



STANDARD OPERATING PROCEDURE

SOP NUMBER CAR-018-01	SOP TITLE OPERATING PROCEDURE FOR THE SAMPLING OF CLAY USING A HAND AUGER SET FOR THE SCOPE OF ARCHAEOLOGICAL RESEARCH
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PART 1

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PART 3

Authoriser	Date of Issue:
<hr/> Mr Simon Sammut University Secretary – Office of the Secretary Rectorate	Date of next revision:

PART 4 (To be filled in by OOS, QSU or RSSD)

<input type="checkbox"/> This procedure has been revised and is no longer valid as from: (Write date)	<input type="checkbox"/> Date of NEXT REVISION is extended until: (Max. 4 years)	<input type="checkbox"/> SOP rendered obsolete on: (Write date)
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1. Reason for revision

- 1.1. New SOP

2. Purpose and scope

- 2.1. To describe the procedure for the sampling of clay using a hand auger set for the scope of archaeological research.

3. Definitions

- 3.1. SOP – Standard Operating Procedure
- 3.2. ERA – Environment and Resources Authority

4. Responsibilities

- 4.1. It is the responsibility of staff and students carrying out sampling with the Department of Classics and Archaeology of the University of Malta to read and follow this SOP.
- 4.2. It is the responsibility of the staff and students using the equipment to wash and store it properly after use.
- 4.3. It is the responsibility of staff and students carrying out research necessitating clay sampling to ask for the appropriate permissions from the Environment and Resources Authority and landowners.
- 4.4. As stipulated in ACT 27/2000, reg 7, it is the duty of every worker to safeguard his or her own health and safety and that of other people who may be affected by the work being carried out.

5. Health and Safety Requirements

- 5.1. Sampling might require a significant walking distance on slippery grounds in harsh weather conditions. Clay slopes might be slippery or friable and care should be taken when walking the hills.
 - 5.1.1. Adequate footwear, such as closed shoes appropriate for walking, should be worn.
 - 5.1.2. Adequate weather gear should be worn (e.g. sun protection and head wear that provides protection from sun exposure).
 - 5.1.3. Special care should be taken when walking carrying the tools. Tools with sharp ends should be enclosed in protective cases to prevent injuries.
- 5.2. The use of the hand auger set involves a degree of physical effort. An appropriate posture should be adopted when using the tools to minimize the pain in the back and joints.
 - 5.2.1. The auger should be held as vertical as possible, with an angle of 90 degrees to the ground (see Royal Eijkelpark 2016 for video on how to best use the equipment).
 - 5.2.2. This might, however, be compromised on clay slopes. In this case, the user of equipment should ensure feet stability on the ground.
- 5.3. The sampling locations should be assessed by a competent person for potential additional hazards such as for example, firework or other waste.
- 5.4. One person from the team should be in possession of a valid First Aid certificate.

- 5.5. A first Aid box made of suitable material and designed to protect its contents, identified as such by means of a white cross on a green background must be available and equipped as per requirements stipulated in article 2.(4). Of L.N. 11/2002.
- 5.6. Every team member should be aware of the Emergency procedure and contact numbers.

6. Procedure

- 6.1. **Equipment:** Equipment should be prepared and visually checked for any deformities or prior to departure for sampling. The following list might be non-exhaustive for specific locations or needs but represent a basic set to be taken during sampling.
 - 6.1.1. Hand auger set: The Dept. of Classics and Archaeology owns an auger set for heterogeneous soils (manufacturer: Eijkelkamp; product reference: 01.11.SO). The whole set is not necessary for sampling clay and for reducing weight-load, it is advisable to only carry the needed augers.
 - 6.1.1.1. The spiral auger is suitable to loosen the clay for sampling.
 - 6.1.1.2. The auger for stony soil has proven efficient for sampling during summer.
 - 6.1.1.2.1. The manufacturer advises the use of one of the Edelman augers for sampling clay (the clay auger or the combination auger). These augers might be appropriate if the clay is damp. This SOP should be updated when new types of augers are used in different weather conditions.
 - 6.1.1.3. At least one extension rod to connect the upper part of the auger (handles) and the bottom part of the auger is necessary. A middle extension is also available for deeper sampling but has not been used in the field.
 - 6.1.2. A small pickaxe and an archaeological trowel are used to scrape the soil before applying the auger to minimize contamination and loosen the clay.

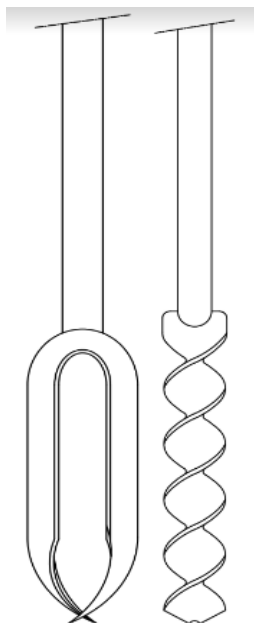


Figure 1: Left: auger for stony soil. Right: spiral auger (Eijkelkamp 2018, 4).



Figure 2: Equipment used during clay sampling. From left to right: pick axe, archaeological trowel, handles with extension rod, spiral auger, auger for stony soil

- 6.1.3. Containers for samples: sample bags (two for one sample to allow double-bagging) and sample buckets.
- 6.1.4. Cleaning equipment should be carried to clean the augers and minimize contamination between locations. It is advised to take: tap water, a bucket and cloth/brushes. Recording equipment should include a charged camera, a handheld GPS, permanent markers, a balance weighing up to 5kg, a tape measure and usual notebook and pens. Labels can also be used to record information to leave with the bags. The balance is meant to give an indication of the weight of the sample to avoid under or over sampling. Precise measurements are to be determined in the laboratories with an electronic and calibrated scale. For clay sampling, the balance needs to be able to weight at least the wanted sample-weight. The department owns a luggage scale (Beurer LS10) with a capacity of 50kg with 50g graduation which can be used easily in the field and tied around a bucket to weight the sample.
- 6.1.5. Handheld shears might be needed for grass / root-cutting.

6.2. General sampling procedure

- 6.2.1. Upon arrival at the location, a sampling area should be selected. A flat area might be easier to sample as it would be more stable
- 6.2.2. The surface soil should be scraped with a trowel and/or a pick-axe to avoid contamination. Vegetation such as thistles should also be cleared from the sample area.
- 6.2.3. The sampling bag should be prepared by writing the sample reference number/name (see Section 6.3.3.1 for the appropriate written record).
- 6.2.4. The spiral auger can then be used to loosen the clay. The spiral auger is to be connected to the upper part of the auger with an extension rod as illustrated in the auger manual (Eijkelkamp 2018; see References for URL; see Appendices). The spiral auger is then ideally held as vertically as possible to the ground while the handles are rotated and pressure is applied.
- 6.2.5. The auger for stony soil should then be connected to the upper part and used in a similar manner until the body of the auger is full. The auger should then be lifted out of the ground with care and slowly as loose clay might fall back. Ideally, a second person should hold the sampling bag close to the auger to facilitate the transfer of the clay from the auger into the bag.
- 6.2.6. If the clay is too compact to be removed from the auger body by shaking it in the bag, a clean trowel can be used to loosen the clay into the bag (taking care not to pierce it). If the clay is too damp to be removed with the trowel, a sharp instrument (e.g. a knife) can also be used to loosen the soil.
- 6.2.7. The stage 6.2.4 is to be repeated, making the hole created deeper, until the required amount of clay is collected, or until the desired sampling depth is reached.
 - 6.2.7.1. The set can be used for depth profiling (see Eijkelkamp 2018, section 5.1)
- 6.2.8. The sampling bag should be weighed regularly with a balance to ensure that the appropriate amount of clay is collected (as specified in permits and decided in the sampling strategy).

- 6.2.9. When the wanted sample weight is reached, the maximum depth of the hole from the surface soil should be recorded with a measuring tape.
- 6.2.10. Samples should be double-bagged.
- 6.2.11. It is advisable to take several samples for one location (e.g. at different elevations) to account for intra-source variation. These samples should be collected in different bags, differentiated by a unique reference number/name and recorded separately.
- 6.2.12. When the written record and photographic record have been completed, the area should be backfilled as best as possible to minimize impact on the location and avoid injury to people walking in the area.
- 6.2.13. The tools should be washed with tap water in between locations to minimize contamination. The tools should also be washed at the end of the sampling session before being put away in the store.
- 6.2.14. Point edge tools should be placed and carried inside their designated cover.

6.3. Recording

6.3.1. Written record:

- 6.3.1.1. Recording of information should include: a unique reference number/name for each sample; the sampling location; the GPS coordinates (Easting, Northing, Height) of the sampled area taken with the handheld GPS; the final weight of the sample; the maximum depth of the sample and the date sampled.
 - 6.3.1.1.1. To name the samples, it is recommended to establish a sample reference number system. This system can then be continued when samples are used for research. An example of suitable referencing system could include:
 - 2 letters for the location (Eg. Two first consonants)
 - 1 letter/number for samples from the same location (Eg. A, B, C...)
 - E.g. 1: First sample from Ta'Leveča: TL.A
 - E.g. 2: Second sample from Nuffara: NF.B
 - 6.3.1.1.2. The data should be recorded on a notebook and might also be recorded on labels left with the back in case the information is lost or not available.
- 6.3.1.2. Additional information should include: observations made on the clay during sampling (e.g. damp, loose/compact, colour); observations on the vegetation and wider context of the sample as well as possible contaminants (e.g. sample from a field; presence of thistles (refer to Figures 3 and 4) or other characteristic vegetation; presence of hazards (e.g. fireworks waste) and primary identifications of other elements found in the samples / surroundings (e.g. fragments of gypsum, pieces of limestone, seeds, shells...). The details of the sampling process itself could also be documented.



Figure 3: Possible *Cynara Cardunculus* (or hybrid from the same family) which is mainly found on clay soils.



Figure 4: Likely the same species but observed in August

- 6.3.1.3. On the sample bag (and sample bucket if appropriate), the following information should be written down: location, reference number/name, date, type of sample (clay sample), initials of researcher or project, weight of sample. (Refer to Figure 5).

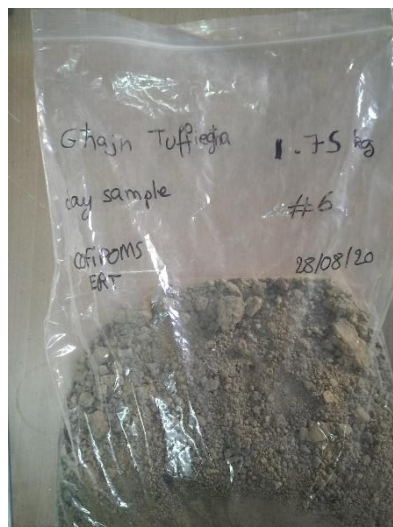


Figure 5: Example of bag labelled in the field with information cited in 6.3.1.3.

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6.3.2. Photographic record:

- 6.3.2.1. The photographic record should include: photos of the location and precise areas sampled, photos of the clay extracted to highlight specific characteristics (e.g. compactness, colour), photos of any additional information that is deemed necessary to record (see 6.3.1.2) and can be photographed.
- 6.3.2.2. The number of photos should be cross-referenced in the written record to ensure that the photos are attributed to the correct samples.
- 6.3.2.3. The above information should ideally be digitised (according to the project data management plan) and backed up directly.

6.4. Storing samples

6.4.1. Storing the samples in the Department of Classics and Archaeology:

- 6.4.1.1. The samples should be stored with permission of the Scientific Officer in charge of the stores and in accordance with the best practices established by the latter.
- 6.4.1.2. The samples should be identifiable and have an appropriate record along them.

6.4.2. Using the clay samples:

- 6.4.2.1. When samples are used and removed during the project, this should ideally be recorded on the original sample and as well as within the project written record.

7. References

- 7.1. Eijkelkamp., 2018. Hand auger set for heterogeneous soils: Manual [Online]. Available at: <https://en.eijkelkamp.com/products/augering-soil-sampling-equipment/tech-specs-Auger-set-for-heterogeneous-soils.html> [Accessed 15/09/2020].
- 7.2. Royal Eijkelkamp., 2016. Hand auger equipment: Basic instruction on the use of the Eijkelkamp Soil & Water hand auger equipment. [Online]. Available at: https://www.youtube.com/watch?v=70MhW4s_JVM&feature=emb_title&ab_channel=RoyalEijkelkamp [Accessed 15/09/2020].
- 7.3. Eijkelkamp., 2018. Hand auger set for heterogeneous soils: Manual.
- 7.4. General Laboratory Practice for the Department of Classics and Archaeology SOP CAR-015-**
- 7.5. Occupational Health & Safety Policy, 2020, [Online], Available at <https://www.um.edu.mt/hrmd/secure/policies/OccupationalHealthandSafetyPolicy.pdf> [Accessed 19th April, 2021].
- 7.6. Health and Safety Risk Assessment – Department of Classics and Archaeology – Faculty of Arts.

8. List of Appendices/Worksheets

- 8.1. N/A