CHAPTER 7
WATER RESOURCE DEVELOPMENT AND OPERATING REGULATIONS

NOTE: Authority cited by GEPA for formulation of these regulations - 10 GCA §45106. These regulations were adopted January 25, 1985 and amended August 2, 1990.

Part II
GUIDELINES FOR WATER WORKS DEPARTMENT

Note from the Guam Environmental Protection Agency.

The enabling legislation of Chapter 46, Title 10, Guam Code Annotated, in particular the Water Resources Conservation Act, established the general requirements that must be met by well drillers, contractors, and operators. However, implementation of the Act required specific regulations and detailed requirements such as the type of information required in license applications as well as the form to be used in preparing such an application. These regulations were promulgated by GEPA under the authority of Title 10, Guam Code Annotated, Chapter 45.

This document presents a completely rewritten version of the existing Rules for the Protection, Development and Conservation of Water Resources in the Island Territory of Guam under Title 16 Subchapter C of the Administrative Rules and Regulations of the Government of Guam. These new regulations address licensing, permit applications for drilling and operating a well and also present specific standards for construction, inspection, and water quality. Data reporting requirements are also addressed, it should be noted that fees for applications, license and permits have been included in the Regulations.

§7101. Authority. Section 45106 of Chapter 45, Title 10, of the Guam Code Annotated authorizes and directs the Guam Environmental Protection Agency to promulgate rules and regulations necessary to implement the provisions of the Water Resources Conservation Act.

§7102. Purpose. The purpose of these regulations is to protect the beneficial use of the Territory's underground and surface water resources in the interest of the people of Guam and for the public welfare by prescribing rules and procedures governing the development and operation of water supply wells and surface water supply wells.

§7103. Definitions. (a) *Abandoned Well* means a well whose use has been permanently terminated and no future use is anticipated.

(b) *Administrator* means the Administrator of the Guam Environmental Protection Agency or his duly authorized representative.

(c) *Agency* means the Guam Environmental Protection Agency (GEPA).

(d) *Agricultural Wells* means water wells used to supply water for irrigation or other agricultural purposes, including so called *stock wells,* and not used to supply water for human consumption.

(e) *Alteration, Rehabilitation or extension* means deepening, reperforating, the installation of packers or seal, or other material changes in the construction design of the well.

(f) *Aquifer* means a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradient, or is permeable enough to yield economic quantities of water to wells.

(g) *Aquifer Yield* means the maximum rate of withdrawal that can be sustained by the complete by an aquifer without causing an unacceptable decline in hydraulic head in the aquifer.

(h) *ASTM* refers to the latest standards of the American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19102.

(i) *AWWA Standards* refers to the latest edition of applicable standards as approved and published by the American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(j) *Basin Yield* means the maximum rate of withdrawal that can be sustained by the complete hydrogeologic system in a ground water basin without causing unacceptable decline in the hydraulic head in the system or causing unacceptable changes to any other component of the hydrologic cycle in the basin.

(k) *Board* means the Board of Directors of the Guam Environmental Protection Agency (GEPA).

(1) *Beneficial Use of Water* shall include the use of water reasonably required for domestic, agricultural, commercial, industrial, recreational and other purposes on both public and private lands. The use of water for domestic purposes shall have the preference over any other uses of water.

(m) *Commercial Irrigation Wells* means wells used to supply irrigation water for landscaping, including golf courses.

(n) *Community Water System* means a system for the provision of piped water for human consumption which serves a minimum of 15 service connections used by year-round residents or regularly serves a minimum o£ 25 year-round residents.

(o) *Confined Aquifer* means an aquifer that is confined between to aquitards and occurs at depth.

(p) *Construction* means all acts necessary to the actual construction of a well as defined in this Section, but excluding the installation of surface appurtenances such as pumps and pumping equipment.

(q) *Contamination* means the presence of any foreign substance (organic, inorganic, radiological or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness of the water.

(r) *Destroyed Well* means a well whose use has been permanently suspended and has been filled in accordance with the provisions of these regulations.

(s) *Destroyed* as used in these regulations shall mean the proper sealing or filling of abandoned well, including test hole to restore, as far as feasible the geohydrologic

conditions that existed before the well was drilled and constructed.

(t) *Driven well* means a well which is constructed by driving a pointed screen, referred to as drive point, into the ground. Casing and lengths of pipe are attached to the driving point as it is being driven into the ground.

(u) *Elevation* means the distance measured vertically from Mean Sea Level (MSL) to the point being stipulated.

(v) *Fill* means placing of fill materials in the well bore of an abandoned well for the effective and permanent prevention of the vertical movement of water within the well bore, including vertical movement of water within the annular space surrounding well casing.

(w) *Groundwater* means any water, except capillary moisture, beneath the land surface in the zone of saturation.

(x) *Inactive Well* means a well whose use has been temporarily suspended and may be reactivated at a future date.

(y) *Individual Domestic Well* means a well used to supply water for human consumption or for the domestic needs of an individual residence or commercial establishment such as an apartment house, cafe, gas station, etc., which are not served by a community waster system as defined in this section.

(z) *Industrial Wells* means water wells used to supply industry on an individual basis and not used to supply water for human consumption.

(aa) *License* means a well driller license issued by the Agency permitting a person to do business in well drilling within the Territory of Guam.

(bb) *Mining* means pumping that exceeds a safe or sustainable yield within a particular zone or sub-basin.

(cc) *Monitoring Well* means wells used for the purpose of observing subsurface hydrologic conditions and collecting hydrologic or water quality data and not for use

in extracting water from an aquifer for beneficial use.

(dd) *NSF* means the National Sanitation Foundation and refers to the listings developed by the Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106.

(ee) *Permit* means a well drilling permit or well operating permit issued by the Agency.

(ff) *Person* means any individual, firm, partnership, association, or corporation, both public and private, including agencies of the Government of Guam and of the United States of America.

(gg) *Plug* means placing of sealing materials in the well bore of an abandoned well to eliminate physical hazard, prevent ground water contamination, conserve yield and maintain hydrostatic head of aquifers and prevent intermingling of desirable and undesirable waters, or the placing of a plug or bridge, lead wool, steel shavings or large stones (not more than 1/3 of the diameter of the hole) inside the bore of an abandoned well to permit the placement of appropriate sealing materials where sealing with ordinary materials by the usual methods is impractical to perform.

(hh) *Public Water Supply Well* means a well used to supply potable water for a community water system as defined in this Section.

(ii) *Recharge or Injection Well* means well constructed for the purpose of introducing water or substances into the ground as a means of replenishing groundwater basins or repelling intrusion of sea water or disposing of a substance.

(jj) *Repair* means any action which involves the physical alteration or replacement of any part of a well, but does not include the alteration or replacement of any portion of a well which is above the ground surface.

(kk) *Test Boring* means a hole drilled for geologic or hydrologic exploration and not intended for use as water production well or monitoring well.

(11) *Transition Zone* means the portion of the

groundwater aquifer where the concentration of chloride in the water varies spatially between 250 mg/l and 19,000 mg/l.

(mm) *Transition Zone Centerline* means the level in a vertical column of water extending through the groundwater lens where the salinity equals 9,500 mg/l.

(nn) *Unconfined Aquifer* or *Water-Table Aquifer* means an aquifer in which the water table forms the upper boundary. It occurs near the ground surface.

(oo) *Water* shall be construed to include ponds, springs, wells and streams and all other bodies or underground wells, natural or artificial, inland or coastal, fresh or salt, public or private.

(pp) *Water Production Well* means well that yield a sufficient amount of potable water and can be used to supply water for the community water system.

(qq) *Well* means any hole that is driven, drilled, dug, or bored at any angle, either cased or uncased, by any method into the ground, for the purpose of obtaining water or knowledge of water bearing or soil formations, or for the disposal of surface water drainage. This definition shall include well used for the purpose or (1) dewatering embankments during construction, or (2) stabilizing hillsides or earth embankments.

(rr) *Well Driller* means any person engaged in the business of well drilling.

(ss) *Well Drilling* means the act of constructing a well as defined in this Section.

(tt) *Wellhead Protection Area* shall mean the surface and subsurface area within a minimum of 1,000 feet radius of a water well or wellfield, supplying a public water system through which contaminants are reasonably likely to move towards and reach such water well or wellfield.

(uu) *Well Seal* means an approved device installed inside the casing or covering the top of the casing to prevent contamination from entering the well.

(vv) *Well Pit* means a common method of providing convenient access to the top of the well and the underground lateral pipe from the well casing connecting to the distribution system.

(ww) *Yield* means the maximum pumping rate that can be supplied by a well without lowering the water level in the well below the pump intake.

§7104. Well Drillers License. (a) Any person who is engaged or intends to engage in the drilling of wells is required to apply for a driller's license. Such licenses are required not only of those who make a regular business of well drilling, but all who may construct wells for their own purposes or for others, as an incident to any line of business activity. The application shall be submitted to the Administrator on forms supplied by the Agency and shall include the following information.

(1) Name and business mailing address of the applicant;

(2) Statement as to whether it is an original application or renewal application;

(3) If the applicant is not an individual natural person, the type of organization or association, or private or public legal entity or the agency the applicant is;

(4) Contractor license number;

(5) Statements and documents for the billing:

(A) Bonding and financial capability;

(B) Insurance for comprehensive and general liability coverage;

(C) Qualifications and experience; and

(6) Signature of the applicant or authorized representative thereof indicating under penalty of perjury that the information provided in the application is true and accurate to the best of his/her knowledge.

(b) A fee of two hundred dollars ($200.00), payable to the Treasurer of Guam, shall accompany each initial application or a well driller's license. A renewal fee of two hundred ($200.00) for another two years or three hundred dollars ($300.00) for triennial renewal shall accompany each renewal application.

(c) The initial license shall be valid for a period of two years from the date of issuance and may be renewed for another two years and triennial thereafter.

(d) A well driller's license shall not be required for person who performs labor or services at the direction and under the direct on-site supervision of licensed well driller.

(e) An application for a well driller's license shall be accepted if applicant proves to the satisfaction of the Administrator that:

(1) He or it has at least a minimum experience of five (5) years continuous work in well drilling and construction under the direct supervision of a licensed driller.

(2) He or it can obtain performance and payment bonds for work of this magnitude or otherwise demonstrate financial capability; and

(3) He or it shall be able to post insurance for comprehensive and general liability coverage in accordance with legal requirements.

(f) Performance and payment bonds, and Comprehensive and general liability insurance does not apply to Federal and Government of Guam Departments and Agencies, but shall apply to all their respective contractors.

(g) The Administrator shall deny an application for a well driller's license if the information submitted demonstrates that the applicant does not satisfy the requirements pertinent to the license.

(h) Well driller's license is not a permit to drill wells and that an application must also be made for a well drilling permit in accordance with §7105 prior to drilling

any well.

§7105. Well Drilling Permits. (a) No well may be drilled unless the Owner of the land on which the well is to be drilled shall, before the commencement of drilling, have obtained a permit therefor and filed a preliminary report to the Administrator. A well drilling permit application shall be completed on a form provided by the Agency and submitted to the Administrator for each new well, repair, or alteration, rehabilitation or extension of an existing well. The application shall include the following:

(l) Name and address of the owner of the well and owner of the land on which the well is to be located. If the Owner of the land and the owner of the well to be drilled are not the same, a notarized statement from the owner of the land granting permission for the construction of the well must be submitted with the application.

(2) A map or drawing with a scale of 1" = 50 showing the following data.

(A) Location of well with respect to known references such as property lines, street intersections or survey monuments, including coordinates of the well. to the nearest foot, based on the Government of Guam Triangulation Network (GGTN)

(B) Topography with contour intervals not greater than two (2) covering a land area extending not less than 1000 feet in all directions from the well.

(C) Property lines of property upon which the well is to be drilled.

(D) Location and identification of a bench mark. where the completed well can be tied. Elevation of the bench mark shall be established by a Registered Land Surveyor in the Territory of Guam.

(E) Location of existing or abandoned wells within a radius of 1000 feet.

(F) Sewer lines and wastewater disposal, ponding basins, septic tanks & leached fields, sewage treatment plants or sewage wet wells, solid waste disposal sites, livestock and animal pens, cesspools, privies, animal feedlots, and abandoned and improperly sealed wells.

(G) Other natural features such as springs, rivers or sinkholes.

(3) A statement as to the purpose for which the water is to be used; estimated pumping rate: estimated hours of operation; and the estimated volume of water to be pumped on an annual basis.

(4) Details of the proposed construction, including:

(A) The type of pump to be installed; the rated capacity (flow at a specific total dynamic head) of the pump or a pump performance curve.

(B) Hydraulic calculations supporting the sizing of the well and pump.

(C) Proposed depth of the well.

(D) A sketch showing well features, including sizing and details of casing or lining, depth of well, type of screen or casing perforations proposed, water level measurement provisions, grouting of annular space, vent, water sample tap, air release valve assemblies, pressure gauge, discharge piping and fittings, production water meter provided with totalizer, etc.

(E) Size and capacity of water production meter. Meter should be capable of reading pumping rates in gallons per minute up to a flow of 150 percent of the pump capacity and be provided with a totalizer registering total volume of water pumped in gallons.

Accuracy shall be within two (2) percent of the range of the meter.

(F) Elevation of the top of the well casino above mean sea level MSL) and a statement regarding the potential of flooding.

(G) A detailed description of the procedures to be utilized in the well drilling operation and well construction including but not limited to water to be used in the drilling operation, distance from pollution sources, disinfection information, sealing information, material setting, slush pit, etc.

(H) Sampling taps as specified in §7119.

(I) Adequate access and clearance for well drilling equipment.

(b) A fee of two hundred fifty dollars ($250.00) per well (production well, monitoring well, observation well, test boring), payable to the Treasurer of Guam, shall accompany each application for the drilling or excavation of a new well production, monitoring, irrigation, industrial, and observation well and electrical ground well, test boring, repair or alteration - rehabilitation or extension of an existing well or new well.

(c) Application for a well drilling permit shall be made at least fifteen (15) dabs before drilling operations begin. No drilling shall commence without issuance of a permit by the Administrator and a building permit issued by the Department of Public Works.

(d) The proposed site for well drilling shall be inspected in the field by the Administrator or his authorized representative prior to issuance of a well drilling permit

(e) Before a permit is granted, the Owner of the well shall submit to the Administrator a performance bond for each well or exploratory hole or test boring hole to be constructed with proposed depth geological and hydrological conditions meeting the following requirements:

(l) The amount of bond shall be set by the Administrator but in no case shall be greater than ten

thousand dollars ($10,000.00)

(2) The amount of performance bond as set by the Administrator shall include the estimated cost of sealing the in accordance with these regulations should it be necessary to abandon the well for any reason prior to its completion. In the event the performance bond is forfeited, the Owner of the well will not be eligible for future permits within a period of two years.

(3) The bond shall be effective for a period covering the duration of the well drilling permit or until issuance of a well operating permit, whichever occurs first.

(4) The payee of the bond shall be the Government of Guam and shall be payable if the applicant fails to complete the well or test holes in accordance with the provisions of the well drilling permit.

(f) The maximum capacity of the well(s) shall not exceed the pumping rates as identified in the Northern Lens Study as prepared by the Guam Environmental Protection Agency, for the groundwater management one in which it is located, taken together with the design pumping rates of all existing wells in that one.

(g) The Owner of the well or his authorized representative shall notify the Administrator 48 hours in advance of initiating any drilling work and when the drilling work is completed, including the installation of the well casing, any equipment or appurtenances in the well.

(h) The Administrator shall deny, or impose appropriate standards or conditions in a permit to drill a new well or to alter, repair, rehabilitate, or extend an existing well so that the proposed work shall not adversely affect the groundwater resources by:

(1) Excessive lowering of the ambient groundwater table, or

(2) causing or bringing about excessive malt water intrusion, excessive mineralization or other

degradation of water quality, or

(3) Significant interference with the operations of existing established water sources, or

(4) Introducing contaminants into the groundwater.

(i) No drilling permit application shall be accepted for review and approval by the Administrator, unless the owner/driller has obtained clearance approval from the Public Utility Agency of Guam (PUAG) in accordance with the following water utilization priorities:

(1) First priority shall be for use or resale by the PUAG for any purpose, or for household use, for bona fide farms, plant nurseries, aquaculture, ranches, other bona fide agricultural uses, for golf courses of less than 4,000 square meters or for ornamental lawns and gardens of less than 4,000 square meters.

(2) Second priority shall be for any other use by the government of Guam for public recreation and for other public purposes only and not for purposes enumerated in subsections (3) and (4) below.

(3) Third priority shall be for industrial use.

(4) Fourth priority shall be for irrigation of golf courses of 4,000 square meters or larger, or for irrigation of lawns or ornamental gardens of 4,000 square meters or larger.

(5) Fifth priority shall be for any other purpose.

Any use of higher priority shall have preference over any use of lower priority regardless of which use was first in time.

As between water uses of equal priority, first in time shall have a temporary priority to the extent of such prior use for so long am the water is actually beneficially used on a regular or seasonal basis, but if not used such temporary water right shall be deemed abandoned pursuant to the common law.

All water rights and water rights to use water shall be determined according to the above-mentioned priorities pursuant to Public Law 20-6.

(j) The owner/driller shall prepare a preliminary report signed by a hydrologist in the form of an Environmental Impact Assessment (EIA) [see Appendix D Forms] for the proposed well project and to be submitted together with the drilling permit application for review and approval by the Administrator.

(k) The well drilling permit shall indicate the maximum pumping rate, as established by the Administrator.

(l) The Administrator shall require that the well driller keep an accurate record of the well drilling operations and well drilling log for each individual well, including a geological description of the representative sample of the materials encountered together with the elevations of the top and bottom of each change -in geological characteristics or at a minimum of five foot intervals whichever provides greater detail. The log shall also include a record of water levels encountered and any changes thereof; construction details, casing grout, gravel pack, etc.; other information such as owner, driller, and equipment used. The well drilling operations and driller's log shall be maintained on forms provided by the Agency (See Appendix J & J-1). The Drilling Operation's Record, in addition to supplying the information specifically required in the drilling operation forms, shall include information concerning all -shut down or standby periods with reason thereof. The Driller's Log, in addition to supplying that information require in the driller's log form, shall include a report on the amount of the hole filled by any cave-in materials and the driller's opinion of the level from which the caving occurred. It shall also include the following:

(1) The reference point for all depth measurement (in feet above MSL)

(2) The depths at which water is encountered (in feet above MSL and depth below top of casing).

(3) Static water level at the start of each day work.

(4) Depth at which hole diameter changes.

(5) Identification of the kind and quantity (when approved for use) of drilling fluid additives employed and the depths at which they are added.

(6) Measured final depth of borehole and completed well.

(7) Description of pumps and pumping procedures including rates and settings.

(8) Description of all cleaning agents and additives used including quantities and times of use.

(9) Any and all other information relating to drilling the well that will contribute to a complete and accurate log.

(m) A complete physical and chemical analysis of the water produced from a new well shall be made after 36 hours continuous pumping at the design withdrawal rate as required in §7106 of these regulations. If the analysis reveals that the water from the well fails to meet the maximum contaminant levels as prescribed by the Guam Primary and Secondary Safe Drinking Water Regulations including turbidity, color, and threshold odor limitations, or shows excessive hydrogen sulfide, carbon dioxide or other constituents or minerals which make the water undesirable or unsuited for domestic use, appropriate treatment shall be provided.

(n) If a well blow-off line is provided, it shall slope downward and terminate at a point which will not be subject to submergence by flood waters

(o) All completed well unit shall be protected by intruder resistant fences, the gates of which are to be provided with locks, or enclosed in locked, ventilated well houses to exclude possible contamination or damage to the facilities by trespassers.

(p) An all weather access road shall be provided to each well site.

(q) The well site shall be fine graded so that the site is

free from depressions, reverse grades or areas too rough for proper ground maintenance so as to assure that surface water will rain away from the well. In all cases, arrangements shall be made to carry off floor drainage. Suitable drain pipes located at the outer edge of the concrete floor shall be provided to carry off this water and prevent its ponding or collecting around the well head. This waste water shall be disposed of in such a manner to that it will not cause any nuisance from mosquito breeding or stagnation. Drains shall not be directly connected to storm or sanitary sewers.

(r) Within thirty (30) days after completion of the construction of each well, the driller shall submit to the Administrator a complete, legible, and true copy of the drilling operation records and the well driller's a log of each well, representative samples of rock materials penetrated during drilling and the results of any pumping tests conducted, inclusive of the drawdown of water level and estimated radius of influence based upon measured transitivity. A map showing the location of the test site, pumped well and piezometers, and including recharge and impervious boundaries, if any. A lithological cross-section of the pumping test site, based on data obtained from the bore holes, and also showing the elevations and depth of the screens, tables with results of the field measurements, including measurements of well discharge and water levels in the various piezometers, hydrographs, illustrating the corrections applied to the data observed, if applicable, time-drawdown curves and distance-drawdown curves, considerations leading to the selection of the method of analysis applied, the calculations in an abbreviated form, including the values of the aquifer characteristics obtained and a discussion as to their accuracy, recommendations for further investigations, if applicable, and a summary of the main results obtained.

(s) An accurately completed report of yield and drawdown resulting from any pumping tests conducted by the well driller shall be submitted to the Administrator on forms provided by the Agency (See Appendix L, L-1, & L-2) upon completion of the required pumping test.

The Administrator shall require the applicant/driller to furnish one or more water samples for subsequent analysis by the Agency laboratory to verify the correctness

of the test results submitted by the applicant/driller.

Pumping tests conducted by the driller for each well shall include: (1) A step-drawdown test with increasing discharge rates; (2) a long-term, continuous, constant rate, time-drawdown; (3) time-recovery tests.

For conducting these tests, the bottom of the sounding tube shall be strapped or lowered adjacent to the bottom of the well screen. Sounding tube shall be one and one-half (1-1/2) inches diameter, schedule 80 PVC pipe. Each section shall be twenty (20) feet length, except the lower-most section shall be ten (10) feet in length, PVC slotted screen, having slot opening of 0.030 inches. Threaded cap shall be provided at the top of the sounding tube.

If any well(s) are located less than 1.000 feet away from the new well, the driller shall measure the water levels of those well(s) during the long-term and subsequent recovery tests at the same time intervals as the well is being pumped.

(1) For step-drawdown tests, the pump shall be initially operated at the rate of 50 gpm. The pumping rate will then be increased by 50 gpm increments at one hour intervals until the well has been tested at design capacity or maximum pumping rate, whichever is lower. The test duration shall not exceed 12 hours unless otherwise specified by the Administrator. During the test, the driller shall record the time, water level in the pumped well and all observation wells, and discharge at 15-minutes intervals. When the test is completed and the pump stopped, the driller shall measure water level recovery in the well and observation wells as directed under sub-section (3) below until the water level has fully recovered to the original static water level.

(2) The long-term, continuous, constant-rate, time-drawdown tests shall commence after the water level in the pumped well has recovered from the step-drawdown test. The rate of pumping shall be equal to 100 percent design capacity or as determined by the Administrator. The driller shall insure that the pumping rate selected remains within the allowable variance of plus or minus 10 percent throughout the

test. The test duration is anticipated to be less than 24 hours, but the driller shall run the test for a period of time as directed by the Administrator.

The water levels shall be measured by the driller in the well being pumped, all observation wells, and springs or ponds hydraulically connected to the aquifer at the following time intervals or as directed by the Administrator.

0 to 5 minutes - once every 0 seconds

5 to 10 minutes - once every minute

10 to 30 minutes - once every two minutes

30 to 90 minutes - once every ten minutes

90 to completion - once every hour

During the long-term tests, changes in water quality, particularly chloride concentrations, are extremely important. The driller shall take water samples at the following intervals or as directed by the Administrator, for analysis of chloride content.

One sample after two minutes of pumping

Once every hour for the first 10 hours

Once every two hours for the remainder of the test.

(3) As soon as the pump is turned off at the completion of the time-drawdown test, the time recovery test shall begin. The driller shall take water level measurements in the well being pumped and all observation wells, and springs or ponds at the following time intervals or as directed by the Administrator.

0 to 5 minutes - once every 30 seconds

5 to 20 minutes - every minute (or until full recovery to original static water level)

20 minutes to full recovery every five minutes

(4) If there is any interruption in conducting this test, the driller shall re-do the test after the water level has fully recovered.

(5) The driller shall plot all test data on semi-log graph paper with drawdown (recovery) indicated on the arithmetic axis and time (in minutes) on the logarithmic axis.

(6) The driller shall not consider the yield at the beginning of the test if the water level is dropping. For estimating the actual flow of water, the yield shall be measured after the water level in the well has stabilized. The estimated yield shall be determined by the average output when drawdown has ceased and when the water table has been stable for at least four continuous hours. The time intervals required for the water level to return to its original level shall begin to be recorded immediately after pumping has ceased.

§7106. Well Operating Permits. (a) No well shall be placed into operation until a well operating permit has been obtained by the owner. (Permits for injection wells are covered in §7111).

(b) An application to operate each new well shall be made within ninety (90) days after the drilling operations are completed and shall be submitted to the Administrator on forms provided by the Agency, signed by the owner, and shall include the following:

(I) Name and address of the owner of the well.

(2) Name and address of the person who will be responsible for operation of the well, if different than the owner.

(3) A plan of the well showing:

(A) Control valves, miscellaneous fittings and appurtenances, and discharge pipes leading from the well;

(B) Flow metering device for recording

output of the well, including size, flow range, and manufacturer;

(C) Diagram of the well along its axis including the following:

(1) Ground surface and bottom of well elevation;

(2) Casing diameter and depth (length from ground surface);

(3) Limits of grouting of annular space;

(4) Elevation of top and bottom of well screen;

(5) Limits of gravel pack;

(6) Pump setting, and

(7) Water level measurement devices or other piping extending down the well (inside or outside the casing);

(8) Sampling tap (for sampling after 36 hours of continuous pumping at the design withdrawal rates and thereafter sampling activities.

(D) Chlorination and fluoridation equipment, if provided;

(E) Elevation and location of a permanent benchmark to which the altitude of a measuring point on the completed well can be determined;

(F) Elevation of the top of the well casing above mean sea level;

(G) Sampling taps as specified in §7119.

(4) Well construction specifications including:

(A) The start and completion date of the

drilling operation;

(B) The well drilling contractor;

(C) The total depth of the well, elevation of the ground surface and elevation of the well bottom, relative to mean sea level;

(D) Casing details specifying diameter, depth (length from surface), type, size, wall thickness, weight and material, and installation procedure;

(E) Screen or perforation details specifying type, slot size, length, diameter, material and method of installation;

(F) Cement grouting, specifying method used in grouting, gravel packing, specifying size, total depth, annular thickness and cubic yards of gravel placed, and emplacement procedure;

(G) Well development, specifying the method used in development;

(H) Flow measurement and testing, specifying pump capacity, design characteristics, static water level, specific capacity at test and method used for flow measurement and testing;

(I) Drilling technique, specifying method of drilling or type of drilling;

(J) Protection of wellhead, specifying provisions for protecting the well from contamination, but not limited to siting (flood level elevation, distance to sources of contamination, etc.); construction (sanitary seal, concrete pad, casing height above pad, check valve, fencing, etc); and to what extent activities in the area around wellhead are controlled (access, land ownership, types of activities, etc.);

(K) Well disinfection by describing procedure of disinfection and other types of laboratory control as provided for in §7116(a) of these regulations: and

(L) Log of well, specifying the formations penetrated and the stratum thickness including description and samples, whenever possible, of the materials penetrated shall be in accordance with the requirement of §7124 of these regulations.

(5) A statement as to the purpose for which the water is to be used, the estimated pumping rate, estimated hours of operation, and the estimated volume of water to be produced on the annual basis.

(c) The owner/driller of the well shall arrange with an approved laboratory, certified to conduct chemical and bacteriological analyses. The owner/driller shall submit all test results to the Administrator for review and approval. Results of the analyses must be approved by the Administrator before an operating permit is issued. The required water analyses shall be performed for all public water supply and individual domestic wells in accordance with the requirements shown in Appendix I, "Water Analysis Reporting Form."

(d) Except for monitoring wells, fee in accordance with the following schedule is required for each operating permit. The fee includes the costs of the inspections, water quality test result evaluations and tabulation of data.

(1) A fee of two hundred fifty dollars ($250.00) shall accompany the initial or renewal application. This fee is payable every five years.

(2) In addition to the initial or renewal fee of two hundred fifty dollars ($250.00), annual operating fee shall be assessed base upon the maximum pumping rate authorized, as stipulated in the operating permit. The annual operating fee shall be as follows:

Pumping Rate (GPM)	Annual Fee
0 to 150	$200.00
151 to 225	$250.00
226 to 326	$400.00
326 to 626	$600.00
greater than 625	$800.00

(e) Any well, prior to the issuance of the well operating permit, shall be inspected by the Administrator

or his authorized representative.

(f) An application for a well operating permit shall be approved if all the necessary conditions and requirements specified above have been fully met to the satisfaction of the Administrator. It shall be valid for a period of five (5) years.

(g) The Administrator shall deny an application for a well operating permit if the well was not constructed, or modified or repaired or extended in accordance with the approved application plan or other limiting conditions of the well drilling permit.

(h) The well operating permit shall indicate the maximum rate the well may be pumped as established by the Administrator.

(i) As a condition of the well operating permit, the owner shall:

(1) File an annual well operating report no later than January 15 of each year which shall include:

(A) Total volume of water pumped by month, for the preceding year;

(B) A description and details of any alteration, rehabilitation or extension made to the well or well appurtenances during the preceding year;

(C) An itemization, including dates, all maintenance performed during the preceding year including repairs or replacement of well equipment (pump, motor, etc.), chemical treatment of the screen, resetting of the pump, etc. Only below ground repairs or replacement of underground equipment must be reported to the Administrator.

(2) Submit the total monthly volume of water withdrawn within the first ten (10) days of the following month.

(3) Submit a quarterly report on the analytical

analysis results of the water (irrigation and monitoring wells).

(4) Have paid the annual operating fees and the five-year renewable application fee, if due.

(j) For wells in existence and operation at the time these regulations are approved and adopted, a well operating permit application shall be filed with the Administrator no later than 60 days after the effective date of these rules, unless a current permit is in effect.

(k) The Administrator may revoke, modify or suspend an operating permit for a well which produces contaminated water until the causes of the contamination are removed, or if the well is not being operated in compliance with the provisions of the well operating permit, or if operation of the well has contributed to the salinity profile of the aquifer.

(l) Government agencies or other appropriate engineering or research organizations shall be required to file an operating permit application in conformance with the provisions of this section for any monitoring wells used in the investigation or management of groundwater basins. All monitoring wells shall be sealed with concrete pads as well as be fitted with locking cap on top of the casing or an approved surface plate and bear the label "Monitoring Well" and the name of the agency or organization. An annual monitoring well report and water quality analysis results shall be submitted to the Administrator no later than January 15 of each year on forms provided by the Agency (See Appendix H and Appendix I).

(1) No fee shall be assessed for operating a monitoring well.

(m) Adequate access and clearance for well drilling equipment within the confines of the property shall be provided by the owner/driller.

(n) The Administrator reserves the right to increase or decrease the monitoring frequency and to include contaminants in addition to the contaminants listed in Appendix I as well as for requirement for additional monitoring well that may be warranted based on the

analysis of submitted data.

§7107. Action on Application. (a) The Administrator may require the applicant to furnish additional information, plans or specifications before acting on an application for license or permit.

(b) The Administrator shall review and act on any permit application and licenses within fifteen (15) days of receipt of the completed application. Should additional information, plans, or specifications be requested, the fifteen (15) days limitation will begin on the latest date of receipt of the requested data.

(c) The Administrator shall notify the applicant in writing of his approval, disapproval or denial, or conditional approval of the application, and he shall inform the applicant of sufficient facts and reasons upon which a disapproval or conditional approval was based and afford the applicant an opportunity to appeal the final actions before the Board in accordance with §7129 of these regulations.

§7108. Revoking of Licenses and Permits. (a) A well drilling permit shall expire, if the construction, repair, alteration, rehabilitation or extension is not completed within one (1) year of the date of issuance, unless the applicant secures an extension of the expiration date.

(b) The Administrator shall revoke a well drilling permit if the construction, repair, alteration, or rehabilitation is not in compliance with the approved application, plans, or limiting conditions of the permit.

(c) The Administrator may revoke a well driver's license, a well drilling permit or a well operating permit for violation of the regulations or conditions pertaining thereto.

(d) The Administrator shall revoke a well driller's license, a well drilling permit or a well operating permit for willful misrepresentation, or falsification of facts for the purpose of obtaining such license or permit.

(e) The Administrator shall revoke or otherwise modify a well operating permit upon his findings that a

well is not being maintained or operated in accordance with these regulations, or that continuance of such permit could adversely affect the groundwater resource. The Administrator shall suspend a well operating permit if the drinking water being produced from such well is contaminated.

(f) If the Administrator proposes to suspend or revoke a license or permit, he shall inform the licensee or permittee of sufficient facts and reasons upon which the proposed suspension or revocation is based and afford the permittee an opportunity for a hearing before the Administrator, prior to making a final decision.

(g) No application for a new well driller's license pursuant to these regulations may be made within one (1) year after revocation of any such license.

§7109. Transfer and Renewal of Licenses or Permits. (a) A well driller's license, well drilling permit or well operating permit issued pursuant to these regulations shall not, under an; circumstances, be transferred from one location to another, or from one person to another, without the approval of the Administrator.

(b) Renewal applications for well driller's license, well drilling permits, or well operating permits shall be treated in the same manner as the initial license or permit application.

(c) The Administrator, upon his discretion may exempt an applicant for renewal of a license or permit from particular initial permit or license requirements if such initial requirements have already been fully met by the applicant to the Administrator's satisfaction.

(d) Renewal applications for well driller's license, well drilling permits, or well operating permits shall be made within thirty (30) days before expiration of such license or permit.

(e) For renewing expired driller's license, the driller shall pay all the required license fees in addition to the two hundred dollars ($200) penalty fee for not renewing the license on time

§7110. Posting of Permits, Falsifying or altering Permits or Licenses. (a) Upon granting an approval for a well drill permit, the Administrator shall issue to the applicant a certificate, referred to as a well drilling permit, which shall be posted in a conspicuous place specified for which the permit is issued.

(b) No person shall deface, alter, forge, counterfeit, or falsify a drilling permit, well operating permit or well driller's license.

§7111. Injection Wells. (a) The construction of injection wells and their operation shall be accordance with the regulations establish by the Guam Environmental Protection Agency entitled "Underground Injection Control (UIC) Regulations", a copy of which can be obtained from the GEPA office.

§7112. Well Location. (a) The minimum horizontal distance from a public water well to potential sources of bacterial contamination** shall conform to the following minimum distances:

MINIMUM DISTANCE FROM WELL TO SOURCES OF BACTERIAL CONTAMINATION

FORMATION	MINIMUM ACCEPTABLE DISTANCE
Favorable (Unconsolidated)	1000 feet. Lesser distances only on Administrator's approval following comprehensive sanitary survey of proposed site and immediate surroundings.
Unknown	1000 feet only after comprehensive geological survey of the site and its surroundings has established, to the satisfaction of the Administrator that favorable formation exist.
Poor (Consolidated)	Safe distance can only be established following both the comprehensive geological and comprehensive sanitary surveys. These survey also permit determining the direction in which a well may be located with respect to sources of contamination. In no case should the acceptable distance be less than 1 000 feet whichever is greater.

** Horizontal distances for other possible sources of contamination will be established on a case-by-case basis.

(b) Whenever there a reasonable basis to expect the adverse conditions exist, the Administrator shall require

greater distance between a well and source of contamination than that given above.

(c) Whenever possible, wells shall be located up gradient (upstream) from any surface or groundwater flow of specific sources of contamination.

(d) For public water supply or individual domestic well located down gradient (downstream) from a contamination or pollutant source, the Administrator shall require greater distances between the well and source of contamination that given in item (a) of this section.

(e) If contaminant/pollutant source is an injection well or drainage well, distances from the well to the contaminants or pollutants shall be at the discretion of the Administrator.

(f) The top of the casino shall terminate above any known conditions of flooding by drainage or runoff from the surrounding land, but in no case shall be less than 13 inches above the concrete pad.

(g) All wells shall be located on terrain not subject to ponding or flooding. Furthermore, the slope of the ground surface in the vicinity of the well(s) shall be away from the well. In level areas, full compacted earth shall be placed around the well so as to elevate the platform, pad or apron.

(h) The minimum separation between a well or wells and possible sources of contamination shall be a function of the drawdown and radius of influence of the well or well. It shall be the responsibil ity of the design engineer to present data showing the radius of influence and drawdown together with the sanitary survey of the area influenced by the well. Such survey shall extend one-mile beyond the radius of influence of the well. In cases involving multiple wells, the interference among wells shall be determined. It shall be the design engineer's responsibility to show that the tow thirty (70) feet of the aquifer is not tapped by the well(s)

(i) Wells shall be so located that there will be no danger of pollution from flooding or from unsanitary surroundings, such as cesspools, privies, sewage treatment plant, or sewage wet well, sewage pumping stations, septic

tanks & leached fields, livestocks and animal pens, solid waste disposal sites, or abandoned and improperly sealed well(s), etc.

(A) No well shall be selected which is within 1,000 feet of a sewage or sewage wet well, sewage pumping station or drainage ditch which contains industrial waste discharges or the wastes from sewage treatment systems;

(B) No water wells shall be located within 1,000 feet of animal feedlots, solid waste disposal sites or land irrigated by sewage plant effluent;

(C) Livestocks in pastures shall not be allowed within 1,000 feet of water supply wells;

(D) Abandoned water wells in the area of a proposed well(s) shall be plugged and sealed properly to prevent possible contamination of fresh water strata. The procedures and methods to be followed in plugging and sealing shall be in accordance with §7128 of these regulations.

§7113. Sealing the Annular Space. (a) **General requirements**. The space between the well casino and the wall of the drilled hole (the annular space) shall be effectively sealed to protect against contamination or pollution by surface and/or shallow, subsurface waters. The minimum vertical distance of the annular space to be sealed from the ground surface shall be 100 feet or the depth to the static groundwater level whichever is less. The required distance may be increased if necessary to protect the aquifer.

(b) **Conductor (or Surface) Casing.** For public water supply wells, if used, the minimum thickness of steel conductor casing shall be one fourth (1/4) inch for single casing. Steel used for conductor casing shall, as a minimum, conform to the specifications described in §7116 of this regulation.

(c) **Sealing materials**. The sealing material shall conform to the American Water Works Association standards (AWWA A100-84) including its latest revision thereof and shall consist of neat cement grout, pozmix-

cement grout, portland cement-concrete grout and sand-cement grout.

(1) Net-cement grout shall consist of a mixture of a API Spec. 10, Class G cement or Class B similar to ASTM C150 Type II) and water in the ratio of 0.67 cubic feet (5.0 gallons) of water per 94 lb sack of cement weighing approximately 118 lb/cu ft. A maximum of 6 percent, by weight, bentonite and 2 percent, by weight, calcium chloride may be added.

(2) Pozmix-Cement grout shall consist of mixture of 50 percent, by volume, Pozzolan (74 cubic feet) and 50 percent, by volume, API Spec. 10, Class G cement with 0.77 cu ft of water per 84 lb of mixture. To this mixture may be added a maximum of 2 percent, by weight, bentonite and a maximum of 2 percent, by weight, calcium chloride, at the discretion of the driller.

(3) Portland cement-concrete grout shall contain 5.3 sacks of portland cement (ASTM C150 Type II) per cubic yard (0.76 cubic meter) of concrete and a maximum 7.0 gallons of water per 94 lb (42.6 kg) of sack of cement. The maximum slump shall be 4 inches. The aggregate shall consist of 47-percent sand and 53-percent coarse aggregate, conforming to ASTM C33. The maximum size aggregate should be 0.75 inches. Concrete seal shall not be place in an annulus of less than 3 inches.

(4) Sand-cement grout shall consist of a mixture of portland cement (ASTM C150 Type II), sand, and water in the proportion of not more than 2 parts, by weight, of sand to 1 part of cement with not more than 6 gallons of water per 94 lb (42.6 kg) sack of cement.

(d) **Thickness of Seal**. The thickness of the seal shall be at least two (2) inches, and not less than three (3) times the size of the largest coarse aggregate used in the sealing material. To accommodate adequate seal thickness the borehole must be nominally at least four (4) inches larger in diameter than the nominal casing diameter.

(e) **Placement of Seal**. The sealing material shall be applied in one continuous operation starting from the

bottom of the interval to the sealed to the top. Temporary casing may be used but must be removed during placement of seal. Gravity installation of sealant without the aid of a tremie, or grout pipe shall not be used unless the interval to be sealed is dry and in no case where the interval is over 30 feet in depth.

§7114. Surface Construction Features. (a) **Openings.** Openings designed to provide access into well casinos for making measurements, adding, gravel, etc., shall be protected against entrance of surface waters or foreign matters by installation of water tight caps or plugs, concrete pad, sampling tap, etc.

Air vents and casing vents: Access opening designed to permit the entrance or discharge of air (air or casing vents) shall terminate above the ground and the known flood lines and shall be protected against the entrance of foreign material by installation of down-turned and screened "U" bends. All other opening shall be sealed.

(1) Where the pump is installed directly over the casing, all holes in the base of the pump which open into the well shall be sealed by a method acceptable to the Administrator. An annular watertight seal shall be placed between the pump head and the pump base, or a watertight seal shall be placed between the pump base and the rim of the casing, or a sanitary seal or "well cap" shall be installed to close the annular opening between the casing and the pump column pipe.

(2) Where the pump is offset from the well or where a submersible pump is used. the opening between well casing and any pipes or cables which enter the well shall be closed by a watertight sanitary seal or "well cap".

(3) All pump discharge piping, not located within the well itself, shall be located above ground.

(4) If the concrete base or slab (sometimes called a pump block or pump pedestal) is to be constructed around the top of the casino. it shall be free from cracks, honeycombing, or other defects likely to detract from its watertightness.

(5) In all cases, a concrete pad extending at least 3 feet from the well casing in all directions, with a minimum thickness of 6 inches, and sloped to drain away at not less than 0.25 inches per foot shall be provided around the wellhead.

(6) Well heads and pump bases shall be sealed by the use of gasket, sealing compounds, and properly vented to prevent the possibility of contamination of the well water. A well casing vent shall be provided with the opening covered with 16-mesh or fine corrosion resistant screen, faced downward and located and elevated so as to prevent the drawing of contaminants into the well.

(b) **Well pits and pitless adaptors.** Because of their susceptibility to contamination and pollution the use of well pits or pitless adaptors shall not be permitted.

(c) **Enclosure of Well and Appurtenances**. For public water supply wells, the well and pump shall be enclosed with a six-foot high chain link fence or other approved security enclosure, and provided with a lock to exclude access by unauthorized persons.

(d) **Well Identification.** The Administrator shall designate the numbers and series of wells. Water operators shall be responsible to see to it that every well shall be identified by means of a sign designating the number and series of the well, e.g., A-3, and shall be posted on the outside of the well enclosure. The sign shall have a minimum size of 9 inches by 12 inches with a yellow background and black letters and numbers with a six inch minimum height.

(e) **Pump Blowoff.** When there is any blowoff or drain line from the pump discharge, it shall be so located that there is no hazard to the safety of the water supply by reasons of flooding, back siphonage, or lack of pressure. The blowoff or drain line shall not be connected to any sewer and must discharge to the atmosphere.

(f) **Air Vents**. Casing vents to minimize possibility of contamination by creation of partial vacuum during pumping and air vent to release sir trapped in pump column when pump is not running.

(g) **Backflow Preventer.** All pump discharges not discharging to the atmosphere shall be equipped with a check valve or similar device to prevent backflow and/or backsiphonage into the well when the pump shuts down. The check valve shall be installed between the pump head and the connection to the distribution system. Sample tap should be installed after this check valve.

§7115. Well Casing. (a) Whenever there is a reasonable basis to expect that any well subject to these regulations could result in wastage or contamination of water resources, which could be prevented through any one of the following construction techniques, the Administrator shall require the well to be cased, recased, lined, re-lined, grouted, or abandoned.

(b) For all new and/or modified wells wherein casing is required, the casino and joints shall be of a quality conforming to the American Water Works Association specifications AWWA A100-84 including its latest revisions thereof or be constructed with any other materials approved by the Administrator (See §7113).

(c) In all new and/or modified wells wherein casing is required the annular space shall be grouted in a manner approved by the Administrator for a minimum depth set under §7113 of this regulation.

(d) Joints in the steel casing may be either of the welded or screwed type with external sleeves. Welded joints are to be made by a competent welder. External sleeve threaded joints shall be screwed to refusal before being lowered into the ground. The threads of the pipe casing and the sleeves shall be cleaned of any rust, dirt, or grease and given a coating of approved metal preservative. After the joint has been made up, all exposed surface of the joints, sleeves and uncovered threads are to be given a final coating of the same preservative.

(e) The lower end of the casino shall be set at such depth and by such method chosen by the contractor and approved by the Administrator as will minimize the possibility of leakage and insure that any loose material will not enter or travel into the well.

(f) Should a pump not be installed immediately after

well drilling and placement of the casing, the top of the casing should be closed with a metal cap screwed or tack-welded into place or covered with sanitary well seal meeting the requirements of §7113. (Sealing Annular Spaces) of this regulation.

(g) All casing shall be placed with sufficient care to avoid damage to casing sections and joints. Where the casing will be enclosed in ground pack and gravel pack), the casing shall be hung in tension while gravel and grout material are being installed. In no case shall the casing or screen be landed on the bottom of the boring.

(h) Galvanize sheet metal pipe downspout or wood shall not be used as casing.

(i) Minimum inside diameters for well casino shall be based on the capacity of the well as indicated below:

CAPACITY OF WELL (GPM)	**MINIMUM DIAMETER OF CASING (INCHES)**
200 OR LESS	10
350	12
500	12
750	12

(i) The minimum wall thickness of steel well casing shall be 5/16 inch and the minimum thickness of the conductor casing, i.e. surface casing, if used, shall be 1/4 inch.

(k) The top of the casino shall terminate above any known conditions of flooding by drainage or runoff from the surrounding lands, but in no less than 18 inches above the concrete pad.

§7116. Sealing-Off Strata. (a) In areas of Southern Guam where a well penetrates more than one aquifer and any of the aquifers contain water of a quality such that, if allowed to mix in sufficient quantity will result in a significant deterioration of the quality of water produced, the strata producing the undesirable quality water shall be sealed off to prevent entrance of the water into the well or its migration to other aquifer(s). The producing strata shall be sealed off by placing impervious material opposite the strata and opposite the confining formations for a sufficient vertical distance (but no less than 10 feet) in

either direction, or, in the case of "bottom“ waters in the upward direction. Sufficient sealing material shall be applied to fill the annular space between the casing and the wall of the drilled hole in the interval to be sealed, and to fill the voids which might absorb the sealing material. The sealing material shall be placed from the bottom to the top of the interval to be sealed.

(b) Sealing material shall consist of the neat-cement grout, poz-mix-cement grout, portland-cement-concrete grout, or sand-cement grout (See §7113 for a description of the various materials required).

§7117. Disinfection and Other Sanitary Requirements. (a) All newly constructed wells or existing wells subjected to any repair work shall be disinfected before being placed in service. A chlorine solution of approximately 100 mg/l of available chlorine in the well water is normally adequate. The solution shall be introduced into the well in such a manner that all surfaces above the static level will be completely flushed with the solution. The well contents should then be agitated to uniformly distribute the chlorine throughout the well. The chlorine solution shall remain in the well for not less than 24 hours. The chlorine residual should be monitored to insure adequate concentration. Before providing water for consumptive use, the well shall be flushed until all traces of chlorine have been removed. After flushing the residual chlorine from the well, a water sample shall be collected for bacterial analysis. If the coliform bacteria test is positive (i.e., one or more counts per 100 ml), the well shall be disinfected again as prescribed above. Water samples shall then be placed into operation until the well has been adequately disinfected as demonstrated by testing.

(b) **Gravel.** Gravel used in gravel-packed wells shall come from clean sources and should be thoroughly washed and disinfected by hypochlorite treatment before being placed in the well. Gravel purchased from a supplier should be washed free of silt, and other foreign materials prior to delivery to the well site. Crushed rock shall not be used.

(c) **Drilling Fluid.** Only fresh water shall be used in drilling fluids whether employed alone or in combination with drilling additives. Only high grade clays or

commercial chemicals, approved by the Administrator, shall be used in the make-up of any drilling fluid. Drilling fluid with a mixture of water and unprocessed mud, clay, or other material will not be permitted. Drilling fluid shall not impart any toxic substances to the water or promote bacterial contamination. Drilling fluid ejected from the well during drilling operation must be contained on-site or disposed off as directed by the Administrator.

(d) The premises, materials, tools and drilling equipment shall be maintained so as to minimize contamination of the underground water during the drilling operation.

(e) Disinfection of Non-flowing Wells.

(1) **Method A.** Where practical, the standard-concentration chlorine solution used to disinfect the well should be prepared in the surface in containers having a volume equal to at least twice the volume of water contained in the well. This prepared solution should then be rapidly discharged into the well, care being taken to flush the walls above the water level.

(2) **Method B**. Instead of preparing the standard-concentration chlorine Solution in containers, a stock chlorine solution of 15,000 mg/l could be added to a continuous flow of water into the well to provide the standard-chlorine concentration. Either of the above methods will carry the chlorinated water into the voids of the water-bearing formation and should provide effective treatment if the chlorinated water is applied rapidly enough to reach all formations penetrated by the well or is introduced at different levels in it.

(3) **Method C.** If methods A and B are not practical, stock solution may be added to the well, preferably at different levels, to provide the standard concentration in the, water contained in the well. The well should then be agitated with a bit, bailer, or test pump to spread the chlorine solution throughout the water.

(4) **Method D.** Instead of using liquid chlorine solutions, a perforated pipe container capped at both

ends, containing hypochlorite tablets may be moved up and down in the wall by means of a weighted cable. Sufficient compound should be applied to provide the standard concentration.

(f) **Disinfection of equipment and material used in well.**

(1) If the well is disinfected prior to the insertion of the test pump all exterior parts of the test pumps coming in contact with the water must be cleaned, wetted, and dusted with a powdered chlorine compound. If possible, at the start of the operation of the pump, the pump discharge be so regulated that some of the chlorinated water maybe returned to the well.

(g) **Chlorine Solution.** A stock solution of chlorine may be prepared by dissolving fresh chlorinated lime, hypochlorite tablets, or other chlorine compounds in water in the proportion of 4 oz (113.4 g) of available chlorine to 1 gal. (3.79 L) of water. This gives a chlorine concentration of 30,000 mg/l or 3.0 percent, by weight. To obtain an applied standard concentration of 100 mg/1, 1 gallon (3.79 L) of stock solution is used to treat 300 gallons (1136 L) of water.

Table 1 shows the number of ounces of chlorine compounds of a given available chlorine content (generally marked on the outside of the can or package) required for the effective disinfection of the well can be computed by the use of Table I together with Table 2, showing the contents in gallons per foot of wells of various diameters. Volume of water for various size wells is shown in Table 3.

TABLE 1
Ounces of Chlorine Compounds

Application mg/l	Available Chlorine			
	Liquid Chlorine		Chlorine Compound	
	percent	oz	percent	oz
100	Bleach 5.25	1.3.4	15	39.4
100	100		25	53.4
100			30	44.6
100			70	19.2

TABLE 2

APPENDIX A -

Volume of Water in Various Diameters of wells

Diameter in.	Volume gal/ft	Diameter in.	Volume gal/ft	Diameter in.	Volume gal/ft
8	2.61	15	9.13	22	19.75
10	4.03	16	10.44	24	23.50
12	5.33	13	17.22	70	76.72
14	8.00	20	16.72	36	52.88

TABLE 3
Chlorine Compound Required to Dose 100 ft of Water-Filled Well at 100 mg/1

		Chlorine Compound**.		
Casing	Volume	70% HTH	25% Chloride	5.25% Purex
	Perchloron, etc. (dry weight)++	of Lime (dry weight)++	Chlorox etc.	(liquid meas.
8	261.1	6 oz	14 oz	4-1/4 pts
10	409.0	8 oz	22 oz	7 pts
12	537.5	12 oz	2 oz	10 pts
16	1044.5	20 oz	3-1/2. lb	2 gal
20	1632.0	2 lb	6 lb	2-1/3 gal
24	2750.1	7.0 lb	3 lb	4-2/3 gal

** Liquid sodium hypochlorite in a 12-percent solution is often sold for water and wastewater treatment plant use, as a commercial bleach, or for use with swimming pools. Using a solution of this nature would call for a liquid measure equal to one half the volumes present in column 5.

++ Where a dry chemical is used, it should be mixed with water to form a chlorine solution prior to placing it into the well.

§7118. Well Development. (a) Developing, redeveloping, or conditioning of a well shall be done with care and by methods which will not cause damage to the well or its casing or cause adverse sub-surface conditions that may destroy barriers to the vertical movement of water between aquifers.

(1) Every well shall be developed to remove the native silts and clays, drilling mud or finer fraction of the gravel pact.

(2) Development should continue until the specific capacity is obtained from the completed well.

(3) Where chemical conditioning is required, the specifications shall include provisions for the method, equipment, chemicals, tasting for residual chemicals, and disposal of waste and inhibiters.

(4) Where blasting procedures may be used, the

specifications shall include the provision for blasting and cleaning. Special attention shall be given to assure that the grouting and casing are not damaged by the blasting. No mercury containing explosives shall be permitted.

(b) Observation wells shall be constructed in accordance with the requirements or permanent wells. If the observation wells will not be used in service it shall be considered as abandoned wells and shall be subject to the requirements of §7128 Well Operating Permit if it will remain in service.

§7119. Water Quality Sampling Provisions. (a) Except where there is free discharge from the pump (that is, except where there is no direct connection to the water delivery system), a sample tap shall be provided on the discharge line downstream (system side) of the check valve and upstream of any disinfection or other treatment equipment so that representative of the water in the well may be drawn for laboratory analysis by an approved certified laboratory.

(b) For wells provided with chlorination or other chemical feed systems, a second sample tap shall be provided on the discharge line after the point at which chlorination or other chemicals are introduced and before connection to main water line.

(c) Water quality (physical, biochemical, and chemical composition) shall be determined by analysis of water samples collected from the well.

(d) Sampling Procedures - The procedures outlined in the latest edition of Manual of Methods for chemical analysis of water and wastes, U.S. EPA shall be followed.

(1) Field tests: water temperature, pH, dissolved gases shall be determined on samples collected and analyzed in the field.

(2) Water samples shall be taken at the end of the pumping test for chemical analyses. Testing must be done by an approved certified laboratory.

§7120. Large Diameter Shallow Wells. (a) The use of

bored or dug wells, or wells less than fifty (50) feet deep to provide cubic water supply shall be avoided unless there is not other feasible means for obtaining water. When used for this purpose, these wells shall be located at least one thousand (1,000) feet away from any underground injection well facility, and stricter monitoring requirements may be instituted.

§7121. Driven Wells. (a) Driven wells shall not be permitted.

§7122. Repair Rehabilitation, and Deepening of Wells, Temporary Cover. (a) **Repair or Rehabilitation or Deepening of Wells.** The Administrator shall be notified at least forty-eight (48) hours before the owner removes pumps or other devices installed in the well bore for the purpose of making repairs to the well. If water quantity decreases over time, the well may need to be rehabilitated rather than deepened. When such devices are removed, the Administrator shall be allowed access to the cleared well for inspection and measurements. In emergencies, the Administrator shall be notified as soon as practicable after the devices are removed. After completion of the rehabilitation, repair or deepening of the well, the well must be disinfected in accordance with the requirements of Section §7115 of this regulation and must be completed with the sampling analysis prior to putting the well back in operation.

§7123. Existing Wells. (a) Every owner or user of any existing well within the Territory of Guam shall, upon request of the Administrator, disclose the location of such well and all other facts or information within his knowledge or possession relating to such well. He shall include a statement of the manner in which the well is being used or operated, and the method and means of control thereof. The owner, upon request, shall provide the Administrator, or his authorized representative, access to the well for inspection purposes.

(b) The owners of existing wells shall be required to alter or augment existing facilities or appurtenances to obtain data, which is satisfactory to the Administrator and to the best interest of the general public.

(c) The owners of all active wells in operation shall be

required to obtain a well operating permit. The owners of all wells to be altered, rehabilitated or repair or extended shall first obtain a well drilling permit.

(d) The Administrator shall allow continued operation of an existing well if such operation would not cause an adverse effect to the groundwater resources and that the existing well must be supplying water of acceptable quality as well. Wells ordered for discontinuance of operation shall be brought into compliance according to the provision of these regulations within a reasonable time as determined by the Administrator, or the well shall be considered abandoned.

(e) For all existing wells without a sounding tube, the owner shall provide, install and maintain at his own expense a sounding tube for determination of water level data. The owner shall complete the installation of the required sounding tube for each well by December 31, 1991.

§7124. Utilization and Metering of Well Water. (a) The Administrator may limit the amount of water drawn from any well covered under these regulations during emergency conditions or drought, or if there is a reasonable basis to expect that otherwise operation of the well will:

(1) Excessively lower the ambient groundwater table, or

(2) Cause or bring above excessive salt water intrusion, excessive mineralization or other degradation of water quality which may render a domestic water source unfit for such purposes, or

(3) Interfere with the operations of existing established water sources.

(b) For all wells constructed after March 9, 1967 from which water is to be drawn, the owner shall provide the installation of a water meter, as set forth in §7105(a)(4)(e) of these regulations, and shall maintain such device at his own expense. At no time shall a well be operated without a water meter for more than a consecutive five (5) day period.

(c) Prior to the replacement of pumps at a well for its operation with a rated capacity different than the rated capacity of the existing pump, an application for new well operating permit shall be filed with the Administrator. Issuance of the permit shall be subject to the approval of the Administrator, based on the criteria set forth in §7105 of these regulations. The Administrator's decision shall be made within fifteen (15) days after filing for the well operation permit.

(d) For all new wells from which water is to be drawn, that does not have the required utilities, the owner shall provide, install and maintain the following at his own expense:

(1) A sounding tube to determine water level in a manner satisfactory to the Administrator;

(2) Adequate access and clearance £or well drilling equipment;

(3) Sample tap for obtaining water samples;

(4) Water meter capable of registering pumpage rates in gallons. The meter shall have an indicator and a totalizer and be of sufficient size to accommodate flows up to 150 percent of the well design capacity. Accuracy shall be within two percent over the range of the water meter; and

(5) Pressure gauge on the discharge piping, reading in pounds per square inch.

§7125. Test Borings. (a) The owner/driller shall notify the Administrator in writing and submit an application for well drilling prior to any test boring work.

(b) Test borings shall be subject to the well drilling permit requirements under §7115 of these regulations, except that a group of test borings less than 20 feet or 10 feet in depth located on a single property may be considered under one permit and a group of ten (10) or portion thereof shall be considered as one (l) well for well drilling fees. All test borings of 20 feet or more in depth shall be permitted individually.

(c) Test borings conducted in aquifer areas or groundwater recharge areas, unless developed into a water producing or drainage well (underground injection control well) or monitoring well, must be properly destroyed in accordance with pertinent sections of §7128 of these regulations.

(d) Test borings which encounter groundwater at any depth shall be afforded the maximum protection possible against entrance of contaminants throughout the drilling process and must be destroyed immediately upon completion of the geologic study for which they were made. In no case shall they remain open overnight.

(e) The owner/driller shall submit to GEPA a boring log and a copy of soil analysis report within ten (10) days of completion of the borings.

§7126. Access to Wells and Inspection of Wells. (a) Any duly authorized officer, employee, or representative of the Agency may enter and inspect any property premises or place where a water well is being operated, constructed, or abandoned, for the purpose of ascertaining the state of compliance with these regulations

(b) No person shall refuse entry or access to any authorized representative of the Agency who requests entry for purposes of inspection, and who presents appropriate credentials; nor shall any person obstruct, hamper or interfere with any such inspection. If requested, the owner or operator of the premises shall receive a report setting forth all facts found which relate to compliance status.

(c) If upon the basis of such inspections the Agency finds that applicable laws, rules and regulation have not been complied with, the Administrator or his authorized representative conducting the inspection shall issue a violation for the purpose of compliance with these regulations. The owner shall have thirty (30) days to bring the well into compliance or the owner shall terminate the use of the well until the violations have been corrected. If the Administrator determines that continued operation of the well could cause an acute danger or health hazard to the people of Guam, the Administrator may terminate the use of the well.

(d) The owner of any well covered under these regulations shall be responsible for providing adequate safeguards at the well at his own expense so that any person permitted to be on such property where such well is located shall be exposed to any danger, hazard or nuisance.

§7127. Discontinued Use of Wells. (a) The well owner or his authorized representative for which a well drilling a well operating permit has been issued shall submit a written statement to the Administrator when a well drilling operation has been discontinued and/or well operation terminated for more than thirty (30) days. The statement shall indicate the nature and reason for the action, the date of termination, the period of time that the well drilling is to be discontinued or the well it to be out of operation, and shall be submitted within thirty (30) days of the action. The well shall then be declared either an "in-active well" or an "abandoned well", and the drilling or operation permit shall be revoked by the Administrator.

(b) A well shall be considered "abandoned" if the well is not being used in compliance with or maintained under a valid operating permit or the well has not been used for a period of twelve (12) consecutive months unless the owner shows evidence of his intention for the continued use and proper maintenance of the well in such a way that:

(1) The well has no defects which will facilitate the impairment of quality of water in the well or in the water-bearing formations penetrated;

(2) The well is covered with an appropriate locked cap or approved surface plate;

(3) The well is marked so that it can be clearly seen; and

(4) The area surrounding the well is kept clear of brush or debris.

(c) If the pump has been removed for repair or replacement, the well shall not be considered "abandoned", provided that evidence of repair can be shown. During the repair period, the well shall be adequately covered to prevent injury to people and to

prevent the entrance of undesirable water or foreign matter into the well.

(d) Monitoring wells used in the investigation or management of groundwater basins by governmental agencies or other appropriate engineering or research organizations are not considered "abandoned" so long as they are maintained for this purpose. When these wells are no longer used for this purpose or for supplying water, they shall be considered as "abandoned wells".

(e) The Administrator, at his option or discretion, may convert the use of Government of Guam owned wells that have been designated as "abandoned" to a new use as a monitoring well. In this event, the well shall be properly maintained at the expense of the Agency according to the provisions specified in the §7127(d) of this Section.

(f) All wells declared as being "abandoned wells" shall be properly destroyed in accordance with §7128.

§7128. Requires for Destruction of Abandoned Wells. (a) All "abandoned" wells, including test holes, shall be destroyed by their owner in such a way that they will not produce water or act as a channel for the interchange of waters, when such interchange will result in a water-bearing formations penetrated, or present a hazard to the safety and well being of people and animals.

(b) Before the hole is filled, the well shall be investigated by a licensed well driller to determine its condition, details of construction, and whether there are obstructions that will interfere with the process of filling and sealing.

(1) If there are any obstructions, they shall be removed if possible, by cleaning out the hole or by redrilling.

(2) Where necessary, the insure that sealing material fills not only the well casing but also any annular space or nearby voids, the casing should be removed (if possible), perforated, or otherwise punctured, prior to placing the sea ling material.

(c) The following are requirements for filling and

sealing when certain conditions have been found to exist as established through inspection by the Administrator.

(1) When the well is wholly situated in unconsolidated material in an unconfined groundwater zone. If the groundwater is within fifty (50) feet of the surface, the upper twenty (20) feet shall be sealed with impervious material and the remainder of the well shall be filled with clay, sand, or other suitable inorganic material.

(2) Well penetrating several aquifers or formations. In all cases the upper twenty (20) feet of the well shall be sealed with impervious material.

In areas where the interchange of water between aquifers will result in a deterioration of the quality of water in one or more aquifers, or will result in a loss of artisan pressure, the well shall be filled and sealed so as to prevent such interchange, and or other formations where impervious sealing material is not required. Impervious material must be placed opposite confining formations for a sufficient vertical distance (but no less than 10 feet) in either direction, or in the case of “bottom water", in the upward direction.

(3) Well penetrating crevice or fractured rock. If creviced or fractured rock formations are encountered just below the surface, the portions of the well opposite this formation shall be sealed with neat cement, cement grout, poz-mix cement grout, or concrete, alternate may be used to fill the well. Fine grained material or fractured rock formations.

(4) Well in noncreviced, consolidated formation. The upper twenty (20) feet of a well in a noncreviced, consolidated formation shall be filled with impervious material. The remainder of the well may be filled with clay or other suitable inorganic material.

(5) Well penetrating specific aquifers, local conditions. Under certain local conditions, the Administrator may require the specific aquifers or formations be sealed off during destruction of the well.

(d) The following requirements shall be observed in placing fill or sealing material in wells to be destroyed:

(1) The well shall be filled with the appropriate material (as described in this Section) from the bottom of the well up.

(2) Where neat cement grout, portland cement grout, poz-mix cement grout or sand-concrete grout is used, it shall be placed in one continuous operation.

(3) Sealing material shall be placed in the interval or intervals to be sealed by methods that prevent free fall, dilution, and/or separation of aggregates from cementing materials.

(4) Where the head (pressure) producing flow is great, special care and special methods must be used to restrict the flow while placing the sealing material. In such cases, the casing must be perforated opposite the area to be sealed and the sealing material forced out under pressure into the surrounding formation.

(5) When pressure is applied to force sealing material into the annular space, the pressure shall be maintained for a length of time sufficient for the cementing mixture to set.

(6) To assure that the well is filled and that there has been no jamming or "bridging" of the material, verification shall be made that the volume of material placed in the well installation at least equals the volume of the empty hole.

(e) **Materials.** Requirements for sealing and fill materials are as follows:

(1) **Impervious Sealing Materials.** Sealing materials shall have such a low permeability that the volume or water passing through them is of small consequence.

Suitable materials include neat cement grout, portland cement grout, poz-mix-cement grout, and sand-cement grout, and native soils and natural material that have a co-efficient of permeability of less than one hundred (100) feet per year, used drilling muds are not acceptable.

(2) **Fill Material.** Many materials are suitable for use as a filler in destroying wells. These include clay,

silt, sand, gravel, crushed stone, native soils, mixtures of aforementioned types, and those described in §7128(e)(1). Material containing organic matter shall not be used.

(f) **Additional Requirements for Abandonment of Wells in Urban Areas.** In areas developed for multiple habitation, to make further use of the well site, the following additional requirements must be met:

(1) A hole shall be excavated around the well casing to a depth of a six (6) feet below the ground surface and the well casing removed to within six (6) inches of the bottom of the excavation.

(2) The sealing material used for the upper portion of the well shall be allowed to spill over into the excavation to form a cap at least one (1) foot thick.

(3) After the well has been properly filled, including the sufficient time for sealing material in the excavation to set, the excavation shall be filled with native soil.

(g) **Temporary Cover.** During periods when no work is being done on the well, such as overnight or while waiting for sealing material to set, the well and surrounding excavation, if any, shall be covered. The cover shall be sufficiently strong and securely anchored to prevent the introduction of foreign material into the well ad to protect the public from a potentially hazardous situation.

(h) The Administrator shall set a compliance schedule for the sealing of abandoned wells and shall notify, in writing, the owner of the wells to be destroyed. The administrator reserves the right to require the owner to replug any well where it can be determined that the previous plugging was not effective due to failure of cement seal or other causes.

(i) **Inspection of destroyed wells after Sealing or Filling.** The owner shall notify the Administrator forty-eight (48) hours in advance of his intent to commence work. All destroyed wells shall be inspected during and after sealing or filling operation, by the Administrator or

his authorized representative to insure that proper procedures have been carried out.

§7129. Surface Water Requirements. (a) **Surface Water Development.**

(1) No surface source development shall be accepted for review and approval by the Administrator, unless the owner/purveyor has obtained clearance approval from the Public Utility Agency of Guam (PUAG) in accordance with the following water utilization priorities:

(A) First priority shall be for use or resale by the PUAG for any purpose, or for household use, for bona fide farms, plant nurseries, aquaculture, ranches, other bona fide agricultural uses, for golf courses of less than 4,000 square meters or for ornamental lawns and gardens of less than 4,000 square meters.

(B) Second priority shall be for any other use by the government of Guam for public recreation and for other public purposes only and not for purposes enumerated in subsections (C) and (D) below.

(C) Third priority shall be for irrigation use.

(D) Fourth priority shall be for irrigation of golf courses of 4,000 square meters or larger, or for irrigation of lawns or ornamental gardens of 4,000 square meters or larger.

(E) Fifth priority shall be for any other purpose.

(2) An elevation shall be made of the proposed surface water impoundment or flowing supply in the area of diversion and its tributary streams to determine the degree of pollution from all sources within the watershed.

(A) Where surface water sources which are subject to continuous contamination by municipal and industrial wastes and/or treated effluent are

contemplated for development for public water supply systems, the adverse effects of said contamination on the quality of raw water reaching the purification plant shall be determined by sanitary surveys and laboratory procedures and findings submitted to the Agency with planning materials. These findings will then be used to determine whether or not the proposed raw water intake is adequately separated from all contamination sources.

(B) The disposal of liquid or solid wastes from any source in the watershed must be in conformity with the requirements of applicable Guam Environmental Protection Agency Regulations and/or United States Environmental Protection Agency Rules and Regulations

(C) Shore installations, marinas, boats and all habitations on the watershed shall provide satisfactory sewage disposal facilities. Septic tanks and soil absorption fields, sanitary sewer, sewer manholes or other approved toilet facilities shall not be located in the area within 1,000 feet horizontal distance from the lake water surface at the uncontrolled spillway elevation at the lake or 1,000 feet horizontally from the 50 year flood elevation whichever elevation is lower.

(D) Disposal wastes from boats or any other watercraft shall be in accordance with the requirements of the Guam Water Pollution Control Act, the Guam Water Quality Standards and all applicable federal rules and regulations.

(E) Development of rivers, streams, etc., shall be subject the review and permit approval by the United States Army Corps of Engineer.

(3) Intakes shall be so located and constructed as to permit a wide variation in depths from which the raw water is taken, as well as to permit withdrawal of water when reservoir levels are very low.

(A) Intakes shall be located, insofar as possible, in areas not subject to excessive siltation

and areas not subject to receiving immediate runoff from flood prone areas, wetlands and swamps.

(B) Water intake works shall be provided with screens or grates to minimize the amount of debris entering the plant and must be constructed so that water can be obtained from various water levels.

(C) No public boat launching ramps, marinas docks, and floating fishing piers, shall be located within 1,000 feet from the raw water intake.

(4) The water treatment plan and all pumping units shall be located in well-drained areas not subject to flooding and away from seepage areas or where the underground water table is near the surface.

(A) Water treatment plants shall not be located within 1,000 feet of a sewage treatment plant. Any sanitary sewer within 1,000 feet of any of the underground treatment plant units shall be constructed of cast iron pipe with watertight joints. A minimum of spacing of 1,000 feet must be maintained within any septic tank open-joint or perforated drainfield line and any underground treatment unit.

(B) Plant site selection shall also take into consideration the need for disposition of all plant wastes in accordance with rules both local and federal.

(C) The water treatment plant and all appurtenances thereto shall be enclosed by an intruder resistant fence, the gates of which can be kept locked.

(D) An all-weather road shall be provided to the treatment plant.

(E) Flow measuring devices shall be provided to measure both the raw water supplied to the plant and the treated water supplied from the plant, to provide for the accumulation of water

production data. These devices shall be so located as to facilitate ease fro daily reading.

(b) **Springs and Other Water Sources.**

(1) Water obtained from springs, infiltration galleries, wells in fissured areas and/or any other source subject to surface or near surface contamination of recent origin shall be evaluated fro the provision of treatment facilities, in addition to chlorination.

(2) The extent of water treatment required will be determined on the basis of geological data, nearby sources of contamination and, if appropriate, on the basis of quantitative bacteriological and chemical analysis.

(c) **Water Treatment.**

(1) Surface Water.

(A) All water secured from surface sources shall be given complete treatment at a plant which provide facilities for pre-treatment disinfection, taste and odor control, continuous coagulation, sedimentation, filtration, covered clear well storage and terminal disinfection of water with chlorine and suitable chlorine compounds.

(B) The treatment capacity of a water plant based on current acceptable design standards shall always be in excess of the maximum expected draft of any day of the year.

(C) No cross connection or interconnection shall be permitted to exist in a filtration plant between a conduit carrying filtered or post chlorinated water and another conduit carrying raw water or water in any prior stage of treatment. No conduit or basin containing raw water or any water in a prior stage of treatment shall be located directly above or permitted to have a single common partition wall with another conduit or basin containing finished water. The rule is not strictly applicable, however, to partitions open to view and readily accessible for inspection and repair.

(D) All drainage conduits shall be constructed

so as to be thoroughly tight against leakage. They shall discharge and be located in such a manner that no currents of water can, under any circumstances, be carried from a drain outlet to the plant intake or to any other water intake located in the vicinity of the plant.

(E) Reservoirs for pretreatment (sedimentation) and/or selective quality control shall be provided where complete treatment facilities may not continue to operate satisfactorily at times of maximum turbidities anticipated from the source of supply to be developed. Recreation at such reservoirs should be prohibited.

(F) Treatment plants shall be provided with efficient devices for measuring and applying chemicals to the water under treatment.

(1) At least one chemical feeders shall be provided as a standby or reserve unit.

(2) An accurate flow meter shall be provided for determining rate of treatment and total amount of water treated. All chemical feed equipment shall be capable of ready adjustment to variations in the flow of water being treated.

(3) Dry chemical feeders shall be provided with dissolving tanks when applicable.

(4) Chemical feeders shall be provided with dissolving tanks when applicable.

(5) Chemical solutions transported from feeder to application point should be accomplished through open channels. If enclosed feed lines must be used, they shall be designed and installed so as to prevent clogging and facilitate cleaning.

(f) Coagulants shall be applied to the water in the mixing basis or chambers so as to permit their thorough mixing with the water.

(G) Provision of chemical application points beyond the mixing basins or chamber shall be provided for taste and odor control, stabilization and disinfection for quality controls.

(H) Chemicals shall be sorted in a separate, dry room above ground and above floor level and protected against flooding or wetting from floors and wells.

(1) Storage facilities at the plant shall be adequate to store at least one month's supply of chemicals used.

(2) Chemical storage facilities shall be so located with reference to chemical feeders to facilitate handling of bulk chemicals from storage to feed machines shall be such as to facilitate good housekeeping.

(I) Flash mixing and flocculation equipment, capable of adequate flexibility of adjustment to provide optimum flocculation under varying raw water characteristics and rates of raw water treatment, shall be provided.

(1) An ideal combination of flash mixing and flocculation will provide 1 to 2 minutes of violent agitation, followed by about 30 minutes to 1 hour of slow mixing to accomplish desired flocculation.

(2) Where special types of equipment for rapid mechanical mixing, softening or sedimentation are proposed, the manufacturer shall guarantee the performance of said equipment.

(3) Sufficient facilities for coagulation and sedimentation must be provided to clarify the water so that settled turbidity is at a level so as to produce a treated water at or below 1.0 turbidity until (TU) after filtration.

(i) Settled water turbidity of 10 TU or less are generally required to produce

treated water turbidity of less than or equal to 1.0 TU after filtration.

(ii) All turbidity measurements must be made in accordance with the requirements of the current Guam Primary Safe Drinking Water Regulations (GPSDWR).

(J) In order to insure continuous operation, basins for flocculation and straight-flow sedimentation of coagulated waters shall be at least two in number. They shall be designed for series or parallel operation and shall provide a total detention period of at least 6 hours each.

(1) Facilities for sludge removal shall be provided by mechanical means or by the provision of hopper bottomed basins with valves capable of complete draining of the units.

(2) Basins shall be designed as to prevent short circuiting of flow or the destruction of the floc. Coagulated water or water from flocculators shall be transported to sedimentation basis in such a manner as to prevent destruction of floc.

(3) The length of rectangular settling basins shall preferably be at least twice their width. Long effluent weirs will aid the efficiency of clarification. The depth of sedimentation basis shall be such as to maintain proper velocity of permissible depth being slightly removal. Flow line elevations shall not vary more than a few inches above or below the normal level.

(4) Sedimentation basins shall be provided with facilities for draining the basin in a period not in excess of 6 hours. In the event that the plant site topography is such that gravity draining cannot be realized, a permanently installed electronic powered pump station shall be provided to dewater

the basin.

(5) Where it is proposed to use a patented, tipflow or other type sedimentation basin or clarification facilities with less than the previously specified detention time, the facility may be conditionally accepted where the manufacturer or supplier provides a 2 year performance bond that the water going to the filters will turbidity of less than 10 turbidity units. In no case shall the minimum settling or clarification detention time be less than 2 hours. Facilities to monitor and record the turbidity of the raw and the settled water must be provided. Engineering data submitted with the engineering report for the proposed settling basin should verity that the basin is of proven design to treat the quality of the raw water available to the treatment plant.

(K) Filters shall be gravity or pressure type.

(1) The design of rapid and pressure type sand filters shall be based on a filtration rate of no more than 2 gallons per square foot per minute. Mixed-media and/or coal-sand filters, of the slow and gravity type only, may be conditionally accepted with filtration rates of more than 2 gallons per square foot per minute when facilities to monitor and record turbidities of raw, settled, and finished water are provided.

(2) The depth of filter sand, anthracite or other filtering materials shall be between 24 inches and 30 inches, and this filtering material shall be free from clay, dirty, organic matter and other impurities. Its effective size shall range from 0.35 to 0.45 mm for fine sand, 0.45 to 0.55 mm for medium sand and 0.55 to 0.65 mm for coarse sand, and its uniformity coefficient shall not exceed 1.7. The grain size prescribed by the latest AWWA Standards.

(3) Under the filtering material, at least 12 inches of gravel shall be placed varying in size from 1/16 inch to 2-1/2 inches. The gravel is to be arranged in 3 to 5 layers such that each layer contains material about twice the size of the material above it.

(4) The rate of flow of wash water shall not be less than 20 inches vertical rise per minute and usually not more than 30 inches vertical rise per minute, which shall expand the filtering bed 30 to 50 percent. The free board in inches shall exceed the wash rate in inches of vertical rise per minute.

(i) The water backwashing of filters shall be of the same quality as that produced by the plant and may be supplied by elevated wash water tanks or by pumps provided for backwashing of filters only, which take suction from clear wells. For installations having a treatment capacity no greater than 150,000 gallons per day, however, waster for backwashing may be secured directly from the distribution system with proper controls.

(ii) Rate of backwashing of filters shall be regulated by rate-of-flow controllers.

(5) If surface filter wash systems are provided, atmospheric vacuum breakers shall be installed in the system lines and above the overflow level of the filters such that all water passes through them.

(6) Each filter unit shall be equipped with rate-of-flow controllers and loss-of-head gauges for proper operation of filtration process.

(7) Filter-to waste connection, if included, shall be provided with an air gap connection to waste.

(8) Filters shall be so located that common walls will not exist between them and aerators, mixing and sedimentation basins or clear wells. This rule is not strictly applicable, however, to partitions open to view and readily accessible for inspection and repair.

(L) Pipe galleries with ample working room, good lighting, and good drainage provided by sloping floors, gutters and slumps shall be incorporated in the plant design, along with adequate ventilation to prevent condensation and to provide humidity control.

(M) The identification of influent, effluent, waste and backwash lines can be accomplished by use of various colors of paint. In order to maintain uniformity, the following color code is suggested for pipe galleries:

Blue	Treated Water
Green	Clarified Water
Tan	Raw Water
Brown	Waste Water
Orange	Pumps, valve bodies and metal pump bases
Bright Red	Chlorine gas piping, flexible couplings on pumps and other machinery, and all exposed rotating parts.

(N) For surface water treatment plants, an adequately equipped laboratory must be available on-site where daily bacteriological and chemical tests can be made on water supplied by all plants serving 25,000 persons or more. For plants serving less than 25,000 population, on-site facilities for making bacteriological tests may be omitted and the required bacteriological samples submitted to a certified laboratory. All surface water treatment plants shall be provided with equipment for making at least the following determinations: pH, chlorine residual, alkalinity, turbidity, threshold odor and other tests deemed necessary to monitor specific water quality problems or to evaluate

specific water treatment processes.

(2) Disinfection.

(A) All waters obtained from surface sources must be chlorinated prior to distribution at a dosage sufficient to produce an adequate chlorine residual in the water leaving the plant.

(B) All water stored in treated water reservoirs for pumping directly to the distribution system must contain an adequate chlorine residual. Chlorination facilities must be provided for all such locations where an adequate chlorine residual is not maintained from prior treatment.

(C) Disinfection equipment shall be selected and installed so that continuous and effective disinfection can be secured under all conditions as covered in treatment requirements for surface water.

(1) Disinfection equipment shall have a capacity at least 50 percent greater than the highest expected dosage to be applied at any time. It shall be capable of satisfactory operation under every prevailing or anticipated hydraulic condition.

(2) Automatic proportioning of the disinfectant dosage to the rate of flow of the water treated shall be provided at the large plants and at all plants were the rate of flow varies more than 50 percent above or below the average flow. Manual control shall be permissible only where the rate of flow is relatively constant or an attendant is always at hand to effect promptly the necessary adjustments in dosage.

(3) All disinfecting equipment at surface water treatment plants shall include at least one standby unit for insuring uninterrupted operation.

(4) Facilities shall be provided for

determining the amount of disinfectant used daily, as well as the amount of disinfectant remaining to be used.

(5) When used, solutions of calcium hypochlorite shall be prepared in a separate mixing tank, then diluted and allowed to settle so that only a clear supernatant liquid is provided in the solution suction tank for the hypochlorinator.

(6) Provision shall be made for both pretreatment disinfection and post chlorination in all surface water plants and at such additional points in the treatment process as in order to provide for quality control treatment procedures.

(7) Disinfectants other than chlorine may be used only at points in the treatment process prior to post chlorination, and only with written permission from the Administrator for community-type systems.

(8) Disinfectants other chlorine proposed for use in non-community type systems will be considered on a case-by-case basis.

(D) A suitable gas mask or self-contained type breathing apparatus and also a small bottle of fresh ammonia solution, or approved equal, for testing for chlorine leakage shall be provided and accessibly located outside the chlorinator room when chlorine gas is used.

(E) Housing for gas chlorination equipment a cylinders for chlorine shall be separate buildings or separate rooms with impervious walls or partitions separating all mechanical and electrical equipment from the chlorine facilities, and shall be located above ground level as a safety measure. This equipment and cylinders may be installed on the outside of buildings when protected from adverse weather conditions and vandals.

(F) Adequate floor level ventilation shall be

provided for all enclosures in which chlorine is being fed or stored.

(G) Safety measures for the use of alternate disinfectants shall be as prescribed by the Agency.

(4) Special treatment processes. The adjustment of fluoride ion content, special treatment for iron and manganese reduction, special methods for taste and odor control, demineralization and other proposals covering other than usual treatment will be considered as special projects.

(5) Sanitary facilities for water works installations. Toilet and hand washing facilities provided in accordance with established standards or good public health engineering practices shall be available at all installations requiring frequent visits by operating personnel.

(6) Permits for waste discharge. For discharging wastes from water treatment the purveyor/owner shall obtain the applicable permits from the GEPA and USEPA. Region IX.

§7130. Wellhead Protection for Public Water Supply Well. (a) The intent and purpose of this section is to safeguard the public health, safety and welfare by providing established standards

(b) *Wellhead Protection Area* shall mean the surface and subsurface area surrounding a water well or wellfield supplying a public water system through which contaminants are reasonably likely to move toward and reach such water well or wellfield, or a minimum of 1,000 feet radius of any potable water supply well.

(c) Maps if the Groundwater Management Protection Zone:

(1) The Administrator shall maintain map(s) of the Groundwater Management Protection Zone (GWMPZ) as are necessary for the purpose of groundwater management. The GWMPZ map(s) may be amended from time to time by the Administrator as he deemed necessary.

(2) Any changes, additions or deletions to said map(s) shall be approved by the GEPA Board of Directors.

(d) Septic tanks and leached fields, sanitary sewer, storm water disposal, liquid waste storage disposal or treatment in violations of this chapter within the GWMPZ:

(1) Notwithstanding any provisions of this rule, no department or agency of the Government of Guam shall approve, grant or issue any building permit clearances, certificate of use and occupancy for any land use served or to be served by a septic tank with leached field, sanitary sewer, storm water disposal method, and which is within the GWMPZ area or within the 1,000 feet radius of any public utility potable water supply well, until the owner obtain the prior written approval of the Administrator.

(2) Furthermore, notwithstanding any provision of this regulations, no person shall construct, utilize, operate, occupy or cause, allow or let, permit or suffer or to be constructed, utilized, operated or occupied any land use served or to be served by septic tank and leached field, sanitary sewer, storm water disposal method, or liquid waste storage, disposal or treatment method, and which is within the GWMPZ and within any 1,000 feet radius of any public utility potable water supply well, until the person has obtained the

prior written approval of the Administrator. The Administrator shall issue his written approval only if he finds that all septic tanks and leached fields, storm water disposal method and liquid waste storage disposal or treatment methods will be installed upon the property as far away as is reasonably possible from all potable water supply well, and;

(i) That the property served or to be served by septic tanks is residential and uses a public water supply.

(ii) Residential land uses: No gravity sanitary sewer shall have an exfiltration rate greater than fifty (50) gallons per inch pipe diameter per mile per day. Sewer lateral lines located in the public right-of-way shall be a minimum of six (6) inches or as required by the Public Utility Agency of Guam latest Standards.

(iii) Sanitary Force Mains: All sanitary sewer force mains installed within the GWMPZ or within the 1,000 feet radius of any public water supply well, shall be constructed of either ductile iron or PVC pressure sewer pipe. No such ductile or PVC pipe sanitary sewer force main shall exfiltrate at a rate greater than that allowable leakage rate specified in the latest American Water Works Association Standard C600 at a pressure of one hundred C100) pounds per square inch.

(iv) All gravity sanitary sewers with invert elevations above the average surrounding water table and all sanitary sewer force mains shall be tested to ensure compliance with the aforementioned exfiltration rate standard.

(v) A registered professional engineer shall provide written certification of the exfiltration rate for all manhole/gravity sewer systems installed, in equivalent gallons per inch pipe diameter per mile per day (twenty four (24) hours), and the exfiltration rate for all sanitary sewer force mains with pipe diameters of eight (8) inches or more shall be visually inspected by television every five

(5) years by the responsible utility or property owner to ensure both structural a and pipe joint integrity. Existing manholes shall be visually inspected for both structural and incoming pipe connection integrity every five (5) years. Certified test and inspection results and repair logs shall be submitted to the Administrator within thirty (30) days after completion of the particular test, inspection, or repair.

(2) Storm Water Disposal Methods: Storm water disposal methods utilized or to be utilized will be limited as set forth in the most current Underground Injection control (UIC) Regulations for the Territory of Guam.

(3) Liquid waste storage, disposal or treatment methods other than septic tanks utilized for the disposal, discharge, storage or treatment of domestic sewage:

Liquid waste storage, disposal or treatment methods (other than septic tanks utilized for the disposal, discharge, storage or treatment of domestic sewage, sanitary sewer lift stations, and public sanitary sewers), shall be prohibited within the GWMPZ or within a minimum of 1,000 feet radius of any potable water supply well.

(4) Notwithstanding the foregoing, no person shall issue his written approval unless the Administrator has determined that the land use will comply with all provisions of this chapter and that the following water pollution prevention and abatement measures and practices shall be provided:

(i) Monitoring and detection of water pollution caused by toxic chemicals and hazardous materials, and

(ii) Secondary containment of water pollution caused by toxic chemicals and hazardous materials, and

(iii) Inventory control and record keeping of toxic chemicals and hazardous materials, and

(iv) Storm water management of water pollution caused by toxic chemicals and hazardous materials, and

(v) Protection and security of facilities utilized for the generation, storage, usage handling, disposal or disposal or discharge of toxic chemicals and hazardous materials.

(e) Prohibition of toxic chemicals and hazardous materials within wellfield protection areas:

(1) Notwithstanding any provision of this regulation, no approval, grant issuance of any building permit, certificate of use and occupancy and business license (except for changes in ownership), zoning action (unusual use, use variance) for any non-residential land use, other than a bona fide agricultural land use, or a public water supply facilities use, a public sewer facilities use, or a public water supply facilities use, within the GWMPZ or within the 1,000 feet radius of any public utility potable water supply well, without obtaining prior written approval from the Administrator. The Administrator shall issue his written approval only if the Administrator determines that the non-residential land use is in compliance with all applicable provisions of these regulations.

(2) Pursuant to the foregoing, the Administrator shall issue his written approval only if the Administrator determines that all potential sources of pollution will be installed upon the property as far away as is reasonably possible from all potable water supply wells, toxic chemicals and hazardous materials will not be used, generated, handled, disposed of, discharged or stored on that portion of the property within the GWMPZ and within the 1,000 feet radius of any public utility potable water supply well.

(3) Notwithstanding the foregoing, the use, handling or storage of factory prepackaged products intended primarily for domestic use or consumption determined by the Administrator to be toxic chemicals and hazardous materials shall not be prohibited provided, however, that the requirements of

applicable subsections of these regulations or other applicable local and federal regulations are fulfilled.

(A) The use, handling or storage of factory pre-packaged products intended primarily for domestic use or consumption determined by the Administrator to be toxic chemicals and hazardous materials shall not be prohibited, provided, however, that:

(i) The use, or storage of said factory pre-packaged products occurs only within a building, and

(ii) The non-residential land use is an office building use (or equivalent land use) or business use (or equivalent land use) engaged exclusively in retail sales of factory pre-packaged products intended primarily for domestic use or consumption, and

(iii) The non-residential land use is served or to be served by public water and public sanitary sewers, and

(B) If the Administrator determines:

(i) That the application for a building permit, certificate of use and occupancy (except for changes in ownership), business license is for replacement, modification or limited expansion of an existing facility, provided in no case shall such replacement, modification or limited expansion, cause, permit, let, suffer or allow the use, generation, handling, disposal, discharge or storage of toxic chemicals and hazardous materials on the property to be increased beyond that existing on the property to be increased beyond that existing on the property at the time of such application.

(ii) That the proposed replacement, modification or limited expansion will result in a substantial reduction in the existing risk of pollution from the toxic chemicals and

hazardous materials to the closest public utility potable water supply well.

(iii) In determining whether these will be a substantial reduction of the existing risk of pollution as aforesaid, the following factors shall be considered and evaluated by the Administrator prior to rendering his decision.

(1) Whether the proposed replacement, modification or limited expansion of the facility will provide adequated and increased monitoring and detection of pollution which may be or which has been caused by the toxic chemicals and hazardous materials on the property;

(2) Whether the proposed replacement, modification or limited expansion will provide adequate and increase inventory control and record keeping of toxic chemicals and hazardous materials on the property;

(3) Whether the proposed replacement, modification or limited expansion will provide adequate and increased storm water management of pollution which may be or which has been caused by the toxic chemicals and hazardous materials on the property;

(4) Whether the proposed replacement, modification or limited expansion will provide adequate and increased protection and security of the facilities utilized for the generation, storage, usage, handling, disposal, or discharge of toxic chemicals and hazardous materials on the property.

(iii) That there will be a substantial reduction of the existing risk of pollution from the toxic chemicals and hazardous materials to the closest public utility potable

water supply well, only if, all the aforesaid factors have been determined by the Administrator to have been complied with.

(f) Applicability of Zone of Influence within the wellhead protection areas:

(1) The following procedures shall be utilized when making a determination on the applicability of the zone of influence under these regulations;

(A) Property wholly within wellhead protection areas have restrictions shall be governed by the restrictions from a minimum of 1,000 feet radius from any potable water production well.

(B) Property within two or more wellhead protection areas have restrictions, shall be governed by the total sewage loading for the property. Total sewage loading shall be derived by adding the sewage loading with each wellhead protection area, and dividing the resultant amount by the gross acreage for the property;

(C) Property within both restricted and unrestricted wellhead protection area shall be governed in accordance with these subsections, except that the portion of the property outside of the restricted wellhead protection area shall be excluded from averaging a the applicable restrictions as aforesaid. However, all septic tanks and, leached fields, storm water disposal methods and liquid waste a storage disposal and treatment methods shall be installed upon the property as far away as is reasonably possible from all potable water supply wells.

(g) **Excavation.**

(1) Notwithstanding any provisions of this regulation, no approval, grant, or issuance of any permit, of any kind whatsoever, certificate of completion, or any excavation within the Groundwater Management Protection Zone (GWMPZ) or within the 1,000 feet radius of any public

utility potable water supply well, until the applicant for such permit or action has obtained the prior written approval of the Administrator.

(2) Furthermore, notwithstanding any provision of this regulation, no person shall cause, allow, let, permit or suffer any excavation within the Groundwater Management Protection Zone (GWMPZ) or within the 19000 radius of any public utility potable water supply well until the person has obtained the prior written approval of the Administrator.

(3) The Administrator shall issue his written approval only if the Administrator determines that the excavation will comply with the following:

(i) The property upon which the excavation has occurred or will occur and that portion of the property which has not been excavated or will not be excavated shall be provided with protection and security measures to prohibit the handling, disposal of, discharge or storage of toxic chemicals and hazardous property which has not been excavated or will not be excavated Said protection and security shall be subject to the approval of the Administrator.

(ii) The excavation will not be located within the 1,000 feet radius of any public utility potable water supply well and the excavation will not exceed a depth of forty (40) feet below the existing grade.

(h) Pipelines for toxic chemicals and hazardous materials:

(1) No approval, grant or issuance of any permit of any kind whatsoever for the installation, modification, or expansion of that portion of any pipeline used or to be used for the transmission or storage of any toxic chemicals and hazardous materials and which portion is within the GWMPZ or within the 1,000 feet radius of any public utility potable water supply well.

(i) Land uses within the GWMPZ:

(1) No approval, grant or issuance of any building permit, certificate of use and occupancy (except for changes in ownership) or zoning action (unusual use, use variance, new use, similar use), for any land use within the GWMPZ, without obtaining the prior written approval of the Administrator.

(2) Furthermore, notwithstanding any provision of this regulation, no person shall construct, utilize, operate, occupy or cause, allow, let, permit or suffer to be constructed, utilized, operated or occupied any land use within the GWMPZ without obtaining the prior written approval of the Administrator.

(3) The Administrator shall issue his written approval only if:

(i) The Administrator determines that the property is within the GWMPZ and the existing land use(s) for the property or the land use(s) requested for the property is one or more of the land uses set forth in the most recent Guam Zoning Regulations and the land use(s) will have an adverse environmental impact upon the groundwater quality in the GWMPZ.

(ii) The Administrator determines that the land use is not listed in the most recent Guam Zoning Regulations, the land use(s) is not set forth as a permitted use, special exception, unusual use of conditional use by the zoning regulations, the land use(s) is not land use(s) found in the zoning regulations and the land use(s) will not have an adverse environmental impact on groundwater quality in the GWMPZ.

(iii) Notwithstanding the foregoing, the Administrator shall not determine that the land use is comparable to land use(s) set forth in the zoning regulations if the land use is permitted in one or more of the zoning classifications and that the land is not permitted in one or more of the zoning classifications which are less restrictive than the most recent zoning classifications.

(iv) In determining whether the land use is comparable to one or more land use(s) set forth in the most current Guam Zoning Regulations, the Administrator shall consider the following factors:

(A) The materials used, handled and stored, and the products and wastes produced;

(B) The activities, processes and methods which are employed and utilized;

(C) The machinery and other facilities utilized and maintenance requirements of said machinery and facilities;

(D) Uses commonly attendant to or associated with the primary use.

§7131. Penalties and Appeals. (a) Any person who violates any of the provisions of these regulations shall be penalized pursuant to §7031 of the Water Resources Conservation Act as amended, 22 GCA Chapter 46.

(b) Any order or decision of the Administrator pursuant to these regulations, shall become final unless a hearing is requested before the Board. The Board shall have the order or decision of the Administrator so appealed. Such appeal shall be made pursuant to the provisions of the Administrative Adjudication Law, 5 GCA Chapter 9.

(c) Any order or decision of the Board pursuant to these regulations shall be subject to an appeal therefrom to the Island Court of Guam. Such appeal shall be made pursuant to the provision of the Administrative Adjudication Law, 5 GCA Chapter 9.

§7132. Severability. (a) If any rule, section sentence, clause, or phrase of these regulations or its application to nay person or circumstance or property is held to be unconstitutional or invalid, the remaining portions of these regulations or the application of these regulations to other persons or the circumstances or property shall not be affected.

APPENDIX A

APPLICATION FOR WELL DRILLER'S LICENSE

Complete Items No. 1 through 7 and submit an application fee of two hundred dollars ($200)/three hundred dollars ($300). Make checks payable to the Treasure of Guam.

1. Date of Application:_____
2. Type of Application:
   ____ New
   ____ Renewal If renewal, indicate previous well driller's license no._____
   [ ] $200.00 for two year period
   [ ] $300.00 for triennial period
3. Name of Applicant: _____
   (Name of Individual or Name and Type of Association or Organization of private or public entity or agency)
   Mailing Address: _____
   _____
4. Contractors License No. _____ Date Issued: _____
5. Authorized representative for applicant
   Name: _____ Title: _____
   Address: _____
   (If different than above) _____
   Telephone: _____
6. The following documents, statements and certifications shall be attached to this application and submitted herewith.
   A. Bonding and financial capability statements.
   B. Insurance for comprehensive and general liability coverage.
   C. Qualifications and experience statements
7. I, _____, _____
   (Name) (Title)
   being duly authorized to act on the behalf of the above applicant state that I have knowledge and belief and are made in good faith.

Signature _____
Date_____

_____

(For Agency Use Only)
Recommendations:
[ ] Approved
[ ] Disapproved
Reasons for Disapproval
_____
_____
_____
_
SIGNED:
_____ _____
Administrator Date

Well Driller's License No.
:_____
Date Issued
:_____
Expiration Date
:_____

APPENDIX B
WELL DRILLER'S LICENSE

Date Issued :_____
Expiration Date :_____

This certifies that _____, a duly registered well driller, with license number _____ dated _____ having met the requirements set forth by the Water Resource Development and Operating Regulations of the Territory of Guam, is entitled to practice as such in Guam for _____ years indicated thereon.

_____
_____
Well Driller

Administrator

_____
Date

APPENDIX C
APPLICATION FOR WELL DRILLING PERMIT

Complete Items No. 1 through 18 and submit an application fee of two hundred fifty ($250.00) per well and a bond in the amount set by the Administrator. Make checks payable to the Treasurer of Guam.

I. Background Information

1. Date of Application: _____
2. Type of Application:
   [ ] New
   [ ] Extension Previous Well Drilling Permit No. _____
3. Name of Owner: _____
   (Name of individual or name and type association or organization or private or public entity or agency)
   Mailing Address:
   _____
   _____
   _____
   Telephone Number: _____
4. Name of Owner of property on which well is located: _____
   Department of Land Management Lot Number on which well is located: _____
   If owner of the land on which the well is located and the owner of the well are not the same, written notarized permission from the owner of the land shall be filed with the application.

II. Driller Information

5. Name of Driller: _____
6. Well Driller's License No. _____
   Expiration Date: _____
7. Well Driller's Contractor's License No. _____
   Date Issued: _____
8. Proposed Well Drilling Start Date: _____
9. Estimated Time Required to Complete Drilling Operation _____
10. Method of Drilling to be used: _____
    Type of drilling fluid (Indicate manufacturer and chemical composition:

_____

III. Well Information

11. Type of Well (Indicate One):
    [ ] Public Water Supply Well
    [ ] Recharge of Injection Well
    [ ] Individual Domestic Well
    [ ] Industrial Well
    [ ] Agricultural Well

[ ] Irrigation Well
[ ] Monitoring Well\par [ ] Grounding Well
[ ] Test Boring
[ ] Dewatering
[ ] Others _____

12. Purposes for which water is to be used: _____
_____
_____
_
13. Estimated Pumping Rate:
Normal pumping rate: _____gpm
Maximum pumping rate: _____gpm
14. Estimated hours of well operation: _____ hours per month.
15. Estimated volume of water to be pumped on an annual basis: _____
gallons per year.

IV. Well Plan and Construction Details.
16. Attach map or drawing with a scale of 1: = 50′ showing the following:
(a) Location of well with respect to known references such as streets, property lines and survey monuments, including GGTN coordinates of the well to the nearest foot;
(b) Topography with contours not greater than two feet (1,000 feet from the well in all directions);
(c) Boundaries of property where well is located;
(d) Location and elevation of semi-permanent benchmark established by Registered Land Surveyor;
(e) Locations of existing or abandoned wells within 1,000 foot radius.
(f) Location of sewer lines, leaching fields, ponding basins, dry wells, buildings, etc., within a 1,000 foot radius; and
(g) Other natural features such as springs, sinkholes, etc.
17. A sketch of the well indicating the proposed depth of well, elevation of the top of the well casing and potential flood hazard area(s), details of casing or lining, water level measurement provisions, grouting of annular space, vents, water sample taps, air release valves, pressure gauges, discharge piping and fittings, type of screen or perforation, etc., shall be attached and submitted with his application.
18. The well pump will be of the _____
(submersible, vertical turbine etc.)
type with a rated capacity of _____ gpm at a total dynamic head of _____ feet. Attach hydraulic calculations supporting the sizing of the well and pump.
19. The production meter will be _____ inches in size and capable of metering flow over a range of _____ to _____ gpm.

V. Permit tee Bond
It is required that before permit be granted a permittee bond on an amount set by the Administrator but not to exceed ten thousand dollars ($10,000) on each new well shall be submitted together with this application to the Administrator and bond shall be payable to the Treasurer of Guam effective for a period covering the life of the drilling permit or until issuance of a well operating permit,

whichever occurs first.

VI. Signature

I _____, _____
Name Title
state that I have knowledge of the facts herein set and that the same are true and correct to the best of my knowledge and belief and are made on good faith.

Date: _____ Signature _____

VII. Public Utility Agency of Guam (PUAG) Clearance:

[ ] Approved
[ ] Disapproved
[ ] Hold for further evaluation

Remarks: _____
_____
_____

Date: _____ Signature: _____
(PUAG Authorized Representative)

_____
Title

_____
_

(FOR AGENCY USE ONLY)

Inspection of the well site was conducted on _____

by _____
_____

Findings:
_____
_____
_____

Review by the Chief Engineer:
_____ Date: _____

Recommendations:
[ ] Approved
[ ] Disapproved
Reasons for disapproval:
_____
_____
_____
_____
_

Signed:
_____ Date: _____
Administrator

Well Drilling Permit No:
:_____
Date Issued
:_____
Expiration Date :_____

APPENDIX D
WELL DRILLING PERMIT

This permit has been issued for the performance of work provided by the Water Resource Development and Operating Regulations of the Territory of Guam, and shall be valid for a period of the life of the drilling operation but not to exceed one *(1)* year.

Permit No._____ Date Approved _____

Owner: _____

Location: _____

_____

Well Driller: _____

The maximum pumping rate shall be _____ gallons per minute.

This notice must be posted visibly on the project site during the progress of the work as required by the law.

_____
Administrator

APPENDIX D-1
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) GUIDELINES FOR WELL DRILLING

I. Is proposed well within the Groundwater Management Protection Zone?
[ ] If Yes, Answer the questions in Section A.
[ ] If No, Skip A and answer the questions in Section B.

A. If Yes, answer the following questions:
1. What Management Zone and Sub-basin will the well be in?
2. What is the sustainable yield of this Management Zone?
3. What is the present pumpage in this Management Zone and contiguous Zone(s)?
_____
_____
__
4. How many PUAG wells (existing and/or planned) are in these Management Zones?
List wells:
_____
_____
__
5. How many Navy Wells (existing and/or planned) are in this Management Zones? List wells:
_____
_____
__
6. How many Air Force Wells (existing and/or planned) are in this Management Zones? List wells:
_____
_____
_
7. How many Private Wells (existing and/or planned) are in this Management Zones? List wells:
_____
_____
__
8. What is the remaining sustainable yield in these Management Zones?
9. What are the documented trends of Groundwater Quality and Well Production in thus. Management zones?
10. Is present pumpage in the zone of this well equal to or greater than sustainable yield?
[ ] If Yes, No Well trilling Permit can be issued (§7105).
[ ] If No, What is the purpose of the Well? (§7105)
(a) Public Drinking Water Supply;
(b) Agricultural Supply;
(c) Industrial Supply;
(d) recreational Supply (including irrigation of golf courses)

B. Has a deep monitoring well been drilled?
[ ] If Yes, Proceed to Section C and answer the questions.
[ ] If No, The only permit that can be issued is for a deep monitoring well. Outside the Groundwater Management Protection Zone (GMPZ) a deep monitoring well must be drilled prior to drilling of any production well in any Coastal Zone (within 4,000 feet of shoreline).

The deep monitoring well must penetrate into the 100 percent Seawater Salinity (19,000 ppm) at the bottom of the Transition Zone - It must be located midway between the shoreline and the site of the proposed production well.

C. Provide the following information for the Monitoring Well.
   1. Ground Surface Elevation feet above mean sea level (MSL).
   2. Centerline Transition Zone feet above mean sea level (MSL).
      The Centerline of Transition Zone is defined as the point where Salinity equals 50 percent that of seawater.
   3. Top Transition Zone feet above mean sea level (MSL).
      The top of the Transition Zone is defined as the point where the chloride content is 250 ppm; the maximum contaminant level (MSL) for drinking water.
   4. Provide the following data for ten (10) foot intervals from the top of the Static Water Table to the bottom of the Transition Zone (100 percent Salinity).
      (a) Chloride (ppm)
      (b) pH
      (c) Total hardness (as $CACO_3$)
      (d) Salinity (ppm)
      (e) Nitrate (ppm) as Nitrogen
      (f) Total alkalinity (as $CACO_3$)
      (g) Specific Conductivity
   5. Plot the conductivity and the salinity profiles and indicate the Transition Zone boundaries and centerline.
   6. Is the thickness of the freshwater layer greater than the thickness of the Transition Zone?
      [ ] If Yes, Proceed to No. 7.
      [ ] If No, Production wells are not permitted in this part of the Coast Zone (§7105)
   7. Is the proposed Production Well for Drinking Water purposes (§7105)
      [ ] If 'Yes, Apply for Test Well Drilling Permit.
      [ ] If No, Proceed to No. 8.
   8. Is the proposed Production Well for:
      Agricultural? [ ] Yes, Proceed to No 9.
      Industrial Use? [ ] Yes, Proceed 10.
      Irrigation? [ ] Yes, Proceed to No. 10.
   9. Are there likely to be any undesirable side effects of development, such as land subsidence or seawater intrusion, that could serve limit the yields?
   10. Apply for a Test Well Drilling Permit and provide supporting information to justify the drilling of the well.
   11. Provide information justifying drilling of a well as opposed to Recycling of Wastewater or Surface Water Source Development.

NOTE: Drilling of a Deep Monitoring Well does not constitute or insure approval of Drilling Test Wells or Production Wells. The Environmental Impact Statements (EIS) must be prepared by a licensed Professional Engineer or Hydrologist/Hydrogeologist.

Prepared by: Date:

_____

_____

APPENDIX E
APPLICATION FOR WELL OPERATING PERMIT

Complete Items No. 1 through 25 and submit application fee as set forth in the Water Resource Development and Operating Regulations. No application fee is required for monitoring wells. Make checks payable to the Treasurer of Guam.

I. Background Information:

1. Date of Application:_____

2. Type of Application:
   [ ]New
   [ ]Extension Previous Well Operation Numbers:_____

3. Name of Well Owner: _____
   (name of individual, company, agency, etc.)
   Mailing Address: _____
   _____
   Telephone: _____

4. Name of Owner of property on which well is located: _____
   _____
   If owner of the land on which the well is located and the owner of the well are not the same, written notarized permission from the owner of the land shall be filed with the application.

II. Well Information

5. Type of Well (indicate one):
   [ ]Public Water Supply Well
   [ ]Individual Domestic Well
   [ ]Industrial Well
   [ ]Recharge or Injection Well
   [ ]Agricultural Well
   [ ]Monitoring Well
   [ ]Irrigation Well (Golf Course)
   [ ]Grounding Well
   [ ]Others _____

6. Purpose for which water is to be used:
   _____
   _____

7. Pumping Rates:
   Design Pumping Rate : _____ gpm
   Maximum Pumping Rate :_____ gpm

8. Estimated Hours of Operation:
   _____ per day
   _____ per month
   _____ per year

9. Estimated Volume of Water to be Pumped on an Annual Basis:
   _____ gallons per year

III. Well Location:

10. Provide a plot plan drawn to a scale of 1" = 50' showing

known references such as streets, property lines, and survey monuments, including GGTN coordinates of the well to the nearest foot.

IV. Well Drilling Summary:

11. Period of well drilling:
    Starting Date: _____
    Completion Date; _____
12. Well Drilling Contractor: _____
13. Well Drilling Permit No. _____
14. Total Depth of Well: _____ feet
    Elevation (MSL) of Ground Surface at Casing: _____ feet
    Elevation (MSL) of Top of Well Casing: _____ feet
15. Describe Method and Type of Drilling:
    _____
    _____
    __
16. Casing:
    Casing Hole Diameter: _____ inches
    Depth (length from surface): _____ feet
    Casing Type: _____ Size (ID): _____ in.
    Wall Thickness: _____ inches
    Weight: _____ lbs.
    Material: _____
    Describe the procedures of the installation of casing: _____
    _____
    _____
17. Well Screen:
    Screen Type (ID): _____ in. Slot Size: _____ in.
    Screen Diameter: _____ in. Material: _____
    Location (from surface) _____ft. to _____ ft.
    Describe Method of Installation:
    _____
    _____
    _____
18. Cement Grouting:
    Material: _____ Total Depth:_____ ft.
    Gravel Size: _____ in.
    Annular Thickness: _____ feet
    Cubic Yards of Cement Placed: _____
    Describe Method of Grouting Used and Emplacement
    Placement Procedures: _____
    _____
    _____
    __
19. Describe Well Development method(s): _____
    _____
    _____

_

V. Well Construction Summary:

20. Flow Measurement and Testing, if performed:
Pump Capacity: _____ gpm
Static Water Level: _____ feet
Pumping Water Level: _____ feet
Air Line Length: _____ feet
Top Elevation (MSL) _____ feet
Bottom Elevation (MSL) _____ feet
Specific Capacity at Test: _____ gpm
Describe Method Used for Flow Measurement and Testing: _____
_____
_____
_

21. Provide a plan(s) of the well showing the following information
(a) Control valves, sampling tap(s), misc. fittings and appurtenances, and discharge piping;
(b) Flow metering device, including size, and flow range and manufacturer;
(c) Vertical cross-section of the well showing details of the casing, grouting, pump setting, gravel pack, water level measurement devices;
(d) Chlorination and fluoridation equipment; and
(e) Elevation and location of permanent benchmark.

22. Describe provisions for protecting the wellhead from erosion and animals and other contamination by specifying provisions for sanitary well seal, casing height above ground, and flood level elevation, etc.
_____
_____
_

23, Describe methods and procedures used for disinfecting the well:
_____
_____

25. If not previously submitted, attach a log of the well to the application.

VI. Signature:
I, _____, _____
Name Title
state that I have knowledge of the facts herein set and that the same are true and correct to the best of my knowledge and belief and are made on good faith.
Signature: _____ Date: _____

_____
__
(For Agency Use Only)
Inspection of the well facilities was conducted on _____
by _____
Findings:
_____

__
_____
_
_____
_
Water sample taken on _____ by _____
_____
__
Results of the water quality analyses are attached.
Reviewed by the Chief Engineer:
_____ Date: _____
Recommendations:
[ ] Approved
[ ] Disapproved
Reasons for disapproval:
_____
_____
_____
Signed:
_____ Date: _____

Well No. _____
Well Operating Permit No. _____
Date Issued: _____
Expiration Date: _____

APPENDIX F
WELL OPERATING PERMIT

Well No. _____
Well Operating Permit No. _____
Expiration Date; _____

This certifies that Well No. _____ located at
_____
_
has met the provisions required by the Water Resource Development and Operating regulations of the Territory of Guam, and is hereby granted permit for its operation for a period of five (5) years providing the following requirements are maintained:

(1) the maximum pumping rate shall be _____ gallons per minutes.
(2) The total annual volume of water withdrawn shall not exceed _____
million gallons.
(3) Annual well operating reports be filed no later than January 15 of each year in conformance with the provisions of §7106 of the Water Resource Development and Operating regulations.
(4) all other provisions of the Water Resource Development and Operating regulations are met.
(5) Total monthly volume of water withdrawn shall be submitted within the first ten (10) days of the following month.
(6) Quarterly report on the analytical analysis results of the water (irrigation and monitoring wells)
(7) An annual operating fee is to be submitted by no laster than January 15 of each year.

_____
_____
Well Driller Administrator
Date:
_____

APPENDIX G
ANNUAL WELL OPERATING REPORT FOR PRODUCTION WELLS

Complete Items No. 1 through 7 and submit the annual operating fee to Guam Environmental Protection Agency (GEPA). Make checks payable to the Treasurer of Guam.

Well Operating Permit No. _____

1. Date of Report: _____
2. Name of Well Owner: _____
3. Well Number: _____
4. Total Water Pumped:

Month	Gallons
January	_____
February	_____
March	_____
April	_____
May	_____
June	_____
July	_____
August	_____
September	_____
October	_____
November	_____
December	_____

Total Annual Production ------ _____ gallons

5. Describe any alteration, rehabilitation or extension made to the well during the preceding year.

Date	Description
_____	_____
_____	_____
_____	_____
_____	_____

6. Itemize all maintenance, repairs or replacement of well equipment (pumps, motors, meters, chlorination, etc.), chemical treatment of the well screen, resetting of the pump, etc., for the receding year.

Date	Description
_____	_____
_____	_____
_____	

_____

7. I, _____, _____
   Name Title
   state that I have knowledge of the facts herein set and that the same are true and correct to the best of my knowledge and belief and are made in good faith.
   Signature: _____ Date: _____

APPENDIX H
ANNUAL WELL MONITORING REPORT

Well Operating Permit No. _____

Complete Items No. 1 through 6.

1. Date of Report: _____
2. Name of Well Owner: _____
3. Well Number: _____
4. Describe type, method and frequency of well monitoring conducted on the well during the preceding year:
   _____
   _____
   _____
5. Describe any alteration, rehabilitation or extension made to the well during the preceding year:

Date	Description
_____	_____
_____	_____
_____	_____
_____	_____

6. I, _____, _____
   Name Title
   state that I have knowledge of the facts herein set and that the same are true and correct to the best of my knowledge and belief and are made in good faith.
   Signature:_____ Date: _____

APPENDIX I
WATER ANALYSIS REPORTING FORM

Well Drilling Permit No. _____
Previous Well Operating Permit No. _____

Well No. _____
Date(s) Sampled _____
_____
Sampled By _____
_____
Date of Analysis _____

By _____
_____

I. Chemical (in mg/1 unless otherwise noted)

Silica	_____	Sulfate	_____
Calcium	_____	Chloride	_____
Magnesium	_____	Fluoride	_____
Sodium	_____	Nitrate (as N)	_____
Potassium	_____	Dissolved Solids	_____
Bicarbonate	_____	pH, units	_____
Carbonate	_____	Specific Conduct-	
Hardness (as $CaCO_{3)}$	_____	tance (mhos)	_____
Salinity	_____	Color, units	_____
Turbidity	_____	Foaming Agents	_____

II. Metals and Special Constituents (in mg/1)

Arsenic	_____	Manganese	_____
Barium	_____	Mercury	_____
Cadium	_____	Selenium	_____
Copper	_____	Zinc	_____
Cyanide	_____	Phenols	_____
Iron	_____	Surfactants (MBAS)	_____
Lead	_____	Silver	_____

III. Volatile Organics (in mg/1)

Benzene	_____
Carbon Tetrachloride	_____
1-2 - dichloroethane	_____
Trichloroethylene	_____
Para-Dichlorobenzene	_____
1,1 -Dichloroethylene	_____
1,1,1,-Trichloroethane	_____
Vinyl Chloride	_____

IV. Bacteriological (counts per 100 ml)

Fecal Coliform	_____
Total coliform	_____

V. Synthetic Organics

Endrin	_____
Lindane	_____
Methoxychlor	_____
Toxaphene 2,4-D	_____
2,4,5-TP	_____

VI. Radionuclides

Gross alpha _____
(excluding radon and uranium)
Radium 226 and Radium 228 _____
(combine)
Gross Beta _____

VII. TTHMS _____
(Total trihalomethanes)

APPENDIX J
LITHOLOGIC LOG OF WELL

Well No. :_____ Logged By: _____
Ground Elevation: _____ Drilled By: _____
Date Started: _____ Diameter by Boring: _____
Date Completed: _____ Depth of Water: _____
Total Depth Drilled: _____

Depth To	Depth From	Lithologic Description	Comments

Signature: _____
Date:_____
Driller

APPENDIX J-1

Location: _____
Elevation: Ground Level: _____
Top of Casing: _____
Personnel: _____
_____
_____

DRILLING SUMMARY:
Total Depth _____
Borehold Diameter _____
Driller _____
_____
Rig _____
Bit(s) _____
Drilling Fluid
_____
_____
_____
Surface Casing
_____
_____

WELL DESIGN:
Basis:
Geologic Log Geophysical Log
Casing String(s): C = Casing S = Screen
_____ - _____ _____ : _____ - _____ _____
_____ - _____ _____ : _____ - _____ _____
_____ - _____ _____ : _____ - _____ _____
_____ - _____ _____ : _____ - _____ _____

Casing: C1 _____
C2 _____
C3 _____
C4 _____

Screen: S1 _____
S2 _____
S3 _____
S4 _____
Centralizers _____
_____
_____

Filter Material: _____
_____
_____

Other: _____
_____

CONSTRUCTION TIME LOG:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling:				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Geophysical Logging:	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Casing: _____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Filter Placement:	_____	_____	_____	_____
Cementing:	_____	_____	_____	_____
Development:	_____	_____	_____	_____
Other: _____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Comments:
_____
_____
_____
__

KEY:

Bentonite	Sand
Cement/Grout	Silt
Sand pack	Clay
Drill Cutting	Screen
Gravel	Limestone

APPENDIX K
NOTICE TO TEST BORE

INSTRUCTION: Send one (1) copy of this Notice to the Guam Environmental protection Agency together with the Well Drilling Permit Application. All test borings are subject to the requirements of the Water Resource Development and Operating Regulations. A boring log and a copy of soil analysis report shall be submitted to GEPA within ten (10) days of completion of the borings.

NAME OF OWNER: _____

DRILLING FIRM/AGENCY: _____

MAILING ADDRESS: _____

_____

PURPOSE OF BORINGS: _____
_____
_____

NUMBER OF PROPOSED TEST BORING: _____

MAXIMUM PROPOSED DEPTH OF BORINGS: _____FEET

DIAMETER OF HOLE: _____INCHES

LOCATION OF TEST BORINGS: _____

LOCATION MAP: _____

PROPOSED STARTING DATE OF BORING: _____

(ATTACHED LOCATION MAP WITH SCALE OF 1:400)

DATE: _____ SIGNATURE: _____
APPLICANT

_____
NAME IN PRINT

_____
TITLE

APPENDIX K-1
LOG OF BOREHOLE

Project _____ Total Depth _____
Location _____ Borehold Dia. _____
Geologic Log by _____ Depth of Fluid _____
Driller _____ Rig _____
Geophysics By _____ Bit(s) _____
Weather _____ Fluid _____

	Start	Finish
Date	_____	_____
Time	_____	_____

How Left

_____
_____
_____

_____
_

APPENDIX L
YIELD AND DRAWDOWN TEST REPORT
WELL NO. _____

Location Coordinates _____ Static Water level _____
Surface Elevation _____ Rate of Pumping _____
Depth of Well _____ Size of Weir (Orifice) _____
Driver _____ Method of Measuring Water Level _____
Date of Pumping Started _____ Average Drawdown _____
Date of Pumping Finished _____ Time of Stabilization _____
Pump Intake Setting _____ Time for 90% Recovery _____
Depth of Screen _____ Time for 100% Recovery _____
Size of Screen Opening(s) _____ Remarks (Such as Quality of Water
Drawdown, Personnel)
Length of Screen _____
_____
Specific Capacity _____
Amount of Sand (Ounces) 1st Hr of Pumping _____
Amount of Sand (Ounces) 2nd Hr of Pumping _____
Number of Location - Observation Wells _____
Witnessed:
Contractor: _____ Government: _____

Time Since Pumping Started-Stopped	Water Level Reading	Draw-Down (Ft.)	Pumping Rate (GPM)	Recovery (Ft.)	Chloride Ion (mg/l)
Minutes	(1)	(2)	(3)	(4)	(5)	(6)

APPENDIX L-1
PUMPING TEST RESULTS REPORT

Well No. _____ Date _____
Static Water Level _____ Measuring Device _____
Measuring Point _____ Elevation of M.P. _____
Witness: _____
_____
Contractor Government

Time	Time Since Pumping Begun (T) (Minutes)	Discharge (gpm)	Water Level (Feet)	Drawdown (Feet)	Comments

APPENDIX L-2
TIME RECOVERY TESTS

Well No. _____ Date _____
Static Water Level _____ Measuring Device _____
Measuring Point _____
Witness: _____
_____
Contractor/Driller Government

Time	Time Since Pumping	Recovery Water Level (Feet)	Drawdown	Comments