Annex 5: Suggested IEE Language on Water Quality Monitoring

*<The following is suggested language for Section 3 of the standard format IEE, “Potential Environmental Impacts & Recommended Determinations, Including Conditions,” for Projects that will be developing or rehabilitating drinking water supplies:[[1]](#footnote-1)>*

The Implementing Partner will prepare a Water Quality Assurance Plan (WQAP) in conformance with the requirements in the Project Initial Environmental Examination (IEE) for approval of the Contract or Agreement Officer’s Representative (C/AOR), the Mission Environmental Officer (MEO), and the Regional Environmental Advisor (REA). The WQAP is intended to reduce the risk of drinking water contamination in drinking water supply systems constructed or rehabilitated by USAID. USAID recommends that Implementing Partners test eight water quality parameters where water supplies are developed and/or rehabilitated: (1) arsenic, (2) fecal coliforms, (3) fluoride, (4) nitrate, (5) electrical conductivity, (6) TDS, (7) pH, and (8) turbidity. It is required that the Implementing Partner conduct initial water quality testing in accordance with their WQAP before the drinking water source is made available for human consumption. Ongoing monitoring of identified parameters at the intervals designated in the approved WQAP is also required. The Implementing Partner will also work with appropriate local authorities and service providers to encourage ongoing water quality monitoring after the USAID activity ends.

The standards for initial and ongoing testing – types of contaminants for which testing should be conducted, testing methods, testing frequency, and issues such as public access to results – should follow applicable USAID minimum recommendations in the WQAP template, local laws, regulations and policies, and the additional considerations as identified in the approved WQAP. At a minimum, the following requirements will be met by the Implementing Partner:

1. **Timing and procedure of sample collection.** For initial water quality testing following completion or rehabilitation of a drinking water source, the source will be pumped and tested with samples taken once water that is representative of the groundwater aquifer is found (i.e., once equilibrium conditions have been established and collected water is unaffected by installation). If the water source is one that cannot be pumped, then the Implementing Partner must develop a sample collection procedure in collaboration with the Project A/COR.
2. **Verification of test kits.** Local water quality laboratories are the preferred method for water quality testing; however, if qualified laboratories are not available field test kits can be considered. If field test kits are used for water quality testing, the Implementing Partner will demonstrate to USAID the accuracy and replicability of any such kit used to meet testing and/or monitoring requirements prior to its use.
3. **Initial testing and monitoring for arsenic**. In compliance with Guidance Cable State 98 108651, the Implementing Partner will provide initial and ongoing testing of groundwater-sourced drinking water for inorganic arsenic at a level not to exceed 10 ppb (10 micrograms per liter; 0.01 mg/l). Following the initial water quality test, the Implementing Partner will ensure that the water source is tested for inorganic arsenic not less than once per quarter for a minimum of four quarters using the same technology and sampling method as used in the initial quality test. The E3 Bureau has prepared a document titled “Guidelines for Determining the Arsenic Content of Ground Water in USAID-Sponsored Well Programs”. During Project implementation, the A/COR will ensure that the standards and testing procedures described in this guideline document are followed.
4. **Initial testing and monitoring for fecal coliforms.** The Implementing Partner will test all new or rehabilitated drinking water sources including both groundwater and surface water sources for fecal coliforms (note: fecal coliform concentration is not the same as either E.coli or total coliform concentration). USAID’s recommended standard is no detectable fecal coliforms in any 100 ml sample. However, it should be recognized that fecal contamination is widespread in developing nations, and that 100% compliance may not be achievable.  In such cases USAID should strive for progressive improvements while providing additional treatment where necessary. In addition, the Implementing Partner will monitor all new or rehabilitated drinking water supplies (groundwater- and surface water-sourced) in accordance with their approved WQAP until responsibility for the supply has been handed over to the partner country government or its designated representative (USAID recommends at least every quarter.)

Fecal coliform testing can be completed using either a field test kit or laboratory analysis. However, measurements should be taken using a comparable technology and sampling method as the initial test.

1. **Initial testing and monitoring for additional parameters.** As part of developing a WQAP, the Implementing Partner will work with USAID to research, select and document relevant water quality parameters, standards and frequency of testing to be conducted over the life of the activity. The Implementing Partner will test all new or rehabilitated drinking water supply systems, from both groundwater and surface water sources, in accordance with their approved WQAP.
2. **Response protocol for exceedance of limits.** If at any time drinking water quality tests conducted by the Implementing Partner indicate that contamination levels in a drinking water supply exceed the limits indicated in their approved WQAP, the Implementing Partner will work with USAID and local authorities to determine the appropriate course of action dependent upon the level of contamination and potential for adverse health effects, the source of the contamination and the potential for adequate remediation of the contaminant, the availability and feasibility of treatment technologies, and the availability of alternative water sources. In all cases the Implementing Partner will document consultations held and decisions made. The following are suggested actions and corrective measures that the IP will consider in consultation with USAID and local authorities.

***Corrective Measures.*** If the water quality testing completed following the commissioning of the water point indicates that contaminant levels exceed the thresholds established in the approved WQAP, the Implementing Partner (IP) will take the following actions:

1. **If any of the levels are exceeded,** the following will be performed (if there is no immediate danger to life and health):
   * 1. an additional round of sampling and analysis for the given parameters will be performed to confirm the initial results;
     2. if the second round of sampling/analysis confirms the exceedance, an investigation of the potential source of contamination will be performed;
2. **If arsenic levels are exceeded**, the IP will immediately notify the appropriate authorities, including the Mission Environmental Officer and relevant local regulatory agencies. The IP will work with these authorities to ensure that appropriate measures are implemented, which may include:
3. Investigate alternative safe water sources. If alternative sources are available, then access to the alternative source should be provided;
4. Substitute high-arsenic sources, such as groundwater, with low-arsenic, microbiologically safe sources such as rainwater and treated surface water. Low-arsenic water can be used for drinking and cooking, whereas high-arsenic water can be used for other purposes such as irrigation, bathing and washing clothes.
5. Discriminate between high-arsenic and low-arsenic sources. For example, test water for arsenic levels and paint tube wells or hand pumps different colors. This can be an effective and low-cost means to rapidly reduce exposure to arsenic when accompanied by effective education.
6. Blend low-arsenic water with higher-arsenic water to achieve an acceptable arsenic concentration level; or
7. Install arsenic removal systems – either centralized or domestic – and ensure the appropriate disposal of the removed arsenic. Technologies for arsenic removal include oxidation, coagulation-precipitation, absorption, ion exchange, and membrane techniques. There is an increasing number of effective and low-cost options for removing arsenic from small or household supplies, though there is still limited evidence about the extent to which such systems are used effectively over sustained periods of time.
8. **If fecal coliform is detected**, the IP will work with the appropriate USAID and local authorities and stakeholders to ensure that appropriate measures are implemented, which may include:
9. Investigation of potential sources of contamination, particularly review the separation distances between water and wastewater systems or solid waste disposal management practices (see WHO, 2012b), and removal of the source of contamination, if possible;
10. Examination of the well construction will be conducted to ensure that the concrete apron and casing are sealed and in good condition, the well head is elevated such that runoff flows away from the concrete pad, and the well area is fenced to keep out livestock and animals;
11. Disinfection of the sampled well via the shock chlorination technique.
12. Outreach to community members (through radio announcements, community meetings, etc.) to boil water if treatment is not effective; or,
13. Provision of purification tablets, like Aquatab™, to community members and education on its proper use.
14. **If fluoride levels are exceeded**, the IP will work with USAID and local authorities to determine the appropriate course of action, which may include the following measures:
15. An investigation of the presence of health effects (i.e. dental or skeletal fluorosis) within the community, and identification of other potential sources of fluoride (e.g. brick tea consumption);
16. Identification and use of alternative low-fluoride sources of water,[[2]](#footnote-2) if possible, and/or blending of multiple sources to achieve acceptable fluoride concentrations levels; or,
17. Installation of fluoride treatment if available and acceptable to the community, such as bone charcoal, contact precipitation, clay, activated alumina, calcium chloride, monosodium phosphate, and Nalgonda.[[3]](#footnote-3)
18. **If nitrate levels are exceeded,** the IP will work with USAID and local authorities to determine the appropriate course of action, which may include the following measures:
19. Investigation of potential sources of contamination, such as nearby agricultural fertilizer application, or leaking septic tanks, and removal or reduction of the contamination at the source, if possible; or,
20. Identification of alternative low-nitrate sources of water that can be use in place of the contaminated source or blended with the nitrate contaminated source in order to reduce nitrate concentrations to acceptable levels; or,
21. Investigation of the feasibility and potential use of treatment processes, such as ion exchange, distillation, and reverse osmosis.
22. **If electrical conductivity or TDS levels are exceeded,** the IP will work with USAID and local authorities to determine the appropriate course of action, which may include the following measures:
23. Additional testing for individual constituents of conductivity including, chloride, sodium, nitrate, calcium, magnesium, and sulfate, to determine if these constituents concentrations pose a health risk to the community and ensure they are not present at levels above the host country regulatory limits; or,
24. Investigate potential sources of contamination and removal or remediation of the source of contamination, if possible.
25. **If pH levels are outside of the range (i.e. below 6.5 or above 8.5),** the IP will work with USAID and local authorities to determine the appropriate course of action, which may include the following measures:
26. Investigation of the potential anthropogenic sources of contamination, such as nearby industrial activities including mining;
27. Identification of alternative sources of water supply, if available;
28. Investigation of potential natural causes of acidity/alkalinity, such as subsurface geology, to determine if the low or high pH is a result of natural conditions;
29. Investigation of the potential for corrosion of the existing water supply extraction and distribution infrastructure (e.g. corrosive metal piping and pumping equipment), if the pH exceedance is due to natural conditions, such as local geology; and,
30. Testing for metals and installation of appropriate water treatment technologies (e.g. neutralizing filter[[4]](#footnote-4)) at the water point or at the point of use (e.g. in the residence), if construction materials and water supply equipment are susceptible to corrosion and leaching of metals at a result of pH levels.
31. **If turbidity levels are exceeded,** the IP will work with USAID and local authorities to determine the appropriate course of action, which may include the following measures:
32. Investigation of potential sources of contamination, and removal of the contamination, if possible; or,
33. Installation or provision of water treatment technologies that are locally available and acceptable to the community, including: fiber filtration, cloth or membrane filters, granular media filters, sedimentation systems, moringa flocculation, and sand filters.
34. **Management of Laboratory Wastes.** If drinking water quality analyses will be performed as part of the Project either in the field or in a laboratory, the following issues will be addressed in the associated IEE:
35. Required drinking water quality tests generate small amounts of hazardous by-products. In addition, laboratory operation and the use of many portable test kits, especially those for arsenic detection, have many significant environmental impacts ranging from energy and resource consumption to chemical and equipment use and disposal.
36. Implementing Partners may be held liable for hazardous wastes that are improperly disposed of and any damage they create even after leaving the laboratory and being transported to a treatment, storage or disposal facility. Therefore, it is important to stipulate in the IEE Implementing Partners’ compliance with regulations and that final disposal of laboratory wastes uses approved methods and is in full compliance with partner country regulations.
37. Most of the waste chemicals resulting from drinking water quality analysis in laboratories should be considered hazardous, so the generation, storage, and disposal of these wastes must be given special consideration in every laboratory supported by USAID.

1. USAID Drinking Water Quality Toolkit: Monitoring, Governance, and Protection. [↑](#footnote-ref-1)
2. Alternatives may include surface waters, rainwater, drilling a deeper borehole at this location, or investigating local low fluoride groundwater in the immediate area. [↑](#footnote-ref-2)
3. These treatment processes are described in the 2006 WHO Guidance entitled, “Fluoride in Drinking Water,” accessed at: http://www.who.int/water\_sanitation\_health/publications/fluoride\_drinking\_water\_full.pdf [↑](#footnote-ref-3)
4. Neutralizing filters include selected media to neutralize pH. For acidic (low pH) water, the neutralizing filter would contain calcite (marble chips) or ground limestone (calcium carbonate) or magnesia (magnesium oxide) to raise the pH. In most cases, water supply will not have a high pH; however, certain alkaline lakes (i.e. soda lakes) have pH between 9 and 12. For high pH water, acidic solutions or CO2 can be added to the water at the point of use to lower the pH; however, these systems are not recommended in community village level water supply systems. [↑](#footnote-ref-4)