

Read the 3-proficient column first, then read the 4,2,and 1 descriptions.

To assess the paragraphs: READ EXAMPLE PARAGRPHS ON THE BACK BEFORE ASSIGNING YOUR SCORE!

____/28 ÷ 7 = ____/4

	4-Advanced	3 - Proficient	2 – Partially Proficient	1 – Unsatisfactory
Materials/ Procedure ____/4	Exceptional detail – includes drawing of set up with the instruction sheet (this may be included with the results / observations	<u>All</u> materials are listed and adequately identified (drawing/description) so another person could find all of the supplies <u>All</u> steps are detailed so another person could repeat your technique exactly	Material are <u>partially</u> listed and/or described. Steps are <u>partially</u> described so a reader would be able to repeat most steps accurately	Materials an/or steps are missing and a reader would be misled by reading your lab.
Results ____/4	In addition to a high quality data table identifies the pH for each sample, an accurate recreation of the pH meter and sample colors as indicated with the Universal indicator is included	A data table is included that clearly identifies each sample and the pH for each sample. A ruler is used.	Data is included which identifies the pH for each water sample – either no table was used or a ruler was not used.	Data is missing and/or inaccurate. No table was used.
Observations ____/4	At least 7 additional notes taken from map and data that help clarify the source and impact of the spill. Notes are clearly written and easy to find by the reader	At least 5 additional notes taken from the map or data table providing details to help identify the source of the spill and the potential impact.	3-4 additional notes from the map or data table	0-2 additional notes from the map or data table
Analysis: Source READ EXAMPLE ON BACK! ____/4	A proficient discussion + at least one comprehensive advanced topic discussed	<ol style="list-style-type: none"> 1. Define/describe pH 2. Sample description 3. Summary of findings which are used to identify source 	2 main points covered	0-1 main points covered
Analysis: Potential Impact READ EXAMPLE ON BACK! ____/4	A proficient discussion + at least one comprehensive advanced topic discussed	3 main points covered	2 main points covered	0-1 main points covered
Conclusion ____/4	The I Wonder material is extended to find solutions to problems with the original data collection. Leads the reader to new hypothetical tests	____ Purpose restated ____ Accept/reject hypothesis ____ What you learned should mention pH indicated where a spill possibly occurred ____ Now I wonder	1 element of the paragraph missing	2 or more elements of the paragraph missing
Mayor letter ____/4	Letter extends to include possible “next steps” based on the information you have so far	Covers main points addressed in the analysis – it should lead the mayor to understand that the initial test only provides limited information but there is potential for the acid to negatively impact the ecosystem	Letter is limited in information which identifies potential sources and impact	Letter is not helpful in identifying possible sources and impacts

River Lab Example Paragraphs

The underlined segments demonstrate “level-4” extensions. Other related extensions may be accepted.

Source

pH is a way to measure whether a chemical is an acid or a base. Acids are identified with a lower pH (1- 6) and bases have higher pH (8 – 14). Neutral chemicals have a pH around 7. pH was used to identify where an acid spill occurred and determine the potential impact to the river and surrounding ecosystems. Nine samples were taken from various locations on a river and its tributaries. The pH was determined by comparing the color of the samples with a Ph meter which showed the colors of chemicals with a known pH. The data shows that samples 5 and 6 have lower pH than all of the other samples which suggests that spill was somewhere just upstream of where the samples were taken. Our data only allows to identify that the sample is acidic but it does not tell us what kind of acid it is so it is not possible to specifically identify the actual source until further analysis is completed. Another possibility that should be considered is the possibility that an acid is being formed by a reaction with water. For example, it is possible for some sulfur compounds to react with water to form sulfuric acid or carbon dioxide can react with water to form carbonic acid. Therefore, it may be possible that the source may not even be an acid, even though the letter says so.

Impact

Several factors must be considered in order to assess the potential impact of the spill on the river ecosystem and surrounding ecosystems.

1. The amount and duration of the spill must be known. If it was a one time spill the impact will be less than if it is an on-going discharge.
2. The living conditions for all species in the ecosystem must be identified. Some species tolerate lower pH more than others and may be able to withstand brief exposures. Others are extremely sensitive and may have experienced considerable loss downstream from the spill. Also, some species tend to fill niches easier than others. Niche is defined as a specific role served by an organism within an ecosystem. If a species is more tolerant about relocating within a region, it is possible that unaffected organisms (up or downstream or from other tributaries) will fill in populations that were adversely affected by the spill.
3. It is important to identify the food web dynamics within the affected area. While a species may not be directly affected by the drop in pH, one or more of the species it needs for food may be directly affected and the consequences could be extreme.
4. It is possible that a predator or intermediate consumer that shares tributaries or migrates could be affected and therefore affects other food webs not directly associated with the river the spill occurred in.

Other problems you may consider include recreation uses like rafting and swimming. If the river is closed from recreation uses, tourism is affected and businesses may lose revenue. Also, your town may develop a reputation of being environmentally hazardous which may influence whether people would want to move to the area.