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RR: 0053

PROPOSED REVISION OF PUBLIC HEALTH REGULATIONS
CHAPTER 37-A: WATER QUALITY STANDARDS

Statement for the Department of Health
Public Hearing 2 May 1978

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INTRODUCTION AND CONCLUSIONS

Context of DHR 37-A

Under Hawaii Revised Statutes (HRS) Chapter 342, responsibility for control of water pollution is placed in the Department of Health (DOH). In accordance with that statutory authority, the DOH has promulgated several chapters of its Public Health Regulations including Chapter 37, Water Pollution Control. This Chapter prohibits discharges that would pollute the waters of the State except under permit (PHR 37, Sec. 3). The permits now applicable are National Pollution Discharge Elimination System (NPDES) permits issued by the DOH (PHR 37, Sec. 1 (p)). Conditions for the issuance of NPDES permits include assurance that initiation or continuation of the discharges "will not endanger the maintenance or attainment of applicable water quality standards" (PHR 37, Sec. 15 (a)(4)). The applicable water-quality standards include State water-quality standards issued under the authority of HRS 342.

PHR 37-A, the State Water Quality Standards, issued under the indicated authority are to be precise standards applicable to receiving waters, effluent standards being prescribed in other regulations.

Defects in present PHR 37-A

Even as last amended in 1974, the standards in PHR 37-A suffer from important defects.

1) The use classification of the waters to which the standards apply does not take into account at all adequately the ecological diversity of the waters, and hence does not adequately differentiate the standards on the basis of ecological effects of their exceedence.

2) Standards are not applied to all of the significant water quality parameters.

3) Some of the standards are ambiguous.

4) Some of the standards do not represent the optimum balance between the benefits and costs of meeting them. Some, indeed, are not met in nature.

The need for revision of PHR 37-A has been recognized for many years, but enough information as to ecological diversity, as to the ecological effects of differences in water quality as indicated by various parameters, and as to the practicability and costs of meeting standards of various levels had to be accumulated to make the revision effort worthwhile.

Criteria for reviewing proposed revision of PHR 37-A

In reviewing the proposed revision of PHR 37-A, we have considered the following questions:

a) Does the revision provide standards in forms pertinent to the evaluation of proposed NPDES permit applications in the context of PHR 37?

b) Are the proposed standards water-quality standards as authorized by HRS 342?

c) Are the receiving waters classified as to occurrence and as to use in sufficient detail to provide an appropriate basis for differentiating the standards?

d) Does the revision include standards applying to all receiving-water-quality characteristics of importance in the context of water pollution control in Hawaii?

e) Do the proposed standards represent appropriate balances between the costs and benefits of pollution control?

f) Are the proposed standards presented unambiguously and as simply as feasible?

General conclusions of review

In brief, we conclude that:

a) The proposed revision provides standards in forms pertinent to the evaluation of proposed NPDES permit application in the context of PHR 37. However, the terminology applied to them could be improved.

b) The proposed standards are intended to be receiving-water-quality standards but in some cases would have to be redefined to become such.

c) The proposed revision provides a use classification of the waters that is approximately as detailed as that in the present standards, and a classification as to occurrence and ecology of the waters much more detailed than the present one. However, most of the detail in the combined classification is completely disregarded in the differentiation of the proposed standards, and, for some combinations of occurrence and use, no standards are provided.

d) Most water quality characteristics that are of importance are represented by standards. However, we note some characteristics that are of possible importance in waters of at least certain occurrence-use classes to which standards have not been applied.

e) Some of the standards are, we believe, violated by nature, and hence costs and benefits of pollution control.

f) Some of the standards are ambiguous.

g) Because the occurrence-use classification of the waters has been carried out to much greater detail than is actually used in the assignment of standards, and for other reasons, the proposed revision is far more complicated than it needs to be.

h) There is no legislative authority for the Department of Health to adopt some of the proposed standards.

g) The further changes that will be necessary to convert the proposed revision of PHR 37-A into an acceptable standard document are so great that we believe a new draft incorporating the changes should be submitted for public review before adoption.

CLASSIFICATION OF WATERS

Introduction

One of the defects of the present PHR 37-A is that the classification of the waters in its is not sufficiently detailed to provide a satisfactory basis for differentiation of standards.

A detailed classification of the waters of the state is provided in the proposed revision of PHR 37-A, however, certain of the classes are not receiving-water classes as they are now defined; others, although described as receiving-water classes are not identified as such. There are some ambiguities in the definitions of certain of the classes and subclasses; very little of the classification is actually used as a basis for differentiating the proposed standards; and no standards are proposed for certain of the subclasses.

Several bases for classification of the waters are provided in the present PHR 37-A, and many bases in the proposed revision. These are here considered in two general groups: 1) occurrence, in which we include situation, salinity, ecology, etc.; and 2) use, that is the human use for which water quality is intended to be safeguarded.

Proposed occurrence classification

Bases for classification

In the present PHR 37-A, the waters of the State are divided by occurrence into fresh waters and coastal waters, and the latter are subdivided into nearshore and offshore waters.

In the proposed revision, the waters are divided by occurrence or the bases of:

General situation (inland vs marine)
Altitude
Proximity to shoreline
Salinity
Extent of confinement
Nature of confinement
Temporal continuity of discharge
Spacial continuity of discharge
Exchange ratio
Depth
Physical nature of bottom or adjacent shore
Ecological nature of bottom
Season
Specific location

Number of classes

Twenty-three classes and subclasses distinguished by occurrence are explicitly recognized in Sec. 2, entitled "Classification of State Waters." In addition, streams are distinguished in that section as perennial or intermittent and as continuous, and or interrupted. Further differentiation by occurrence is provided in the sections prescribing standards on the basis of season (dry season vs wet season stream waters), exchange ratio ("wet" and "dry" embayment waters and open coastal waters), and depth (shallow-draft and deep draft harbors).

In total about 29 occurrence subclasses are recognized.

Entities classified

Since the standards are those applicable to receiving waters, it should be the waters to which the classification applies. The entities to which the proposed occurrence classification acutally applies are a combination of waters, hydrologic-hydrographic features containing the waters, and bounding features such as shorelines, bottoms, and bottom ecologies, adjacent to or underlying the waters.

No great confusion results from the inclusion of such features such as streams, wetlands, estuaries, pools, embayments, harbors, coves, and basins in the classification, because it will generally be recognized that the standards apply to the waters within such features. However, it would be simple to change the designations to (for example): stream waters, waters in pools and coves, etc.

It would be simple also to change the designations in the case of the other features to (for example): waters adjacent to beaches, waters overlying reef flats etc. However, in the case of these features most of the standards apply not to physico-chemical conditions of the waters but to rates of sediment deposition from the waters or effects on the bottom biota. It is, thus, useful to have a classification of bottom types such as is indicated in Sec. 2.3B.

Inconsistencies and ambiguities

There are a number of inconsistencies and ambiguities in the proposed occurrence classification. A problem is presented, for example, in the attempt to distinguish between estuaries (which are considered inland waters) and embayments (which are considered marine waters). According to Sec. 2.2C, estuaries (the waters of estuaries) may be either brackish or saline, but according to Sec. 5.6A, they are characteristically brackish. The waters of embayments are saline. According to Sec. 1.3, brackish water have salinities less than 30,000 ppm, saline waters have greater salinities. Yet Pearl Harbor, whose waters have median salinities in excess of 30,000 ppm except at the surface in the most mauka portions, is considered an estuary (in 5.6 C (2)). Kaneohe Bay, in which the salinity pattern is similar, is listed as an embayment in 6.1 B. The waters of the Ala Wai Canal, which is presumably a "developed estuary" (5.6 A), have median salinities in excess of 30,000 ppm at depth, although less than 30,000 at the surface.

Other problems in distinction are presented by: a) Loko Nomilo (Kauai), originally a freshwater lake but now an estuarine body (or possibly even an embayment by the salinity criterion) because of its connection with the ocean by a tunnel; b) Kuapa Pond (Oahu), originally an embayment by geology but an estuary by hydrology, converted by the Hawaiians to an estuarine fishpond, and now to a "developed estuary"; and c) perhaps Paiko Lagoon (Oahu) (an embayment?).

The DOH should consider adopting a more conventional defintion of estuary, distinguishing estuaries from embayments in accordance with that definition.

The water-quality standards applicable to embayments (Sec. 6.1) are distinguished according to whether the embayments are "wet" or "dry," the classification being based on the ratio of mean daily inflow to embayment volume. The values of this hydrographic parameter in various embayments will not be known even to most experts and, in addition, depend on locations of the seaward boundaries of the embayments that are not specified. Furthermore, the criterion proposed to distinguish between the two classes does not do so. If the ratio approaches one percent, the "wet" standards are supposed to apply; if it is less than one percent the "dry" standards apply. However, any percentage between a half and one may be considered both: a) less than one, and b) "approaching one."

Much the same problem is presented in the distinction between "wet" and "dry" open coastal waters (Sec. 6.2). Here, the criterion is the rate of freshwater discharge per unit length of coast. The proposal does not indicate whether the discharge to be taken into account is merely that of streams, or whether groundwater is to be included. Presumably the criterion applies to an average discharge, but the proposal does not indicate whether the average is the mean or the median, nor does it indicate over what coastal lengths the averaging is to be performed.

To clarify the "wet" and "dry" distinctions, it would be best to list separately those embayment waters and open coastal waters that are "wet" and those that are "dry" (and substitute terminology would be preferable).

Where coastal fish ponds fall in the water occurrence classification is not clear. They are not streams because they are not actively flowing; they are not lakes because they are not natural; they are not anchialine pools because they are man-made and contain fish. They do not seem to fall in the estuary or embayment classes. They may be coastal wetlands because these include man-made ponds, but they have controlled connections to the ocean and are tidal. It would seem that distinctive standards applied to the water quality of coastal fishponds would be important.

It seems intended that "artificial basins" (Sec. 7.4) are intended to correspond somehow to the present Class B waters. However, the extent and implication of the correspondence is not clear. Most of the harbors are not artificial basins, even as defined, but natural estuaries and bays that have been dredged, protected by breakwaters, provided with piers, etc.

We suggest that, in place of the present two-category, general-situation classification of waters now provided in PHR 37-A (fresh water vs. coastal waters) or the two-category classification proposed (inland waters vs marine waters), it would be advantageous to substitute a three-category classification, inland waters vs coastal waters vs ocean waters. In such a classification, the inland waters would be fresh, the ocean water would be saline, and the coastal waters might be fresh, saline, or brackish. The coastal waters would include coastal wetlands, anchialine pools, estuaries, estuarine canals, harbors, and embayments; and their bottom types would include all those identified in the proposed revision as marine bottom types.

Proposed classification by use

In both the present and the proposed revised PHR 37-A the waters of the State classified as to uses to be protected through the control of water quality in relation to the standards. The two proposed classifications are compared in Table 1:

Table 1. Comparison of use classes of waters

Present PHR 37-A	Proposed PHR 37-A
Fresh waters	Inland waters
1. Drinking water supply, pristine preservation, etc.	1a. Research, education, etc.
	1b. Domestic and agricultural supplies, etc.
2. Recreation, propagation of aquatic life, industrial and agricultural supply, etc.	2. Recreation, propagation of aquatic life, etc.
Coastal waters	Marine waters
AA. Pristine preservation, research, etc.	AA. Pristine preservation
A. Recreation, propagation of aquatic life, etc.	A. Recreation, propagation of aquatic life, etc.
B. Harbors, propagation of aquatic life, etc.	Marine Bottom types
	I. Pristine preservation, etc.
	II. Propagation of aquatic life, etc.

The difference between the proposed subclass 1a and the present class 1 does not seem to represent a distinction as to the water quality needed for the uses indicated, but an attempt to regulate uses--development of class 1a waters for drinking water supply not being allowed. As indicated in Sections 5.1B, 5.2 A.2, 5.3 B and 5.4 B, any regulation of development of these waters is under HRS 195, and hence under the Department of Land and Natural Resources (DLNR), not DOH. The subclass 1a waters in Sections 5.5, 5.6, and 5.7, are not freshwaters and hence would not be usefully developable for drinking water supply. Therefore, there seems to be no reason to distinguish proposed class 1a from present class 1.

Waters developable for agricultural use are placed in class 2 in the present classification, but lumped with waters developable for domestic supply in the proposed class 1b.

Waters to be developed for domestic supply must be purer with respect to both salinity and bacteriological quality than those developable for agricultural supply. Waters developable for agricultural use must be fresh, but otherwise in quality resemble those to be used for recreation and the propagation of fish and aquatic life. It may be impractical to improve the waters of harbors so as to make them suitable for water-contact recreation or propagation of all forms of aquatic life.

We suggest, therefore, that a simple tripartite classification of water uses might be satisfactory and applicable to all waters.

I. Preservation of pristine quality, scientific and educational uses, and (if fresh) development of domestic water supply.

II. Recreation, propagation of fish and aquatic life, and (if fresh) development of agricultural water supply.

III. Harbor uses, including compatible propagation of fish and aquatic life.

Combined classification

Number and use of subclasses

The combination of occurrence and use classification in the proposed revision results in the identification of about 82 subclasses. The revision proposes, however, only 21 sets of standards. As indicated in Table 2, three sets of standards apply to 12 subclasses of streams differentiated on the basis of temporal continuity, spacial continuity, and use (2x2x3). One set of standards applies to all six subclasses of springs, seeps, lakes, and reservoirs; and one set to seven subclasses of reef flats, etc. One set of standards applies to two subclasses in the case of elevated wetlands, sand beaches, solution beaches, marine pools, protected coves, and artificial basins. No standards are provided for low wetlands, coastal wetlands, anchialine pools, or lava-rock shorelines, totalling nine subclasses. However useful the details of the combined occurrence-use classification may be for other purposes, a much simpler classification would serve the purposes of PHR 37-A.

Significance of lists of examples of subclasses

In Sections 5, 6, and 7, descriptions of subclasses representing the combination of the occurrence classification and the use classification are followed by lists of examples. These lists seem intended to include all present examples of the waters in each respective subclass, but it is not clear whether it is the descriptions or the lists of examples that define the subclasses.

To the extent that one of these subclasses is defined by uses prescribed by DLNR under HRS 195, it seems best that the list of examples should be identified as supplied for the purpose of illustration, and the description should serve as the definition, so that if DLNR adds additional examples they will automatically be included in the subclass.

Table 2. Association of standards with occurrence-use classes proposed in revised PHR 37-A

Occurrence classes	Use classes	Standards
5. Inland Waters		
5.1 Streams*? (Perennial) (Intermittant) (Continuous) (Discontinuous)	1a EL 12 EL 2 D	Water column: dry-season standards; wet-season standards Bottom standards
5.2 Springs, etc.		
A. Springs and seeps*?	1a E 1b E 2 D	Common standards
B. Natural Lakes*?	1a L 1b D 2 O	Common standards
5.3 Elevated wetlands*	1a EL 1b E+O	No standards
5.4 Low wetlands*	1a E 2 O	No standards
5.6 Estuaries: Natural*, Developed*?	1a E 2 O	Standards for all except PH Standards for Pearl Harbor
5.7 Anchialine pools	1a E 2 O	No standards
6. Marine Waters		
6.1 Embayments*	AA L+E A L	"Wet" standards "Dry" standards
6.2 Open coastal waters	AA L A O	"Wet" standards "Dry" standards
6.3 Transition waters	A T	Standards
6.4 Oceanic waters	A T	Standards
7. Marine Bottom Types		
7.1 Sand beaches*	I D II O	Common standards

7. Marine Bottom Types (continued)

7.2 Lava rock shorelines and solution benches		
A. Lava rock shorelines*	I D II O	No standards
B. Solution benches*	I E II L#	Common standards
7.3 Marine pools and protected coves*	I EL# II EL#	Common standards
7.4 Artificial basins*	II shallow-draft hbrs L deep draft hbrs L	Common standards
7.5 Reef flats, etc.		
A. Nearshore reef flats*	I EL# II DL#	Common standards
B. Offshore reef flats*	I EL# II DL#	Common standards
C. Exposed coral communities*	I EL# II DL#	Common standards
D. Protected coral communities*	I EL#	Common standards
7.6 Soft bottom communities*	II DT	Standards

NOTES:

E = Established through regulations other than PHR 37-A

D = Defined by description in PHR

O = Other members of class than those previously listed

L = List of loci included

T = All examples

* = Physiographic features or ecological communities. The standards properly apply to the waters in, adjacent to, or overlying these features and communities.

= Listed are localities within which the features or communities occur rather than the individual features or communities.

THE STANDARDS

Preliminary comment

The University of Hawaii Water Resources Research Center has not yet been able to complete a careful review of the proposed standards themselves, checking them against present knowledge about current levels of pollutants, natural levels of pollutants, or technological and economic implications of enforcement. The WRRC will advise the DOH of its findings when they are complete.

In the meantime, we have the following comments on the standards.

Terminology

The title of PHR 37-A is "Water Quality Standards" and its purpose is to establish "standards for water quality in all state waters" (1.2). It is to "Water Quality Standards" that the authorization in HRS 342-32 (1) applies. The regulatory provisions to which the water-quality values specified in PHR 37-A relate are primarily those of PHR 37, which refers to the values as "standards of water quality" (PHR 37, Sec. 2). Yet the values proposed to serve a basis for regulatory action in the proposed revision of PHR 37-A are in every case identified as "criteria."

Standards are criteria but since it is the term "standards" to which the legal authority, regulatory provisions, and title and purpose of PHR 37-A refer, it would seem far preferable to refer to the value in question as standards rather than "criteria." The term "standards" will be employed generally in this review when referring to the proposed "criteria."

Applicability

Bottom standards

Most of the standards proposed apply directly to receiving waters, however, there are a number of exceptions. The exceptions include standards applying to stream bottoms (Sec. 5.1C(2)) and to marine bottom types (Secs. 7.1C, 7.2B(3), 7.3C, 7.4C, and 7.5E. They include standards as to sediment deposition, the E_h of interstitial water in sediments, and benthic biota.

We do not suggest that all of these non-receiving-water-quality standards are inappropriate in the context of PHR 37-A. We do consider, however, that they should be identified as sedimentation standards and benthic biota standards, and that these standards be tied in to the water-quality standards as criteria for the interpretation of the following basic water-quality standards (Sec. 4) as applied to the respective bottom situations:

4.1A Materials that will settle to form objectionable sludge or bottom deposits (standards as to sediment deposition and interstitial water E_h).

4.1D Biocides, toxic, and other deletrious substances, etc. (benthic-biota standards).

4.2 Freedom from soil particles (sedimentation deposition standards).

Relative numbers of prescribed standards

In several instances, there seem to be inverse correlations between the numbers of standards prescribed and the quality of the waters to be protected. For example, the interstitial water standards of 7.4C are applied to artificial basins but not to embayments. The rational may be that there is no threat to the bottom waters in embayments except in artificial conditions in sediments in both natural embayments and artificial basins, although aggravated in the latter.

Lacks of standards

No standards are proposed for low wetlands, coastal wetlands, anchialine pools, or lava-rock shorelines. The reason may be that present knowledge is insufficient to set sensible standards. If this is the case, the reason may be that serious deleterious effects on these waters resulting from water quality changes have not yet been experienced. In any case, there is no point to defining a class of waters for which no standards are prescribed.

Standards applying to treatment, control, and practice

Best degree of treatment or control

At several points in the proposed PHR 37-A (for example, in the description of the basic standard regarding soil particles, and in the discussion of requirements for zones of mixing) the water quality standards are referred to a standard identified as the "best degree of treatment or control. There are both editorial conceptual flaws in the definition of best degree of treatment or control in Sec. 1.3. The definition is critical because it provides the basis for regulatory action under PHR 37-A 3.2B, 3.3B, 4.2, 8.1A, 8.2E(4), and 8.2J, in combination with PHR 37.

The editorial flaw is in the prepositional phrase referring to the applicable federal law. The preposition probably intended is "by", not "to".

The possible conceptual flaw is the more serious. The "definition" is not a definition in itself but a reference to what is "required by" applicable State statutes and regulations and (if corrected editorially) the Federal Water Pollution Control Act. The only seemingly applicable State regulation is PHR 37-A, whose revision is here considered. It is circular nonsense to define

a term by reference to a document in which the term is not defined except by such reference. The only seemingly applicable State Statute is HRS 342, but neither that nor the Federal Act use precisely the term in question.

Hence one must look for whatever treatment or control is implied by the combination of requirements of HRS 342 and the Federal Act. There is ample room for extensive legal search for what may be required by either document in any particular case. To simplify this discussion we assume that what is required in the case of the State Statute is indicated by the definition of "Standard of performance" which is to be determined by the Director of Health as whatever is the greatest degree of effluent reduction "achievable [by] the best demonstrated control technology." (HRS 342-31 (8)). In the case of the Federal Act, we assume that what is required until July 1983 is the "best practicable control technology currently available" (Sec. 301 (b)(1)(A)), and after that date is the "best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants" (Sec. 301 (b)(2)(A)). More precise determinations are left to the EPA Administrator in the light of further specifications in seven complicated subsections of Sec. 304(b).

The interpretation of what is "best" in the Federal terms and in the definition of the State term is critical. It has been held that "best" means most extreme, but it has been the contention of the Environmental Center that in the context of public regulation, "best" must be interpreted in the light of overall, long-term, human welfare (e.g. SR:0005; see also AD:0011; CN:0007. Copies of these documents appended to this statement.) In this interpretation, consideration must be given, not only to economic practicality, but to the balance of overall costs and benefits of control, taking into account such considerations as health, aesthetics, energy and other physical resource and biological conservation. Past regulatory practices of the DOH seem in accord with our recommended interpretation. The instruction to the EPA Administrator that, in determining what is the "best practicable technology," he must consider "the cost of application of technology in relation to the effluent reduction benefits to be achieved" (Sec. 304 (b)(1)(B)) may be in accord with this interpretation. The qualifications that the "best available technology" is what will achieve "reasonable...progress" would be in accord with this interpretation except that the goal of the reasonable progress is "eliminating the discharge of all pollutants," which is in general irrational.

The State cannot avoid compliance with the Federal statute, however, irrational it may be. A definition of "best degree of treatment or control" may have to take into account the federal definitions as well as the State statutory definition. It would be best, however, if the term were defined in the regulation as that which is optimal in terms of overall, long-term human welfare, and in accord with the "standards of performance" "best practicable technology" and "best available technology" to such an extent as these terms are applicable. The definition should include with specific citations to the legal usage and definitions of the latter terms.

Best Management Practice

"Best management practice" is proposed to be defined as what is "most" effective and "practicable." What is determined by these criteria is not necessarily "best," as indicated above. We consider that the definition also should be revised. The term seems to be used only in connection with the basic standard concerning solid particles (4.2). We discuss the proposed standards relating to soil particles and sedimentation elsewhere.

Specific problems

Basic standards

A phytoplankton bioassay test is indicated as a minimum for identifying problems involving toxic substance, etc. in Sec. 4D. The proposal indicates that "afterwards it would be necessary "to perform certain analyses." It does not indicate under what circumstances these additional analyses will be necessary. In many cases the deleterious effects may be identified and evaluated most easily through analyses of bottom biota, rather than by either water quality analyses or bioassays of phytoplankton.

The standards of Secs. 4.1, 4.2, and 4.3 are applicable to all water areas (water classes) in accordance with the title of Sec. 4. The standards of Sec. 4.4 are, however, indicated as restricted to recreational waters. They should either be transferred from Sec. 4 to the sections applicable to the inland water use class 2 and marine water use class A, or if appropriate redescribed so as to apply to all waters.

Sediment-deposition standards

The sediment-deposition standards proposed for streams (Sec. 5.1C(2)) are certain to be violated by nature. So are the sediment-deposition standards for beaches (Sec. 7.1C) in the vicinity of some stream mouths, and the sediment-grain-size standard applicable to sand beaches (Sec. 7.1C), to coves with sand bottom (Sec. 7.3C), and to sand patches in coral reefs (Sec. 7.5E) in some localities. There may be some utility to providing sediment-deposition standards as bases for the interpretation of the basic standard relating to soil particles (Sec. 4.2), but the more effective interpretation is provided by PHR 37-B. In place of providing sediment-deposition standards in PHR 37-A, we suggest that PHR 37-B should be amended to increase the value of the coastal-water rating factor used in determining the sedimentation hazard in those areas in which sediment deposition is particularly detrimental.

Interstitial water standards

We question whether it will be practicable in all situations to meet the proposed standards as to redox potential (E_h) in the interstitial water of

bottom sediments applicable to Pearl Harbor (Sec. 5.6C(2)), marine pools and coves (Sec. 7.3C), and to artificial basins (Sec. 7.4C); and even whether in some situations the proposed standards may not be violated by nature.

Benthic Biota Standards

Standards applying to benthic biota are proposed for streams (Sec. 5.1C(1)), solution benches (Sec. 7.2B(3)), marine pools and protected coves (Sec. 7.3C), reef flats and coral communities (Sec. 7.5E). The phrasing is lengthy and identical in all cases, and hence could usefully be expressed but once. As now phrased, the standard proposed is nonsensical. Any change in biota would apparently be a violation, including a natural change no matter how minor, except that the interpretation of what is a change seems to be left entirely to the DOH Director who may be forced into a complicated process of determination if there is a controversy, with no specific objective guidance.

Temperature and salinity

Temperature and salinity standards are proposed for estuaries (Sec. 5.6C(1) and C(2)), embayments (Sec. 6.1C(1) and C(2)), open coastal waters (Sec. 6.2C), transition waters (Sec. 6.3C) and oceanic waters (Sec. 6.4C). These are in the form of percentage allowable variations from ambient conditions. The intended ambient conditions need definition. Presumably they are natural ambient conditions as these would vary naturally from time to time.

It is questionable that the standards are useful in the case of transition and oceanic waters, because temperature and salinity are very unlikely to be subject to significant artificial influence in these waters.

Ocean water standards

Restricted applicability

The applicability of the standards proposed from transition and oceanic marine waters (Sec. 6.3 and 6.4) should be indicated as limited to surface waters. Most of the proposed chemical standards would not be met in natural deeper waters (for example the standards for N, P, O_2, and pH.

Chemical standards generally

The chemical standards proposed for transition and oceanic waters are in general too elaborate. In the first place dissolved inorganic N and P concentrations are not good indicators of pollution because they are taken up so rapidly by phytoplankton and other algae. It would be preferable to have a standard based on masses of nutrients added to given volumes of water or on phytoplankton productivity, or some combination of these.

If they must measure nutrients the sum of particulate plus inorganic dissolved N and P sufficient. Standards should not include dissolved organic N and P in that these are insensitive to pollution.

Minimum stream flow standards

The minimum stream flow standards indicated in Sec. 5.1C(1) and the appendix are discharge standards not water-quality standards. HRS 342, which is the sole State statute indicated as authority for the proposed standards, provides the DOH with no authority to regulate stream flow by regulating stream diversion or to adopt stream discharge standards. The Coastal Zone Management Act (HRS 305A) adopts as a policy to the State the regulation of stream diversions to assure preservation of aquatic biota and aesthetic qualities, but it does not delegate the authority to any department. The Department of Planning and Economic Development is named as the agency to recommend where the authority should rest for implementation policies under the CZM Act.

Parallelism with present authority suggests that it should be DLNR rather than DOH that should regulate stream diversion and thus minimum stream flow. The DOH should, however, be commended for initiating the attempt to implement the CZM policy in question.

Zones of Mixing

In the section on zones of mixing (ZOM's) (Sec. 8), there is no distinction between classes of waters in which ZOM's are permitted and those in which ZOM's are not permitted, and there is no mention of the allowance or disallowance of ZOM's in the sections on "Uses and criteria" (Secs. 5 through 7). However, in the section on the "Classification of water uses" (Sec. 3), it is indicated that no waste discharges will be permitted in class 1 fresh water (Sec. 3.2A(1)), and specifically that no ZOM's will be permitted in class AA waters (Sec. 3.3A) and no new ZOM's will be permitted in the class A waters of embayments (Sec. 3.3B). It is doubtful that ZOM's will be inappropriate in all embayments.

We point out that the class A embayment waters include Kahului Bay and Honolulu Harbor, in both of which there are now ZOM's established after due consideration of the benefits and detriments. It is not clear that the proposed prohibition will apply to renewals of these ZOM's but, if it does, it would seem illogical in the light of this consideration.