

CORE PROCESSING AND ANALYSIS



TABLE OF CONTENTS

Core Processing & Preparation	3
Processing and Marking Kit	3
Core Encapsulaiton	3
Processing Table	4
Mud Tracer (D20).....	4
Core Stabilization	5
<i>Foam Injection</i>	5
<i>Gypsum Stabilization</i>	7
<i>Core Shim Stabilization</i>	8
.....	9
Core Preservation	9
Wax Baths	10
Plug Bath	10
GeoSeal Wax	10
Standard Waxing Kit	11
Vacuum Sealing.....	11
Plugging & Trimming	13
Plugging Units	14
Trimming Saw	14
Profiling & Imaging	15
Portable Gamma Logger	16
XRF Analyses	17
Permeability.....	18
Core Photography.....	18

CORE PROCESSING & PREPARATION

PROCESSING AND MARKING KIT



A user friendly kit to ensure that we are prepared on site. Includes a complete tool box with rags, orientation marking pens and clip, ruler, tape measure (Metric & Imperial)

CORE ENCAPSULATION



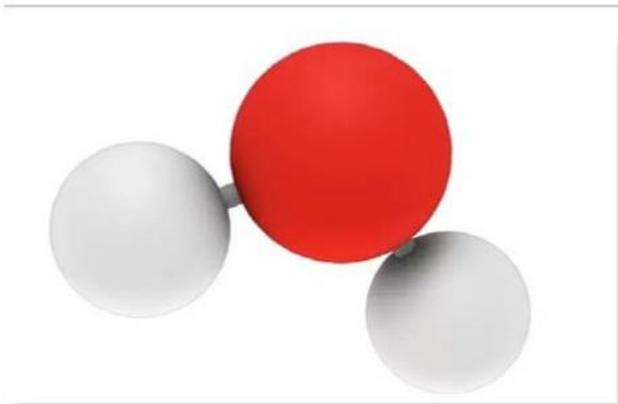
Special rubber caps and premium clamps to fit standard sized inner tubes. The end caps are color coded Red and Black to designate top and bottom to prevent mix up during the various handling stages. The caps are moulded with a special insert to aid in foam injection

PROCESSING TABLE



The processing table is the best on site solution. Made of heavy gauge steel the weight is an asset when performing horizontal tasks such as foam injection or face photography.

MUD TRACER (D₂O)



Deuterium Oxide (D₂O) is used to trace water base mud infiltration during coring. Also referred to as “Heavy Water” it will help to determine the correct water saturation directly from the core sample.

CORE STABILIZATION

FOAM INJECTION

For geologists, petrophysicists and reservoir engineers, a core represents the DNA of their target formation—revealing the lithology, porosity, permeability, saturation, wettability and electrical properties that form the reservoir’s geologic model. And like DNA, any contamination or alteration of the core sample can skew the results.

Reduce risks of core damage Foam Injection core stabilization service prevents the physical movement of recovered core materials within the coring inner tube by introducing stabilizing foam into the annular space between the inner tube and core. This process is conducted at the wellsite to prepare the core for safe, secure transportation to the laboratory.



Prior to arriving at the laboratory for analysis, unconsolidated core material can be susceptible to damage from slumping or collapse during handling and transportation. The multi-point foam injection process takes place at the wellsite and secures the core to prevent movement of core segments within the containment tubes, reducing the risk of damage during handling or transportation. The foam system is extremely effective in applications worldwide—successfully protecting the core material without disturbing or altering core properties.



Preserve core quality

Supplied in self-contained “foam kits” to mix the two-part formulation immediately prior to injecting the foam into the annulus. The foam is injected horizontally at low pressure to minimize the risk of collapse or slumping, regardless of the core’s length. Once injected, the foam expands into the annulus to displace residual drilling fluid and stabilize recovered core segments ranging from 3 ft (1 m) to 30 ft (9 m). Rigsite personnel then use the foam to create a cushion on the ends of the core segments, further securing the core and preventing axial movement during transport.



GYPSUM STABILIZATION



Reduce the risks of core damage

Gypsum core stabilization applies a hard layer of gypsum to the annular space between the core material and the core liner, reducing the risk of core damage during handling and transport.

Before arriving at the laboratory for analysis, core material can be susceptible to damage during handling and transportation. By applying an encapsulating gypsum layer at the wellsite, field specialists can stabilize the core material to prevent this damage.

Preserve core quality at the wellsite

At the rig site, coring technicians use our gypsum system to stabilize 3 ft (1 m) core segments. Drilling fluid is allowed to escape from the annulus of each segment by gravity drainage prior to stabilization. The gypsum slurry is mixed and poured into the core segment where it flows easily into the annulus. The mix sets to form a hard layer—securing and preserving the core in the inner tube for safe transport.

CORE SHIM STABILIZATION

Description

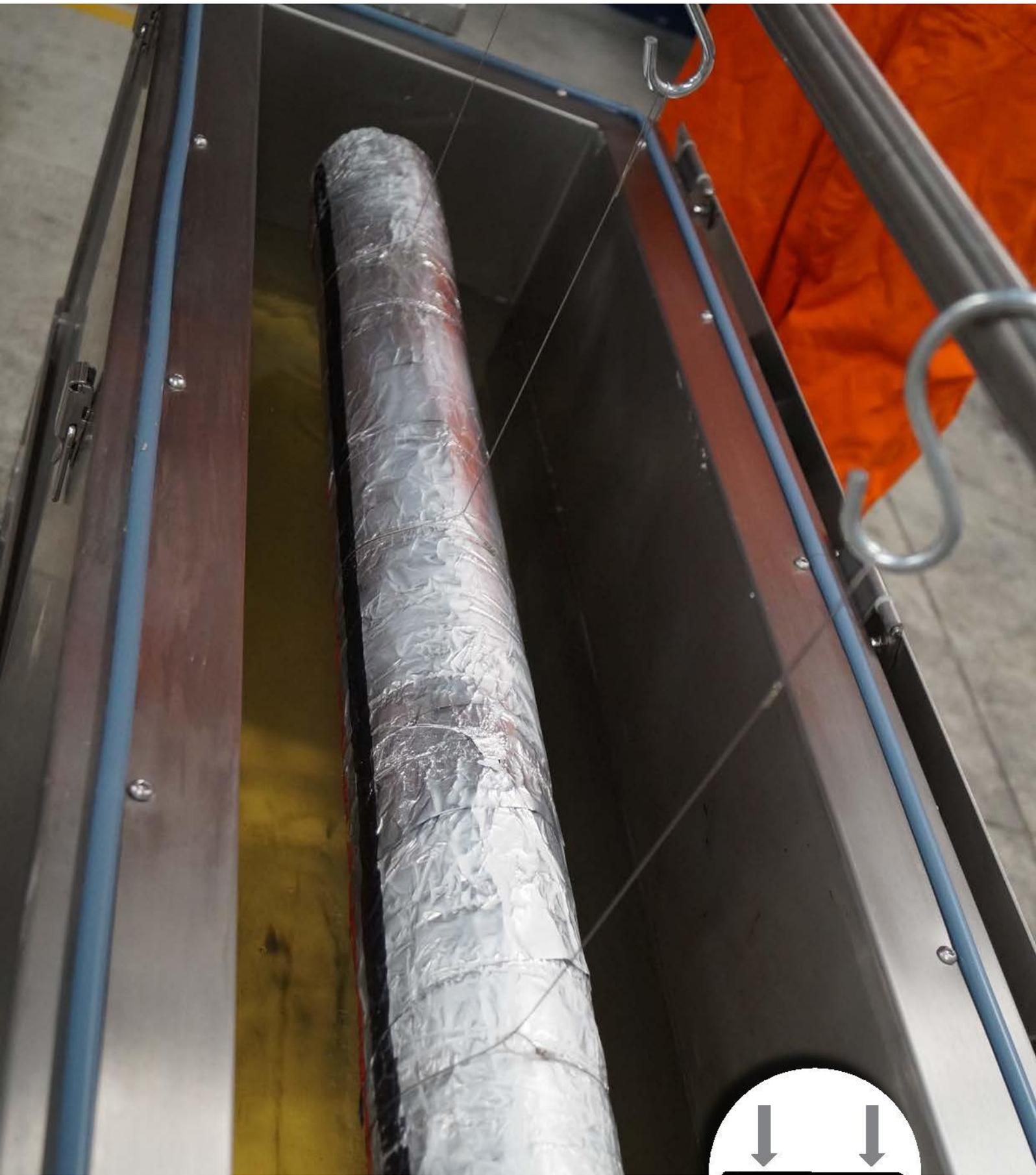
Teflon (PTFE) material is the best solution to use in order to stabilize a fractured formation. The PTFE is a key engineering plastic, highly specific due to its resistance to extremely high temperatures, its ability to withstand strong chemicals and acids and, famously, because of its exceptional lack of friction, which makes it a slippery plastic. The GeoShim is inserted into the annulus to fix the piece of rock and fractures. Easy to handle and easy to remove in the laboratory, different sizes are available in order to guarantee perfect fixation.



Reduce the risk of core damage The PVC strip stabilization process prevents the physical movement of consolidated core material by placing PVC shim strips into the annular space between the core and the inner barrel. This process is an extremely cost-effective method for avoiding core damage during handling or transportation—successfully protecting the sample without disturbing or altering its properties.

Preserve consolidated cores at the wellsite

After matching the size of the non-reactive PVC to the apparent annulus, coring technicians insert the strips to stabilize the core quickly and efficiently at the wellsite without the need for any special tools or equipment. The strips are environmentally friendly with no toxic chemicals and are compatible with all drilling fluid types. The result: a safe, cost-effective means for preserving core quality during handling to facilitate accurate laboratory analysis.



CORE PRESERVATION

WAX BATHS



The wax baths (Large and Medium) have been designed specifically for melting common waxes during preservation operations. They feature an adjustable range from 50°C to 200 °C (122 °F to 392 °F) in order to suit all ranges of coring wax available. The melting pots are insulated with rock wool and fitted with double wall hinged stainless steel lids, and lifting handles. All models are explosion proof for offshore work.

PLUG BATH



Portable and not voluminous it is an instrument really useful when you have to preserve small rock sample. The Plug Bath has been designed with two independent tanks and it offers three different modes that you will manage in function of the temperature required and time that you need. This wax melter find its place in laboratory and offshore operation.

GEOSEAL WAX



GeoSeal™ is a wax material specially formulated to guarantee a preservation of fluid saturations and preventing the selected samples from drying out over a long period of time prior to any analyses at the lab.

Foothills Resource Services follows API RP40 protocols including the use of plastic film and foil when using GeoSeal™ wax on plug or full diameter samples.

STANDARD WAXING KIT



A necessary kit for the effective handling of rock sample preservation. The consumable designed for the kit is in line with the American Petroleum Institute's (API) recommended practices for the perfect sealing of a geological sample. The kit is designed to process up to 20 core samples and to coat around 100 plug samples of 1" or 1.5" diameter. Perfectly adapted to well-site conditions.

VACUUM SEALING



Available for full diameter, full length cores as well as plugs 1" to 1.5" diameter and up to 6" in length, vacuum bags are the ideal solution to protect your samples from external chemical elements, vacuumed, heat sealed or taped they are easy to handle and can be used for wellsite or laboratory storage. The bag is considered to be a reliable preservation method but requires the correct technique.



We offer a variety of vacuum, heat seal units that can be adopted to fractured samples. The instruments can also be configured to replace the oxygen removed during the vacuum process with an inert gas like nitrogen.



PLUGGING & TRIMMING

PLUGGING UNITS



Available in pneumatic or electric, the Foothills Plugging Machines can take samples ranging from 0.75" up to 1.5" and 6" in length.

TRIMMING SAW



The portable trimming unit is a necessary tool when a plugging operation is required. The high quality blades enable a precision cut at the extremity of the samples. The unit has all of the safety protection necessary and has an available recirculating coolant/ lubricant system.



PORTABLE GAMMA LOGGER



The Foothills Gama Unit provides quick isotope detection and identification allowing us to focus on our job and not waiting for the instrument to do its job. Sampling time is selectable via the onboard menu. Data is stored in the instrument until it is returned to our computer to extract the measurements via the weatherproofed enclosed USB connector and supplied software. Behind the weatherproof enclosure the power recharging jack is also protected.

The unit comes preset with commonly used radionuclides Uranium, Thorium and Potassium. In addition to the 6 ROIs the unit uses an additional region covering the entire energy range for overall gross radiological measurements.

Key benefits are:

- Designed specifically for the rugged industrial environment and field use
- Easy to use unlike other gamma radiological identification handhelds
- Large Detector for quick identification

XRF ANALYSES



ANALYSIS

The portable XRF instrument can collect samples almost anywhere, post-drilling or during drilling, without interfering in the drilling operations. Drill cuttings, core, or outcrop samples can all undergo nondestructive XRF analysis. Archived core or drill cuttings can also be analyzed at the storage facility quickly, without the need for transport.

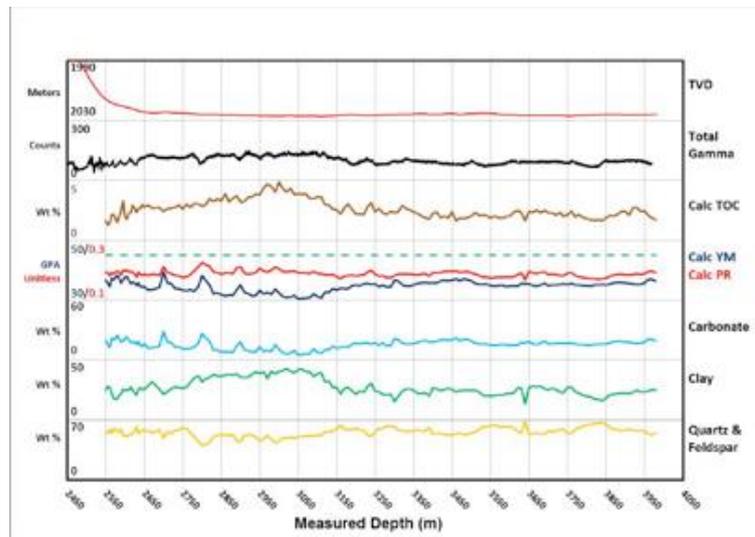
RESERVOIR QUALITY

Local and regional reservoir models are developed based on chemical stratigraphy. These are used to evaluate reservoir quality and select the best location for well placement based on mineralogy, TOC content, and calculated mechanical properties from vertical wells. These same logs can be developed in the horizontal well from drill cuttings. This data can also assist with keeping the well in zone, hydraulic fracture planning in horizontal wells or post well production

CHEMICAL LOGS

Chemical stratigraphy is developed by running elemental data through algorithms to construct chemical logs. Data are reported in Excel format which can easily transfer to any program used by geologists or engineers. Chemical logs developed by XRF Solutions include:

- ❑ Molecular Percentages
- Spectral Gamma
- ❑ Mineralogy
- ❑ Trace Metals
- ❑ TOC Content & Redox
- ❑ Rock Mechanics



PERMEABILITY



TinyPerm is a portable handheld air permeameter used for measurement of rock matrix permeability or effective fracture apertures on outcrops and at the core scale.

CORE PHOTOGRAPHY



The fully automated core photography system is designed for complete core photography and archiving purposes, producing high quality white and ultraviolet colour images of full diameter whole or slabbed core samples. The operator positions the core samples on a four rows rack and a digital camera mounted above the core samples under white or ultra violet lighting takes a high resolution picture.