



SCHLUMBERGER WELL SERVICES A DIVISION OF SCHLUMBERGER TECHNOLOGY CORPORATION

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United States Atomic Energy Commission Division of Materials Licensing Washington, D. C. 20545

Attention: Dr. John A. McBride

Gentlemen:

Attached is a draft of a pamphlet being prepared for distribution to oil and gas companies and to departments of health of the states in which we operate. We would appreciate having your comments and permission to include them in the bulletin.

Yours very truly,

O. C. Cheatham, Manager of Radiation Protection

OCC:bb Enclosure

cc: Region IV, Div of Compliance Denver, Colorado

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## SOURCES ABANDONED IN OIL OR GAS WELLS

by

## O. C. Cheatham, Manager of Radiation Protection SCHLUMBERGER WELL SERVICES A Division of Schlumberger Technology Corporation

The increasing use of radioactive sources in well logging, together with the increasing number of regulatory agencies involved, have created confusion or perhaps a lack of understanding of the action which should or should not be taken when a source becomes lodged in the hole. This lack of understanding has ranged from one client's opinion that a source must be recovered at all costs to another's impression that immediate abandonment of the well was mandatory.

A source may be safely abandoned; and it is fortunate that only a few clients have needed to acquire <u>first hand knowledge</u> of the procedures and requirements. Only 14 Schlumberger sources have been irretrievably lodged in wells during more than 75,000 operations. No incident resulted in loss of production. There was only one case of well damage due to a ruptured source, and that well was successfully decontaminated and is producing gas today.

The relationship between the client and the service company is well defined and understood when no radiation source is involved. Under the terms and conditions of the service order, the client assumes financial responsibility for the equipment once it is lowered into the well. The well operators accept as ore of the hazards of the industry an occasional loss of very expensive and sophisticated electronic equipment in their wells. The service companies' prices reflect this policy. When a tool minus a radiation source is lodged, the final decision of whether to fish for the equipment or abandon it rests entirely with the client.

Among the many factors which influence his decision are:

- 1. Cost of tool versus best estimate of minimum cost and probable maximum cost of recovery.
- Risk of sticking drill stem and fishing tools, especially if all zones of interest are above the tool.

- Interference of tool with potential production or deeper drilling.
- 4. Value of clearing the hole for additional logs.

When a radioactive source is associated with the stuck equipment, Schlumberger becomes more actively involved. It is our responsibility to:

- Remain in contact with the client and offer our best advices and recommendations regarding <u>safe</u> fishing procedures.
- Have our field personnel notify Schlumberger's Manager of Radiation Protection in Houston if the tool is not readily recovered or if there appears to be a chance of lamaging the source capsule.
- Notify the AEC and/or State if it becomes apparent that it may be necessary, advisable, or <u>desirable</u> to abandon the tool and source (by Houston office).

The introduction of the regulatory agencies does not alter the main objectives: to recover the source intact or abandon it in such a way as to protect personnel and property in the future.

If abandonment of a source appears probable, Schlumberger notifies the AEC and State by telephone. We then attempt to determine which line of action is to the best interest of all concerned, what the client wishes to and can reasonably do, and to present a packaged proposal to the agencies for final approval or further recommendations.

Abandorment of a source in a dry hole is simple. All records, including those of the state agency issuing permits for or controlling the drilling of oil and gas wells, should contain information regarding the depth, date, type and quantity of radioactive materials. The well head, if left above the surface, should contain the same information on an engraved durable metal placard.

A source left below a producing zone presents little difficulty. In most cases the normal cementing of the production string of casing or tubing will isolate the source. If the well is to be produced from open hole completion, cement should be spotted around and/or above it to prevent the movement of fluids past the capsule and eventual destruction of the capsule through abrasion.

In questionable cases the life of the capsule and the solubility of radioactive material might influence the acceptance of the proposal. (Schlumberger's source capsules have an estimated life of 500 years in undisturbed salt water. The solubility of the radioactive material is in the order of one part per billion per week).

Production of gas, water or oil past a source should be prohibited unless the capsule is protected from abrasion. Casing or tubing should be adequate. The spotting of cement, if practical and feasible, adds to the protection.

In the event a source is left in a producing zone it should be cemented in place if possible. Extreme caution should be used in side tracking to avoid reentering the original hole and damaging the source container.

IN SUMMARY:

- A. All precautions should be taken to avoid rupture of a radioactive source during fishing operation. Although each Schlumberger source has been individually pressure tested to 25,000 psi, it is small and will not withstand milling, drilling, or pounding fishing operations.
- B. A radioactive source may be safely abandoned in the well. All the factors influencing the client's decision regarding a tool with no source involved have their place when a source is lodged. Added guidelines are the safety aspect, the proper placarding of the well and entering the information in the well records.
- C. There should be no costly delay in obtaining approval to abandon a radioactive source inasmuch as Schlumberger keeps the agencies well advised of the progress of the fishing operations as events develop.
- D. Responsibility for notifying the regulatory agencies and making all reports is Schlumberger's.

E. It is the client's responsibility to deal with the State agencies issuing permits for drilling oil and gas wells and to furnish that agency with any information which may be required.