DRAFT TANZANIA STANDARD

TBS/MMDC1(5634)/ P3 ***Transportation and preservation of rock core samples – code of practice***

TANZANIA BUREAU OF STANDARD

 First edition

0. Foreword

This draft Tanzania standard is being prepared by the Exploration Technical Committee (MMDC 1), under the supervision of the Mining and Minerals Standards Divisional Committee (MMDC).

Diamond drilling in exploration activities yields rock core samples that are used in various analytical processes. Currently there is no harmonized national standard (code of practice) to address the transportation and preservation of the rock core samples and it is this gap that prompted the need to develop this draft standard.

The rock core samples must be handled and preserved in such a way that the measured properties are not significantly influenced by mechanical damage, changes in chemistry, and environmental conditions of moisture and temperature, from the time that the core is recovered from the core drill until testing is performed. Generally the geologic characteristics and the intended use of the rock core samples determine the extent and type of preservation required.

In preparation of this draft Tanzania standard main assistance was drawn from ASTM D5079 – 02 Standard practice for preserving and transporting rock core samples.

1. Scope

This draft Tanzania standard mainly covers the transportation and preservation of the core samples and aspects relating to rock core samples preservation such as cataloging, retrieval, and post-test disposition of rock core samples obtained for testing purposes and geologic study.

2. Terms and definition

For the purposes of this standard, the following terms and definitions shall apply:

2.1 Critical care

Protection of samples which are fragile or fluid or temperature sensitive and includes the requirements prescribed for routine and special care.

2.2 Routine care

Protection of non-sensitive and non-fragile samples for which only general visual identification is necessary and samples which will not change or deteriorate before laboratory testing.

2.3 Soil-like care

Protection of materials which are so poorly consolidated that soil sampling procedures must be employed to obtain intact pieces of core.

2.4 Special care

Protection of fluid sensitive samples and those which must later be subjected to testing, and requirements for this level of protection include those prescribed for routine care.

3. Pre- transportation Requirements and Procedures.

3.1. Handling

3.1.1 Each borehole shall be given full-time attention by a qualified inspector constantly available for observing, directing, photographing, and field logging.

3.1.2 For relatively solid pieces of core that will not be adversely affected, the inspector shall use a marker, such as a felt-tip, to orient each piece so that later users will always be able to distinguish top from bottom. The direction convention shall be recorded in the log book. Locations of known depths should be marked directly on the core when the orientation marks are drawn.

3.2 Core photography

Perform core photography on all core samples with a camera of 35 mm (minimum) format using color film to record permanently the unaltered appearance of the rock. The film selected should be color balanced for the available lighting, or an appropriate filter should be placed on the camera to compensate for the difference and the core should be cleaned prior to any photography. The following should be noted when performing core photography:

3.2.1 Commercially available color strip chart should be included in the photo frame to serve as a reference to check the accuracy of the photographic reproduction of the rock core colors.

3.2.2 For rock placed in core boxes, take one photo of each box once it is filled to capacity. Include the inside of the box lid with appropriate identification data and a clearly visible length scale laid along one edge of the box so that it also shows in the photo.

3.2.3 Where very long, intact cores are being preserved in single plastic tubes, make detail-revealing close-ups of each core interval in addition to a single photo showing the complete core.

3.2.4 Take photographs before the core is obscured by protective sealants and wraps, and before any deterioration begins in particularly fragile or sensitive rock types.

3.2.5 For a boxed core that is not particularly sensitive and for which maintenance of in situ moisture content is not important, two photos should be made: one with the core in a surface dry condition and one with the core in a wet condition to bring out optical properties that would not otherwise be apparent.

3.2.6 This procedure may require photography both in the field and then later in the storage facility, but it must be completed before any test core removal and before damage from mishandling has a chance to occur.

3.2.7 Where it is impossible for a photo to show identification data marked directly on the sample or its container, then mount appropriately marked placards so as to be included in the frame.

3.2.8 Organize the photographs and mount in a folder for easy access and preservation.

3.3. Initial logging

3.3.1 Preliminary field log of the core must be completed before it is packed away to be transported. The preliminary log must include all identification data for the borehole and personnel and equipment involved, notations of coring run depths, recovery percentages, lithologic contact depths, types and locations of protection applied to samples, and any facts that would otherwise be unknown to whomever may complete a more detailed log at a later time.

3.3.2 Detailed log on the core samples which are likely to deteriorate or otherwise change before being examined again shall be completed at the drill site.

3.3.3 For fragile core that must be immediately protected by wrapping and sealing, preliminary logging should take place in the field, but application of protective measures are to take precedence over time-consuming detailed logging.

3.4. Sample protection

3.4.1 *Routine care*

3.4.1.1 For rock cored in 1.53 m to 3.05 m runs, samples are sufficiently protected if placed in structurally sound core boxes. Enclosing the core in a loose-fitting polyethylene sleeve (layflat tubing) prior to placing the core in the core box is recommended.

3.4.1.2 Where very long solid cores have been recovered and need to be preserved intact, place each core in a reasonably stiff tube (poly vinyl chloride (PVC) tubing is recommended) of equal or slightly greater length and secure both ends to prevent slippage. The wall thickness of the tube must be sufficient to provide the rigidity to prevent core breakage due to bending.

3.4.2 *Special care*

3.4.2.1. Samples requiring special care shall be sealed and such sealing shall consist of a tightly fitting wrapping of a plastic film, such as vinylidene chloride.

3.4.2.2. Over this, place another tight wrapping of aluminum foil and incase it becomes reactive replace it with some other metal foil which is non-reactive.

3.4.2.3. Apply both of these wrappings above **(3.4.2.1 and 3.4.2.2)** so that as little air as possible is trapped beneath the wrappings.

3.4.2.4. Overlap the ends of the wrappings over the ends of the sample and fold over so as to seal the ends of the sample.

3.4.2.5. Finally, apply a few coats of a plastic microcrystalline wax (since it is not brittle as compared to other regular microcrystalline waxes which are brittle and susceptible to cracking) preferably with a paint brush, although rapid dipping in molten wax is also acceptable. Apply a minimum of 3 mm of this plastic microcrystalline wax over the entire surface of the sample and this thickness shall consist of at least two coatings of wax and preferably more. For long periods of storage, apply a minimum of 6 mm of wax.

> NOTE 1: The moisture state of some rocks, and even the moisture-state history of rocks such as shales, affects their properties. If tests are to be performed on the core, and if it is possible that a change in the moisture state may influence the test results, then the core must be sealed to prevent changes in the moisture state until the time of testing. This same procedure also applies to other samples where it is important to maintain fluids other than water (for example, hydrocarbons).

3.4.3. *Critical care*

3.4.3.1 Protect fragile samples from mechanical disturbance, such as vibration and shock. Completely encase each sample in the cushioning material (sawdust, rubber, polystyrene, urethane foam, or material of similar resiliency).

3.4.3.2 Thermally insulate samples that are temperature sensitive by placing the core container (box or tube) inside another container that is designed specifically to provide thermal insulation. Such insulating containers are generally constructed of double or triple layers of an insulating material. Additionally, such containers are usually relatively airtight. Seal samples that are sensitive to mechanical disturbance, fluid content, and temperature in accordance with 3.4.2.

3.4.4 *Soil-like care*

Preserve and transport these samples in sealed, moisture-proof containers. All containers shall be of sufficient thickness and strength to ensure against breakage and moisture loss.

> NOTE 1**:** Handling of sensitive samples between borehole and transport vehicle should take place within a covered space that either provides shade against intense sunlight.

3.5. Preparation of storage and shipping containers

3.5.1 Core boxes must be constructed rigidly enough to prevent flexing of the core when the box is picked up by its ends. Wood is the desired construction material. Partitions between core lengths shall be firmly nailed in place to increase the stiffness of the box. The lid should have sturdy hinges and a strong hasp or screw closure and do not drive nails in the lid.

3.5.2 Packing material should be placed in the core box to support the core and prevent it from rolling around in the box.

3.5.3 Gently place the core in the core box starting with the shallowest depth at the upper left corner and progressing downward, as in reading a book, to the deepest depth at the lower right corner.

3.5.4 Core blocks should be placed at the ends of each core run.

3.5.5 Where a run of less than 100 % recovery yields a core that is too short to fill its assigned trough, the recovered core should be held secure and prevented from scattering by placement of spacer block such as a piece of wood or cardboard tube cut to the length of the missing core.

3.5.6 Unnecessary breaking of the core to fit the core box should be avoided as it may reduce the number of available test specimens. Any intentional breaks shall be recorded on the log.

3.5.7 Mark depths of the top and bottom of the core length in the box with a waterproof marker near the core ends and corresponding box corners. Intermediate depths that are accurately known should also be similarly marked.

3.5.8 Mark both the top and one edge of the core box with the following information before transportation:

3.5.8.1 Company or project name, or both,

3.5.8.2 Drill hole number or location,

3.5.8.3 Core box number in sequence down the hole, and

3.5.8.4 Depths from a specified hole datum to top and bottom of core length in box marked on appropriate corners of box.

3.5.9 The following additional information may be required to be written on the core box for specific projects:

3.5.9.1 Percent core recovery, and

3.5.9.2 Rock quality designation,

3.5.10 Mark or label tubes with the same information as core boxes. Such tubes shall have sufficient flexural rigidity to prevent core breakage due to bending. A core that requires protection from mechanical shock should have shock absorbing material packed concentrically around the core.

4. Transportation

4.1. Damage may occur to the core if certain precautions are not taken during transportation. The mode of transportation, distance, terrain, and handling at each end are important factors. The following requirements and procedures should be considered when transporting a core from one location to another:

4.1.1. Remove the core from the drill site before it has a chance to heat up or be damaged by activities at the drill site.

4.1.2 Handling during loading and unloading should be done gently. Never drop core boxes or tubes, but rather slide gently into position. If a box is accidentally dropped, record this fact.

4.1.2.1 A record of mishandling by commercial carriers is often difficult, if not impossible, to obtain. The use of company or agency vehicles is recommended, with someone assigned to supervise handling and storage along the transport route.

4.1.3 Provide transportation by a suitable vehicle to prevent damage by mechanical vibration, shock, freezing, and high temperatures along the entire transport route.

4.1.3.1 Rough terrain near the drill site may require the use of four-wheel drive vehicles for transport. In such cases, protect a core in the critical care category (3.4.3) by vibration insulators around the sides, bottom, and top of the core containers.

4.1.3.2 Highway transportation by passenger car, rather than van or truck, may be required for a fragile core.

4.1.4. Thermally insulate temperature sensitive cores. Thermally insulated containers are the preferred method (3.4.3.2). Such containers will maintain a thermal environment suitable for core preservation during the period of transport.

5. Preservation

5.1 Cataloging

Assign unique identification numbers to each core sample in the inventory. The identification numbers shall be easily traceable to the borehole number and depth interval from which the core was recovered. An acceptable method in many cases is to use the borehole number and depth interval as the identification numbers. It may be helpful to include the core box numbers in the cataloging system, as well as other important subgroupings on large projects.

> NOTE 2**:** Specimen Identification—Core samples may be removed from inventory for a variety of tests and analyses. Preparation of specimens for these tests typically requires that the original sample be sawed and sometimes recorded. Assign core material removed for testing and analysis unique identification numbers which are easily traceable to the borehole number and depth, or which may actually be the borehole number and depth. It is often convenient to further identify the specimen with letters or numbers signifying the type of test or analysis to be performed. End pieces remaining after cutting shall be returned to their respective locations in the original core box. To hold the end pieces in their proper locations in the core box, a spacer should be placed in the location from which a test specimen has been removed.

5.2 Storage

Store the core so that it can be easily retrieved and in an environment that does not alter properties that are of interest. The following are also important matters to consider during rock core storage:

5.2.1 Place core boxes on racks that provide support over the entire length of the box. To reduce damage due to handling of core in the critical-care and soil-like categories, do not place more than a single layer of core boxes on a shelf. The lowest shelf in the rack should be a few inches above floor level to allow air circulation for temperature control and as a precaution against water damage.

5.2.2 Temperature extremes may need to be limited to prevent undesirable chemical changes, such as dewatering of certain minerals. More stringent temperature control is required to prevent large temperature variations which could pump fluid from the sample.

5.3 Laboratory specimen preparation

5.3.1. Samples removed from the inventory for testing and analysis in the laboratory must be handled carefully to preserve fluid content, integrity and specimen preparation techniques must be selected carefully to prevent sample alteration.

5.3.2. Give special attention to the choice of cutting fluids that are used in machining operations such as sawing, coring, and grinding. For example, water will dissolve halite and will cause some shales to swell or slake.

5.3.3. Specimens of water-sensitive material may be prepared with air cooling if the material is soft enough that there are no hot spots during the operation.

5.3.4. Cutting oils, if used, should be removed from the sample using a solvent because the oil may affect certain properties of some rock types.

5.3.5. Specimens that are moisture sensitive should be sealed between various steps of preparation if the time between steps is more than 30 min. A controlled-humidity room or chamber may be necessary for preparation of some rock types. Samples that were sealed in the inventory should be sealed after preparation until tested, unless testing occurs within 30 min after preparation.

5.4 Post-test disposition

5.4.1 The tests performed may be destructive or nondestructive. Reassemble and tape major fragments from destructive tests and place in a plastic bag with the fine material. Identify the bag with the specimen identification (borehole number and depth). Also place specimens from nondestructive tests in plastic bags and label.

5.4.2 If the specimen material is not moisture sensitive, and if easy access to the test specimens is desired, the specimens in the labeled bags may be placed in a box labeled as follows:

5.4.2.1 Company or project name, or both,

5.4.2.2 Borehole number or location,

5.4.2.3 Types of tests performed on specimens,

5.4.2.4 Name of person responsible for disposition, and

5.4.2.5 Date of disposition.

5.4.3 For moisture sensitive test specimens for which easy access is desired, the requirements of 5.4.2 apply except that the specimen shall be suitably sealed from the atmosphere. The sealing procedure shall be as stringent for post-test disposition as it was for the initial core preservation.

5.4.4 If easy access to all of the test specimens is not required, return the tested specimens to their original locations in the core boxes or PVC tubes, and reseal as appropriate.

6. Records

6.1 A permanent, legible record shall be maintained by a technically qualified person for the core from each borehole. The following information shall be recorded:

6.1.1 Company and project names,

6.1.2 Drill hole number and location,

6.1.3 Orientation of borehole,

6.1.4 Elevation of hole or some other datum,

6.1.5 Date(s) of coring,

6.1.6 Core box or PVC tube numbers and core depth interval contained in each,

6.1.7 Date and name of person doing initial logging,

6.1.8 Geologic log and

6.1.9 Photographs of core or reference to their location.

> NOTE 3: A permanent historical record needs to be maintained so that it is accessible for later use in identifying the core, ascertaining what geologic study and testing has been performed on the core, and its storage location of other disposition.

6.2 Desirable records which may also be required for some projects are as follows:

6.2.1 Each date of transportation, from start point to end point, mode of transportation, and name of responsible person,

6.2.2 Storage locations and source of temperature and relative humidity data,

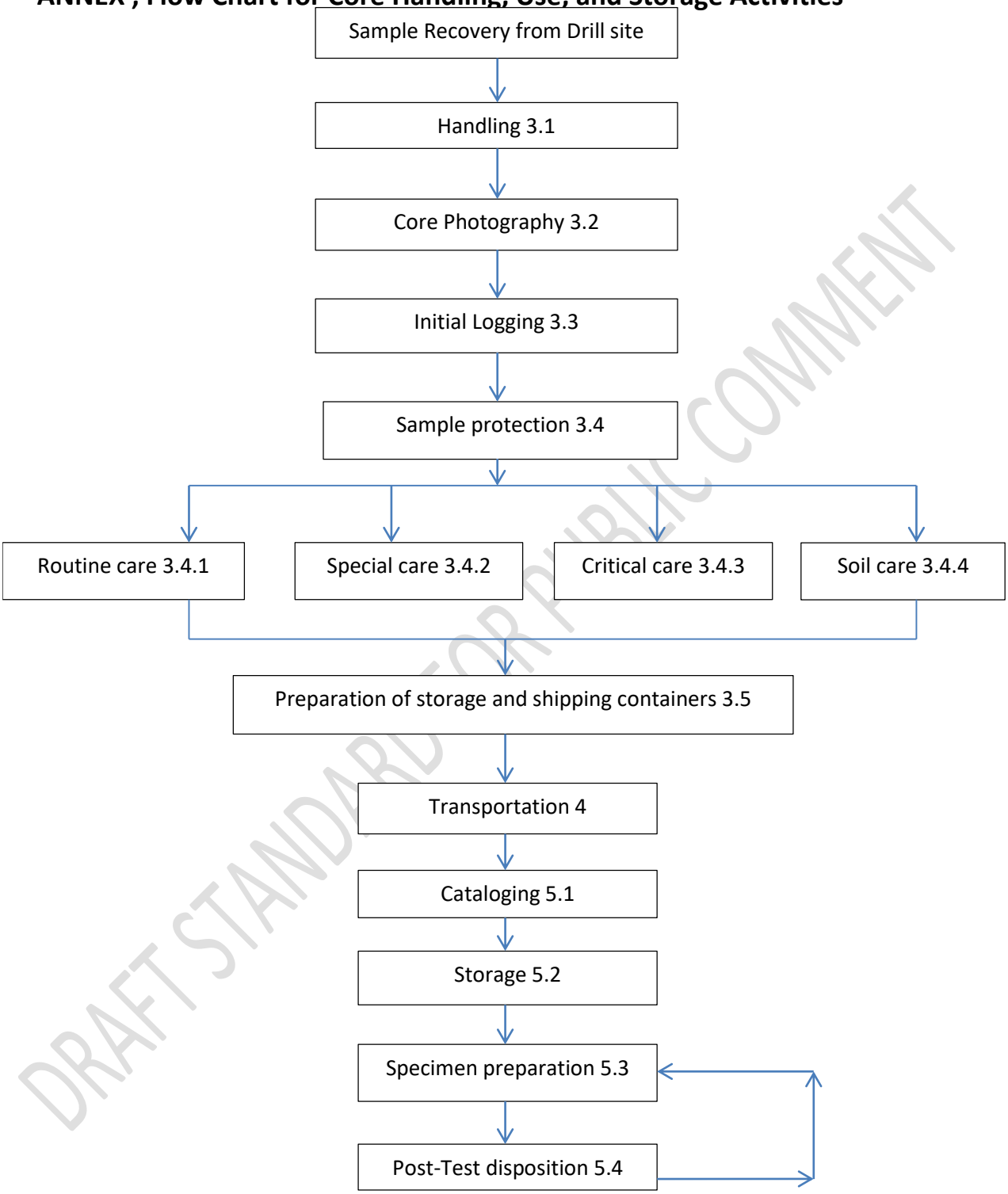
6.2.3 Date and person removing test samples from storage, including a list of sample lengths removed and their depths,

6.2.4 Name and location of testing laboratory, nature of testing, if known, and name of responsible person,

6.2.5 Post-test disposition including date, name of responsible person, and location of tested specimens if not returned to original core boxes or PVC tubes, and

6.2.6 Date and nature of any other activity involving the core such as handling, and additional inspection and testing.

ANNEX ; Flow Chart for Core Handling, Use, and Storage Activities



Note: numbers refer to corresponding sections of this practice

