## Stage 2 Scientific Studies: Assessment Type 1: Investigation Folio

**Science Inquiry Skills – Task 1**

**“*How pure is pure*”**

The purpose of this assignment is to demonstrate your ability to collect and represent data from a scientific investigation.

**Introduction**

Whether it’s drinking water from the tap or the water in your local stream, water quality is an important factor that is monitored continuously.

The health of ecosystems is almost always tied to the quality of water in the ecosystem. Often, human activity is the cause of poor water quality in an ecosystem, although natural events can also be a significant cause too. Recent examples include:

* Tropical Cyclone Marcus, March 2018

Following the cyclone, Darwin and the surrounding areas were placed on a ‘boil water alert’ due to the suspected contamination of the fresh water supply. The water was tested in a number of different locations and in sufficient quantities, that it was cleared for consumption three days later.

* Ranger Uranium Mine, Jabiru (NT)

There are rigorous testing regimes in place to ensure chemicals are not released in toxic quantities into the ecosystem. The data on water quality has a direct effect on Ranger’s compliance with Government environmental requirements. The same level of water testing diligence is used in the MacArthur region with MacArthur River Zinc and Lead mine.

Recent news articles have covered testing of bottled water brands and reported on certain brands having levels of minerals or other chemical species that aren’t accurately represented on the nutrition label.

**Task**

Your task is to research commercially available water testing kits and, with your teacher’s assistance, use water quality testing methods to gather water quality data from several sites.

You should represent this data appropriately and draw some brief conclusions on what it shows. The major emphasis of this assignment is data collection and representation.

Your report can include (but is not limited to):

1. a short description of the water quality parameters being tested
2. a picture/diagram/short description of the testing kit(s) used
3. a list of sites tested
4. tables representing the water quality parameters tested
5. graphs representing the data (if required), and
6. conclusions drawn about what the quantitative data shows
7. an evaluation that considers how procedures taken affected data

Water samples could come from:

* Taps in different locations
* Swimming pool water (private and public), and
* Local water sources like creeks and rivers
* You might cover several different sources in an area and draw conclusions on the quality of the water there
* You could also create situations where water quality is affected by eutrophication

Students and teachers should refer to their local water supply company for standards relating to water quality levels.

**Assessment conditions**

Your report should be a maximum of four A4 pages (minimum font size of 10).

You must submit your report electronically using the following naming protocol:

*SACE registration number-2STU20-AT1-SIS task 1*

**Assessment Design Criteria**

Your report will be assessed against the following Performance Standards

* Investigation, Analysis, and Evaluation: IAE 2, 3, 4
* Knowledge and Application: KA 2

**Considerations**

* The teacher and student must agree which water quality parameters to test, how and where to test them.
* If links with local universities exist, opportunities for more comprehensive testing regimens e.g. Atomic Absorption Spectroscopy could be explored.

**Performance Standards for Stage 2 Scientific Studies**

| - | **Investigation, Analysis, and Evaluation** | **Knowledge and Application** |
| --- | --- | --- |
| **A** | **Critically** deconstructs a problem and designs a **logical**, **coherent**, and **detailed** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **appropriate** procedures, conventions and formats **accurately** and **highly** **effectively**.  **Systematically** analyses and interprets data and evidence to formulate **logical** conclusions with **detailed** justification.  **Critically** and **logically** evaluates procedures and their effect on data.  **Critically** and **perceptively** evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **deep and broad** knowledge and understanding of a **range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific 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 science concepts coherently, with **highly effective** use of **appropriate** terms, conventions, and representations. |
| **B** | **Logically** deconstructs a problem and designs a **well**-**considered** and **clear** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **appropriate** procedures, conventions and formats **mostly** **accurately** and **effectively**.  **Logically** analyses and interprets data and evidence to formulate **suitable** conclusions with **reasonable** justification.  **Logically** evaluates procedures and their effect on data.  **Critically** evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **some depth and breadth** of knowledge and understanding of a **range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific 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 science concepts with **mostly coherent and effective** use of appropriate terms, conventions, and representations. |
| **C** | Deconstructs a problem and designs a **considered** and **generally** **clear** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **generally** **appropriate** procedures, conventions and formats with **some** **errors** but **generally accurately and effectively**.  Undertakes **some** analysis and interpretation of data and evidence to formulate **generally appropriate** conclusions with **some** justification.  Evaluates procedures and **some** of their effect on data.  Evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates knowledge and understanding of a **general range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific concepts **generally effectively** in new **or** familiar contexts.  Explores and understands **aspects** of the interaction between science and society.  Communicates knowledge and understanding of science concepts with **generally effective** use of appropriate terms, conventions, and representations. |
| **D** | Prepares a **basic** deconstruction of a problem and an **outline** of a scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using procedures, conventions, and formats **inconsistently**, with **occasional accuracy and effectiveness.**  **Describes** data and undertakes some **basic** interpretation to formulate a **basic** conclusion.  **Attempts** to evaluate procedures or **suggest** an effect on data.  **Attempts** to evaluate the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **some basic** knowledge and **partial** understanding of science inquiry skills and scientific concepts.  Applies **some** science inquiry skills and scientific concepts in **familiar** contexts.  **Partially** explores and **recognises** aspects of the interaction between science and society.  Communicates basic scientific information, using **some** appropriate terms, conventions, **and/or** representations. |
| **E** | **Attempts** a **simple** deconstruction of a problem and a procedure for a scientific investigation using a scientific method and/or engineering design process.  **Attempts** to use **some** procedures and record and represent some data, with **limited** accuracy or effectiveness.  **Attempts** to **describe** results **and/or** interpret data to formulate a basic conclusion.  **Acknowledges** that procedures affect data.  **Acknowledges** the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **limited** recognition and **awareness** of science inquiry skills **and/or** scientific concepts.  **Attempts** to apply science inquiry skills **and/or** scientific concepts in **familiar** contexts.  **Attempts** to explore and identify **an aspect** of the interaction between science and society.  **Attempts** to communicate **information** about science. |