

OFFICE OF CONSERVATION
INJECTION & MINING DIVISION

TUBING AND PACKER SWD

RADIOACTIVE TRACER SURVEY GUIDELINES AND PROCEDURES

The purpose of running a “**Radioactive Tracer Survey**” (RTS) in a disposal well completed with tubing and packer is to determine (1) whether injected fluids will leak through a hole or holes in the casing between the packer and the perforations. (2) Are injected fluids migrating vertically above the top of zone (TOZ) outside the casing after passing through the perforations? Confirmation of fluid moving above TOZ shall be determined by running a “**Time Drive**” survey after the RTS is run. *See the “Time Drive” Guidelines. If there are any questions, please call the Injection and Mining Division at 225/342-5515.*

GUIDELINES:

- A. The gamma-ray log may be run up to 60 ft/min at a Time Constant of 1 second (suggested) or up to 30 ft/min at Time Constant 2 or up to 15 ft/min at Time Constant 4. Record logging speed and Time Constant on the log heading.
- B. Include a collar locator for depth control.
- C. Vertical scale may be 2" or 5" per 100 ft; 2" being preferred.
- D. Record the horizontal scale in API units. It is suggested that two gamma-ray curves at different sensitivities (such as one at 20 API units per division and one at 100 API units per division) be recorded on each log pass. If only one gamma-ray curve is recorded, make sure the sensitivity used is such that the tracer material will be obvious when detected and will not be confused with normal “hot spots” in the formations; i.e., choose a low sensitivity. It need not be sensitive enough to show lithology.
- E. Record beginning and ending clock times on each log pass.
- F. Record injection rate (if any) during each log pass (see *Note).
- G. Record volume of water injected between log passes.
- H. Record injection pressures required to displace the radioactive slug between log passes.
- I. Record volume and concentration of each slug of tracer material.
- J. Do not move the radioactive material more than 500 ft between passes.

If preferred, most of the above may be shown in tabular form rather than on the log, as long as all information is provided (the Injection & Mining Division will provide forms on request).

PROCEDURES:

- 1. Run a base log from at least 200 feet (ft) below the perforations or the total depth of the well to at least 200 ft above the packer.
- 2. Release tracer material, either liquid or water soluble Iodine 131 (normally 10 millicuries), from the tool into the tubing about 100 ft above packer depth. Trace the slug with the gamma-ray tool by running short overlapping passes while following the tracer downhole. Each pass should extend from at least 100 ft below the slug to at least 100 ft above the top of the previously recorded slug depth (above the point where the gamma ray count returned to baseline levels on the previous run). Although it is difficult to determine the number of passes needed, the complete pathway followed by all of the tracer material needs to be demonstrated. At a minimum, the following passes should be made:
 - a) Upon release of the radioactive material a pass should be made from 100 ft below the slug to at least 100 ft above the position of the top of the slug.

- b) The slug should then be pumped to the packer and a logging pass made from 100 ft. below the slug to 100 ft. above the position of the top of the slug on the previous pass.
- c) The slug should then be pumped below the packer but above the perforations and a logging pass made from 100 ft below the slug to 100 ft above the position of the top of the slug on the previous pass. The slug **should not be pumped down** more than 500 feet between passes.
- d) Continue the pumping/logging sequence until the slug reaches the perforations. A logging pass should be made from 100 ft below the perforations (or from PBTD) to 200 ft above the packer depth.
- e) Continue the pumping/logging sequence from 100 ft below the perforations (or from PBTD) to at least 100 ft above the perforations until the radioactive material virtually disappears. The volumes of fluid pumped between the logging passes should be consistent. The last pass should essentially duplicate the base log.

Do not pump during logging; that is, pump only to move tracer down hole between log passes. Be cautious of the volume of water pumped between log passes to prevent premature loss of the tracer! If the tracer has been prematurely lost, it will be necessary to pump away the slug, inject another slug and follow it from the point of the last good log pass.

- 3. As soon as the tracer reaches the perforations, stop pumping and run a log from 100 ft below the perforations (or from PBTD) to 200 ft above the packer depth.
- 4. As tracer is pumped out of the perforations into the well bore, run a few short logging passes from at least 100 ft below the perforations (or from PBTD) to at least 100 ft above the perforations showing the pathway the tracer follows. Continue running log passes until the tracer virtually disappears. Do not pump a large volume between log passes to “pump away” the slug. The last log pass should essentially duplicate the base log.
- 5. Each log pass must be submitted on a separate log segment with collar locator. A merged log may be submitted in addition to the separate log passes.
- 6. An interpretation of the log must be supplied by the logging company on the log itself.
- 7. Include a schematic diagram of the well on the log itself. The diagram should show the casing diameters and depths, tubing diameter and depth, packer depth, perforated intervals, and total or plugged back depth.
- 8. Write the **Serial Number** of the well on the log heading.

A “Time Drive” survey must be run, after completing the RTS. See the “Time Drive” Guidelines

***NOTE:** The above “Guidelines and Procedures” will apply in most instances. In certain situations, it may be necessary to deviate from these directions. Necessary modifications may be made as long as the reasons stated in the introduction paragraph can demonstrate well integrity. **However, deviations from these guidelines must be approved by this Office prior to running the test.** For questions, call (225)342-5515 weekdays.

Send two copies of the complete log to:

Office of Conservation
Injection and Mining Division
617 North 3rd Street, 8th Floor
Baton Rouge, LA 70802