RADIOLOGICAL COUNCIL

RADIATION SAFETY ACT
RADIATION SAFETY (QUALIFICATIONS) REGULATIONS 1980

BOREHOLE LOGGING
SYLLABUS

The courses recognised by the Council deal with general principles of radiation safety matters as well as the requirements of the Act and regulations relating to the possession, transportation, storage, disposal and use of radioactive substances and to the use of equipment capable of producing ionising radiation.

The examination syllabus for Radiation Safety in BOREHOLE LOGGING as provided for in the Radiation Safety (Qualifications) Regulations 1980.

The examination comprises two sections:-
- Core Paper – closed book, one hour multiple choice examination covering general radiation safety
- Main Paper – Open book, two hour written paper covering the safe use of borehole logging gauges

CORE PAPER

Legislation - Radiation Safety Act 1975
- Radiation Safety (General) Regulations 1983

Dose limits - radiation workers
- non radiation workers

Radiation types and properties
Background radiation
Quantities & units of measurement
Biological effects
Radiation risk
Basic radiation safety calculations
Inverse square law
Pro rata dose calculations
Personal radiation monitoring
Principles of protection

WRITTEN PAPER

1. Properties and Uses of Radiation

Properties of α, β, γ, x and n radiation, energy of the radiations, absorption, scatter, transmission factors, half and tenth value layers, inverse square law.

Radioactive Substances

Half-life, decay constant, decay curves, specific activity, specific gamma ray constant, n emission rate, flux rates.

2. Production, Detection and Measurement of Radiation

Radioactive Substances

Atomic structure - electrons, protons and neutrons, atomic number, atomic weight, isotopes, radioactive isotopes, radioactive decay, production of radiation, units of radioactivity.

Detection and Measurement

Ionisation, GM tubes, ionisation chambers, scintillation detectors, neutron detectors and measuring instruments incorporating these three detectors, photographic films, film badges, TLD, various direct reading personal monitoring devices, integrating and dose rate measuring devices, energy dependence, time constant, techniques of use and limitations of the various types.

Units of Measurement of Ionising Radiation (SI Units).

3. Biological Effect of Radiation

Genetic, somatic, deterministic and stochastic effects, dose-effect relationships, effective dose limits, comparison of risks, natural sources of radiation.

4. Circumstances that may give rise to radiation hazards and means of protecting persons from those hazards

Use of Time, Distance and Shielding in Protection.

Scattered radiation, leakage radiation, radiation penetrating into occupied or public areas, warning signs, barriers, shields, site surveillance and security, general safe working procedures.

Radioactive Substances and Electrically Powered Neutron Generators

Sealed sources, loss of integrity of the encapsulation, wipe tests, shielded source housings and associated mechanisms, locking systems, source security, working procedures to ensure safe use of radioactive sources and to avoid radiation hazards, loss of or accidents to radioactive sources, contamination and decontamination, requirements for transport and storage of sources.

5. The Radiation Safety Act and Regulations

Those parts of the Act and Regulations applicable to the proposed usage of ionising radiations.

6. Standards, Rules, Codes or Specifications

(1) Applicable to Logging Equipment only -

Code of Practice for the safe use of sealed radioactive sources in borehole logging (1989) published by the National Health and Medical Research Council.

(2) Generally applicable -

Recommendations for limiting exposure to ionizing radiation (1995) published by the National Health and Medical Research Council.

(3) Applicable to Transport of Radioactive Substances only -

Code of practice for the safe transport of radioactive material (2001) published by the Australian Radiation Protection and Nuclear Safety Agency.

7. Legal Aspects

Radiation Safety Act and Regulations, Working Rules and Emergency Procedures required to be prepared and followed by licence holders, Registration and Licence Conditions.

8. Matters Relating Specifically to Use of Borehole Logging Equipment

Basic principles of operation of logging equipment using radioactive substances or irradiating apparatus, hazards which may arise to persons using and maintaining the equipment and to other persons, protective measures to be adopted in practice, safety systems.

EXCLUSION

This syllabus does not relate to the actual manipulation of radioactive sources such as may be involved in loading of sources into source housings and the repair of defective housings containing sources.