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Dr. John C. Lewin, Director
Department of Health
1250 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Lewin:

Proposed Revisions
Hawaii Administrative Rules Chapter 23
Underground Injection Control
Statewide

The proposed revisions to Chapter 23 of Hawaii Administrative Rules governing Underground Injection Control (UIC) have been reviewed with the assistance of L. Stephen Lau and Edwin Murabayashi, Water Resources Research Center; Keith Loague, Frank Peterson, and Donald Thomas, Hawaii Institute of Geophysics; and Steven Armann and Nancy Kanyuk, Environmental Center. We are concerned that some of the proposed revisions appear to jeopardize the public's health and safety by permitting injection wells in potentially harmful areas. In particular, we have commented below on the revisions to Section 11-23-05, which, if adopted, could result in serious degredation to Hawaii's potable groundwater. The following comments are offered for your consideration.

Definitions Section 11-23-03

"Aquifer"--We believe a better definition for "Aquifer" comes from Groundwater, by R. Allan Freeze and John A. Cherry, (Prentice Hall, 1979), "Saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients." An alternative definition similar to that proposed would be, "a geological formation that is capable of yielding a significant amount of water."

"Confining materials or zone"--We suggest retitling the definition as an "Aquiclude."

"Contaminant"--A revision of the definition for contaminant is required. As defined, naturally occurring dissolved salts (chemical substances), heat (physical substance), or radionuclide (e.g. radon, potassium-40, carbon-14) (radiological substance), or biota (zooplankton or phytoplankton) could be construed to be contaminates. Likewise, the addition of beneficial substances to a water supply (e.g. chlorine or fluoride) could be challenged on the basis that they are "contaminates" to the water supply. A modification of the definition is needed that would take into account naturally occurring substances and would allow the addition of substances that would have a net beneficial affect on public health. The existing language prior to the proposed amendment seems more accurate and reasonable.

"Injection pressure"--There is no defintion of "head" in the definition of "injection pressure". We suggest that the definition for "head" be given as, "the total energy of the fluid at any given point." In Hawaii the main components of "head" are the elevation and the pressure.

"Pollute"--The definition may have been broadened more than is appropriate. Many substances have the potential to be "harmful" at some level and that level is often in dispute. For example, addition of any fluoride to drinking water, or disposal of parts per billion of arsenic might be construed by some to be harmful even though both are known to have beneficial effects at low concentrations and are present in many natural groundwater supplies.

Furthermore, the amended definition of "pollute" is grammatically, and as a result, substantively incorrect. We believe the intent of the amendment is better expressed by the following language:

1. To alter the physical, chemical, biological or radiological properties of any state waters or USDW, including but not limited to temperature, taste, potablity, mineral content, turbidity, color or odor; or...

"Radioactive waste"--Section 11-23-06(c): indicates that injection of hazardous waste and radioactive waste is prohibited, however there is no definition of radioactive waste. Low-level radioactive waste is defined in HRS 339 K-1, Article II(b).

Section 11-23-05(b): The original UIC lines were selected on the basis of brackish water (5000 mg/L TDS) not potable water; the proposed change significantly weakens this criterion.

Section 11-23-05(b1): This proposed amendment (11-23-05(b)(1)) should be deleted from the rules. The depth of the borehole is unspecified and as presently drafted, a 5-foot depth would qualify as a borehole. Allowance of underground injection under these proposed provisions could

seriously and most significantly result in long term, irreversible degradation of potentially useful water supplies. We strongly oppose this amendment and recommend against its inclusion.

Section 11-23-05(b2): We recommend that this section be amended to read, "if groundwater is encountered in the borehole, test samples shall be taken and analyzed to determine whether the water contains more than 5,000 milligrams per liter chloride, if the water contains more than 5,000 milligrams per liter chloride, underground injection shall be allowed, provided that the adminstrative rules of the department are followed."

It should be recognized that in agricultural areas, especially sugar cane, there is a layer of salt water above the groundwater lens. This is caused by irrigation recharge and it may be up to 10 to 15 feet thick. Test borings should extend well below this layer.

Furthermore, a minimum test borehole depth needs to be indicated or defined in order to clarify the ambiguous language of this section. We suggest that a section 11-23-05(b)(2a) be added following this language, "At a minimum, test boreholes will be drilled deep enough so as to penetrate the saturated water body (either the basal or perched groundwater)." We suggest that "5,000 milligrams per liter chloride" be used in place of "potable" because that was the criteria used in originally setting the UIC boundaries. These recommended changes will allow exploratory borings which will in turn help to determine more specific UIC boundaries depending on the quality of water found.

Section 11-23-05(d): Proposed changes seem unduly broad; for example there may be potable goundwater supplies overlying a geothermal resource, yet under the proposed new rule geothermal wastes presumably could be injected into the shallow potable groundwater supply. Modification of this amendment is required.

Section 11-23-06: In general, we find the language of this section to be extremely ambiguous and the content difficult to follow rationally. For example, Classes I through IV describe various types or classifications of injection wells and then conclude that wells in all these classes are prohibited anyway.

Section 11-23-06 (a)(4): The rationale presented for the amendment to this section notes that the rewording proposed is necessary because it fulfils the requirement of being at least as stringent as the Federal UIC regulations. In our opinion the proposed classification of Class IV wells seems weakened - injection of wastes within one-quarter mile of USDW in some cases may be too close and therefore may pose a threat to drinking water supplies. Consideration should be given to increasing this distance depending on the permeabilty and geo-hydrology of the area.

Section 11-23-06(3a): The purpose for the new part "G" under subclass B is confusing. Should the language also include the new subclasses added, ie., C,D, and E, and thereby read, "All wells not included in subclasses A, AB, C, D, or E of class V or in classes I through IV." This would cover the added subclasses in the present revision. However, it seems that if Subclass B wells include all wells not included in the other subclasses or classes, what purpose is served by the lengthy description of the individual types of wells under Subclass B?

Section 11-23-06(b): According to this section, "without exception", only class V injection wells are permissible and these are defined in a series of subclasses A, AB, B, C, D, & E. Each subclass is further classified by the types of fluids they inject. Subclass A for example states that wells in this subclass "inject fluids into an underground source of drinking water." Furthermore, subclass A wells include:

(A) Sewage injection wells; and
(B) Industrial disposal wells other than those classified under subclasses AB or B.

Surely this language is either incorrect or ambiguous. Injection of sewage and industrial wastes into an underground source of drinking water (USDW) can not be intended!

Section 11-23-12: It may be advisable to add a provision/procedure that would allow for the conversion of an existing well to an injection well. This would be particularly appropriate for conversion of a geothermal well from designation as a producer to an injector. Such a case could occur if an exploration/production well was found to have too low a temperature or have insufficient production to be viable after completion or in the case of a well that was found to be drawing low-temperature fluids into the reservoir. In this case, the wells would be acceptable as injectors although it would not necessarily have been anticipated that they would be used for injectors when they were drilled.

Section 11-23-13(a17): The word geologist should be changed to hydrogeologist. A similar problem occurs in section 11-23-05(b1), however we have suggested that this section be deleted altogether.

Section 11-23-16: For the case of injection into exempted aquifers, we would like to suggest that some general guidelines be included for governing where injection would be allowed. A very general requirement that might be included is that reinjection into an aquifer of similar water quality would be appropriate. A specific example would be in the case of the geothermal exempted aquifer - there are many reasons to expect that natural hydrothermal circulation will contaminate shallow groundwater with geothermal fluids. However, in some cases the shallow groundwater may be of a reasonable quality, in which case it would be advisable to reinject geothermal fluids into an underlying aquifer of lower quality.

Although a requirement to reinject fluids into an aquifer of equivalent water quality may be to restrictive, to require that non-potable fluids be reinjected into non-potable aquifers (ie., similar water quality) would be a reasonable requirement and would provide adequate protection for potable water supplies.

We appreciate the opportunity to comment on the proposed revisions to the UIC rules. It is essential that the rules remain stringent to insure that potable groundwater sources continue to supply safe water for the increasing population of Hawaii. We urge that careful consideration of the proposed changes be carried out in full accordance with standard administrative procedures. UIC Program Staff and the UIC Steering and Technical Advisory Committees should be required to review and make a full report on their findings prior to any adoption of amendments to the existing UIC rules. Please feel free to contact us if we can be of further assistance.

Yours truly,

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Associate Environmental Coordinator

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