



ERICA

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ERICA will provide an integrated approach to scientific, managerial and societal issues concerned with the environmental effects of contaminants emitting ionising radiation, with emphasis on biota and ecosystems. The project started in March 2004 and is to end by February 2007.

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The authors would like to thank all those individuals who gave their time to participate in the engagement processes described in this report. Their involvement has made a valuable contribution to the development of the ERICA project.

A list of the organisations from which participants were drawn is provided in Appendix 1, although it must be emphasised that participants were asked to reflect their views as individuals, rather than act as representatives of any organisation.



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Introduction

The UK case study has considered semi-natural coastal (dune and saltmarsh) and agricultural ecosystems in the vicinity of the Sellafield reprocessing plant, Cumbria, UK. The study has involved a group of local stakeholders with an interest in the sites. The aim of involving stakeholders was twofold; firstly to investigate how input from stakeholders could most usefully be integrated into the assessment process, and secondly to elicit feedback as to the overall credibility and acceptability of the assessment process to an interested and well informed group of lay people. This note summarises the work to date, key outputs and learning points.

Two case studies have been conducted on the site. The first (Phase 1), conducted in late 2004 and early 2005, applied the methods and data developed by the FASSET project, with the principal objective of identifying gaps and uncertainties that needed to be addressed during the course of the ERICA project. The second (Phase 2), conducted in early 2007, had the principal objective of testing the ERICA methodology and tool in application to a site for which conservation interests are an important consideration.

Timescales for the Phase 2 case study were compressed by delays in the completion of the ERICA tool, and the processes used for stakeholder engagement in this second phase needed to be adapted as a result. Consequently this summary is presented as a sequential narrative, describing the process as it developed in parallel with the scientific work of the ERICA project

1 Phase 1

1.1 Initial contact

Initial contacts were made with stakeholders identified from amongst nature conservation organisations, parish councils, landowners, and farmers. Background briefing material was sent out with an invitation to attend a workshop meeting at Westlakes.

1.2 First meeting

The meeting was run as a facilitated workshop. Introductory presentations about the FASSET and Erica projects were made and the site descriptions prepared prior to conducting the case study assessment were presented. The principal questions explored with stakeholders were:

- Do the site descriptions adequately cover the site features?
- Are there site features which the stakeholders consider to be of particular value and to which special attention should be paid in the assessment?
- Are there any concerns about conservation at the sites – whether or not these are associated with radioactivity?
- Are there other individuals or organisations who we should consult?

A summary meeting report was circulated to stakeholders (including those who were unable to attend the meeting) to elicit any further comments or information.

1.2.1 Assessment

The assessment was conducted taking account of the outcome of the first meeting (see below) and a draft report prepared for circulation to stakeholders prior to the second meeting.

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1.3 Second meeting

The meeting was run as an independently chaired round-table discussion. The principal questions put to stakeholders were:

- Whether we had managed to provide stakeholders with an understandable report;
- Whether they felt the overall methodology is sensible;
- The extent to which any study like this - which is bound to have gaps in coverage for particular species – can provide an assurance as to the effects of ionising radiation. How far is it necessary to go to achieve this?
- Do the results which we have been able to obtain give stakeholders any cause for concern about these sites?
- How can stakeholders most effectively be involved in studies of this type?
- Do stakeholders feel we have been able to give you a reasonable general understanding of the methodology, its limitations and the findings for these sites? If not, how could we do better?
- We have made some recommendations for things which could be done to improve our assessment of these specific sites, and also to improve the overall methodology. Do stakeholders think these are reasonable? Would they want to add anything?

As for the first meeting, a summary report has been circulated and stakeholders who could not attend will be canvassed by telephone to elicit any further comments.

1.3.1 Future involvement

Stakeholders expressed an interest in a further meeting should we re-visit the case study assessment to test the improved methodologies developed by the ERICA project – this was therefore included in the programme of work.

1.4 Main outcomes

1.4.1 First meeting

The main points which the ERICA team took away from the meeting were:

- The division of case study sites into ‘agricultural’ and ‘semi-natural’ was artificial. Both sites should be assessed on the basis of species present in both semi-natural and agricultural habitats within the Drigg Coast and Sellafield 3 km radius designated areas.
- The boundaries of the study areas were amended in the light of information from stakeholders on valuable habitats outside the conservation designated areas.
- There was a general consensus that the Drigg Coast nature reserve is of local importance as a result of the biodiversity at the site rather than specific species. Therefore, a range of species to be included in the assessment was identified through consultation with English Nature and other relevant organisations and individuals identified during the course of the meeting
- A number of additional stakeholders who the ERICA team should contact were identified.
- Concern was expressed by some stakeholders that the study (if it revealed ‘problems’ in terms of radionuclide contamination) could lead to a form of ‘blight’, either for agricultural produce or landholdings themselves. Accordingly, it was agreed that a draft of the case study report would be provided in confidence to stakeholders, to enable comments to be made particularly around

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possible unintended interpretations of the findings, prior to wider dissemination through the ERICA project.

1.4.2 Second meeting

The meeting discussions led to recommendations which were specific to the case study, and also recommendations which were generic:

Recommendations relevant to the case study

- R 1. Some measurements of radionuclide concentrations in soil on the Drigg sand dune site, would test the assumption that the data taken from the Sellafield sand dunes represent an over-estimate for the Drigg site.
- R 2. Similarly, some measurements of radionuclide concentrations in soil on the Low Church Moss site would help to verify the starting assumptions made for that site.
- R 3. Measurements of radionuclide concentrations in freshwater and freshwater sediments at the sites would provide a starting point for considering impacts on the freshwater components of these ecosystems.
- R 4. The lack of any data on radionuclide uptake by natterjack toads is a major gap; although the protection of this species precludes sampling for analysis it may be possible to sample other amphibians (e.g. common toads) on the site. Such data would be valuable both for the case study and as generic data for ERICA.
- R 5. No areas of 'sensitivity' were identified in the draft report; indeed stakeholders were keen for the information to be in the public domain as a matter of general principle.

Recommendations relevant to ERICA as a whole

- R 6. Dose coefficients should be provided to enable the calculation of dose rates to plants from internally incorporated radioactivity.
- R 7. Attention should be paid to achieving consistency between the definition of reference organisms for tabulating radionuclide transfer factors and those for tabulating dose coefficients.
- R 8. Attention should be paid to filling, where possible, the gaps in availability of transfer factor data. This assessment draws particular attention to the lack of data for amphibians and terrestrial birds.
- R 9. There should be clear advice on the selection and use of transfer factor values, including advice on their limitations.
- R 10. Consideration should be given as to how actual ecosystems, in which particular species of organisms are of special interest, can best be represented by the limited number of 'reference organisms'. Reference organisms should be capable of representing at least those species designated for protection at the European level.
- R 11. Although we recognise a need to simplify the methodology on the basis of a limited number of 'generic' ecosystems, guidance on how to combine data to assess a real site would be useful – as in the example here of agricultural land with co-existing semi-natural components.
- R 12. The coverage of radionuclides provided by the FASSET project should be extended as necessary, including the addition of ^{35}S , ^{60}Co and ^{125}Sb .

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- R 13. A concise, user friendly, guide through the assessment methodology would make the methodology easier to apply and would aid uptake of the methodology by a wider cross section of end users.
- R 14. Stakeholder inputs into assessments of this nature are beneficial in ensuring that all important components of an ecosystem are included within an assessment. However, the methodology as a whole is difficult to explain to interested stakeholders who lack a specialist background in radioecology, and an 'intelligent lay persons guide' to the methodology, including its key assumptions and limitations, would be very helpful.
- R 15. Stakeholders felt that the explanation given to them in initial briefing – that previously humans had been the focus of protection, but now there was an international consensus that protection of the environment as a whole was necessary – was helpful and should always be presented in the preamble to reports. Explanation that this was a subject which was being developed with international collaboration helped greatly in assuring that (understandable) knowledge gaps were being addressed seriously.
- R 16. It was acknowledged that assessments would always contain knowledge gaps and be subject to uncertainty – therefore assessment reports could usefully include a general appraisal of the conservation status of the site. Stakeholder input could be very useful here; other means by which stakeholder input could help in filling knowledge gaps should be considered.
- R 17. Stakeholders felt that identification of 'indicator' species could be very helpful. These may well need to be selected specifically for a particular site, as organisms most likely to show any detrimental effects from contamination. Interested stakeholders could then be involved in ongoing monitoring simply by their observations of the populations of these indicator species.
- R 18. Comparison of 'contaminated' and 'uncontaminated' sites may be helpful in assessment reports.
- R 19. It would be helpful in assessment reports if anthropogenic and natural contributions to contamination/dose could be separately identified and, if appropriate, the source(s) of anthropogenic contributions could be identified, at least in qualitative terms – e.g. Sellafield, Chernobyl, weapons fallout etc.
- R 20. If there was a particular issue of concern at a site (e.g. the decline of black-headed gulls during the 1980s at the Drigg site) it would always be difficult to prove a negative – e.g. that radioactivity wasn't the cause. More holistic investigations aimed at identifying the causative factor of factors, whatever those may be, are likely to be more productive and convincing.
- R 21. Consideration as to how this type of report can best be presented to a lay audience is needed. The report as discussed was clearly trying to address two audiences – i.e. the stakeholders and ERICA work package 4 – and it would probably be better to produce two separate reports, or alternatively an overview report with extensive technical annexes. ERICA could usefully provide some guidance in this area.
- R 22. Stakeholders recognised the need to address uncertainty and urged that this should be done, but cautioned that it needs to be carefully and clearly presented –'uncertainty' can be interpreted by the lay person as indicating that the experts don't know what they are doing.
- R 23. Stakeholders are being asked to give their time voluntarily; particularly where this is not part of their normal professional duties efforts need to be made to generate enthusiasm for engagement and the assessment team need to ensure that participation is made as easy as possible. Stakeholders suggested that making a series of presentations to potentially interested groups, or holding public meetings, to publicise a project such as this would generate more general interest as a pre-cursor to engagement by individuals.



2 Phase 2

The initial intention in Phase 2 had been to arrange one or more presentations to interested groups in order to raise interest (as per R18 above), followed by a workshop to discuss a draft of the Phase 2 case study report, prior to submission as part of ERICA deliverable D10. Arranging stakeholder meetings requires a good deal of notice to achieve good representation, and the compressed timescale for the Phase 2 case study made this difficult. The process adopted was:

2.1 Public lecture

A public lecture and discussion was arranged at the Westlakes Research Institute in November 2006, prior to commencing the Phase 2 case study assessment. Invitations were sent out through the normal channels for Westlakes public lectures, to individuals who had been involved in the Phase 1 engagement process, and to local nature conservation organisations. The intention was to present to as wide an audience as possible the issues involved in protection of the environment from ionising radiation, the approach to these issues taken by the ERICA project, and the role of the UK case study within the project. The lecture concluded with a facilitated discussion of some of the issues arising.

2.2 Phase 2 – presentation to Ravenglass Coastal Partnership

The Ravenglass Coastal Partnership is an informal association of groups and individuals with an interest in the Ravenglass coastal environment, including the Drigg Dunes site. Individuals from the Partnership have shown great interest in the case study work, and have been very supportive of our efforts to engage local stakeholders. A presentation of the case study findings, and the sampling programme that provided data to the case study, was made to the January 30th (2007) meeting of the Partnership.

2.3 Closure of engagement

Having started a process of engagement, it is important to ‘close’ the process in an appropriate way. In this case it is intended to produce a shortened, ‘intelligent lay person’s’ report on the Phase 2 case study assessment for distribution to the Ravenglass Coastal Partnership and other interested parties. This will of course reference the much more detailed literature and information available through the ERICA website. There will be an open offer to make further presentations to other interested groups, which will be honoured, if necessary, after the closure of the ERICA project itself.

2.4 Outcomes

2.4.1 Public lecture

More than 60 individuals indicated their intent to attend the lecture, and in the event more than 50 did so. Attendees included individuals with a background from the nuclear industry, from local authorities and parish councils, and from local conservation organisations.

The discussion following the lecture was facilitated around a number of specific questions. The outcome is summarised below.

Is it desirable to establish a radiation protection framework for biota?

Some members of the audience said that it is difficult to answer this question without understanding what the effects are and whether there is a sensible timeframe to establish such a framework. The concern here is that this is a huge subject to take on and discussions could go on forever. The speaker responded that the EU Habitats Directive is a powerful driver requiring action to occur now. The EA has decided that this process needs to take place and a methodology has been developed to carry it out; the time for action is now.



Another individual pointed out that it seems a very good idea to establish a RP framework, but it is important to know what value would the framework provide and if it is realistic in terms of fundability over a reasonable time scale. The speaker answered that more credibility can be generated in assessments if we analyse both the human and wildlife sides of the problem. Here, case studies can be of particular value.

If so, has the ERICA project set about simplifying the problem in a credible way?

One individual expressed the strong opinion was that the approach is too complicated because it aims at protecting everything from bacteria to large animals. It would be more sensible to simplify things, for example by focussing on the top of the foodchain as done in studies on chemicals e.g. DDT. The speaker responded that experts did not agree that managing the top of the foodchain would be an adequate and good simplification, but the speaker insisted that still the approach could be much simplified.

Other speakers professed themselves satisfied that the approach is sensible. One point impinging on the credibility of the approach is the fact that the radioecological picture is not static but it has varied over the years. For example, how do we account for the fact that the Drigg sand dunes have received radiation over a ~ 50 year period and the most sensitive organisms may no longer be there? The speaker explained that the assessment methodology would predict high doses to a sensitive organism even if this organism is no longer there, so in this respect the assessment wouldn't just come out with an "OK" answer.

The basis for setting a 'no ecological effects level' is complicated – will the experts be trusted?

As expected this question provoked a lot of debate.

Some audience members supported the idea that the experts can be trusted by people attending meetings like the one reported here, which would tend to be the kind of people that welcome technical arguments. However, the average "Sun reader" (quote) may not agree. One reason for this is the stigma over radiation. There is a lack of trust in experts in this area, as "men on white coats" claiming to have everything under control had proven unable to control things in past accidents (e.g. Windscale, Chernobyl). That experts will just not be trusted was identified as being the big problem. Some people would never be convinced that radiation is not harmful, no matter what an ERICA assessment said. The word "cynical" to describe the state of mind of the lay public was used a lot to illustrate this.

Is the tiered approach a sensible way of proceeding?

One member of the audience was not satisfied because he thought that the approach covered beta and gamma radiation but not alpha. The speaker reassured him by explaining that the approach considers the effect of alpha-radiation but, in doing so, this opens the issue of radiation quality and the use of radiation weighting factors, which adds extra uncertainty to the assessment. It is difficult to derive RWFs for biota.

Another member suggested that an assessment that failed tier 1 but passed tier 2 would be unconvincing, because people would think that, having identified a problem in tier 1, the numbers in the more detailed tier 2 assessment would have been "fudged" (again, the "cynical" viewpoint). It was also suggested that ellipsoid abstractions of organisms are far too removed from public intuition. Other people took the opposite view, stating that failing tier 1 but passing tier 2 meant taking a closer look at the problem with more realistic (less conservative) data and stating that they did not see this as being a problem.

One member of the audience posed an intriguing question: Could an assessment be devised that can pass tier 1 but fail tier 2? The speaker said that this would be tried during testing.

Gaps in knowledge inevitably remain – what are the ethical issues arising from filling them with field sampling or laboratory effects studies, involving harm to organisms?

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One audience member suggested that the best way to get around this problem is to make use of opportunistic sampling. Two others said that studies on organisms would be acceptable provided there is enough evidence of a useful outcome.

Some took the opposite view. One suggested that field studies involving radiation could “genetically modify” wildlife causing an outrage, a reaction all too predictable, considering the public reaction to genetically modified crops. The speaker reassured the audience that we would never get approval to perform the kind of “heroic” field irradiation studies that have been carried out in past decades, so this problem would not arise.

At this point there was a small regression into question 1. An audience member highlighted the fact that the presence of man seems to be the bigger source of harm to organisms, not radiation. So, then, why bother? The speaker explained that whilst this is true, the more reason why, in addition to human presence, one must avoid creating an additional impact and should take steps to investigate and minimise this.

How and where can stakeholders best be involved?

The first reaction was to state that everyone is a stakeholder but the people that are going to use this approach are operators and regulators, not the general public. One member of the audience stated that this is an interesting enough subject from the academic point of view, but it will be difficult to influence it as a local resident or a member of the general public. The speaker re-focused the question: was there any benefit in involving people like today’s audience or were they happy that the project was fine without their involvement? Responses reiterated that the ordinary stakeholder was faced with a very complex issue but the public would be satisfied with this kind of dialogue with the experts, but only if the issues were discussed with openness, which would build-up the trust (presumed non-existing at the outset). The best way forward would be to be transparent and open, organising public meetings like this one. The suggestion was made that a stakeholder group worthy of being involved is the West Cumbria environmental health stakeholder group. Finally, another point that was made was that there is a need for reaching people that have a more passive attitude to ensure real public engagement on science issues: that there is a need to talk to people and explain.

Ultimately, everyone agreed that it is good to involve stakeholders in meetings like the present one and that by making efforts to engage the wider public scientists could only benefit by increasing public trust.

At the end of the session an informal poll was held and in response to the question of whether it is necessary to establish a radiation protection framework for the environment and the vote was a unanimous “yes”.

2.4.2 Presentation to Ravenglass Coastal Forum

The presentation was well received. Questions were principally about the details of what had been done in sampling and assessment; for those at the meeting there was a general acceptance that many if not all of the issues raised following the Phase 1 study had been adequately dealt with, although the summary nature of the presentation (and the limited time for stakeholders to reflect on it) meant necessarily that this was a ‘feeling’ rather than a systematic ‘check off’ of the issues.

The principal benefit of this presentation was the provision of some feedback to individuals (and an organisation) that had been supportive during the Phase 1 process



3 Reflections and learning points from the exercise

- The involvement of stakeholders has been beneficial both in assisting with site characterisation and providing a lay perspective on the whole assessment process.
- Involvement of this kind should lead to much greater acceptance of the findings from a ‘real assessment’.
- Some of the most useful outputs can emerge from discussions which deviate from the expected agenda; ‘structured flexibility’ is needed. Flexibility is also needed to accommodate timing issues in the project overall (e.g. Phase 2 in this exercise).
- The time demands of involving stakeholders are substantial and should not be under-estimated; it is necessary to produce a substantial amount of briefing material and correspondence; simply keeping in contact, arranging meetings, and securing comments can be very time consuming; there are significant extra demands in terms of presentation and report writing.
- Stakeholders are being asked to give their time voluntarily; particularly where this is not part of their normal professional duties efforts need to be made to generate enthusiasm for engagement and the assessment team need to ensure that participation is made as easy as possible. Stakeholders suggested that making a series of presentations to potentially interested groups, or holding public meetings, to publicise a project such as this would generate more general interest as a pre-cursor to engagement by individuals.
- A review of the recommendations made during the Phase 1 engagement indicates that virtually all of the recommendations that could reasonably be addressed either generically by the ERICA methodology or specifically during the Phase 2 case study re-assessment have been adequately addressed. Recommendations 16, 18 and 20 could perhaps be highlighted as useful suggestions to those undertaking a ‘real’ site assessment; they could not be addressed within the scope of the ERICA case studies.
- Recommendations 13, 14, 21 and 22 – concerning explanation of the approach to lay people - have not as yet been adequately addressed. One clear conclusion from the Phase 2 experience reported here is that the ERICA methodology is complex; considerable thought is needed when trying to explain it clearly and concisely to an audience of non-specialists. Individuals with a good knowledge of the ERICA methodology should be able to do this, but more help in the form of pre-prepared material would be very useful.
- Finally, it is worth re-iterating the comment made about ‘trusting the experts’. Although it may be time consuming to do so, engaging openly and face to face with individuals who have an interest in the site being assessed is, ultimately, the best way of building trust and laying the foundation for co-operation. In this case engagement undoubtedly helped Liverpool University secure the permissions needed for sampling on a sensitive conservation site.



Appendix 1: Organisations from which stakeholders were drawn

Ravenglass Coastal Partnership
National Park Authority
Landowners
National Farmers Union
English Nature
Cumbrian Wildlife Trust
Herpetological Conservation Trust
Parish Councils
District Councils
Environment Agency (individuals not involved in the ERICA project)
British Nuclear Group
Nuclear Decommissioning Authority
UK Nirex Ltd
Nuclear industry supply chain

