

# Optical Televiewer Standard Operating Procedure



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SOP18-###

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SOP18-###

### Table of Contents

1	Objective and Overview	2
2	Equipment	2
2.1	Equipment List	2
2.2	Optical Televiewer Technical Specifications	2
3	Documentation	3
4	Training	4
4.1	Job Shadowing	4
4.2	Competency Evaluation	4
5	Safety	4
6	Procedures	4
7	Troubleshooting	8
8	Data	8

## Optical Televiewer Standard Operating Procedure

SOP18-###

### 1 Objective and Overview

The objective of this SOP is to outline all steps that must be taken to ensure that the job is carried out in a safe and efficient manner. This Standard Operating Procedure (SOP) covers all **Optical Televiewer** procedures that will be performed by GroundTruth Exploration employees and any subcontracting employees that are performing work for GroundTruth Exploration.

The Optical Televiewer Instrument is a downhole imaging tool which provides a 360-degree image of the outer wall of any borehole filled with air or clear water. The tool also provides a high resolution downhole magnetic, inclinometer, gravity survey which provides an azimuth and dip survey throughout the borehole. The tool is operated via an electric winch which lowers the tool into a borehole, data is viewed in real time via laptop. The Data is recorded into a .tfd file which can later be used for structural interpretation, geological logging in WellCAD software.

### 2 Equipment

#### 2.1 Equipment List

- Optical Televiewer QL40 OBI-2G with installed stabilizers
- Dummy Probe
- Electric winch and case/stand
- Pulley stand – for directing the wire down the borehole
- Bebox controller – relays information from the winch and televiewer to the laptop
- Laptop – has Logger software that records data from the survey
- Connection Cords – powercord to winch, winch to bebox, bebox to laptop, etc.
- Extension cord and Generator
- Cleaning supplies – lens cleaner and paper towel
- Grease and Lubricants – for the winch and pulley
- Miscellaneous tools – crescent wrenches, allenkeys, etc.
- Canopy – protect equipment from weather

#### 2.2 Optical Televiewer Technical Specifications

- Diameter – 40 mm (1.6")
- Length – 1.49 m (58.7")
- Weight – 5.3 kg (11.7 lbs)
- Max Temperature – 70°C (158°F)
- Max Pressure – 200 bar (2900 PSI)
- Light Source – LEDs
- APS544 with 3 axis magnetometer and 3 accelerometers.

## Optical Televiwer Standard Operating Procedure

SOP18-###



### 3 Documentation

The following documentation must be read and fully understood by the operator before any work can commence.

- Optical Televiwer Standard Operating Procedure

## **4 Training**

### **4.1 Job Shadowing**

New employees will receive two days of one-on-one training in the field with a supervisor or more experienced person. If returning employees require a training refresher, or policies and procedures have changed since they were last employed with GTE, one-on-one training will be provided.

### **4.2 Competency Evaluation**

After a new or returning employee has been in the field for one week or more, a competency evaluation will be performed by a supervisor or manager to ensure all of the required skills have been learned and are being used in the field.

## **5 Safety**

The main safety precautions while using Televiewer are:

- Pinch points – keep your hands away from the wireline when its moving and other pinch points.
- Weather – do not operate the equipment if there is lightning in the area or in rain without a canopy.
- Proper Lifting and Moving – some pieces of the equipment are heavy, make sure two people transport heavy items and watch for unstable footing
- Moisture – when dealing with electronics, exercise caution when working in wet conditions.
- PPE – Wear appropriate protective equipment.

## **6 Procedures**

1. Once at the borehole the operator and assistant will set up all necessary equipment. The stand and wheel will be set up on top of the borehole; the winch will be set up in front of the borehole on a relatively solid surface and be moved from travel position to operating position. The B-Box and laptop will be placed in a safe a dry place with cords connecting the winch, B-Box, laptop and generator connected. The generator will be turned on.

2. The wire line is fed through the stand. The centralizers are fitted onto the dummy probe; the dummy probe is attached to the wireline and fed into the top of the borehole.



## Optical Televiewer Standard Operating Procedure

SOP18-###



## Optical TelevIEWer Standard Operating Procedure

SOP18-###

3. Using the winch controls, the dummy probe is raised until the top of the probe is at the top of casing.
  - a. While wireline is in operation, the operator must have his hands on the controls at all time
  - b. While the wireline is in operation, the operator must ensure that no personnel have their hands near a moving wire
4. The B-Box is turned on, and the Logger Software is started on the laptop the depth measurements should be visible in the Logger window.
5. Using the logger software, the depth is set to zero using the bottom of probe as zero reference (ie: if the probe is 1m long, the depth is set to 1.0m)
6. The dummy probe is lowered downhole to check for obstructions.
  - a. While inside of casing and until 5m past casing the operator will feed wire at <5m/min
  - b. After the probe is 5m past casing the operator may speed up the rate of descent to up to 30m/min
  - c. When the probe is <5m from the bottom of the hole, the operator will slow the probe down to 5m/min
7. When dummy reaches bottom, line will become slack and the operator must stop the winch. The end/refusal depth is noted.
8. Dummy is raised to the top of the hole
9. The rate of ascent may be up to 30m/min while the probe is below 5m from bottom of casing
10. Once the probe is above 5m below the bottom of casing, the operator will slow the rate of ascent to 5m/min
11. The centralizers are removed from the dummy and cleaned off.
12. If there are no concerns from the dummy survey (ie: the dummy probe did not catch on anything), the TelevIEWer is fitted with centralizers and placed into the hole. If there were any concerns from the dummy survey, the hole is not surveyed.
13. In the Logger software, the tool is selected (MSI1-OBI40).
14. The TelevIEWer is raised until the top of the unit is at the top of casing, the depth is re-zeroed by pressing the zero button in the top right corner of the depth window – the software knows the length of the tool and sets the zero depth to the length of the tool.
15. In the Logger Software:
  - a. Tool is turned "On".
  - b. Data acquisition method is changed to "Depth Down".

## Optical Televiewer Standard Operating Procedure

SOP18-###

- c. Under Setting/Commands, the hole diameter is selected, and the PPT is set where the hole diameter is close to or under where the recommended depth sampling of Pixel 1:1 is close to 8mm (0.008m) and 'Apply is Pressed)
- d. Exposure and Light intensity can be adjusted in this menu
- e. The Settings (Resolution, Exposure, Light Intensity, Sampling Rate) are written down for each survey completed.
- f. Acquisition is turned "On".

16. Record is pressed to start saving a Televiewer file, you can specify where the file is saved, if multiple surveys are recorded, the second will have the suffix -02.

17. The probe is lowered slowly down the hole, starting at 1m/min

18. The operator will watch the tool workload reader on the OBI40IMG window and increase the rate of descent until the workload stabilizes at 80%. This is the maximum survey speed for the survey. It is often between 4 and 7m/min. If the workload increases past 100%, errors (gaps) in the survey will start to appear which are not desirable.

19. The operator keeps his hand on the control at all times in order to be able to stop the winch if the line goes slack

20. Once the Televiewer reaches 10m from bottom of hole, speed is reduced to 3m/min.

21. The survey is completed once the Televiewer reaches opaque 'mud' or touches the bottom of the hole.

22. At the end of the survey, 'Stop' is pressed in the Acquisition window and data acquisition is turned to "Off".

23. The data acquisition method is changed to "Depth Up". Acquisition is turned "On".

24. The Televiewer is raised at 1m/min until an image is visible and then stopped.

25. The operator decides if surveying out of the hole is warranted.

26. If the lens is too dirty from murky water or mud, a Depth up Survey may not be warranted

27. If there were many errors in the Depth Down survey, and Depth Up survey may be warranted (An error is a gap in the downhole survey)

28. If the exposure setting was too high or low, the setting can be adjusted, and the Depth up survey run

29. To complete a Depth Up survey, repeat steps 19 - 25 while winching the Televiewer uphole.

30. Once the Televiewer is within 5m from casing, reduce speed



## Optical TelevIEWER Standard Operating Procedure

SOP18-###

31. Once the Survey is complete, the TelevIEWER is turned off in the Logger software and the software is closed
32. The TelevIEWER is removed from the hole and disconnected from the winch
33. Everything is packed up and cleaned off.

## 7 Troubleshooting

**Muddy or wet borehole:** When drilling in wet ground, RAB drills tend to coat the walls of the borehole with wet cuttings, RC drills tend to leave the walls in cleaner condition. Several gallons of water will be needed to dump down the casing if the walls are dirty.

**Clarity of the picture:** If the image is hard to see on the laptop, adjust the brightness. If there are several rock types in the borehole (should be able to tell from the cuttings) then it may be necessary to stop and save the file, adjust the brightness for the new rock type, and continue.

**On the way down:** At the bottom of the casing the televIEWER or dummy with stabilizers may get stuck and the line will become slack. If so, you may need to let a few inches of slack in the wireline and gently jiggle it past the casing. This will move the televIEWER faster than it is able to record data resulting in gaps in the imagery, but if done slowly, most gaps can be prevented.

If there is an area where this happens further down the hole after the dummy has been put down, it is much riskier to wiggle the televIEWER by the area, for risk of not getting it back up. In this situation, get in touch with a supervisor before you proceed further down the hole.

**On the way up:** Sometimes the top stabilizer on either the dummy or the televIEWER will get caught on the bottom of the casing. In this case, try manually pulling the wireline at different angle at the top of the casing to see if the stabilizer will slip over, do this gently. If it remains caught, then it will be necessary to lower something of similar diameter and weight down to the bottom of the casing to wedge the stabilizer over the edge of the casing (If the televIEWER is caught then tie something that won't break to the dummy and lower it down).

## 8 Data

Label the file/files appropriately and upload to the proper subfolder on the Drive. If necessary the .tfd file can be viewed through the logger software (sometimes helpful when looking at XRF chemistry).

Analysis of the borehole imagery can be completed using WellCAD software to produce 3-D core. This program produces oriented structural measurements and lithologies.