**Field Investigation**

**Purpose**

This assessment allows you to develop and demonstrate your field observation skills and communicate your knowledge through a field investigation report. You will undertake a field trip to the Brukunga Mine Site during which you will investigate the impacts on the local environment of acid metalliferous drainage (AMD). Assisted by prior research, you will design an investigation exploring the effect of AMD on water quality and hence biodiversity. You will make measurements using field testing equipment, record notes and diagrams of your observations in the field notebook supplied. You are encouraged to supplement your notes and diagrams with photographs. You will use the evidence gathered to construct a report of this investigation.

**Part A: Design Proposal** (design pre-mine visit with modifications at mine site). **IAE1**

*Individually, research the history of the Brukunga mine and the environmental damage caused by acid leaching.*

*Useful resources include those from the State Development, Minerals website – Brukunga Mine Site*

[*http://minerals.statedevelopment.sa.gov.au/mining/former\_mines/brukunga\_mine\_site*](http://minerals.statedevelopment.sa.gov.au/mining/former_mines/brukunga_mine_site)

Waterwatch Australia – rating your waterway [*http://nrmonline.nrm.gov.au/downloads/mql:2879/content*](http://nrmonline.nrm.gov.au/downloads/mql:2879/content)

*You will then be placed in groups of three to deconstruct the problem of AMD and hence formulate possible questions that you can investigate at the mine site. For example, you could consider the effect of pH, temperature, dissolved oxygen or turbidity of water on the diversity of macroinvertebrates.*

**Proposal Development**

Hypothesis

*State the hypothesis for the investigation.*

Variables and Constants

* *State the independent variable and the reason for choosing this variable.*
* *Describe how the independent variable is to be varied.*
* *State the dependent variable.*
* *Describe how the dependent variable will be measured.*
* *Identify factors that should be kept constant and describe how, or whether, they will be kept constant.*

Materials and Equipment

* *List all chemicals and equipment, including the quantities, required*
* *Examples of tests available include;*
* Data harvester with pH, dissolved oxygen, temperature, conductivity probes
* pH test strips
* Hanna Copper Ultra LR (low range) colorimeter test kit, copper –
* Hach test strips for iron and copper
* Hanna colorimeter test kit sulphate, nitrate, nitrite, phosphate, hardness

Method

* *Describe your procedure, using clear and detailed steps that others can follow.*
* *Consider the number of samples to test and the need for repetition.*
* *Complete a risk assessment and determine equipment requirements.*
* *Describe potential safety issues and how you will minimise them.*
* *Describe any ethical issues and how you will minimise them.*

**Due date for design proposal**

**Mine visit** - P*articipate in a tour and general information session. You will then have time in your group to finalise the question you would like to investigate and modify your proposal. You may need to modify your question and method based on time, equipment availability and access to the site.*

**Part B: Conducting the investigation – collaborative.**

* *Trial the method you have proposed and modify to suit the conditions*
* *Conduct your investigation recording raw data in a suitable format for analysis. Observations could include quantitative measures, sketches or photographs.*

**Part C: Report – individual. IAE2, 3, 4, KA1**

The report should include:

* an introduction with relevant earth and environmental science concepts
* the hypothesis and variables
* materials/apparatus, method/procedure outlining steps taken\*
* identification and management of safety and/or ethical risks\*
* results\*
* analysis of results, identifying trends, and linking results to concepts
* evaluation of procedures and data, identifying sources of uncertainty
* conclusion with justification

*The report should be a maximum of 1000 words, if written or a maximum of 6 minutes for an oral presentation or the equivalent in multimodal form. \*The materials/apparatus, method/procedure outlining steps to be taken, identification and management of safety and/or ethical risks, and results sections are excluded from the word count.*

*Due date for the report*

**Performance Standards for Stage 1 Earth and Environmental Science**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | **A** | **B** | **C** | **D** | **E** |
| **Investigation, Analysis and Evaluation** | **1**  **2**  **3**  **4** | Designs a logical, coherent, and detailed earth and environmental science investigation.  Obtains records, and represents data, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and their effects on data. | Designs a well-considered and clear earth and environmental science investigation.  Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.  Logically analyses data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effects on data. | Designs a considered and generally clear earth and environmental science investigation.  Obtains, records, and represents data, using generally appropriate conventions and formats with some errors but generally accurately and effectively.  Makes some analysis of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effects on data. | Prepares the outline of a earth and environmental science investigation.  Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and formulates a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Identifies a simple procedure for a earth and environmental science investigation.  Attempts to represent some data, with limited accuracy or effectiveness.  Attempts to describe results and/or attempts to formulate a basic conclusion.  Acknowledges that procedures affect data. |
| **Knowledge and Application** | **1**  **2**  **3**  **4** | Demonstrates deep and broad knowledge and understanding of a range of earth and environmental science concepts.  Applies earth and environmental science concepts highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between science and society.  Communicates knowledge and understanding of earth and environmental science coherently with highly effective use of appropriate terms, conventions and representations. | Demonstrates some depth and breadth of knowledge and understanding of a range of earth and environmental science concepts.  Applies earth and environmental science concepts mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between science and society.  Communicates knowledge and understanding of earth and environmental science mostly coherently with effective use of appropriate terms, conventions, and representations. | Demonstrates knowledge and understanding of a general range of earth and environmental science concepts.  Applies earth and environmental science concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of earth and environmental science generally effectively using some appropriate terms, conventions, and representations. | Demonstrates some basic knowledge and partial understanding of earth and environmental science concepts.  Applies some earth and environmental science concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic chemical information, using some appropriate terms, conventions, and/or representations. | Demonstrates some limited recognition and awareness of earth and environmental science concepts.  Attempts to apply earth and environmental science concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about earth and environmental science. |