Positive comments on improvement of application process (Q10):

- I feel process is excellent for funding
- No. I think the process is excellent and clear.
- I thought the whole process was very efficient
- I have applied several times over the years and always found the process extremely supportive and straightforward
- Discussions with staff at NIEF proved to be really helpful.
- It is always good to see top scientists involved as external members.
- The availability of support and advice before submitting the proposal is very valuable
- Application/grant award worked well.
- Very efficient and very fair.

Positive comments on technical improvements (Q16):

- Ongoing support and maintenance of state-of-the-art capabilities. Geochronology underpins all Earth Science and therefore requires community level engagement and support.
- Stable isotope and radiocarbon been have been quite excellent, and helped by collaboration with staff
- ONGOING FUNDING TO ENSURE UK RETAINS STATE OF THE ART CAPABILITIES IN GEOCHRONOLOGY
- Give them funding to buy new machines.
- Nope, you're doing great! Thank you!
- Dialogue and collaboration with NEIF has been great.
- But interaction with staff at the proposal stage, and then sample analysis stage, was very good.
- Again, from my perspective the facility works perfectly, but I only use it for a very specific part of its remit.
- While services provided by the Facility are excellent, I do not think there is sufficient awareness of these services within the UK scientific community. NEIF staff could add a great deal to NERC funded science and DTPs through collaboration as grant Co-I's and PhD co-supervision but only if the community are aware it is an option.
- It is VERY hard to fault…
- I am delighted that such unique facilities are available to us researchers. SUERC is truly world leading, and it has been a pleasure to interact with staff at SUERC (during a visit last month) to discuss the details of the project, samples, facilities and how the analyses will be carried out.
- I have had an excellent working relationship with the RCF SUERC over many years. This has been truly collaborative, and provided much more than a 'analytical facility'. The methods development, interpretation of results, and co-authorship with RCF staff, all attest to this.

Free Form Comments and responses: 2021 user survey

Question 10 - Do you feel there are ways to improve the application / grant award process?

***Portal/web* comments**

- The portal could be a little easier to use.
- The submission website was a bit difficult to use at first. Some of the questions about people involved at different levels weren't entirely obvious.
- The website for the application process could be improved, because it was not possible to see what was required on page 2 before filling in page 1.
- Application process is generally sound - perhaps a clearer website.
- The interface is not the most user friendly. Better/clearer time lines between submission and dates for notification of success or failure
- "User interface is unintuitive, and extremely difficult for folks with any form of visual issue. Font like those used in this box are inaccessible for many.
- The only issue I found was that it was a bit difficult to find the latest version of the guidelines and the related FAQ.

Facility response: *We appreciate that any online system will be more difficult to use for some people than a paper form and we have been working to continually improve it in response to users' queries and requests. In particular we have added the ability for someone to have help from their colleagues or the facility with the form where this is useful – only the actual submission has to be done by the principle applicant. The majority of applicants seem to have found it straight-forward and the portal has been very useful in making the submission process more efficient.*

We take accessibility seriously and have considered carefully the comment "User interface is unintuitive, and extremely difficult for folks with any form of visual issue. Font like those used in this box are inaccessible for many". The fonts used are essentially identical to those used by the Max OS operating system and in many public service websites such as the BBC news. The menu and windowing system are also closely based on those from Mac OS and so will be familiar to many users. All of the text in the forms should resize with other fonts in their web-browser if people choose to do this for accessibility purposes, and the text should be readable by any accessibility software as it is not image based. We are happy to provide any additional assistance and changes if these are requested by anyone with any issues of this kind.

Application form/ guidance comments

- Allow PhD students to submit their proposal. It is weird that students can't do this.

Facility response: *Facility awards are NERC grants in kind and NERC doesn't allow PhD students to apply for funding as a PI or Co-I. We therefore require an academic, normally the supervisor, to take responsibility for overseeing the project. However, the student can play a major part in writing the proposal and help with filling in the form.*

- Greater clarity required on the combined proposals. Sometimes not enough space, although that has been extended to allow for this.
- The move to joint submissions (e.g. mine was stable isotopes and radiocarbon, left limited space for justification relative to a single application. However, discussions with staff at NIEF proved to be really helpful and I hope that there will be a modification to the form to address this potential imbalance.

Facility response: *There are guidelines for combined proposals allowing for a longer application. The main issue for submitters here seems to be the page limit for the case for support. The length limit is there to try to reduce the burden for submitters in providing over-long justifications, and to make it possible for the panel to fairly compare proposals.*

- The application process is clear but the application is unnecessarily onerous at five pages for a small grant of <£20k. It would be a massive time save for applicants and presumably reviewers too if it could be reduced to 2 pages. You might consider implementing a very short application for a pilot or small project, e.g., requiring < 100 stable isotope (C and O) samples.
- Maybe a simpler/shorter application process?

Facility response: *The page length of the case for support has been revisited. From feedback we received from applicants and the panel members it was clear that a standard 4 pages of A4 text wasn't necessary for all applications. Most applications are now 2 pages of text and 4 pages of diagrams/photos etc. The exceptions being radiocarbon (4 pages text), cosmogenics (3 pages text), and joint applications (4 pages text). The length limit is there to try to reduce the burden for submitters and panel members when reviewing and to make it possible for the panel to fairly compare proposals.*

- Pilot data is the best way to get a grant funded. Could offer more obvious route to get pilot data from NEIF to try out new things before applying to NEIF for a project.

Facility response: *NEIF does do pilot work, either at the labs discretion or via an application to NEIF before grant submission. Please discuss this with the facility staff.*

- On some occasions I have more than one PhD student applying for radiocarbon funding in the same round, and unless I am mistaken, I can only front one application per round, which we circumvent by getting a co-supervisor or colleague to submit the application. It would be convenient and beneficial for me to be able to submit more than one in a particular round. As I say, perhaps I have misunderstood the system!

Facility response: *There are no limits on the number of applications a person can submit as the PI in one round.*

- More flexibility in application processes
- More regular project committee meetings for faster processing of applications.

Facility response: *Applications that support NERC/UKRI grants and NERC/UKRI funded studentships can apply at any time and don't have to submit to the deadlines. The increased workload in holding more than 2 meetings per year outweigh the benefits and would increase admin costs that are better spent on projects.*

- Please consider emailing to advise of calls/deadlines

Facility response: *We will look into announcing this call to a wider audience.*

- As to the application process, it would be quite useful to have some general information on the criteria for grading proposals.

Facility response: *NEIF panels use the standard UKRI grading system.*

Feedback Comments

- More specific feedback even if funded. It would still be useful to learn to improve through the process
- If not funded, detailed feedback on the concerns raised and why the application was not funded would be useful.
  I have been successfully awarded 2 grants. On one of these not all of the samples were funded, but no particular justification was given. It was hence not clear whether there were not enough funds or whether it was because of scientific concerns. It would be helpful, when such a decision is being made to know which of the two it is, so one knows what format the re-submission should/could take.
  A third application was only successful upon second submission. After the first rejection, the information provided for not funding the project was very basic and did not really provide much input to consider how a re-submission could look like. I don't know how the steering committees evaluate proposals, but maybe it would be worth having a very basic evaluation table that needs to be filled in for every proposal, which can then be forwarded to the PI when grants have not been awarded."
- Criticism is of course part of the application process, but reviewer comments should be constructive. One of the reviewers for my application was unnecessarily rude throughout whole process. It's should not be acceptable to do this as will discourage many (especially ECRs) from applying.

Facility response: *The feedback applicants receive are the comments as written by each of the reviewers. They are aware of this and we ask they write their comments in a respectful way. Whilst we cannot comment on individual letters, we do ask the panel members provide constructive criticism, giving as much information as they can, especially for those unfunded or where the application is only part funded. The secretary adds any feedback that arises from the panel discussion.*

Standard grants comments

- There is still an issue with clarity of guidance on projects that have been funded by a NERC Standard Grants (or similar) panel but then require a further application to the facility. I understand why the application process *might be* helpful to the facility but the guidance is still not clear about whether the facility are helping tighten up the details of the submission OR if they have the ability to reject it (in which case I think there is potentially a problem).
- Need for duplicate application after a grant has already been reviewed and funded. Adds extra work for scientists and reviewers.
- This was a stand-alone proposal and was appropriate for me to write a full case. In previous instances I have been seeking support for a proposal that has been funded in full by NERC already, and I hope NEIF are still receptive to a much lighter-touch process when that occurs.

Facility response: *When reviewing an application supporting a NERC grant, the panel do not re-review the science which has already undergone peer-review at the grant stage. They concentrate on the technical/analytical aspect of the project. With limited space allowed in the grant application there is often very little about the analytical/facility work or just a general analytical plan may be in place that needs refining as the project progresses or there may be changes to the plan. The panel often make valuable suggestions that help improve a project, especially for new users or non-experts.*

We need to ensure best use of facility resources. Facility staff help and guide users and they would only reject projects if for example, there are serious technical issues, the facility doesn't have the capability requested, and this would be discussed when the PI speaks with the facility prior to a grant application.

Feedback Comments

- Faster turnaround. Maybe more than 2 opportunities for access especially if NERC grant holder or DTP student.

Facility response: *NERC grant holders are able to submit applications at any time during the year, and these will be evaluated outside the two annual NEIF Panel meetings, unless received close to one of our published submission deadlines (see Section 3.2 of the Guidance notes for applicants). Applications in support of a studentship are only accepted at the two annual deadlines, but applicants are encouraged to contact the facility early on, preferably when planning the student project, to ensure the application can work its way through the NEIF Panel approval process without delaying the student's work (see Section 3.3 of the Guidance notes for applicants).*

- The award notification was rather slow.
- Potential to be a quicker turnaround
- Decrease the turn-around time between Panel meeting and decision letter.

Facility response: *Compiling notification letters and feedback for large numbers of complex applications is a time-consuming process, which NERC staff acting as Panel Secretaries undertake in addition to their usual duties. We aim to send out notification letters within six weeks of each Panel meeting, but this is not always possible. We are exploring the possibility of publishing a list of funded / not funded proposals on the NEIF website shortly after Panel meetings in the future, with detailed feedback to follow at a later date.*

- We are told we have to contact facility staff first, but sometimes it takes a very long time to get a response, or no response is received. It is also unclear when we will hear about results which can be a bit frustrating (still waiting on outcome of one application submitted in July). I suspect everyone is just very busy and the NEIF could do with more dedicated staff time?

Facility response: *Applicants who are having difficulties getting in touch with a suitable NEIF staff member to discuss their project should feel free to contact the Secretary of the respective NEIF Panel for advice. Applicants who have not received detailed feedback on their proposals more than six weeks after the Panel meeting at which their project was evaluated should also contact the Secretary of the relevant Panel. Panel Secretaries are listed on the NEIF website as ex-officio members of the NEIF reviewer groups.*

Question 16 - Do you feel there are ways to improve the facility?

SI-CEH

- I emailed [redacted] at CEH about accessing the facility and never got a response. After 3 follow-up emails abandoned the project and changed the project focus for my student. Exceptionally poor service.

Facility response: *It is difficult to know for certain what happened in this instance given that the sender can't be checked. We try to answer all the emails received in a reasonable timeframe and would not ignore three emails.*

- Since [redacted] has left the service offered by CEH has suffered and is poor. The current CEH staff never responded to our emails and I had to chase them up on the phone. Level of support received in developing the project was poor and it was clear that the scientists running the facility are not actively engaged in the science the facility should support.

Facility response: *We have engaged with the users and provided help with Grants, development of experimental design, etc. I am sorry this was not the experience of this user. One suggestion is that the users contact the head of the facilities.*

- I have concerns with the way in which NEIF CEH is currently operating. Loss of two facility staff within recent years has left a facility without sufficient expertise. Longterm instrument breakdowns due to lack of investment have led to grant allocations being unfulfilled. Lack of communication with users has led to an extremely frustrating position of not knowing when/if a new analyst will be appointed, who we should be communicating with, and when we may be able to complete the research. There also seems to have been a loss of analytical portfolio overall, eg. I think I am right in asserting there to no longer be any compound specific analysis (eg. PFLA work). Coupled with the loss of a working trace gas analyser, this is pulling the laboratory away from the cutting edge of the field.

Facility response: *The facility retains all the expertise that it had previously given that 2 members of the team have worked in the facility for > 20 years. One of these staff actually trained the leaver. We are also training more analysts at present to ensure that there is duplication of skills.*

The lack of capital budget to replace all NEIF instruments is an issue across the facility. Unfortunately, instrument breakdowns happen even with new instruments. All work was delivered on time.

The user is correct that we do not do PLFAs, but this is not linked to lack of expertise, but because the instrument was very old, very expensive to run and not environmentally friendly. In conjunction with Panel B we made this decision of remove these analyses from our portfolio given that NEIF Bristol can do these analyses for NEIF users. Therefore, NEIF maintained all the capacity. Meanwhile, UKCEH is in the process of acquiring a new GC-IRMS and we will be happy to again offer this analysis.

We are now in the process of acquiring a new trace gas analysing analyser to replace the old one.

SI-Geo SUERC

- Responsiveness of SUERC when trying to implement the proposal and do the actual analyses is often extremely slow and requires multiple contacts to get responses. This needs to be improved and more resilient and professional.

Facility response: *We appreciate this comment and acknowledge the concern of the respondent. Whilst this will be the exception to the rule of our high response rate, it is a real concern for our Facility, which prides itself on the service we offer our PI's and students. Whilst COVID did impact on our service significantly, we have implemented measures to ensure all PI's receive timely responses moving forward.*

- Information on the analytical procedures used for stable isotopes analyses at SUERC could be improved. It can take a very long time to get written analytical protocols for use in methods sections of papers and theses.

Facility response: *We thank the PI for this comment. The inability to hold our annual "Principles and Practice" training course because of COVID restrictions (and associated knock-on effects with lab scheduling) contributed to these concerns. The course includes a full day of directly relevant hands-on training for potential PhD student users, and its absence was thus a significant blow. Clearly a greater on-line digital presence is required moving forward. To this end, together with all of NEIF (NEIF Geosciences Advanced E-Learning Academy initiative), our Facility is in process of putting much more information on-line, including 3D lab tours, with introductions to kit; and on-line practical introductions to running our systems. With funding made available, this is well under way and is anticipated to be on-line in first half of 2022 across all Facilities. These resources will include easy access to all protocols, relevant papers and theses chapters.*

- More technical support

Facility response: *We are unsure as to the precise areas of support to which the PI alludes, but moving forward we will double our effort to enhance the experience of our visitors. If it alludes to increasing staffing, then this is a matter to be considered under the next review.*

- Expand capabilities into emerging isotope systems

Facility response: *We are happy to respond to this request as part of our Future Look. We have an existing Capital Bid on the table for kit for an in situ laser SF6 system – which would allow us to remain at the forefront of in our S isotope system, by facilitating the analyses of 33S and 36S as well as the standard 32S and 34S (we have existing mass spec capability for this). Our focus on natural resources, has also led to a demand for transition metal isotopes (e.g. Cu, Zn, Fe), which at present are not supported by the Facilities. This will also be addressed in the Future Look. We are aware that both of these expansions will require significant additional funding for kit and also offer significant opportunities to foster new talent to be at the forefront of their development.*

Geochron-BGS

- NIGL are exceptionally slow to deliver projects and this compromises ongoing/rolling funding opportunities. If I can muster funding I prefer to take U-Pb analyses abroad. Lack of communication appears to be better from some personnel than others. Given the amount funding received and the responsibility to engage with the science community there is clearly a need to prioritise, especially amongst the senior management team. NIGL are

regarded in the community as slow with respect to U-Pb, it has become a running joke. How is this to be fixed? I suggest not with more resource - time management.

- As a UK supported facility there is no option but to rely on provision but this does not make it any less frustrating to deal with the team and try to push for projects to be delivered on time. The model of facilities is great on paper but from a high precision geochronology perspective the reality is very different. Rather than 'new' capability NERC should ensure current provision is maintained at the cutting edge and ongoing funding is in place. Only then should new capability be considered and only if it is accompanied by increased resource.
- "Publicly published QA/QC data for various techniques. Comprehensive publicly available recommendations for sampling, preservation & preparation methods. (Although much of this is findable in relevant journal articles already)"

Facility response: *We appreciate these frank comments. These comments relate to a subset of projects that have taken longer than expected but are not typical of throughput/level of community support provided via this laboratory. In addition to the staff issues highlighted, the issue with this laboratory/capability is a combination of high demand and technical demands in terms of 'low blank' requirements. The nature of the laboratory infrastructure for the high-precision ID-TIMS has failed several times in the past couple of years, impacting throughput times (unplanned, and reducing annual capacity by ~30%). This is being addressed with some investment in new laminar flow hoods in 2022/23 and we hope that will reduce the down time considerably and increase the sample throughput. With respect to staff issues – the person alluded to is writing this response and the comments and has been working to address these issues. The past two years (Covid related such as home schooling etc.) has had an impact on all of us and this is a compounding factor, in addition to role changes at the host institution prior to this period. In addition to throughput and capacity, communication is one area where we will improve. We have appointed a permanent lab manager for this area at the end of 2021 who will act as first point of contact allowing the PI to request an update on progress and issues as they arise.*

CN-SUERC

- As I feel this facility is vital for UK strategic needs, there are 3 main aspects that may need consideration:
  (1) The time between delivering the samples to the CIAF and getting results back can approach two years in some instances, and instances of this occurred both before and during the Covid-19 period (so Covid-19 is not the underlying reason). This, combined with a ~3-4 month lead-in from writing the proposal to gain funding, and the need to formulate a scientific objective and collect the samples before application (several months at least), means it is very risky to think about building cosmogenic work into a 3-year PhD studentship. In our case, the results have been provided by the CIAF either a few months before submission of the final PhD thesis, making it challenging to incorporate in the thesis, or in some instances after the PhD has been awarded. We are convinced that the CIAF staff do their utmost to deliver results in a timely manner, so we are unsure what causes these delays; it may be a lack of staff time, but staff at the facility will have a better understanding of this issue than us. However, I feel I am unlikely to think about PhD studentships in the future that contain or may contain cosmogenic analysis as I am unconvinced that results can be achieved with any certainty within the time period, and so this would be unfair to the PhD student.

Facility response: *NEIF-CN endeavours to generate data between 6-12 months from receipt of the samples. This timeframe reflects the fact that NEIF-CN does not control the AMS schedule, and samples frequently wait for months between AMS target preparation and switching of the AMS*

system to measuring the required nuclide. We agree that the pilot and follow-up approach is an ideal and we have in the past managed to deliver this. However, it is only feasible if samples arrive in a timely fashion, and if the student takes part in NEIF-CN training (See Comment 3) and assists in the crucial early stages of sample processing. NEIF-CN sends reminder letters to successful applicants who have not sent samples 5 months after the award.
With the current resources, guaranteed delivery of pilot and follow-up data is not possible in what is effectively a 2-year timeframe described in the comment. Detailed discussion of the project with NEIF-CN staff will help with setting realistic expectations.

(2) 36Cl data need accompanying ICP-OES data on calcium concentrations before they can be interpreted. In one instance we were provided with Ca data that were clearly of unacceptable quality (confirmed by expert CIAF panel members). The issue was not raised by CIAF staff and we had to raise the issue. New Ca data were provided by the CIAF, and we understand the initial poor results were due to a machine failure, and we understand that a new or alternative machine was used for the second run. However, we felt that (a) the CIAF staff should have noticed this and it should not have been left to us to point this out, and (b) we felt our complaint about the initial results was not welcomed by the CIAF staff; we apologise in advance if this was not the case and we misread this, but that was how we felt at the time. The ICP-OES analyses may be a weak link at the CIAF, and we feel this may need to be considered.

Facility response: *The issue raised occurred over 3 years ago and NEIF-CN again apologises for the failure to recognise the issue raised, and for any perceived reaction of CIAF staff to being made aware of the problem. The failing ICP-OES was replaced and the samples were re-analysed as rapidly as was possible. Improved QA/QC procedures were put in place and there has been no re-occurrence of the data quality issue since then.*

(3) CIAF staff expect PhD students to take part in sample preparation and PhD students receive valuable training during this period. We were told initially that students are given more rapid sample analysis if they attend (although I believe this was under discussion at later CIAF committee meetings). This appears to be a good idea and valuable at first sight. However, the sample preparation takes at least several weeks in East Kilbride, and ~ 1 month is a more realistic time period to prepare significant numbers of samples. This means it can be logistically very difficult for PhD students in some instances, because the visit to East Kilbride is costly and time consuming. (a) Full-time NERC DTP PhD students have limited research budgets that are set before the PhD commences. It is challenging to know if cosmogenic work is needed and justified before the initial field work by the student and it is not possible to change the budget after such fieldwork. Thus, it is challenging to find funds for Full-time NERC DTP PhD students to spend 1 month in East Kilbride. The CIAF kindly offers a flat to stay in, but our experience has been that accommodation was unsuitable as the students felt unsafe in the building and the flat was unclean. (b) Some PhD students have family/carer commitments and simply cannot attend for ~1 month. (c) Self-funded PhD students have to find their own funds to pay for travel and subsistence and this can be challenging. We think it is wrong if sample preparation is delayed if a student cannot attend as this is discriminatory and we hope the expectation of attendance has been revised.
Despite these 3 issues, we do feel that the CIAF staff have been helpful and approachable. We feel it is not a problem with any individual staff member or group of staff members and we feel they have put a lot of effort into helping us. We have managed to publish 2 research papers using data they provided (and have a 3rd in review), and we have included CIAF staff

on the papers due to their valuable contributions. We do hope to use the facility in the future, but as you can see we have some doubts about whether this is feasible.

Facility response: *NEIF-CN only expects students to undergo training in our laboratories when the "T" box in the application form has been ticked. If it is ticked NEIF-CN contacts the student to schedule the training.*

All samples go into the processing queue when samples are received. Where the submitter has ticked the "T" training box in the application form NEIF-CN will try to organize the training visits so that the student can work on their own samples, retaining ownership of the process, rather than working on unknown samples. Usually, the student brings the samples to NEIF-CN and immediately gets to work on them. Where samples have been shipped, we try to arrange a student visit as soon as the samples arrive. This is not always possible, and the samples go into the normal processing queue. The student picks up the process at a time suitable for them and will work on unknown samples as well as their own.

During the training the allocated NEIF-CN staff member will be directly supervising the student and any samples the NEIF-CN staff member was already working on will therefore progress more slowly.

Students that cannot participate in the training are supported remotely, especially during data analysis and interpretation. NEIF is currently developing online training materials which will be particularly useful for students who cannot undertake the NEIF-CN training.

With respect to (a) in the comment, it is up to the supervisor and student to decide how best to spend their limited resources prior to commencing an inherently expensive and time-consuming cosmogenic nuclide dating project. We agree this is challenging, and discussion with NEIF-CN staff will help in setting realistic expectations.

We are concerned about the comment on the security and cleanliness of the SUERC flat and have passed it onto SUERC management. The flat is maintained and serviced by a professional maintenance team and has been used by dozens of researchers over many years without any previous complaint or security incident. The SUERC flat has undergone refurbishment in recent years and of course there are lots of accommodation options in East Kilbride.

- It would be helpful to:
  1) receive an email when samples have been received by NEIF and logged into the system so one is sure they have entered the processing stage (it recently came to my attention that 3 samples had not started the process even though they were submitted in 2018 because they were not logged as having arrived, but were in effect at SUERC - this only became apparent once I had received all the data from the remaining samples but not of the 3 missing).
  2) receive an update on sample processing duration/issues maybe 3-6 months after submitting the samples to NEIF, given that sometimes there are queues/some samples do not yield enough material etc. Knowing this information can be helpful to suggest/send a replacement sample without losing to much time and delaying the project outputs. Ideally if a sample is not yielding enough material or not working, this could be communicated upon realizing with the PI so that one can make adjustments etc. as soon as possible.
- It would be useful to know when we might expect to receive results to facilitate planning.

Facility response: *NEIF is working on an online portal that allows applicants to track the status of their samples. In the meantime we do stay in contact with the students via email, providing them with sample updates and expected measurement timelines.*

SI-Ecol SUERC

- More staff support from NERC would help when there are bottle necks - I mean more financial support, as each staff member is excellent, but they are all stretched.

Facility response: *We agree that there have been some bottlenecks over the last eighteen months, which have been exacerbated by Covid. Consequently, there have been problems in getting a replacement system for sulfur isotopes delivered, installed and finally commissioned by us; concurrently there have been further issues with our older system that have slowed our throughput. Whilst these issues are almost solved, throughput could certainly be improved, and we concur with the suggestion of new staff support. We are currently writing a case for a new junior technician, to improve our sample throughput now and to deal with future staffing, given our staff demographics.*

- Greater volume or throughput of samples

Facility response: *See also Comment 1. Whilst some issues have been resolved, we intend to make the case for a new junior technician.*

SI-BGS

- Not sure how involved facility staff can get in developing projects from initial idea versus providing just technical assessments of whether the analysis is feasible.

Facility response: *Yes this is always feasible, please liaise with the relevant facility staff.*

- Give them funding to buy new machines.

Facility response: *Agreed, we have a strategic plan for replacing instruments and working with new innovation.*

- Yes with a broader range of environmental tracers particularly in waters. There is a reliance mass spectrometers which is not necessarily the future.

Facility response: *We currently offer 18O-H2O, 2H-H2O, 13C-TDIC, 13C-CH4, 2H-CH4, 13C-C2H6, 34S-SO4, 15N-NO3, 18O-NO3 and 18O-PO4 tracer work from waters. All our samples are run via isotope ratio mass spectrometry as this is the facilities primary focus and where we have staff expertise.*

14C- SUERC

- Single biggest issue is understanding progress on samples - once the samples are submitted (particularly in radiocarbon lab) it is very difficult to understand/track progress, particularly when there are delays. I would be happy to be more involved in discussion of detail, particularly to intercept samples where it comes back at final results stage that there was low carbon (or quartz for cosmo). If someone could let me know earlier (before final result reporting) it would allow us to feed in additional sample material (14C) or alternate samples (cosmo). Is there perhaps merit in making the progress of batches for a particular PI trackable online by that PI? It would also help reduce email traffic of questions sent to the facility staff.

Facility response: *We appreciate the comment and the useful suggestion. The longer-term plan across NEIF is to establish a Virtual User Environment where online project tracking can occur, however this requires IT development. In the interim we will review processes to identify where additional contact points may be most beneficial for users. Each project is individual and requirements vary, therefore we will tailor this approach to the user, to ensure the maximum benefit for NEIF users across the board.*

- Faster turnaround time from application to sample submission to results would be beneficial in some projects.

Facility response: *This response relates to the interval from sample submission to results, as the interval from application to submission is covered by responses relating to the NEIF Panel process and administration. We have recently introduced a range of measures aimed to increase efficiency in turnaround times. An example is Python programming and automation of more systems in the lab, and development of a new database system. The period from March 2020 has been challenging, and we have seen increases in turnaround related to a wide range of factors. Our aim is a reduction in turnarounds in the first quarter of 2022 as restrictions ease*

- Turnaround of radiocarbon samples can be very long.

Facility response: *We appreciate that turnaround times are very important to users, and this is one area we include in our continuous programme of improvements. Turnarounds have increased since March 2020 and we are currently working to bring these down as pandemic-related restrictions ease. In addition, we have a programme of increased efficiency that seeks to continually assess lab processes and implement developments that can assist this as they become available.*

14C-Oxford

- Sometimes feels a bit slow to get data without pushing, but I appreciate staff are all v busy

Facility response: *The lab is very grateful for the patience of submitters over the last year when there have been some unexpected delays and we are working hard to ensure data is returned as soon as possible.*

Question 18 - Do you feel there are ways to improve the training?

- Is there more ways to engage prior to lab meetings?
- For the CIAF facility, more material could be provided either online or in a written form so the amount of time required to attend East Kilbride could be kept to a minimum. More guidance could be provided once 36Cl and Ca results are provided.
- More annual workshops focussed on different aspects of geochronology.
- Some sort of structured reading programme would be very helpful that I could then use to brief my students and work with them before they reached the facility, and so there would then be an agreed baseline of knowledge before arriving in the CIAF lab. I never quite know how much to try and prepare them or how much CIAF staff want to do the training themselves.

Facility response: *we are currently developing a new online website for the NEIF facilities focussed on training (NEIF Geosciences Advanced E-Learning Academy initiative). This will provide detailed training aids and documentation related to the analytical activities of the NEIF labs.*

- Realistically, many users of these facilities will not want to go on to run the equipment itself. Time spent being instructed on running the analytical equipment therefore seems wasted. A better use of training resources would be detailed instruction on sample preparation, which most groups do for themselves, and for students, more guidance on data interpretation.

Facility Response: *Sample preparation and data interpretation are undoubtedly important but both are also linked to instrument operation. An intimate knowledge of how and instrument works informs both prior and subsequent processes and makes the user a better scientist.*

- Could you fund time of students spent at laboratories as a part of NEIF?

- Training is excellent, but it would be helpful to have some financial support for students who may find it difficult to pay for additional accommodation etc for a training trip.
- Fund students to visit labs?

Facility response: *Students visiting need to be funded through their research grants. Its therefore important to plan work carefully prior to the start of the project and discuss timeframes and cost with facility staff where possible.*

- I think there should be a more formal recognition of this training. At the moment it's largely experience based and there is varying participation of different students in the analytical process. Greatest benefits are where the student gets hands-on experiences. However, nothing formal about that. Perhaps they could get some sort of association with the lab?

Facility response: *lab training is a fundamental component of the training associated with the PhD process; we hope that listing the detailed training provided useful for their CVs.*

- Facility personnel to engage with PhD students prior to accessing facilities that would require formal links through DTPs maybe.

Facility response: *students are encouraged to engage before accessing the facilities this can be done via facility staff directly.*

Question 20 - Which new analytical facilities would you like to see within the NEIF?

- Replacement of old Ar/Ar kit with new instruments. Of course new capability will be great for the community but NERC should make sure current capability is world leading before committing resource elsewhere.

Facility response: *The Ar/Ar lab has in 2021 and 2022 commissioned two new mass spectrometers that are now available to the user community. One instrument remains outdated and we are seeking capital funding to replace this.*

- Multiple (incl. rare) S isotopes

Facility response: *We are able to do triple CNS isotope analysis and dual OH on some materials.*

- Stable isotope (d18_O) true spot analysis

Facility response: *Currently we analyse spots by drilling (micromilling) or via a laser. For carbonates we use micromilling and analysis down to 5 microgrammes because we cannot retain high enough precision using laser ablation. Our sister facility the ion microprobe can undertake this type of analysis.*

- a dedicated cosmogenic 14C extraction line in order to supplement the other 3 nuclides currently being offered at SUERC. Particularly for late-glacial to Holocene glacier dynamics and complex exposure histories this nuclide would significantly increase the scope and impact of the UK geochronology research community.

Facility response: *This has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*

- increasing the accuracy of cosmogenic 26Al measurements through methodological development (sample prep. etc.) for routine analysis of 26Al with SSAMS and/or PIMS.

Facility response: *We have won NERC grant funding to develop such capability. This will not be routine application, however and will require significant facility investment to bring online.*

- Routine (and high volume number of samples) in situ 14C analysis of quartz at the CIAF.

Facility response: *This has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*

- ion counting multiplier instrument for Ar

Facility response: *The new Ar/Ar masss spectrometers are equipped with ion counters.*

- New in situ laser system with improved optics for targeting samples

Facility response: *The Ar/Ar lab has acquired a new in situ laser system with excellent optics.*

- Clumped isotopes

Facility response: *This has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*

- Clumped isotopes for palaeoclimate

Facility response: *This has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*

- TOF-MS.

Facility response: *GC-TOFMS is available although not implicit in the name of the facility.*

- Position specific isotope analysis.

Facility response: *The facility is currently developing this technique (in collaboration with the Royal NIOZ, The Netherlands) using Orbitrap technology although it is early days at the moment.*

- Ramped Pyrox

Facility response: *Ramped oxidation is a technique we are currently developing. Instrumentation is currently at the beta-test stage to establish Quality Assurance against international 14C standards. After this stage we hope to be able to offer the technique to users.*

- Archaeological lipid dating (this may be provided already?)

Facility response: *The facility can currently date bulk lipids. We are working on a extraction method for specific compounds which will be offered as a service when it has been fully tested on known-age material.*

- wider range of biomarker analyses, perhaps even proteomics

Facility response: *'omics approaches are fielded by NEOF but the Facility is keen to develop methods for new biomarker compounds and other molecular targets with users.*

- Non-traditional isotope analysis of archaeological remains.

Facility response: *We are happy to engage with end-users and explore new analytical approaches beyond those current offered or being developed by the facility.*

- dD Hydrogen isotopes from dinosterols - really important for palaeoclimate reconstruction from lakes. Currently limited by need for calibrated HPC. See Maloney et al (2019).

Facility response: *dD of dinosterol (or any other sterol) is possible and the facility is keen to explore such approaches with users.*

- Not a facility, but more emphasis on multi isotope approaches.

Facility response: *The facility already supports multi-isotope approaches, the need for which is driven by the nature of the research being conducted. For example coupled CNS stable isotope analysis.*

- It would be useful to have access to the clumped isotope facilities that are now being more routine.

Facility response: *Clumped isotopes has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*

- ultra small delta 15 N.

Facility response: *15N value determination of low concentration, N-bearing compounds is being developed at the Bristol laboratory. We can currently analyse 15N in bulk N down to 20ug of N and 15N-NO3 at the ppb level from waters at the BGS-SI lab.*

- Dedicated small volume high sensitivity noble gas systems for high precision work

Facility response: Please get in contact with SUERC who undertake this kind of analysis.

- Within NEIF as a whole, there are a few areas that require investment:
  1. There needs to be capability to analyse for 17O in sulphates and nitrates. This could be facilitated via an upgrade to existing trace gas capabilities for 17O in nitrate; or by laser fluorination perhaps for 17O in sulphates.
  2. It would be great to be able to analyse for 33S.

Facility response: *For 17O analysis we would need more user engagement to justify further resource allocation, this is something that could be developed given sufficient (potential) demand. We have an existing Capital Bid on the table for kit for an in situ laser SF6 system – which would allow us to remain at the forefront of in our S isotope system, by facilitating the analyses of 33S and 36S as well as the standard 32S and 34S.*

  3. The denitrifier technique needs to be brought online to replace current resin extraction methods delivered at NEIF BGS.

Facility response: *NEIF BGS has recently developed the TiCl method of Altebet 2019 to replace the resin method. This is comparable to the denitrifier method allowing a few 100's of ppb NO3-N concentrations to be measured in 3ml of sample.*

- CFCs and SF6 as groundwater age tracers.

Facility response: *This is something that could be developed given sufficient (potential) demand.*

- The ability to apply for OSL dating in the same way as 14C

Facility response: *OSL is included in our recent NERC SoCN. However there was previously a NERC recognised OSL lab and this capability was sunset from the portfolio due to low levels of demand.*

- Aqueous nitrate isotope analysis using the microbial denitrifier technique. This is a really important technique for the NEIF to deliver in order stay at the leading edge of the analytical field.

Facility response: *NEIF BGS has recently developed the TiCl method of Altebet 2019 to replace the resin method. This is comparable to the denitrifier method allowing a few 100's of ppb NO3-N concentrations to be measured in 3ml of sample.*

- ZooMS lab. This would require sufficient community demand as it would require additional new infrastructure (MALDI-TOFMS/MS) investment and increased recurrent resourcing (staff + consumables).
- Greater applications of compound specific 14C

Facility response: *This is an area we are currently developing. Capabilities in ongoing development include both larger molecules amenable to HPLC approaches and smaller molecules suitable for GC-FID separation. As development proceeds the aim is to offer these techniques through NEIF.*

- Quicker and cheaper 14C analyses (lower accuracy needed for environmental samples could offset time and cost)

Facility response: *We appreciate the suggestion and are always looking for ways to improve the scientific output of NEIF-supported researchers. High volume/ low precision measurements have value within specific environmental projects where the methodology is designed around this approach. Such samples usually require not only a reduction in AMS precision, but also reduced (or no) pre-treatment to achieve sample volumes required. A scientific case would need to be made to the NEIF panel to support this approach for an individual project, however the NEIF laboratories would be certainly able to support this work if it were approved at review.*

- Carbonate clumped isotope analysis for marine palaeotemperature determination. This approach is becoming ever more widely used and is the one area of isotope geoscience that I can identify where NEIF is 'behind the curve'

Facility response: *This has been highlighted in the recent recommissioning SoCN to NERC. This maybe brought online pending review in 2024.*