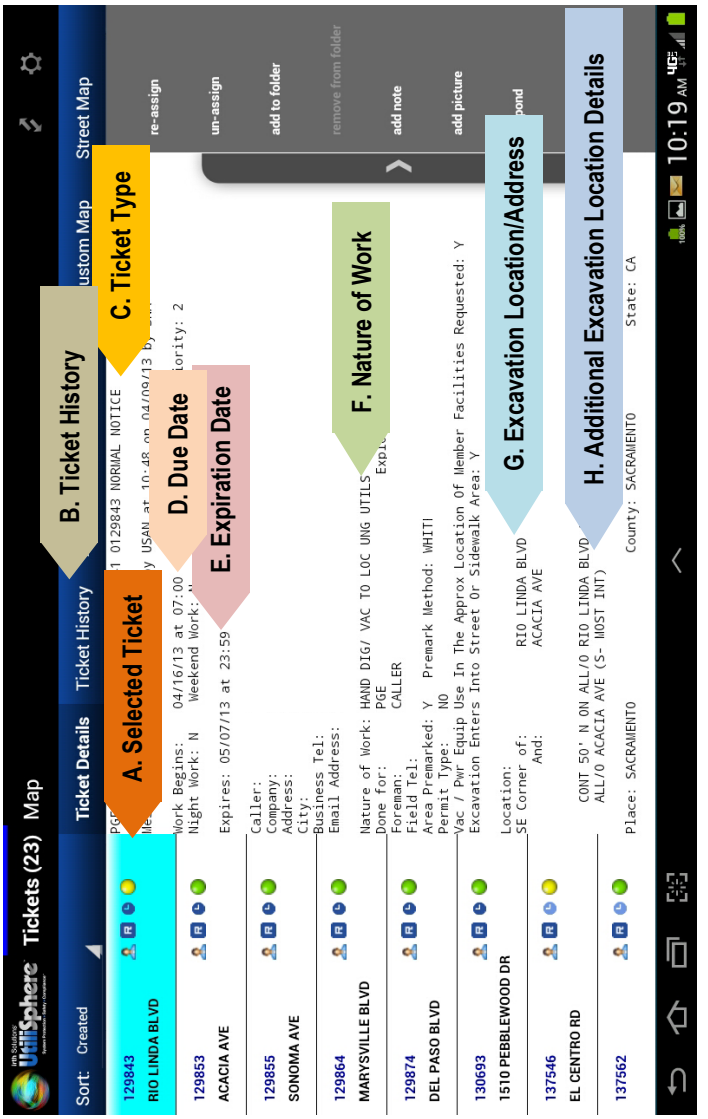
Table of Contents

Publication Date: March 2014

1 Understanding the Ticket Details Screen

The ticket details screen (Figure 1) contains the scope of the ticket request.

Figure 1. An Example of a USA Ticket Details Screen



Publication Date: March 2014

A. **Select a Ticket** to display its details.

B. **Ticket History** displays tickets history, past responses, and notes.

C. **Ticket Type** describes the urgency nature of the request:

- **Emergency Notice** is a zero-hour notice that requests an immediate response.
- **Short Notice** has a start date of less than 2 work days.
- **Normal Notice** has start date at least 2 work days.
- **Follow-Up Notice** is a valid ongoing ticket used to request or provide additional information.
- **Extension Notice** is a valid ongoing ticket used for extending excavation projects. A ticket can be extended up to 6 months.
- **Renewal Notice** is used when a USA ticket has lapsed over 6 months. A new ticket number is issued for renewal notice.

D. **Due Date** is the date/time the ticket is due. Tickets MUST be responded to within 2 workings days, excluding weekends and holidays OR by the start date of the excavation, whichever is greater.

E. **Expiration Date** is the date ticket stops being valid. Excavators must have a valid ticket to perform excavations. Excavator must contact USA to extend or renew an expired ticket.

F. **Nature of Work** explains the method of excavation (boring, vacuum, trenching, blasting, hand digging, etc.).

G. **Excavation Location/Address** identifies the cross streets or direct address of excavation area.

H. **Additional Excavation Location Details** provides additional information about the excavation area. These details help to determine the size of excavation area and should accurately match the delineations at the site.

2 Arriving at the Excavation Site

1. IF the contractor has begun excavation without following proper excavation procedures OR does not have a standby when required,

   THEN issue a **Record of Warning** to the excavator.

   For instructions, see Job Aid TD-5811-301-JA02 "Issuing a Record of Warning."

---

3 Reviewing USA Ticket Details

1. Open the **Utilisphere™ Application** on your electronic tablet.

   For instructions, see Job Aid TD-5811P-102-JA01, "Using Utilisphere™ on Tablet."

2. Select the ticket you are working on.

3. Look at information in ticket details screen. See Figure 1, "An Example of a USA Ticket Details Screen."

4. Review ticket **Expiration Date**.

   A. IF ticket has expired,

      THEN do the following:

      1) Have excavator contact USA to extend or renew ticket.

      2) DO NOT proceed to locate and mark until ticket has a valid date.

      3) Enter discussion details and description of situation into the **Notes** section of the USA ticket.

         For instructions, see TD-5811P-105, "Responding to a Ticket."

5. Review **Nature of Work** to determine excavation method.

Publication Date: March 2014

6. Review ticket **Due Date**.

   A. Determine if you're able to complete all required tasks detailed on ticket by the due date.

   B. IF you're unable to complete the entire ticket by the due date because of the excavation size,

      THEN do the following:

      1) Discuss options to phase ticket with excavator.

      2) Develop a plan to locate a different section each day to stay ahead of the excavation schedule. In most situations, the excavator does not plan to excavate a large job in 1 day.

      3) Enter the following information in the **Notes** section of the USA ticket:

         - Name and phone number of person with whom you agreed to phase ticket.
         - Discussion details
         - Phase plans
         - Other pertinent information

         For instructions, see TD-5811P-105, "Responding to a Ticket."

   C. IF you're unable to complete the entire ticket by the due date because of other relevant issues and you must renegotiate a new start time,

      THEN discuss with the excavator to set a new mutually agreeable start date and time to complete the ticket.

      1) Relevant issues include but are not limited to:

         - Qualified Electrical Worker (QEW) needed to complete locate.
         - Emergency ticket pulled you away to another site.
         - Access issues
         - Prioritization
         - Size of project
         - Weather

Publication Date: March 2014

2) IF a new start date and time was negotiated,

   THEN enter the following information in the USA ticket:

   - Name and phone number of person with whom you agreed to phase ticket.
   - Discussion details
   - New start date and time
   - Other pertinent information

3) IF excavator is unavailable or cannot renegotiate,

   THEN do the following:

   a. IMMEDIATELY notify your supervisor of the situation.

   b. Document details in USA ticket.

7. IF ticket details do not match delineations at the excavation site,

   THEN do the following:

   A. Have excavator contact USA at 811 to update tickets description.

   B. Proceed to work ONLY in delineated areas that match ticket request.

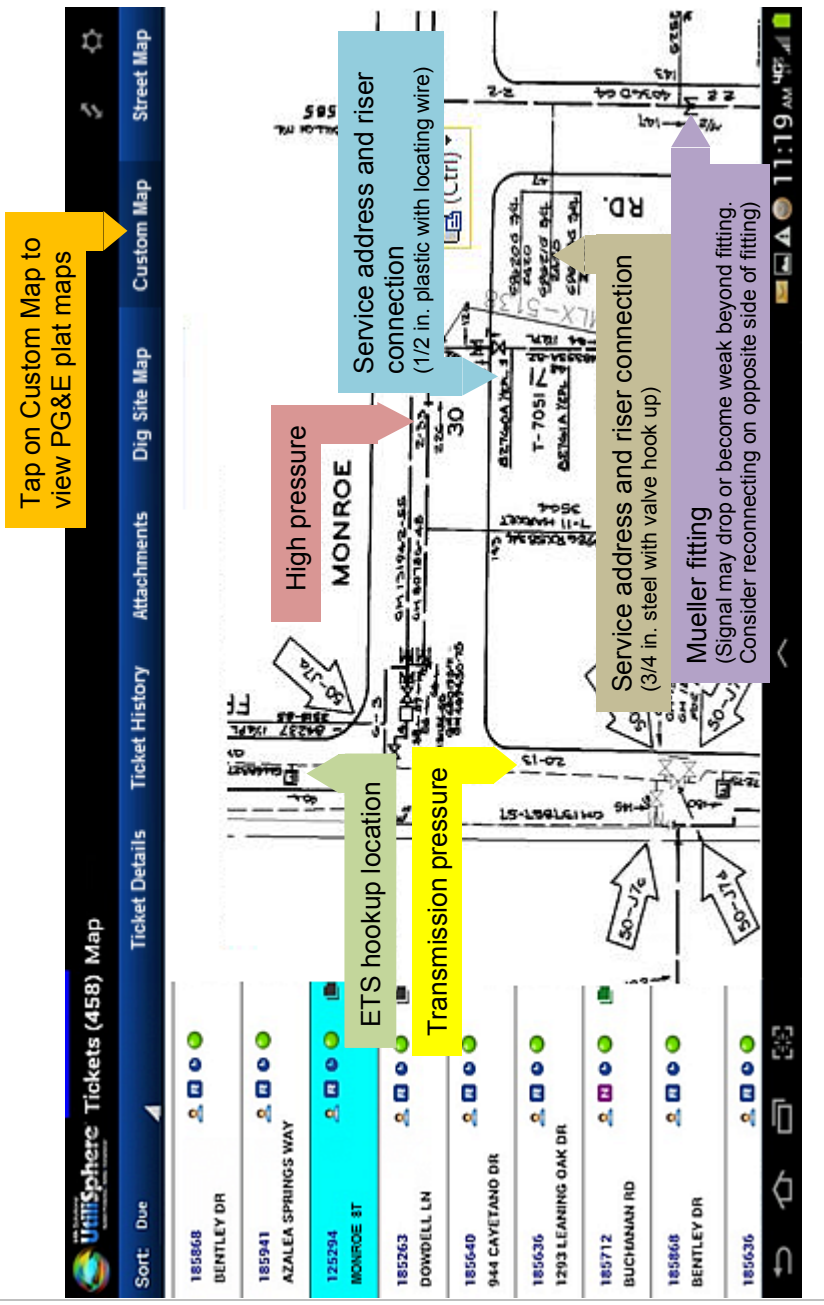
   C. Enter a description of situation into the **Notes** section of your USA ticket.

8. Review PG&E maps of the excavation site if ticket details match delineations.

4 Reviewing Custom Maps

1. Select **Custom Map** tab on your ticket. See Figure 2, "Example of a USA Ticket Custom Map Screen."

Figure 2. Example of a USA Ticket Custom Map Screen



Publication Date: March 2014

2. Identify the following:

   - Service count
   - Conductive hook-up locations
   - Type of facilities to be located (steel plastic, cast iron, copper, fiber, etc.)
   - Abandoned or deactivated facilities
   - Critical facilities
   - Available measurements
   - End of main or stub services
   - Electric conduit counts
   - Proposed facilities that may have already been tied into the system
   - Electric facilities where a QEW is required (above 600 volts)
   - Pad-mounted electric equipment
   - Streetlights
   - Subsurface primary electric enclosures
   - Subsurface secondary boxes
   - Electric primary and secondary risers.

3. Call Mapping if you have questions or concerns about information on maps.

4. IF critical facilities are identified in the excavation area,

   THEN make note of the facilities AND verify the location during the marking procedure.

   For instructions, see TD-5811P-104, "Proper Markings."

5. Identify best hook-up locations based on service types and facility material types. See Table 1, "Hook-up Location Based on Material Types."

Table 1. Hook-up Location Based on Material Types

PLASTIC	CONDUCTIVE METAL STEEL, COPPER, CAST IRON, ETC.	ELECTRIC	FIBER
Tracer wire at riser	Valve at service riser	Electric service riser with inductive clamp	Tracer wire at enclosure /box
Tracer wire at Electrolysis Testing Station (ETS)	Any metal riser where an inductive clamp can fit around	Electric riser at pole location with inductive clamp	
Valve at service riser	Tracer wire at Electrolysis Testing Station (ETS)	Pad-mounted transformer	
		Secondary enclosure/Meter panel	

6. Plan a locate strategy.

   A. If possible, do the following:

   - Hook-up at connection points located in the middle of work area to locate multiple directions from one connection.
   - Identify multiple connection points in case the locating instruments signal becomes weak or is lost.

5 Performing Visual Inspection

1. Implement the **Two-Minute** rule.

   For details, see the Safety section of this handbook.

2. Visually inspect excavation area to determine if area is properly delineated.

   A. Types of acceptable delineations are:

   - White paint
   - White flags
   - White whiskers

Publication Date: March 2014

- White stakes
- A combination of any of the above.

B. For home owners:

1) IF delineations are not found on a private property,

THEN assist homeowner in creating delineations. Flour is an acceptable means to mark delineations.

2) Locate and mark according to ticket.

C. For excavators:

1) IF area contains no delineations,

THEN do the following:

a. Require excavator to submit a new ticket when delineations have been established. Leaving a voicemail is an acceptable means of communication.

b. Take picture of the non-delineated area.

c. Document details in the **Notes** section of ticket.

d. Close ticket.

For instructions to close ticket, see Procedure TD-5811P-105, "Responding to a Ticket."

3. Visually inspect area for existing surface markings or indication of underground facilities (e.g., risers, patches in the street and meters, pipeline markers [see Figure 3, "Pipeline Marker"]).

Publication Date: March 2014

Figure 3. Pipeline Marker

4. Visually inspect area for possible interferences such as:
   - Overhead power lines
   - Underground facilities that may create bleedover.
   - Radio transmitters
   - Chain link fences
   - Any metallic structures within 25 feet of the area being located.
   - Other locators working in the same area.
5. IF work in a confined space is necessary,

   THEN **refer to Utility Standard D-S0213, "Work Procedures in Confined Spaces" located online in the TIL.**
6. IF working near interferences that may cause signal fluctuation,

   THEN include the following in the locate plan:
   - Look for multiple hook-up locations to complete ticket.
   - Try different frequencies, instruments, or locating methods.

Publication Date: March 2014

7. Verify the surrounding with maps. For example:

   - Landmarks
   - Overhead and underground equipment
   - Equipment numbers

8. Look for inconsistencies on maps. Map inconsistencies may include but are not limited to:

   - Extra services
   - Missing facilities
   - Missing tracer wire not labeled on map
   - Work in progress (WIP) cloud
   - Map measurements and locate do not match
   - Missing electrolysis testing station (ETS)
   - Incorrect address

6 Identifying a Request for Design Purposes

1. USA ticket process is not to be used for design purposes. Use the following information to determine if a ticket might be for design purposes:

   - An excavator is unsure of where to excavate until after PG&E locates and marks facilities.
   - An excavator requested to have an entire block located, but is lacking specific excavation locations or crossings.
   - Look for lack of specific direction in delineations.
   - The **Nature of Work** on ticket details doesn't match delineations at site.
   - Ask excavator for city or county permit number for excavating in the area. **No permit is a red flag!**
   - Excavation is not planned to start for more than 14 calendar days. Excavator cannot submit a USA ticket more than 14 calendar days in advance [CGC law 4216.1.(a)(1)].

Publication Date: March 2014

2. IF you determine that the ticket is for design purposes,

   THEN do the following:

   A. Provide excavator with PG&E Service Planning phone number to request PG&E maps for their project design plans.

   B. Explain that USA requests are not utilized for design purposes.

   C. IF further explanation is needed,

      THEN refer excavator to call USA at 811 for more details and law specifics.

   D. Close ticket.

      For instructions to close ticket, see Procedure TD-5811P-105, "Responding to a Ticket."

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

Electronic Tablet is PG&E issued device for locate and mark personnel to use in the field to complete a USA ticket.

Publication Date: March 2014

Supplemental References

D-S0213, “Work Procedures in Confined Spaces”

TD-5811P-104, “Proper Markings”

TD-5811P-105, “Responding to a Ticket”

Publication Date: March 2014

Identifying the Proper Location

Procedure

Summary

This procedure provides step-by-step instructions for identifying the methods and locations by which to hook up a locating instrument.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Complete the steps presented in Procedure TD-5811P-102, “Determining Scope of Locate.”

Table of Contents

Publication Date: March 2014

1 Identifying Abnormal Operating Condition (AOC)

1. An **AOC** is a condition that may indicate:
   - A malfunction of a component.
   - A deviation from normal operations that:
     - Causes a condition to exceed design limits.
     - Results in a hazard to people, property, or the environment.
2. Gas AOCs include but are not limited to the following examples:
   - Gas leak
   - Pipe corrosion (pitting, scaling, blistering, atmospheric corrosion)
   - Pipe wrap (missing or damaged)
   - Bent riser
   - Damaged facility
   - Another source inducing an electrical current onto Pacific Gas and Electric Company (PG&E) facilities
   - Overbuild (structure built over the top of a PG&E facility). See Figure 1, "Examples of Overbuilds."

Figure 1. Examples of Overbuilds

Example 1: Building was built on top of a PG&E gas facility.

Example 2: Gas meter is inside a building without proper ventilation.

Publication Date: March 2014

- PG&E facility comes in contact with other underground facilities

A. IF a discovered AOC has an **immediate hazard condition**,

THEN IMMEDIATELY contact:

- Gas dispatch for Gas Distribution at 888-353-3477 and your supervisor to report.
- Gas control for Gas Transmission at 800-811-4111 and your supervisor to report.

B. IF a discovered AOC presents **no immediate hazards**,

THEN submit a **Corrective Work Form**.

For instructions, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

CAUTION!

DO NOT enter a primary electric enclosure above 600 volts without a qualified electrical worker (QEW).

3. Electric AOCs include but are not limited to the following examples:

- Broken conduit
- Burn-out wire inside secondary box
- Missing streetlight cover
- Open electrical panel
- Broken/missing box lids
- Broken pole

A. IF a discovered AOC has an **immediate hazard condition**,

THEN IMMEDIATELY contact electric dispatch (at 866-411-4743) and your supervisor to report.

B. IF a discovered AOC presents **no immediate hazards**,

THEN submit an **electric corrective work form**.

Publication Date: March 2014

2 Performing a Non-Contact Voltage (NCV) Test

WARNING!

DEATH or SERIOUS BODILY INJURY may occur when performing physical work on a meter set that contains voltage.

1. Before you come in physical contact with any metallic facility, perform a non-contact voltage (NCV) test at facility.

   For instructions to perform an NCV test, see Procedure TD-5811P-201, "Conductive Locate."

3 Using a Proper Grounding Technique

1. Proper grounding is crucial to getting a strong locating signal:
   - Use an independent ground.
   - Adjust the ground if signal is weak.
   - In dry soil, use salt water to increase grounding effectiveness.
2. Place ground stake in the ground at approximately a 90° angle position from target conductor AND at a minimum depth of 9 in, but not to exceed 12 in.

   For additional information, see Procedure TD-5811P-201, "Conductive Locate."

4 Choosing an Instrument Hook-up Method

1. Use the locating methods in the following order:

   A. Conductive (direct connect) to locate.

   For instructions, see Procedure TD-5811P-201, "Conductive Locate."

Publication Date: March 2014

B. Inductive with coupler when direct connect is not available but access to a conductive riser or electric riser is available.

For instructions, see Procedure TD-5811P-202, "Inductive with Coupler Locate."

C. Inductive when direct connect and inductive with coupler are not possible, but you must first identify an estimated location of the facility. This location is where to place the transmitter to begin locating.

For instructions, see Procedure TD-5811P-203, "Inductive Locate."

D. Passive locate when conductive, inductive with coupler, and inductive are not available. You must first identify an estimated location of the facility.

For instructions, see Procedure TD-5811P-204, "Passive Locate."

2. Select a preferred hook-up method. The methods include, but are not limited to the following:

- Gas:
  - Conductive – Tracer wire (Figure 2)
  - Conductive – Valve (steel) (Figure 3)
  - Conductive – Electrolysis Testing Station (ETS) (Figure 4)
    - IF multiple wire exist at an ETS,

      THEN connect:

      - Black wires to the South and/or West.
      - White wires to North and/or East.
  - Conductive – ETS FINK (Figure 5)
  - Conductive – Rectifier (contact Corrosion Department for assistance)
  - Conductive – High Pressure Regulator (HPR) or Mueller HTS (Figure 6)

Publication Date: March 2014

Figure 2. Conductive (Tracer Wire)

Figure 2 shows a direct connection to a tracer wire at a service riser.

Figure 3. Conductive (Valve)

Figure 3 shows a direct connection to a valve at a service riser.

Publication Date: March 2014

Figure 4. Conductive (ETS)

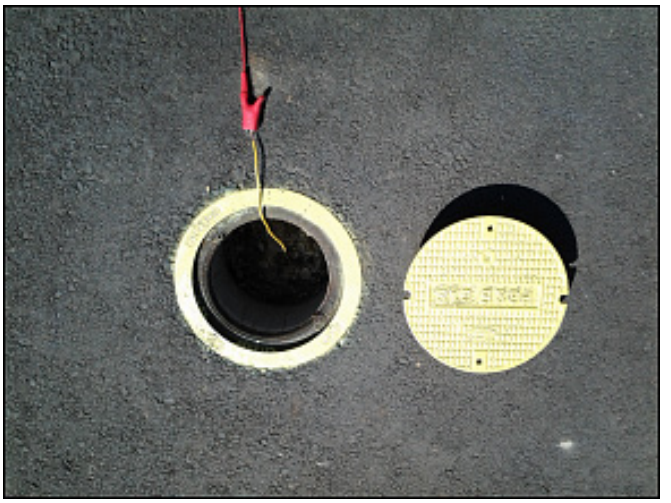


Figure 4 shows a direct connection to a tracer wire at an ETS location.

Figure 5. Conductive FINK (ETS)

Figure 5 shows a direct connection to a tracer wire at a FINK ETS location.

Publication Date: March 2014

Figure 6. Conductive (HPR)

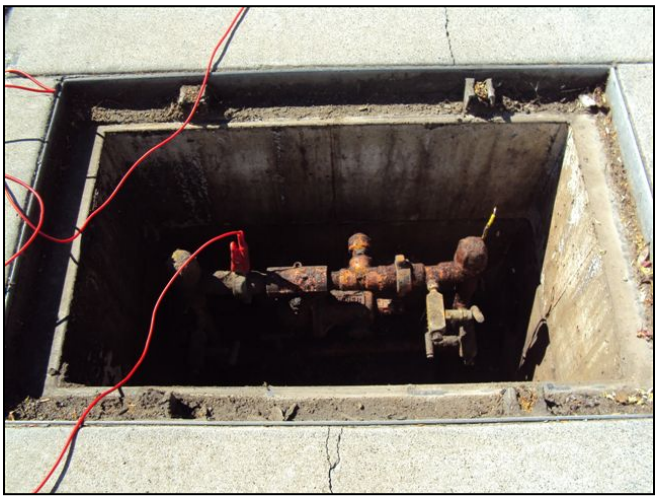


Figure 6 shows a direct connection to a High Pressure Regulator (HPR) for a Transmission locate.

- Electric:
  - Conductive – Electric panel (Figure 7)
  - Conductive – Electric Pad-mounted Transformer (Figure 8)
  - Conductive − Electric Meter (Figure 9)
  - Inductive Clamp – Conductive pipe (Figure 10)
  - Inductive Clamp – Electric service(Figure 11)
  - Inductive Clamp – Electric riser (Figure 12)

Figure 7. Conductive (Electric Panel)

Figure 7 shows a direct connection to a handle at an electrical panel. Connecting to the bolt at the handle is also an option.

Figure 8. Conductive (Pad-mounted Transformer)

Figure 8 Shows direct connection to door handle or bolt. Requires a QEW for entry.

Publication Date: March 2014

Figure 9. Conductive (Electric Service Meter)

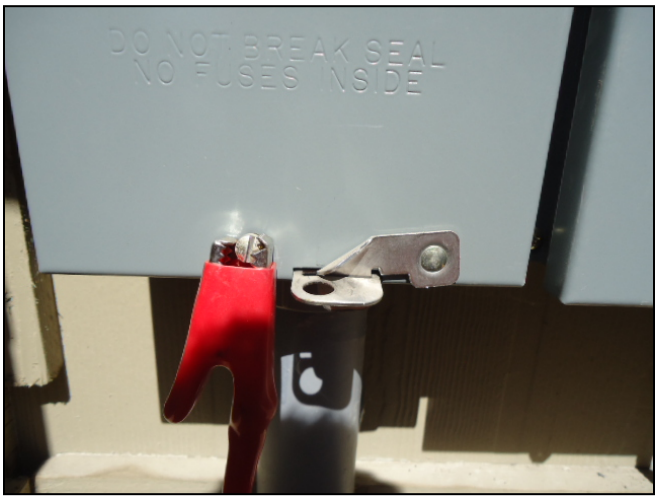


Figure 9 shows a direct connection to a bolt at an electric service meter.

Figure 10. Inductive Clamp (Conductive Pipe)

Figure 10 shows an inductive coupler connection at a steel riser.

Publication Date: March 2014

Figure 11. Inductive Clamp (Electric Service Riser)

Figure 11 shows an inductive coupler connection at an electric service riser.

Figure 12. Inductive Clamp (Electric Riser at Pole)

Figure 12 shows an inductive coupler connection at an electric riser.

Publication Date: March 2014

3. Select a preferred instrument placement method from the examples below. The examples include, but are not limited to the following:

   - Inductive – Over the top of facility (Figure 13)
   - Inductive – At electric riser (Figure 14)

Figure 13. Inductive (Over the Top of a Facility)

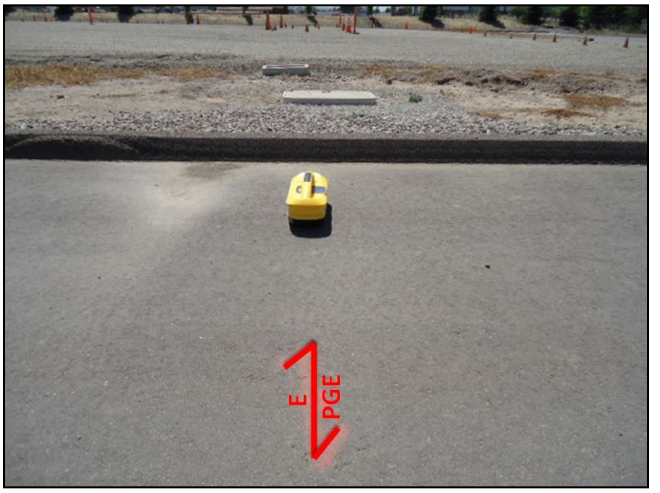


Figure 13 shows an inductive placement of a transmitter over the top of an underground facility.

Figure 14. Inductive (Electric Riser)

Figure 14 shows an inductive placement of a transmitter onto an electric riser.

Publication Date: March 2014

5 No Available Hook-Up Location

1. IF you're unable to identify an effective hook-up location at any section of the excavation area,

   THEN do the following:

   A. See **Job Aid TD-5811P-103-JA01, "Troubleshooting Difficult to Locate."**

   B. See **Procedure TD-5811P-104, "Proper Markings"** for instructions to properly mark facilities based on map measurements.

END OF PROCEDURE

Definitions

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Electronic Tablet is PG&E issued device for locate and mark personnel to use in the field to complete a USA ticket.

Electronic Marker System (EMS) is a set of markers placed underground to help identify facilities that would otherwise be difficult to locate.

Independent Ground is a metallic object in the ground that is **confirmed** to have no contact with any underground facility or structure that may cause interference.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Publication Date: March 2014

Supplemental References

TD-5811P-103-JA01, “Troubleshooting Difficult to Locate”

TD-5811P-104, “Proper Markings”

TD-5811P-105-JA03, “Corrective Work Form”

TD-5811P-201, “Conductive Locate”

TD-5811P-202, “Inductive with Coupler Locate”

TD-5811P-203, “Inductive Locate”

TD-5811P-204, “Passive Locate”

Publication Date: March 2014

Proper Markings

Procedure

Summary

This procedure provides step-by-step instructions for properly marking Pacific Gas and Electric Company (PG&E) facilities.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Complete the steps presented in Procedure TD-5811P-103, “Identifying the Proper Location.”

Table of Contents

Publication Date: March 2014

1 Selecting Marking Tool Based on Surface Type

1. Select the appropriate marking tool for surface ground. See Figure 1, "Use the Appropriate Marking Tool for the Job."

Figure 1. Use the Appropriate Marking Tool for the Job

Tool	Surface Type
Paints (long term use)	Asphalt DO NOT use paint on concrete
Chalks (short term use)	Concrete
Flags	Lawn or soil
Whiskers	Dirt or gravel
Stakes	Rural or brush
Wax Crayons	Concrete

2 Looking for Possible Mapping Errors

1. The most commonly found mapping errors include, but are not limited to:

   - Proposed facilities have been tied into system (work-in-progress (WIP) cloud)
   - Located facilities are found in wrong area of map
   - Abandoned or deactivated services still on map as live
   - Unmapped facilities
   - Facility information is not on the map
   - Facilities identified on map do not exist in the field
   - Wrong size or type of facility on map

Publication Date: March 2014

2. Call Mapping to confirm error.

   A. Complete a “Map Correction Form” if error was confirmed.

   For instructions, see Job Aid TD-5811P-105-JA02, “Submitting a Map Correction Form.”

3 What to Mark

1. Mark the following:

   - PGE (as facility owner)
   - Material type (“STL” for steel, “PL” for plastic, “CI” for cast iron)
   - Commodity (also indicate the transmission and line number, if applicable)
   - Size
   - Number of ducts
   - Directional changes
   - Taps/tees/laterals
   - Horizontal offsets
   - Stubs
   - Termination or end of mains.
   - Company’s newly installed unmapped facilities

4 Marking from Map Measurements

1. Use this method when facilities cannot be located using:

   A. Conductive locate

   B. Inductive with coupler locate

   C. Inductive locate

2. Contact Mapping:

   - To obtain additional information from records when locating a **service** using map measurements. Offsets less than 150 ft in length may exist but are not shown on plat maps.

Publication Date: March 2014

- When measurements do not exist on the maps.
- When additional clarification is needed.

3. Mark facility using map measurements.
4. Contact excavator to:

   A. Inform that you were not able to locate the entire work area with an instrument

   B. Describe which locations were completed using map measurements

5. Enter detailed description of conversation with excavator in the **Notes** section of the USA ticket.

5 Marking New Facilities

NOTE

The requirement below applies to PG&E personnel and contractors performing work for PG&E.

A. During a new PG&E facility installation process in areas of ongoing construction or potential excavation activities, place marks over the approximate center of a newly installed underground facility. This ensures that all excavators working in the area can identify the PG&E newly installed facility.

Publication Date: March 2014

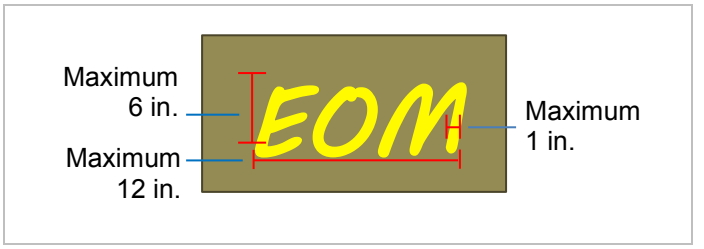
6 Marking in Response to a USA Ticket

NOTE

Maintain awareness of existing abnormal operating conditions (AOC) while performing marking procedures in the field.

1. Clarify any mapping discrepancies.
2. Mark as follows:
   - For facility size and composition, create markings not to exceed 6 in. in height and 1 in. thick.
   - Mark each line no longer than 12 in. in length. See Figure 2, “Marking Size.”

Figure 2. Marking Size



   - Space line-markings 5−50 ft apart depending on the length of facility being located, the terrain of the land, and the type of excavation.
   - Use offset if facilities are in soil or if markings might be removed by excavation process.
   - Identify PG&E as the facility owner.
   - Be respectful of private property by marking the least amount necessary to identify facilities.
   - Extend markings 24 in. outside of delineated area. See Figure 3, “Proper Distance Markings of Facilities Continuing Past Delineations.”

Publication Date: March 2014

Figure 3. Proper Distance Markings of Facilities Continuing Past Delineations

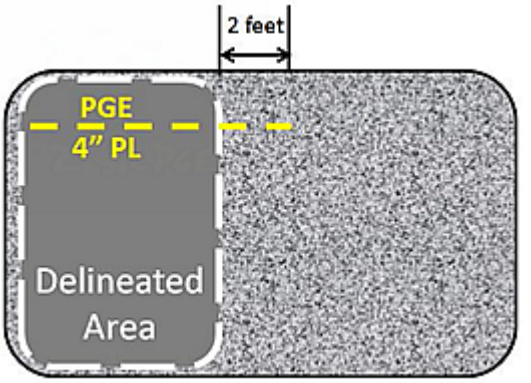


Figure 3 shows an example of markings for 4 in. plastic distribution gas main within work area extending a proper distance of 2 ft.

- For facilities outside delineated area, use the **2, 5, 10** rule below:
  - IF a **distribution facility** is outside of the delineated area,

    THEN mark within **2 ft** of the outside edge of delineations.
  - IF a **critical high-priority distribution facility** is outside of the delineated area,

    THEN mark within **5 ft** of the outside edge of delineations.
  - IF a **transmission facility** is outside of the delineated,

    THEN mark within **10 ft** of the outside edge of delineations. See Figure 4, "Proper Distance Markings of Facilities Outside Delineations."

Figure 4. Proper Distance Markings of Facilities Located Outside the Delineations

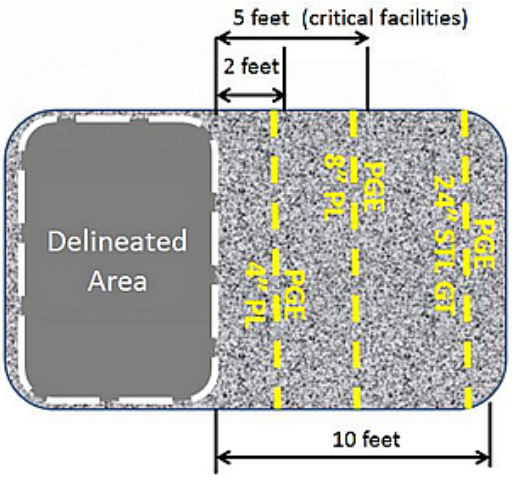


Figure 4 shows examples of marking for:

- 4 in. plastic gas main distribution pressure less than 2 ft outside of delineated area.
- 8 in. plastic gas main distribution pressure (critical facility) less than 5 ft outside of delineated area.
- 24 in. steel gas main transmission pressure less than 10 ft outside of delineated area.

Publication Date: March 2014

- Determine if a site visit, field meet, or standby is required.

  For instructions, see Job Aid TD-5811P-105-JA04, "Identifying the Need for Site Visit, Field Meet, and Standby."

- IF delineated work area contains no conflict with PG&E facilities,

  THEN do the following:

  1) Use the proper color for each facility identified. See Table 1, "Underground Facility Color Code Identifiers."

Table 1. Underground Facility Color Code Identifiers

COLORS	USE FOR
Red	Electric
Yellow	Gas
Orange	Fiber
White	USA delineation area (proposed excavation area)

  2) Mark "NO PGE" within the delineated work area.

     a. IF transmission and distribution both exist in the area,

        THEN specify which facility has been cleared. For example:

        - "NO PGE GT"
        - "NO PGE ET"
        - "NO PGE GD"
        - "NO PGE ED"

- Use the correct abbreviation for facilities as presented in Table 2, "Facility Marking Abbreviations."

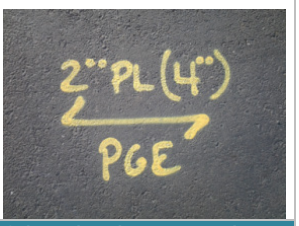
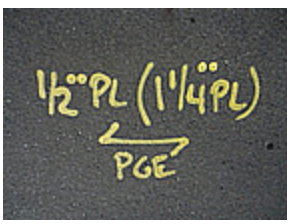
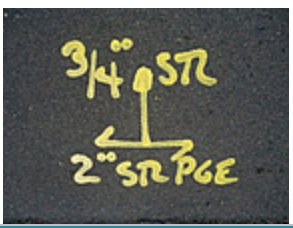
Publication Date: March 2014

Table 2. Facility Marking Abbreviations

SYMBOLS	DESCRIPTIONS	PAINT MARKINGS
CI	Cast iron	Same as symbols
CU	Copper	
DB	Direct buried	
DE	Dead end or termination point	
ED	Electric distribution	
ET	Electric transmission	
FO	PG&E fiber optic telecommunications	
GD	Gas distribution	
GT	Gas transmission	
PGE	PG&E facility	
PL	Plastic	
PLC	Plastic coated wrap	STL
STL	Steel	Same as symbols
WI	Wrought iron	

Publication Date: March 2014

7 Marking Examples and Descriptions

		
4 in. plastic main.	Gas end of main.	Electric 3−4 in. ducts.
		
8 in. steel gas transmission main.	2 in. steel gas main 6 ft back of walk offset.	Electric distribution primary or secondary.
		
1/2 in. plastic gas service.	Joint trench with 4 in. plastic gas main and electric distribution primary line.	2 in. plastic gas main inserted into a 4in. steel casing.
		
1/2 in. plastic gas service inserted into 1-1/4 in. plastic casing.	No PG&E facilities for both gas and electric.	Tee directional change. 3/4 in. steel service tee off of a 2 in. steel main.

Publication Date: March 2014

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Supplemental References

TD-5811P-103, “Identifying the Proper Location”

TD-5811P-JA04, “Identifying the Need for Site Visit, Field Meet, and Standby”

Publication Date: March 2014

Responding to a Ticket

Procedure

Summary

This procedure provides step-by-step instructions for responding to and closing a USA ticket request.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Complete the steps presented in Procedure TD-5811P-104, “Proper Markings.”

Table of Contents

Publication Date: March 2014

1 Taking Pictures of Work Area

Figure 1. Examples of Good Work Area Photos

Example 1 includes the following:

- Reference points: fence, utility pole, tree, bushes
- Entire delineation
- Facilities owner
- 2 in. plastic.
- Gas main painted using appropriate color
- Marking starts 2 ft outside of premarked work area

Example 2 includes the following:

- Reference points include permanent water structures, parking sign, tree, and building.
- Facilities owner
- 2 in. plastic gas main 5 ft back from edge of asphalt.
- Flags were used for lawn area and paint for asphalt.

Publication Date: March 2014

1. Take pictures of work area when it contains no delineations AND no locate and mark was performed.
2. When taking pictures of your markings, be sure to include:
   - Reference points such as street signs, address, permanent landscaping, etc.
   - Beginning and end of delineated work area
   - **ALL** markings, flags, whiskers, paint, and offsets
   - Close up photos to include necessary details
   - Distance photos to include scope of excavation
3. Attach all picture(s) to the USA ticket.
4. See Figure 1, “Examples of Good Work Area Photos.”

2 Entering Information into Ticket Respond Screen

1. Select an appropriate task for the **Response** field. This is the work completed in response to this USA ticket. See Figure 2, “USA Ticket Respond Screen.”
2. Select your name in the **Locator** field.
3. Visually ensure that the **Locate Time** field is accurate. Information in this field auto generates when you select a response for the ticket. This time stamp also marks the ticket’s complete time.
4. Select **Yes** or **No** in the **Complete Job** field.
   - **Yes** means ticket is completely located and marked.
   - **No** means job is ongoing and there is more work to be completed (e.g. phased or new start time tickets).
5. IF a new start time is required,

   THEN change the Response field to **Notification of New Start Time** to activate the **New Start Time** field.

   A. Enter a new start time. A new start time is established by negotiating with the excavator. Include:
      - Name of person with whom the new start time was negotiated.

Publication Date: March 2014

- Method of contact used to negotiate.
- Contact phone number of the person with whom the new start time was negotiated.

Figure 2. USA Ticket Respond Screen

6. Enter PM number into the **PM #** field if work is for Pacific Gas and Electric Company (PG&E).

7. Enter the time you arrived at the job location into the **Time Arrived** field.

Publication Date: March 2014

8. Enter estimate length of **gas footage** and **electric footage** (in ft).
9. Select **Yes** or **No** for the **Critical Facility** and **Standby** fields.
   - **Yes** for critical facility means a field meet is required.
   - **Yes** for standby means both field meet AND standby are required.
10. Select a **Standard Comment**. These are comments generated for the response selected in Step 1.
11. Enter **Notes** detailing work performed, all conversations with excavators, and information directly related to locate at job site.

EXAMPLE OF NOTES FOR PHASING A TICKET
Marked gas main; marked gas service; marked electrical secondary; from address 100 North Street to 600 North Street. Had field meet with John Doe 555-123-4567 at excavation site, agreed to phase ticket. Staying ahead of crew.

EXAMPLE OF NOTES FOR STANDBY
Marked gas main; marked gas service; marked branch service. Standby required. Spoke with John Doe at excavation site and notified him of the standby requirements. John Doe 555-123-4567.

EXAMPLE OF NOTES FOR RENEGOTIATING A START TIME
Renegotiated new start time with excavator John Doe 555-123-4567. Need access to address 100 North St. to complete locate. Locked gate.

12. Attach pictures of work area using the **Attachment** field.
13. Select **Yes** or **No** for the **Area Premarked** field.
    - **Yes** means area was delineated properly. Proceed with locate.
    - **No** means no delineations found. Do the following:
      1) DO NOT perform locate.
      2) Notify excavator to submit another ticket when delineations are present.

Publication Date: March 2014

3) Change the **Response field** to **No Delineation**.

4) Select **Yes** for **Complete Job field**.

5) Save ticket.

14. Select **Yes** or **No** for **Un-Locatable**.

    - **Yes** means you have exhausted all locating methods and troubleshooting options up to requiring a PG&E crew to expose facility.
    - **No** is the default option. It indicates that you were able to locate facility.

15. Select **Yes** or **No** for **Heavy Equipment**.

    - **Yes** means heavy equipment is used directly over PG&E underground facility.
    - **No** means no heavy equipment is used directly over PG&E underground facility.

16. Select all facilities located in work area in the **Facility Types** field.

17. Select a surface type from the **Surface** field. When working on multiple surfaces, select the surface option where the majority of the work is being performed.

18. Select **Conductive** or **Inductive** from the **Method Used** field.

    - Conductive means directly connect to facility to be located.
    - Inductive means inducing signal onto facility to be located.

19. Enter information or notes into the **Add'l Message to Excavator** field. This is a form of communication to the excavator regarding details of the ticket.

20. Select **Save** to save all updated information.

21. Select **Sync** to send information to Utilisphere™ database. Sync sends response information to the excavator and updates new tickets into database ticket folder.

Publication Date: March 2014

3 Contacting Excavator

1. Contact the excavator to discuss if you encounter any of the following:
   - Access or safety issues at work area.
   - Field meet or standby is needed.
   - Difficult to locate service or main.
   - When hand digging is required.
   - When measurements from maps are used to locate and mark facilities.
2. **NEVER** communicate depth of facility with excavator.
3. Document all communications with excavator in the USA ticket.

4 Performing End-of-Job Walkthrough

CAUTION!

NEVER leave a job incomplete without communicating with excavator. This could lead excavator to assume that locating and marking are completed and begin excavation.

1. Before leaving work area:
   A. Look at map to verify that previous facility count of gas and electric facilities was marked.
   B. Ensure that any inaccurate marks are covered in black paint.

Publication Date: March 2014

C. Make sure no hazards are left behind:

- Close all open facilities (boxes, etc.).
- Close gates
- Secure PG&E locks.

5 Documenting Abnormal Operating Condition (AOC)

1. IF you discovered an AOC while responding to a USA ticket request,

   THEN submit a **Corrective Work Form**.

   For instructions to submit the form, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

6 Correcting Mapping Errors

1. Contact Mapping to discuss all mapping discrepancies.
2. Complete a **Map Correction Form**.

   For instruction to submit the form, see Job Aid TD-5811P-105-JA02, "Submitting a Map Correction Form."

7 Completing a Corrective Work Form

1. Complete a **Corrective Work Form** to address situations such as but not limited to the following:

   - Address AOC's.
   - Request an electrolysis testing station (ETS) to be installed.
   - Request main or service to be lowered due to shallow depth (less than 12 in. deep).
   - Repair decals on markers.

   For instruction to submit the form, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

Publication Date: March 2014

8 Issuing a Record of Warning to the Excavator

1. When you observe unsafe work practices being performed by a third party working around or near overhead and/or underground gas, electric, or fiber facilities, issue a **Record of Warning** to the excavator. See **Job Aid TD-5811P-301-JA01, "Handling Excavators Working Unsafely" and Job Aid TD-5811P-301-JA02, "Issuing a Record of Warning."**

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Supplemental References

TD-5811P-104, "Proper Marking"

TD-5811P-105-JA02, "Submitting a Map Correction Form"

TD-5811P-105-JA03, "Corrective Work Form"

TD-5811P-301-JA02, "Issuing a Record of Warning"

Publication Date: March 2014

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Conductive Locate

Procedure

Summary

This procedure provides step-by-step instructions to conductively locate Pacific Gas and Electric Company (PG&E) underground facilities.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.

Table of Contents

Publication Date: March 2014

1 Understanding Conductive Locate

In the conductive method (direct connection), you are transferring the transmitter's signal directly onto the target conductor. One lead wire connects your instrument to the target conductor; the other wire connects to the ground stake. This method of hooking up has the highest probability of an accurate locate and the lowest probability of known locating issues (such as bleedover, signal interference, signal induction onto another facility, etc.).

2 Inspecting Leads

1. Inspect conductive leads to ensure that they:
   - Are in good working order (cables are unbroken, clamps are not bent, etc.).
   - Have good wire clamp connections.
2. IF lead clamps are loose, defective, OR do not have rubber sleeves,

   THEN replace leads.

3 Performing a Non-Contact Voltage Test

WARNING!

SERIOUS BODILY INJURY may result from physical contact with metallic facilities that carry an electric current.

1. Perform a non-contact voltage (NCV) test to **prevent possible personal injury** or damage to locating instrument.
2. Use an NCV tester when connecting to any metallic object.
3. See Figure 1, "Non-Contact Voltage Tester."

Publication Date: March 2014

Figure 1. Non-Contact Voltage Tester

4. Do the following:

   A. Turn the NCV tester **ON**.

   B. Guide the tip of the NCV tester to touch the houseline stub or gas meter assembly.

   C. IF the NCV emits a beeping tone or a flashing red light,

      THEN:

      1) DO NOT proceed with your work because this indicates that 40 volts or above are present. See Figure 2, “Above 40 Volts.”

      2) Contact gas dispatch to inform them of the abnormal operating condition (AOC).

      3) Notify customer of the condition.

      4) Wait at the service address for electric utility personnel.

   D. IF the NCV has a green light with NO beeping tone,

      THEN proceed with your work. See Figure 3, “Less than 40 Volts.”

   E. Turn the NCV tester **OFF**.

Figure 2. Above 40 Volts

Figure 3. Less Than 40 Volts

Publication Date: March 2014

4 Hooking Up Equipment

1. Proper grounding is crucial to getting a strong locating signal:
   - Use an independent ground.
   - Adjust the ground if signal is weak.
   - In dry soil, use salt water to increase grounding effectiveness.
2. Place ground stake as follows:
   A. Location:
      - Choose an isolated ground stake location.
      - Place ground stake at approximately 90° angle to the facility being located. See Figure 4, “Proper Grounding.”

Figure 4. Proper Grounding

      - IF surface does not allow placement of a new independent ground,

        THEN use a magnet to attach the lead to a metal post such as a street sign.

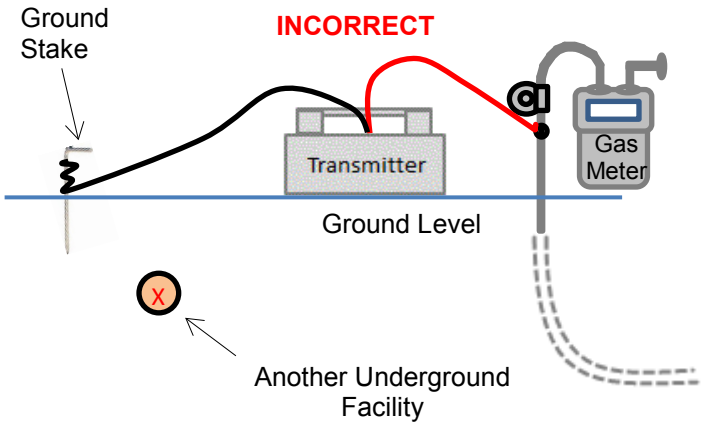
Publication Date: March 2014

B. Depth:

- Place the independent ground stake at a maximum of 12 in. deep.

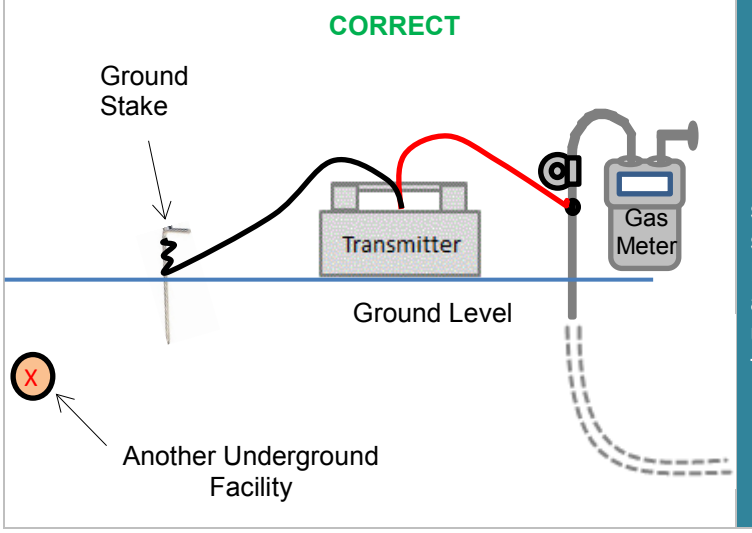
C. Place ground stake as far away from target conductor as possible while ensuring that leads **DO NOT** cross over another facility. Cross-over is when another underground facility exists between target conductor and ground stake. Cross-over may cause the wrong facility to be located. See Figure 5, "Cross-over."

Figure 5. Cross-over



Example 1 shows another underground facility located between the ground stake and gas meter.

This can lead to a false reading, resulting in locating an incorrect facility.



Example 2 shows a ground stake that DOES NOT cross over another underground facility.

Publication Date: March 2014

D. Place ground stake in the ground at approximately a 90° angle position from target conductor AND at a minimum depth of 9 in., but not to exceed 12 in. See Figure 6, “Ground Stake Placement and Conductive Lead Placement.”

Figure 6. Ground Stake Placement and Conductive Lead Placements

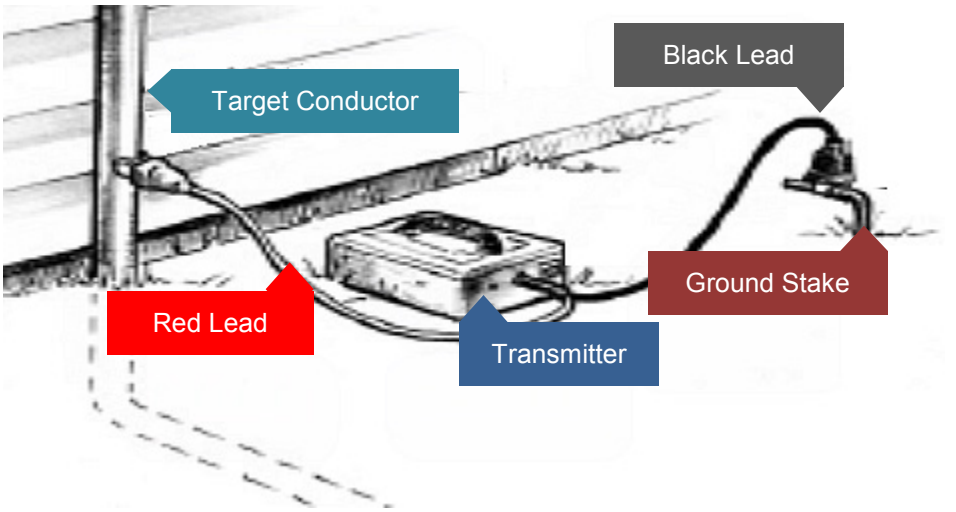


Figure 6 shows ground stake is placed at approximately a 90° angle from the conductor, and transmitter is between ground stake and target conductor.

3. Determine a point of contact on the conductor. This is where you plan on connecting red lead to conductor.

   For instructions on selecting the appropriate point of contact, see TD-5811P-103, “Identifying the Proper Location.”

4. Clean any rust, paint, or other insulating substances from the conductor point of contact.

WARNING!

ELECTRIC SHOCK may occur when disconnecting leads from or connecting leads to an energized instrument.

Publication Date: March 2014

5. Connect conductive leads as follows:

   A. Connect black lead to ground stake.

   B. Connect red lead to target conductor.

   C. Plug connection lead into transmitter.

6. IF target conductor is not accessible for direct connection,

   THEN see **Procedure TD- 5811P-103, "Identifying the Proper Location."**

---

5 Performing Conductive Locate (Direct Connection)

1. Turn transmitter **ON**.

   For instrument operating instructions, see the instrument-specific procedures in this handbook.

   A. IF you need to disconnect leads from transmitter,

      THEN turn transmitter **OFF BEFORE** disconnecting leads.

2. Turn receiver **ON**.

3. Select the best frequency on transmitter and receiver:

   A. Choose from various low and high frequency selections for conductor material.

   B. Select the best frequency for target conductor.

      For more information on frequency, see Job Aid TD-5811P-103-JA02, "Choosing Best Frequency."

4. Walk 8 to 10 ft away from transmitter.

5. Use the receiver to walk in a 360º path (if possible) around target conductor to detect the highest reading on the receiver. This reading identifies target conductor.

6. At the location where you identify the highest reading, walk away from the transmitter along the suspected path of target conductor WHILE doing the following:

   A. Sweeping the receiver left and right.

Publication Date: March 2014

B. Using receiver signal tones to trace the underground facility.

C. Looking for visual display confirmation on receiver when approaching conductor location.

7. IF you can match **all** of the following:

   - Receiver peak signal strength
   - Receiver visual indicator
   - Receiver audio indicator

   THEN target conductor is located.

8. Mark the facility at the location where the strongest signal is found.

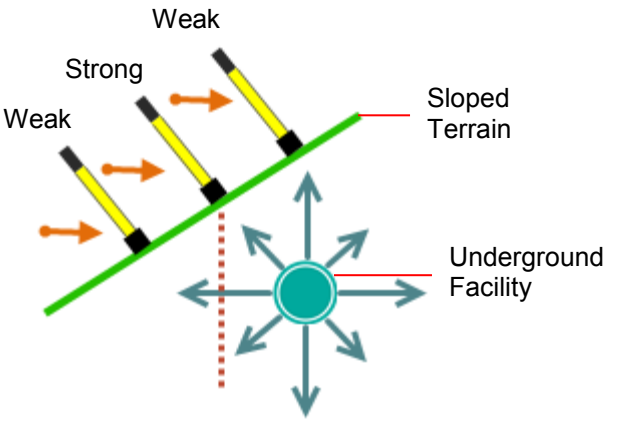
   For instructions to mark properly, see TD-5811P-104, "Proper Markings."

9. IF the ground is sloped,

   THEN position receiver vertical and level. See Figure 7, "Receiver Position on Sloped Terrain."

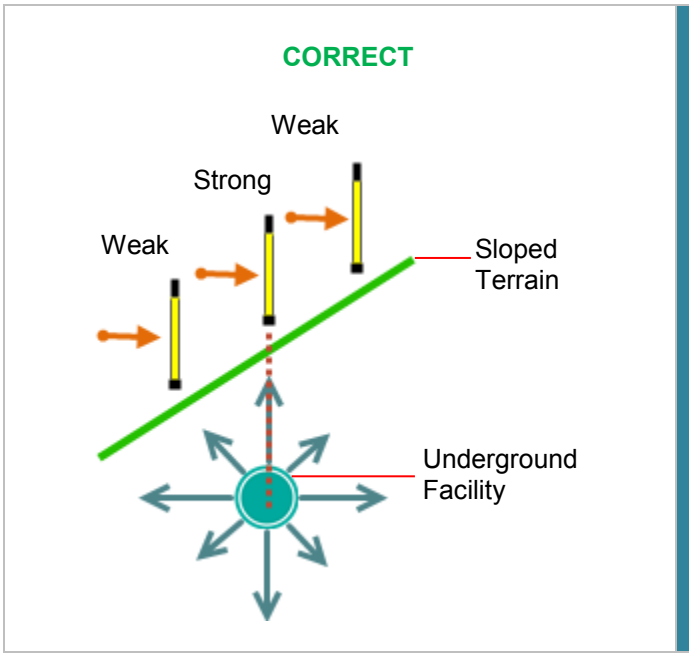
Figure 7 Receiver Position on Sloped Terrain

INCORRECT



Example 1 shows the strongest signal is obtained left of the center of the facility.

Publication Date: March 2014



Example 2 shows the signal is obtained at the center of the facility.

10. Identify directional changes as follows:

    A. Track facility until signal is lost.

    B. Walk the receiver in a 360º circle around the location where signal is lost. See Figure 8, “Investigative Sweep.”

    C. Identify where signal comes back.

    D. Continue locating.

Publication Date: March 2014

Figure 8. Investigative Sweep

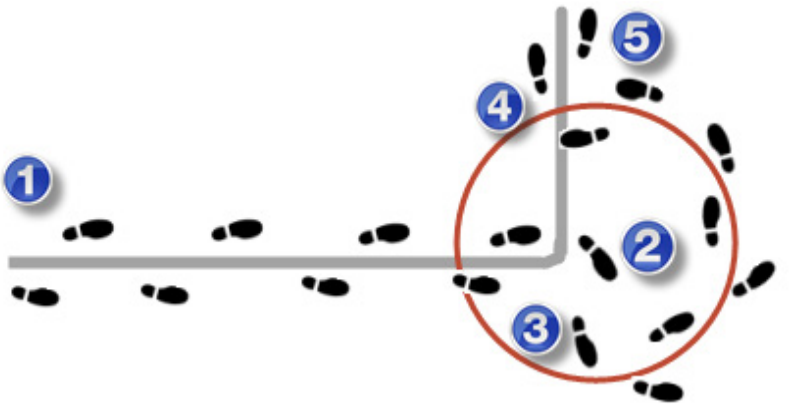


Figure 8 shows how to identify directional changes:

1. Locator follows signal to track facility.
2. Signal is lost.
3. Locator walks in 360° circle around the location where signal is lost.
4. Signal comes back. This identifies direction change.
5. Locator continues locating.

END OF PROCEDURE

Definitions

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Instrument Frequency is the rate at which a transmitter sends signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Publication Date: March 2014

Supplemental References

TD-5811P-103, “Identifying the Proper Location”

TD-5811P-103-JA02, “Choosing Best Frequency”

TD-5811P-103-JA01, “Troubleshooting Difficult-to-Locate”

TD-5811P-104, “Proper Markings”

Publication Date: March 2014

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Inductive with Coupler Locate

Procedure

Summary

This procedure provides step-by-step instructions for using inductive with coupler (clamp) method to locate Pacific Gas and Electric Company (PG&E) underground facilities.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Attempt to locate using a direct connection (conductive method).

Table of Contents

Publication Date: March 2014

1 Understanding Inductive with Coupler Locate

In the inductive with coupler (clamp) locating method, the transmitter induces a signal through the clamp onto the target conductor without direct connection.

2 Inspecting Lead

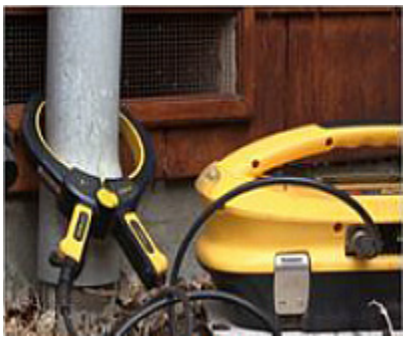
1. Inspect lead and clamp to ensure that:
   - Lead contains NO frayed wires.
   - Clamp closes properly.
   - Clamp connection is NOT loose.
2. Replace lead if you identify any signs of damage.

3 Setting up Equipment

1. Look around the work area to identify existing facilities that are suitable for equipment hook-up. Inductive clamp must fit around a facility. See Figure 1, “Examples of Hook-up Location (Electric Riser).”

   For instructions to select a proper hook-up location, see Procedure TD-5811P-103, “Identifying the Proper Location.”

Figure 1. Examples of Hook-up Location (Electric Riser)



Publication Date: March 2014

2. Review available maps or drawings for specific information about the hook-up facilities.

CAUTION!

DO NOT enter a primary electric enclosure above 600 volts without a qualified electrical worker (QEW).

3. Wear the following additional personal protective equipment (PPE) if the selected clamp connection location is an electric facility:

   - Flame resistant (FR) clothing
   - PG&E approved safety glasses
   - Rubber gloves with approved leather protector (Class 00–Type II)

4. Ensure transmitter is **OFF**.

5. IF facility selected for clamp connection is:

   - An electric facility that requires enclosure access (above 600V−primary [see Figure 2, “Primary and Secondary Enclosures”]),

   OR

   - An enclosure that has a **YELLOW** tag attached to wires (yellow tag indicates that the wires are above 600V [primary voltage]; red tag indicates wires are 600V or less [secondary voltage]),

     THEN do the following:

     1) Request a qualified electrical worker (QEW).

     2) Perform locate with QEW assistance.

Publication Date: March 2014

Figure 2. Primary and Secondary Enclosures

Primary Enclosure (QEW required for entry)

Secondary Enclosure

Subsurface Transformer Enclosure (QEW required for entry)

Primary Enclosure (QEW required for entry)

Top: Subsurface Secondary Enclosure (No QEW required for entry)

Bottom: Subsurface Primary Enclosure (QEW required for entry)

6. IF facility selected for clamp connection is a secondary electric enclosure (600V or less),

   THEN continue to locate. See Figure 3, “Connecting to Secondary Enclosure (Red Tag).”

Figure 3. Connecting to Secondary Enclosure (Red Tag)

7. IF facility selected for clamp connection is a PG&E owned streetlight,

   THEN:

   - Access the secondary box next to the streetlight to reach target conductor. This is the preferred method.
   - IF the preferred method is not an option,

     THEN do the following:

     1) Open the lid of the streetlight.

     2) Pull out the desired conduit to connect clamp.

8. If facility selected for clamp connection is an electric primary at a riser that is in a conduit, then continue to locate.

9. Place transmitter on the ground away from metallic surfaces.

Publication Date: March 2014

10. Place clamp around target facility.

WARNING!

ELECTRIC SHOCK may result from connecting leads to or disconnecting leads from an energized instrument.

11. Connect lead to transmitter.

4 Performing Inductive with Coupler Locate

1. Turn transmitter **ON**.

   A. IF you need to disconnect lead from transmitter,

      THEN turn transmitter **OFF BEFORE** disconnecting lead.

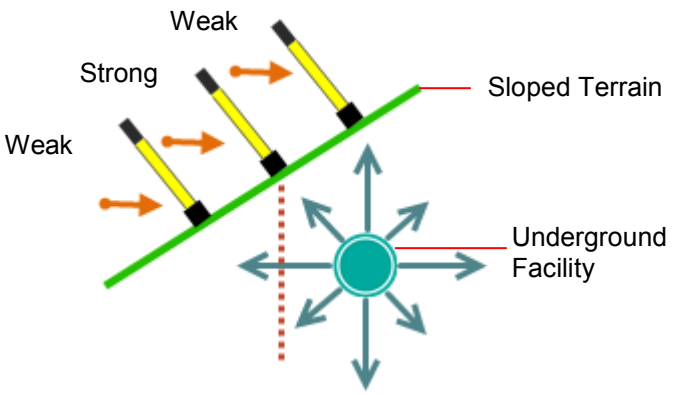
2. Turn receiver **ON**.
3. Set receiver frequency to match transmitter frequency.
4. Take the receiver AND walk 8 to 10 ft. away from transmitter.
5. Walk in a 360º path around target conductor (if possible) to detect the highest reading on the receiver. This reading identifies the target conductor.
6. Sweep receiver to the left and right to find the strongest signal.
7. IF the ground is sloped,

   THEN position receiver vertical and level. See Figure 4, “Receiver Position on Sloped Terrain.”

Publication Date: March 2014

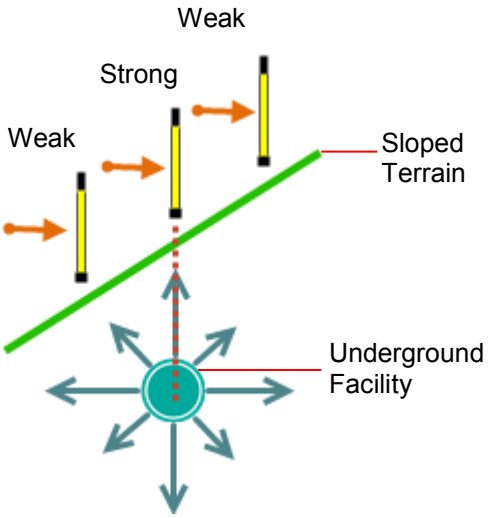
Figure 4. Receiver Position on Sloped Terrain

INCORRECT



Example 1 shows the strongest signal is obtained left of the center of the facility.

CORRECT



Example 2 shows the signal is obtained at the center of the facility.

8. Pinpoint the path of the facility as follows:

   A. Confirm the locations that have:

      1) The strongest signal.

      2) A balanced signal. This signal increases and decreases by the same degree when receiver sweeps by the same distance to the right and left passing the suspected facility.

   B. This location is where to mark the facility.

Publication Date: March 2014

For instructions on marking, see Procedure TD-5811P-104, "Proper Markings."

9. Identify directional changes as follows:

   A. Track facility until signal is lost.

   B. Walk the receiver in a 360º circle around the location where signal is lost. See Figure 5, "Investigative Sweep."

   C. Identify where signal comes back.

   D. Continue locating.

Figure 5. Investigative Sweep

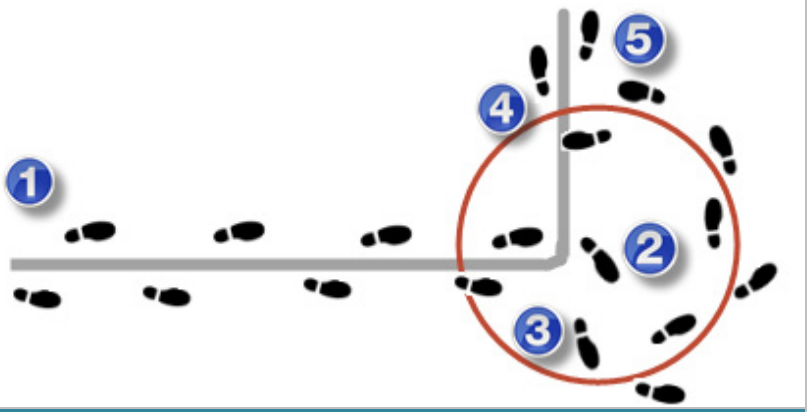


Figure 5 shows how to identify directional changes:

1. Locator follows signal to track facility.
2. Signal is lost.
3. Locator walks in 360º circle around the location where signal is lost.
4. Signal comes back. This identifies direction change.
5. Locator continues locating.

END OF PROCEDURE

Publication Date: March 2014

Definitions

Balanced Signal is a signal displayed on a receiver that indicates the signal strength increases and decreases an equal distance from the center of the suspected facility location.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-103, “Identifying the Proper Location”

TD-5811P-104, “Proper Markings”

TD-5811P-202, “Inductive Locate”

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Inductive Locate

Procedure

Summary

This procedure provides step-by-step instructions to perform an inductive locate of Pacific Gas and Electric Company (PG&E) facilities.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Attempt to locate using conductive (direct connect) and inductive with coupler (clamp) methods.

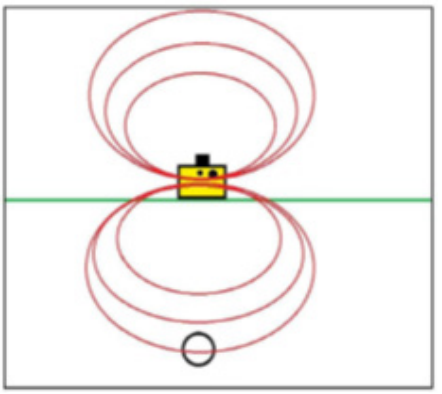
Table of Contents

Publication Date: March 2014

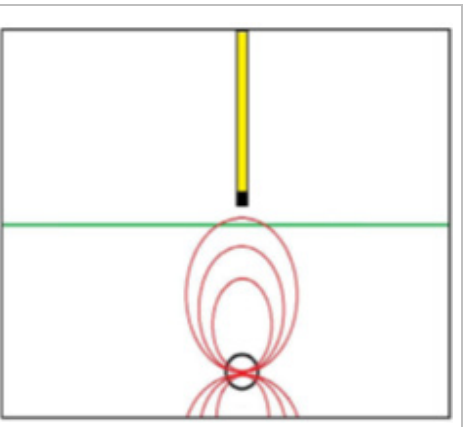
1 Understanding Inductive Locate

The inductive method locates by using instrument signal transmitting to a conductor without a lead connection. The transmitter's antenna induces a high frequency signal onto the target conductor without a direct connection. See Figure 1, "Inductive Signal Transmission."

Figure 1. Inductive Signal Transmission



Example 1 shows signal from a Pipehorn at transmitter. The signal is transmitted towards the facility that is to be located.



Example 2 shows signal received by a Pipehorn 50 ft from transmitter. The signal is carried by the facility. A balanced signal is shown.

2 Choosing Inductive Locate Method

1. Use inductive locate method:

   - Where a facility has no direct hook up locations.
   - In an area that may have other unknown underground facilities (search and sweep method).
   - When working with facilities that are difficult to locate.

     For more information about working with facilities that are difficult to locate, see Job Aid TD-5811P-103-JA01, "Troubleshooting Difficult to Locate."

Publication Date: March 2014

2. Look out for conductors in surrounding area such as other utilities and overhead power lines. These may carry signals that cause the wrong facility to be located or an inaccurate locate of the right facility.

   A. IF you identify any possible interferences,

      THEN move to a location away from interferences.

3 Locating a Visible Facility

1. Look around the work area to identify existing facilities that may conduct signal. See Figure 2, “Examples of Visible Facilities That May Conduct Signal.”

   For instructions on identifying a proper location, see TD-5811P-103, “Identifying the Proper Location.”

   Figure 2. Examples of Visible Facilities That May Conduct Signal

Example 1 Electric Riser

Example 2 Gas facility

Example 3 Gas Substructures

Publication Date: March 2014

2. Review available maps or drawings for specific information about the visible facilities.

3. Set up transmitter as follows:

   A. Place transmitter:

      1) On a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

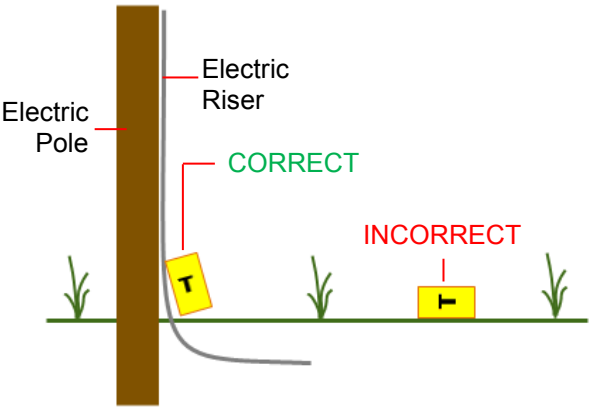
      2) Away from a location beneath an overhead power line, which may cause signal interference.

      3) Directly over a conductor.

      4) Away from any interferences that may adversely affect the locate.

      5) Vertically to induce signal along facility. See Figure 3, “Transmitter Vertical Placement.”

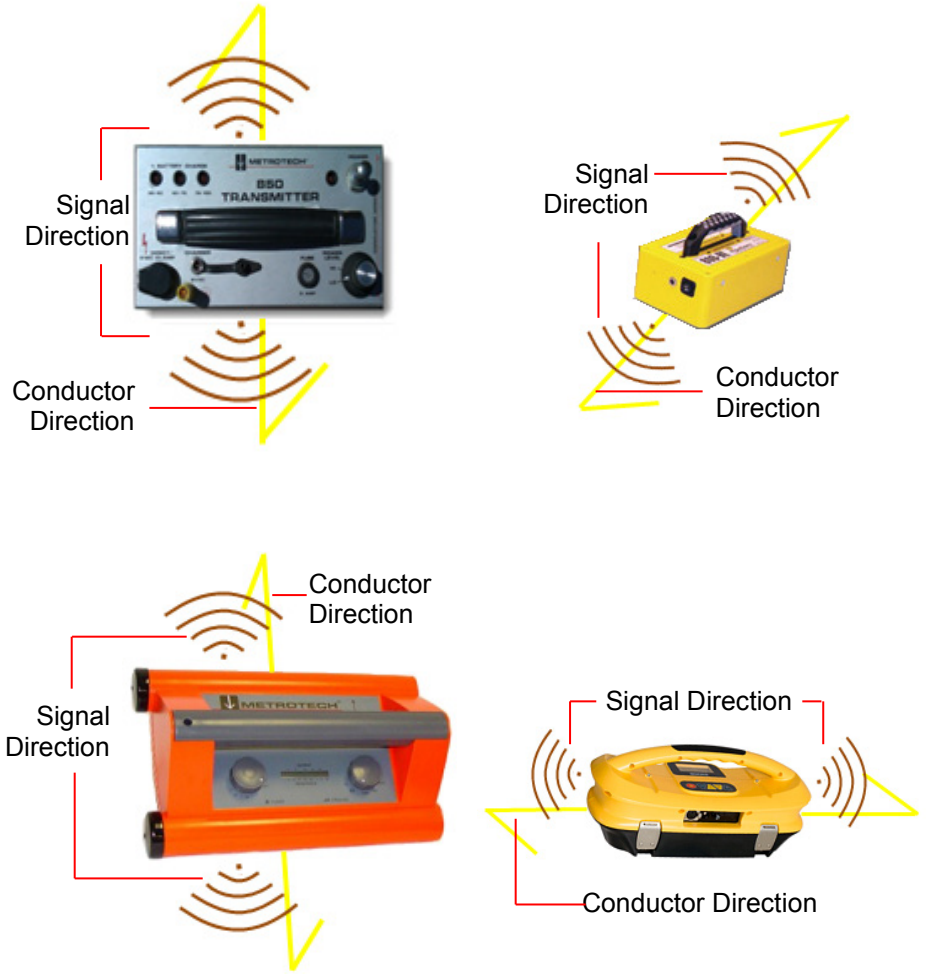
Figure 3. Transmitter Vertical Placement



   B. Position transmitter so that transmitter signal transmits in the same direction as conductor direction. See Figure 4, “Examples of Transmitter Signal.”

Publication Date: March 2014

Figure 4. Examples of Transmitter Signal



Publication Date: March 2014

4 Locating Inductively

1. Turn transmitter **ON**.
2. Select the best frequency for your instrument to perform an inductive locate.

   For instructions, see the instrument-specific procedures in this handbook.
3. Take the receiver to a location approximately 50 ft away from transmitter.
4. Turn receiver **ON**.
5. Set receiver frequency to match transmitter frequency.
6. Walk in a 360° path around target conductor (if possible) to detect the highest reading on the receiver. This reading identifies the target conductor.
7. Sweep receiver from left to right to find the strongest signal.
8. Pinpoint the path of the facility as follows:

   A. Confirm the location that has:

      1) The strongest signal.

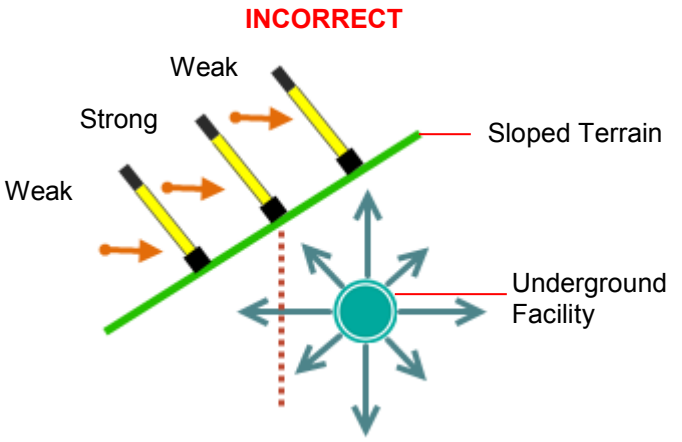
      2) A balanced signal. This signal increases and decreases by the same degree when receiver sweeps by the same distance to the right and left passing the suspected facility in the middle.

      3) IF the ground is sloped,

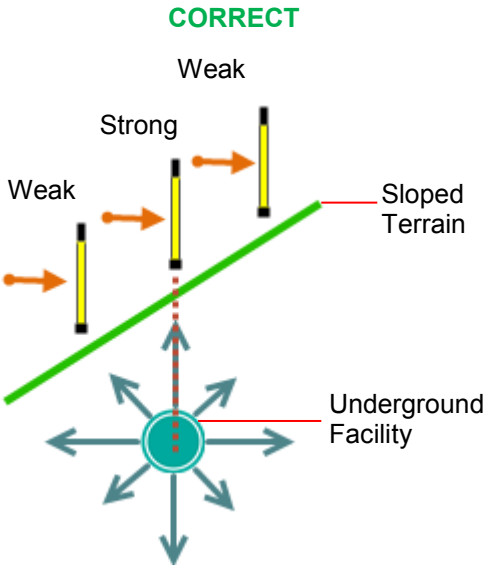
         THEN position receiver vertical and level. See Figure 5, “Receiver Position on Sloped Terrain.”

Publication Date: March 2014

Figure 5. Receiver Position on Sloped Terrain



Example 1 shows the strongest signal is obtained left of the center of the facility.



Example 2 shows the signal is obtained at the center of the facility.

B. Place a temporary mark at each confirmed strongest and balanced signal location.

9. At the location where you identify the highest reading (strongest signal), raise AND point receiver at transmitter.

Publication Date: March 2014

10. IF signal gets significantly weaker,

    THEN location of facility is confirmed.

    A. IF signal DOES NOT get significantly weaker,

       THEN air coupling may have caused false reading.

    B. IF you suspect that air coupling occurs,

       THEN move further away from transmitter in the direction of facility and pinpoint again.

11. Verify the locate as follows:

    A. Select a temporarily marked location.

    B. Rotate receiver left and right to confirm this location has the strongest signal.

    C. Reposition transmitter to this location.

    D. Track facility in the opposite direction to the previous location of transmitter.

    E. IF receiver signal suddenly becomes erratic or weak,

       THEN do the following:

       1) Move transmitter to the last clear signal location or another visible facility location.

       2) Continue to locate.

12. Mark the facility where strongest signal is verified.

    For instructions on marking, see Procedure TD-5811P-104, "Proper Markings."

13. Identifying directional changes:

    A. Track facility until signal is lost.

    B. Walk the receiver in a 360º circle around the location where signal is lost. See Figure 6, "Investigative Sweep."

    C. Identify where signal comes back.

    D. Continue locating.

Publication Date: March 2014

Figure 6. Investigative Sweep

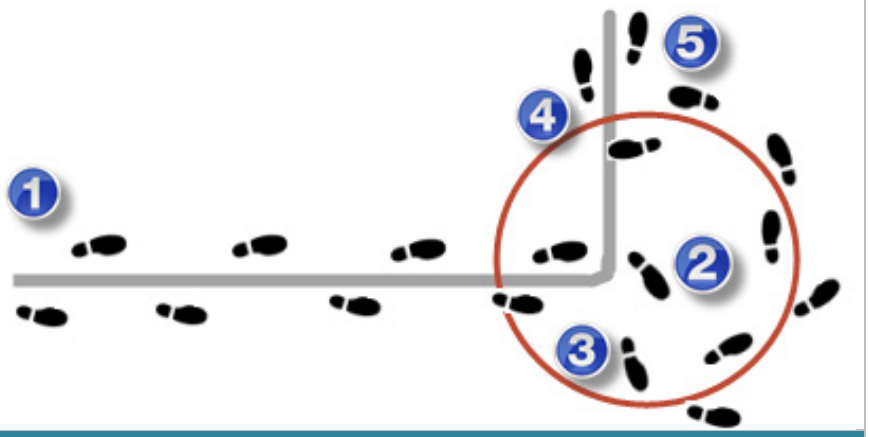


Figure 6 shows how to identify directional changes:

1. Locator follows signal to track facility.
2. Signal is lost.
3. Locator walks in 360º circle around the location where signal is lost.
4. Signal comes back.
5. Locator continues locating.

Publication Date: March 2014

5 Locating an Unknown Facility (One Person Method)

NOTE

The Metrotech 850 DOES NOT have the appropriate feature to use with this method.

1. Set transmitter to the highest frequency.
2. Lay transmitter on its side.
3. Turn transmitter **ON**.
4. Take receiver to a location approximately 50 ft away from transmitter in the direction of the suspected conductor.
5. Turn receiver **ON**.
6. Adjust receiver frequency to match transmitter frequency.

   For instructions, see the instrument-specific procedures in this handbook.
7. Hold receiver so that it faces transmitter **AND** walk in a circle around transmitter.
8. Maintain a solid signal on receiver to ensure proper alignment with conductor.
9. Place a temporary mark at each location that has the strongest signal.
10. Move transmitter several steps in one direction. This ensures that the entire area is located; a transmitter lying on its side cannot detect any conductor directly underneath it.
11. Place transmitter upright on one of the temporary marks placed earlier.
12. Locate Inductively.

Publication Date: March 2014

6 Locating an Unknown Facility (Two-Person Method)

NOTE

The Metrotech 850 DOES NOT have the appropriate feature to use with this method.

1. Use the two person method when facility to be located has no direct connection and is unvisible.
2. One locator controls the transmitter.
3. Set transmitter to the highest frequency.
4. A second locator controls the receiver.
5. Set receiver to the same frequency as transmitter.
6. Second locator moves approximately 50 ft away from transmitter.
7. The two locators point the instruments at each other.
8. Turn both instruments **ON**.
9. Set receiver sensitivity level high enough to receive lowest signal.
10. The two locators start walking in the same direction, parallel to each other.
11. The two locators maintain a constant distance from each other across the suspected conductor.
12. Each time receiver picks up a peak in signal, temporarily mark the location of both transmitter and receiver.
13. Verify the locate as follows:
    A. Select a temporarily marked location.
    B. Rotate receiver left and right to confirm this location has the strongest signal.

Publication Date: March 2014

C. Reposition transmitter to this location.

D. Track facility in the opposite direction to the previous location of transmitter.

E. IF receiver signal suddenly becomes erratic or weak,

THEN do the following:

1) Move transmitter to the last clear signal location or another visible facility location.

2) Continue to locate.

14. Mark the facility where strongest signal is verified.

END OF PROCEDURE

Definitions

Air Coupling occurs when the transmitter's signal travels through open air and is detected directly by the receiver.

Balanced Signal is a signal displayed on a receiver that indicates the signal strength increases and decreases an equal distance from the center of the suspected facility location.

Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

Inductive is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends signal over a set time frame.

Potholing is a method to expose gas lines in various spots to confirm the location and depth of PG&E facilities before excavation begins.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Publication Date: March 2014

Supplemental References

TD-5811P-103, “Identifying the Proper Location”

TD-5811P-104, “Proper Markings”

TD-5811P-103-JA01, “Troubleshooting Difficult-to-Locate”

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Passive Locate

Procedure

Summary

This procedure provides step-by-step instructions to passively locate Pacific Gas and Electric Company (PG&E) underground facilities.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Locate facilities using conductive, inductive with coupler, and inductive method.

Table of Contents

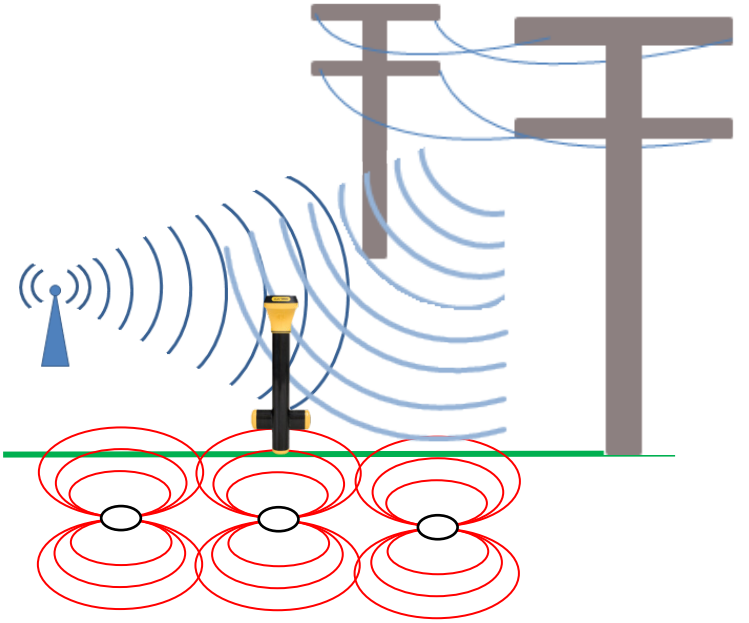
Publication Date: March 2014

1 Understanding Passive Locate

Every energized conductor transmits a passive signal. Passive locating is only possible when a conductor is energized. For example, when a street light is turned off, it does not transmit a passive signal.

The main drawback of passive locating method is **interferences from other energized conductors and/or radio transmitters**. Your instrument receiver receives passive signals from all energized conductors within range. Therefore, knowing exactly which conductor the signal comes from is a nearly impossible task. See Figure 1, “Passive Signals Interferences.”

Figure 1. Passive Signals Interferences



Publication Date: March 2014

2 Choosing Passive Locate Method

1. Use the passive locate method:

   A. When facilities **cannot** be located using:

      1) Conductive locate

      2) Inductive with coupler locate

      3) Inductive locate

   B. To verify the results of a previously completed locate.

2. Use one of the following instruments to perform passive locate:

   - Vivax vLoc-9800
   - Vivax vLocML and vLocML2
   - Metrotech 9890 XT™

   For instructions, see the instrument-specific procedures in this handbook.

To avoid interferences in your work area:

1. Maintain a minimum horizontal distance of 50 ft from overhead power lines.

2. Identify other underground facilities that may transmit passive signals.

Passive signals are commonly found on Pacific Gas and Electric Company (PG&E) electric facilities using an alternating current (AC) of 60 Hz. Radio frequencies are considered passive signals and can be found on telephone, television cable, and PG&E gas facilities under cathodic protection.

Publication Date: March 2014

3 Locating from a Known Facility

1. Look around the work area to identify existing facilities that may transmit passive signals. See Figure 2, “Examples of Energized Facilities.”

Figure 2. Examples of Energized Facilities

Electric Riser

Electric Primary Enclosure

Electric Secondary Box

Electric Primary Box

2. Review maps or drawings for locations of facilities.
3. Walk in a 360° path (if possible) around target conductor.

   For instructions, see the instrument-specific procedures in this handbook.

4. Stop at each location where receiver registers the highest reading.

Publication Date: March 2014

5. Raise the receiver toward the sky.

   - IF **signal gets weaker**,

     THEN you have identified the location of an underground conductor that transmits a passive signal.

   - IF **signal does not get weaker**,

     THEN interferences exist AND **passive locate method is unsuitable for this location**.

6. Place a mark for each location where signal peaks AND no interferences are found.

   For instructions to mark properly, see Procedure TD-5811P-104, "Proper Markings."

7. Continue to locate AND sweep receiver from left to right to maintain a peak signal reading.

8. Identify directional changes. See Figure 3, "Investigative Sweep."

Figure 3. Investigative Sweep

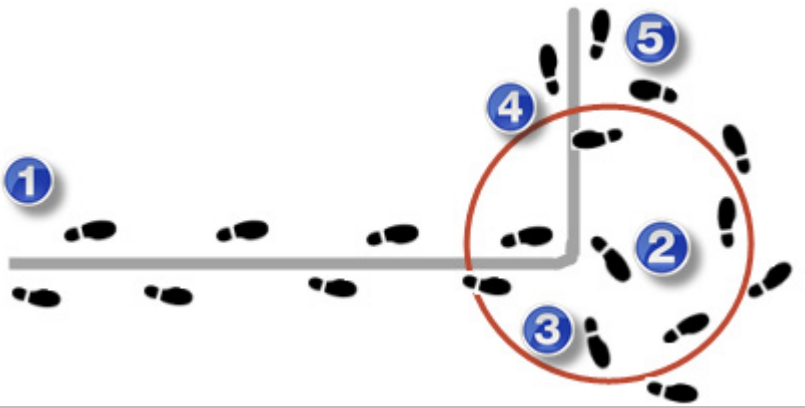


Figure 3 shows how to identify directional changes:

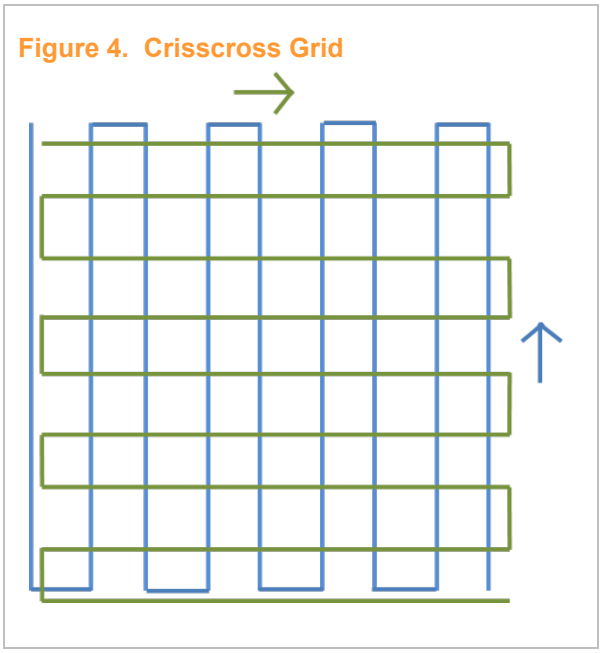
1. Locator follows signal to track facility.
2. Signal is lost.
3. Locator walks in 360° circle around the location where signal is lost.
4. Signal comes back. This identifies a directional change.
5. Locator continues locating.

Publication Date: March 2014

4 Locating from an Unknown Facility

1. Turn your receiver's sensitivity setting to the maximum setting.
2. Walk in a crisscrossing grid pattern to sweep the entire work area. See Figure 4, "Crisscross Grid."

Figure 4. Crisscross Grid



3. Look at receiver for the highest signal readings.
4. Stop walking at each location where receiver registers the highest reading.
5. Raise the receiver toward the sky.

   - IF **signal gets weaker**,

     THEN you have identified the location of an underground object that transmits a passive signal.

   - IF **signal does not get weaker**,

     THEN interferences exist AND **passive locate method is unsuitable for this location**.

Publication Date: March 2014

6. Place a mark for each location where signal peaks AND no interferences are found.

   For instructions to mark properly, see Procedure TD-5811P-104, "Proper Markings."

7. Continue to locate AND sweep receiver from left to right to maintain a peak signal reading.

8. Identify directional changes (see Figure 3).

5 Communicating with Excavator

1. Inform excavator of the following:

   A. ALL facilities located using passive method.

   B. Reasons why passive method was used.

2. IF excavation area is **within 10 ft. of markings**.

   THEN do the following:

   A. Perform a field meet.

   B. **Suggest** excavator to daylight facility to verify exact locations.

3. IF excavation area is **within 24 in. of markings**,

   THEN do the following:

   A. Perform a field meet.

   B. **Instruct** excavator to daylight facility to verify exact locations (CGC Law 4216).

6 Documenting a Passive Locate

1. IF you used passive locate as your primary locating method,

   THEN document the following in the **Notes** section of ticket:

   A. Reasons why other locating methods were unsuccessful.

   B. ALL communications with excavator, including but not limited to the following:

Publication Date: March 2014

- Name of person you contacted.
- Method of contact (phone, field meet, etc.)
- Agreements for potholing.

END OF PROCEDURE

Definitions

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Potholing is a method to expose gas lines in various spots to confirm the location and depth of PG&E facilities before excavation begins.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-104, “Proper Markings”

Publication Date: March 2014

Verifying Instrument Calibration

Procedure

Summary

This procedure provides step-by-step instructions to verify calibration of Pacific Gas and Electric Company (PG&E) approved locate and mark instruments.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- See the instrument specific procedures in this handbook for your instrument operating instructions.

Table of Contents

Publication Date: March 2014

1 Complying with Verification Requirements

1. Verify instrument calibration according to the following schedules:

   A. When instrument is put into service initially.

   B. For production locate and mark (completing USA tickets), verify calibration once per calendar month, not to exceed 45 days.

   C. For non-production locate and mark (crew locates, maintenance, operations and engineering locating), verify once every 6 months, not to exceed 190 days.

   D. After a dig in: Verify as soon as possible, if it is suspected that the instrument has contributed to the event.

   E. After repair work is completed at an approved facility: Verify calibration BEFORE placing instrument back in service.

2. Confirm that the aboveground or subsurface verification facility location is free from external interference, such as:

   - Overhead power lines
   - Radio transmitters
   - Any metallic structures within 25 ft of the test site
   - Any electrical interference that may distort electromagnetic fields

3. Confirm that subsurface facilities used for verification:

   - Are a minimum of 50 ft in length.
   - Have a known AND exposed start point, mid-point, and endpoint. See Figure 1, “Underground Calibration Field,” and Figure 2, “Examples of Calibration Facility Start-point, Mid-point, and End-point.”
   - Have an independent ground stake placed at 9 to 12 in. deep AND at approximately a 90° angle to the facility. See Figure 3, “Instrument Hook Up for Underground Facility.”

Figure 1. Underground Calibration Field

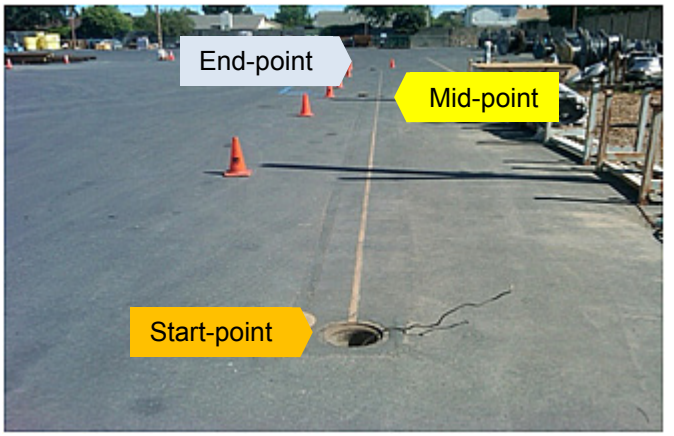
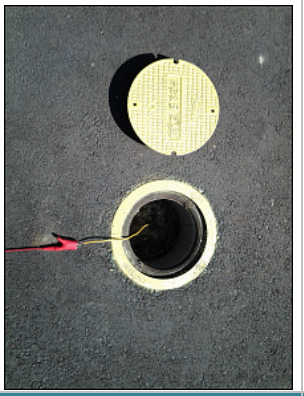
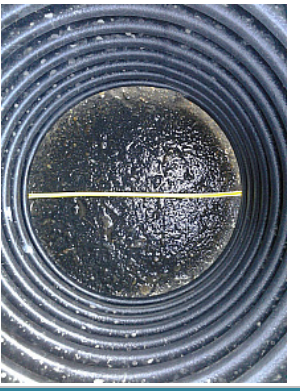


Figure 1 shows a known underground calibration test facility.

Figure 2. Examples of Calibration Facility Start Point, Mid-point, and End Point



Example 1: Calibration Start Point



Example 2: Calibration Mid-point

Example 3: Calibration End Point

Publication Date: March 2014

Figure 3. Instrument Hook up for Underground Facility

Figure 3 shows instrument hook up for underground facility with ground stake at approximately a 90º angle.

NOTE

An aboveground facility is NOT approved for verifying Pipehorn calibration.

4. Use an aboveground facility ONLY when you cannot use an underground facility to verify calibration. See Figure 4, “Aboveground Calibration Facility.”

   A. Aboveground facility requirements:

      1) Use 100 ft of PG&E-approved #10 American Gauge Wire (AWG) or #14 AWG wire.

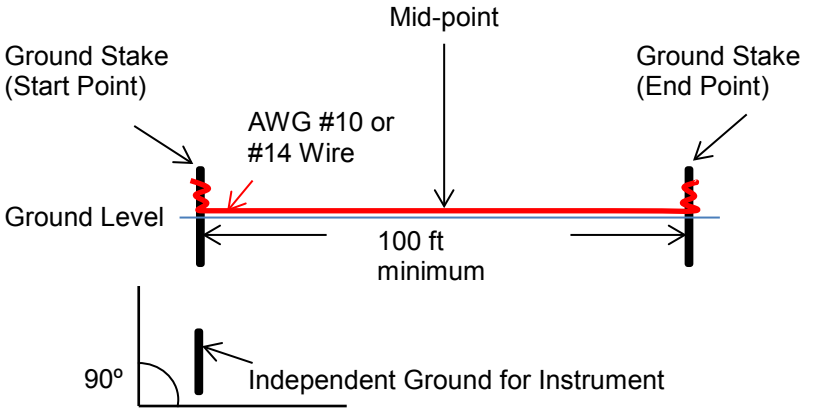
      2) Connect each end of wire to a separate ground stake.

Publication Date: March 2014

3) Place an independent ground stake according to the following rules:

   - 9 to 12 in. deep
   - Approximately 90º angle to facility
   - Typically 1 to 6 ft away from facility; ensure that ground stake does not cross over another facility. See Figure 3.
   - Place a non-metallic stake vertically at mid-point and exactly 24 in. above ground to help identify depth.

Figure 4. Aboveground Calibration Facility



2 Verifying Calibration

1. Perform a conductive locate of verification facility to:

   For instructions on performing a conductive locate, see Procedure TD-5811P-201, "Conductive Locate."

Publication Date: March 2014

A. **Determine centerline accuracy**:

1) Walk the instrument receiver over the entire known facility centerline from start to finish.

2) Stop every 10 ft to verify centerline accuracy.

3) Verify that the instrument's highest reading is within 3 in. of the actual center of facility.

4) Document the following:

   - Greatest deviation of instrument indicated centerline and known centerline.
   - Document zero (0) if instrument's highest reading is the same as known facility centerline. See Section 3, "Documenting Calibration Verification."

   Example: For line locate, instrument's highest reading is 1 in. to the left of the known centerline of the test facility. Instrument has Electronic Marker System (EMS) feature; instrument highest EMS reading is the same as test facility centerline. Document "1" and "0" in form. See Figure 5, "Example of Centerline Accuracy Documentation."

Figure 5. Example of Centerline Accuracy Documentation

YEAR	2013	SIGNAL STRENGTH[1] OR dB (a)	MAXIMUM DEVIATION FROM CENTERLINE	
MONTH			LINE LOCATE[2] (b[1])	EMS[3] (b[2])
JANUARY			1	0

Publication Date: March 2014

B. **Determine baseline signal strength**:

- Obtain baseline signal record by reviewing calibration verification records for your instrument at your local headquarters.
- IF an instrument:
  - Has never been verified AND documented by PG&E before,
  - Was recently returned from an approved repair facility,
  - Has never been verified using this test facility,

  THEN do the following:

  a. Verify instrument signal strength at the approximate mid-point of the test calibration facility.

  b. Document the baseline signal strength on instrument's form:

     - The first time an instrument is put into service.
     - After an instrument repair.
     - When switching to a new calibration site.

C. **Determine signal strength**:

1) Use the same earth ground point for the transmitter during the monthly verification. This method is critical in measuring consistent signal strength.

2) At the approximate mid-point of calibration test facility, verify that instrument signal strength remains within the baseline ranges presented in Table 1, "Comparing Baseline Signal Strength."

Publication Date: March 2014

Table 1. Comparing Baseline Signal Strength

INSTRUMENT	SIGNAL STRENGTH	SIGNAL STRENGTH RECORDING
Metrotech: 9890 850 Vivax 9800	±25% of baseline signal reading	At the approximate mid-point of the test facility.
Vivax: vLocML vLocML2	±15% of baseline decibel (dB) reading	
Pipehorn 800-HL	2 points on the sensitivity knob	

3) Document signal strength reading.

4) For **Vivax vLocML** and **vLocML2**:

   a. Locate target facility to the approximate midpoint of the test calibration facility.

   b. Confirm that the receiver indicates a peak reading while being directly over known target facility.

   c. Ensure that continuous depth appears on receiver display.

   d. Let the bottom of the receiver touch the surface directly over known target conductor.

   e. Slowly rotate receiver until compass turns solid blue. This indicates that receiver is lined up with target conductor.

   f. Push the **Increase Gain** button until digital signal is approximately 99.9 AND the analog signal graph is full.

   g. Push the **Reduce Gain** button once to display decibel (dB) reading.

   h. Document dB reading.

Increase Gain Button

Reduce Gain Button

5) For **Pipehorn 800-HL**:

   a. Locate target facility to the approximate midpoint of the test calibration facility.

   b. Adjust sensitivity knob until meter needle reaches “10”. See Figure 6, “Receiver Meter.”

   c. Document the sensitivity setting.

   d. IF sensitivity knob requires an adjustment of more than 2 numbers from baseline on the dial,

      THEN submit instrument for repair.

Figure 6. Receiver Meter

D. **Determine depth measurement**:

1) At the approximate mid-point of calibration test facility verify that depth is within the acceptable range from the actual depth of facility. See Table 2, “Acceptable Depth Range.”

Publication Date: March 2014

Table 2. Acceptable Depth Range

DEPTH OF KNOWN CONDUCTOR	ALLOWABLE DEVIATION FROM KNOWN DEPTH
Less than 24 in.	± 3 in.
24− Less than 36 in.	± 4 in.
36−48 in.	± 5 in.
Greater than 48 in.	± 6 in.

2) Document depth from mid-point reading.

NOTE

Aboveground test facility is NOT approved for verifying the Pipehorn depth measurement.

3) IF you use an **aboveground test facility**,

THEN do the following:

a. While performing verification, place the receiver on the non-metallic stake located at facility midpoint (24 in. above test facility wire). See Figure 7, “Determine Depth Using an Aboveground Facility.”

b. Ensure that depth reading is ± 4 in., of the measurement at the top of the stake.

Example:

Your calibration facility depth measurement stake is 24 in. above ground. When you place the instrument on top of the stake, the instrument reads 26 in. deep. Because 26 in. is 2 in. different from the actual depth measurement (within ±4 in.), so the instrument successfully passes depth calibration verification.

Publication Date: March 2014

Figure 7. Determine Depth Using an Aboveground Facility

Figure 5 shows a locator holding the receiver 24 in. above wire.

E. IF your instrument has an EMS feature,

THEN **determine EMS accuracy**.

1) To determine EMS accuracy, do the following:

a. Use a known EMS marker. An EMS marker may be aboveground or at a maximum of 3 ft below ground. Belowground markers:

- Are visible through a covered box.
- Have surface marks that identify EMS types and locations.

b. Use instrument receiver to determine location of EMS marker. The instrument indicated location must be within 3 in. of the known EMS marker location.

   i. Submit instrument for repair if instrument does not show the required result.

c. Document the greatest deviation of indicated centerline and known centerline of EMS marker.

---

3 Documenting Calibration Verification

1. Complete form **TD-5811P-205-F01, "Calibration Verification Form"** as follows:

   - For routine monthly verification, enter all applicable information on the first page of the form.
   - For post-dig-in and repair verification, enter all applicable information on both pages of the form.

NOTE

The instrument's local headquarters keeps verification record for 5 years from the verification date.

2. IF an instrument fails calibration verification,

   THEN do the following:

   A. Fill out instrument repair form.

      The instrument repair form is located in the Form section of this handbook AND online in the Technical Information Library (TIL).

   B. Provide completed form and instrument to your supervisor to send for repair.

END OF PROCEDURE

Publication Date: March 2014

Definitions

Baseline Signal Strength is the signal strength recorded initially before an instrument is put into service, after a repair, or when switching to a new calibration facility.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Electronic Tablet is a PG&E-issued device for locate and mark personnel to use in the field to complete a USA ticket.

Electronic Marker System (EMS) is a set of markers placed underground to help identify facilities that would otherwise be difficult to locate.

Supplemental References

TD-5811P-201, “Conductive Locate”

Publication Date: March 2014

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Performing a Standby

Procedure

Summary

This procedure provides step-by-step instructions for qualified standby personnel to **observe** and **protect** (standby) Pacific Gas and Electric Company (PG&E) underground facilities at an excavation site.

Target Audience

Personnel who have the operator qualifications (OQ) below:

- All of the following:
  - OQ 03-05 (Pipe Inspection)
  - OQ 05-02 (Standby Pipeline)
- One of the following:
  - OQ 05-01 (Locate and Mark Facilities)
  - OQ 05-04 (Non-production Mark and Locate)

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.

Table of Contents

Section **Page**

1 Standby Role and Responsibilities

1. As a standby person, your **sole** responsibility is to:

   - Dedicate 100% of your attention to **observe** and **protect** PG&E facilities during excavation.
     - DO NOT perform any other work while standby is required.
     - IF you have to leave an excavation site for any reason,

       THEN instruct excavator to stop excavating in the area that requires a standby until you return.
   - Protect PG&E high priority or critical facility from damage.
   - Inspect exposed facility.
   - Ensure that excavator follows safe excavation practices outlined in this document.

2 Verifying Standby Request

1. Review the following:

   - USA ticket request (location, expiration, nature of work, etc.)
   - Area maps
   - As-builts (as needed)

2. Contact excavator to ask the following questions:

   - Are there multiple USA tickets for this excavation project?
   - What is the USA ticket number that requires a standby?
   - Where is work location?
   - What is the nature of work?
   - What type of equipment will be used?
   - Are all marks still visible at the excavation site?
   - Will heavy equipment (e.g., motor grader, scraper, or dozer) be operated, driven, transported, or parked over facility?

1) IF excavator plans on using **heavy equipment**,

   THEN do the following:

   a. Gather the following required information to determine allowable loading over facility:

      - Location of loading on facility.
      - Depth of cover material over facility.
      - Type of heavy equipment.
      - Weight of heavy equipment.

   b. Provide information to local engineer to:

      - Obtain approval to use heavy equipment over facility.
      - Obtain any additional requirements to protect facility. (e.g., matting, bridges, etc.).

   c. Ensure that additional requirements to protect facility are implemented.

2) IF the excavator plans on using **pipe bursting** near PG&E facility,

   THEN do the following:

   a. Perform the actions described in Table 1, “Pipe Bursting Parallel to PG&E Facility” and Table 2, “Pipe Bursting Perpendicular to PG&E Facility.”

      i. Communicate required actions with excavator.

   b. Inform the excavator that pipe bursting is not allowed if the distance between PG&E facility and third party utility is 12 in. or less.

   c. Document conversation with the excavator in the **Comments** section of the Standby Form.

Publication Date: March 2014

Table 1. Pipe Bursting Parallel to PG&E Facility

HORIZONTAL DISTANCE FROM FACILITY	INSTALLED UTILITY OUTSIDE DIAMETER (OD)	ACTIONS
8 ft or less	Any	▪ Contact supervisor and gas engineer for assistance. ▪ If gas engineer requires facility to be exposed, then standby is required.
Greater than 8 ft	Less than or equal to 32 in.	▪ Excavator can proceed with pipe bursting. Standby is not required.
	Greater than 32 in.	▪ Minimum clearance is three times that of the OD. ▪ Contact supervisor and gas engineer for assistance if minimum clearance is not met. ▪ If gas engineer requires facility to be exposed, then standby is required.

Publication Date: March 2014

Table 2. Pipe Bursting Perpendicular to Facility

VERTICAL DISTANCE FROM FACILITY	INSTALLED UTILITY OUTSIDE DIAMETER (OD)	ACTIONS
Less than 3 ft	Any	▪ Pipe bursting is not allowed UNLESS performed with an air gap. Standby is required.
3 ft to 5 ft	Any	▪ Contact supervisor and gas engineer for assistance. ▪ If gas engineer requires facility to be exposed, then standby is required.
Greater than 5 ft	Less than or equal to 12 in.	▪ Excavator can proceed with pipe bursting. Standby is not required.
	Greater than 12 in.	▪ Minimum clearance is three times that of the OD. ▪ Contact supervisor and gas engineer for assistance if minimum clearance is not met. ▪ If gas engineer requires facility to be exposed, then standby is required.

3. If air gap is required,

   THEN communicate the following air gap requirements with excavator:

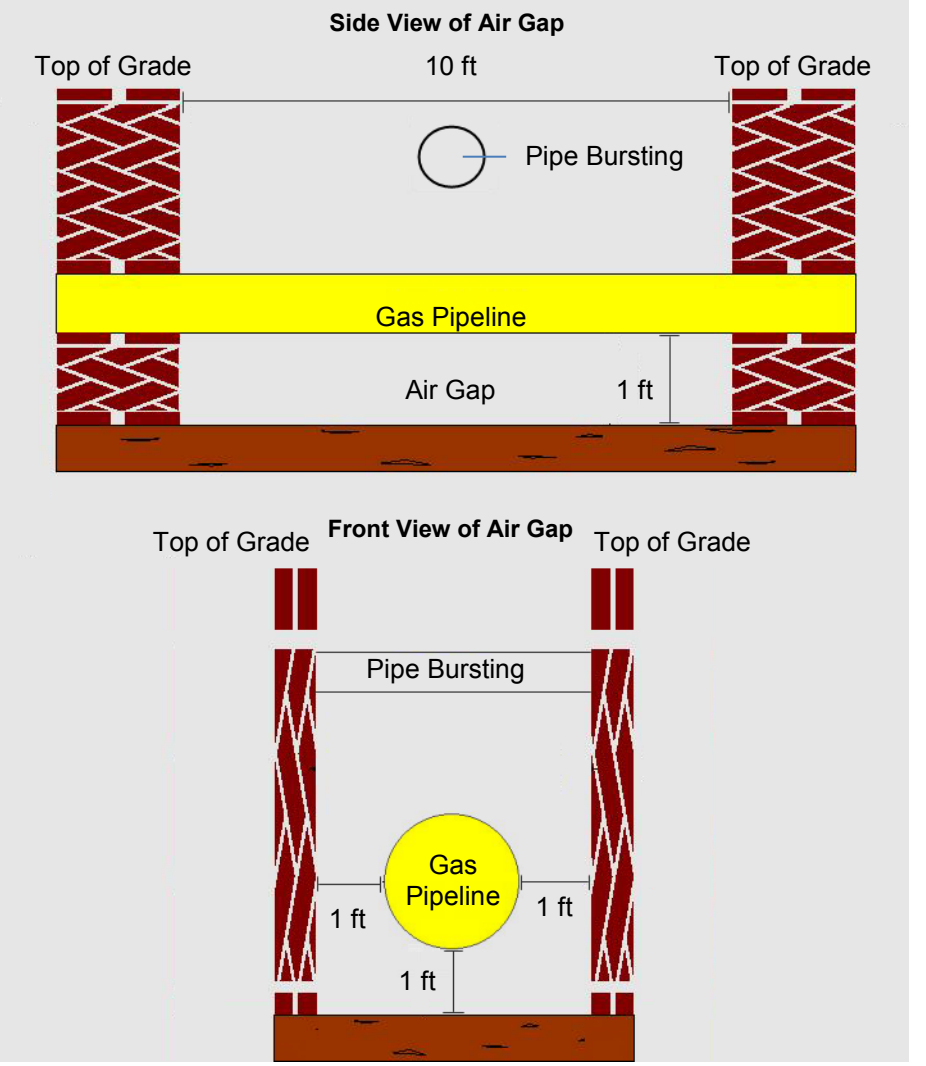
   A. Air gap is 1 ft deeper than gas pipeline and extend for 1 ft on each side of pipe.

   B. Trench is 10 ft long and centered on utility being bursted. See Figure 1, “Air Gap Views.”

   C. PG&E may choose to create air gap AND bill the excavator if excavator refuses to create air gap.

Publication Date: March 2014

Figure 1. Air Gap View



4. Determine if a standby is required.

   For instructions, see Job Aid TD-5811P-105-JA04, "Identifying the Need for a Site Visit, Field Meet, and Standby."

   A. IF a standby is required,

      THEN schedule field meet and standby with excavator.

Publication Date: March 2014

B. IF a standby is NOT required,

THEN document decision details in the **Comments** section of the standby request form.

3 Preparing to Perform Standby

1. Before you leave for the job site, obtain the following:

A. Equipment and tools:

- PG&E approved gas reading tool
- Probe tool
- Shovel
- Marking supplies (paints, stakes, flags, etc.)
- Gas pipeline underground warning tape
- Camera
- PG&E approved locating instrument (see **Reference M-60.4, "Approved Locating Instruments"**)
- Cell phone or radio

B. Documents:

- Engineering Material Specification No. 4123, "Backfill Sand"
- TD-5811P-301-F01, "Standby Form"
- TD-4110P-03-F02, "Gas Incident Report Addendum (Form A-1)"
- TD-4110P-03-F19, "Additional Inspection (A-Form) Or Inspection Only (If Applicable)"
- TD-5811P-401-F01, "Gas Dig-in First Responder Form"
- Operating map, diagram, or GIS map
- Underground facility map (for stations)
- A copy of USA ticket
- Corrective Work Form − Gas Distribution (JA_096G)
- PLM Work Request
- Record of Warning of Unsafe Practices (Form M61-0427 (12-10) Safety Health and Claims)

4 Arriving at the Excavation Site

1. Perform a field meet to address the following:

   A. Describe your role and responsibilities as a standby to **watch** and **protect**.

   B. Review potential safety hazards at facility location.

   C. Describe hand signal procedure to equipment operators and spotters.

   D. Require hand dig to find the outermost edge of the underground facility.

   E. Explain that excavation site must be barricaded and protected when:

      - Excavation lasts more than 1 day.
      - Work has concluded for the day.

   F. Identify AND communicate to the excavator the location of any known fittings (e.g., Mueller and TDW fittings, elbows, and service tees) that may protrude above, below, or to the sides of the facility.

   G. Communicate to the excavator the potential for unknown fittings.

   H. Inform excavator that the use of power excavation equipment within 24 in. of a facility is **not** allowed.

      Exception:

      1) Vacuum excavation (use only after facility is visually verified).

      2) If excavator uses vacuum equipment, then require excavator to use pressure control equipment to control air or water jet pressure. See Table 3, “Air/Water Pressure Requirement for Vacuum Excavation.”

Publication Date: March 2014

Table 3. Air/Water Pressure Requirement for Vacuum Excavation

PIPE TYPE	MAXIMUM AIR PRESSURE	MAXIMUM WATER PRESSURE / MINIMUM NOZZLE ANGLE
All pipe types	*120 pounds per square inch (psi)	*1,000 psi/40 degrees

**Adjust pressure accordingly to prevent vacuum equipment from damaging pipe wrap.*

2. Verify markings at excavation site:

   A. Inform the excavator that excavation cannot proceed until area is marked or remarked if excavation site contains no marks.

      1) Have the excavator call USA for new ticket if the excavation site is outside the original ticket delineated area.

      2) Remark area if excavation site is inside the original ticket delineated area.

   B. IF excavation site contains proper marks,

      THEN do the following:

      1) Use an approved locating instrument to verify accuracy of marks.

         a. IF you identify any **marking discrepancy greater than 24 in. from the edge of facility**,

            THEN do the following:

            ii. Inform excavator about discrepancy.

            iii. Explain to excavator that excavation cannot proceed until area is remarked.

            iv. Notify your supervisor.

            v. Remark area.

      2) Inform excavator to proceed with excavation when all marks are verified.

Publication Date: March 2014

5 Monitoring the Excavation Process

1. During excavation, standby AND continuously observe the excavation process at all times.
2. Ensure that the excavator complies with safe excavation practices.
   A. IF excavator does not comply with safe excavation practices,

      THEN do the following:

      1) Stop the excavation process.
      2) Explain to excavator about the safety violation(s) you observed.
      3) Instruct excavator to take the necessary actions or precautions before resuming work.
      4) IF excavator continues to work unsafely or becomes difficult to work with,

         THEN see **Job Aid TD-5811P-301-JA01, "Handling Excavators Working Unsafely."**
3. Use the approved gas reading tool to:
   - Check for hazardous atmosphere **BEFORE** allowing PG&E personnel to descend (i.e., individual's head goes below grade) into the excavation area.
   - Continue to monitor for hazardous atmosphere as long as an individual stays in the excavation area.
4. Hand dig or daylight area to verify facility location. Use ONLY hand digging within 24 in. of the facility. DO NOT allow probing on non-steel facilities.
5. For **steel facilities 2 in. or larger**, ensure that proper probing methods are used to physically locate the pipe as follows:
   A. Push probe into the ground perpendicular to pipeline.
   B. Probe to a depth of approximately 36 in.
   C. Probe at intervals of 5 in. maximum OR half the diameter of the facility, whichever is smaller.

D. Probe the full width of the proposed excavation.

E. Remove ground materials by hand digging if at any time ground conditions do not permit probing.

F. Use ONLY hand digging within 24 in. of the facility.

G. Alternate between probing and power excavating as follows:

1) Push probe into the ground to 36 in. deep.

2) Excavator perform power excavate to a depth of 12 in.

3) **Stop** alternating between probing and power excavating when the excavation is **within 24 in. of the facility**.

6. Ensure excavator uses hand digging method to:

- Continue excavating from this point on.
- Find the outermost edge of the underground facility.

7. When the facility is exposed, check the following:

A. Compare the remaining marks on the ground to the actual facility location to confirm accuracy.

1) IF marks have discrepancies that are greater than 24 in. from the edge of facility,

THEN do the following:

a. Stop excavation.

b. Explain to excavator that excavation cannot proceed until area is remarked.

c. Notify your supervisor.

d. Remark facility.

B. Inspect pipe condition to identify any damage to pipe, pipe wrap, corrosion, etc.

1) See Figure 2, “Example of Abnormal Operating Condition (AOC).”

C. Fill out **TD-4110P-03-F19, “Additional Inspection (A-Form) Or Inspection Only (If Applicable).”**

Publication Date: March 2014

Figure 2. Example of Abnormal Operating Condition (AOC)

Example 1 shows damaged pipe wrap.

Example 2 shows pipe damaged by excavation backhoe (gouge marks).

D. Ensure proper support for exposed facility as follows:

1) Contact your local engineer for assistance with unsupported pipe lengths greater than 5 ft.

EXCEPTION:

IF the exposed steel pipe meets all of the following conditions:

- The pipe is straight and does not have bends, miters, or elbows.
- The ground supporting each end of the pipe is stable.
- The slope of exposed pipe is minimal (± 5 degrees).

Publication Date: March 2014

- Unsupported length of exposed pipe is free of additional weight or forces (e.g. no fittings, valves, or other fixtures, etc.).

THEN See Table 4, “Maximum Unsupported Steel Pipe Spans.”

Table 4. Maximum Unsupported Steel Pipe Spans

PIPE SIZE (IN.)	MINIMUM WALL THICKNESS (IN.)	MAXIMUM UNSUPPORTED PIPE SPAN LENGTH (FT)
2	0.154	Contact Gas Engineering
3	0.148	Contact Gas Engineering
(1973-1974)		
3	0.148	8.7
(1975-Present)		
4	0.148	10.0
6	0.188	12.1
8	0.217	13.9
10	0.22	15.5
12	0.25	16.8
14	0.375	17.6
16	0.25	18.8
20	0.25	20.8
22	0.25	21.9
24	0.313	22.9
26	0.3125	23.7
30	0.281	25.3
32	0.36	26.6
34	0.312	27.0
36	0.312	27.6
42	0.375	29.9

8. Identify any **AOC** during the entire work process. An AOC includes but is not limited to:

   - A gas leak. Identified by an odor similar to sulfur or rotten egg, a hissing or roaring sound, dirt or water blowing into the air.
   - Pipe corrosion such as loss of pipe protection wrap, pitting, and wall loss.
   - Damaged facility includes damaged wrap and any damage from previous work (e.g., previous excavations, dig-in).
   - Overbuilds, such as a structure(s) built over the top of a PG&E facility.
   - PG&E facility comes in contact with other underground facilities.
   - Third party threats such as digging, drilling, fencing, blasting, horizontal boring, within 150 ft each side of the pipeline.
   - Construction AND/OR maintenance work with 300 ft each side of the pipeline that indicates presence of building(s).

9. Do the following if you discover an AOC:

   A. IF the AOC has an **immediate hazard condition**, such as a gas leak or a severely corroded pipe,

      THEN IMMEDIATELY do the following:

      1) Stop excavation process.

      2) Inform your supervisor.

      3) Do the following:

         - For Gas Distribution, contact gas dispatch to report.
         - For Gas Transmission, contact gas control to report.

      4) Perform the tasks of a **PG&E first responder**.

         For instructions, see Procedure TD-5811P-401, "Dig-In First Responder."

      5) Take pictures of AOC.

   B. IF the AOC presents **no imminent hazards**,

      THEN do the following:

      1) Take pictures of AOC.

Publication Date: March 2014

2) Repair pipe wrap if AOC is damaged pipe wrap AND you are qualified to repair pipe wrap.

3) IF you are unable to repair AOC,

   THEN report AOC as follows:

   - For Transmission Districts AOC:
     i. Fill out a **PLM Work Request**.
     ii. Submit PLM Work Request to your supervisor.
   - For Gas Distribution or Gas Transmission Divisions AOC:
     i. Fill out a **Corrective Work Form Gas Distribution**.

     For instructions, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

6 When Exposing Less than 10 ft of Pipe

1. Meet with the excavator to communicate the following:

   A. The backfill:

   - Must be free of rocks, stones, stumps, garbage, etc., which can damage pipe or its coating
   - Material meets the backfill requirements per Engineering Material Specification No. 4123, "Backfill Sand"
   - Is compacted such that the backfill provides continuous support for facility per requirements of Engineering Material Specification No. 4123, "Backfill Sand"

   B. Precaution is taken when working near facilities.

   C. DO NOT use power operated equipment within 24 in. of a facility. Instead, use a manual tamper, a pneumatic tamper, or a shovel to compact soil around facility.

   D. Install a gas pipeline underground warning tape over facility (see Section 8, "Installing Gas Pipeline Underground Warning Tape"). Inform excavator of the underground warning tape requirements.

      1) Leave warning tape with excavator if excavator does not have warning tape.

Publication Date: March 2014

E. DO NOT allow heavy equipment to operate over facility once the backfill is completed.

2. Fill out the **standby form**.

3. Standby is complete.

---

7 When Exposing 10 ft of Pipe (or More)

1. Meet with the excavator to communicate the following:

   A. Schedule a time for you to return to excavation area to observe the backfill process **over** PG&E facility.

   B. The backfill:

      - Must be free of rocks, stones, stumps, garbage, etc., which can damage pipe or its coating
      - Material meets the backfill requirements per Engineering Material Specification No. 4123, “Backfill Sand”
      - Is compacted such that the backfill provides continuous support for facility per requirements of Engineering Material Specification No. 4123, “Backfill Sand”

   C. Precaution is taken when working near facilities.

   D. DO NOT use power operated equipment within 24 in. of a facility. Instead, use a manual tamper, a pneumatic tamper, or a shovel to compact soil around facility.

   E. Install a gas pipeline underground warning tape over facility (see Section 8, “Installing Gas Pipeline Underground Warning Tape”). Inform excavator of the underground warning tape requirements.

2. Observe to ensure that excavator uses **proper backfill procedures** that result in:

   - NO damage to pipe
   - NO damage to pipe wrap
   - Adequate pipe support
   - Sufficient compaction to minimize impact from soil shifting or settling

3. Observe until the facility is backfilled with 24 in. of backfill material.

Publication Date: March 2014

4. Inform excavator to prevent heavy equipment from operating over facility once the backfill is completed.

5. Fill out the **standby form**.

6. Standby is complete.

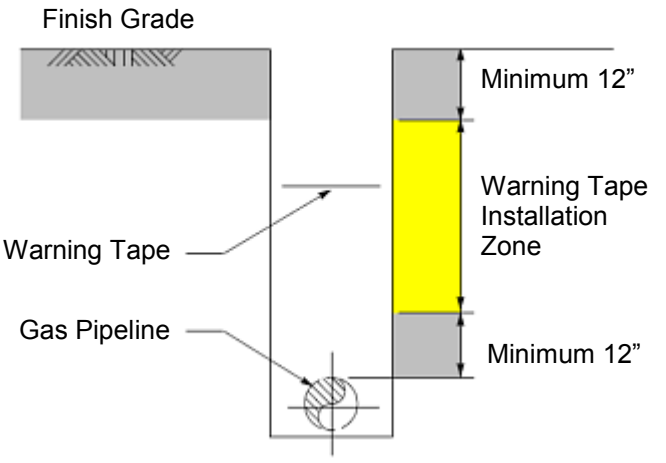
8 Installing Gas Pipeline Underground Warning Tape

1. Install a 6 in. wide **gas pipeline underground warning tape** as follows:

   - Over open trench for BOTH transmission and distribution gas pipelines greater than 5 ft.
   - Along the entire length of the excavation.
   - At a minimum of 12 in. below grade and no closer than 12 in. above gas pipeline. See Figure 3, “Warning Tape Installation.”

Underground Warning Tape

Figure 3. Warning Tape Installation



Publication Date: March 2014

- IF gas pipeline is at a depth that does not provide the required 12 in. below grade and above pipeline,

  THEN place warning tape at mid-depth.

- Ensure that the edges of tapes overlap when using multiple pieces of tape.

END OF PROCEDURE

Definitions

Air Gap is a method of construction that provides air space that prevents pipe bursting forces from acting on the pipeline.

First responder: is a PG&E employee on site or first to arrive at a dig-in. The first responder's primary responsibility is to take appropriate action to create a safe zone and evacuate everyone from harm's way.

Pipe Bursting: is a trenchless method of replacing buried utility pipelines (e.g., water, sewer, natural gas, etc.) with the same or larger size facilities without digging up the entire facility.

Hazardous atmosphere: is an atmosphere that may expose people to the risk of death, incapacitation, injury, inability to self-rescue, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit.
- Airborne combustible dust at a concentration that meets or exceeds its lower flammable limit.
- Atmospheric oxygen concentration below 19.5% or above 23.5%.

Supplemental References

TD-5811P-105-JA03, “Corrective Work Form”

TD-5811P-105-JA04, “Identifying the Need for a Site Visit, Field Meet and Standby”

TD-5811P-401, “Dig-In First Responder”

M60.4, “Approved Locating Instruments”

Publication Date: March 2014

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Dig-in First Responder

Procedure

Summary

This procedure provides step-by-step instructions for first responders responding to dig-ins.

Failure to evacuate damaged facility area and establish a safe zone could result in injuries to Pacific Gas and Electric Company (PG&E) personnel and the public.

Target Audience

PG&E personnel responding to dig-ins.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Obtain a PG&E approved gas reading tool.
- Obtain TD-5811P-401-F01, “Dig-in First Responder Form.”

Table of Contents

Publication Date: March 2014

1 Understanding Reportable Requirements

The California Public Utilities Commission (CPUC) and Department of Transportation (DOT) reportable requirements for an incident include any of the following criteria:

- Death or personal injury necessitating overnight hospitalization.
- Property damage greater than $50,000 (excluding gas lost).
- Unintentional release of 3 million cubic feet (MMCF) or more of gas. For example, a severed 2 in. pipe operating at 60 psig blowing for 4 hours will release 3 MMCF of gas.

For information on other pipe sizes and operating pressure, see TD-4413P-01, "Procedure for Reportable Gas Incidents" located online in the Technical Information Library (TIL).

- All explosions
- Fires involving Company facilities (up to and including the meter set) and the release of gas.
- Events that have attracted either public attention or coverage by major news media.
- IF no other criteria are met beside major media on scene,

  THEN the incident is reportable only to the CPUC.

Reportable time frame:

- **For CPUC**: report within 2 hours (during working hours) or 4 hours (during non-working hours) after PG&E gas employees are aware of the incident and have arrived on the scene.
- **For DOT**: report within 3 hours (during working hours) or 5 hours (during non-working hours) after PG&E gas employees are aware of the incident and have arrived on the scene.

For additional information on CPUC and DOT requirements, see TD-4413B-001, "Changes to the Gas Incident Reporting Requirements" located online in the TIL.

2 Arriving at the Dig-in Site

1. Park vehicle in a safe location.
2. Observe field conditions by answering the following questions:
   - Is there damage to an underground electric facility?
     - Identified by a crackling or popping sound.
   - Is there an electrical outage?
   - Is there a downed power line?
   - Is there a downed utility pole?
   - Is there a gas leak?
     - A gas leak is often identified by the following characteristics:
       - A faint or momentary odor similar to rotten eggs or sulfur.
       - Hissing or roaring sound.
       - Water or dirt blowing into the air.
   - Is there an active fire on site?
   - Is the fire department on site?
   - Is the police department on site?
   - Are the media on site?
     - IF media are on site,

       THEN do the following:

       a. DO NOT answer any questions media direct to you.

       b. Refer media to PG&E's Communication Media Representative at 415-973-5930.

       c. Inform area gas OR electric supervisor immediately.

Publication Date: March 2014

3 Calling Dispatch or Gas Control

See Table 1, “Calling Dispatch or Gas Control for Assistance.”

Table 1. Calling Dispatch or Gas Control for Assistance

GAS DISTRIBUTION DIG-IN	GAS TRANSMISSION DIG-IN
1. Call dispatch at 888-353-3477. 2. Use the automated system: A. Select the gas option. B. Select area of incident. 3. Provide dispatcher the following information: A. You are the on-site PG&E employee (name and LAN ID). B. Field conditions. Provide the answers to questions in Section 1, “Arriving at the Site.” 4. Ask dispatcher to call 911 if needed. Emergency responders may be used to assist with evacuations, securing safe zones, and lane closures. 5. IF gas is leaking, THEN ask dispatcher to do the following: A. Contact gas control. B. Contact area’s supervisor to initiate a crew response. 6. IF NO gas is leaking, THEN tell dispatcher what damage has occurred on site. 7. Inform dispatcher if incident is reportable to CPUC and DOT.	1. Call gas control at 800-811-4111. 2. Answer questions prompted by the dispatcher. 3. Inform your supervisor of situation.
ELECTRIC DIG-IN	
1. Call dispatch at 866-411-4743. 2. Use the automated system to select the work-area of incident. 3. Give dispatcher the following information: A. You are the on-site PG&E employee (name and LAN ID). B. Field conditions. Provide the answers to questions in Section 1, “Arriving at the Site.” C. Request an electrical first responder. D. Ask dispatcher to call 911 if needed. Emergency responders may be used to assist with evacuations, securing safe zones, and lane closures. 4. Stand by to keep damaged area clear until electric first responder arrives. 5. Inform your supervisor of situation.	

Publication Date: March 2014

4 Establishing a Safe Zone—NO Fire Department on Site

WARNING!

DEATH or SERIOUS BODILY INJURY may occur in structures where gas readings are at or above 2% gas-in-air.

1. Use the approved gas reading tool to take initial gas readings at the site.

   A. IF you do not have access to an approved gas reading tool,

      THEN do the following:

      1) Move to a safe location.

      2) Contact your supervisor for assistance.

      3) Assess your environment.

      4) Establish a safe zone:

         a. Evacuate everyone from area that contains gas odor. DO NOT permit anyone to drive away in a vehicle.

         b. DO NOT turn off any running engines (e.g., motor vehicle, power equipment, etc.) OR operate electrical devices such as cell phones, switches, door bells, etc. Sparks could ignite leaking gas.

         c. Extinguish all ignition sources such as cigarette smoking, and open flames.

         d. Identify safe zone with “PG&E Caution Do Not Enter” tape.

         e. Stand-by to prevent entry to area until you are relieved or Employee in Charge (EIC) is transferred.

Publication Date: March 2014

2. IF gas is leaking,

   THEN do the following:

   1) Take readings with the gas reading tool to establish a gas-free atmosphere.

   2) IF gas monitor indicates a continuous reading of 2% gas-in-air or greater inside a structure.

      THEN do the following:

      a. Evacuate structure and people.

      b. Assess your environment and establish a safe zone:

         i. DO NOT turn off any running engines (e.g., motor vehicle, power equipment, etc.) OR operate electrical devices such as cell phones, switches, door bells, etc. Sparks could ignite leaking gas.

         ii. Extinguish all ignition sources such as cigarettes, and open flames.

         iii. Continue to take gas readings until you have reached 0% gas-in-air.

         iv. Identify safe zone with “PG&E Caution Do Not Enter” tape.

         v. Record gas readings on the **Dig-in First Responder Form**.

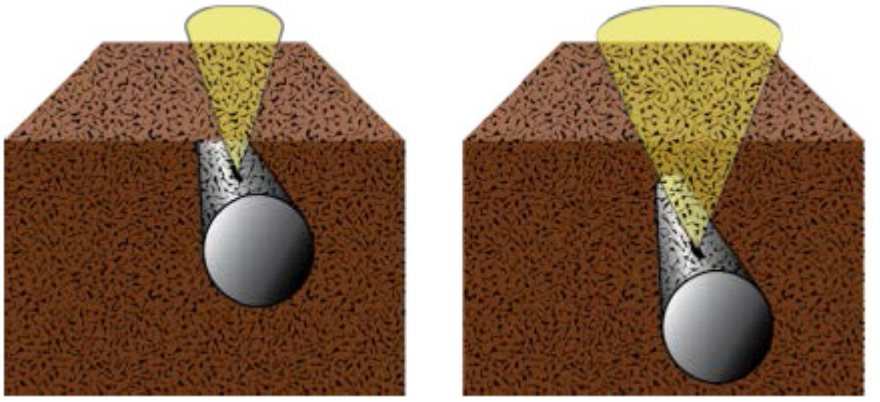
3. Maintain an established safe zone until gas crew arrives.

4. See:

   - Figure 1, “Gas Leaks Through Soil.”
   - Figure 2, “Gas Leaks Through Manhole.”
   - Figure 3, “Gas Leaks Through Asphalt.”
   - Figure 4, “Examples of Caution Tape Usage.”

Publication Date: March 2014

Figure 1. Gas Leaks Through Soil



Shallow pipe, small spread

Deep pipe, wide spread

Figure 2. Gas Leaks Through Manhole

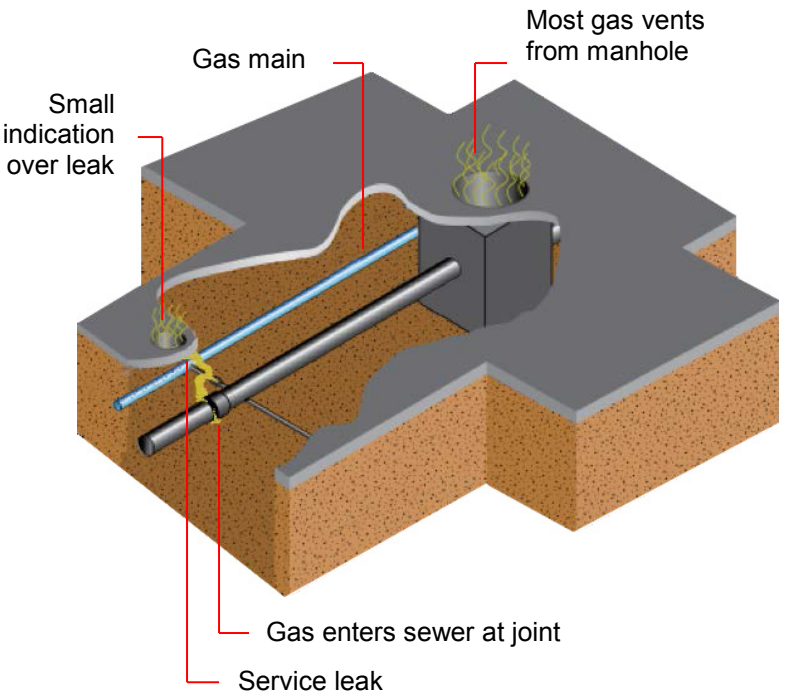


Figure 3. Gas Leaks Through Asphalt

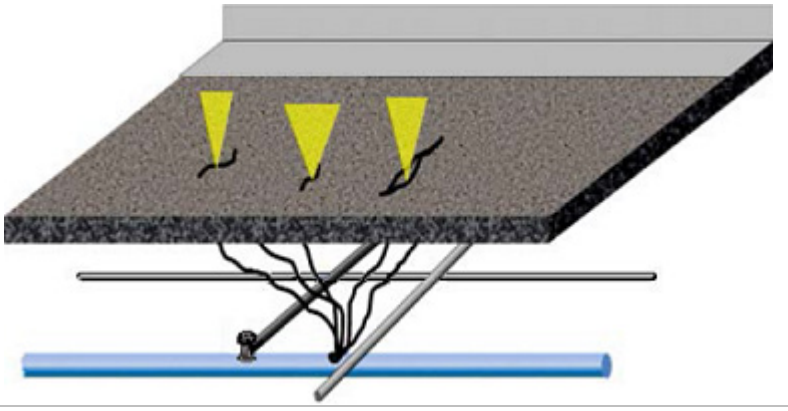


Figure 4. Examples of Caution Tape Usage

Example 1 shows caution tapes attached to a side gate door.

Example 2 shows caution tapes attached to the front door.

Publication Date: March 2014

5 Establishing a Safe Zone—Fire Department on Site

1. Locate Fire Department Incident Commander (IC).
2. Identify yourself as the EIC.
3. Ask the IC the following questions:

   A. Has the IC established a safe zone using a gas reading tool? A safe zone is established where gas monitor indicates 0%.

      1) If fire department has not established a safe zone, then make area safe (see Section 4, “Establishing a Safe Zone—No Fire Department on Site”).

   B. Is there an evacuation in place?

      1) IF evacuation took place,

         THEN do the following:

         a. Ask IC how many building(s) are evacuated.

         b. Obtain addresses of the building(s).

         c. Document details in **First Responder Form**.

   C. Has IC shut off any gas service(s)?

      1) IF gas service has been shut off,

         THEN do the following:

         a. Ask IC which building(s) have gas service shut off.

         b. Obtain addresses of the building(s).

         c. Document details in **First Responder Form**.

   A. Use a gas reading tool to verify the fire department’s gas readings.

      1) Record gas readings on the **Dig-in First Responder Form**.

Publication Date: March 2014

2) IF you do not have access to an approved gas reading tool,

   THEN move to a safe location and contact your supervisor to request assistance.

4. Maintain an established safe zone until gas crew arrives.

---

6 Documenting Event—NO Gas Leak

1. Call your area's gas Maintenance & Construction (M&C) supervisor for further instruction.
2. Document all information on **Dig-in First Responder Form**.

---

7 Updating Dispatch or Gas Control

- For Gas Transmission, call gas control to:
  - Update event status.
  - IF event is CPUC/DOT reportable OR damages are above $20,000,

    THEN obtain area Law-Claims number. After business hours, obtain on call after hour number.
- For Gas Distribution, call dispatch to:
  - Update event status.
  - IF event is CPUC/DOT reportable OR damages are above $20,000,

    THEN obtain area Law-Claims number. After business hours, obtain on call after hour number.

---

8 Contacting Law-Claims

1. Call Law-Claims to report event.

---

9 Transferring EIC to Gas Repair Crew

1. Complete the **Dig-in First Responder Form**.

Publication Date: March 2014

2. Transfer of EIC to gas crew foreman as follows:
   - Hand over the **Dig-in First Responder Form**.
   - Inform location of evacuation and service(s) shut-off.
   - Relay any other pertinent information regarding incident.
3. Notify IC of the change in EIC.

10 Preserving Surface Marks

1. IF the dig-in investigator is on site,

   THEN dig-in investigator is responsible for preserving and documenting marks.

2. IF the dig-in investigator is NOT on site,

   THEN do the following:

   A. See **Procedure TD-5811P-501, "Dig-in Investigation,"** for instructions to preserve marks.

   B. Forward all photos, notes, and information to dig-in investigator.

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Publication Date: March 2014

Supplemental References

TD-5811P-501, “Dig-in Investigation”

TD-4413B-001, “Changes to the Gas Incident Reporting Requirements”

TD-4413P-01, “Procedure for Reportable Gas Incidents”

Publication Date: March 2014

Dig-in Investigation

Procedure

Summary

This procedure provides step-by-step instructions to perform a dig-in investigation. A dig-in investigation immediately follows an incident caused by a third party digging into Pacific Gas and Electric Company's (PG&E's) underground facilities.

Target Audience

Locate and mark and maintenance & construction (M&C) personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.

Table of Contents

Publication Date: March 2014

1 Dig-in Investigator's Role and Responsibilities

1. As a dig-in investigator, your responsibility is to:

   A. Secure and preserve evidence.

   B. Obtain factual information on the incident.

   C. Document all evidence and findings.

   D. Determine if incident is billable or non-billable.

2 Preparing for the Investigation

1. Before leaving for the dig-in site, do the following:

   A. IF a USA ticket for the location of the dig-in is available,

   THEN print the following:

   - All versions of the USA ticket.
   - Locate and mark photos (if available).

   B. Obtain a plat map of the dig-in site.

   C. Ensure you have the contact numbers for locator(s).

   D. Stock your vehicle with items necessary to perform a dig-in investigation. See Table 1. "Dig-in Investigation Checklist."

Publication Date: March 2014

Table 1. Dig-in Investigation Checklist

FORMS AND RECORDS	
▪ TD-4110P-03-F02 "Gas Incident Report Addendum – (Form A-1)"	▪ Record of Warning of Unsafe Practices (Form M61-0427 [12-10] Safety Health and Claims)
▪ TD-5811P-501-F-01 "Dig-in Investigation Questionnaire"	▪ Record of Evidence Law – Third Party Claims (62-6406) **Located online via PGE@Work > Organizations > Law > Law-Claims > Litigation and Claims > Forms.**
EQUIPMENT AND TOOLS	
▪ Cell phone and charger	▪ Notepad and pen
▪ Camera	▪ Broom
▪ Electronic device (laptop or tablet with access to Quick Maps and IRTHnet)	▪ Personal Protective Equipment (PPE)
▪ HIT kit (if available)	▪ Video camera (if available)
▪ Cones	
REFERENCES	
▪ USA North's California Excavation Manual	▪ Damage Prevention Handbook

3 Understanding Reportable Requirements

The California Public Utilities Commission (CPUC) and Department of Transportation (DOT) reportable requirements for an incident include any of the following criteria:

- Death or personal injury necessitating overnight hospitalization.
- Property damage >$50,000 (excluding gas lost).
- Unintentional release of 3 million cubic feet (MMCF) or more of gas. For example, a 2 in. pipe operating at 60 psig blowing for 4 hours will release 3 MMCF of gas.

Publication Date: March 2014

For information on other pipe sizes and operating pressure, see Procedure TD-4413P-01, "Procedure for Reportable Gas Incidents," located online in the Technical Information Library (TIL).

- All explosions
- Fires involving Company facilities (up to and including the meter set) and the release of gas.
- Events that have attracted either public attention or coverage by major news media.
- IF no other criteria are met beside major media on scene,

  THEN the incident is reportable only to the CPUC.

Reportable time frame:

- **For CPUC**: report within 2 hours (during working hours) or 4 hours (during non-working hours) after PG&E gas employees are aware of the incident and have arrived on the scene.
- **For DOT**: report within 3 hours (during working hours) or 5 hours (during non-working hours) after PG&E gas employees are aware of the incident and have arrived on the scene.

  For additional information on CPUC and DOT requirements, see TD-4413B-001, "Changes to the Gas Incident Reporting Requirements" located online in the TIL.

4 Arriving at the Dig-in Site

1. Meet with Employee-In-Charge (EIC) to obtain additional information about the dig-in.
2. Ensure that the EIC has relayed any reportable information to:
   - Dispatch
   - Law-Claims

   For details about Law-Claims reportable requirements, see Procedure TD-5811P-401, "Dig-in First Responder."
3. IF new markings are needed to repair damage,

   THEN do the following:

   A. Ensure ONLY white paint is used for marking.

Publication Date: March 2014

B. DO NOT cover any existing markings.

5 Capturing Visual Evidence

1. Set current date AND time on camera.
2. Turn **camera time stamp feature** on so that date AND time are stamped on each photo.
3. Use HIT kit for photos (if available).
4. Take photos (and record video if possible):
   - From 360º of dig-in site.
   - From the same position as the pre-dig-in photos (if possible). See Figure 1, "Example Photos of Before and After Dig-in."

Figure 1. Example Photos of Before and After Dig-in

	**Example1** shows: ▪ Pre-excavated area was marked to identify 2 in. plastic gas main. ▪ Reference points: fence, utility pole, tree, bushes.
	**Example 2** shows : ▪ The same position as the pre-dig-in photo. ▪ Reference points: fence, utility pole, bushes.

Publication Date: March 2014

- Clearly capture the following (see Figure 2, “Examples of Dig-in Photos”):
  - Damage area
  - All visible markings and marking tools (flags, whiskers, stakes or das™ markers).
  - Measured distance between PG&E marks and damage area.
  - Beginning and end of delineated work areas.
  - Reference points (street signs, address, permanent landscaping, etc.)
  - All vehicles, equipment, tools and individuals at dig-in site.
  - Any daylighted facilities.
  - Transmission pipeline markers
  - Other utility facility markings

Figure 2. Examples of Dig-in Photos

Example 1 shows damage area with existing facility marks.

Publication Date: March 2014

	**Example 2** shows damage area with HIT kit.
	**Example 3** shows: ▪ Measured distance between facility marks and damage area. ▪ Dig-in location with HIT kit indicating that damage is 18 in. horizontal from original locating marks.

5. Sketch the dig-in on the **Dig-In Investigator Questionnaire**. Including the following in your sketch:

   A. General map of dig-in (include street names, cross street, etc.)

   B. Measurement of distances from cross street, landmark, or property line.

   C. General excavation equipment location.

Publication Date: March 2014

6 Meeting with the Excavator

1. Prepare to document all findings on the **Dig-in Investigation Questionnaire**.
2. Find the excavator's site crew lead or person in charge of the excavation.
3. Introduce yourself as a PG&E employee. Avoid making any judgmental comments or preconceived decisions about the event.
4. Explain your role in the investigation.
5. Ask for:
   - Excavator's business card
   - Excavator's role in the project being performed (e.g., supervisor, foreman, operator, etc.)
     1) IF a business card is not available,

        THEN document the following:
        - Name of excavator
        - Phone numbers
        - Other contact information
6. IF work was performed WITHOUT valid USA ticket,

   THEN do the following:
   - Educate excavator about calling USA at 811 before digging.
   - Explain how this incident could have been prevented by having a valid USA ticket.
   - Issue a **Record of Warning**.

     For instructions, see Job Aid TD-5811P-301-JA02, "Issuing a Record of Warning."
7. IF work was performed WITH a valid USA ticket,

   THEN use the **Dig-in Investigation Questionnaire** to ask excavator questions and document answers.
8. Request a follow-up meeting to discuss findings (if needed).

Publication Date: March 2014

9. IF excavator is unresponsive or uncooperative,

   THEN do the following:

   A. Look around the area for excavator company information, such as company logo, information on vehicles and equipment.

   B. Take photos of vehicles and individuals.

7 Investigating Damaged Area

1. Use the information you have collected to investigate damage area.
2. Document additional findings in the **Notes** section of the **Dig-in Investigation Questionnaire**.
3. Verify the following:

   A. On site excavator (company or individual) matches name of excavator on USA ticket.

   B. Dig-in occurs between ticket start date and expiration date.

   C. Date and time locate and mark was completed (if applicable)

   D. Work performed matches **Nature of Work** on ticket.

   E. Work site location and delineation match descriptions on ticket.

   F. IF remark was requested,

      THEN verify the following:

      1) PG&E was required to remark.

      2) Date AND time of documentation for remark.

   G. IF remark was NOT requested,

      THEN verify that marks are still maintained by excavator (as required by California Government Code [CGC] 4216 law).

   H. Temporary patches over facilities. This indicates daylighting was performed.

      1) IF daylighting has not been backfilled,

         THEN verify the following:

Publication Date: March 2014

a. PG&E facility is exposed.

b. Warning tape over facility.

c. Sand around facility.

4. Verify that a standby was scheduled for critical facilities.

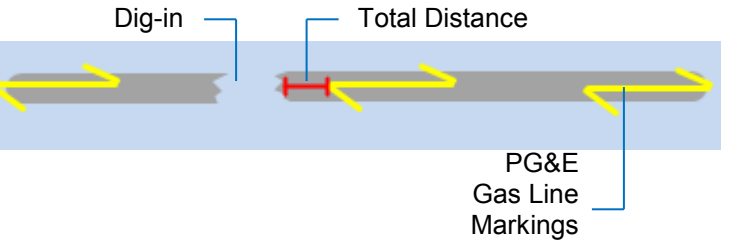
5. Perform delineation area investigation:

   - Verify that proper color was used to delineate.
   - Verify that delineations have not been altered or extended.

6. Check facility marking:

   - Verify that correct abbreviations were used to indicate the type of pipe and size.
   - Verify mark location accuracy. Marks are required to be within 24 in. of outer edge of facility.
   - Measure the total distance. This is the distance from the dig-in to the closest PG&E marking. See Figure 3, “Total Distance.”

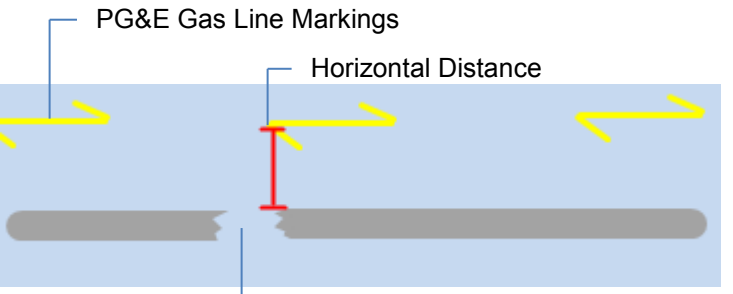
Figure 3. Total Distance



7. Measure the horizontal distance. This is the offset distance between PG&E markings and the outer edge of facility. See Figure 4, “Horizontal Distance.”

Publication Date: March 2014

Figure 4. Horizontal Distance



8. IF no visible markings are found in the work area,

   THEN perform the following:

   A. Compare site to original pictures in USA ticket.

   B. Look for markings under vehicles or equipment.

   C. Look for original delineations.

   D. Sweep area to expose markings (if necessary)

   E. Check for signs of marking removal:

      1) Wet surfaces

      2) Black paint on surfaces

      3) Evidence left by cleaning equipment (e.g. street sweeper, pressure washer, etc.)

      4) Removal of asphalt, soil, concrete, etc. For example, area was completely excavated.

      5) Area backfilled with new soil, concrete, asphalt, etc.

      6) Discontinuation of markings in a continuous path.

9. Collect damaged pipe(s) (if applicable):

   A. Fill out the **Record of Evidence Law – Third Party Claims (62-6406)**.

10. Perform the following (if needed):

Publication Date: March 2014

A. Meet with the locator(s):

1) Use the **Dig-in Investigation Questionnaire** to ask locator(s) questions and document answers.

2) Ask locators to reproduce markings by:

a. Using the same locating instrument.

b. Recreate steps to complete markings using original connection points.

c. Verify that the locator checks and documents post dig-in instrument calibration.

B. Meet with the following individuals AND use the **Dig-in Investigation Questionnaire** to ask questions and document answers:

- First responder
- Field meet attendants
- Standby personnel

8 Performing Additional Investigative Work

1. Download photos from camera to a computer.
2. Name the file of each photo with the following information:

   - Photographer LAN ID
   - Date AND military time stamped on each photo.

   Examples of photo filename:

   LANID_YYYYMMDD_HH_MI.jpg

   SSBA_20131010_16_03.jpg

3. Search IRTHnet for:

   - Additional information attached to other USA tickets for the same address or nearby work location. Look for photos, notes, and field meets.
   - Previous dig-in by excavator.

4. Identify if excavator is on the **Repeat Offender List** (if available).

Publication Date: March 2014

9 Analyzing the Evidence

1. Contact M&C supervisor to obtain:
   - Completed A-Form
   - Completed First Responder Form
   - Gas Incident Report Addendum Form A-1
2. Review **Dig-in Investigation Questionnaire**.
3. Document your findings by completing Form A-1.

   For instructions to fill out the form, see Job Aid TD-5811P-501-JA01, "Completing a Gas Incident Report Addendum (Form A-1)."
4. Determine whether damage is billable or non-billable. See Table 1, "Examples of Billable Damages" and Table 2, "Examples of Non-Billable Damages."

Table 3. Examples of Billable Damages

EXAMPLES OF BILLABLE DAMAGES	
▪ No USA Ticket	▪ Invalid or expired USA ticket
▪ Work is outside of delineation area	▪ Failed to hand dig when required
▪ Operating heavy equipment over facility	▪ Failed to daylight when required
▪ Excavating before marking is applied	▪ Working under an another excavator's USA ticket

Table 4. Examples of Non-Billable Damages

EXAMPLES OF NON-BILLABLE DAMAGES	
▪ Facility was mismarked	▪ Unmapped or incorrectly mapped facilities
▪ Locator error (incorrect/incomplete marking)	▪ Instrument failure

Publication Date: March 2014

A. IF damage is non-billable,

THEN enter the dig-in incident as an event into the **Gas Operations Corrective Action Program (CAP)**. Contact Corrective Action Program (CAP) for assistance.

B. IF damage is billable,

THEN follow up with excavator to:

1) Discuss signs of violation (e.g., whether the excavator has maintained tolerances [vertical & horizontal]).

2) Review any discrepancies between the information provided by excavator in previous meeting and findings from investigation.

3) Issue a **Record of Warning** (as needed).

For instructions, see Job Aid TD-5811P-301-JA02, "Issuing a Record of Warning."

4) Provide excavator a copy of **USA North's California Excavation Manual** highlighting areas that contain violations.

10 Submitting Evidence

1. Submit the following evidence to local M&C clerk:

- Damaged pipe(s)
- Record of Evidence Law – Third Party Claims form
- All photos
- Completed Form A and Form A-1
- First responder form
- Copy USA ticket(s)
- All notes taken for the investigation
- Dig-in Investigator Questionnaire

END OF PROCEDURE

Definitions

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Daylighting is a method of exposing gas lines in their entirety at excavation site before work begins.

Potholing is a method of exposing gas lines in various spots to confirm the location and depth of PG&E facilities before excavation begins.

Supplemental References

TD-5811P-101-JA02, “Using IRTHnet for Locating USA Tickets”

TD-5811P-301-JA02, “Issuing a Record of Warning”

TD-5811P-501-JA01, “Completing a Gas Incident Report Addendum (Form A-1)”

TD-4413B-001, “Changes to the Gas Incident Reporting Requirements”

TD-4413P-01, “Procedure for Reportable Gas Incidents”

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Approved Locating Instruments

Reference

For more details, see **Design Standard M-60, "Approved 'Mark and Locate' Instruments, Equipment, Accessories and Products."**

The locating instruments in this reference are approved for use as presented in the tables below. Receivers must be paired with like transmitters. Units are not interchangeable.

VIVAX	
ITEMS	**MATERIAL CODES**
Vivax vLoc-9800	Contact Gas Methods and Procedures.
Vivax vLocML	
Vivax vLocML2	
Vivax vLoc 5Tx Transmitter	
Vivax vLoc 10Tx Transmitter	
Vivax VX5-125 5 in. Inductive Clamp	
Vivax VX18-450F 18 in. Inductive Clamp	
Vivax Conductive Leads	

Vivax vLoc 9800

Vivax vLoc ML2

Publication Date: March 2014

PIPEHORN 800-HL	
ITEMS	**MATERIAL CODES**
Instrument, Conductive Leads, Manual, Ground	M 206115
5-in. Inductive Clamp	Contact Gas Methods and Procedures.

Pipehorn 800-HL

METROTECH 850 AND 9890 XT™	
ITEMS	**MATERIAL CODES**
Transmitter and Receiver	Discontinued
4-in. Metroclamp	203740
12.5-in. spiral wound maximum span (conductive lead)	203744

Metrotech 850

Metrotech 9890

Publication Date: March 2014

JAMESON LINE TRACER	
ITEM	**MATERIAL CODES**
Line Tracer	Contact Gas Methods and Procedures.

Jameson Line Tracer

GOLDAK MLX-GP	
ITEMS	**MATERIAL CODES**
For Electric and Gas	209374
For Gas and Telephone/Fiber Optic	203319

Goldak MLX-GP

MADE® GAS TRACKER (ACOUSTIC LOCATOR)	
ITEMS	**MATERIAL CODES**
Gas Tracker Transmitter and Receiver	Contact Gas Methods and Procedures.
Digital sound level meter kit: Extech Sound dB Meter (model #407732)	

Gas Tracker

Sound Meter Kit

*METROTECH 480B SPLIT BOX	
ITEMS	**MATERIAL CODES**
Transmitter and Receiver	Discontinued
4-in. Metroclamp	203738
12.5-in. Lead	204744
Headphone	203792
** Approved only for Non-Production Locate & Mark*	

Metrotech 480B

Publication Date: March 2014

*FISHER M-SCOPE TW-6	
ITEMS	**MATERIAL CODES**
Transmitter and Receiver	Discontinued
4-in. Fisher	203733
Headphone	203791
Search Handle – One Person	203734
** Approved only for Non-Production Locate & Mark.*	

Fisher M-Scope TW-6

EMS MARKERS			
	GAS	**ELECTRIC**	**FIBER**
EMS balls	374944	374945	371852
EMS carrots	374942	374943	371875

EMS Ball

EMS Carrot

Publication Date: March 2014

*IMPACT PROBE	
ITEMS	**MATERIAL CODES**
M-Pact-O Deluxe Repairable Bar Probe	200509
Anglefin Bar Hole Plunger Impact Bar	205003
**For usage guideline, see Numbered Document M-54.1 located online in the Technical Information Library (TIL).*	

M-Pact-O Deluxe Repairable Bar Probe

Anglefin Bar Hole Plunger Impact Bar

END OF REFERENCE

Publication Date: March 2014

Vivax vLoc-9800

Operating Instructions

Procedure

Summary

This procedure provides step-by-step instructions for operating the Vivax vLoc 9800 locating instrument.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this manual.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Ensure that your instrument calibration has been verified and documented.

Table of Contents

Publication Date: March 2014

1 Instrument Features

The Vivax vLoc-9800 has the following features:

- Predefined frequencies: 982 Hz, 9.8 kHz, and 83.1 kHz.
- Instrument works with either the vLoc-5x or vLoc-10x transmitter.
- Push button controls.
- Position specific audible tone signals:
  - Solid tone indicates that receiver needs to move to the right to find target conductor.
  - Beeping tone indicates that receiver needs to move to the left.
  - Silent indicates that receiver is centered over conductor.

2 Checking vLoc-5x Transmitter Batteries

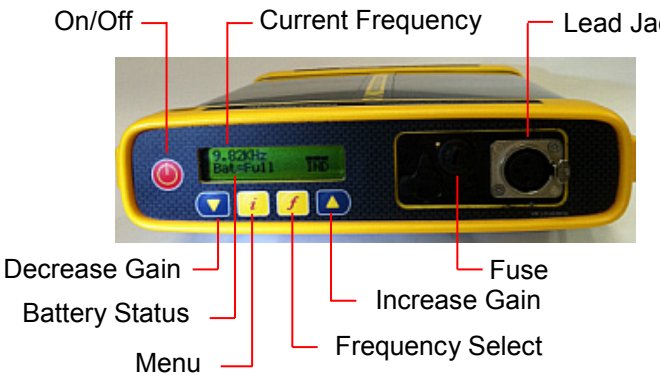
For transmitter model vLoc-10x, see Procedure TD-5811P-602, "Vivax vLocML & vLocML2."

1. Verify that battery level is sufficient:

   A. Press AND hold the power button to turn transmitter **ON**.

   B. Look at battery status. See Figure 1. "Transmitter."

Figure 1. Transmitter



Publication Date: March 2014

1) IF battery status indicates **Bat=Low** at any time during the course of a workday,

   THEN do the following:

   a. Press AND hold the power button to turn transmitter **OFF**.

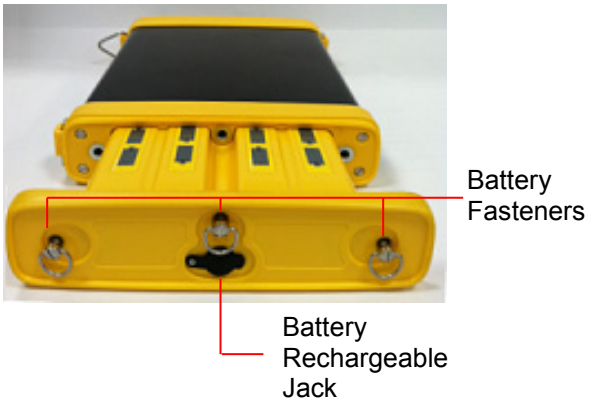
   b. Replace OR recharge batteries.

2. Replace batteries:

   A. Look for the three battery tray fasteners at the back of transmitter.

   B. Turn each fastener ¼ turn counterclockwise. See Figure 2, “Battery Compartment.”

Figure 2. Battery Compartment



   C. Slowly detach battery tray from transmitter. Batteries are placed loosely inside of tray. Removing tray quickly may cause batteries to fall out.

   D. Replace eight D-Cell Alkaline batteries.

   E. Carefully insert battery tray into transmitter.

   F. Turn fasteners to secure battery tray.

Publication Date: March 2014

3. Recharge batteries:

   A. DO NOT recharge non-rechargeable batteries. This may damage instrument.

   B. Use the transmitter's original charger cable. Damage to battery occurs when using a charger cable not made for the instrument battery pack.

   C. Plug charger into the rechargeable jack of transmitter.

   D. Plug charger power cord into a wall socket.

   E. Look at the light (LED) on the charger. Red light indicates charge cycle is in progress.

   F. Unplug charger from transmitter when LED emits a green light. This indicates batteries are fully charged.

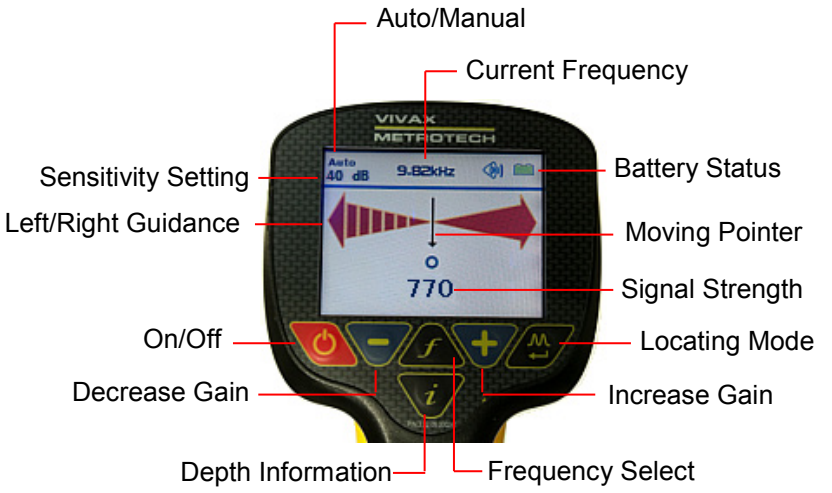
3 Checking Receiver Batteries

1. Verify that battery level is sufficient:

   A. Press AND hold power button to turn receiver **ON**.

   B. Look at the battery status. See Figure 3, "Receiver."

Figure 3. Receiver



Publication Date: March 2014

1) IF battery level is lower than two bars at any time during the course of a workday,

   THEN do the following:

   a. Press AND hold power button to turn receiver **OFF**.

   b. Replace or recharge batteries.

2. Replace batteries:

   A. Unscrew two stainless steel screws on the back of the receiver handle.

   B. Remove battery cover.

   C. Remove **battery holder**.

   D. Replace six “AA” batteries.

   E. Insert battery holder into battery compartment.

   F. Fasten screws to secure battery cover.

Battery Holder

3. Recharge batteries:

   A. Lift the rubber cover at the base of the receiver battery compartment. See Figure 4. “Receiver Battery Compartment.”

Publication Date: March 2014

Figure 4. Receiver Battery Compartment

B. Plug charger into the receiver charger jack.

C. Plug charger cord into a wall socket.

D. Look at the LED on the charger. Red light indicates charge cycle is in progress.

E. Unplug charger from transmitter when LED emits a green light. This indicates batteries are fully charged.

4 Performing Instrument Daily Checkout

1. Inspect instrument for signs of damage such as:

- Broken receiver display
- Damaged meter needle
- Cracked transmitter or receiver
- Missing controls or components

A. IF instrument is damaged,

THEN do the following:

1) Fill out the instrument repair form.

Publication Date: March 2014

The instrument repair form is located in the Form section of this handbook AND online in the Technical Information Library (TIL).

2) Contact your supervisor to send instrument to an approved repair facility.

2. Inspect leads and clamps to ensure that:

- Leads contain NO frayed wires.
- Rubber sleeves are in good condition.
- Clamps close properly.
- Clamp connections are NOT loose.

A. Replace leads if you can identify any signs of damage.

3. Check conductive leads:

A. Visually inspect 3-pin lead and clamps to ensure they are in good working condition:

1) Look for signs of damage such as frayed wires or tears in protective sleeve.

2) IF you can identify any signs of damage,

THEN replace leads.

B. Verify that the 3-pin lead and clamps work properly:

1) Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

2) Plug 3-pin lead into transmitter.

3) Attach red clamp to black clamp.

4) Make sure rubber sleeves cover clamps.

5) Turn transmitter **ON**.

6) Wait for beeping sound to occur. This indicates that the transmitter is on.

a. IF transmitter does not emit a beeping sound,

THEN do the following:

i. Verify that the volume setting is turned on.

Publication Date: March 2014

ii. Submit instrument for repair if adjusting volume does not resolve issue.

WARNING!

ELECTRIC SHOCK may occur when disconnecting leads from or connecting leads to an energized instrument.

7) Check transmitter display screen for digital signal reading.

8) Wiggle connected wires and connection joints of clamps to check for fluctuation in the milliampere (mA) reading.

   a. IF the screen displays any of the following:

      - A fluctuation in the mA reading,
      - A zero (mA) reading,
      - Flashing digital signal reading,

      THEN do the following:

      i. Turn transmitter **OFF**.

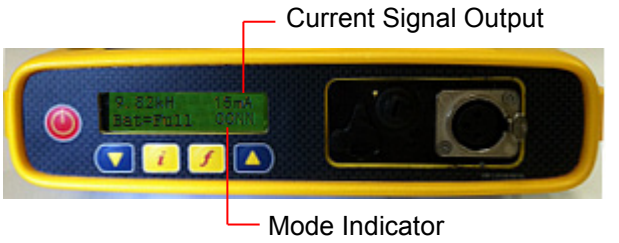
      ii. Replace leads.

      iii. Submit instrument for repair if replacing leads does not resolve issue.

9) Verify that **CONN** appears on transmitter display screen. See Figure 5, “Transmitter Display Screen.”

Publication Date: March 2014

Figure 5. Transmitter Display Screen



a. IF **CONN** mode indicator is missing from display screen,

   THEN do the following:

   i. Turn transmitter **OFF**.

   ii. Replace leads.

   iii. Submit instrument for repair if replacing leads does not resolve issue.

10) Turn transmitter **OFF**.

11) Unplug leads from transmitter.

4. Check inductive clamp:

   A. Plug the 3-pin inductive clamp lead into transmitter.

   B. Turn transmitter **ON**.

   C. Wait for beeping sound to occur. This indicates that the transmitter is on.

      1) IF transmitter does not emit a beeping sound,

         THEN do the following:

         a. Verify that the volume setting is turned on.

         b. Submit instrument for repair if adjusting volume does not resolve issue.

   D. Look at the transmitter mode indicator.

   E. Verify that **CLAMP** appears on transmitter display screen.

Publication Date: March 2014

1) Replace lead if **CLAMP** does not appear on screen,

2) Submit instrument for repair if replacing lead does not resolve issue.

F. Check transmitter display screen for digital signal reading.

1) IF the screen displays any of the following:

- A zero mA reading,
- Flashing digital signal reading,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace lead.

c. Submit instrument for repair if replacing lead does not resolve issue.

G. Turn transmitter **OFF**.

H. Remove lead.

5. Verify inductive capabilities:

Frequency Select Button

A. Turn transmitter **ON**.

B. Press the **frequency select button** on the transmitter to verify frequency level.

C. Look at the transmitter mode indicator.

D. Verify that **IND** appears on transmitter display screen.

1) IF **IND** does not appear on screen,

THEN do the following:

a. Turn transmitter **OFF**.

b. Turn transmitter **ON**.

c. Verify if **IND** appears.

d. Submit instrument for repair if **IND** does not appear after you have turned transmitter off and on.

Publication Date: March 2014

E. Turn the receiver **ON**.

F. Press the **frequency select button** on the receiver to change the frequency level to match the frequency of the transmitter.

Frequency Select Button

G. Walk 25−30 ft away from the transmitter.

H. Ensure that receiver is in-line with the transmitter's induction direction arrows.

I. Rotate the receiver from left to right AND verify that the **moving pointer** reflects transmitter position.

Moving Pointer

J. Verify that the audible tone is present when moving pointer is not in-line with transmitter.

1) IF receiver does not emit a tone,

THEN do the following:

a. Verify that the volume setting is turned on.

b. Submit receiver for repair if adjusting volume does not resolve issue.

K. Check transmitter AND receiver to ensure that battery level is sufficient for the day's workload.

L. Turn transmitter AND receiver **OFF**.

5 Operating Transmitter

1. Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

2. Set up instrument according to the locate method you are performing.

For conductive locate, see Procedure TD-5811P-201, "Conductive Locate."

For inductive locate with clamp, see Procedure TD-5811P-202, "Inductive with Coupler Locate."

Publication Date: March 2014

For inductive locate, see Procedure TD-5811P-203, "Inductive Locate."

3. Turn transmitter **ON**.
4. Confirm that transmitter has a minimum signal reading of 10 mA.
   A. Adjust ground and connection if signal reading is below 10 mA.
   B. Submit transmitter for repair if adjusting ground and connection do not resolve issue.
5. Select the best frequency for conductor and work area.

For instructions to select the best frequency, see Job Aid TD-5811P-103-JA02, "Choosing the Best Frequency."

6 Operating Receiver

Frequency Select Button

1. Turn receiver **ON**.
2. Press **frequency select button** to match transmitter frequency.
3. Press the **mode button** to set receiver locating mode to auto.

Mode Button

4. Check **moving pointer** on receiver to verify that receiver is in line with conductor.
5. Sweep suspected conductor location for the highest reading.
6. Press the **menu button**.

Moving Pointer

> **NOTE**
>
> DO NOT communicate depth to excavators.

Menu Button

7. Confirm that receiver displays a reasonable depth for the type of facility being located.

Publication Date: March 2014

A. IF receiver does not display a reasonable depth,

THEN bleedover may exist.

For instructions to work around bleedover, see Job Aid TD-5811P-103-JA01, "Troubleshooting Difficult to Locate."

7 Operating Receiver in Passive Mode

Frequency Select Button

1. Press **frequency select button** to select one of the following (see Figure 6, "Passive Modes"):
   - Power 60
   - Radio

Figure 6. Passive Modes

A. IF Radio or Power 60 is not an option,

THEN do the following:

1) Press AND hold **menu button**.

2) Press **increase gain button** several times to select frequency mode.

3) Press **frequency select button**.

Menu Button

Increase Gain Button

Publication Date: March 2014

4) Scroll through the frequency selection list by pressing **increase** or **decrease gain buttons**. See Figure 7, “Frequency Selection Screen.”

Decrease Gain Button

Figure 7. Frequency Selection Screen

5) Press **frequency select button** to select one of the following:
   - Power 60
   - Radio

Frequency Select Button

6) Press the **menu button** twice to return to the main screen.

7) See **Procedure TD-5811P-204, “Passive Locate.”**

Menu Button

END OF PROCEDURE

Publication Date: March 2014

Definitions

Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends a signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-201, “Conductive Locate”

TD-5811P-202, “Inductive with Coupler Locate”

TD-5811P-203, “Inductive Locate”

TD-5811P-204, “Passive Locate”

TD-5811P-103-JA01, “Troubleshooting Difficult to Locate”

Publication Date: March 2014

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Vivax vLocML and vLocML2

Operating Instructions

Procedure

Summary

This procedure provides step-by-step instruction for operating the Vivax vLocML and vLocML2 locating instruments.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Ensure that your instrument calibration has been verified and documented.

Table of Contents

Publication Date: March 2014

1 Instrument Features

1. The Vivax vLocML and vLocML2 each has the following features:

   - Wide range of frequencies: 16 Hz to 200 kHz.
   - Instrument works with either the vLoc-5x or vLoc-10Tx transmitter.
   - Push button controls.
   - Position-specific audible tone signal:
     - Solid tone indicates that receiver is directly over target conductor.
     - Silent indicates that receiver is either on the left or the right of target conductor.
   - Electronic Marker System (EMS) features:
     - Marker ball frequencies.
     - Dual mode (line and marker locate simultaneously).

2 Checking vLoc-10Tx Transmitter Batteries

For transmitter model vLoc-5x, see Procedure TD-5811P-601, "Vivax vLoc-9800."

1. Verify that battery level is sufficient:

   A. Press AND hold the **power button** to turn transmitter **ON**.

   B. Look at battery level on display screen. See Figure 1, "Transmitter Display Screen."

      1) IF at any time during the course of a workday battery level is lower than two bars OR the low power (LP) indicator is on,

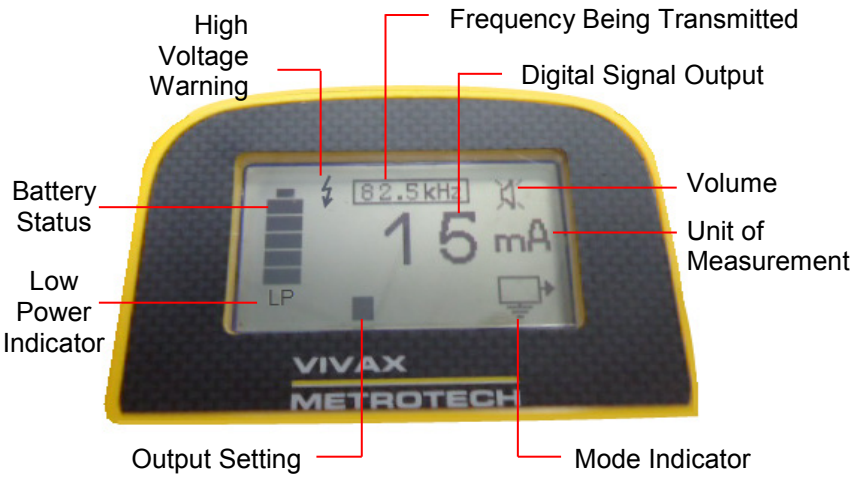
         THEN do the following:

         a. Press AND hold the **power button** to turn transmitter **OFF**.

         b. Replace OR recharge batteries.

Publication Date: March 2014

Figure 1. Transmitter Display Screen



2. Replace batteries:

   A. Unhook battery tray clamps.

   B. Detach battery unit from transmitter.

   C. Unscrew the stainless steel screws on each battery cover.

   D. Turn tray upside down with the upside resting on your open palm.

   E. Use your other palm to tap sharply on the battery tray to remove batteries.

   F. Insert eight D-cell batteries according to instructions on the battery covers.

   G. Replace battery covers.

   H. Hook battery tray back on transmitter.

3. Recharge batteries:

   A. DO NOT recharge non-rechargeable batteries. This may damage instrument.

   B. Plug charger cable into the rechargeable jack on the side of transmitter.

Publication Date: March 2014

C. Plug charger power cord into a wall socket.

D. Look at the light (LED) on the charger. Red light indicates charge cycle is in progress.

E. Unplug charger from transmitter when LED emits a green light. This indicates batteries are fully charged.

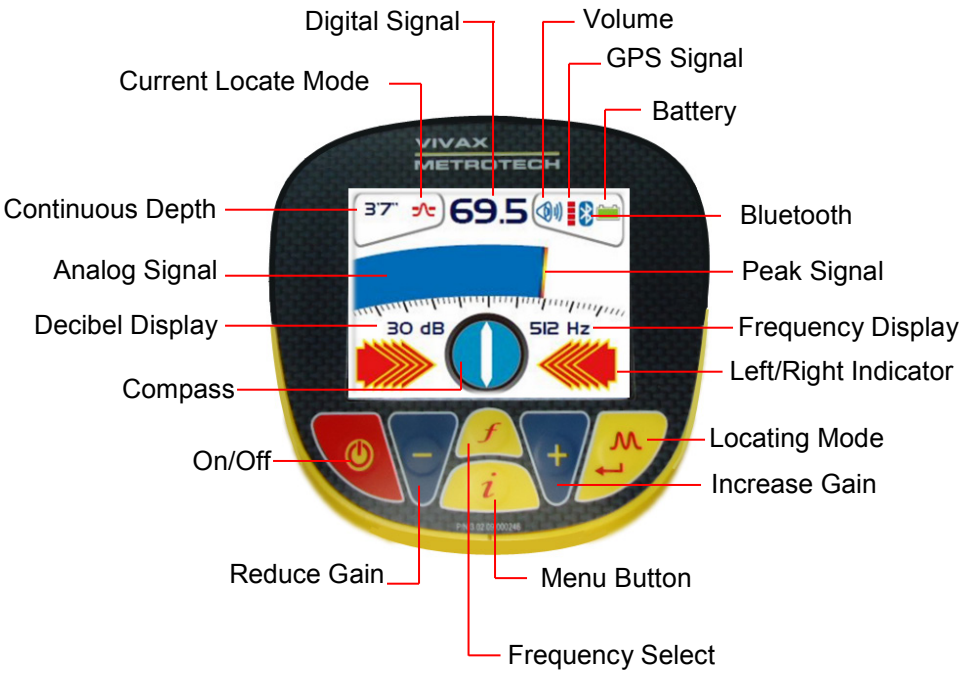
3 Checking Receiver Batteries

1. Verify that battery level is sufficient:

   A. Press and hold the **power button** to turn receiver **ON**.

   B. Check display screen for battery level. See Figure 2, “Receiver Display Screen.”

Figure 2. Receiver Display Screen



Publication Date: March 2014

1) IF battery level is lower than two bars at any time during the course of a workday,

   THEN do the following:

   a. Press AND hold the **power button** to turn receiver **OFF**.

   b. Replace OR recharge batteries.

2. Replace batteries:

   A. Remove stainless steel screws on the back of the receiver handle.

   B. Remove battery tray.

   C. Replace six “AA” batteries.

   D. Insert battery tray into receiver.

   E. Fasten screws to secure battery tray.

3. Recharge batteries:

   A. DO NOT recharge non-rechargeable batteries. This may damage instrument.

   B. Plug charger cable to the rechargeable jack on the back of the receiver.

   C. Plug charger power cord into a wall socket.

   D. Look at the LED on the charger. Red light indicates charge cycle is in progress.

   E. Unplug charger from transmitter when LED emits a green light. This indicates batteries are fully charged.

4 Performing Instrument Daily Checkout

1. Inspect instrument and components for signs of damage such as:

   - Broken display on transmitter or receiver.
   - Cracked transmitter or receiver.
   - Missing controls or components.

Publication Date: March 2014

A. IF instrument is damaged,

   THEN do the following:

   1) Fill out the instrument repair form.

      The instrument repair form is located in the Form section of this handbook AND online in the Technical Information Library (TIL).

   2) Contact your supervisor to send instrument to an approved repair facility.

2. Visually check all clamps and leads to ensure they are in good working condition:

   A. Look for signs of damage such as:

      - Frayed wires
      - Tears in protective sleeve.
      - Clamp does not close properly.
      - Clamp connections are loose.

   B. Replace leads if you can identify any signs of damage.

3. Verify that the 3-pin inductive leads and clamps work properly:

WARNING!

ELECTRIC SHOCK may occur when disconnecting leads from or connecting leads to an energized instrument.

   A. Ensure that transmitter is **OFF**.

   B. Plug 3-pin leads into transmitter.

   C. Connect red clamp to black clamp.

   D. Make sure rubber sleeves cover clamps.

   E. Turn transmitter **ON**.

Publication Date: March 2014

F. Wait for beeping sound to occur. This indicates that the transmitter is on.

1) IF transmitter does not emit a beeping sound,

THEN do the following:

a. Verify that the volume setting is turned on.

b. Turn transmitter **OFF**.

c. Submit instrument for repair if adjusting volume does not resolve issue.

G. Look at the transmitter display screen for digital signal reading AND wiggle connected wires and connection joints of clamps to check for fluctuation in the milliampere (mA) reading.

1) IF the screen displays any of the following:

- A fluctuation in the mA reading,
- A zero mA reading,
- Flashing digital signal reading,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace leads.

c. Submit instrument for repair if replacing leads does not resolve issue.

H. Verify that the **direct connect icon** appears on transmitter display screen.

Direct Connect Icon

1) IF direct connect icon does not appear on screen,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace leads.

c. Submit instrument for repair if replacing leads does not resolve issue.

I. Turn transmitter **OFF**.

Publication Date: March 2014

J. Unplug leads from transmitter.

4. Check inductive clamp:

A. Plug the 3-pin inductive lead into transmitter.

B. Turn transmitter **ON**.

C. Wait for beeping sound to occur. This indicates that the transmitter is on.

1) IF transmitter does not emit a beeping sound,

THEN do the following:

a. Verify that the volume setting is turned on.

b. Turn transmitter **OFF**.

c. Submit instrument for repair if adjusting volume does not resolve issue.

D. Look at the transmitter mode indicator to verify that the **clamp icon** appears on transmitter display screen.

1) IF clamp icon does not appear,

Clamp Icon

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace clamp.

c. Submit instrument for repair if replacing clamp does not resolve issue.

E. Check transmitter display screen for digital signal reading.

1) IF the screen displays any of the following:

- A zero mA reading,
- Flashing digital signal reading,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace clamp.

c. Submit instrument for repair if replacing clamp does not resolve issue.

Publication Date: March 2014

F. Look at the transmitter display screen for digital signal reading AND wiggle connected wires and connection joints to check for fluctuation in the mA reading.

1) IF the screen displays any of the following:

- A fluctuation in the mA reading,
- A zero mA reading,
- Flashing digital signal reading,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace leads.

c. Submit instrument for repair if replacing leads does not resolve issue.

G. Turn transmitter **OFF**.

H. Remove clamp.

5. Verify inductive capabilities:

A. Turn transmitter **ON**.

B. Press the **frequency select button** on the transmitter to verify frequency level.

Frequency Select Button

1) IF frequency level is NOT set to 82.5 kHz or 83.1 kHz,

THEN change frequency to 82.5 kHz or 83.1 kHz.

C. Look at the transmitter mode indicator to verify that the **inductive icon** appears on transmitter display screen.

Inductive Icon

1) IF inductive icon does not appear on screen,

THEN do the following:

a. Turn transmitter **OFF**.

b. Turn transmitter **ON**.

c. Verify if inductive icon appears.

Publication Date: March 2014

d. Submit instrument for repair if inductive icon does not appear after you have turned transmitter off and on.

D. Turn receiver **ON**.

E. Press the **frequency select button** on the receiver to change the frequency level to match the transmitter frequency.

Frequency Select Button

F. Walk 25−30 ft away from the transmitter.

G. Ensure that receiver is in line with the handle of transmitter.

H. Rotate the receiver from left to right.

Compass

I. Verify that the **compass** maintains a reading in line with the transmitter.

J. Verify that receiver emits audible tone when in line with transmitter.

1) IF receiver does not emit a tone,

THEN do the following:

a. Verify that gain is turned up.

b. Verify that volume setting is turned on.

c. Submit receiver for repair if adjusting volume does not resolve issue.

K. Check transmitter to ensure battery level is sufficient for today's workload.

L. Turn transmitter **OFF**.

Locate Mode Button

6. Verify receiver EMS capability:

A. Press AND hold the **locate mode button** twice to switch to EMS mode.

Marker Icon

B. Look for the **marker icon** on receiver display.

C. Press the **frequency select button** to change marker type:

Publication Date: March 2014

- Yellow marker for gas
- Red marker for electric
- Orange marker for fiber

D. Hover receiver over a marker to verify that receiver can pick up signal from marker.

E. Check receiver to ensure battery level is sufficient for the day's workload.

F. Turn receiver **OFF**.

---

5 Operating Transmitter

1. Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

2. Set up instrument according to the locate method you are performing.

   For conductive locate, see Procedure TD-5811P-201, "Conductive Locate."

   For inductive with coupler locate, see Procedure TD-5811P-202, "Inductive with Coupler Locate."

   For inductive locate, see Procedure TD-5811P-203, "Inductive Locate."

3. Turn transmitter **ON**.

4. Confirm that transmitter has a minimum signal reading of 10 mA.

5. IF signal reading is less than 10 mA,

   THEN adjust ground and connection as necessary.

6. IF adjusting ground and connection do not yield a minimum signal reading of 10 mA,

   THEN do the following:

   A. Turn transmitter **OFF**.

   B. Submit transmitter for repair.

7. Select the best frequency for conductor type and work area.

Publication Date: March 2014

For instructions to select the best frequency See Job Aid TD-5811P-103-JA02, "Choosing the Best Frequency."

6 Operating Receiver

Frequency Select Button

1. Turn receiver **ON**.
2. Press **frequency select button** to match transmitter frequency.
3. Set receiver **locating mode** to:
   - **Peak response mode**: displays peak signal graph.
   - **Peak null mode**: displays peak signal graph and left/right indicators.

Locate Mode Button

NOTE

Null mode displays left/right indicators for directional guides. DO NOT use null mode to locate.

A. See Figure 3, "Peak Response Mode" and Figure 4, "Peak-Null Mode."

Figure 3. Peak Response Mode

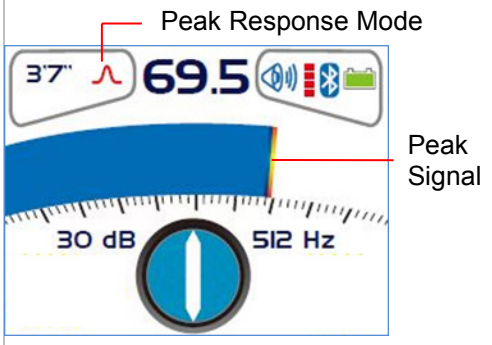
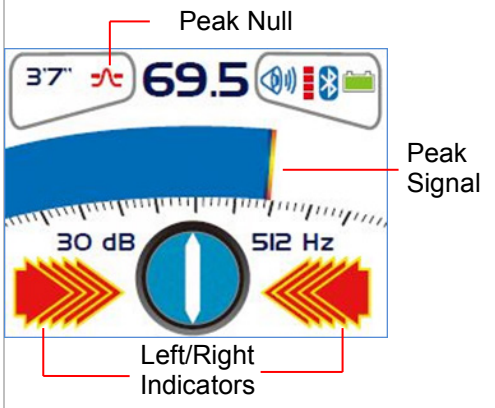


Figure 4. Peak Null Mode



Publication Date: March 2014

4. Check **compass** on receiver to verify that receiver is in line with conductor.

   - Blue compass background means direction is verified.
   - Transparent compass background means direction of conductor is NOT verified.

Blue Background

Transparent Background

5. Sweep conductor location for the highest **peak signal** reading.

6. Press **increase gain button** to maintain the highest reading.

Increase Gain Button

NOTE

DO NOT communicate depth to excavators.

7. Confirm that receiver displays a reasonable depth for the type of facility being located.

   A. Place receiver on the ground directly over conductor.

   B. Press the **menu button** to display depth.

Menu Button

      1) Bleedover may exist if receiver does not display depth reading.

         For instructions to work around bleedover, see Job Aid TD-5811P-103-JA01, "Troubleshooting Difficult to Locate."

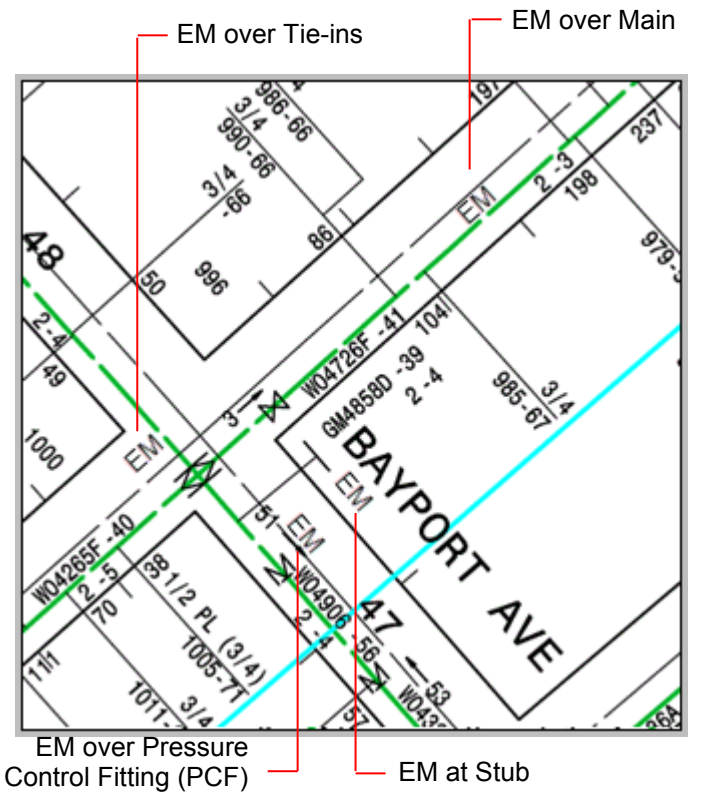
7 Performing an EMS Locate

1. Use EMS locating method when:

   A. Searching area for unmarked facilities where EMs is installed. See Figure 5, "Example of Ems on a Map."

Publication Date: March 2014

Figure 5. Example of EMs on a Map



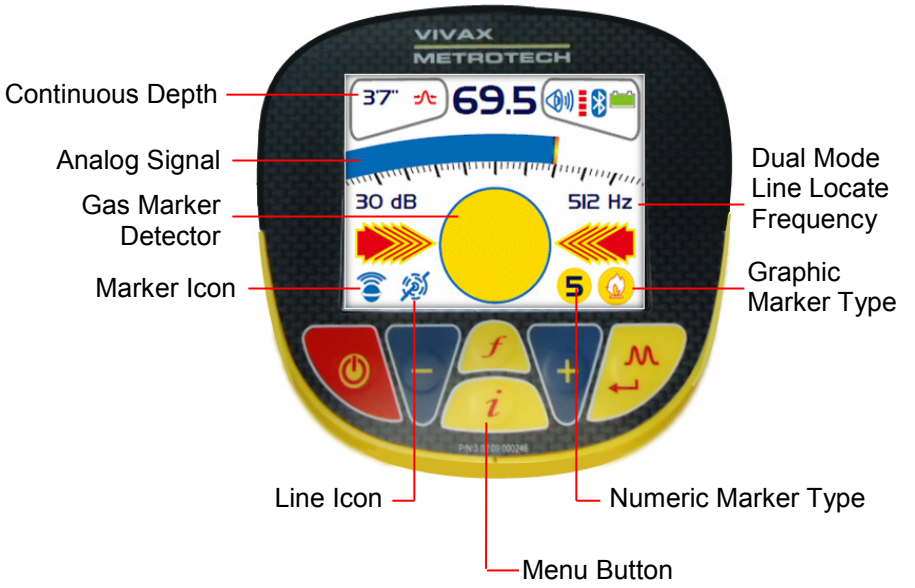
B. Map indicates that at least one EMS was installed in your work area.

2. Choose an EMS configuration mode to operate the receiver:

- **Dual cable locator and marker locator** mode (or dual mode). In this mode:
  - Set receiver to 512 Hz, 640 Hz, or 8.19 Hz frequency. The dual mode only works in these frequencies.
  - Receiver can trace an energized cable or pipe while simultaneously looking for the presence of markers.
  - Instrument can locate in conductive, inductive with clamp, and inductive mode while simultaneously searching for electronic markers.
- **Dedicated marker locator** mode (or dedicated mode). In this mode, receiver is dedicated to detect only markers.
  See Figure 6, “Receiver Display for EMS Mode.”

Publication Date: March 2014

Figure 6. Receiver Display for EMS Mode



3. To operate receiver in dual mode:

   A. Press AND hold the **locate mode button** once to activate the marker icon and the line icon. The compass becomes the **marker detector** when EMS mode is successfully initiated. See Figure 6.

   B. IF you need to change the marker type for dual mode,

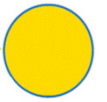
      THEN do the following:

      1) Press AND hold the **locate mode button** once to switch to dedicated mode.

      2) Press the **frequency select button** to select a different marker type.

      3) Press AND hold the **locate mode button** twice to return to the dual mode.

Locate Mode Button



Marker Detector (Gas)

Frequency Select Button

Publication Date: March 2014

C. Locate conductor AND search for indication of EMS in the area. The marker detector fills with color when approaching marker location.

D. Determine the marker location by pinpointing the highest marker detector reading.

4. To operate receiver in dedicated mode:

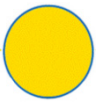
A. To switch to dedicated mode:

- From dual mode, press AND hold the locate mode button once.
- From normal mode, press AND hold the locate mode button twice.

Frequency Select Button

B. Push the **frequency select button** to select a marker type:

- Yellow for gas
- Red for electric
- Orange for fiber


Marker Detector (Gas)

C. Search for indication that EMS is in the area. As the **marker detector** moves closer to the marker location, detector ball increasingly fills with the color of the marker.

D. Determine the marker location by the highest analog signal strength and highest marker detector reading.

8 Performing a Passive Locate

1. Turn receiver **ON**.

2. Press **frequency select button** to select the following frequencies.

- Power 60 Hz
- Radio (radio frequency)

Publication Date: March 2014

A. IF Power 60Hz and Radio frequencies are not found on the receiver,

THEN do the following to manually set passive mode:

Menu Button

1) Press AND hold **menu button**. See Figure 7, “Menu Screen.”

Figure 7. Menu Screen

2) Press **increase gain button** several times to scroll to “Frequency”.

Increase Gain Button

3) Press **locate mode button**.

4) Scroll to “Power 60” frequency.

5) Press **locate mode button** twice.

6) Select “Radio” frequency. See Figure 8, “Frequency Selection Screen.”

Locate Mode Button

Publication Date: March 2014

Figure 8. Frequency Selection Screen

7) Press **menu button** twice to return to the main screen. Your instrument only has digital and analog signal readings available when the passive mode is set.

3. Locate facilities using passive locate method.

   For instructions, see Procedure TD-5811P-204, "Passive Locate."

4. Sweep facility location for the highest peak signal reading.

5. Press **increase gain button** to maintain the highest reading.

Increase Gain Button

END OF PROCEDURE

Publication Date: March 2014

Definitions

Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Electronic Marker System (EMS) is a set of markers placed underground to help identify facilities that would otherwise be difficult to locate.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends a signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-103-JA01, “Troubleshooting Difficult to Locate”

TD-5811P-201, “Conductive Locate”

TD-5811P-202, “Inductive with Coupler Locate”

TD-5811P-203, “Inductive Locate”

TD-5811P-204, “Passive Locate”

TD-5811P-103-JA02, “Choosing the Best Frequency”

Publication Date: March 2014

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Pipehorn 800-HL®

Operating Instructions

Procedure

Summary

This procedure provides step-by-step instructions for operating Pipehorn 800-HL locating instrument.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Ensure that your instrument calibration has been verified and documented.

Table of Contents

1 Instrument Features

The Pipehorn 800-HL has the following features:

- Frequencies: 9 kHz and 480 kHz.
- Locates depth of a conductor up to 20 ft below ground.
- Frequency switch and sensitivity knob.
- Instrument transmits both high and low frequency when operating in conductive and inductive with coupler methods.
- Produces strongest signal when handle is in line with target conductor.
- Position-sensitive audible tone signal control:
  - Beeping tone indicates sensitivity level is too high.
  - No tone indicates sensitivity level is too low.
  - High-pitch tone indicates receiver is near target conductor.
  - Low-pitch tone indicates receiver is far away from conductor or sensitivity level is too low.
  - Highest-pitch tone indicates receiver is centered over conductor.
  - Lower tone indicates receiver is to the left or right of target conductor.

2 Checking Transmitter Batteries

1. Verify that battery level is sufficient:

   A. Push the **power switch** to turn transmitter **ON**.

   B. Listen for audible tone. This indicates that transmitter is on.

Power Button

Publication Date: March 2014

C. IF any of the following occurs during the course of a workday:

- Transmitter emits a beeping tone,
- Audible tone becomes weak,
- Operation distance decreases,
- Instrument is inactive,

THEN do the following:

1) Push the **power switch** to turn transmitter **OFF**.

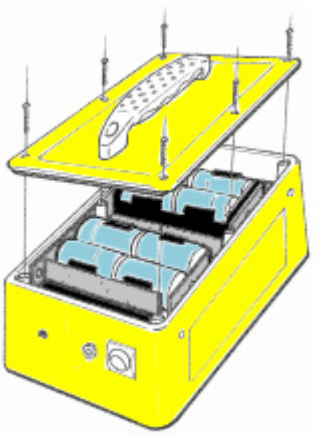
2) Replace batteries.

2. Replace batteries:

A. Turn transmitter **OFF**.

B. Remove screws from the cover of transmitter. See Figure 1, “Transmitter Cover Removal.”

Figure 1. Transmitter Cover Removal



C. Lift handle to remove cover.

D. Replace eight C-cell batteries.

E. Replace cover.

F. Fasten screws to secure cover.

Publication Date: March 2014

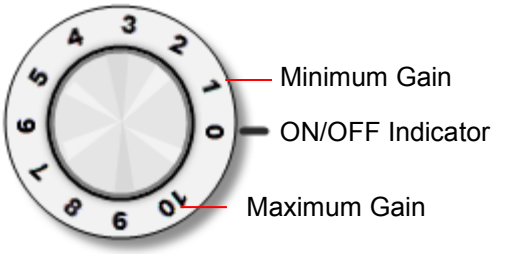
3 Checking Receiver Batteries

1. Verify that battery level is sufficient:

   A. Turn transmitter **ON**.

   B. Turn receiver **sensitivity knob** clockwise until it clicks. See Figure 2, “Sensitivity Knob.”

Figure 2. Sensitivity Knob



   C. Continue to turn the knob until receiver emits an audible tone. This tone indicates that:

      - Receiver is **ON**.
      - Sensitivity is set.

   D. Listen to the tone of the receiver.

      1) IF any of the following occurs:

         - Receiver tone is intermittent or inaudible,
         - Meter needle is erratic or unresponsive,

         THEN do the following:

         a. Turn sensitivity knob to “OFF” position.

         b. Replace batteries.

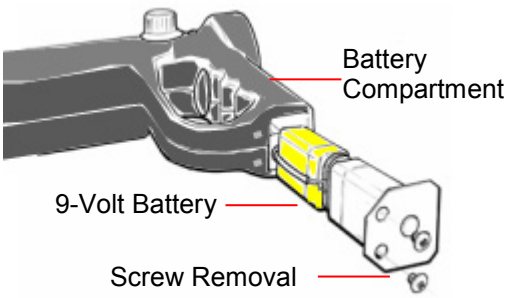
2. Replace batteries:

   A. Turn receiver **OFF**.

Publication Date: March 2014

B. Remove screws from the metallic plate at the bottom of the receiver handle. See Figure 3, “Receiver Battery Location.”

Figure 3. Receiver Battery Location



C. Remove metallic plate.

D. Remove two 9-volt batteries from the battery compartment.

E. Replace batteries.

F. Replace metallic plate on receiver handle.

G. Fasten both screws to secure metallic plate.

4 Performing Instrument Daily Checkout

1. Inspect instrument for signs of damage such as:

   - Broken receiver display
   - Damaged meter needle
   - Cracked transmitter or receiver
   - Missing controls or components

   1) IF instrument is damaged,

      THEN do the following:

      a. Fill out the instrument repair form.

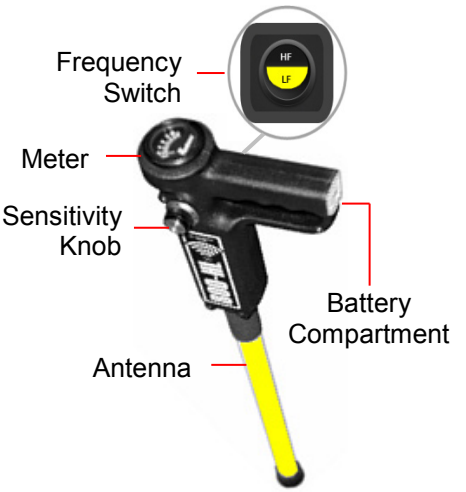
Publication Date: March 2014

The instrument repair form is located in the Form section of this handbook AND online in the Technical Information Library (TIL).

b. Contact your supervisor to send instrument to an approved repair facility.

2. See Figure 4, “Receiver Components.”

Figure 4. Receiver Components



3. Inspect leads and clamps to ensure that:

   - Leads contain NO frayed wires.
   - Rubber sleeves are in good condition.
   - Clamps close properly.
   - Clamp connections are NOT loose.

   A. Replace leads if you can identify any signs of damage.

4. Check the 480 kHz high-frequency inductive signal:

   A. Place transmitter on a non-metallic surface. Placing transmitter on metallic surfaces may cause damage to transmitter.

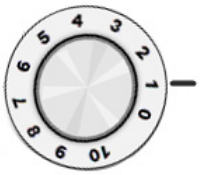
   B. Turn transmitter **ON**.

Frequency Switch

Publication Date: March 2014

C. Press the **frequency switch** on receiver to high frequency (HF).

D. Turn **sensitivity knob** to "1."



Sensitivity Knob

E. Hold receiver vertically next to the transmitter.

F. Listen for receiver to emit a beeping tone.

1) IF receiver does not beep,

THEN perform the following:

a. Inspect instrument for damage.

b. Replace batteries on both transmitter and receiver.

c. Submit instrument for repair if replacing batteries does not resolve issue.

G. Move receiver in a straight line approximately 3–7 ft away from transmitter.

H. Listen for the beeping tone to transition into a high-pitch tone. Audible tone stops when transmitter and receiver are approximately 10 ft apart.

I. Turn transmitter **OFF**.

5. Check the 9 kHz low frequency signal:

WARNING!

ELECTRIC SHOCK may occur when disconnecting leads from or connecting leads to an energized instrument.

A. Ensure transmitter is **OFF**.

B. Connect red clamp to black clamp.

C. Make sure rubber sleeves cover clamps.

D. Plug leads into transmitter.

Publication Date: March 2014

E. Stretch leads into a circle. See Figure 5, “Checking Conductive Leads.”

Figure 5, Checking Conductive Leads

F. Turn transmitter **ON**.

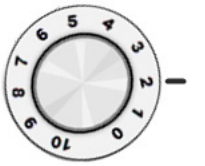
G. Turn **receiver sensitivity** knob to “2”.

H. Press **frequency switch** to low frequency (LF).

Frequency Switch

I. Place receiver on top of AND in line with one of the leads. See Figure 5.

J. Listen for receiver to beep.



Sensitivity Knob

1) IF receiver does not beep,

   THEN do the following:

   a. Turn transmitter **OFF**.

   b. Check lead connections.

   c. Replace damaged leads.

   d. Replace leads if lead connections appear to have no damage, but receiver does not beep.

Publication Date: March 2014

e. Submit instrument for repair if replacing leads does not resolve issue.

K. Wiggle both ends of leads AND verify that signal on receiver does not fluctuate.

1) IF lead connections appear to connect properly but signal continues to fluctuate,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace leads.

c. Check conductive signal using the new leads.

L. Turn transmitter **OFF**.

M. Remove leads.

6. Checking inductive clamp (optional accessory):

A. Ensure transmitter is **OFF**.

B. Plug inductive lead into transmitter.

C. Turn transmitter **ON**.

D. Place clamp on the ground 3−5 ft away from transmitter.

E. Press **frequency switch** to high frequency (HF).

F. Turn **receiver sensitivity** knob to “2”.

G. Position receiver in the center of clamp without touching the clamp.

H. Listen for receiver to beep.

1) IF receiver does not beep,

THEN do the following:

a. Turn transmitter **OFF**.

b. Check clamp connection.

c. Replace damaged clamp.

Publication Date: March 2014

d. Submit instrument for repair if replacing clamp does not resolve issue.

l. While holding receiver in the center of the clamp, wiggle both the transmitter and clamp ends of cable.

1) Check lead connections if signal fluctuates.

2) IF lead connections appear to connect properly but signal continues to fluctuate,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace clamp.

c. Submit instrument for repair if replacing clamp does not resolve issue.

7. Check transmitter AND receiver to ensure that battery level is sufficient for the day's workload.

8. Turn transmitter and receiver **OFF**.

9. Disconnect lead.

---

5 Operating Transmitter

1. Place transmitter on a non-metallic surface. Placing transmitter on metallic surfaces may cause damage to transmitter.

2. Setup instrument according to the locate method you are performing.

For conductive locate, see Procedure TD-5811P-201, "Conductive Locate."

For inductive locate with clamp, see Procedure TD-5811P-202, "Inductive with Coupler Locate."

For inductive locate, see Procedure TD-5811P-203, "Inductive Locate."

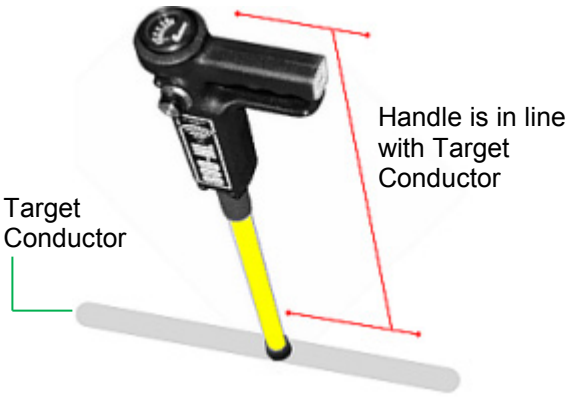
3. Turn transmitter **ON**.

Publication Date: March 2014

6 Operating Receiver

1. Turn receiver **ON**.
2. Confirm that receiver emits an audible tone.
3. Hold receiver vertically and level.
4. Position the receiver handle in the same direction as target conductor. See Figure 6, “Receiver Position with Conductor.”

Figure 6. Receiver Position with Conductor



5. Position receiver with handle parallel to the ground if the ground is flat. See Figure 6.
6. Select the correct sensitivity setting. See Table 1, “Sensitivity Settings.”

Table 1. Sensitivity Settings

CONDITION	ACTION
Receiver beeps continuously	Lower sensitivity setting to achieve a solid tone.
Conductive locate	Start at sensitivity level 2
Inductive with coupler locate	Start at sensitivity level 2
Inductive locate	Start at sensitivity level 4

Publication Date: March 2014

7. Sweep receiver to the left and right to find the strongest signal AND the highest-pitch tone.
8. Adjust sensitivity level as necessary to ensure you can obtain a signal while tracking the facility.
9. Receiver is directly above target conductor when receiver tone changes from low to high-pitch tone. This is where you can determine the depth of the conductor.
10. Verify you have a balanced signal.
11. Confirm where receiver emits the highest-pitch tone. This location is the center of a conductor.
12. Slowly twist receiver handle in a circular motion to determine direction of the underground facility. The highest signal and pitch tone indicates when the handle is parallel with the facility.
13. Identify depth at regular intervals to confirm the correct facility is being located.

7 Determining Depth of a Conductor

NOTE

DO NOT communicate depth to excavators.

1. Verify target conductor's location. See Section 6, "Operating Receiver."
2. Place receiver vertically on the ground.
3. Adjust sensitivity switch until meter needle reaches 10. See Figure 8, "Receiver Meter."

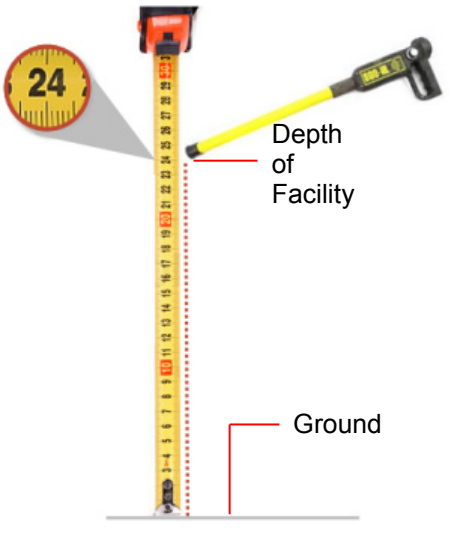
Publication Date: March 2014

Figure 8. Receiver Meter

4. Lift receiver tip (See Figure 9, “Example of Depth Measurement at 24 in”) vertically until meter needle stops deflecting downwards AND tone stops alerting.

5. Measure the distance between the bottom of receiver and the ground. This distance is equal to the depth of the underground facility. See Figure 9.

Figure 9. Example of Depth Measurement at 24 in.



Publication Date: March 2014

END OF PROCEDURE

Definitions

Balanced Signal is a signal displayed on a receiver that indicates the signal strength increases and decreases an equal distance from the center of the suspected facility location.

Baseline Signal Strength is the signal strength recorded initially before an instrument is put into service, after a repair, or when switching to a new calibration facility.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends a signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-201, “Conductive Locate”

TD-5811P-202, “Inductive with Coupler Locate”

TD-5811P-203, “Inductive Locate”

TD-5811P-205, “Verifying Instrument Calibration”

Publication Date: March 2014

Metrotech 9890 XT™

Operating Instructions

Procedure

Summary

This document provides step-by-step instructions for operating the Metrotech 9890 XT™ locating instrument.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Ensure that your instrument calibration has been verified and documented.

Table of Contents

Publication Date: March 2014

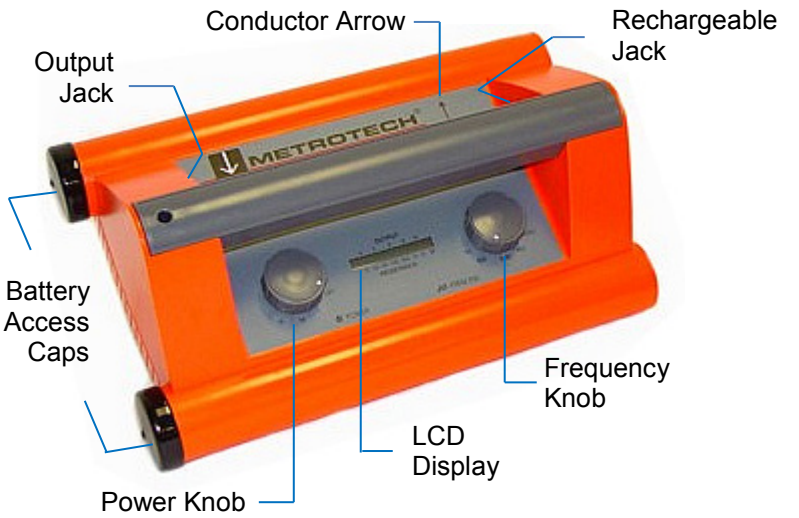
1 Instrument Features

The Metrotech 9890 XT™ has the following features:

- Frequency capabilities:
  - 982 kHz
  - 9.82 kHz
  - 82 kHz
  - 50/60 Hz (Passive)
  - Radio frequency (RF)
- Locates depth of a conductor up to 20 ft below ground.
- Push button and knob controls.
- Solid beeping tone for left and right guidance.
- Silent (null) tone over conductor centerline.
- Distance-sensitive left and right guidance arrows.
- Continuous signal display.
- Automatic and manual gain options.

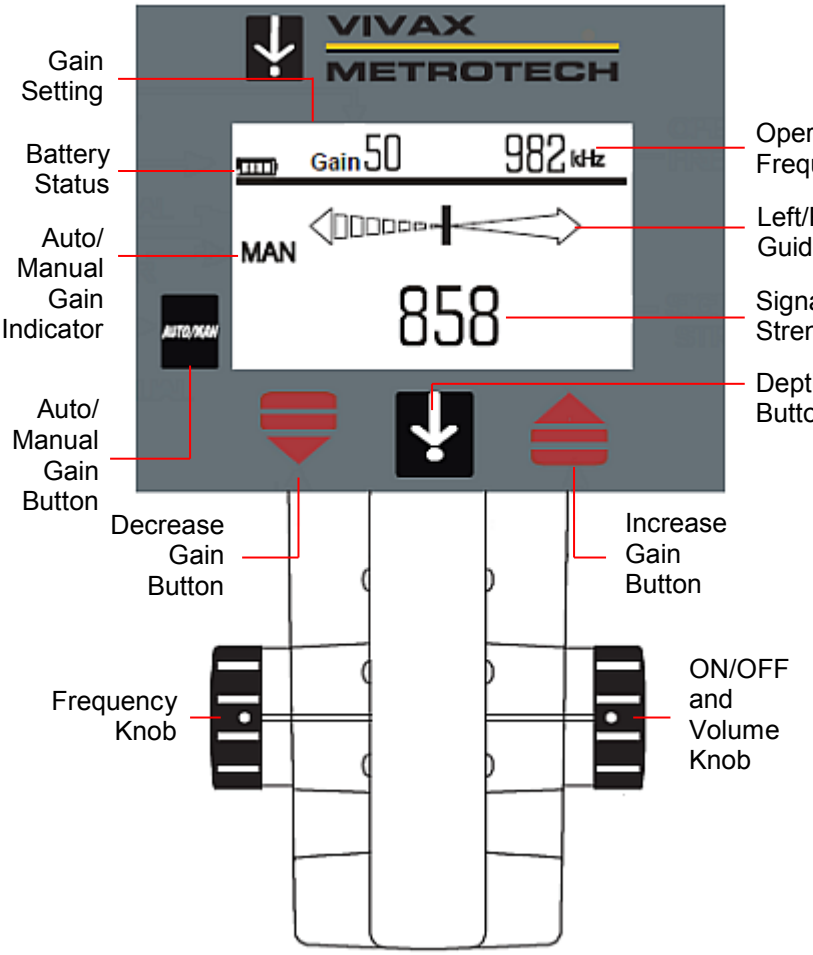
See Figure 1, “Transmitter Features” and Figure 2, “Receiver Features.”

Figure 1. Transmitter Features



Publication Date: March 2014

Figure 2. Receiver Features



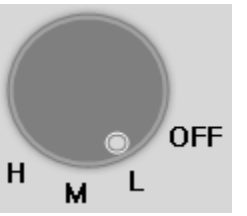
2 Checking Transmitter Batteries

1. Verify that battery level is sufficient:

   A. Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

Publication Date: March 2014

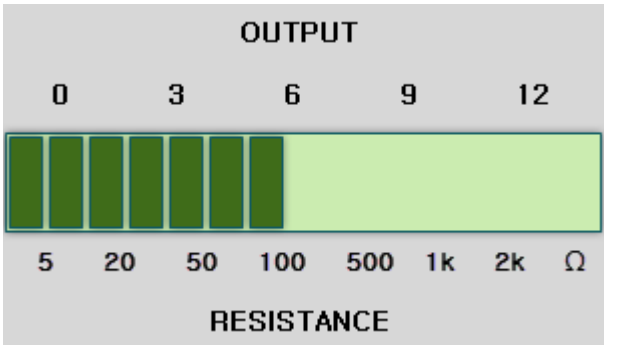
B. Turn transmitter **power knob** to “L”. Transmitter displays two flashing arrows and emits a beeping tone every five seconds.



Power Knob

C. Look at the LCD display screen. Battery status displays for 3 seconds after transmitter is turned on. See Figure 3, “Battery Status.”

Figure 3. Battery Status



1) IF any of the following occurs during the course of a workday:

- Battery status is lower than four bars,
- No flashing arrows and no beeping sounds,
- Instrument is inoperative,
- Operation distance decreases,

THEN do the following:

a. Turn transmitter **OFF**.

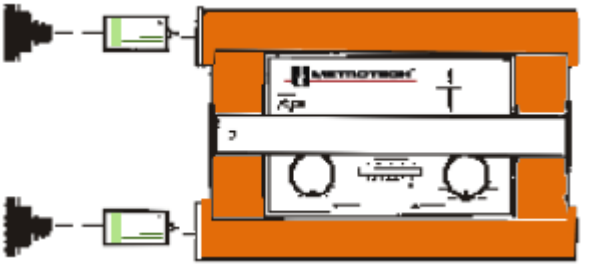
b. Replace or recharge batteries.

2. Replace batteries:

A. Remove battery access caps. See Figure 4, “Battery Access Caps.”

Publication Date: March 2014

Figure 4. Battery Access Caps



B. Replace 10 D-cell batteries.

C. Replace access caps.

3. Recharge batteries:

A. DO NOT recharge non-rechargeable batteries. This may damage instrument.

B. Plug charger cable into rechargeable jack.

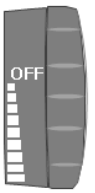
C. Plug charger power cord into a wall socket. A complete recharge takes approximately 12−14 hours.

3 Checking Receiver Batteries

1. Verify that battery level is sufficient:

A. Turn **power and volume knob** clockwise to turn receiver **ON**.

B. Look at battery status on receiver display screen.



Power and Volume Knob

Publication Date: March 2014

C. IF the following occurs any time during the course of a workday:

- Battery status icon flashes,
- Battery status show one bar or less,

THEN do the following:

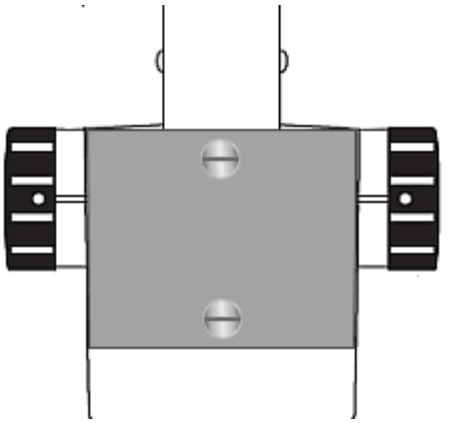
1) Turn **power knob** counterclockwise to turn receiver **OFF**.

2) Replace batteries.

2. Replace batteries:

A. Remove screws from the battery cover plate. See Figure 5, “Battery Cover Plate.”

Figure 5. Battery Cover Plate



B. Detach battery cover plate.

C. Carefully remove battery pack from receiver.

D. Disconnect battery pack from cable connection.

E. Replace six “AA” batteries.

F. Reconnect cable connection.

G. Insert battery pack into receiver.

H. Fasten screws to secure cover plate.

Publication Date: March 2014

4 Performing Instrument Daily Checkout

1. Inspect instrument for signs of damage such as:

   - Broken receiver display
   - Damaged meter needle
   - Cracked transmitter or receiver
   - Missing controls or components

   A. IF instrument is damaged,

   THEN do the following:

   1) Fill out the instrument repair form.

   The instrument repair form is located in the Form section of this handbook AND online in the Technical Information Library (TIL).

   2) Contact your supervisor to send instrument to an approved repair facility.

2. Inspect all leads and clamps to ensure that:

   - Leads contain NO frayed wires.
   - Rubber sleeves are in good condition.
   - Clamps close properly.
   - Clamp connections are NOT loose.

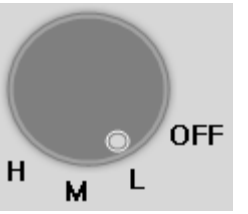
   A. Replace leads if you can identify any signs of damage.

3. Check inductive signal:

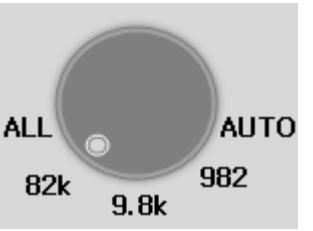
   A. Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

   B. Turn transmitter **ON**.

   C. Turn **frequency knob** to “82k”.



Power Knob

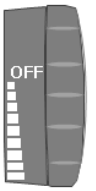


Frequency Knob

Publication Date: March 2014

D. Check batteries if transmitter does not display flashing arrows AND emits beeping sounds.

E. Turn the **power and volume knob** until receiver emits an audible tone.



Power and Volume Knob

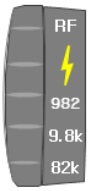
F. Turn **receiver frequency knob** to “82k”.

G. Check batteries if receiver does not display flashing arrows AND emits beeping sounds.

H. Confirm that receiver is on auto-gain. This is the default setting.

1) IF the auto/manual gain indicator shows **MAN** (abbreviation for manual),

THEN press the **auto/man button** to switch to auto-gain setting.



Frequency Knob

I. Hold receiver over transmitter in line with conductor arrow.

J. Confirm that receiver displays a signal strength of 999.

Auto/Man Button

K. Sweep receiver left and right.

L. Confirm that left and right guidance arrows reflect left and right movements.

1) Submit instrument for repair if receiver does not reflect changes.

M. Turn transmitter **OFF**.

4. Check conductive signal:

WARNING!

ELECTRIC SHOCK may occur when disconnecting leads from or connecting leads to an energized instrument.

Publication Date: March 2014

A. Ensure transmitter is **OFF**.

B. Plug leads into transmitter.

C. Connect black clamp to red clamp.

D. Place leads in a circle on the ground.

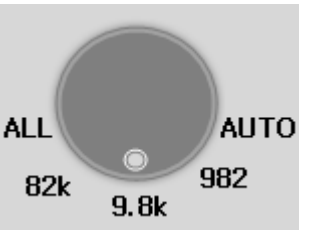
E. Make sure rubber sleeves cover clamps.

F. Turn transmitter **ON**.

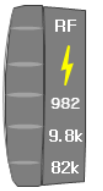
G. Turn transmitter **frequency knob** to "9.8k".

H. Turn receiver **frequency knob** to "9.8k".

I. Hold receiver over leads to confirm signal strength of 999. See Figure 6, "Checking Conductive Signal."



Frequency Knob



Frequency Knob

Figure 6. Checking Conductive Signal

1) Replace leads if signal strength is lower than "999".

J. Sweep receiver left and right.

K. Confirm that left and right guidance arrows reflect left and right movements.

L. Place receiver on the leads.

Publication Date: March 2014

M. Wiggle both ends of leads AND verify that signal on receiver does not fluctuate.

1) Check lead connections if signal fluctuates.

2) IF lead connections appear to connect properly but signal continues to fluctuate,

THEN do the following:

a. Turn transmitter **OFF**.

b. Replace leads.

c. Check conductive signal using the new leads.

N. Turn transmitter **OFF**.

O. Disconnect leads.

5. Check inductive clamp:

A. Plug inductive lead into transmitter.

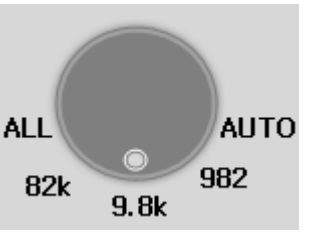
B. Place clamp on the ground 3−5 ft away from transmitter.

C. Turn transmitter **ON**.

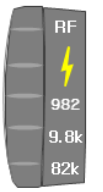
D. Turn transmitter **frequency knob** to “9.8k”.

E. Turn receiver **frequency knob** to “9.8k”.

F. Hold receiver over clamp without touching the clamp.



Frequency Knob



Frequency Knob

G. Confirm that receiver displays signal strength of “999”.

H. While holding receiver over the middle of the clamp, wiggle both the transmitter and clamp ends of cable.

1) Check lead connections if signal fluctuates.

Publication Date: March 2014

2) IF lead connections appear to connect properly but signal continues to fluctuate,

   THEN do the following:

   a. Turn transmitter **OFF**.

   b. Replace leads.

   c. Check inductive signal using the new leads.

6. Check transmitter AND receiver to ensure that battery level is sufficient for the day's workload.

7. Turn transmitter and receiver **OFF**.

8. Disconnect lead.

---

5 Operating Transmitter

1. Place transmitter on a non-metallic surface. Direct contact with a metallic surface may damage transmitter.

2. Set up instrument according to the locate method you are performing.

   For conductive locate, see Procedure TD-5811P-201, "Conductive Locate."

   For inductive locate with clamp, see Procedure TD-5811P-202, "Inductive with Coupler Locate."

   For inductive locate, see Procedure TD-5811P-203, "Inductive Locate."

3. Turn transmitter **ON**.

4. Look for the following indications:

   - Transmitter displays battery strength and resistance in ohms (Ω) when a lead is connected.
   - Transmitter displays battery strength, followed by two flashing arrows, and emits a beep every 5 seconds in inductive locate mode.
   - A flashing right arrow on transmitter LCD screen indicates that ground location is poor.

Publication Date: March 2014

For proper grounding instructions, see Procedure TD-5811P-103, "Identifying the Proper Location."

5. Select the appropriate power output depending on the type of locate you are performing. The power output changes according to frequency and output setting. See Table 1, "Transmitter Power Output."

Table 1. Transmitter Power Output

	SIGNAL FREQUENCY		
SETTING	982 kHz	9.82 kHz	82 kHz
LOW (L)	0.3 watts	0.3 watts	0.15 watts
MEDIUM (M)	1 watt	1 watt	0.25 watts
HIGH (H)	3 watts	3 watts	0.70 watts

6. Select the best frequency for your work area and locating method. See Table 2, "Transmitter Frequency Output."

Table 2. Transmitter Frequency Output

FREQUENCY	USAGE
All	Conductive locate: ▪ 9.82 kHz ▪ 982 kHz ▪ 82 kHz
	Inductive locate: ▪ 9.82 kHz ▪ 82 kHz
Auto	▪ Pick the best frequency ▪ Default to 82 kHz
982 Hz	▪ Use on good conductors and long distance locating. ▪ No output for inductive locating.
9.82 kHz	▪ General purpose frequency ▪ Cables ▪ Congested areas
82 kHz	▪ Good for conductors with non-metallic joints. ▪ The best inductive frequency.

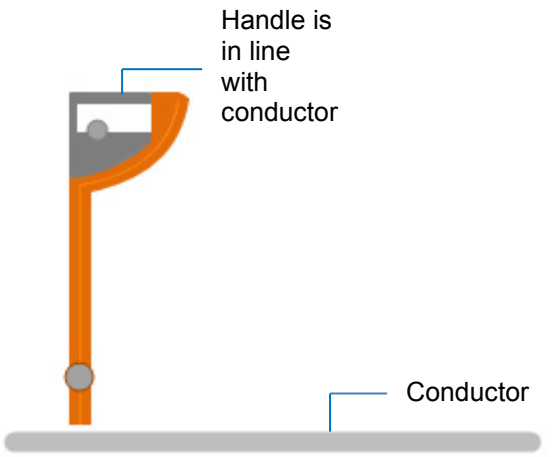
Publication Date: March 2014

For more information, see Job Aid TD-5811P-103-JA02, "Choosing Best Frequency."

6 Operating Receiver

1. Turn the **power and volume knob** until tone is audible.
2. Confirm that receiver has a proper battery level.
3. Hold receiver vertically.
4. Position receiver's handle in a horizontal position in line with the direction of target conductor. See Figure 7, "Receiver Position with Conductor."

Figure 7. Receiver Position with Conductor



5. Operate receiver in auto gain mode:
   A. IF receiver auto/manual indicator displays **MAN**,

      THEN **press the auto/man button** to switch to auto mode.

Auto/Man Button

   B. Sweep receiver from side to side passing over suspected target conductor. Receiver alternates between solid tone, no tone, and beeping tone.

Publication Date: March 2014

C. Pinpoint the location where receiver momentarily goes silent AND indicates the strongest signal. This is the spot where:

- Signal is balanced.
- Receiver is directly over target conductor.
- You can determine the depth of the conductor.

D. Determine direction of the conductor:

1) Slowly rotate receiver at a pinpointed location.

2) Look for a single bar display between the guidance arrows. This occurs when the handle is in line with target conductor. See Figure 7.

E. Take a depth measurement at regular intervals to confirm reasonable depth for the conductor being located. See Section 7, “Determining Depth of a Conductor.”

6. Operate receiver in manual gain mode:

Auto/Man Button

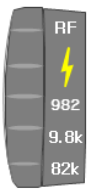
A. Press **auto/man button** to switch to manual gain mode. The auto/manual indicator displays **MAN** when you are in this mode.


Increase/ Decrease Gain Buttons

B. Use the **increase/decrease gain buttons** to manually adjust gain settings between zero and “100”.

C. Locate conductor using the same method as auto gain mode.

D. Press **auto/man button** to switch to auto gain mode.



Frequency Knob

7. Operate receiver in passive mode:

A. Turn the **frequency knob** to one of the following:

- **Yellow lightning bolt icon** (for 50 Hz/60 Hz) setting. Use this setting on active power lines.
- Radio Frequency (RF) setting. Use this setting on good conductors that re-radiate radio signals (cathodic protection).

Publication Date: March 2014

B. Look at the receiver display screen. In passive mode, the left and right guidance arrows become a curtain display.

C. Locate facility using the passive method.

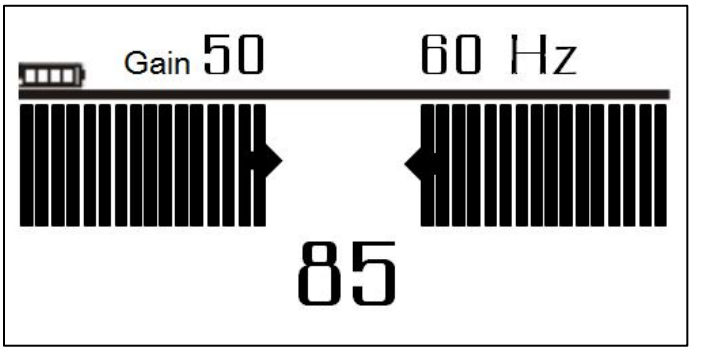
For instructions, see Procedure TD-5811P-204, "Passive Locate."

1) Receiver indicates that you have pinpointed the conductor centerline when the following occurs:

   - Curtain bars come together.
   - Receiver emits a solid tone when curtain bars close from half way to the center of the display.

2) See Figure 8, "Passive Receiver Screen."

Figure 8. Passive Receiver Screen



Publication Date: March 2014

7 Determining Depth of a Conductor

NOTE

DO NOT communicate depth to excavators.

1. Verify target conductor's location. See Section 6, "Operating Receiver."
2. Obtain signal strength of at least "100".
3. Place receiver vertically on the ground.
4. Press **depth button**.
5. Wait approximately 3 seconds for depth to display.
6. See Table 3, "Depth Errors."

Depth Button

Table 3. Depth Errors

ERROR	CAUSE
Err	Signal strength of 100 was not obtained.
▪ Flashing "20" ▪ Flashing "600"	Depth of conductor exceeds 20 ft.
CL	Receiver is not over center line of the conductor.

END OF PROCEDURE

Publication Date: March 2014

Definitions

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends a signal over a set time frame.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

Supplemental References

TD-5811P-103, “Identifying the Proper Location”

TD-5811P-103-JA02, “Choosing the Best Frequency”

TD-5811P-201, “Conductive Locate”

TD-5811P-202, “Inductive with Coupler Locate”

TD-5811P-203, “Inductive Locate”

TD-5811P-204, “Passive Locate”

Publication Date: March 2014

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Jameson Gas Line Tracer

Operating Instructions

Procedure

Summary

This procedure provides step-by-step instructions for using the Jameson Gas Line Tracer tool.

Target Audience

Locate and mark personnel.

Before You Start

- Read the Safety section of this handbook.
- Wear the appropriate personal protective equipment (PPE) for your specific tasks and work area.
- Ensure your Operator Qualifications for “Location of Facility without Wire” (OQ-05.03) is current before operating the Jameson Gas Line Tracer tool.

Table of Contents

Publication Date: March 2014

1 Tool Overview

1. Before using the Jameson Gas Line Tracer tool, obtain the following tools:

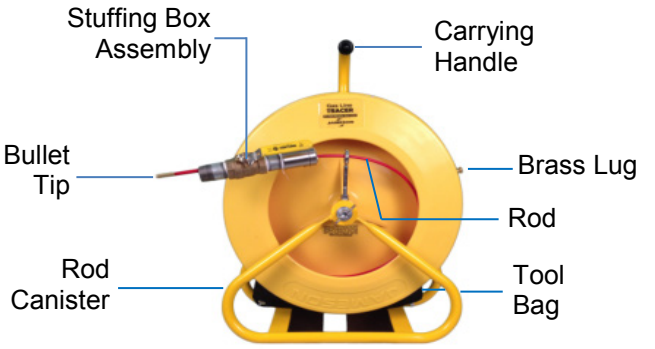
- Pipe wrench
- Hand wire brush
- Various-sized bushings
- Pipe thread sealant
- Permanent marker
- PG&E-approved leak-detection soap solution.
- Adjustable smooth-faced wrench
- Fine-tooth hacksaw or wire cutter

2. The Jameson Gas Line Tracer consists of the following parts:

- Bullet tip at end of rod
- Rod canister
- Rod
- Carrying handle
- Stuffing box assembly
- Brass lug
- Tool bag
- O-ring

3. See Figure 1, “Tracer Tool Parts.”

Figure 1. Tracer Tool Parts



Publication Date: March 2014

2 Communicating with the Customer

1. Tell customer the reason for your visit (locate, hot tank process, relight process, etc.).

   A. IF customer cannot be contacted,

      THEN prepare a customer service report that:

      - Explains work performed at the site.
      - Provides contact information.

3 Performing a Non-Contact Voltage (NCV) Test

WARNING!

DEATH or SERIOUS BODILY INJURY may result from stray voltage at the gas meter set and adjacent piping.

1. Use a NCV tester to test for electric voltage at the gas meter set. Stray voltage may be present when customer appliances are damaged or improperly grounded.

   For instructions to perform an NCV test, see Procedure TD-5811P-103, "Identifying the Proper Location."

Publication Date: March 2014

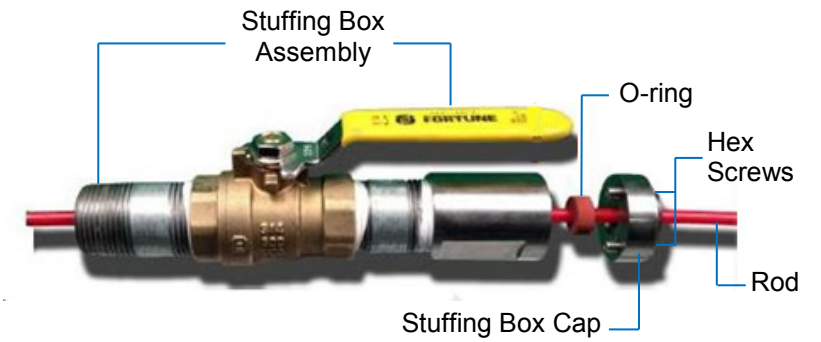
4 Inspecting Tool

WARNING!

EXPLOSION from excessive gas leakage may occur if O-ring or rod is damaged.

1. Use the Jameson kit hex screwdriver to unscrew the hex screws on the stuffing box cap. See Figure 2, “Stuffing Box Assembly.”

Figure 2. Stuffing Box Assembly



2. Slide **stuffing box cap** out of **stuffing box assembly** to reveal the O-ring.
3. Inspect the O-ring for tearing, cracking, or pitting.
   A. Replace O-ring if it is damaged.
4. Inspect the rod for damage.
   A. Remove damaged section of rod if rod surface is damaged.

Publication Date: March 2014

5. IF the **bullet tip** is on the rod,

   THEN do the following:

   Bullet Tip

   A. Remove the bullet tip using a fine-tooth hacksaw or wire cutter. The bullet tip is not necessary for the tool to function.

   B. Ensure that the exposed end of the rod is free of fiberglass splinters and burrs.

6. Inspect rod for markings at 6 in. and at 12 in. from the end of rod. See Figure 2, “Markings on Rod.”

Figure 3. Markings on Rod

   A. Re-apply markings with a permanent marker if markings on the rod are not visible.

5 Installing Stuffing Box Assembly

1. Whenever possible, maintain service to customer by using hot tank.
2. Disconnect the meter set from the gas service valve.

   For instructions, search online in the Technical Information Library (TIL) for Procedures:

   - **TD-6436P-38, “Using a Grunsky Type Quick-change (QC) Apparatus.”**
   - **TD-4612P-01, “Hot-tanking for Construction.”**

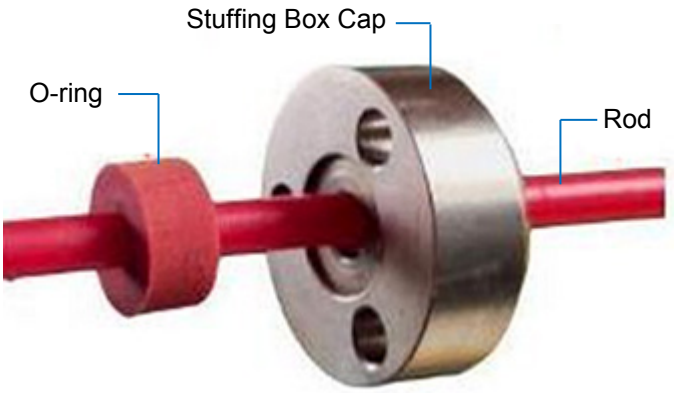
3. Apply thread sealant on stuffing box assembly.
4. Install stuffing box assembly on the gas service valve.
5. For gas service valves larger than 3/4 in. in diameter, use bushing to connect the stuffing box assembly.

Publication Date: March 2014

6 Installing Stuffing Box Cap

1. Pull rod approximately 15 ft out of rod canister.
2. Use lubricated wipes to lubricate rod end and O-ring. See Figure 4, “Stuffing Box Cap and O-ring.”

Figure 4. Stuffing Box Cap and O-ring



3. Insert rod into stuffing box assembly.

WARNING!

INJURY may occur if the stuffing box cap is not securely tightened.

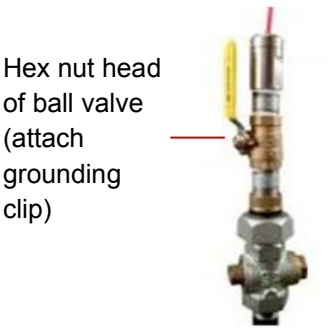
4. Tighten hex screws to secure stuffing box cap.

Publication Date: March 2014

7 Establishing Static Grounding for Rod Insertions

1. Attach a grounding clip to the hex nut head of the ball valve. See Figure 5, “Hex Nut Head of Ball Valve.”

Figure 5. Hex Nut Head of Ball Valve



2. Attach other end of the grounding clip to the ground rod used for locate.

For instructions to place ground rod properly, see Procedure TD-5811P-201, “Conductive Locate.”

8 Pressurizing Stuffing Box Unit

WARNING!

DEATH or INJURY may occur if hex screw threads are not connected with the threads on stuffing box assembly.

Publication Date: March 2014

1. Tighten hex screws to maintain proper seal and prevent excessive gas release.
2. Move rod through stuffing box.
3. Allow rod to move easily through stuffing box by:
   A. Tightening or loosening stuffing box.
   B. Lubricating the rod.
4. Slowly open gas service valve.
5. Use leak-detection soap solution to check for gas leaks,
   A. IF gas is leaking excessively,

      THEN perform the following tasks:

      1) Close gas service valve.
      2) Inspect Jameson tool to identify and fix the source of the leak.

         For information, see Procedure TD-4414P-04, "Assessing and Working with Hazardous/Gaseous Atmospheres" located online in the TIL.

   B. Lubricate rod WHILE pushing it through stuffing box until you cannot go any further if gas does not leak.

9 Locating a Service Line

1. Attach red clamp of conductive leads to **brass lug** on rod canister.
2. Locate the service line.

   For instructions, see Procedure TD-5811P-201, "Conductive Locate."
3. Detach locating instrument from Jameson Gas Line Tracer tool.

Brass Lug

Publication Date: March 2014

10 Removing Jameson Gas Line Tracer Tool

1. Loosen hex screws to let the rod move easily without allowing excessive gas release.

WARNING!

INJURY may occur if rod is completely removed from stuffing box cap while both gas service AND brass valves are open.

2. Slowly retract rod from pipe WHILE keeping your eyes on the 12 in. mark from end of line.
3. **Stop** when you reach the 6 in. mark.
4. Close gas service valve.
5. Remove stuffing box unit from the riser.
6. Disconnect static grounding clamp.
7. Store all Jameson tools in bag on the rod canister.
8. Re-assemble meter set if you removed it earlier to perform locate.

   For instructions, search online in the TIL for Procedures:

   - **TD-6436P-38, "Using a Grunsky Type Quick-change (QC) Apparatus."**
   - **TD-4612P-01, "Hot-tanking for Construction."**

9. Do the following if gas supply to customer is disrupted:

   A. IF customer is present,

   THEN do the following:

   1) Contact gas dispatch.

   2) Schedule a gas service representative to restore service.

10. IF customer is not present,

    THEN do the following:

    A. Prepare a customer service report to:

    B. Explain work performed at the site.

    C. Provide contact information.

    D. Leave report on customer's door.

11. Install an Electronic Marker System (EMS) for future locators to identify the location of the difficult-to-locate facility.

    For instructions, see Job Aid TD-5811P-605-JA01, "Installing an EMS."

END OF PROCEDURE

Definitions

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Supplemental References

TD-5811P-103, "Identifying the Proper Location"

TD-5811P-105-JA02, "Submitting a Map Correction Form"

TD-5811P-201, "Conductive Locate"

TD-5811P-605-JA01, "Installing an EMS"

TD-6436P-38, "Using a Grunsky Type Quick-change (QC) Apparatus"

TD-4612P-01, "Hot-tanking for Construction"

TD-4414P-04, "Assessing and Working with Hazardous/Gaseous Atmospheres"

Publication Date: March 2014

JOB AID TABLE OF CONTENTS

Publication Date: March 2014

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Standard Vehicle Checklist

For Locate and Mark Personnel

Job Aid

1 Purpose

The vehicle checklist contains essential tools and equipment for completing your locate and mark tasks correctly and safely.

2 Safety Equipment

REQUIRED	
▪ Hard hat with PG&E logo ▪ Safety gloves (Class 00 Type II) ▪ Flame resistant (FR) clothing ▪ FR safety vest with PG&E logo ▪ Non-contact voltage (NCV) tester ▪ Caution “Do Not Enter” tape (material code: 2656497)	▪ Bloodborne pathogen kit ▪ First Aid Kit ▪ Hearing protection ▪ Safety glasses ▪ Water spray can (for use in rural areas) (material code: 481006) ▪ *Damage Prevention Handbook* ▪ *USA North’s California Excavation Manual*
RECOMMENDED	
▪ Ball cap with PG&E logo (available through “Your Store @ Work” [http://co-store.com/pge]) ▪ Stop and Slow paddle (material code: 033056) ▪ Emergency overnight bag that contains extra change of clothes	▪ *Code of Safe Practices* safety manual ▪ 5 lbs. Type ABC fire extinguisher with holder ▪ Insect repellent

Publication Date: March 2014

3 Electric Locating Tools and Equipment

REQUIRED

- Manhole barricade
- Single-persons safety-line lifter
- Pelican work lights to illuminate work area when outlining manholes
- Leak bar (¾ in. by 5 ft)
- High level warning sign with flags
- Primary rubber gloves
- Secondary rubber gloves
- Leather protectors for rubber gloves
- 15−20 traffic cones
- Heavy-duty flexible lifting hooks (2 per vehicle)
- Light duty flexible lifting hooks for #3, #5, and #7 boxes and secondary splice boxes (2 per vehicle)
- Gas Port
- Swivel-Lock manhole cover lifting device
- Hard hat lights
- T-Handle pentahead wrenches
- Caution tape

4 General Supplies

RECOMMENDED

- Grunt bags for garbage and empty paint cans (material code: 202922)
- Brief relief (disposable waste bags) (material code: 036624)
- Paper towels
- Door hangers
- Device locking 2-way customer equipment (for gate) (material code M249458)
- Organizing crates
- Backpack
- List of contact phone numbers
- Spray bottle for soap solution (clearly labeled)
- Hand sanitizer
- Sunscreen

5 Locating Tools and Equipment

REQUIRED	
▪ Locating instrument ▪ Extra instrument batteries ▪ Screwdrivers ▪ Pentahead wrenches (5-star wrench) ▪ Lid puller (material code: 200479) ▪ Electronic Marker System (EMS)	▪ Flashlight ▪ 25 ft tape measure (material code: 200640) ▪ Measuring wheel (material code: 204936) ▪ Wire stripper (material code: 038941) ▪ Utility knife
RECOMMENDED	
▪ Extra leads for instrument ▪ Grounding magnet ▪ File ▪ Crescent wrenches ▪ 100-ft ground extension ▪ Salt water (use for increasing grounding effectiveness) ▪ Probing bar (material code: 200509) ▪ Electrical tape	▪ Socket set ▪ Bolt cutter ▪ Step ladder ▪ Shovel ▪ 5-lbs. sledge hammer (material code: 200424) ▪ Claw hammer ▪ PG&E locks and chain (to secure transmitter when leaving unattended) (material code: 016583)

6 Vehicle Accessories

REQUIRED	RECOMMENDED
▪ Bluetooth or hands-free device for your cellular phone ▪ Electronic tablet ▪ Fuel card ▪ Cones	▪ Power inverter ▪ GPS ▪ Flashing beacon ▪ Wheel chock

Publication Date: March 2014

7 Marking Tools and Equipment

REQUIRED	RECOMMENDED
▪ Chalks (white, yellow, red, and orange) ▪ Paints (white, black, yellow, red, and orange) ▪ Crayons (yellow, red, and orange) ▪ Flags (yellow, red, and orange) ▪ Whiskers (yellow, red, and orange) ▪ Nails	▪ Marking paint stick (material code: 204854) ▪ Wooden stakes ▪ das™ markers (yellow, red, and orange) ▪ das™ adhesive

Figure 1.
Marking Tools*

** For material codes, see Design Standard M-60, "Approved "Mark and Locate" Instruments, Equipment, Accessories and Products."*

Publication Date: March 2014

8 Forms

REQUIRED

- Record of Warning of Unsafe Practices (Form M61-0427 (12-10) Safety Health and Claims)
- Gas Map Correction Form (TD-4460B-001-F01)
- Electric Map Correction Form (TD-9001P-01-F02)
- Corrective Work Form – Gas Distribution (JA_096G)
- Corrective Work Form – Gas Transmission (JA_096H)
- Electric Corrective Work Form
- Employee Motor Vehicle Incident Glove Box Packet (62-1518)
- Dig-in First Responder Form (TD-5811P-401-F01)

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Using IRTHNet for Locating USA Tickets

Job Aid

1 Purpose

This job aid assists you with the search for USA tickets, reopening previously closed tickets, adding notes to tickets, and responding to multiple tickets.

2 Enable Internet Pop-ups

You have to enable the electronic tablet browser pop-ups settings only once.

1. Start from the tablet home screen.
2. Tap on the **Internet icon**.
3. Navigate to the top right corner of the browser window.
4. Tap on the **Internet Options icon**.
5. Select the **Settings icon**.
6. Tap on the **Advanced tab**.
7. Uncheck **Block pop-ups box**. See Figure 1, “Advanced Settings.”

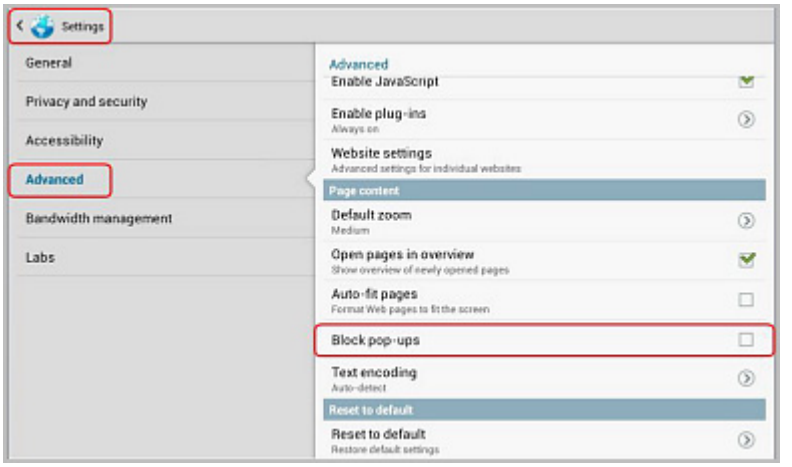
Internet Icon

Internet Options Icon

Settings Icon

Publication Date: March 2014

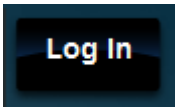
Figure 1. Advanced Settings



8. Tap on **Settings icon** to exit.

3 Log in to IRTHNet

1. Open one of the following browsers:
   - Internet Explorer (computer)
   - Google Chrome (computer)
   - Internet browser (electronic tablet)
2. Go to http://www.irthsolutions.com/.
3. Navigate to the top right corner of the homepage.
4. Click or tap on the **Log In button**.
5. Use the same user name and password that you use for Utilisphere™ on your electronic tablet. See Figure 2, "IRTH Logon Screen."

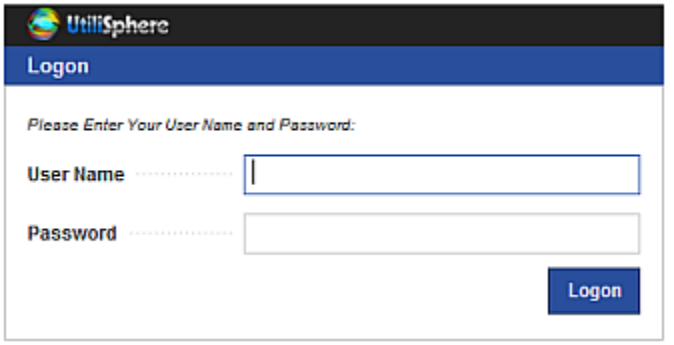


Log In Button

   A. Contact TSC if you cannot log in to your Utilisphere™ or IRTHNet folder.

Publication Date: March 2014

Figure 2. IRTH Logon Screen



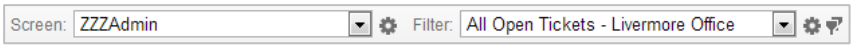
6. Click or tap on the **Logon button**.

   A. Contact your supervisor for assistance if you forget your password. **DO NOT USE** the **Forgot Password** feature. Attempting to reset password on your own may cause you to get locked out of your folder.

4 View Ticket Summary Page

1. Navigate to the top left of the homepage.
2. Click or tap on the **IRTHNet tab**.
3. Select **Ticket Summary**.
4. Navigate to the bottom of the ticket summary page.
5. Click or tap on the **filter drop down menu**.
6. Select the correct filter to view only tickets related to your folder. See Figure 3, “Filters.”

Figure 3. Filters

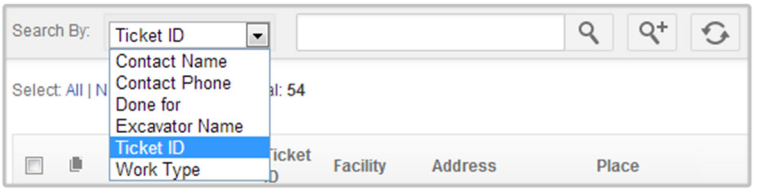


Publication Date: March 2014

5 Use Basic Search Feature

1. Use **Basic search feature** to find records of the last 120 days. To search for tickets older than 120 days, use Archive search feature. Contact your supervisor for assistance.
2. Navigate to the top left corner of the ticket summary page.
3. Click or tap on the **Search By drop down menu** to select search criteria (see Figure 4, “Search Field”).

Figure 4. Search Field



4. Enter searchable information corresponding with the selected search by criteria into the text field.
5. Select the **Search icon** to start searching.
6. Check your search criteria if your search returns zero results.
7. Select **Ticket ID** to view ticket details.

Search Icon

6 Use Advanced Ticket Search Feature

1. Use **Advanced search feature** to find records of the last 120 days. To search for tickets older than 120 days, use Archive search feature. Contact your supervisor for assistance.
2. Navigate to the top left corner of the ticket summary page.
3. Select the **Advanced Search icon**.

Advanced Search Icon

Publication Date: March 2014

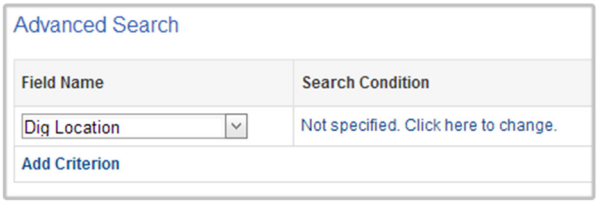
4. Select search criteria from the **Field Name drop down menu**.

   Example:

   To search for a dig location, do the following:

   A. Select **Dig Location** from the field name drop down menu. See Figure 5, "Advanced Search Window."

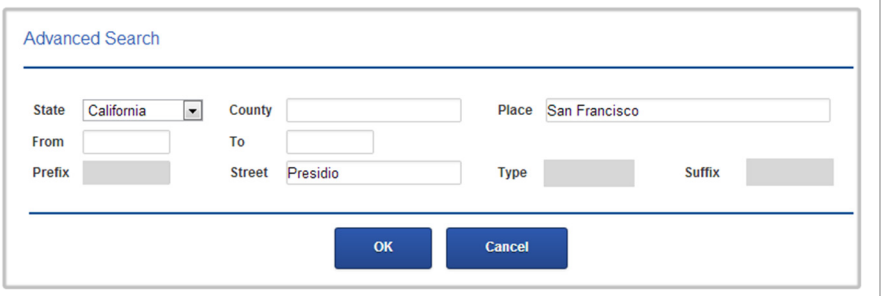
Figure 5. Advanced Search Window



   B. Enter search information into the **Dig Location Search Window**.

   C. Verify spelling and information accuracy. See Figure 6, "Dig Location Search Window."

Figure 6. Dig Location Search Window



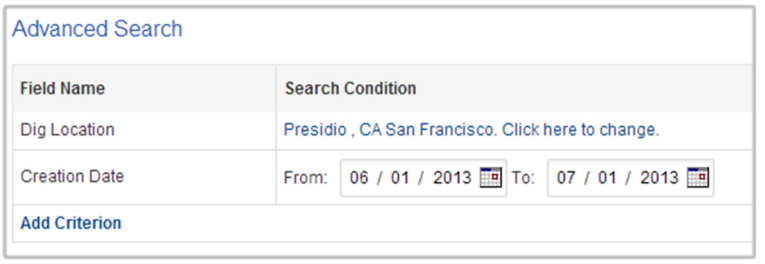
   D. Select **OK**.

   E. Do the following to narrow your search:

      1) Select **Add Criterion** (see Figure 7, "Example of Additional Search Criteria"). You may have more than one search criterion.

Publication Date: March 2014

Figure 7. Example of Additional Search Criteria



2) Select a **Search Condition**, for example, creation date.

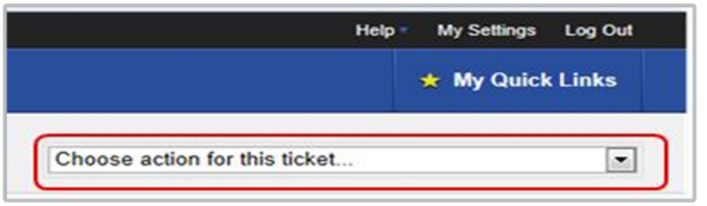
3) Enter a **date range**.

4) Select **OK** to initiate search.

7 Re-open a Closed Ticket from Ticket Details Page

1. Navigate to the far right corner of the ticket details page.
2. Select **Choose action for this ticket**. See Figure 8, "Ticket Action Menu."

Figure 8. Ticket Action Menu



3. Select **Re-open this ticket**.
4. Enter a reason for reopening the ticket in the **Notes** section, (e.g., closed ticket by mistake).
5. Click or tap on **Save**.

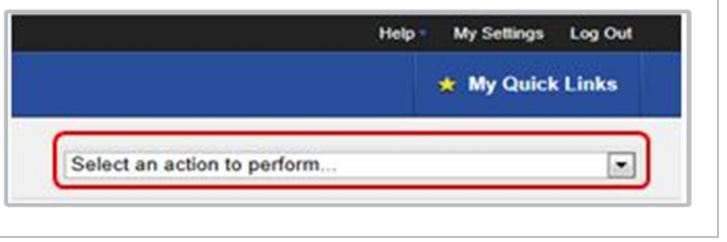
   A. Contact your supervisor for assistance if you cannot find the ticket you reopened. Ticket is reopened in its original folder, which may be different from the folder it was closed in.

Publication Date: March 2014

8 Re-open a Closed Ticket from Ticket Summary Page

1. Navigate to the top left corner of the ticket summary page.
2. Click or tap on the **IRTHNet tab**.
3. Navigate to the far left of the page.
4. Select the **check box** next to the **tickets to be re-opened**.
5. Navigate to the far right of the page.
6. Click or tap on **Select an action to perform**. See Figure 9, “Action Menu.”

Figure 9. Action Menu



7. Select **Re-open Selected Tickets**.
8. Enter a reason for re-opening the ticket in the **Notes** section (e.g., Markings incomplete).
9. Click or tap on **Save**.
   A. Contact your supervisor for assistance if you cannot find the ticket you reopened. Ticket is reopened in its original folder, which may be different from the folder it was closed in.

9 Add a Note to Multiple Tickets at Once

1. Use this method when you need to add the same note to multiple tickets.
2. Start from the ticket summary page.
3. Select the check box for all tickets to which you intend to add notes.
4. Navigate to the far right of the page.
5. Click or tap on **Select an action to perform**. See Figure 9.

Publication Date: March 2014

6. Select **Add Notes to Selected Tickets**.
7. Enter a note in **Notes** section.
8. Click **Save**.

10 Respond to Multiple Tickets at Once

1. Use this method to add the same response to multiple tickets.
2. Start from the ticket summary page.
3. Select the check box for all the tickets to which you intend to add a response.
4. Navigate to the far right of the page.
5. Click or tap on **Select an action to perform**.
6. Depending on the response for particular ticket selected, click or tap on one of the following:
   - **Respond to Complete Job for Selected Tickets.**
   - **Respond to Open Job for Selected Tickets.**
7. Fill in the **Add Response** screen as you would in Utilisphere™ on your electronic tablet.
8. Click or tap on **Save**.

Using Utilisphere™ on Tablet

Job Aid

1 Purpose

The Utilisphere™ application, PG&E map sync, and other features on the electronic tablet are a collection of powerful technology and tools essential to your locate and mark work in the field. Using these tools correctly, and understanding how they work, can help you to complete your assigned USA tickets and communicate with excavators in an effective and timely manner.

NOTE

Keep your electronic tablet powered on 24/7 to receive important software updates. Updates help the device to operate at peak performance.

2 Configuring PG&E Map Sync

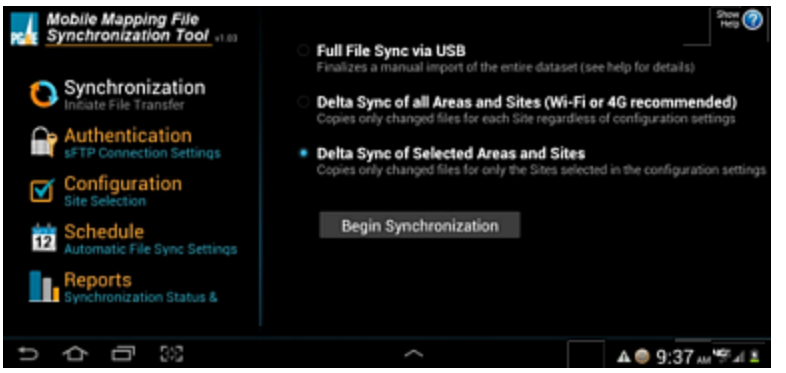
1. Configure PG&E map sync for each of your work areas. This process downloads your work area maps into the Utilisphere™ application.
2. Start from the home screen.
3. Tap on the **PG&E Map Sync icon**.

Map Sync Icon

4. Select **Configuration**.
5. Navigate to the right hand side.
6. Select as many map areas as you need. However, each map area adds to the amount of time automatic updates take to complete nightly.
7. Tap on **Synchronization**.
8. Tap **Begin Synchronization**. See Figure 1, “Synchronization Screen.”

Configuration

Figure 1. Synchronization Screen



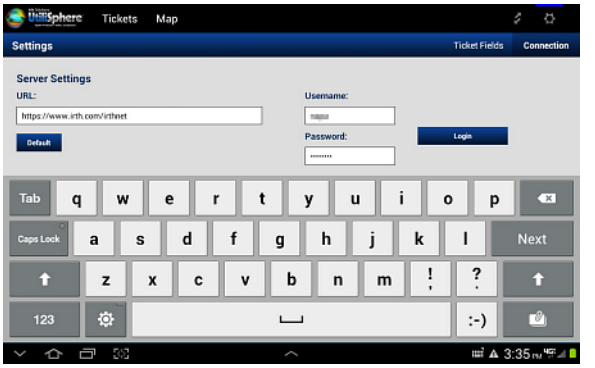
3 Accessing Utilisphere™ Application

1. Start at the home screen.
2. Tap on the **Utilisphere™ icon** to open the USA ticket program.
3. Log on to your Utilisphere™ folder (see Figure 2, “Login Screen”). The program allows you to skip this step if you previously logged in and did not log off.

Utilisphere™ Icon

Publication Date: March 2014

Figure 2. Login Screen



4 Getting to Know the General Tickets Screen

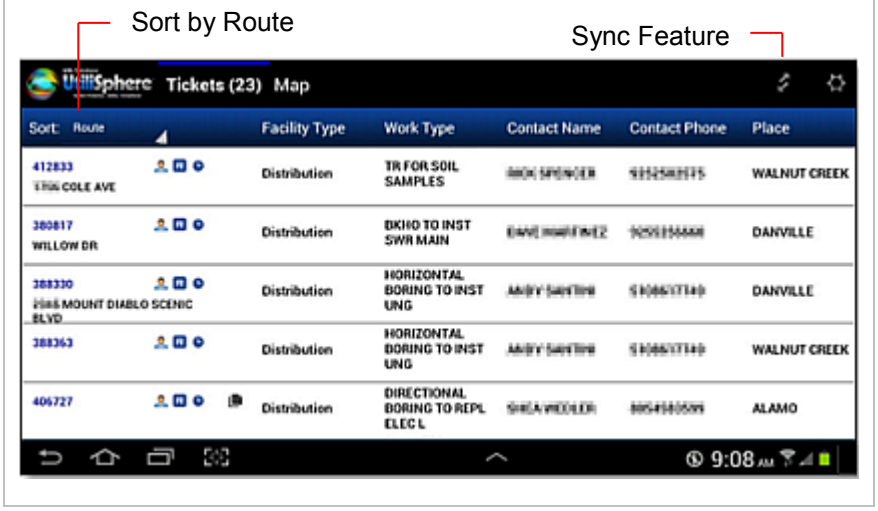
1. General information:

   Tickets displayed in the tickets screen are those you are responsible for in your area.

   The ticket screen allows you to have a quick glance at the general information for each ticket.

   The sync feature allows you to download new tickets and update ticket information between your tablet and the Ticket management system. See Figure 3. “Ticket Screen.”

Figure 3. Ticket Screen



Publication Date: March 2014

2. Tap on the **Sync feature icon**:

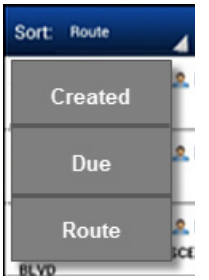
   - Once at the start of each work day BEFORE work begins to download new tickets and any existing tickets updates.
   - Each time AFTER you update or complete a ticket.

   This action sends your updated ticket information to the server, which sends your note communications and ticket status updates to excavators.

Sync Feature Icon

3. The **Sort feature** allows you to sort tickets:

   - **Created**: sort tickets by creation date. This is the date USA opens ticket.
   - **Due**: sort tickets by the date and time ticket is due to complete.
   - **Route**: sort tickets by proximity to other jobs.



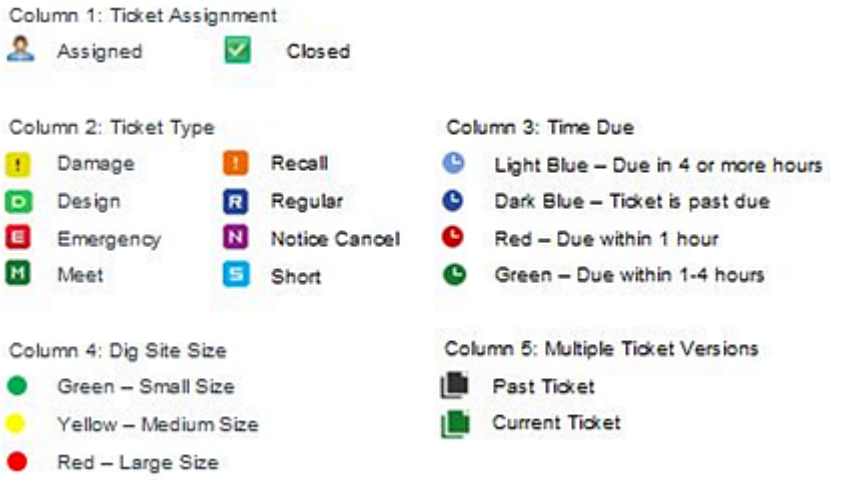
Sort Feature

4. The **quick reference icons** allow you to quickly identify important information for each ticket. See Figure 4. “Icon Definitions.”

Quick Reference Icons

Publication Date: March 2014

Figure 4. Icon Definitions



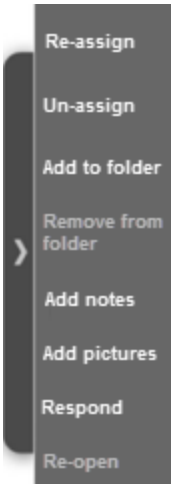
5 Viewing a Ticket

1. Tap on a ticket number to display ticket details. This action highlights the ticket you are viewing. The top row of the screen displays tabs that contain more detailed information. See Figure 5, “Ticket Details Screen.”

Figure 5. Ticket Details Screen

Publication Date: March 2014

2. Select each tab to view more specific details.
3. Tap on the **action bar** to view available actions for each individual ticket
4. View **Ticket History tab** for past ticket versions and related actions for a job site that has multiple ticket associations.
5. Tap on **Attachments tab** to view photographs of the ticket site. This is a view-only tab.
6. Select **Dig Site Map tab** to see dig site location of ticket.
7. The **Custom Map tab** links to the PG&E map viewer application.



Action Bar

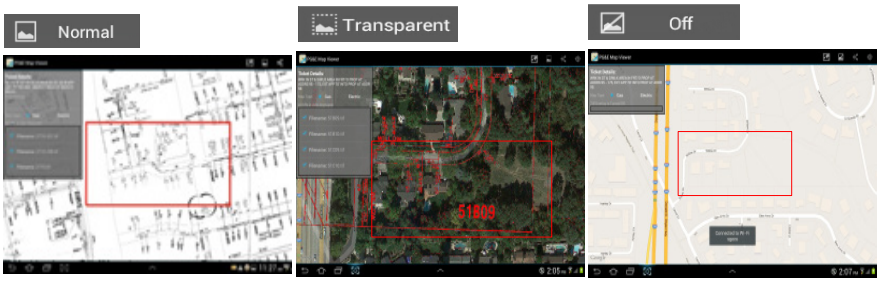
   A. Touch the custom maps tab to view the GEMS map, street map, or a hybrid of both GEMS and street maps.

   B. Use the **map view options icon** to change map views (see Figure 6, "Map View Options"):

Map View Options Icon

- **Normal**: shows the PG&E plat map with a red rectangle identifying the dig site.
- **Transparent**: overlays the plat map onto a Google satellite view of the dig site. The facilities are transparent and shown in red.
- **Off**: displays only Google map view of the dig site.

Figure 6. Map View Options



The red box that appears on the map is only a guide to show the perimeter of the excavation site. It is not intended for use to determine the exact location of your work area.

Publication Date: March 2014

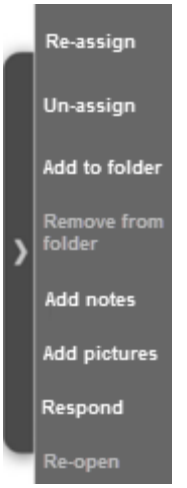
8. Touch the tablet's **Back button** to return to the Utilisphere™ application.

9. Tap on the **Street Map tab** to view map location on Google maps.

Back Button

6 Using the Action Bar

1. Touch the **action bar** to select an action for your ticket. For usage details, see Table 1, "Ticket Action Items."



Action Bar

Table 1. Ticket Action Items

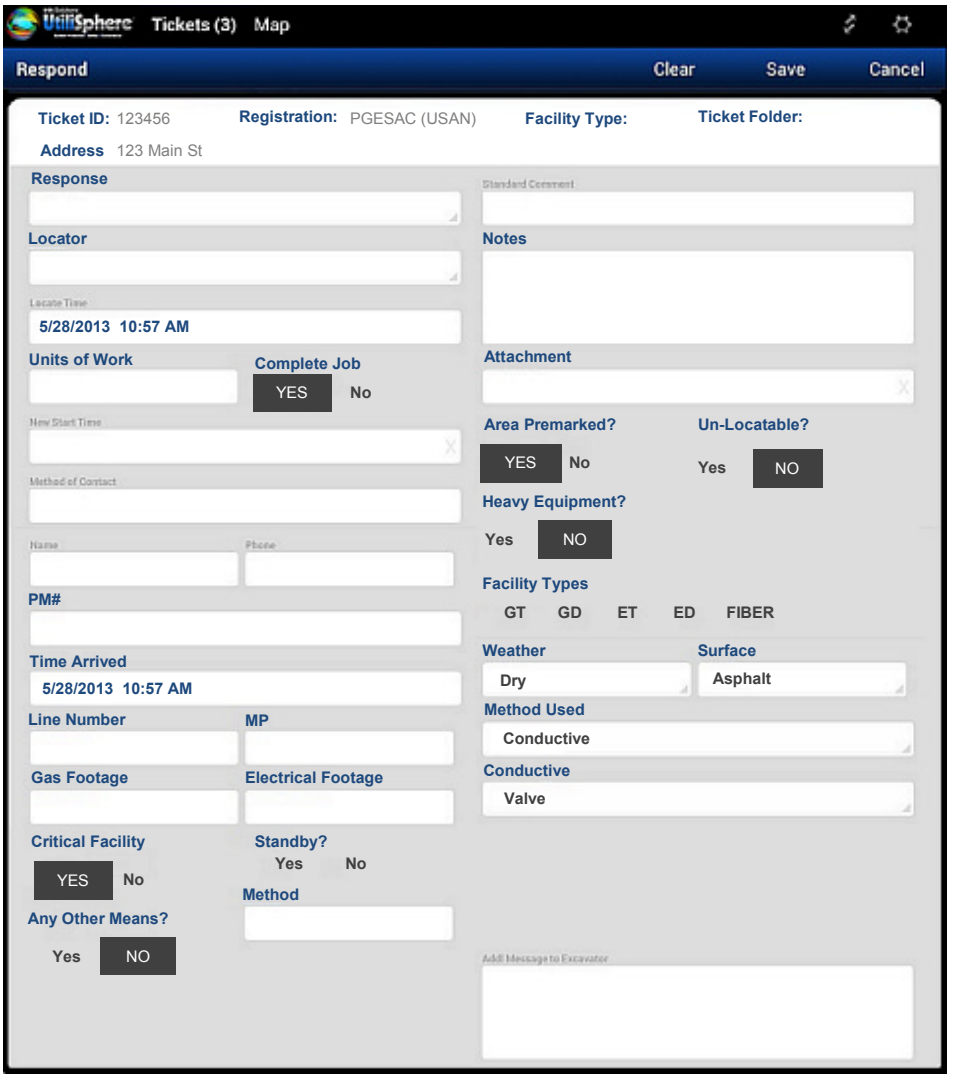
ACTION ITEM	USAGE
Re-assign	Not used at PG&E
Un-assign	Not used at PG&E
Add to folder	Moving a ticket from one folder to another
Remove from folder	Not used at PG&E
Add pictures	Adding multiple pictures to a ticket
Respond	Entering a response into a ticket
Re-open	Reopening a ticket previously closed

7 Responding to a Ticket

The respond screen is an electronic form that contains the necessary information to assist you in responding to a ticket. See Figure 7, "Ticket Respond Screen."

Publication Date: March 2014

Figure 7. Ticket Respond Screen



1. Tap on **Respond** in the action bar.

   A. Touch the **Response field** to select the task you performed in response to the USA ticket.

   For instructions to select the appropriate response, see Job Aid TD-5811P-105-JA01 "Choosing the Correct Utilisphere™ Response."

   For instructions to complete the Respond screen, see Procedure TD-5811P-105, "Responding to a Ticket."

Publication Date: March 2014

8 Adding Pictures

1. Adding one photo to a ticket:

   A. Tap the **Attachment field** in the respond screen.

   B. Wait for the camera to be ready.

   C. Aim your camera toward the objects you want to capture.

   D. Tap on the camera icon to capture image.

   E. Save photo. See Figure 8. “Taking a Picture.”

Figure 8. Taking a Picture

Aim and shoot.

Save or discard and start over.

2. To add multiple (or additional) photos to a ticket:

   A. If you are viewing the respond screen, then touch the **back button** to return to the **Ticket Details screen**.

Publication Date: March 2014

B. Tap on the **action bar**.

C. Select the **add picture** option.

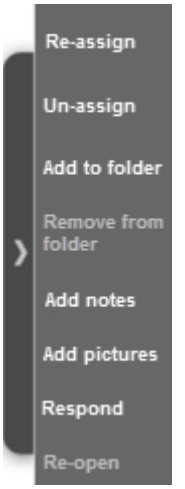
D. Wait for the camera to be ready.

E. Aim your camera toward the objects you want to capture.

F. Tap on the camera icon to capture image.

G. Save photo.

H. Repeat steps C through G to add additional photos.



Action Bar

For instructions to take good pictures, see Procedure TD-5811P-105 "Responding to a Ticket."

NOTE

Remember to select Sync to save changes you made from the tablet to the server.

Publication Date: March 2014

Troubleshooting Difficult to Locate

Job Aid

1 Purpose

Using proper troubleshooting methods to locate difficult-to-locate facilities helps you complete locate and mark without delay.

2 Troubleshooting Difficult to Locate Facilities

1. Before you start troubleshooting:

   A. Confirm that you have proper grounding, leads are in good working order, and your equipment is connected and functioning properly.

   B. Scrape paint off of metallic surfaces to create a good connection.

   C. Try all available direct connect hook-up locations before considering using any other locating method.

   D. IF signal gets weak or is lost during a locate,

      THEN try hooking up at a closer location. Multiple hook-up locations are often needed to complete most USA locate requests.

   E. Strip 1 in. of locating wire to create a better connection. DO NOT allow the bare metal to come in contact with other metallic objects. This could cause a signal fluctuation or other signal-related issues.

2. See Section 3, “Troubleshooting Solution Clarifications” for more information.

LONG DISTANCE WITHOUT ANOTHER HOOK-UP LOCATION	
CAUSES	Distance between transmitter and receiver causes signal to become weak or to disappear.
SYMPTOMS	**SOLUTIONS**
Signal becomes weak and difficult to locate after a long distance of locating.	Use the following methods one by one until you can locate facility: 1. Lower frequency 2. High transmitter output 3. Inductive locate 4. Pipehorn instrument 5. Mapping 6. Excavation to expose facility 7. PG&E corrosion mechanic

STANDING WATER OVER FACILITY	
SYMPTOMS	**SOLUTIONS**
Large puddles of water in work area. Locating with an instrument cannot be accomplished over standing water.	Field meet

INCOMPLETE SERVICE LINE/STUB NO HOOK-UP AVAILABLE WIRE NOT BONDED	
SYMPTOMS	**CAUSES**
Incomplete Service Line/Stub: Service stub shown on map CANNOT be picked up from a main.	Incomplete service line (or stub). Facility is difficult to locate because the incomplete end is not grounded to a service.
No hook-up available: Facility does NOT have any available direct connect hook-up locations.	No hook-up access for transmitter (e.g., no riser or Electrolysis Testing Station [ETS]).
Wire not bonded: When connecting to wire, signal becomes distorted, disappears, and/or drops off abruptly. This is near the area where wire is not bonded.	Wire may not have been bonded or may have been damaged during installation or inserts.

SOLUTIONS

1. Use one or all of the following methods together:
   - Higher frequency
   - High transmitter output
   - Inductive locate
   - Pipehorn instrument
2. IF the above methods do not resolve issue,

   THEN use the following methods one by one until you can locate facility:

   A. Mapping
   B. Excavation to expose facility

Publication Date: March 2014

BROKEN TRACER WIRE	
CAUSES	Broken locating wire caused by corrosion or breakage.
SYMPTOMS	**SOLUTIONS**
Signal disappears or drops off abruptly near broken wire area.	1. Use one or all of the following methods together: ▪ Higher frequency ▪ High transmitter output ▪ Inductive locate ▪ Pipehorn instrument 2. IF the above methods do not resolve issue, THEN use the following methods one by one until you can locate facility: A. In-line locating tape or acoustic locator B. Mapping C. Excavation to expose facility

NO TRACER WIRE	
CAUSES	Facility does NOT have a locating wire.
SYMPTOMS	**SOLUTIONS**
A plastic or fiber facility does not have a tracer wire available for direct connection.	Use the following methods one by one until you can locate facility: 1. In-line locating tape or acoustic locator (use only for plastic gas facilities) 2. Mapping 3. Excavation to expose facility

Publication Date: March 2014

INSULATED JOINTS	
CAUSES	Insulated joints causing signal to become weak beyond the joint.
SYMPTOMS	**SOLUTIONS**
Signal becomes weak or drops off abruptly after passing over joint.	Use the following methods one by one until you can locate facility: 1. Higher frequency 2. High transmitter output 3. Pipehorn instrument 4. Mapping 5. Excavation to expose facility

BLEEDOVER	
CAUSES	High frequency signal jumps onto other facilities. Facilities in close proximity to each other.
SYMPTOMS	**SOLUTIONS**
Receiver depth measurement indicates a sudden AND drastic drop in depth. OR Receiver depth reading DOES NOT coincide with known depth. OR Signal leads you to an unintended facility. For example, while locating a gas facility, you were led to an electric riser, or a telecom or cable box.	Use the following methods one by one until you can locate facility: 1. Lower frequency 2. Mapping 3. Excavation to expose facility

Publication Date: March 2014

STEEL TO PLASTIC TRANSITION	
CAUSES	Steel pipe not bonded to tracer wire.
SYMPTOMS	**SOLUTIONS**
Signal becomes distorted, disappears and/or drops off abruptly near transition area (confirmed on map).	Use the following methods one by one until you can locate facility: 1. Mapping 2. Excavation to expose facility

CONTACT WITH ANOTHER FACILITY	
CAUSES	Facility made contact with another facility causing instrument signal to transfer to the other facility.
SYMPTOMS	**SOLUTIONS**
Instrument signal is erratic and difficult to pinpoint in area where no directional change exists.	Use the following methods one by one until you can locate facility: 1. Mapping 2. Excavation to expose facility 3. PG&E corrosion mechanic

3 Troubleshooting Solution Clarifications

1. **Lower Frequency**: A lower frequency travels farther and provides a smaller, less noticeable trail. These signals can sometimes be difficult to identify initially, but they are less likely to cause bleedover. Low frequencies are helpful for long locates such as mains and transmission lines.

2. **Higher Frequency**: A higher frequency travels only a short distance. In this short distance, a high frequency leaves behind a wide and easy to locate trail. High-frequency signal is known to be able to jump over breaks in tracer wire, insulated joints, and inserts. When your instrument is used for inductive method, high frequencies are usually the default settings.

3. **Higher Transmitter Output**: A more powerful transmitter output can locate long distances, locate the end of a stub, and jump signal over breaks in tracer wire, insulated joints, and inserts.

4. **Inductive Locate**: An inductive locate is a method used to induce signal onto a facility conductor. Use this method when direct-connect is not an option, when signal is lost during a conductive locate, or when sweeping for unknown underground facilities.

5. **Pipehorn 800-HL**: The Pipehorn locating instrument has a super-high 480 kHz frequency that can sometimes locate difficult-to-locate facilities. Use this super-high frequency to jump signal over breaks in tracer wire, insulated joints, and inserts. This instrument is effective in locating service stubs (locate from the main to the service until signal drops off).

6. **In-line locating tape/Acoustic Locator**: Both of these instruments require a breakdown of the gas meter and are effective only on plastic facilities. Both instruments require special training from the academy.

   A. After locating facilities, do the following:

      1) Install DAS™ markers to help locate facilities in the future.

         a. Complete a **Map Correction Form** to record the accurate location of the facility.

      2) Install Electronic Marker System (EMS) carrots to help locate facilities in the future.

         a. Complete a **Map Correction Form** to record the newly installed EMS.

   For instructions on completing form, see Job Aid TD-5811P-105-JA02, "Submitting a Map Correction Form."

7. **Mapping**: For use only after all instrument-specific options have been exhausted. Request as-builts or service orders from Mapping to verify you have the most up-to-date information before marking using map measurements.

8. **Excavation to Expose**: If the above options fail, schedule PG&E crew to expose facility to:

   - Install EMS. Complete a **Map Correction Form** to record the newly installed EMS and exact location of facilities.

Publication Date: March 2014

- Install an ETS when locating a long distance without an available direct-connect location. Complete a **Map Correction Form** to record the newly installed ETS and exact location of facilities.

  For instructions on completing form, see Job Aid TD-5811P-105-JA02, "Submitting a Map Correction Form."

9. **PG&E Corrosion Mechanic**: Schedule a corrosion mechanic to investigate and isolate the location where a PG&E conductor comes in contact with another underground facility.

   Schedule a PG&E crew to repair a problem once location is identified.

4 Communicating with Excavator

1. Inform excavator of all sections that were difficult or impossible to locate.
2. IF excavation is planned to commence within 24 in. of PG&E markings,

   THEN notify excavator to hand dig to verify the exact location of facility (CGC Law 4216.4.[a]).

3. IF facility needs to be exposed,

   THEN discuss options for excavator to hand dig to expose facility instead of requiring PG&E crew assistance.

5 Documentation

1. Document the following in USA ticket:
   - Describe difficult-to-locate facility.
   - Enter detailed notes of all discussions with excavator.
   - Describe final outcome of situation.
2. Submit a **map correction form** if:
   - An unmapped facility was located.
   - Identified location of facility is different than indicated on map.
   - An EMS was installed.

Publication Date: March 2014

For instructions, see Job Aid TD-5811P-105-JA02, "Submitting a Map Correction Form."

3. Submit a **corrective work form** to:

   - Request an ETS to be installed
   - Request assistance to install an EMS

   For instructions, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

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Choosing Best Frequency

Job Aid

1 Purpose

Choosing the correct frequency for your task is essential to complete effective and accurate locates.

2 Frequency Variables

1. The best frequency for a locate depends on, but is not limited to, the following variables:

   - Soil conditions
   - Conductive material (copper, steel, cast iron, etc.)
   - Corrosion on conductive material
   - Grounding capabilities
   - Interference in the area
   - Method of connection (conductive, inductive clamp, or inductive)
   - Depth of the facility being located
   - Signal distortion
   - Breaks in the tracer wire
   - Insulated joints
   - Fittings

3 Connection Methods

1. **Conductive** method **(direct connect)** is most effective using the lowest available frequency. Start from a low frequency and gradually select higher frequencies as the instrument's signal becomes harder to pick up with the receiver.

   For details, see Procedure TD-5811P-201, "Conductive Locate."

2. **Inductive** and **Inductive with Coupler** methods require high frequencies to be effective. Most locating instruments default to the highest available frequency when using these methods.

Publication Date: March 2014

For details, see Procedures TD-5811P-202, "Inductive with Coupler Locate" and TD-5811P-203, "Inductive Locate."

4 Frequency Comparison

1. Low Frequencies

A lower frequency travels farther and provides a smaller, less noticeable trail. These signals can sometimes be difficult to identify initially, but they are less likely to cause bleedover. Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

The best practice is to attempt a locate using a low frequency first and choose a higher frequency as needed. Use low frequencies only when direct connect is possible.

2. High Frequencies

The higher frequency you select, the shorter distance your signal travels before it can no longer be picked up by the receiver. In this short distance, a higher frequency leaves behind a wide and easy-to-locate trail. However, wide signals have a high probability of bleedover.

High frequencies are always used for inductive locating.

See Figures 1-3 below for details.

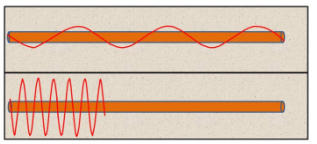

Figure 1.
Frequency Comparison

Low frequency has a narrow signal, but travels longer distance. High frequency has a wide signal but travels only a short distance.

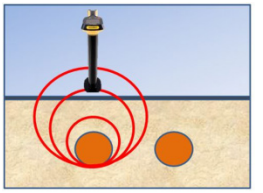

Figure 2.
Low Frequency

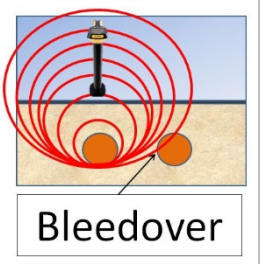

Figure 3.
High Frequency

Publication Date: March 2014

5 Choose the Right Frequency for Your Instrument

1. See Table 1, "PG&E Preferred Instrument Frequencies" for your instrument.

Table 1. PG&E Preferred Instrument Frequencies

INSTRUMENT	FREQUENCY		
	LOW	MID	HIGH
Fisher TW-6	81.92 kHz		
Metrotech 480B	83 kHz		
Metrotech 850	9.82 kHz		
Metrotech 9890	982 Hz	9.82 kHz	82.5 kHz
Vivax vLocML vLocML2	982 Hz	9.82 kHz	82.5 kHz 83.1 kHz
Vivax vLoc-9800	982 Hz	9.82 kHz	83.1 kHz
Pipehorn 800-HL	9 kHz		480 kHz

NOTE

The Pipehorn transmitter sends both low and high frequencies simultaneously by default. With this function, you can switch the receiver to either frequency during a locate without having to return to the transmitter to change frequencies.

For instrument operating instructions, see the instrument-specific procedures in this handbook.

Publication Date: March 2014

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Choosing the Correct Utilisphere™ Response

Job Aid

1 Purpose

Choosing the correct Utilisphere™ response has a direct impact on public safety and damage prevention. It helps you generate the appropriate communication with the excavator and accurately record your work for each specific USA ticket. The Utilisphere™ database stores this information as the official record for each ticket.

Most responses have standard comments already created. Use these standard comments whenever possible.

2 Facility Marked

WHEN TO USE	Locate and mark is completed in one visit.
EXAMPLES OF PROPER NOTES	▪ Marked gas service (branch service) and electric service. Placed flags in lawn. ▪ Excavator excavated area before start date. Stopped job on 07/22 at 10:00am. Completed a “Record of Warning” form and provided a copy to foreman, John Doe, and explained the hazards. Marked remaining excavation area (gas main and services).
ADDITIONAL ACTIONS	1. Check one or more facility types (e.g., GT, GD, ET, ED, fiber). 2. IF you use this response for an area that was excavated before marking, THEN document details of excavation and conversations with excavator into the Notes section. 3. Take pictures of all markings. 4. Close ticket.

Publication Date: March 2014

3 No Conflict

WHEN TO USE	After clearing PG&E facilities from the vicinity of excavation area or from office.
EXAMPLES OF PROPER NOTES	▪ No PG&E facilities near delineations. Closed from office, contacted excavator to notify of no conflict. ▪ PG&E gas and electric distribution are only facilities cleared at this time. Entire excavation area not cleared until you receive a response from PG&E electric.
ADDITIONAL ACTIONS	1. IF you are at excavation site, THEN do the following: A. Paint "NO PGE" in delineations using the appropriate color for the facility identified as clear. B. Take pictures of markings. 2. Contact excavator to inform of no conflict if you are **closing ticket WITHOUT a site visit**. 3. Notify excavator if any PG&E facilities still need to be located by another department (i.e., Gas Transmission, Electric Transmission). 4. IF unable to make contact with excavator, THEN use **Addl Notes to Excavator** option in the response screen to notify of other departments not yet identified as cleared. 5. Close ticket.

Publication Date: March 2014

4 Bad Ticket Info − Resubmit

WHEN TO USE	A ticket contains incorrect information (wrong address, wrong directions, etc.).
EXAMPLES OF PROPER NOTES	▪ Address does not exist. Contacted excavator and left message to re-submit ticket with accurate information. ▪ No PM # provided. Resubmit ticket with PM #.
ADDITIONAL ACTIONS	1. Document details of inaccurate information. 2. Document conversation with excavator. 3. Close ticket.

5 Cancelled Ticket

WHEN TO USE	Excavator cancels a ticket.
EXAMPLE OF PROPER NOTES	Ticket cancelled by excavator.
ADDITIONAL ACTIONS	1. Search your folder for all tickets that have the same ticket number. 2. Close tickets.

6 Duplicate Ticket

WHEN TO USE	Identical tickets exist in your folder, or a ticket was placed in your folder by mistake.
EXAMPLES OF PROPER NOTES	▪ Ticket submitted to wrong area. Informed supervisor. ▪ Ticket is duplicate. Close one copy.
ADDITIONAL ACTIONS	1. IF a ticket is placed in your folder by mistake, THEN do the following: A. Inform supervisor to have ticket reassigned. B. Leave ticket open. 2. Close the duplicate ticket(s) if you can confirm that you have multiple copies of the same ticket.

Publication Date: March 2014

7 Excavated Before Marked

WHEN TO USE	Excavator began excavation before PG&E marks.
EXAMPLE OF PROPER NOTES	Excavator started to excavate area before I could locate and mark. Stopped job at 10:00am. Completed a "Record of Warning" form and provided a copy to excavator. Spoke with foreman, John Doe, and explained the hazards.
ADDITIONAL ACTIONS	1. IF excavation is still in progress, THEN do the following: a. IMMEDIATELY stop excavation. b. Complete a **Record of Warning** form. See Job Aid TD-5811P-301-JA02, "Issuing a Record of Warning." 2. Close ticket if excavation IS completed. 3. IF excavation is NOT completed or facilities still need to be located, THEN do the following: A. Proceed to locate and mark. B. Use the response **Facility Marked** (include notes regarding excavation before marked).

8 Expired Ticket

WHEN TO USE	Ticket is expired (older than 28 days) and has not been extended or renewed.
EXAMPLE OF PROPER NOTES	Ticket is expired. Made direct contact with excavator to notify about extend or renew if job is still active.
ADDITIONAL ACTIONS	1. Inform excavator to submit a renewal or extension ticket. 2. Close ticket.

Publication Date: March 2014

9 Located by PG&E Crew

WHEN TO USE	PG&E's crew locates and excavates.
EXAMPLE OF PROPER NOTES	Located by PG&E crew (John Doe, LanID). PM#1234567. (PM# is needed only if you have spent 15 minutes or longer on ticket.)
ADDITIONAL ACTIONS	1. Document PM#, name, and LanID of person who located facilities. 2. Close ticket.

10 No Delineation

WHEN TO USE	No delineations at excavation site.
EXAMPLE OF PROPER NOTES	Site has no signs of delineation. Contacted the foreman, John Doe (555-367-5309), and informed him to delineate area and re-submit ticket.
ADDITIONAL ACTIONS	1. Document conversation with excavator. 2. Close ticket.

11 No Remark Required

WHEN TO USE	Ticket indicates no remark required.
EXAMPLE OF PROPER NOTES	Excavator indicates on ticket that no remarks are required.
ADDITIONAL ACTIONS	Close ticket.

12 No Response from Excavator

WHEN TO USE	Excavator has not responded to 3 requests for help OR information needed to complete ticket.
EXAMPLES OF PROPER NOTES	▪ Left message on 06/29/13 at 2:03pm for John Doe (555-367-5309) requested access to locked gate and more information to complete ticket request. ▪ Left message on 06/30/13 at 8:30am for John Doe (555-367-5309). Same request as first attempt. ▪ Left message on 06/30/13 at 1:00pm for John Doe (555-367-5309). Same request as first attempt.
ADDITIONAL ACTIONS	1. Attempt to contact excavator at least 3 times. 2. Document date, time, and details of each attempt. 3. Close ticket.

13 Notification of New Start Time

WHEN TO USE	After direct contact was made with excavator and a new start date and time have been mutually agreed upon.
EXAMPLES OF PROPER NOTES	Spoke with John Doe (555-367-5309) and discussed a new start date and time due to rain in the area.
ADDITIONAL ACTIONS	1. Document the following: ▪ New start date and time. ▪ Name and phone number of person you contacted. ▪ Method of contact (phone conversation or field meet. Voice message is NOT acceptable). 2. Leave ticket open.

Publication Date: March 2014

14 PG&E Response Not Required

WHEN TO USE	After confirming that PG&E services are NOT required for a ticket request.
EXAMPLES OF PROPER NOTES	▪ Spoke with John Doe (555-367-5309) and was informed that ticket request is for telecom and cable. ▪ Excavator comments on ticket state: “Re-mark Yes, Telecom.”
ADDITIONAL ACTIONS	1. Document the following: ▪ Conversation with excavator (if applicable). ▪ How you determined that PG&E services were not needed. 2. Close ticket.

15 Re-assigned Ticket

WHEN TO USE	For supervisor to use when re-assigning a ticket to a different folder.
EXAMPLE OF PROPER NOTES	Moved ticket to PGE01 folder to even-out work flow.
ADDITIONAL ACTIONS	1. Document reason for re-assignment. 2. Leave ticket open.

16 Completing a Phased Ticket

WHEN TO USE	To log the final response of a phased ticket when job is completed.
EXAMPLE OF PROPER NOTES	Completed locate and mark of the ticket request.
ADDITIONAL ACTIONS	1. Check one or more facility types (e.g., GT, GD, ET, ED, fiber). 2. Take pictures of ALL markings. 3. Close ticket.

Publication Date: March 2014

17 Respond to a Phased Ticket

WHEN TO USE	Phasing a ticket for large excavations that cannot be completed within the 2 working day time limit. DO NOT use for a notification of new start time.
EXAMPLE OF PROPER NOTES	Spoke with John Doe (555-367-5309). Discussed plan to phase ticket to stay ahead of excavation. Located west side of Main St. between 1st and 2nd St. on 10/22. Will return 10/23 at 10:00am to locate the west side of Main St. between 2nd and 3rd St.
ADDITIONAL ACTIONS	1. Check one or more facility types (e.g., GT, GD, ET, ED, fiber). 2. Document all discussions with excavator, including the agreed phase plans. 3. Take pictures of daily markings. 4. Leave ticket open until job is completed. 5. Use **Respond to a Completed Phased Ticket** to close ticket.

18 Site Visit/Field Meet

WHEN TO USE	Field Meet or Site Visit is held to discuss concerns or excavation scope with excavator. DO NOT use if you locate and mark facilities during visit.
EXAMPLE OF PROPER NOTES	Met with John Doe and discussed concerns regarding excavation 8 ft from a PG&E critical facility. Explained a standby will be required if they come within 5 ft.
ADDITIONAL ACTIONS	1. Document all discussions with excavator and the agreed phase plans. 2. Take pictures of areas of concern. 3. Leave ticket open.

Submitting a Map Correction Form

Job Aid

1 Purpose

A map correction form (see Figure 1, “Gas Map Correction Form”) is a method to communicate a mapping inconsistency with Mapping. Mapping is responsible for verifying your findings and making appropriate changes to the PG&E system map.

The most commonly found mapping errors include, but are not limited to:

- Services left off of map
- Proposed facilities tied into the system
- Located facilities found in wrong area of map
- Abandoned or deactivated services still on map

2 Completing a Map Correction Form

1. Use one form for each plat map where correction(s) is needed:
   - For a gas map correction request, use **Form TD-4460B-001-F01, “Gas Map Correction Form.”**
   - For an electric map correction request, use **Form TD-9001P-01-F02, “Map Correction Transmittal Form.”**

   A. Enter the **General Information** in the first rectangle box of the form.

   B. **Type of Correction**: Check all applicable boxes.

   C. **Location**: Provide the address of the location where correction(s) is needed.

   D. **Map Discrepancy Correction**: Provide a brief description of correction. DO NOT draw a map in the form.

2. Print a copy of the map that needs correction. See Figure 2, “Map Before Correction.”

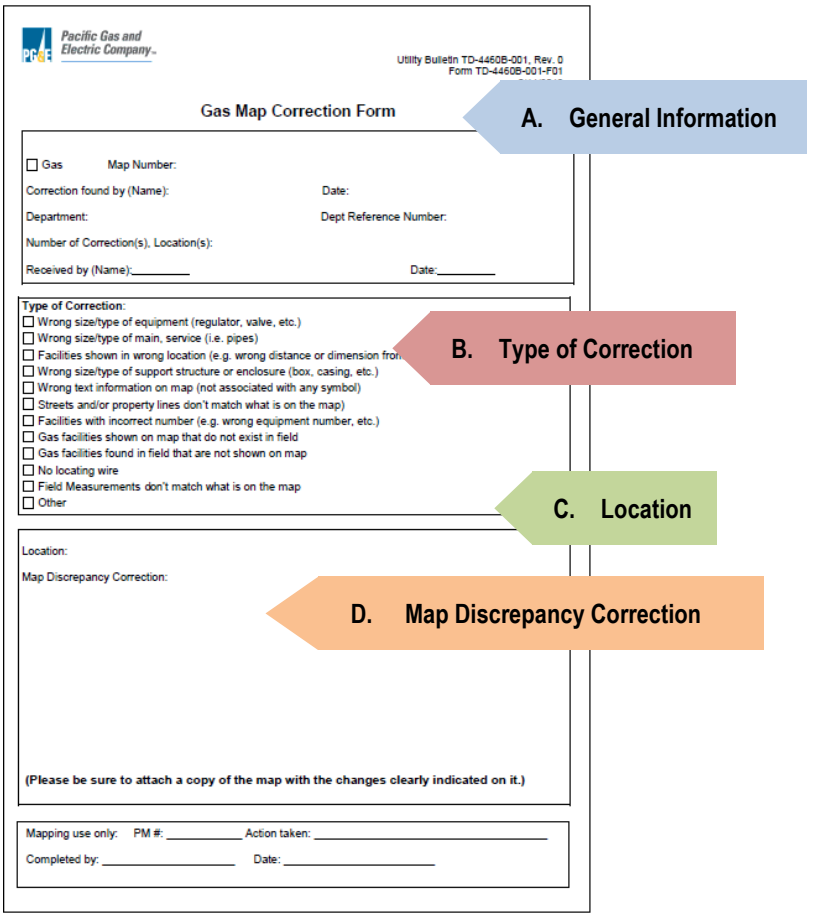
3. Make all necessary changes on the printed map. See Figure 3, “Map with Correction.”

Publication Date: March 2014

4. Submit a copy of the following to Mapping:

   - Map with your corrections
   - Form with descriptions of corrections

Figure 1. Gas Map Correction Form



Publication Date: March 2014

Figure 2. Map Before Correction

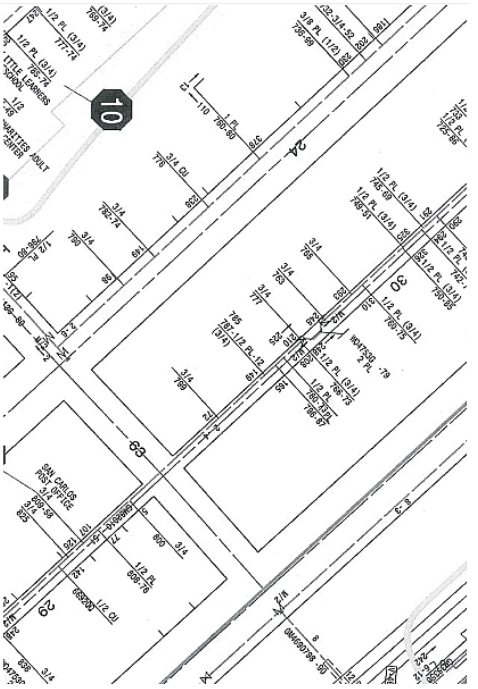
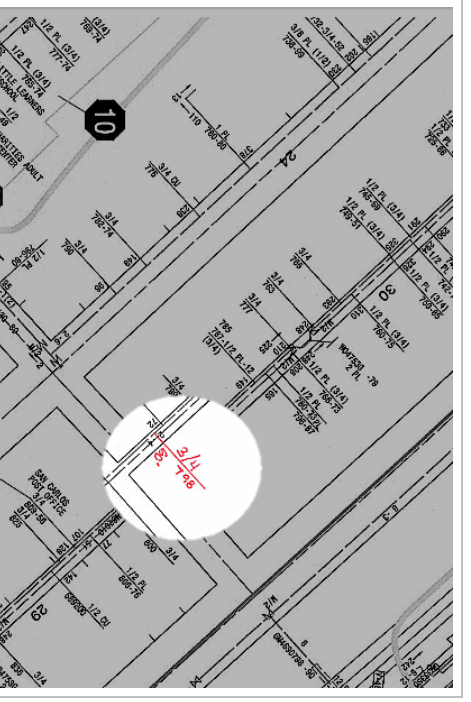


Figure 3. Map with Correction



Publication Date: March 2014

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Corrective Work Form

Job Aid

1 Purpose

A corrective work form (see Figure 2, “Corrective Work Form”) is a method to communicate with the gas distribution personnel when discovering any abnormal operating condition (AOC) or another problem found in the field that needs correction. An AOC is a condition that may indicate:

- A malfunction of a component
- A deviation from normal operations that:
  - Causes a condition to exceed design limits
  - Results in a hazard to people, property, or the environment

AOCs include, but are not limited to the following examples:

- Gas leak
- Pipe corrosion (loss of protection on pipe)
- Bent riser
- Damaged facility
- Electric shock
- Overbuild (structure built over the top of the PG&E facility)

See Figure 1, “Examples of AOCs.”

CAUTION!

IMMEDIATELY contact Gas Dispatch AND your supervisor to report if a discovered AOC has an imminent hazard condition.

Publication Date: March 2014

Figure 1. Examples of AOCs

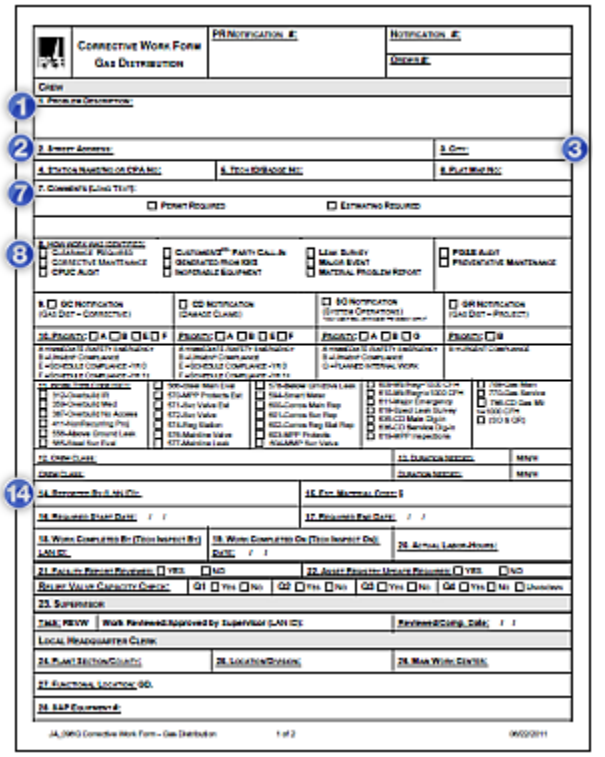
	**Example 1** shows a buried meter set.
	**Example 2** shows evidence of scaling and blistering on a pipe.
	**Example 3** shows severe corrosion, rust, and blistering.

2 Completing a Corrective Work Form

Locate and mark personnel fill out the following fields:

1. **Problem Description**: Provide detailed account of why corrective action is being issued and what work is needed to be performed. See Table 1, “Examples of Problem Description and Request for Correction.”
2. **Street Address**
3. **City**
7. **Comments:** Add any remarks associated with the requested correction.
8. **How Work was Identified**: Check the **preventative maintenance box**.
14. **Reported By (LAN ID)**: Your LAN ID

Figure 2. Corrective Work Form



Publication Date: March 2014

Table 1. Examples of Problem Description and Request for Correction

PROBLEM DESCRIPTION	REQUEST FOR CORRECTION
Weak signal on gas main due to distance from nearest connection point.	Request for electrolysis test station (ETS) to be installed.
Overbuild of a gas service by homeowner.	Request to have service rerouted.
Shallow facilities located in field.	Request to have facilities lowered or new facilities installed.

3 Submitting a Corrective Work Form

1. If the discovered problem has an imminent hazard condition, then hand the corrective form to the Gas Division group that responded to your report to Gas Dispatch.
2. If the discovered problem does not have an imminent hazard condition, then submit the corrective form to your supervisor when you arrive back at the office.

Identifying the Need for a Site Visit, Field Meet, and Standby

Job Aid

1 Purpose

Site visit, field meet, and standby are known to directly reduce the number of damages to Pacific Gas and Electric Company (PG&E) facilities. See Figure 1, “Excavation without a Standby.”

Figure 1. Excavation without a Standby

2 Site Visit

Site visit is a meeting between locate and mark personnel and the excavator. This is an opportunity for a locator to build a positive relationship with excavators.

1. A site visit is needed for any of the following:

   - To phase a ticket because locate and mark cannot be completed before due date.
   - To determine excavation schedule for a large project
   - To gain access to locate and mark work areas
   - To obtain critical information regarding work area

Publication Date: March 2014

- To address safety concerns for locate and mark personnel
- To discuss safe excavation practices

2. IF a site visit is needed,

   THEN do the following:

   - Communicate with excavator regarding the need for a site visit.
   - Schedule site visit with excavator.
   - Document the following in USA ticket **Response** screen:
     - All actions taken
     - All communications with excavator including name and phone number of person you spoke with.

3 Field Meet

A field meet is a meeting between locate and mark personnel, excavator, a standby person, and anyone whose role is important to the protection of PG&E facilities during an excavation.

1. Use the field meet to communicate to the excavator any possible threat of damage to PG&E underground facilities.

2. A field meet is needed for any of the following:

   - Excavation is within 10 ft of a critical facility subsurface installation.
   - A non-compliant excavator performing excavation activities. A non-compliant excavator is someone who is known to have worked in an unsafe manner.
   - Agricultural activities where grading, discing, ripping, or other disruptive physical work may threaten underground facilities.
   - Planned construction methods or practices are likely to threaten the integrity of underground PG&E facilities.
   - Excavation activities may impact overhead facilities (e.g., cranes, booms, drilling rigs).
   - Blasting activity is within 50 ft of the nearest edge of a PG&E facility.
   - Planned cross boring.

Publication Date: March 2014

3. IF a field meet is needed,

   THEN do the following:

   A. Communicate with excavator regarding the need for a field meet.

   B. Schedule field meet with excavator.

   C. Document the following in USA ticket **Response** screen:

      - All actions taken
      - All communications with excavator including:
        - Name and phone number of excavator contact person
        - Location and date of field meet
        - Reason why field meet is needed

4 Standby

A standby person's primary responsibility is to protect PG&E critical facilities from the risk of damage.

1. A standby person is needed for any of the following:

   - Excavations within 5 ft of the nearest edge of a critical facility.
   - Boring activity crosses a critical facility.
   - Boring activity is parallel to a critical facility within 10 ft of the nearest edge of the facility.
   - Blasting activity occurs within 50 ft of the nearest edge of a facility.

2. IF a standby is needed,

   THEN do the following:

   A. Inform excavator of the following:

      1) Allow a 48-hour advance notification to schedule a standby person.

      2) A standby person must be on site.

   B. IMMEDIATELY inform a standby scheduler.

   C. Document the following in USA ticket **Response** screen:

Publication Date: March 2014

- All actions taken
- All communications with excavator including:
  - Name and phone number of excavator contact person
  - Location of facility where standby is needed
  - Reason why a standby person is needed

Handling Excavators Working Unsafely

Job Aid

1 Purpose

Excavators working near underground gas, electric, and fiber-optic utility facilities sometimes conduct unsafe work practices. The key to success in resolving unsafe work practices is to remain calm and handle the situations in a professional manner.

2 What is an Unsafe Work Practice?

An unsafe work practice includes but is not limited to the following:

- Using power equipment within 24 in. of an underground facility.
- Work in the vicinity of a utility facility that exposes someone or a property to a hazard.
- Excavation is performed without a USA ticket.
- Excavating near a high-priority or critical facility but without the assistance of qualified standby PG&E personnel.
- Using a crane within 10 ft of overhead power lines.
- Excavating over unmarked ground.

3 How to Handle an Unsafe Work Practice Situation

1. Be prepared that excavator may behave unprofessionally.
2. When you observe a potentially hazardous situation, do the following:
   - A. IMMEDIATELY stop excavation.
   - B. Identify the highest level personnel at the job site.
   - C. Move the conversation to a safe distance away from the hazardous area.
   - D. Calmly explain about your observation of the potential hazard.

Publication Date: March 2014

E. Ask excavator to take the necessary actions or precautions before resuming work.

F. Issue a **Record of Warning.**

For instructions, see TD-5811P-301-JA02, "Issuing a Record of Warning."

3. IF excavator continues to work in an unsafe manner,

   THEN do the following:

   A. Move to a safe distance away from the hazardous area.

   B. IMMEDIATELY notify your supervisor of the situation.

   C. Inform supervisor that you are about to call 911.

   D. Call 911 for assistance.

   E. Report to 911 dispatcher that excavator violates California Penal Code § 593c.

4 California Penal Code 593c

Every person who willfully and maliciously breaks, digs up, obstructs, interferes with, removes or injures any pipe or main or hazardous liquid pipeline erected, operated, or maintained for the purpose of transporting, conveying or distributing gas or other hazardous liquids for light, heat, power or any other purpose, or any part thereof, or any valve, meter, holder, compressor, machinery, appurtenance, equipment or apparatus connected with any such main or pipeline, or used in connection with or affecting the operation thereof or the conveying of gas or hazardous liquid there through, or shuts off, removes, obstructs, injures, or in any way interferes with any valve or fitting installed on, connected to, or operated in connection with any such main or pipeline, or controlling or affecting the flow of gas or hazardous liquid through any such main or pipeline, is guilty of a felony.

Issuing a Record of Warning

Job Aid

1 Purpose

A record of warning (see Figure 1, “Record of Warning”) is a form of official communication issued by PG&E personnel upon observing an excavator or homeowner performing unsafe or unauthorized work near overhead or underground gas, electric, or fiber facilities.

2 Completing the Record of Warning Form

Complete the form whether or not the responsible party complies with the warning.

1. Complete Section A, “Third Party Information” and Section B, “Job Site Location,” using information and nature of work from the USA ticket when possible.
2. If the responsible party does not have a valid USA ticket, then complete the form with information you can collect from the job site AND immediately contact your supervisor.
3. Complete Section C, “Reason for Warning,” by describing the type of job in progress and the reason for warning.

Examples of reasons for warning:

REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning Contractor installing sewer line, working without USA ticket.
REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning Contractor installing electric panel, working outside delineated work area.
REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning Contractor trenching for water main, crossing marked gas transmission line without PG&E standby personnel.

REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning Contractor installing traffic signal, starting work before USA ticket start date and time.

REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning Contractor installing freeway sign with crane, working within 10 ft of overhead power lines.

4. Complete Section D, “PG&E Information.”

3 Issuing a Record of Warning to the Responsible Party

Complete the form whether or not the responsible party complies with the warning.

1. Notify the responsible party job site supervisor that a potentially hazardous situation exists.
2. Explain the hazard.
3. Request that work stop immediately until necessary actions or precautions can be taken.
4. If the responsible party continues to work in an unsafe manner, then move away to a safe distance and immediately notify your supervisor.
5. Distribute warning as follows:

WHITE Copy goes to public safety program manager at address provided in the Contact Information area.

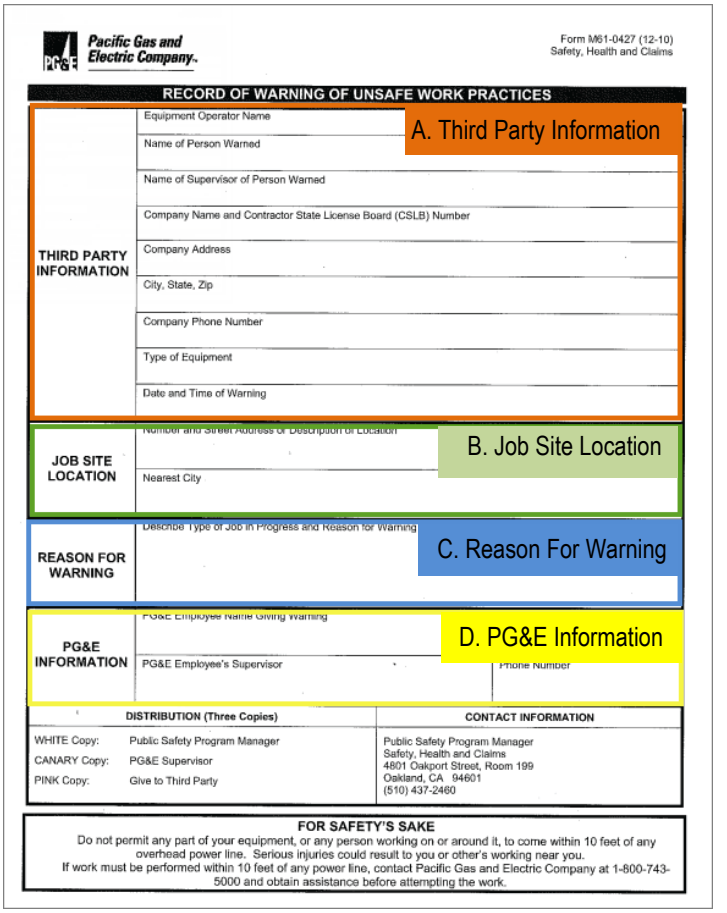
CANARY Copy goes to your PG&E supervisor.

PINK Copy goes to responsible party to whom the warning was issued.

NOTE: If responsible party refuses to accept record of warning, then write the word “refused” on pink copy and give it to your supervisor.

Publication Date: March 2014

Figure 1. Record of Warning



Pacific Gas and Electric Company.

Form M61-0427 (12-10)
Safety, Health and Claims

RECORD OF WARNING OF UNSAFE WORK PRACTICES

THIRD PARTY INFORMATION

A. Third Party Information

- Equipment Operator Name
- Name of Person Warned
- Name of Supervisor of Person Warned
- Company Name and Contractor State License Board (CSLB) Number
- Company Address
- City, State, Zip
- Company Phone Number
- Type of Equipment
- Date and Time of Warning

JOB SITE LOCATION

B. Job Site Location

- Number and Street Address or Description of Location
- Nearest City

REASON FOR WARNING

C. Reason For Warning

- Describe Type of Job in Progress and Reason for Warning

PG&E INFORMATION

D. PG&E Information

- PG&E Employee Name Giving Warning
- PG&E Employee's Supervisor
- Phone Number

DISTRIBUTION (Three Copies)		CONTACT INFORMATION
WHITE Copy:	Public Safety Program Manager	Public Safety Program Manager Safety, Health and Claims 4801 Oakport Street, Room 199 Oakland, CA 94601 (510) 437-2460
CANARY Copy:	PG&E Supervisor	
PINK Copy:	Give to Third Party	

FOR SAFETY'S SAKE

Do not permit any part of your equipment, or any person working on or around it, to come within 10 feet of any overhead power line. Serious injuries could result to you or other's working near you.
If work must be performed within 10 feet of any power line, contact Pacific Gas and Electric Company at 1-800-743-5000 and obtain assistance before attempting the work.

Publication Date: March 2014

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Completing a Gas Incident Report Addendum (Form A-1)

Job Aid

1 Purpose

The Gas Incident Report Addendum (Form A-1) (see Figure 1, "Form A-1") is the official record of a dig-in investigation. The form captures all details of an incident for recordkeeping and to assist Damage Claims in finalizing the investigation. This job aid provides some useful examples of a good report.

2 Filling Out Form A-1

The dig-in investigator arriving at a dig in collects information and fills out the following fields:

1. Leak Number/Non-Leak Reference Number **(issued by local headquarters)**.

2. Part B: Incident Description:

   A. Summary of the Dig-in: **State only the facts**.

      Examples:

      - Homeowner severed ½ in. plastic gas service line with shovel.
      - Excavator punctured 2 in. steel gas main with backhoe.
      - Excavator bored through 4 in. plastic gas main with hole auger.

   B. Photo Taken: **Yes or No** by **LAN ID**.

   C. Other evidence secured: **Yes or No**.

      Examples:

      - Damaged pipe
      - Video file
      - Excavator business card

   D. Location of Dig-in: **Select one**.

3. Part C: Detailed Damage Report:

   A. Excavator-Type Causing Incident: **Select one**.

   B. Owner Information: **All applicable**.

4. Part D: Type of Excavation Method: **Select one**.

5. Part E: Type of Work Being Performed: **Select one**.

6. Part F: USA Marking Visible and Observable at the Time of the Dig-in: **Select all applicable**.

   Examples of "none:"

   - No USA ticket for excavation
   - Facility not mapped
   - Marks not maintained or were removed

   A. Horizontal distance **(inches)**.

   B. Total distance **(feet)**.

      For more information about horizontal and total distance, see Procedure TD-5811P-501, "Dig-in Investigation."

7. Part G: Excavator Provided Information:

   A. USA Ticket: **Yes or No**.

   B. USA Ticket Number: **If available**.

   C. No USA Ticket: **Provide reason**.

8. Part H: Gas Loss:

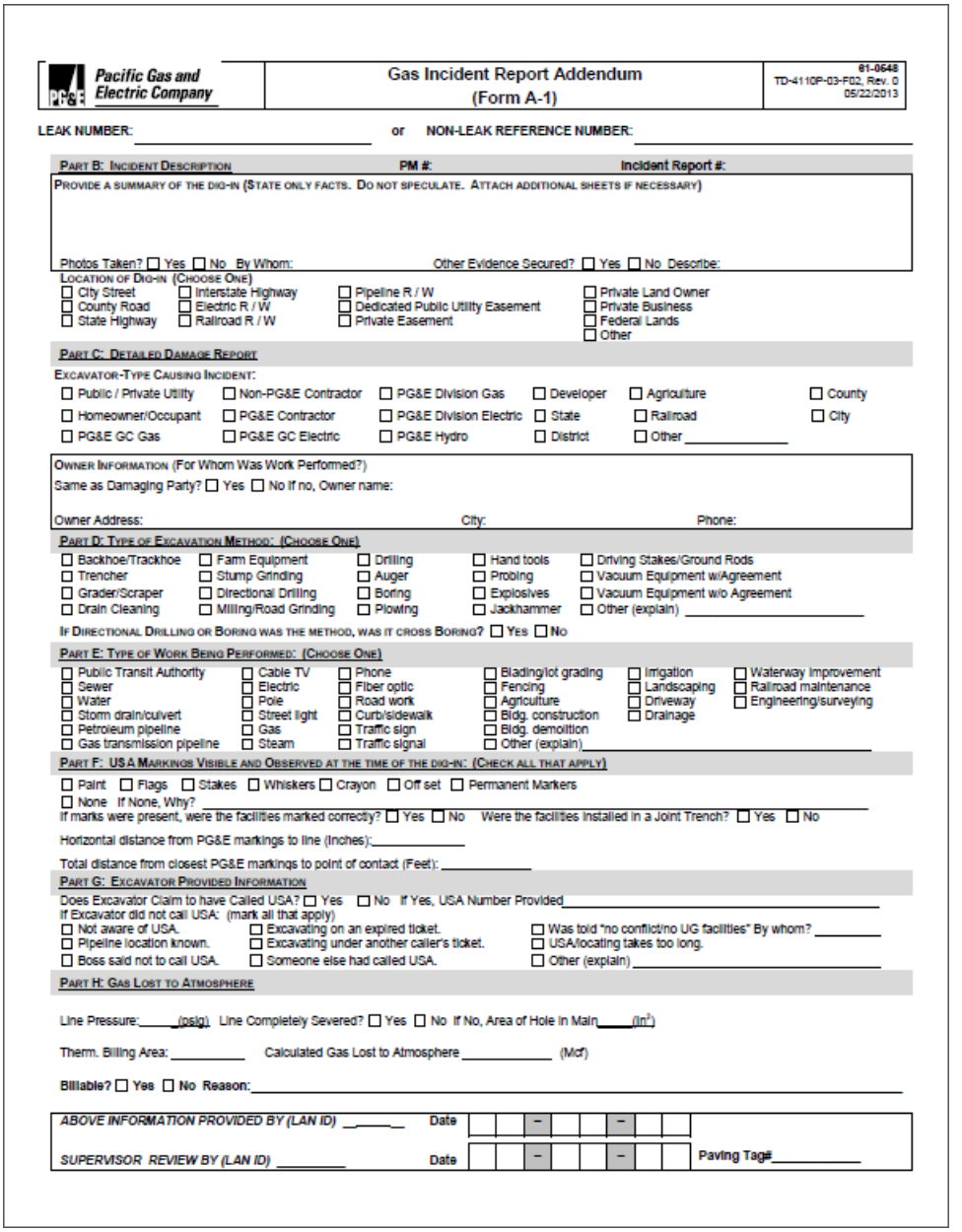
   A. Line pressure, line completely severed, therm. Billing area, and calculated gas lost to atmosphere **(leave blank)**.

   B. Billable? **Yes or No**.

      For examples of billable damages, see TD-5811P-501, "Dig-in Investigation."

Publication Date: March 2014

Figure 1. Form A-1.



Pacific Gas and Electric Company

Gas Incident Report Addendum (Form A-1)

61-0648 TD-4110P-03-F02, Rev. 0 05/22/2013

LEAK NUMBER: _____ or NON-LEAK REFERENCE NUMBER: _____

PART B: INCIDENT DESCRIPTION PM #: Incident Report #:

PROVIDE A SUMMARY OF THE DIG-IN (STATE ONLY FACTS. DO NOT SPECULATE. ATTACH ADDITIONAL SHEETS IF NECESSARY)

Photos Taken? ☐ Yes ☐ No By Whom: Other Evidence Secured? ☐ Yes ☐ No Describe:

LOCATION OF DIG-IN (CHOOSE ONE)

☐ City Street ☐ County Road ☐ State Highway ☐ Interstate Highway ☐ Electric R / W ☐ Railroad R / W ☐ Pipeline R / W ☐ Dedicated Public Utility Easement ☐ Private Easement ☐ Private Land Owner ☐ Private Business ☐ Federal Lands ☐ Other

PART C: DETAILED DAMAGE REPORT

EXCAVATOR-TYPE CAUSING INCIDENT:

☐ Public / Private Utility ☐ Non-PG&E Contractor ☐ PG&E Division Gas ☐ Developer ☐ Agriculture ☐ County
☐ Homeowner/Occupant ☐ PG&E Contractor ☐ PG&E Division Electric ☐ State ☐ Railroad ☐ City
☐ PG&E GC Gas ☐ PG&E GC Electric ☐ PG&E Hydro ☐ District ☐ Other _____

OWNER INFORMATION (For Whom Was Work Performed?)

Same as Damaging Party? ☐ Yes ☐ No If no, Owner name:

Owner Address: City: Phone:

PART D: TYPE OF EXCAVATION METHOD: (CHOOSE ONE)

☐ Backhoe/Trackhoe ☐ Trencher ☐ Grader/Scraper ☐ Drain Cleaning ☐ Farm Equipment ☐ Stump Grinding ☐ Directional Drilling ☐ Milling/Road Grinding ☐ Drilling ☐ Auger ☐ Boring ☐ Plowing ☐ Hand tools ☐ Probing ☐ Explosives ☐ Jackhammer ☐ Driving Stakes/Ground Rods ☐ Vacuum Equipment w/Agreement ☐ Vacuum Equipment w/o Agreement ☐ Other (explain) _____

IF DIRECTIONAL DRILLING OR BORING WAS THE METHOD, WAS IT CROSS BORING? ☐ Yes ☐ No

PART E: TYPE OF WORK BEING PERFORMED: (CHOOSE ONE)

☐ Public Transit Authority ☐ Sewer ☐ Water ☐ Storm drain/culvert ☐ Petroleum pipeline ☐ Gas transmission pipeline ☐ Cable TV ☐ Electric ☐ Pole ☐ Street light ☐ Gas ☐ Steam ☐ Phone ☐ Fiber optic ☐ Road work ☐ Curb/sidewalk ☐ Traffic sign ☐ Traffic signal ☐ Blading/lot grading ☐ Fencing ☐ Agriculture ☐ Bldg. construction ☐ Bldg. demolition ☐ Other (explain) _____ ☐ Irrigation ☐ Landscaping ☐ Driveway ☐ Drainage ☐ Waterway improvement ☐ Railroad maintenance ☐ Engineering/surveying

PART F: USA MARKINGS VISIBLE AND OBSERVED AT THE TIME OF THE DIG-IN: (CHECK ALL THAT APPLY)

☐ Paint ☐ Flags ☐ Stakes ☐ Whiskers ☐ Crayon ☐ Off set ☐ Permanent Markers
☐ None If None, Why? _____
If marks were present, were the facilities marked correctly? ☐ Yes ☐ No Were the facilities installed in a Joint Trench? ☐ Yes ☐ No

Horizontal distance from PG&E markings to line (Inches): _____

Total distance from closest PG&E markings to point of contact (Feet): _____

PART G: EXCAVATOR PROVIDED INFORMATION

Does Excavator Claim to have Called USA? ☐ Yes ☐ No If Yes, USA Number Provided _____

If Excavator did not call USA: (mark all that apply)

☐ Not aware of USA. ☐ Pipeline location known. ☐ Boss said not to call USA. ☐ Excavating on an expired ticket. ☐ Excavating under another caller's ticket. ☐ Someone else had called USA. ☐ Was told "no conflict/no UG facilities" By whom? _____ ☐ USA/locating takes too long. ☐ Other (explain) _____

PART H: GAS LOST TO ATMOSPHERE

Line Pressure: _____ (psig) Line Completely Severed? ☐ Yes ☐ No If No, Area of Hole in Main _____ (in^2)

Therm. Billing Area: _____ Calculated Gas Lost to Atmosphere _____ (Mcf)

Billable? ☐ Yes ☐ No Reason: _____

ABOVE INFORMATION PROVIDED BY (LAN ID) _____ Date ☐☐-☐☐-☐☐

SUPERVISOR REVIEW BY (LAN ID) _____ Date ☐☐-☐☐-☐☐ Paving Tag# _____

Publication Date: March 2014

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Installing an EMS

Job Aid

1 Purpose

The installation of an Electronic Marker System (EMS) helps to identify the location of difficult-to-locate facilities for future locates.

2 Types of EMS

Near surface marker (Carrot): is ideal for marking an underground facility up to 2 ft in depth. This is the most convenient marker for a locator to install because it does not require an excavation.

Extended range marker (Ball or Disc): is ideal for marking an underground facility up to 5 ft in depth. This marker requires an excavation to install.

Mid-range marker: is ideal for marking an underground facility up to 6 ft in depth. This marker requires an excavation to install, and must be installed in a level position.

Full range marker: is ideal for marking an underground facility up to 8 ft. This marker requires an excavation to install, and must be installed in a level position.

3 Installing an EMS

1. Spacing for EMS:
   - **For Services**: at intervals less than 10 ft
   - **For Mains**: at intervals less than 50 ft
2. For soil areas:
   A. Locate facility.
   B. Create a hole over facility to a depth of 12 in.
   C. Choose the correct marker for the facility:
      - Yellow for gas
      - Red for electric

Publication Date: March 2014

- Orange for fiber

D. Place EMS carrot in hole in an upright position.

E. Back-fill hole to bury the carrot.

F. Complete map correction form to identify location of EMS.

For instructions, see Job Aid TD-5811P-105-JA02, "Submitting a Map Correction Form."

3. For pavement areas:

A. Locate facility.

B. Submit a corrective work form to have construction personnel install appropriate EMS markers over located facility.

For instructions, see Job Aid TD-5811P-105-JA03, "Corrective Work Form."

*EXAMPLE OF FORMS

TABLE OF CONTENTS

**Example shows only the first pages of the forms.*

Publication Date: March 2014

Pacific Gas and Electric Company

TD-5811P-201-F01
10/2013
Page 1 of 2

CALIBRATION VERIFICATION FORM

MANUFACTURER	SERIAL NUMBERS	VERIFICATION METHOD (CONDUCTOR)	DIVISION	YARD	YEAR
NAME:	TRANSMITTER:	FACILITY ABOVEGROUND (AG) ☐ HOLD RECEIVER 24" ABOVE TARGET WIRE			
MODEL :	RECEIVER:	FACILITY BELOWGROUND ☐ DOCUMENT LOCATIONS ON TABLE 3 ON PAGE 2			

MONTH	LOCATION OF CALIBRATION OR AG SEE TABLE 3 PAGE 2	BASELINE SIGNAL STRENGTH, SENSITIVITY SETTING OR dB[3]	SIGNAL STRENGTH, SENSITIVITY SETTING OR dB[3]	MAXIMUM DEVIATION FROM CENTERLINE[2]		INSTRUMENT DEPTH AT MIDPOINT[4]	STANDARD COMMENTS: SEE TABLE 4 PAGE 2	EMPLOYEE[6]		SUPERVISOR	
				LOCATE (LOC)	EMS			LAN ID	DATE	LAN ID	DATE
JANUARY											
FEBRUARY											
MARCH											
APRIL											
MAY											
JUNE											
JULY											
AUGUST											
SEPTEMBER											
OCTOBER											
NOVEMBER											
DECEMBER											

Note: use "NA" if information is not available or not applicable.
[1] BASELINE determined when - new unit is placed in service, unit returned from approved repair facility after repairs or first check on a different test facility. If unit is checked on same facility all year with no repairs list the same baseline for the entire year. January baseline is carried over from previous year.
[2] Remove instrument from service and send to an approved repair facility if Metrotech 9890/850 and Vivax 9800/- signal strength differs by (+/-) 25% of the baseline signal strength , Vivax Vloc - differs by (+/-) 15% dB of the baseline, Pipehorn - sensitivity setting on the dial differs by more than 2 from baseline.
[3] Line/EMS locate - if the largest distance from peak location to actual centerline differs more than 3 inches, then remove instrument from service and send to approved repair facility.
[4] See table on page 2 for allowable deviation. If outside of allowable range need to an approved repair facility.
[5] If unit is placed out of service (OOS) after calibration has been documented for the month, record date unit was placed out of service on page 2 table 1.
[6] Employee must be 05-01 or 05-04 operator qualified

Publication Date: March 2014

Pacific Gas and Electric Company

Standby Form

TD-5811P-301-F01, Rev 0

Part A- Standby Request

Employee Name: _____ LANID: _____
Requester's Name: _____ Date received: _____
Company Name: _____
Company Address: _____
_____
Contact Person: _____
Contact Number: _____

Part B- Standby Information

USA Ticket Number: _____
Valid Ticket Date: _____ Ticket Expiration Date: _____
Standby Request Date: _____ Standby Start Time: _____
Address of Standby: _____ Mile Point: _____
_____
City / County: _____ Map: _____ Plat: _____
Gas Line(s) No.: _____

Part C- Tailboard Topics

☐ PPE	☐ Pipeline Safety	☐ Excavation Safety	☐ Air Monitor	☐ Power Equipment
☐ Shoring	☐ Ladder Safety	☐ Tabulated Date	☐ Welding	☐ Fire Watch
☐ Evacuation Plan	☐ Wrap Removal	☐ Re-coating	☐ Backfilling	☐ Shore Removal
☐ Warning Tape	☐ Other _____			

Part D- Comments

_____
_____
_____
_____
_____
_____
_____
_____
_____

Part E- Standby Log

Standby Name: _____ LANID: _____
Date Completed: _____ Time Completed: _____
GAS CONTROL LOG ON (24 HR) __ __:__ __ LOG OFF __ __:__ __ Date: _____
Print Name: _____ Signature: _____

Publication Date: March 2014

Pacific Gas and Electric Company®

Gas Dig-in First Responder Form

TD-5811P-401-F01, Rev. 0
10/01/2013

Part A- Site Information

Date of damage: _____ PG&E notification time: _____
Street address: _____ PG&E dispatch time: _____
City: _____ PG&E arrival time: _____
Fire department YES ☐ NO ☐ Police department YES ☐ NO ☐ PG&E departure time: _____
Gas flow stopped YES ☐ NO ☐ If yes, by who? LanID: _____
Date gas flow stopped: _____ Time gas flow stopped: _____
Address of services shut-off: _____ No. of services shut-off: _____
Address of evacuated bldgs.: _____ No. of evacuated bldgs.: _____

Part B- Site Readings (Readings must be taken at a minimum of 4 locations)

Readings %Gas (a)	Readings Instr (b)	Readings Grade	Info Code (c)	Date (MM/DD/YYYY)	Time (24 hr Time)	Unit Serial Number (Last 4 Digits)	Location

Part C- 3rd Party Causing Damage

USA ticket YES ☐ NO ☐ Ticket number: _____ If not, why? _____
Party causing damage: Contractor ☐ Home-owner ☐
Name/address of party causing damage: _____
City: _____ Phone number: _____
If applicable, contract license #: _____

Part D- Excavation Information

Type of Facility:
☐ Distribution main ☐ Service/Drop ☐ Transmission ☐ Electric underground
☐ Other _____

Type of Excavation Equipment:
☐ Backhoe/Track ☐ Boring ☐ Auger ☐ Trencher ☐ Drilling
☐ Directional drilling ☐ Hand tools ☐ Probing device ☐ Other _____

Type of Work Being Performed:
☐ Electric cable ☐ Water/Sewer ☐ Landscaping ☐ Telephone ☐ Cable TV
☐ Gas pipeline ☐ Road work ☐ Poles ☐ Fencing ☐ Other _____

Describe How Incident Occurred: _____

Part E- First Responder Information

Name: _____ Lan ID: _____ Phone #: _____
Photos Taken: YES ☐ NO ☐ Other evidence collected: YES ☐ NO ☐

Part F- Repair Crew Information (For Repair Crew use only)

Name: _____ Lan ID: _____ Phone #: _____

Publication Date: March 2014

Pacific Gas and Electric Company

Dig-In Investigation Questionnaire

Page 1 of 6
TD-5811P-501-F01, Rev.0
10/13

Incident Address: _____ Incident Date: _____

_____ PM No.: _____

City: _____

Investigator Name: _____ LAN ID: _____

PART A - EXCAVATOR CONTACT INFORMATION

Name: _____ Phone number: _____

Address: _____ City: _____

Company name: _____

PART B - QUESTIONS FOR EXCAVATOR

1. Was USA 811 called? ☐ YES Ticket number: _____
   ☐ NO Why not? _____
2. Name on USA ticket? ☐ Company ☐ Individual
   _____
3. When was work scheduled to begin? Start date: Start time:
4. What type of work was being performed? _____
   _____
5. Did you see markings before excavation began? ☐ YES ☐ NO
6. Did you understand markings (i.e., size, pipe material, etc.)? ☐ YES ☐ NO
   If no, what was unclear? _____
7. Were facilities: ☐ potholed? ☐ daylighted? ☐ exposed?
8. What type of equipment or tool was used to pothole or daylight? _____
9. Was there sand around PG&E's facility? ☐ YES ☐ NO
10. Was there warning tape above facility? ☐ YES ☐ NO
11. Did you feel that a remark was needed? ☐ YES ☐ NO
12. Was a remark requested? ☐ YES ☐ NO
13. Was a field meet performed? ☐ YES ☐ NO
    If yes, who requested? _____
14. Who were present when the dig-in occurred? (provide names and roles)
    _____
    _____
15. Describe how damage occurred?
    _____
    _____
    _____
    _____

Document facts. Do not speculate or make judgments.

Publication Date: March 2014

Pacific Gas and Electric Company	**Instrument Repair Form**	TD-5811P-601-F01 10/13 Rev. 0 Page **1** of **1**

INSTRUMENT INFORMATION

Manufacturer: _____ Model Number: _____

Transmitter SN _____ Receiver SN: _____

Comments (List issue(s) with the instrument):

_____

_____

_____

_____

_____

VIVAX METROTECH

3251 Olcott St.
Santa Clara, CA 95054
Phone: (800)-638-7682
FAX: (408)-734-1799

Pipehorn LOCATING TECHNOLOGY

Utility Tool Company, Inc.
2900 Commerce Blvd.
Birmingham, Alabama 35210
Phone: (800)-952-3710

BILLING ADDRESS

Street: _____ State: CA Zip: ____-____

City: _____ Name: _____

Office Phone: ___-___ ext.: _____ Cell Phone: ___-___-_____

Fax: ___-___-_____ Email: _____

SHIPPING ADDRESS (if different from billing address)

Street: _____

City: _____ State: CA Zip: ____-____

Purchase Order Number: _____

Credit Card: ☐ Visa ☐ MasterCard ☐ American Express

Card Number: _____

Expiration Date: ___/_____

Publication Date: March 2014

Pacific Gas and Electric Company

Utility Bulletin TD-4460B-001, Rev. 0
Form TD-4460B-001-F01
5/14/2013

Gas Map Correction Form

☐ Gas Map Number:

Correction found by (Name): Date:

Department: Dept Reference Number:

Number of Correction(s), Location(s):

Received by (Name):_____ Date:_____

Type of Correction:

- ☐ Wrong size/type of equipment (regulator, valve, etc.)
- ☐ Wrong size/type of main, service (i.e. pipes)
- ☐ Facilities shown in wrong location (e.g. wrong distance or dimension from P/L)
- ☐ Wrong size/type of support structure or enclosure (box, casing, etc.)
- ☐ Wrong text information on map (not associated with any symbol)
- ☐ Streets and/or property lines don't match what is on the map)
- ☐ Facilities with incorrect number (e.g. wrong equipment number, etc.)
- ☐ Gas facilities shown on map that do not exist in field
- ☐ Gas facilities found in field that are not shown on map
- ☐ No locating wire
- ☐ Field Measurements don't match what is on the map
- ☐ Other

Location:

Map Discrepancy Correction:

(Please be sure to attach a copy of the map with the changes clearly indicated on it.)

Mapping use only: PM #: _____ Action taken: _____

Completed by: _____ Date: _____

Publication Date: March 2014

Pacific Gas and Electric Company.

Map Correction Transmittal Form

Mapping Support
03/2013
TD-9001P-01-F02

☐ Electric Map Number: Sub: Circuit:

Correction found by (LAN ID): Date: Department:

Number: Number of Correction(s), Location(s):

Received by (Name):_____ Date:_____

Type of Correction:

- ☐ Wrong size/type of equipment (e.g., transformer, line equipment)
- ☐ Wrong size/type of conductor, cable, main, service
- ☐ Facilities shown in wrong location (e.g. wrong distance or dimension from P/L)
- ☐ Wrong size/type of support structure or enclosure (e.g., pole, guy, box, conduit)
- ☐ Wrong text information on map (not associated with any symbol)
- ☐ Land-base discrepancy (e.g., streets or property lines do not match)
- ☐ Facilities with incorrect number (e.g., wrong equipment number, circuit number)
- ☐ Facilities added or removed
- ☐ No locating wire
- ☐ Other

Each discrepancy is required to have a location number on the form that directly correlates with a number on the electric map image/map.

Location:
Discrepancy #
Map Discrepancy Correction:

Location:
Discrepancy #
Map Discrepancy Correction:

Mapping Use Only:

PM #: _____ Action taken: _____

PG&E Internal Use Information Page 1 of 1

Publication Date: March 2014

PG&E	**CORRECTIVE WORK FORM GAS TRANSMISSION**	**PR NOTIFICATION #:**	**NOTIFICATION #:** **ORDER #:**

CREW

1. PROBLEM DESCRIPTION:

2. STREET ADDRESS:		**3. CITY:**
4. STATION NAME/NO OR CPA NO:	**5. TECH ID/BADGE NO:**	**6. PIPELINE NO:**

7. COMMENTS (LONG TEXT):

☐ PERMIT REQUIRED ☐ ESTIMATING REQUIRED

8. HOW WORK WAS IDENTIFIED:

☐ CLEARANCE REQUIRED	☐ CUSTOMER/3RD PARTY CALL-IN	☐ PATROL - GROUND	☐ PG&E AUDIT
☐ CORRECTIVE MAINTENANCE	☐ GENERATED FROM IGIS	☐ PATROL - AERIAL	☐ PREVENTATIVE MAINTENANCE
☐ CPUC AUDIT	☐ INOPERABLE EQUIPMENT	☐ MATERIAL PROBLEM REPORT	
☐ MAJOR EVENT	☐ LEAK SURVEY		

9. ☐ **TC NOTIFICATION** (GAS TRANS – CORRECTIVE)	☐ **CD NOTIFICATION** (DAMAGE CLAIMS)	☐ **SO NOTIFICATION** (SYSTEM OPERATIONS) *ONLY USE IF M&L OR STANDBY PM DOESN'T APPLY*	☐ **TR NOTIFICATION** (GAS TRANS – PROJECT)
10. PRIORITY: ☐ A ☐ B ☐ E ☐ F A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE E =SCHEDULE COMPLIANCE -YR 0 F =SCHEDULE COMPLIANCE -YR 1+	**PRIORITY:** ☐ A ☐ B ☐ E ☐ F A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE E =SCHEDULE COMPLIANCE -YR 0 F =SCHEDULE COMPLIANCE -YR 1+	**PRIORITY:** ☐ A ☐ B ☐ G A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE G =PLANNED INTERNAL WORK	**PRIORITY:** ☐ B B =URGENT COMPLIANCE

11. WORK TYPE CODE (TC):			
☐ JOR – Leak Rechecks	☐ JOO – Main Valve Automated	☐ JPI – Comp Station	☐ JOU – Class Location
☐ JON – Main Valve Manual	☐ JOP – Mainline Leak	☐ JPL – Comp Stat Power Unit	☐ 703 – Stan-Pac Expense
	☐ JOM – Reg Station	☐ JOS – Pipeline Markers	☐ (SO & TR)
	☐ JPJ – Comp Station Other	☐ JTB – Pipeline Repair	

12. CREW CLASS:	**13. DURATION NEEDED:**	MIN/H
CREW CLASS:	**DURATION NEEDED:**	MIN/H

14. REPORTED BY (LAN ID):	**15. EST. MATERIAL COST:** $
16. REQUIRED START DATE: / /	**17. REQUIRED END DATE:** / /

18. WORK COMPLETED BY (TECH INSPECT BY) **LAN ID:**	**19. WORK COMPLETED ON (TECH INSPECT ON):** **DATE:** / /	**20. ACTUAL LABOR-HOURS:**

21. FACILITY REPORT REVIEWED: ☐ YES ☐ NO	**22. ASSET REGISTRY UPDATE REQUIRED:** ☐ YES ☐ NO

RELIEF VALVE CAPACITY CHECK:	Q1 ☐ YES ☐ NO	Q2 ☐ YES ☐ NO	Q3 ☐ YES ☐ NO	Q4 ☐ YES ☐ NO ☐ UNKNOWN

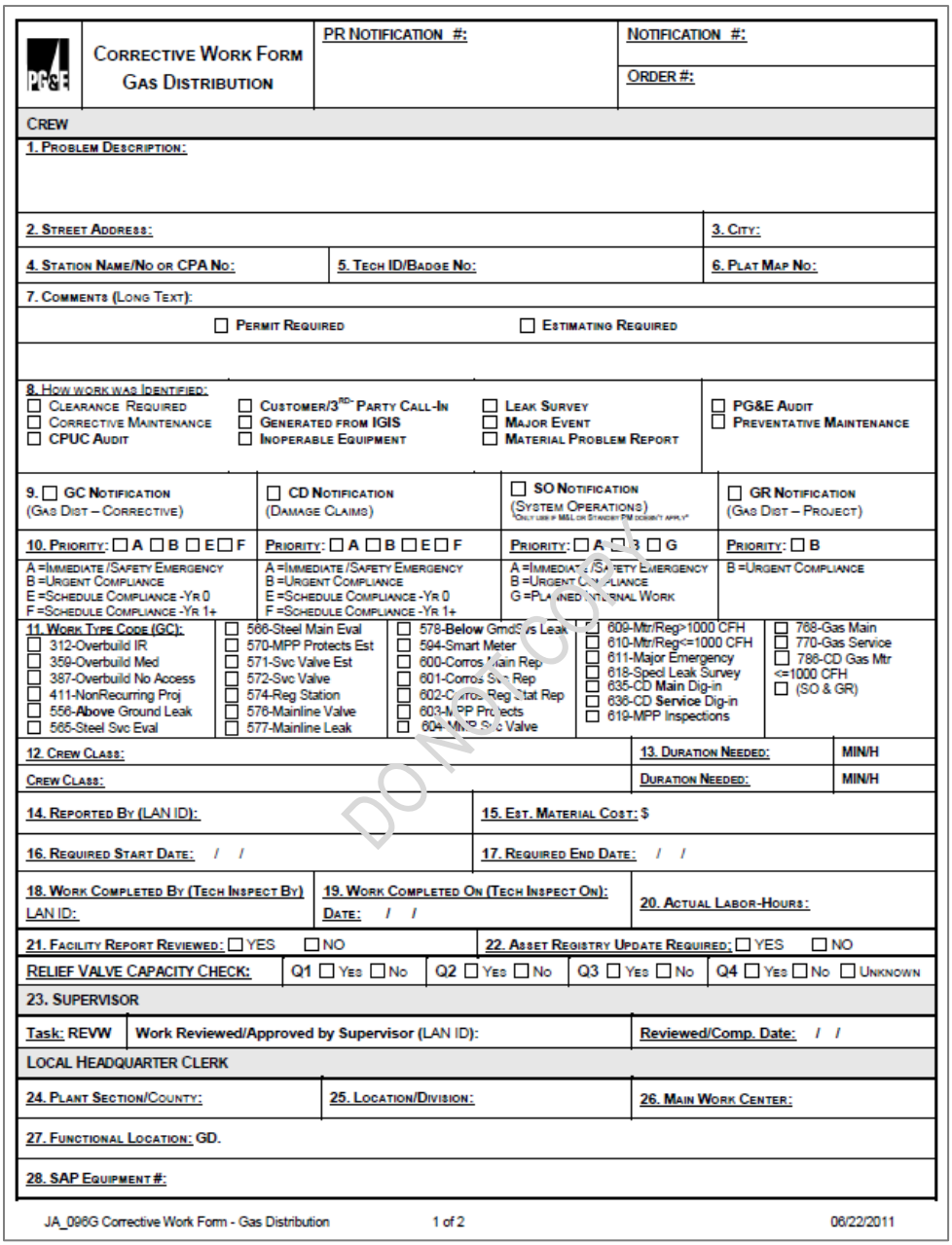
23. SUPERVISOR

Task: REVW	**Work Reviewed/Approved by Supervisor (LAN ID):**	**Reviewed/Comp. Date:** / /

LOCAL HEADQUARTER CLERK

24. PLANT SECTION/COUNTY:	**25. LOCATION/DIVISION:**	**26. MAIN WORK CENTER:**
27. FUNCTIONAL LOCATION: GT.	**28. SAP EQUIPMENT #:**	

JA_ 096H Corrective Work Form - Gas Transmission Page 1 09/27/2012



CORRECTIVE WORK FORM
GAS DISTRIBUTION

PR NOTIFICATION #:

NOTIFICATION #:

ORDER #:

CREW

1. PROBLEM DESCRIPTION:

2. STREET ADDRESS:

3. CITY:

4. STATION NAME/NO OR CPA NO:

5. TECH ID/BADGE NO:

6. PLAT MAP NO:

7. COMMENTS (LONG TEXT):

☐ PERMIT REQUIRED ☐ ESTIMATING REQUIRED

8. HOW WORK WAS IDENTIFIED:

☐ CLEARANCE REQUIRED
☐ CORRECTIVE MAINTENANCE
☐ CPUC AUDIT
☐ CUSTOMER/3RD PARTY CALL-IN
☐ GENERATED FROM IGIS
☐ INOPERABLE EQUIPMENT
☐ LEAK SURVEY
☐ MAJOR EVENT
☐ MATERIAL PROBLEM REPORT
☐ PG&E AUDIT
☐ PREVENTATIVE MAINTENANCE

9. ☐ GC NOTIFICATION (GAS DIST – CORRECTIVE)	☐ CD NOTIFICATION (DAMAGE CLAIMS)	☐ SO NOTIFICATION (SYSTEM OPERATIONS) *ONLY USE IF M&L OR STANDBY PM DOESN'T APPLY*	☐ GR NOTIFICATION (GAS DIST – PROJECT)
10. PRIORITY: ☐ A ☐ B ☐ E ☐ F	PRIORITY: ☐ A ☐ B ☐ E ☐ F	PRIORITY: ☐ A ☐ B ☐ G	PRIORITY: ☐ B
A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE E =SCHEDULE COMPLIANCE -YR 0 F =SCHEDULE COMPLIANCE -YR 1+	A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE E =SCHEDULE COMPLIANCE -YR 0 F =SCHEDULE COMPLIANCE -YR 1+	A =IMMEDIATE /SAFETY EMERGENCY B =URGENT COMPLIANCE G =PLANNED INTERNAL WORK	B =URGENT COMPLIANCE

11. WORK TYPE CODE (GC):

☐ 312-Overbuild IR
☐ 359-Overbuild Med
☐ 387-Overbuild No Access
☐ 411-NonRecurring Proj
☐ 556-**Above** Ground Leak
☐ 565-Steel Svc Eval
☐ 566-Steel Main Eval
☐ 570-MPP Protects Est
☐ 571-Svc Valve Est
☐ 572-Svc Valve
☐ 574-Reg Station
☐ 576-Mainline Valve
☐ 577-Mainline Leak
☐ 578-**Below** Grnd Svc Leak
☐ 594-Smart Meter
☐ 600-Corros Main Rep
☐ 601-Corros Svc Rep
☐ 602-Corros Reg Stat Rep
☐ 603-MPP Protects
☐ 604-MNP Svc Valve
☐ 609-Mtr/Reg>1000 CFH
☐ 610-Mtr/Reg<=1000 CFH
☐ 611-Major Emergency
☐ 618-Speci Leak Survey
☐ 635-CD **Main** Dig-in
☐ 636-CD **Service** Dig-in
☐ 619-MPP Inspections
☐ 768-Gas Main
☐ 770-Gas Service
☐ 786-CD Gas Mtr <=1000 CFH
☐ (SO & GR)

12. CREW CLASS:

13. DURATION NEEDED: MIN/H

CREW CLASS:

DURATION NEEDED: MIN/H

14. REPORTED BY (LAN ID):

15. EST. MATERIAL COST: $

16. REQUIRED START DATE: / /

17. REQUIRED END DATE: / /

18. WORK COMPLETED BY (TECH INSPECT BY) LAN ID:

19. WORK COMPLETED ON (TECH INSPECT ON): DATE: / /

20. ACTUAL LABOR-HOURS:

21. FACILITY REPORT REVIEWED: ☐ YES ☐ NO

22. ASSET REGISTRY UPDATE REQUIRED: ☐ YES ☐ NO

RELIEF VALVE CAPACITY CHECK: Q1 ☐ YES ☐ NO Q2 ☐ YES ☐ NO Q3 ☐ YES ☐ NO Q4 ☐ YES ☐ NO ☐ UNKNOWN

23. SUPERVISOR

Task: REVW Work Reviewed/Approved by Supervisor (LAN ID): Reviewed/Comp. Date: / /

LOCAL HEADQUARTER CLERK

24. PLANT SECTION/COUNTY:

25. LOCATION/DIVISION:

26. MAIN WORK CENTER:

27. FUNCTIONAL LOCATION: GD.

28. SAP EQUIPMENT #:

JA_096G Corrective Work Form - Gas Distribution 1 of 2 06/22/2011

Publication Date: March 2014

PLM Work Request

(System Assigned) ***Request ID:*** _____

(System Assigned) **Status:** _____

Request Section

District: _____ Requested Priority: 1 2 3
Group: _____ Request Date/Time: _____
Facility: _____ Requestor's LAN ID: _____
Bar Id: _____ Requestor's Phone: _____
Tag No.: _____ Est Hrs.: _____
Keep Me Posted: Yes / No

Equipment Desc: _____

Failure / Request: _____

Job Requirements

OQ Skill Required: _____ Order Number: _____
Clearance Required: Yes / No Clearance Number: _____ Requested Crew Size: _____
Form Required.: Yes / No Form Number: _____ All Required Parts In Stock: Yes / No
Outage Required: Yes / No Hazardous Condition Report: Yes / No USA Required: Yes / No

Plan Section

Approved Priority: _____
Approved By: _____ Est. Wrench Hours: _____
Assigned To: _____ Approved Date: _____
Scheduling Notes: _____

Department: _____ Planned Crew Size: _____
Start Date: _____ Expected Completion Date: _____

Hold Section

Part Requistion Number: _____
Hold Reason: _____
Expected reschedule Date: _____ Actual Wrench Hours to Date: _____

Completion Section

Failure Code (Circle) Communication Electrical NonFailure-Maint
Controls Mechanical Project
Air Patrol Response Corrosion Third Party

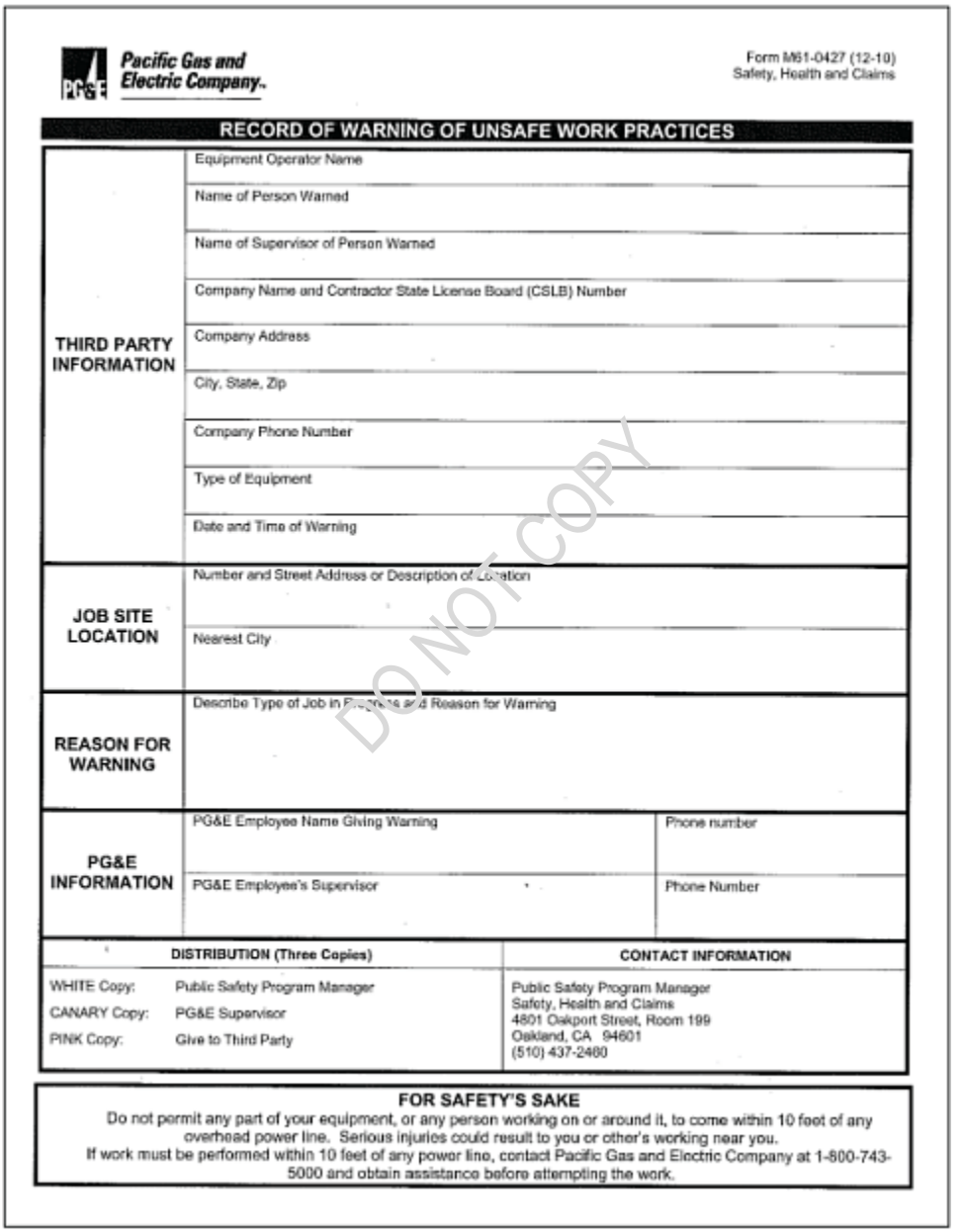
Performed By: _____
Performed Date: _____

What was found / What was done / How was it left: _____

Actual Preperation Hours: _____
Actual Travel Hours: _____
Actual Wrench Hours: _____

IS THIS WORK REQUEST COMPLETE: YES / NO

Publication Date: March 2014



Pacific Gas and Electric Company.

Form M61-0427 (12-10)
Safety, Health and Claims

RECORD OF WARNING OF UNSAFE WORK PRACTICES

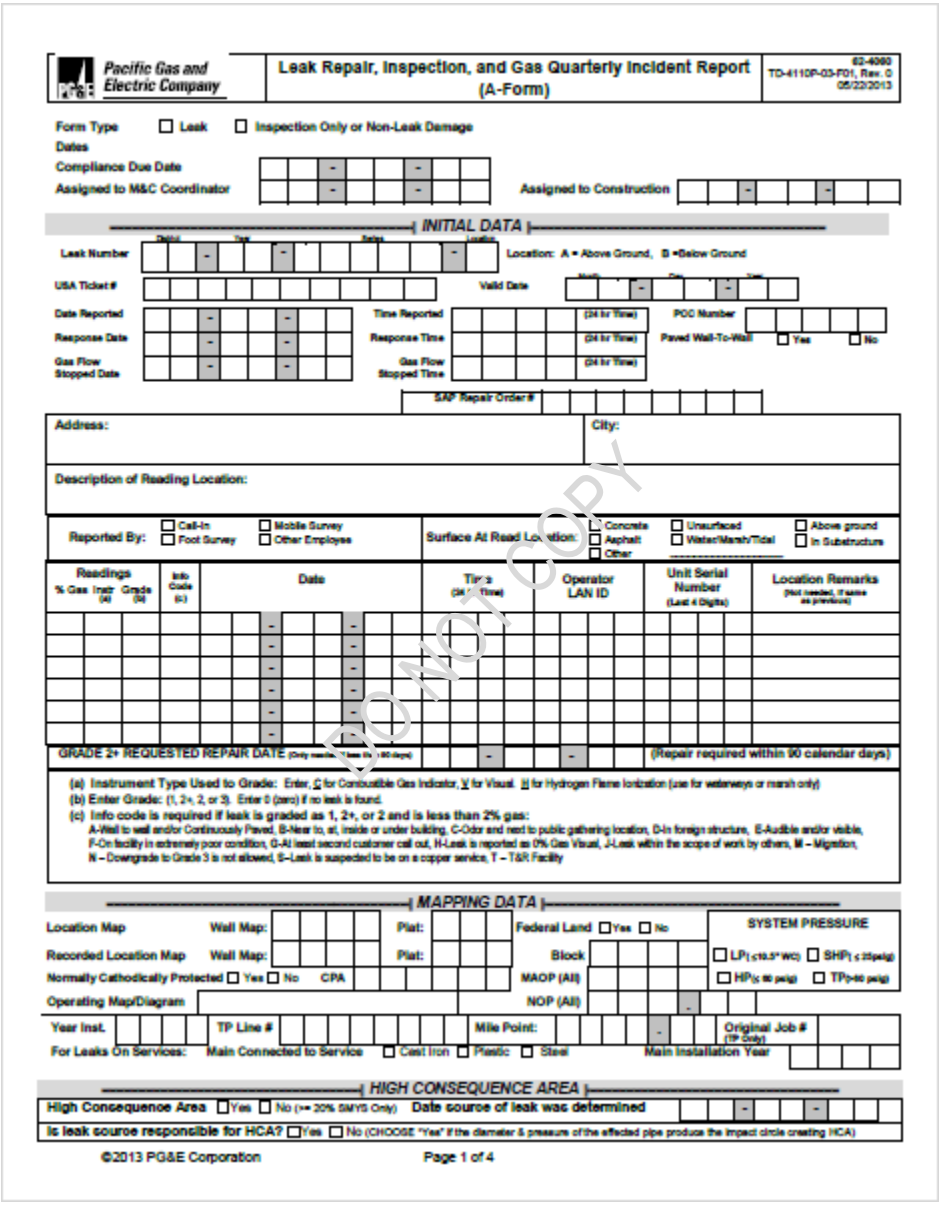
THIRD PARTY INFORMATION	Equipment Operator Name	
	Name of Person Warned	
	Name of Supervisor of Person Warned	
	Company Name and Contractor State License Board (CSLB) Number	
	Company Address	
	City, State, Zip	
	Company Phone Number	
	Type of Equipment	
	Date and Time of Warning	
JOB SITE LOCATION	Number and Street Address or Description of Location	
	Nearest City	
REASON FOR WARNING	Describe Type of Job in Progress and Reason for Warning	
PG&E INFORMATION	PG&E Employee Name Giving Warning	Phone number
	PG&E Employee's Supervisor	Phone Number

DISTRIBUTION (Three Copies)		CONTACT INFORMATION
WHITE Copy:	Public Safety Program Manager	Public Safety Program Manager Safety, Health and Claims 4601 Oakport Street, Room 199 Oakland, CA 94601 (510) 437-2460
CANARY Copy:	PG&E Supervisor	
PINK Copy:	Give to Third Party	

FOR SAFETY'S SAKE

Do not permit any part of your equipment, or any person working on or around it, to come within 10 feet of any overhead power line. Serious injuries could result to you or other's working near you.
If work must be performed within 10 feet of any power line, contact Pacific Gas and Electric Company at 1-800-743-5000 and obtain assistance before attempting the work.

Publication Date: March 2014



Pacific Gas and Electric Company

Leak Repair, Inspection, and Gas Quarterly Incident Report (A-Form)

62-4060
TD-4110P-03-F01, Rev. 0
05/22/2013

Form Type ☐ Leak ☐ Inspection Only or Non-Leak Damage

Dates

Compliance Due Date

Assigned to M&C Coordinator

Assigned to Construction

INITIAL DATA

Leak Number (District - Year - Number - Series - Location)

Location: A = Above Ground, B = Below Ground

USA Ticket #

Valid Date (Month - Day - Time)

Date Reported

Time Reported (24 hr Time)

PCC Number

Response Date

Response Time (24 hr Time)

Paved Wall-To-Wall ☐ Yes ☐ No

Gas Flow Stopped Date

Gas Flow Stopped Time (24 hr Time)

SAP Repair Order #

Address:

City:

Description of Reading Location:

Reported By: ☐ Call-In ☐ Foot Survey ☐ Mobile Survey ☐ Other Employee

Surface At Read Location: ☐ Concrete ☐ Asphalt ☐ Other ☐ Unsurfaced ☐ Water/Marsh/Tidal ☐ Above ground ☐ In Substructure

Readings % Gas	Instr (a)	Grade (b)	Info Code (c)	Date	Time (24 hr Time)	Operator LAN ID	Unit Serial Number (Last 4 Digits)	Location Remarks (Not needed, if same as previous)
				- -				
				- -				
				- -				
				- -				
				- -				
				- -				

GRADE 2+ REQUESTED REPAIR DATE (Only needed if less than 90 days) - - (Repair required within 90 calendar days)

(a) Instrument Type Used to Grade: Enter, C for Combustible Gas Indicator, V for Visual, H for Hydrogen Flame Ionization (use for waterways or marsh only)
(b) Enter Grade: (1, 2+, 2, or 3). Enter 0 (zero) if no leak is found.
(c) Info code is required if leak is graded as 1, 2+, or 2 and is less than 2% gas:
A-Well to wall and/or Continuously Paved, B-Near to, at, inside or under building, C-Odor and next to public gathering location, D-In foreign structure, E-Audible and/or visible, F-On facility in extremely poor condition, G-At least second customer call out, H-Leak is reported as 0% Gas Visual, J-Leak within the scope of work by others, M – Migration, N – Downgrade to Grade 3 is not allowed, S–Leak is suspected to be on a copper service, T – T&R Facility

MAPPING DATA

Location Map Wall Map: Plat: Federal Land ☐ Yes ☐ No

Recorded Location Map Wall Map: Plat: Block

Normally Cathodically Protected ☐ Yes ☐ No CPA MAOP (All)

Operating Map/Diagram NOP (All)

SYSTEM PRESSURE
☐ LP (≤10.5" WC) ☐ SHP (≤ 25psig)
☐ HP (≤ 60 psig) ☐ TP (>60 psig)

Year Inst. TP Line # Mile Point: Original Job # (TP Only)

For Leaks On Services: Main Connected to Service ☐ Cast Iron ☐ Plastic ☐ Steel Main Installation Year

HIGH CONSEQUENCE AREA

High Consequence Area ☐ Yes ☐ No (>= 20% SMYS Only) Date source of leak was determined - -

Is leak source responsible for HCA? ☐ Yes ☐ No (CHOOSE "Yes" if the diameter & pressure of the effected pipe produce the impact circle creating HCA)

DO NOT COPY

©2013 PG&E Corporation Page 1 of 4

Publication Date: March 2014

Pacific Gas and Electric Company

Gas Incident Report Addendum (Form A-1)

61-0548
TD-4112P-03-F02, Rev. 0
05/22/2013

LEAK NUMBER: _____ or NON-LEAK REFERENCE NUMBER: _____

PART B: INCIDENT DESCRIPTION PM #: Incident Report #:

PROVIDE A SUMMARY OF THE DIG-IN (STATE ONLY FACTS. DO NOT SPECULATE. ATTACH ADDITIONAL SHEETS IF NECESSARY)

Photos Taken? ☐ Yes ☐ No By Whom: _____ Other Evidence Secured? ☐ Yes ☐ No Describe: _____

LOCATION OF DIG-IN (CHOOSE ONE)

☐ City Street ☐ Interstate Highway ☐ Pipeline R / W ☐ Private Land Owner
☐ County Road ☐ Electric R / W ☐ Dedicated Public Utility Easement ☐ Private Business
☐ State Highway ☐ Railroad R / W ☐ Private Easement ☐ Federal Lands
☐ Other _____

PART C: DETAILED DAMAGE REPORT

EXCAVATOR-TYPE CAUSING INCIDENT:

☐ Public / Private Utility ☐ Non-PG&E Contractor ☐ PG&E Division Gas ☐ Developer ☐ Agriculture ☐ County
☐ Homeowner/Occupant ☐ PG&E Contractor ☐ PG&E Division Electric ☐ Other ☐ Railroad ☐ City
☐ PG&E GC Gas ☐ PG&E GC Electric ☐ PG&E Hydro ☐ Unknown ☐ Other _____

OWNER INFORMATION (For Whom Was Work Performed?)

Same as Damaging Party? ☐ Yes ☐ No If no, Owner name:

Owner Address: City: Phone:

PART D: TYPE OF EXCAVATION METHOD: (CHOOSE ONE)

☐ Backhoe/Trackhoe ☐ Farm Equipment ☐ Drilling ☐ Hand tools ☐ Driving Stakes/Ground Rods
☐ Trencher ☐ Stump Grinding ☐ Auger ☐ Probing ☐ Vacuum Equipment w/Agreement
☐ Grader/Scraper ☐ Directional Drilling ☐ Boring ☐ Explosives ☐ Vacuum Equipment w/o Agreement
☐ Drain Cleaning ☐ Milling/Road Grinding ☐ Plowing ☐ Jackhammer ☐ Other (explain) _____

IF DIRECTIONAL DRILLING OR BORING WAS THE METHOD, WAS IT CROSS BORING? ☐ Yes ☐ No

PART E: TYPE OF WORK BEING PERFORMED: (CHOOSE ONE)

☐ Public Transit Authority ☐ Cable TV ☐ Phone ☐ Blading/lot grading ☐ Irrigation ☐ Waterway Improvement
☐ Sewer ☐ Electric ☐ Fiber optic ☐ Fencing ☐ Landscaping ☐ Railroad maintenance
☐ Water ☐ Pole ☐ Road work ☐ Agriculture ☐ Driveway ☐ Engineering/surveying
☐ Storm drain/culvert ☐ Street light ☐ Curb/sidewalk ☐ Bldg. construction ☐ Drainage
☐ Petroleum pipeline ☐ Gas ☐ Traffic sign ☐ Bldg. demolition
☐ Gas transmission pipeline ☐ Steam ☐ Traffic signal ☐ Other (explain) _____

PART F: USA MARKINGS VISIBLE AND OBSERVED AT THE TIME OF THE DIG-IN: (CHECK ALL THAT APPLY)

☐ Paint ☐ Flags ☐ Stakes ☐ Whiskers ☐ Crayon ☐ Offset ☐ Permanent Markers
☐ None If None, Why? _____
If marks were present, were the facilities marked correctly? ☐ Yes ☐ No Were the facilities installed in a Joint Trench? ☐ Yes ☐ No
Horizontal distance from PG&E markings to line (inches): _____
Total distance from closest PG&E markings to point of contact (Feet): _____

PART G: EXCAVATOR PROVIDED INFORMATION

Does Excavator Claim to have Called USA? ☐ Yes ☐ No If Yes, USA Number Provided _____
If Excavator did not call USA: (mark all that apply)
☐ Not aware of USA. ☐ Excavating on an expired ticket. ☐ Was told "no conflict/no UG facilities" By whom? _____
☐ Pipeline location known. ☐ Excavating under another caller's ticket. ☐ USA/locating takes too long.
☐ Boss said not to call USA. ☐ Someone else had called USA. ☐ Other (explain) _____

PART H: GAS LOST TO ATMOSPHERE

Line Pressure: _____ (psig) Line Completely Severed? ☐ Yes ☐ No If No, Area of Hole in Main _____ (In^2)

Therm. Billing Area: _____ Calculated Gas Lost to Atmosphere _____ (Mcf)

Billable? ☐ Yes ☐ No Reason: _____

ABOVE INFORMATION PROVIDED BY (LAN ID) _____ Date ☐☐-☐☐☐-☐☐☐☐

SUPERVISOR REVIEW BY (LAN ID) _____ Date ☐☐-☐☐☐-☐☐☐☐ Paving Tag# _____

Publication Date: March 2014

Pacific Gas and Electric Company

62-1518

Event #_____

EMPLOYEE MOTOR VEHICLE INCIDENT REPORT

Employee: ***Complete the information requested on this report AT THE SCENE OF THE INCIDENT or as soon as possible. Give the report to your supervisor IMMEDIATELY.***

MAKE IT SAFE

- Stop immediately
- If a serious accident, leave vehicle in place so law enforcement can investigate. If a minor accident, move vehicle safely to side of road
- Set out warnings (flares, reflectors, flashers) to help avoid further accidents
- If there is an injury or fatality, call 911 first, then call your supervisor and Law-Claims immediately
- If PG&E owned, leased or rented vehicle is damaged, contact your local PG&E garage
- Protect the vehicle or equipment from further damage or theft

BE COURTEOUS AND PROFESSIONAL

- **DO NOT** admit liability, take responsibility or agree to pay for anything

Supervisor: ***Report all motor vehicle incidents immediately. Complete the Supervisor's Motor Vehicle Incident Packet. Have the motor vehicle incident report entered into the Law-Claims database: (choose one)***

- ***IR Express I-800-422-0764***
- ***Scan to Email ED RMC Concord Damage Claims***
- ***Fax to RMC Concord: 8-459-7321 or (925) 459-7321.***

When you prepare sketches, take photographs and secure evidence, call your local Law-Claims Investigator to determine where these items are to be sent/delivered.

COLLECT INFORMATION

- Take photographs if possible (full scene, damage/no damage to vehicles)
- **DO NOT** take pictures of injured persons
- Collect the names and contact phone numbers for any parties or potential witnesses by filling out this card completely

Law – Claims Intended for the use of Company Attorneys Revised 4/09

Publication Date: March 2014

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Gas Map Symbols

Reference

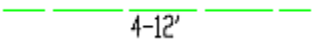
Target Audience

Locate and mark personnel.

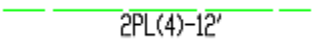
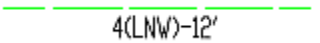
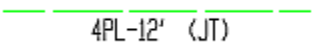
Table of Contents

1 Gas Mains

GAS MAINS AND PRESSURES	
	Low pressure (7” W.C. normal)
	Semi-high pressure (25 psig maximum)
	High pressure (60 psig maximum)
	Transmission pressure (gathering/feeder) (above 60 psig)
	Deactivated main (future) (any pressure)

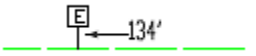
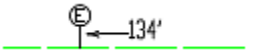
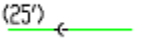
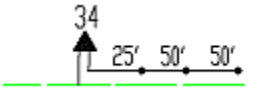
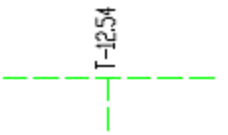
GAS MAINS LABELING	
	4 in. steel 12 ft out from property line.

Publication Date: March 2014

GAS MAINS LABELING	
	2 in. plastic inserted into 4 in. steel 12 ft out from property line.
	4 in. steel with liner non-weldable 12 ft out from property line.
	4 in. plastic joint trench 12 ft out from property line (JT is anywhere in the block).
	4 in. number transmission main (show line number or DFM).

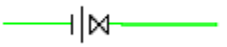
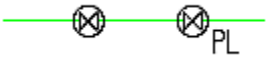
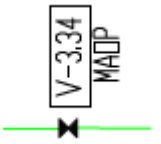
NOTE:

1. All plastic mains/services assumed to have locating wire.

GAS MAINS	
	End of main
	ETS station in pedestal
	ETS station frame and cover or vault
	Riser (show height)
	Cathodic protection station
	Cathodic protection station and anode bed (show number and footage to anodes)
	Cathodic protection station and deep well anode
	Transmission line mile post tap

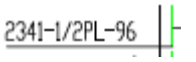
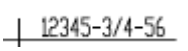
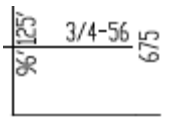
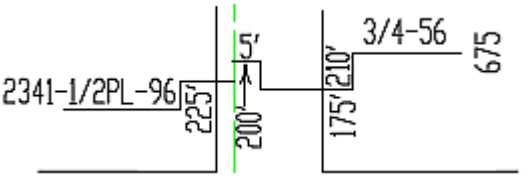
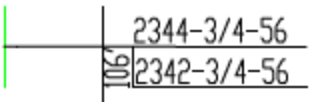
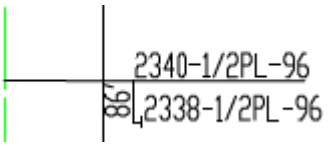
Publication Date: March 2014

PRESURE CONTROL FITTINGS	
	Pressure Control Fitting (PCF)
TEES	
	Straight extension valve tee
	Lateral extension valve tee

VALVES	
	Valves (show plastic valve)
	Insulated valve
	Valve in a frame and cover (frame and cover are not shown on 500 ft)
	Valve in vault
Distribution 	MOP valves
Transmission 	

Publication Date: March 2014

2 Gas Services

GAS SERVICES		
Breakdown of service house number:		Address number
		Service order number
		Address number (address is perpendicular to street)
		Off set service
		Branch service (branch inside property)
		Branch service and stub

3 Abbreviation and Terms or Units

ABBREVIATIONS	TERMS OR UNITS
AI	Applicant installed (1-year limit)
AT	Applicant trench (2-year limit)
B	Bare steel
B/W	Back of sidewalk
C	Compressor
CI	Cast iron

Publication Date: March 2014

ABBREVIATIONS	TERMS OR UNITS
C/L	Center line
CMP	Corrosometer probe
CNG	Natural gas station
CU	Copper
DUCT	Plastic duct
DW	Deep well
DWG	Drawing
EFV	Excess flow valve
EM	Electronic marker system
ETS	Electrolysis testing station
F/C	Face of curb
IPS	Inhibitor pump station
JT	Joint trench
M	Mechanical
MAOP	Maximum allowable operating pressure
LNW	Liner non-weldable
LP	Low Pressure
LW	Liner weldable
PCF	Pressure Control Fitting
PL	Plastic
psig	Pound per square inch gauge
REG	Regulator
R/W	Right of way
S	Screwed
TDW	TD Williams equipment
WI	Wrought iron
WOW	Without locating wire
X-42, X-52, X60, and X-65	High grade steel

For a complete set of map symbols:

1. Visit the Technical Information Library (TIL).

Publication Date: March 2014

2. Click on **Gas** (top left corner).
3. Click **Mapping**.
4. Select **Maps and Symbols**.

END OF REFERENCE

Electric Map Symbols

Reference

Target Audience

Locate and mark personnel.

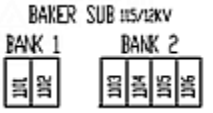
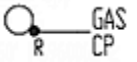
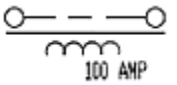
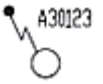
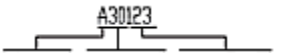
Table of Contents

1 Streetlight Maintenance Maps Only

SYMBOLS	DESCRIPTIONS
	Twin luminaires (show streetlight number)
	Streetlight owned and maintained by PG&E (show number [LS-1 and OL-1])
	PG&E owned and maintained, but installed on customer poles (LS-1C)
	Customer owned, PG&E maintained (show streetlight number [LS-2B and LS-2C])
	Owned and maintained by customer (LS-2A)
	State streetlights (show streetlight number if available [LS-2A])

Publication Date: March 2014

2 Electric Overhead

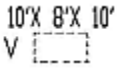
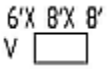
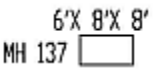
ELECTRIC OVERHEAD	
	Existing transformer
	Substation (show name, transmission and distribution voltage, bank and circuit numbers)
	Cathodic protection = CP
	Riser (show “R” and on circuit map only)
	Riser quadrant detail (EST)
	Radio interference coil (show AMP rating)
	Antenna with number  Antenna district equipment number
	Photovoltaic cell controlling street light (show if on pole other than transformer)

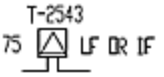
Publication Date: March 2014

3 Electric Underground

ELECTRIC UNDERGROUND	
	Existing primary subsurface round enclosure (show around appropriate device or equipment, and label CUST if customer owned)
	Existing primary PAD (show around appropriate device or equipment, and label CUST if customer owned)
	Existing primary subsurface enclosure
	Existing secondary subsurface enclosure (label CUST if customer owned)
	Existing primary and secondary subsurface enclosure
	Existing 10 in. diameter streetlight box
	Existing pedestal (label CUST if customer owned)
	Existing jointly owned pedestal
	Proposed 10 in. diameter streetlight box (show depth [EST])
	Proposed 13 in. by 24 in. subsurface enclosure (show depth [EST])
	Proposed 17 in. by 30 in. subsurface enclosure (show depth [EST]).
	Proposed 24 in. by 36 in. subsurface enclosure (show depth [EST])
	Proposed 30 in. by 48 in. subsurface enclosure (show depth [EST])
	Proposed 3 ft by 5 ft subsurface enclosure (show depth [EST])

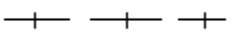
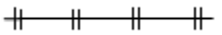
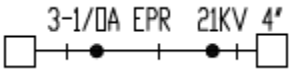
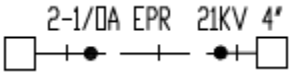
Publication Date: March 2014

ELECTRIC UNDERGROUND	
	Proposed 4 ft by 6 ft 6 in. subsurface enclosure (show depth ([EST])
	Proposed 4 ft 6 in. by 8 ft 6 in. subsurface enclosure (show depth [EST])
	Proposed secondary pedestal – 4-way (EST)
	Proposed secondary pedestal – 6-way / 8-way (EST)
	Proposed vault (show number [EST])
	Existing vault (show number; typically show dimensions only if no vault drawing available)
	Proposed manhole (show number)
	Existing manhole (show number, location of cover W/T and location of vent shaft W/V; show dimensions [length, width, height] only if no vault drawing available)

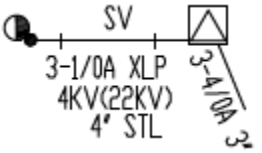
SUBSURFACE AND PAD-MOUNTED EQUIPMENT SHOWN LOOP FEED	
	Subsurface transformer (show T number, size in KVA; and voltage [if other than 120/240V])
	Pad-mounted transformer (show transformer number, size, and label [if applicable; LF=live front; DF=dead front])

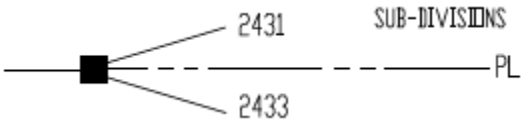
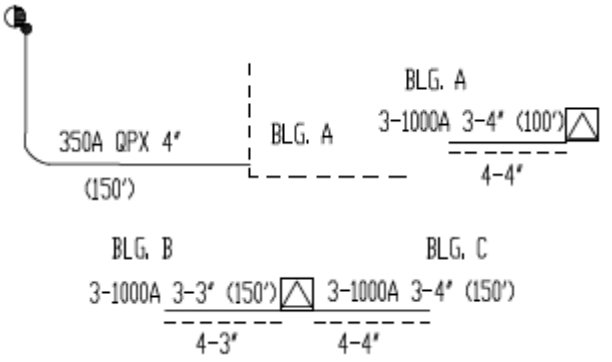
Publication Date: March 2014

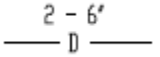
4 Underground Cable

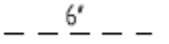
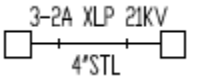
UNDERGROUND CABLE	
	Proposed primary P, P1, P2, P3 (EST)
	Proposed secondary S, S1, S2, S3 (EST)
	Proposed service SV, SV1, SV2, SV3 (EST)
	Proposed streetlight SL, SL1, SL2, SL3 (EST)
	Proposed common neutral
60 and 70 kv circuits	Transmission conductor symbols (show line name, number, and voltage. Used for overhead and underground on circuit maps)
 115 kv circuit	
230 kv circuit	
 500 kv circuit	
	Existing three-phase primary underground, when connected to overhead common neutral circuits
	Existing single-phase primary underground when connected to overhead common neutral circuits

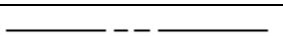
Publication Date: March 2014

UNDERGROUND CABLE	
	Primary underground serving one customer
	Abandon underground facilities

UNDERGROUND CABLE	
	For residential, underground services show source and service address
 Single underground service 	
	For commercial, industrial, and aboveground

CONDUIT	
	Proposed conduit D, D1, D2, D3, D4, D6 (estimate sketches only) (label size, type, and number. Label if customer owned)

CONDUIT	
	Existing empty conduit (label size, type [if other than plastic], and number of conduits. Label if customer owned)
	Conduit with cable (show size and number, and type [if other than plastic])

BOUNDARIES	
	Subdivision boundaries
	City limit lines
	Sub-division lot boundaries
	Rancho lines
	Property line

For a complete set of map symbols:

1. Visit the Technical Information Library (TIL).
2. Click on **Electric** (top left corner).
3. Click **Mapping**.
4. Select **Maps and Symbols**.

END OF REFERENCE

Publication Date: March 2014

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DEFINITIONS OF TERMS

Air Coupling occurs when the transmitter's signal travels through open air and is detected directly by the receiver.

Air Gap is a method of construction that provides air space that prevents pipe bursting forces from acting on the pipeline.

Balanced Signal is a signal displayed on a receiver that indicates the signal strength increases and decreases an equal distance from the center of the suspected facility location.

Baseline Signal Strength is the signal strength recorded initially before an instrument is put into service, after a repair, or when switching to a new calibration facility.

Bleedover is a condition in which a signal is wide enough to bleed onto another conductor while traveling on its intended path. This condition could cause the wrong conductor to be located.

Constant Bar (from the acoustic instrument) means a constant vibration, which equals to constant signal sent by the transmitter.

Critical Facility is any gas transmission facility with pressure above 60 psig and any electric facility operating at or above 60 kilovolt (kV).

The following facilities may also be critical facilities:

- Facilities identified as critical by the local operating area.
- Facilities which, if damaged, are likely to result in difficulty controlling the gas flow due to their size, material properties, operating pressure, or location, as well as the personnel and equipment available.
- Electric distribution facilities which, if damaged, are likely to result in outages of long duration or outages to critical customers.

Conductive Locate is the method of locate in which instruments are directly connected to the facility being located.

Conductor is a pipe, cable, conduit, traceable optic, fiber, tracer wire/tape, sewer snake, fish tape, or other line that carries a signal from a locate instrument.

Daylighting is a method of exposing gas lines in their entirety at the excavation site before work begins.

Electronic Tablet is a PG&E issued device for locate and mark personnel to use in the field to complete a USA ticket.

Electronic Marker System (EMS) is a set of markers placed underground to help identify facilities that would otherwise be difficult to locate.

Publication Date: March 2014

Gain is a sensitivity level of the receiver.

Inductive Locate is the method of locate in which instruments induce a signal onto the facility being located.

Instrument Frequency is the rate at which a transmitter sends a signal over a set time frame.

Pinpoint Mode is a setting used to accurately locate and trace the pipe.

Potholing is a method to expose gas lines in various spots to confirm the location and depth of PG&E facilities before excavation begins.

Prelocate Mode is a setting used to quickly identify the area where the pipe is located.

Signal is the output from a transmitter, either directly or through the air, which is carried along a conductor and detected with the receiver.

USA Ticket is generated by USA 811 at the request of an excavator to notify member utilities of planned excavations near their assets for the purpose of locate and mark.

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