

As the responsible project manager, how would you approach the process of introducing a specified new piece of equipment (such as a survey unit or microscope) or change in working practice (such as revised recording form) for use by your team, and what measures you would take to ensure that it was being used correctly and safely (documentation, training and monitoring)?

Introduction

As part of an overhaul of how archives are prepared at ULAS, an assessment was undertaken as to how practices employed in the post-excavation lab contribute to issues with archive deposition. This has included an evaluation of how the processing of finds lines up with the guidance and expectations of the accessioning bodies with whom we frequently deposit our site archives. The key area of concern highlighted by this has been our use of nail varnish when marking finds. Guidance on the marking of archaeological material, such as that produced by the Collections Trust (2020) and the National Museum of Ireland (2022), makes it clear that nail varnish is not an appropriate barrier medium to use as part of the marking process. This is due to the variation in nail varnish formulas making it unfeasible to conduct tests on how long-lasting or damaging a medium it could be (National Museum of Ireland, 2022:39). Objections to its usage centre around the high potential for nail varnish to become brittle over time and discolour (National Museum of Ireland, 2022:39), both factors which would make it unsuitable for use on material which will be part of long-term archives.

At the current time the usage of nail varnish in the post-excavation lab has primarily been for providing a better marking surface on uneven or unstable pottery, and for sealing in marking on glazed ceramic surfaces and flint. Recent trials have also been conducted regarding its usage on all pottery, to both increase the speed with which marking can be completed and make it more easily reversible than ink marked directly onto pot. Further to this, it has been lab policy up until this point that nail varnish should not be used when marking bone. However, guidance from the Society for Museum Archaeology (2020) and the likes of National Museums Liverpool (2010) do in fact specify the use of a barrier medium for marking bone as well, and this is now also being considered as lab policy going forward.

As a result of these moves towards an increasing usage of a barrier medium when marking our finds, the objection to the usage of nail varnish for this purpose has become more consequential in nature. As such, discussions have taken place with our finds team as to the possibility of replacing it with the preferred barrier medium of the archives sector – paraloid.

Paraloid and ULAS

Paraloid is a “a durable and non-yellowing acrylic polymer” (Conservation Resources, 2025) that has been a staple of conservation work since the 1950s, due to having a stability of over 100 years and being easily reversible in its application (Feller, 1963; Feller, 1984; In Situ Conservation, 2025; Koob, 2018). Up until now ULAS’s reluctance to use paraloid as a barrier medium has been due to the fact that it needs to be mixed with a solvent to be usable for this purpose. For finds marking it is recommended that two forms of paraloid are utilised: Paraloid B67, which is mixed with white spirit, and Paraloid B72, which is mixed with acetone (Collections Trust, 2020). It is the use of these solvents which means that its use comes with increased health and safety concerns over that of nail varnish, and consequently changes would be required in the lab to mitigate this.

Part of the reason this has not been deemed a worthwhile undertaking in the past is that while ULAS’s post-excavation lab is situated on the campus of the University of Leicester, it is not within purpose-built facilities. It is largely made up of repurposed offices and storage rooms, which means these rooms have been adapted as best they can for the work taking place within them, but there are features which are lacking. In relation to the use of paraloid the most pertinent of these is poor ventilation and limited extraction equipment (HSE, 2003; HSE, 2025a; HSE, 2025b). Nail varnish usage is not without its own hazards in this respect, but it is a less potent chemical, and its use has been fairly limited up to this point. Therefore, working in a specific corner of the lab with the outside door propped open has been a viable enough working practice to have not caused any real problems. This is not however an approach that will be suitable with the introduction of paraloid.

Health and Safety Considerations

With the primary concerns surrounding the use of paraloid being health and safety related, the key figures consulted on this matter were the University’s departmental Health and Safety Officer and

ULAS's own post-excavation Health and Safety Advisor. The initial outcome of this was the preparation of a Control of Substances Hazardous to Health (COSHH) form (HSE, 2025c) for paraloid usage, which would serve as the official guidance for any arrangements made regarding its introduction into the lab. Further discussions leading on from the preparation of this form made clear that there were three key aspects which would need to be planned around. Firstly, the safe storage of the paraloid; secondly, whether it is purchased pre-mixed or is mixed ourselves in the lab; and thirdly, how will the need for increased ventilation/fume extraction be addressed.

The storage of the paraloid was the simplest to solve. A metal chemical cabinet is already in place in the lab, which is only used for storing nail varnish and nail varnish remover at present. Although not engaged as part of its current usage there is a coded lock on its door meaning this can easily be made secure. In order to control and monitor the safe usage of the paraloid a sign-out sheet will be introduced that will be the responsibility of the lab Health and Safety Advisor to administer. Once this has been filled out the Health and Safety Advisor will retrieve the paraloid from the cabinet whenever it is needed and will then be responsible for ensuring it is returned to the cabinet and signed back in when the task has been completed.

In terms of the decision as to whether or not to purchase the ready-mixed paraloid solutions, the fact that pure acetone is also used to reverse the application of paraloid means that we would likely need to purchase some of this anyway. As a result, it was decided that we may as well mix things ourselves, as the mixing process would present no further health and safety concerns that were not already being accounted for. This also made sense from a costing standpoint as buying the paraloid resin and solvents separately would be cheaper than the ready-mixed solutions. As a result of this decision additional glass mixing equipment will be needed and some training in the safe mixing of the solutions would need to take place. This training will likely involve arrangements being made for a nominated member of staff to spend a day shadowing someone from another archaeological unit or a conservation specialist that already utilises and mixes their own paraloid. This member of staff will then initially have sole responsibility for preparing the solutions in the lab, with other staff members being trained in the process at a later date once its use was fully integrated into the workflow.

The most significant changes needed will be those to improve ventilation and fume extraction owing of the use of acetone and white spirit. The nature of the building means that having outside doors propped open while working is the only feasible way to increase ventilation, so the focus instead needs to be on fume extraction. On an individual basis the post-excavation lab has recently purchased a wearable air purifying respirator fan unit with a hood, which is being used with particle

filters when staff are sieving dry environmental residues. This unit can also be fitted with alternate filters that protect against gases and vapours, such as solvents, which would make it potentially suitable for usage with the paraloid solution.

This however would only be a practical option if the individual working with the paraloid solution is alone in a workspace and would also mean only one person could be using the paraloid at a time. As such, further measures will need to be taken to allow the paraloid solution to be used in the same manner and context as the nail varnish. Research into a solution for this concluded that the most suitable option for this would be to set aside an area of the lab for paraloid work and for ULAS to purchase a portable fume extractor which could be set up whenever the paraloid is being used. This should keep all staff in the vicinity well within the exposure limits for acetone (HSE, 2025d; Sentry Air Systems, 2025).

Acetone is also an eye irritant and can cause skin irritation from repeated exposure (Preservation Equipment Ltd, 2025). As such the fume extraction will be combined with the compulsory use of nitrile gloves and safety glasses as a protective suite from any potential issues. Staff will also be made to take regular breaks from the work and will undertake no more than half a day's work using paraloid at a time.

A further health and safety consideration concerns the volunteers and students who regularly spend time in the lab. Although the fume extraction setup will create a safe environment for staff members to use the paraloid in, they also have the added protection of being subject to mandated occupational health monitoring, which the volunteers and students do not have. As the volunteers and students are normally working on community projects and University of Leicester field school finds which do not fall under the direct responsibility of ULAS, discussions will need to be had with the departments who are responsible for these finds. It may be the case that the use of nail varnish continues on this material so that paraloid exposure is limited to only those for whom it is strictly necessary.

Changes in animal bone marking process

The majority of paraloid usage in the lab will simply be as a one-to-one replacement for all prior nail varnish usage in the finds processing workflow, including a continuation of the policy of applying a barrier layer to all pottery. Its usage on bone however will be a new part of the workflow and will also bring with it issues that don't apply to the other finds types.

The guidance for the marking of animal bone from the accessioning bodies is for the purposes of archiving, but the methods involved in the analysis of animal bone prior to this requires other considerations be made. Notably, Historic England (2019) guidance recommends that no bones which will be used for either carbon dating or isotope analysis be marked. This becomes even more of a concern when a barrier medium is also being used.

The stage at which marking takes place within the workflow means that it occurs long before any form of assessment or analysis is conducted on the material. Therefore, the potential usage of any material for radiocarbon dating or isotope analysis will not have been decided upon at this stage. As a result, there will also need to be a change in procedure for marking animal bone beyond simply the introduction of a barrier medium. The general criteria for radiocarbon dating from the companies we use for this work is that the material must have a minimum weight of 1 gram but a recommended weight of 5 grams for any testing to be viable (SGS Beta, 2025; SUERC, 2025). We have sent bones for testing in the past that have been marked, and if the bone is large enough to work around this it has not proved to be an issue, but additional precautions will now need to be taken with the use of a barrier medium. Consequently, it has been decided that no complete bones weighing under 10 grams will ever be marked prior to analysis to allow for their potential usage for radiocarbon/isotope testing.

Introducing paraloid into the workflow

The introduction of this new approach to finds marking will require a number of changes to working practices within the lab as well as possible adjustments to the lab itself. Changes of this scale will certainly make it necessary to undertake a period of consultation with staff working in the lab currently. The idea will first be introduced during the weekly lab meeting when all members of lab staff are routinely on campus. Although there is a good familiarity with paraloid among lab staff thanks to the discussions that have been taking place over the previous few months, not all of them have been equally involved in these. To ensure everyone is fully informed as to the reasons for the change taking place it is likely that a small presentation will be necessary, illustrating how the use of paraloid fits into the guidance and why it is part of the guidance in the first place. As part of this meeting all staff will read through the finalised COSHH form for paraloid usage and provide confirmation of this via signature. Feedback will then be sought from the group regarding any concerns the proposed change might raise. If necessary, the initial introduction of paraloid will be delayed while work to alleviate any concerns is undertaken.

The initial introduction of the new process will not be wholesale and will be conducted in a phased manner. Testing will primarily take place on any smaller evaluation sites that are being worked on, with initially only the staff member nominated to undergo training responsible for any of this marking. It is possible that finding the optimal spot in the lab for using the paraloid may involve a certain amount of trial and error. Until the portable extractor is acquired it is not possible to know if any kind of buffer zone around the work area will still be needed. A digital air monitor will be in place in the lab during the initial trial phases to ensure safe working zones are established.

Considerations will also need to be made as to the health and safety hazards of the portable extractor itself. It will need to be located in an area where it will not cause a physical hazard, and an assessment of the noise it creates will also need to be completed to determine if the length of time it is in continuous use will need to be limited.

Once the trial phase has been successfully completed the use of paraloid will gradually be expanded to include all finds being processed in the lab. The manner in which paraloid is applied is very similar to that of nail varnish and shouldn't require extensive training, but time will need to be set aside for this to occur, and some form of training documentation will be prepared to guide new users. The first phase of full integration will see paraloid only used on sites where no marking has yet occurred. In order to maintain a consistent archive those sites where marking has been started using nail varnish will be completed with it. This should also allow anyone having difficulties with using the paraloid to be able to engage in a more gradual transition to its usage. Once these sites have completely passed through the system the use of paraloid should have become routine and the use of nail varnish will cease, provided no staff member raises any objections to this.

Assessing the success of the paraloid switch

The assessment of the impact of the use of paraloid on the lab workflow will involve a period of monitoring taking place. For future budgetary considerations the speed of any marking work will be a key factor that will need to be tracked. Ideally this will be monitored for a short while both before and after implementation of the paraloid, to allow for accurate comparisons between the two workflows to occur. This will only be undertaken in agreement with the staff members being monitored, and any not comfortable with this will be free to opt out. No records derived from this

will be kept beyond the length of the monitoring. It is not anticipated that the time spent mixing the solutions will be especially notable, but this will also be factored into this evaluation.

Staff feedback will be sought throughout the process. They will be encouraged to report comments and concerns to the senior members of the lab team at any time, and time will also be set aside in the weekly lab meetings to discuss how things are progressing. There will be an understanding among the team that the trial or introduction of paraloid can be paused immediately if anyone believes it necessary. It will be especially important to acquire feedback on topics such as the ease of use of the paraloid in comparison to the nail varnish, and whether there are changes that need to be made to simplify things at all, and also whether the use of paraloid/acetone is affecting working conditions in ways unrelated to those aspects mitigated by the health and safety protocols.

If the weighing of the bone prior to marking is slowing things down too much, then we may consider reverting back to not using a barrier medium on bone. However, this decision will not be made too swiftly as it is hoped that through practice staff will eventually begin to intuitively judge which bones are below the threshold weight. Staff feedback will again be sought at regular intervals to determine if progress is being made in this respect. The administration of the signing out of the paraloid by the Health and Safety Advisor may also be phased out if it proves inconvenient, with the responsibility for signing in/out the paraloid reverting to the person using the paraloid once everyone is sufficiently experienced with it.

On a longer-term basis, the levels of staff happiness with the new workflow will continue to be sought for a number of months after the full integration of paraloid. Assessment of the effectiveness of the workflow will also be continually undertaken to hopefully smooth out any issues that become apparent, with every staff member free to suggest improvements to the processes employed. Other things that will need to be assessed include the ease of inducting new members of staff into the paraloid marking process. This will highlight any flaws in the training approach that may not have been clear when training the first group of staff, who will have had more focussed levels of support during their introduction. We will also look to seek feedback from any accessioning bodies we deposit archives with once finds marked with paraloid begin to be deposited. If any issues arise from this, changes may again need to be made to the workflow.

The key to any successfully switch overall will be all staff members involved maintaining a level of adaptability throughout the process, with the understanding that nothing is set in stone until a consensus is reached that the optimal workflow has been achieved.

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