GUIDELINES FOR PREPARATION OF ENGINEERING REPORTS FOR NEW SURFACE WATER OR GROUNDWATER UNDER THE DIRECT INFLUENCE OF A SURFACE WATER SOURCES

Unless otherwise directed by the Department of Health, Safe Drinking Water Branch (SDWB), existing or new systems proposing to use a surface water or groundwater under the direct influence of a surface water (GWUDI) source shall prepare a comprehensive engineering report in accordance with the following table:

IF YOU ARE…	YOU MUST PREPARE AN ENGINEERING REPORT IN ACCORDANCE WITH THE FOLLOWING SCHEDULE OF ITEMS:
a new system proposing to use a new surface water or GWUDI source…	All items plus demonstrate capacity.
an existing system proposing to use a new surface water or GWUDI source…	All items.
an existing system whose existing source is redesignated as a GWUDI source and now requires treatment that complies with the SWTR…	Items 1, 5, 8, 12 and 13 as a minimum. Other items shall be included as required by the Director to evaluate the entire extent and impact of the improvements.

For new surface water or GWUDI sources, this report also satisfies the engineering report requirements under Hawaii Administrative Rules (HAR) section 11-20-29 Use of new sources of raw water for public water systems. Approval of the engineering report by the director does not constitute an "approval to construct" until construction plans and specifications, required under HAR section 11-20-30, New and modified public water systems, are reviewed and approved by the Department of Health.

The report shall be typewritten reproductions on bond paper, 8-1/2" x 11", and firmly bound. Appropriate figures, tables and manufacturer's data are highly recommended to clarify the extent and purpose of the project. A minimum of seven (7) copies of the completed report shall be submitted to the Department of Health, Safe Drinking Water Branch for review.

1. General Information

   a. Brief description of the project and location, including phasing schedule, public water system (PWS) name and number (designated by SDWB);

b. Name of owner and authorized representative(s);

c. Site plan with contours and drawn to scale.

d. Existing water system overview

1) Description of the nature and extent of the existing area and future area to be served;

2) Description of population served, land use, and consumption data, including the forecasting of water demands;

3) Appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional and other water supply needs;

4) Required capacity to meet fire protection and pressure requirements;

5) Alternate solutions considered and supporting data for recommended plan; and

6) Environmental and economic impact.

2. Physical and Hydrological Characteristics of Source Area

a. Location;

b. Size of contributing area (acres);

c. Climate;

d. Topography including vegetal cover, streams and water bodies;

e. Geology and foundation conditions;

f. Earthquake considerations and design parameters;

g. Groundwater conditions;

h. Flood problems including tsunami inundation zones and preventive measures that may be used;

i. Information confirming the conformance with local land use planning and zoning regulations; and

j. Discussion of water rights and future uses.

3. Potential Sources of Contamination

Sources of contamination in the watershed or sensitive areas surrounding existing or proposed intakes, wells or springs should be identified. Not only should this be determined by physically touring and observing the watershed and its daily uses, but the survey should also actively question the land owner, jurisdictional agency and/or utility representatives about adverse and potentially adverse activities in the watershed. An example of types of contamination includes:

a. Man Made.

1) Point discharges of sewage, stormwater, and other wastewater. On-site sewage disposal systems.Recreational activities (swimming, boating, fishing, etc.).

2) Human habitation.

3) Pesticide usage.

4) Logging.

5) Highways or other roads from which there might be spills.

6) Commercial or industrial activity.

7) Solid waste or other disposal facilities.

8) Barnyards, feed lots, turkey and chicken farms and other concentrated domestic animal activity.

9) Agricultural activities such as grazing, tillage, etc., which affects soil erosion, fertilizer usage, etc.

10) Other.

b. Naturally Occurring.

1) Animal populations, both domestic and wild.

2) Turbidity fluctuations (from precipitation, landslides, etc.)

3) Fires.

4) Inorganic contaminants from parent materials (e.g., asbestos fibers).

5) Algae blooms.

6) Other.

This list is by no means all-inclusive. The surveyor should rely principally on his observations and thorough questioning regarding the unique properties of each watershed to completely describe what may contaminate the source water.

4. Source Vulnerability Assessment

Vulnerability assessments are used to determine the likelihood that potential contaminant sources (identified in Item 5) in the watershed or drinking water protection area will degrade the public water system's source water quality. The resulting susceptibility determination shall consider the following minimum factors: hydrogeologic or hydrologic sensitivity, contaminant source characteristics, contaminant source management, and well or intake integrity:

a. Hydrogeologic or hydrologic sensitivity refers to the tendency for transport of a contaminant from any point within a watershed or drinking water protection area to a well or intake based on well or intake location, surface topography and vegetal coverage, stress (e.g. drought) condition and subsurface geology (permeability, etc.).

b. Contaminant source characteristics refers to the identification of point or nonpoint sources of contamination, e.g., persistence and mobility, toxicity, volume and method of discharge, and acute or

chronic health effects.

c. Contaminant source management evaluates whether potential contaminants are regulated, what containment or control practices are used (e.g. watershed management program) and whether spill or release contingency plans are in place.

The goal of the watershed management program is to protect the quality of a water system's surface water source by monitoring activities in the source watershed and minimizing their impact. To assess the degree to which the watershed management program is achieving its goal, the following types of inquiries could be made:

- If the watershed is not entirely owned by the utility, have written agreements been made with other land owners to control land usage to the satisfaction of the utility? Are appropriate regulations under the control of state/local department of health in effect?

- Is the utility making efforts to obtain as complete ownership of the watershed as possible? Is effort directed to control critical elements?

- Are there means by which the watershed is regularly inspected for new sources of contamination or trespassers where access is limited?

- Are there adequately qualified personnel employed by the utility for identifying watershed and water quality problems and who are given the responsibility to correct these problems?

- Are raw water quality records kept to assess trends and to assess the impact of different activities and contaminant control techniques in the watershed?

- Has the system responded adequately to concerns expressed about the source or watershed in past sanitary surveys?

- Identify what other agencies have control or jurisdiction in the watershed. Does the utility actively interact with these agencies to see that

their policies or activities are consistent with the utility's goal of maintaining high raw water quality?

d. Well or intake integrity refers to the design, contruction and maintenance of existing source water infrastructure.

5. Source Water Quality

Analyses for all of the contaminants listed in the table, "Contaminants to be Tested in All New Sources of Potable Water" shall be performed by a laboratory approved by the Department of Health, State Laboratories Division, for all sources being addressed in the report. For example, when approval of a "well field" is being sought, all of the wells must be tested for the all of the required contaminants.

Laboratories performing the analyses must be currently certified by the Hawaii Department of Health, State Laboratories Division. While the lab data has often been conveniently summarized in a table, some reports have failed to note when analyses have been subcontracted to another lab. The lab reports from all of the laboratories involved must be included in the engineering report to allow the Department to verify that an approved lab performed the analyses. Failure to do so will delay the review process.

6. Source Construction

a. Surface Intakes

1) Source quantity

2) Protection from vandalism

3) Is the intake screened to prevent entry of debris, and are screens maintained?

4) Animal activity controls within the immediate vicinity of the intake

b. Infiltration Galleries under the influence of a surface water.

1) Source quantity

2) Is the lid over the gallery watertight and locked?

3) Is the collector in sound condition and maintained as necessary?

c. Springs under the influence of a surface water

1) Source quantity

2) Protection around the spring (such as fencing to control the area)

3) Spring construction (collection structure) excludes surface water infiltration?

4) Screened overflow and drain pipe?

d. Well under the influence of a surface water

1) Description of well site;

2) Coordinates (latitude, longitude), State Well Number, and Tax Map Key Number;

3) Surface elevation and slope;

4) Size and topography of catchment area;

5) General summary of soil and substrata;

6) Well depth and depth to groundwater;

7) Well cross-sectional diagram;

8) Water quality data on any existing wells in the area;

9) Approximate groundwater contours;

7. Source Water Pumps, Pumphouses, and Controls

a. Capacity of intake pumps, booster pumps, etc.

b. Pumps and controls operation and maintenance

c. Operation and maintenance of check valves, blow off valves, water meters and other appurtenances

d. Emergency power backup with automatic start-up

e. Are underground compartments and suction wells waterproof?

f. Structural condition of the interior and exterior of the pumphouse

g. Pumphouse safety hazards (chemical, electrical or mechanical)

h. Protection measures against vandalism

i. Availability of water production records onsite

8. Proposed Treatment Works

a. Siting analysis: Discuss various sites available indicating proximity to developed areas, availability of utilities, and accessibility of plant site. Show on topographic maps the treatment plant and arrangement of present and proposed treatment facilities;

b. Inlet feed pressure range and source (pumps, gravity head);

c. Design flows (average, max day, peak hour) and Basis For Design of major unit processes (pilot studies may be required for the proposed treatment works);

d. Detailed description and layout plan of the plant's process treatment train, including all biological, chemical or physical treatment processes, (presedimentation, predisinfection, strainers, chemical addition, filtration, pH adjustment, post-treatment, backwash or waste stream disposal, solids handling, redundancy, emergency power, etc.);

1) For media filters: media material specifications, bed depths, surface loading, backwash triggers and backwash rates; and

2) For membrane filters: array configuration, specs (materials, hollow fine fiber or spiral wound, warranty), design flux (gpd/sf) using outside surface area or parameter as approved by SDWB, maximum transmembrane pressure, backwash and Clean-In-Place equipment and operating setpoints,

membrane integrity test and repair procedures;

e. Description of the plant operations, including startup, filter ripening, backwash, filter to waste, shutdown and emergency procedures, compliance monitoring and calculations;

f. The specific monitoring and recording equipment, and their locations (calibration schedule, periodic maintenance);

g. Detailed CT calculation procedure;

h. NSF certified products shall be specified where applicable; and

i. A detailed explanation on how the treatment plant will be able to meet the filtration and disinfection criteria.

9. Treated Water Pumping Facilities

a. Purpose of service;

b. Pumping layout and sizing of force main;

c. Design flow requirements including maximum, average, minimum, variations in demand, and effect of storage;

d. Electric power;

e. Pumping arrangement;

f. Pump selection including system and characteristic curves;

g. Proposed buildings and other structural improvements;

h. Water hammer consideration;

i. Descriptions of essential features of construction and operation, including staging sequence if applicable; and

j. Electrical system including provisions in the event of power failure, and telemetering and supervisory control systems.

10. Finished Water Storage

Describe location, type and size of existing and new storage facilities. Include discussion on inlet/outlet configurations, tank baffling, drains, overflows, compliance monitoring points (CT calcs), telemetering and supervisory controls, and other important and pertinent considerations. Screens or flappers must protect the end of drains and overflow pipes.

11. Water Distribution Systems

a. Provide general layout of the system;

b. Indicate materials, valves, hydrants, meters, etc.;

c. Identify proximity of other interconnected systems and provide detailed information on system isolation measures;

d. Include effects of incremental or phased construction, possibilities of future developments as applicable; and

e. Provide information any other important data affecting operation of the surface water or GWUDI distribution system.

12. Financing

Provide information on estimated costs of construction, operation and maintenance and other related costs. Costs should reflect any project phasing.

13. Professional Engineer Certification

Provide an engineer's certification that the engineering report and the information contained therein is true to the best of the engineer's knowledge and that the source of potable water identified in the report will comply with Chapter 11-20 (refer to sample form).

NOTES:

1. Capacity Evaluation (for NEW Public Water System)

   All new community public water systems and new nontransient noncommunity public water systems must demonstrate adequate technical, managerial, and financial capacity in compliance with State and Federal drinking water regulations (Hawaii Administrative Rules, Title 11, Chapter 20, Capacity Demonstration and Evaluation, section 11-20-29.5).

   A prospective water system owner or representative must submit application materials to obtain approvals in two steps: 1) pre-construction approval and 2) post-construction or startup approval. The SDWB should be consulted for guidance materials on these submittals.

2. Operator Certification

   Operator certification will require certified operators to operate the treatment facilities and/or distribution systems of public water systems.

3. Operation and Maintenance Certification

   Persons proposing to use a new source of raw water to supply a non-County of Water Supply public water system shall certify that the new source of raw water and its treatment system, if any, will be operated and maintained to provide water that complies with state primary drinking water regulations (see sample form).

4. Operations Plan and Emergency Plan

   Operations and Emergency Plans shall be submitted along with the Engineering Report for approval. The Operations Plan shall be prepared in accordance with Chapter 2 Filtration Criteria, paragraph IV.A. of the Hawaii SWTR Administrative Manual. The Emergency Plan shall be prepared in accordance with Chapter 3 Disinfection Criteria, paragraph II.B. of the Admin Manual.

SAMPLE FORM

PROFESSIONAL ENGINEER CERTIFICATION

The undersigned, being a registered professional engineer, certifies that:

1. ***He/She*** has prepared the attached report and the information contained therein is true to the best of ***his/her*** information and belief; and

2. The water produced by ***name of source(s) (State Well No(s).)***, the potable water system identified in the attached report, will comply with the State primary potable water regulations contained in Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, and will comply with the Rules and Regulations of the ***Department of Water Supply, County of _____ / Board of Water Supply, City and County of Honolulu***, when said drinking water system is operated and maintained in accordance with the instructions and information contained in this report.

Professional Engineer Seal

This work was prepared by me or under my supervision

_____

Name
Title
Company or Organization

SAMPLE FORM

OPERATION AND MAINTENANCE CERTIFICATION

Name of Public Water System

Name of Source (State Well No. _____)

The undersigned, being the owner of the above identified project, certifies that:

2. ***He/She*** will operate and maintain the potable water system for said project in accordance with instructions prescribed by a professional engineer and so that the product/finished water will comply with the following laws (herinafter referred to as "applicable laws"), Hawaii Revised Statutes, Chapter 340E; Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems; and the Rules and Regulations of the ***Department of Water Supply, County of _____/Board of Water Supply, City and County of Honolulu***; and

3. ***He/She*** will require all subsequent owners of said potable water system to operate and maintain the potable water system for said project in accordance with instructions prescribed by a professional engineer and so that the product/finished water will comply with applicable laws; and

4. ***He/She*** will notify before the transfer of ownership, all subsequent owners of the potable water system of their duty to operate and maintain the potable water system for said project in accordance with instructions prescribed by a professional engineer and so that the product/finished water will comply with applicable laws.

5. ***He/She*** has authority to perform the acts certified to above, and ***he/she*** has authority to make the above certification on behalf of the other owners of the project, if any.

_____

Name, Title

Company or Organization