RADIOGRAPHIC INTERPRETER TEXTBOOK



American Welding Society®
EDUCATION SERVICES

Radiographic Interpreter Textbook

Edition – May 9, 2016

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International Standard Book Number:
American Welding Society
8669 NW 36 Street, #130, Miami, Florida 33166
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American Welding Society

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Chapter 1

Radiographic Interpretation and the Radiographer Interpreter

Introduction

This course is designed to provide a basic foundation of knowledge for the Radiographic Interpreter (RI) and to prepare the RI for the American Welding Society's Radiographic Interpreter Certification Examinations as delineated in AWS B5.15, "Specification for Qualification of Radiographic Interpreters."

Radiographic testing is a volumetric nondestructive test (NDT) method used to assure soundness of materials and welds. Depending upon how well technical control is applied in producing the radiograph, the resulting radiographs may contain much information, or very little information about the soundness of the test specimen. It must be remembered that soundness does not mean perfection; most welds contain discontinuities to some degree. The determination as to whether a discontinuity is serious enough to be classified as a defect is the responsibility of the Radiographic Interpreter (RI).

AWS A3.0, "Standard Welding Terms and Definitions," defines a discontinuity as an interruption of the typical structure of a material, such as a lack of homogeneity in its mechanical, metallurgical, or physical characteristics. A defect is defined as a discontinuity or discontinuities that by nature or accumulated effect render a part or product unable to meet minimum applicable acceptance standards or specifications. The term designates rejectability.

There are occasions when reading radiographs in which an indication on a radiograph may appear to be nothing more than a surface irregularity; however, its appearance may also be similar to that of a weld discontinuity. In these situations the RI will need to check the surface of the weld and the adjacent base metal visually before making a decision.

If no surface irregularity corresponding to the indication on the radiograph is found, the RI interprets and evaluates the indication as a weld discontinuity. However, if a surface irregularity corresponding to the indication on the radiograph is found, the RI indicates on the radiographic report that the indication is due to a surface irregularity. No disposition is necessary, as most

codes address surface conditions in the visual inspection acceptance criteria, not the radiographic acceptance criteria; therefore, the evaluation is the responsibility of the CWI, not the RI.

Radiography and Weld Process Control

Although one generally thinks of radiography as a tool for determining the soundness of welds, it can also be a valuable tool in weld process control. The radiographic interpreter must be aware not only of discontinuities that might be present in the weld, but also trends or repetitive conditions that might indicate some lack of process control. For example, when reading the radiographs of a number of piping welds (all of the same material and pipe size) slag inclusions may be discovered in approximately the same location on a number of weldments. Even though the slag inclusions may be acceptable, this might indicate a problem with process control. Poor tie-ins in the same location may also indicate a process control problem.

The next step is to determine if the condition is prevalent with only one welder, or if it occurs with all welders. If it occurs with only one welder, then it indicates a welder technique problem; however, if it occurs with several welders, it may indicate a procedure problem. For example, the condition may occur in a location where the welder has limited access. Whatever the case, there is a recurring issue that needs attention before it becomes a serious problem.

As he reads the radiographs, the RI must always gather as much information as possible from the radiograph and report everything he detects, even though the conditions may be acceptable or may not even be addressed in the applicable code or specification. It is always advisable to submit, in addition to the written radiographic report, a verbal report to the cognizant engineer. Written reports are not always read in a timely manner by the individuals who can make use of this information.

Radiography Is Not an Exact Science

Radiographic Interpretation is not an exact science, but rather something of an art. Some consider it a combination of art and science. The basic principles of radiation and the principles concerned in producing a radiograph involve science, while the interpretation and evaluation of the radiographic image is more of an art. This art cannot be

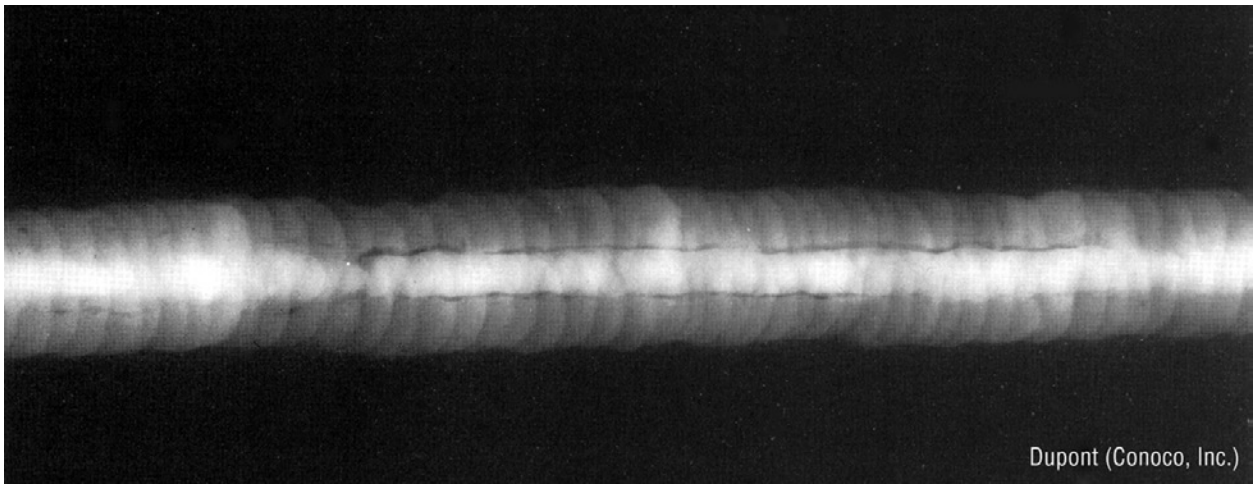


Figure 1.1. Sample Radiograph of a Weld