

Field Hydrographer Study Guide

**Knowledge Test (#2449)
and
Work Sample Test(#4709)**

**Human Resources
Performance Assessment Services
Southern California Edison International
An Edison International Company**



Introduction

The purpose of this study guide is to assist Edison Employees in preparation for the Field Hydrographer tests.

These tests are designed to sample an individual's ability to perform important aspects of the job. Test questions are prepared based on the knowledge categories (*e.g.*, Hydrography, etc.) of the job. It is important to use this study guide in a manner that will help develop an overall knowledge of the job, not just the limited knowledge required to answer specific questions on the test.

At the end of this guide, we have provided comment sheets for your feedback. If a procedure or policy has changed, making any part of this guide incorrect, we would appreciate your feedback so that changes can be made.

Test Scheduling

Employees who apply for positions, bids, and transfers requiring testing before March 9, 2009, will be scheduled for testing by their Supervisor through Human Resources. For those who apply after March 9, 2009, both the employee and their Supervisor will be notified of a scheduled test date by Human Resources. Test times and dates for positions requiring testing will be specified in the bid/transfer/requisition/job posting. Employees should be prepared to test on the specified dates. Only employees who apply for positions requiring testing, and who meet basic qualifications, will be invited to test. Applicants will be scheduled through the recruiter. If you have any questions, please call 626-302-9830.

You should be aware of allowable aids before testing (calculator, 12-inch ruler, etc.).

Test Session

At the test session, it is important that you follow the directions of the Test Administrator *precisely*. Once testing has begun, you may not leave the room, talk, smoke, eat, or drink. Since some tests take several hours, you should consider these factors before the test begins.

There are two tests for the Field Hydrographer position: a Knowledge Test and a Work Sample Test. During your testing session, you will first take the Knowledge Test and then the Work Sample Test. The questions on the Work Sample Test require you to perform tasks similar to those performed by a Field Hydrographer. The Field Hydrographer Work Sample Test is comprised of four parts: parts 1 and 2 are paper/pencil and parts 3 and 4 are performed using a computer (using Microsoft Excel and Word). For the paper/pencil portion, be

sure to write clearly and completely erase any answer you wish to change. For the computer portion, you will be asked to save all your work to the floppy disk provided.

During the test session, you will receive a test comment form so that you can make comments about questions if you feel there is no correct answer, multiple answers, or if you have not been given enough information to answer the question. Your comments will be reviewed, and you will be contacted if your test result is affected as a result of your comment.

Test Feedback

You can expect test results through your supervisor within five working days. Test results are not given by phone to employees or supervisors. If you pass the tests, you will be notified of the pass results only. Actual scores are not reported. If you fail the tests, you will be given the actual scores you achieved, the scores necessary to pass, and the areas in which you were weak. When studying for a retest, however, you should not assume that other areas should be neglected.

Computer Based Testing

Effective **March 9, 2009**, all knowledge tests will be administered on the computer. This information will help prepare you for the knowledge portion of the test taken on or after **March 9, 2009**.

Taking an SCE knowledge test on the computer is simple. You do not need any computer experience or typing skills. You will only use the keyboard to enter your candidate ID and password. You'll answer all questions by pressing a single button on the mouse.

Log in Screen

You will be seated at a testing station. When you are seated, the computer will prompt you to enter the candidate ID and password you received in your invitation e-mail. You **MUST** have your candidate ID and password or you will be unable to take the test. Once you have confirmed your identity by entering this information, you will see a list of tests available to you.

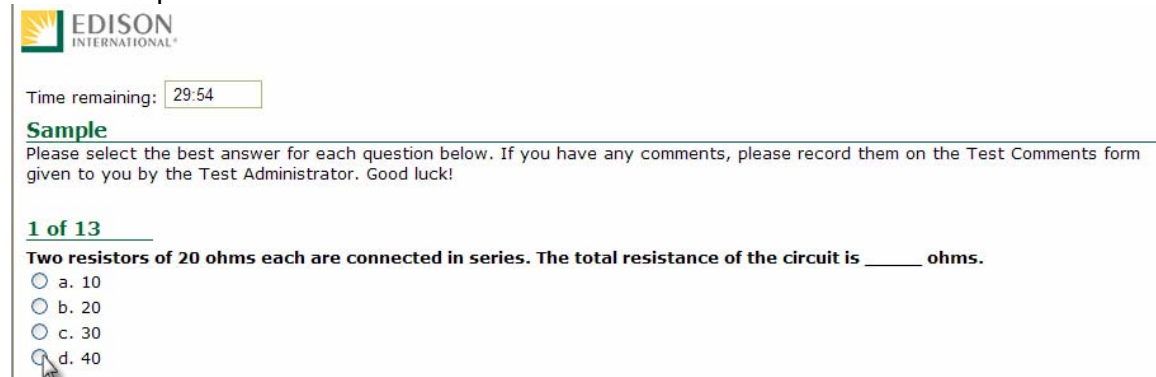
Sample/Tutorial

Before you start your actual test, a Sample/Tutorial Test is provided to help you become familiar with the computer and the mouse. From the list of exams that appear when you complete the log in, you will select Sample/Tutorial. You will have up to 10 minutes to take the Sample/Tutorial Test. The time you spend on this Sample Test DOES NOT count toward your examination time. Sample questions are included so that you may practice answering questions. In the Sample/Tutorial Test, you will get feedback on your answers. You will not receive feedback on your actual test.

Example

During the test, to answer each question, you should move the mouse pointer over the circle (radio button) next to the answer of your choice, and click the left mouse button. The amount of time you have remaining to take the test will always be shown in the top left corner of the screen. A sample is show below:

1. When you begin the test, you can see the total time allowed for completion displayed at the top of the screen. You can scroll up to see that information at any time during the test.
2. In order to answer each question, first read the question and determine the response that best answers the question. Put the mouse pointer directly over the circle corresponding to that response.



The screenshot shows the Edison International test interface. At the top left is the Edison International logo. Below it, a timer shows "Time remaining: 29:54". A section titled "Sample" contains the instruction: "Please select the best answer for each question below. If you have any comments, please record them on the Test Comments form given to you by the Test Administrator. Good luck!". Below this, it says "1 of 13". The question is: "Two resistors of 20 ohms each are connected in series. The total resistance of the circuit is _____ ohms." The options are: a. 10, b. 20, c. 30, and d. 40. A mouse cursor is pointing at the radio button for option d.

3. While the pointer is over the circle corresponding to the best answer, click the left mouse button.



Click the left button when the pointer icon is over your answer choice.

- The answer you selected should now have a green dot in the circle. If you need to select an alternate answer, simply move the pointer over that circle, and click again.



Time remaining:

Sample

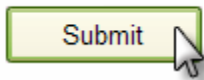
Please select the best answer for each question below. If you have any comments, please record them on the Test Comments form given to you by the Test Administrator. Good luck!

1 of 13

Two resistors of 20 ohms each are connected in series. The total resistance of the circuit is _____ ohms.

- a. 10
- b. 20
- c. 30
- d. 40

- You can change your answers at any time during the test until the time runs out, or you click the "Submit" button.



Test Taking Strategies

Introduction

The purpose of this section is to assist you in identifying some of the special features of knowledge and work sample tests and to suggest techniques for you to use when taking these types of tests.

Your emotional and physical state during the test may determine whether you are prepared to do your best. The following list provides “common sense” techniques you can use before the test begins.

Technique

Remarks

Be confident

- o If you feel confident about passing the test, you may lose some of your anxiety.
- o Think of the test as a way of demonstrating how much you know, the skills you can apply, the problems you can solve, and your good judgment capabilities.

Be prepared

- o Be punctual. Arrive early enough to feel relaxed and comfortable before the test begins.

Concentrate

- o If you can, block out all distractions and concentrate only on the test. You will not only finish faster but also reduce your chances of making careless mistakes.
- o If possible, select a seat away from others who might be distracting.
- o If lighting in the room is poor, sit under a light fixture.
- o If the test room becomes noisy or there are other distractions or irregularities, mention them to the test administrator *immediately*.

Testing Strategies

Once you are given the signal to begin, open your test and position it in a convenient location. Make a mental note of the time and proceed with answering the questions. The following list provides some “common sense” techniques you can use for taking the test.

Technique

Remarks

Budget your time

- o **You are allowed 7 hours and 15 minutes to complete the test.** You will be given 45 minutes to complete the Knowledge Test followed by a 15-minute break. You will then be given 3 hours to complete Parts 1 and 2 of the Work Sample Test followed by a 30-minute break. Finally, Parts 3 and 4 of the Work Sample Test will be administered in the remaining 3 hours and 30 minutes.

- o Time yourself carefully to ensure that you will have enough time to complete all items and review your answers.

Read critically

- o Read all directions and questions carefully before answering.

Return to difficult questions

- o If particular questions seem difficult to understand, make note of them and continue with the test.
- o Return to the difficult questions later if time permits.

Changing answers

- o If you need to change an answer, be sure to completely erase your previous answer. On the computer, be sure that the new answer is the one selected.

Double check mathematic calculations

- o Verify your answer choice. Check your math calculations on a piece of scratch paper if necessary.

Review

- o If time permits, review your answers.
- o Answer the questions you skipped previously.
- o Make sure each question is answered fully before turning in your test. When testing on the computer, make sure that each question has a green dot next to the answer you're selecting.

Remember the techniques described in this section are only suggestions. You should follow the test taking methods that work best for you.

Additional Resource

Additional strategies and test-taking information can be obtained by reading the following book.

Dobbins, J. E., *How to Take a Test: Doing Your Best*, Princeton: Educational Testing Service, 1981.

References

Here is a list of references you may wish to review in preparation for taking this test. You are encouraged to locate and review other references that cover the same material. This list is provided as a focal point for your consideration.

The best reference for this test is a Web Based training program provided by USGS on field methods that is very applicable to the Field Hydrographer position. The web site address for this training program is:

<http://wwwrcamnl.wr.usgs.gov/sws/fieldmethods>

Below, are some additional resources:

1. *Measurement and Computation of Steam Flow*
Volume 1, chapters 1 through 5.

Volume 2, chapter 10 (Graphical plotting of rating curves, Stage Discharge controls) and Chapter 15 (plotting of discharge measurements)
USGS Water-Supply Paper 2175
2. *Handbook of Hydraulics* by Brater & King
3. *Stevens Water Resources Data Book* 4th Edition
4. *Water Measurement Manual* USBR
5. *Handbar Conversion Guide*
6. *Modern Intermediate Algebra* by Willerding
7. *Applied Hydrology* by Linsley, Kohler & Paulthus
8. *Basic Electrical Course* by Southern California Edison
9. *Computation of Water-Surface Profiles in Open Channels* USGS Book 3 A15
10. *Discharge Measurements at Gaging Stations* USGS Book 3 A8
11. *Stage Measurement of Gaging Stations* USGS Book 3 A8

12. *Calibration and Maintenance of Vertical-Axis Type Current Meters* USGS Book 3 A8
13. *General Procedure for Gaging Streams* USGS Book 3 A6
14. *General Introduction and Hydrologic Definitions* USGS Paper 1541-A
15. *An Introduction to American Forestry* Allen & Sharpe
16. *Earth* Press & Siever
17. *Agricultural Surveying* Salo & Westesen
18. *Instream Flow Information/Paper No. 5* Fish & Wildlife Service
19. *Structures for Cableways* Pierce/USGS Cir. 17
20. *Personal Survival Paper* USFS
21. *Basic Cold Weather Manual* Paladin Press
22. *Stevens Papers Concerning A-35 Recorders*
23. *Stream-Gaging Stations for Research on Small Watersheds* USGS No. 268
24. *Care and Rating of Current Meters* Frazier/USGS
25. *SCE Accident Prevention Manual*
26. *Basic Training Program* USGS
27. *An Outline of Forest Hydrology* Hewlett & Nutter
28. *California Cooperative Snow Surveys/Snow Survey Guide*
29. *Miscellaneous Information Sheets, e.g., Handar, Solarex, Sierra/Misc*
30. *Excel/ Word For Windows For Dummies*

Study Outline

The following areas should be reviewed in preparation for the test.

1. Hydrography

- a. Hydrographic theory
- b. Ability to use both manual and computer methods (**Microsoft Excel and Word**) for current metering, map reading, data collection, and snow surveying.
- c. Computation and interpretation of hydrographic charts (e.g., Stevens A-35 chart)
- d. Map drawing and reading.

ADDITIONAL INFORMATION/EXAMPLE: Terms used in the Township and Range System of Map Reading:

Section

Basic unit of the system, a square tract of line one mile by one mile containing 640 acres.

Township

36 sections arranged in a 6 by 6 array, measuring 6 miles by 6 miles. Sections are numbered beginning with the northeast-most section, proceeding west to 6, then south along the west edge of the township and to the east.

Range

Assigned to a township by measuring east or west of a Principal Meridian

Range Lines

North to south lines which mark township boundaries

Township Lines

East to west lines which mark township boundaries

Principal Meridian

Reference or beginning point for measuring east or west ranges.

Map of meridians & base lines from the BLM web server

Base line

Reference or beginning point for measuring north or south townships.

Map of meridians & base lines from the BLM web server

How the System Works.

A specific township is identified as being north or south of a particular baseline and east or west of a particular principal meridian. For example, T3N, R1E of the 3rd Principle Meridian is the third township north of the baseline in the first range east of the Third Principle Meridian.

This particular 36 square-mile area is located in southern Illinois.

The land description generally starts with the smallest part of the description and proceeds to the largest definition. For example, SE1/4 of NW1/4 of Section 3, T3N, R1E, 3rd PM would be the southeast quarter of the northwest quarter of section 3 in township 3 north, range 2 east of the 3rd Principle Meridian.

You may find some irregularly shaped townships and sections which result from surveying errors and other difficulties.

Graphical Display of the Federal Township and Range System

Use the following link for a graphical version of the description of township and range explained below.

<http://www.outfitters.com/genealogy/land/twprange.html>

The largest grouping is the township which is named in reference to a Principal Meridian (P.M.) and a Baseline. T2N, R1E refers to Township 2 North (of the Baseline), Range 1 East (of the Principal Meridian).

Within each township are 36 sections, each one mile square. Each section contains 640 acres. The sections are numbered from 1 to 36 in the following order. [Text only display]

Within each section, the land is referred to as half and quarter sections. A one-sixteenth division is called a quarter of a quarter, as in the NW1/4 of the NW1/4. The descriptions are read from the smallest division to the largest.

Within each township are 36 sections, each one mile square. Each section contains 640 acres. The sections are numbered from 1 to 36 in the following order:

6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

- e. Development of rating curves and graphs.
- f. Safety rules when performing hydrographic work activities.

2. Water Measurements

- a. Acre feet for 24 hours = Second feet times 1.9835
- b. Acre feet = $\frac{\text{second feet times hours}}{12.1}$
- c. Acre feet = second feet times hours times .0826
- d. One acre foot = 43.560 cubic feet
- e. One acre foot = 325.900 gallons
- f. One cubic foot = 7.48 gallons
- g. One cubic foot per second = 450 gallons per minute
- h. 1.9835 = one cubic foot flow for 24 hours
- i. For every foot of height you gain .434 P.S.I.

3. Hydrographic and Meteorological Equipment and Tools

- a. Basic hydrographic equipment (flow metering devices, weirs, flumes, levels, venturi meters, micrometers, gages, etc.)
- b. Meteorological equipment such as precipitation gages, temperature gages, snow survey equipment and tools.
- c. Basic surveying principles and techniques.
- d. Application of safety procedures when working with hydrographic and meteorological equipment and tools.

4. Mathematics

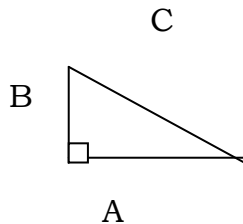
- a. Basic math, including addition, subtraction, multiplication, and division.
- b. Fractions.
- c. Decimals.
- d. Percentages.
- e. Algebra (e.g., polynomial expressions using F.O.I.L./distributive method for solving problems, factoring polynomials, solving rational expressions, Pythagorean Theorem & reducing figures to the LCD).

ADDITIONAL INFORMATION/EXAMPLES: The Pythagorean Theorem and F. O. I. L.

The Pythagorean Theorem

A useful and famous theorem used in mathematics provides the means for finding the length of any side of a right-angled triangle, given the lengths of the other two sides.

The sides are related by the equation:- $C^2=A^2+B^2$



E.g. If A is 4 and B is 3 then using the above equation:

$$C^2= 9+16=25. \text{ The } \sqrt{25} =5$$

Also: Any set of three whole numbers that satisfy the above equation is known as a Pythagorean Triple. The sets {3,4,5}, {5,12,13}, {8,15,17} are the most common. You should memorize these sets and be able to recognize their multiples (e.g. 6,8,10 is a multiple of 3,4,5). This is used in the calculation of areas of canal sections in the test.

F. O. I. L.

$(x +4)(x+7) = x^2 + 7x + 4x+ 28$	First	x multiplied by $x = x^2$
	Outside	x multiplied by $7 = 7x$
$= x^2 + 11x + 28$	Inside	4 multiplied by $x = 4x$
	Last	4 multiplied by $7 = 28$

- f. Geometry.
- g. Simple trigonometry.
- f. Measurement conversions.
- g. Calculations involving simple weir formulas.
- h. Calculations involving level measurements.
- i. Other formulas related to the Field Hydrographer position (e.g., volume, area, etc.)

5. Electrical, Electronic, and Mechanical Knowledge

- a. Basic electrical theory.
- b. Basic electronic theory.
- c. AC/DC principles and applications.
- d. Use maintenance and repair of hydrographic equipment, such as data loggers, Stevens Recorders, precipitation gages, gaging stations, etc.
- e. Basic mechanical principles.
- f. Operation and maintenance of weather stations, gaging sites, etc.
- g. Use of basic tools and equipment.
- h. Knowledge of safe work practices when working with mechanical, electrical and electronic equipment.

Example Questions

The following are similar examples of the types of questions which will be on the Hydrographer Knowledge Test and Work Sample Test. Answers may not be provided for all example questions.

1. Solve the following polynomial expression: $(x + 9)(x + 8) =$

2. Factor the following polynomial expression: $2x^2 + 11x + 15 =$

3. Solve for x in the following rational expression: $3x+5=20 =$

4. Reduce to lowest term assuming no denominator is zero: $\frac{4x+6}{14} =$

5. Columbus weights are streamlined in order to:
 - a. minimize resistance of flowing water.
 - b. stabilize the tag line.
 - c. minimize the resistance of wind.
 - d. break through ice that is over a flume.

6. A 6 Volt battery can be used in a _____ Volt system if not connected in series.
 - a. 6
 - b. 8
 - c. 12
 - d. 24

Answers to Study Guide Questions

1. $x^2 + 17x + 72$

2. $(x + 3)(2x + 5)$

3. $x = 5$

4. $\frac{2x + 3}{7}$

5. a

6. a

**To: Performance Assessment Services
Ground Floor, G.O. 4
PAX 25642**

Test No. _____

You may need to revise this study guide based on these comments.

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