

WELL LOGGING, INC.

OPERATING INSTRUCTIONS
AND
EMERGENCY PROCEDURES
MANUAL

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A. HANDLING AND USE OF RADIOACTIVE SOURCES

At all times, the approved logging personnel of Well Logging, Inc. will be directly in charge of the logging operations utilizing radioactive sources and will be responsible for protection of the health and safety of personnel associated with the sources and the general public. These personnel must supervise all source handling operations, transportation, storage and shipping according to the following procedures. Mr. Dwight Knoblett is designated as the Radiation Protection Officer.

1. Only the approved logging personnel of Well Logging, Inc. shall perform operations involving radioactive sources. All customer personnel shall be required to be remote to these operations.

2. Only the approved handling tool may be used for removing the source holder from the storage assembly and placing the source holder in the logging tool, and the subsequent return of the source to the storage assembly.

3. Radioactive sources are to be transported and stored in the approved, locked, and secured storage assembly.

4. For calculations of possible exposures, the neutron logging source assembly encloses a 3.0 curie Americium-241 Beryllium (AmBe 241) neutron source. A dose rate of approximately 48-54 mr/hr (neutron and gamma) is present at one meter from the source assembly.

5. Using the approved remote handling tool, the source is removed from the storage container. The source is promptly attached to the logging tool and lowered into the well. When the logging operation is finished, the logging tool will be returned to the surface. The logging operator will remove the tool from the well, and utilizing the approved remote handling tool, will remove the source from the logging tool and immediately place it back in the storage container. The storage container will then be locked. The time-distance factors must be used effectively when working with radioactive sources to keep exposure to a minimum. When utilizing the remote handling tools a safe distance is provided but great care should be taken so as to keep the handling exposure time to an absolute minimum.

6. Surveys as discussed below should be taken and recorded at the proper times.

7. In the event the logging tool is lost in the well, see the instructions in Part I below.

B. RADIATION SURVEYS

In general a survey should be taken each time a source is manipulated or moved. The approved portable low level survey meter should be used for the surveys.

1. Before travel to a job site, survey the truck on all four sides, and survey the storage assembly at its surface and at a distance of three feet from the surface. Record on Job Log Sheet. The radiation level at the surface of the container may not exceed 200 mr/hr and at three feet from the surface no radiation level may exceed 10 mr/hr. The radiation level at 18 inches from any surface of the truck or in the passenger cab shall not exceed 2 mr/hr.

2. Upon arrival at the well site, survey the area and the well bore at the surface before commencing the job. Record these readings. After the logging tool is removed from the hole and the source is removed from the tool, survey the area, the logging tool, and the well bore to determine whether there is any contamination around the well site. Record on Job Log Sheet.

3. A survey of the Field Office Storage Facility shall be conducted monthly. The readings at 18 inches from each external wall of the facility shall be recorded. No such reading is to be in excess of 2 mr/hr.

4. A leak test wipe must be surveyed before forwarding the wipe for assay. Record the result in the leak test records. High levels of contamination on the wipe shall be reported to the manufacturer of the source assembly and use of the source shall be discontinued.

5. In the event a source is lost in the well, frequent surveys of the recovery operation will be made and recorded. Further procedures are described in Part I below.

6. A survey of the truck when the source storage assembly is in the Field Office Storage Facility will be made and recorded on a monthly basis.

C. ACCESS CONTROL PROCEDURES

1. All containers carrying or storing or used for transporting radioactive materials will bear a tag with the identification of the radioactive material, the quantity of the radioactive material, and the date that the radioactive material was that particular quantity. The tag will also state: "Caution -- Radioactive Material."

2. The truck will be labeled and operated according to the procedures specified in Part F below.

3. For logging operations performed at well sites, logging personnel will, at all times during the operation, maintain surveillance of the area and prevent unauthorized personnel from entering that area at any time the source holder is not secured in the storage assembly.

D. STORING AND SECURING RADIOACTIVE MATERIALS

1. As described in Part A above, the storage container will remain locked or within the immediate line of sight of logging personnel whenever the source holder is placed therein.

2. Surveys as required in Part B above will be conducted of the source storage assembly, the Field Office Storage Facility, and the truck.

3. The "RADIOACTIVE" placards described in Part F below will be placed on the truck whenever the storage assembly is placed therein.

4. The Field Office Storage Facility will be securely locked when the source storage assembly is placed therein. Signs reading "Caution -- Radioactive Material" will be placed in conspicuous and obvious locations around the Storage Facility. These signs will bear the radiation symbol and will be magenta and safety yellow in color.

E. PERSONNEL MONITORING PROCEDURES

1. Logging personnel shall wear personnel monitoring devices at all times when conducting activities in the well logging program.
2. Logging personnel will wear a film badge attached to the outside of a shirt pocket during all operations involving the radioactive source.
3. Each film badge shall be assigned to and worn by only one individual.
4. The processing results of the film badge shall be recorded and maintained until their disposal is authorized by the Nuclear Regulatory Commission. The doses entered on the records shall be maintained on a quarterly basis.
5. It is understood that the maximum acceptable dose levels for individuals is 1.25 Rem per calendar quarter. In the event that the doses to any individual exceed that limit, notice will be given to the Nuclear Regulatory Commission, Office of Inspection and Enforcement, Washington, D.C. and the Regional Enforcement Office.
6. Personnel monitoring equipment shall be stored away from the source when logging operations are not being conducted.
7. Film badges will be sent in for processing at intervals not to exceed one month.

F. PROCEDURES FOR TRANSPORTING RADIOACTIVE SOURCES

1. Upon removal of the storage assembly from the Field Office Storage Facility, the storage assembly shall be placed on the truck and secured in its designated position. It should be sufficiently secured to prevent shifting of the storage assembly in transit.
2. Surveys as described in Part B above should be taken and the results recorded at the proper stages of the well logging operation.

3. The truck shall bear a placard on four sides which bears the word "RADIOACTIVE." This sign shall be approximately 6" x 30" and will be placed on the truck only when it is transporting or storing the radioactive materials. The sign shall have black lettering on a safety yellow background.

G. RECORDS MANAGEMENT

1. A record of the initial receipt of the radioactive source shall be made by the Radiation Protection Officer. This record shall be kept for at least two years after receipt.

2. Personnel exposure records of the film badge results will be maintained in a separate file, along with quarterly reports on the exposures of each person utilizing radioactive materials.

3. Leak test records will be maintained on the sealed source. The leak tests shall be performed and the results recorded at six month intervals.

4. Survey records of the Field Office Storage Facility shall be maintained. These records will reflect, in milliroentgens per hour, the readings at a point 18 inches from the external surface of each wall of the storage facility. These surveys will be done on a monthly basis.

5. Survey records of the job sites and truck as set forth in Part B above will be maintained.

6. Survey meters will be calibrated at approximately six month intervals. A record will be maintained of the current calibration certificates.

H. LEAK TEST PROCEDURES

1. The sealed source shall be tested for leakage at intervals not to exceed six months.

2. The wipe shall be made of the surface of the source holder and any other surface which may be contaminated if the source is leaking.
3. The wipe shall be surveyed before transmittal for assaying to determine if high levels of radiation are present.
4. In the event that either the preliminary survey of the wipe or the leak test results indicate the source is leaking, the source shall be withdrawn from use.
5. Records of the leak test results shall be maintained as described in Part G above.

I. EMERGENCY PROCEDURES

In the event of any accident specifically dealt with in the following procedures, or any other emergency situation which may develop, the following persons should be notified immediately by telephone and telegraph, mailgram or facsimile:

Director, NRC Regional Office (Region IV)
Office of Inspection and Enforcement
611 Ryan Plaza Drive
Suite 1000
Arlington, Texas 76012
Telephone: 817/334-3841

Corporate Officers of Well Logging, Inc.
These persons can be reached through the
Well Logging, Inc. office number.
Telephone: 918/749-0941

In addition, the following state officials should be immediately notified if the emergency is within that state:

Oklahoma
Director, Oklahoma Department of Energy
4400 N. Lincoln Blvd.
Oklahoma City, OK 73105
405/521-2995

Kansas
Director, Kansas State Department
of Health and Environment
Bureau of Radiation Control
Topeka, Kansas
913/862-9360 (ext. 284 through 287)

1. Vehicle Wreck

In the event of an accident while transporting radioactive materials, efforts should be made to minimize the exposure of any persons. These would include roping off the area and maintaining surveillance to prevent unauthorized persons from entering the area. The appropriate officials listed above should be notified, but surveillance of the area should be continuously maintained.

2. Procedure for Lost Source Downhole

- a. When a source is lost, notify the well owner or his representative that a source is stuck in the well. As soon thereafter as possible, hand the well operator a drawing of the source and the logging tool. This will enable him to know before he starts the fishing operation the quantity, type of radioactive material, and the mechanical construction of the source and the logging tool involved.
- b. Immediately notify the persons listed above and keep them informed of the progress toward recovery of the source.
- c. Personnel monitoring equipment should be distributed to the rig personnel and company personnel. The well operator should be advised that these are for their protection and are intended primarily for a record of the operation.
- d. During the fishing operation, the mud being circulated should be monitored using survey equipment capable of measuring gamma ray radiation.

- e. It is necessary to minimize possible exposures by controlling the time and distance factors during the fishing operation. Where practical, everyone, except the well operator and enough personnel to provide necessary assistance during the operation, should be kept from the area. All handling of the drilling rig equipment should be handled by the well operator and actual handling of the source should be done by the Radiation Safety Officer or a qualified designee.

3. Fires

- a. Notify all personnel in the area immediately.
- b. Attempt to put out the fire if a radiation hazard is not immediately present.
- c. Notify the fire department.
- d. Notify the Radiation Protection Officer.
- e. The Radiation Protection Officer will set up restrictions governing the fire fighting and other emergency activities.
- f. Following the emergency, monitor the area and ascertain the emergency devices necessary for safe contamination.
- g. Notify the authorities listed above.
- h. Decontaminate the area.
- i. The Radiation Protection Officer will have to approve the area before work can resume.
- j. Monitor all persons involved in combating the emergency.
- k. Prepare a complete report of the accident for transmittal to the authorities listed above.

4. Leaking Source
 - a. If the logging tool indicates that a source is leaking, shut the operation down.
 - b. Notify the well owner.
 - c. The Radiation Protection Officer will set up control procedures for keeping personnel out of the immediate area until recovery is commenced.

J. REVIEW OF RADIATION SAFETY PROGRAM

The Radiation Protection Officer will conduct quarterly reviews of the radiation safety program. These reviews will include:

1. Determining that these established procedures are being followed to ensure the protection of the health and safety of well logging personnel and the general public.
2. Check to see that all required records are being maintained, including those records described in Part G above.
3. Determining that all equipment associated with the well logging operation is in safe working order.