ILLINOIS POLLUTION CONTROL BOARD
January 3, 1975

In the Matter of)
Public Water Supplies) R73-13

OPINION OF THE BOARD (by Mr. Marder)

The following Opinion constitutes the rationale the Board used in adopting Chapter 6 of the Rules and Regulations of the Illinois Pollution Control Board. Six days of hearings were held on this matter, at which times testimony was elicited on virtually every rule covered. As adopted, these regulations institute a number of major provisions:

Supplant all existing public water regulations now in use, including the Public Health Regulations and, incorporating by reference in the Technical Policy Statements, the Ten-State Standards. In doing so, the new regulations initiate an easily understandable set of rules common to the entire gamut of water supplies.

In addition to continuing the Agency practice of requiring construction permits, also introduce the concept of operating permits. These one-time permits will allow the Agency to render a final check on a system before it is actually allowed to distribute water to the public.

Delegates the authority to the Agency to issue algicide permits, thereby deleting unnecessary delay and expense from the process of controlling algae in public water supplies.

Establishes the concept of emergency permits which will allow public water supplies to effectively deal with problems as they arise.

Establishes reasonable, safe limits for bacteriological levels in public water supplies, as well as detailing which type of tests and procedures shall be followed.

Introduces enforceable limitations for a whole gamut of chemical constituents. The analysis of these numbers incorporated a complete review of all constituents and reflects the best current knowledge.

For the first time, requires chlorination in all public drinking water supplies.

Establishes criteria for boil orders which will protect the public safety under emergency situations.

Reevaluates Rule 204 of Chapter 3 to bring it into accord with this new Chapter 6 and also reviews the constituents to reflect the best available knowledge.

Since their formation in 1970 pursuant to the Environmental Protection Act, the Agency and the Board have been relying on the Public Health Regulations as they apply to drinking water standards. Under Section 17 of the Environmental Protection Act, the Board was given the authority to adopt regulations covering the area of public water supplies. The last revision of these rules was accomplished in 1960, and as such was in dire need of review and upgrading. We are dealing with an area which can so easily and seriously affect the public health that it becomes even more necessary than usual to constantly critically review such regulations. Data relating to various constituents are in a fluid state, more is being learned about chemicals every day, and new hazards are uncovered each time a new pesticide or insecticide is introduced to the market place. Therefore, these regulations can be best termed an up-to-date starting point - review will be needed from time to time as new situations and information arise. Noticeably missing in these regulations are criteria for radiation. This is simply because at the present time not enough is known to write a meaningful regulation in this area. The Board is well aware of its responsibility to change the regulations as more information becomes available, and will endeavor to do so.

Adherence to Title 7, Section 27, of the Environmental Protection Act

General criteria to be followed by the Board in adopting substantive regulations are detailed in Section 27 of the Environmental Protection Act. Throughout the hearings and deliberations on these regulations, these general constraints were kept in mind. It is the Board's opinion that these regulations reflect the legislative intent of Section 27.

Section 27 mandates attention to different problems in different geographical areas, attention to short-term health effects, and existing physical conditions, including the technical feasibility and economic reasonableness of the enacted regulations. As can be determined from the rule by rule discussion which follows, attention was given to each area.

A case in point would be the Board's cognizance of the inherent physical differences between ground water and surface water. Different geographical areas of the state require that public water supplies derive their feed from either ground or surface water. The physical nature of these supplies plays a significant role in what would be allowed in such feed. Water drawn from an aquifer may have natural contaminants in quantities in excess of what would normally be found in surface water. A look at Rule 204, Chapter 3, reveals that sulphates for public water supplies are limited at 250 mg/l. Table 1 of these regulations makes no such provision. This reflects the knowledge that many ground water supplies have sulphates in excess of 250 mg/l. Exhibit 41 reflects some 130 such supplies. Exhibits and testimony show no adverse health effects of sulphates, and Exhibits 85 and PC-7 show signif-

icant costs for removal. When balancing these three considerations: e.g., health effects, physical and geological nature, and costs, the Board has deleted this "aesthetic" parameter from its regulations. This attention to Section 27 is manifest throughout our deliberations on each rule, and is reflected in the rule-by-rule discussion below.

Before commencing with a rule-by-rule discussion, it is necessary to express our satisfaction with the manner in which these proceedings were carried forth. The Illinois Environmental Protection Agency, Division of Public Water Supplies, originally proposed these regulations on October 24, 1973. During the course of six hearings much vigorous discussion of the proposal was encountered. The Agency listened and modified its proposals in an earnest attempt to propose rules which will protect the public health and at the same time not create an unreasonable burden on the owners and operators of public water supplies. This type of attitude on the part of the Agency made it much easier for the Board to accept almost all of the Agency's proposals. It was evident that there was an almost universal respect for this division of the Agency, and a general feeling that these rules will be applied fairly and honestly by the members of this division. It is also necessary at this time to express our appreciation to the many representatives of the municipalities and the public water supply industry, who by their expertise and meaningful attention to this matter, assisted this Board in formulating meaningful and protective regulations.

The following is a rule-by-rule discussion of the rationale used by the Board in adopting Chapter 6.

SUMMARY OF RULES AND REGULATIONS
CHAPTER 6

Rule 101 Authority

This rule simply cites Section 17 of the Environmental Protection Act, which authorizes the Board to promulgate regulations in the area of public water supplies. This rule is the standard opening on all Board regulations. No public comment was received.

Rule 102 Policy

This rule states that the main purpose of these rules is to serve as a guide for the design, preparation, and operation of public water facilities. It further defines the words shall and must as mandatory, based on enough expertise to warrant such a use. Other terms (e.g., should, recommended) denote desirable methodology, but are open to deviation. The rule further encourages new technology, but in view of the potential hazards which might occur due to faulty installations, outlines the safeguards which must be taken by a supplier or engineer. Use of a new type of water treatment method or equipment may not simply be installed and considered as satisfaction of these regulations. Simply meeting specific parameters will not alone guarantee that the resultant water is safe for human consumption. Such a new system must have been previously used and thoroughly tested on a full-scale installation or tested on a pilot plant system. Such proof will be required by the Agency before such a new system will be acceptable.

Rule 103 Repeals

103 (a): This paragraph states which rules and regulations will be superseded by these rules.

103 (b): States that when the rules in Chapter 6 are adopted, all Agency technical policy statements will be effective. Rule 212 will be the appropriate mechanism for technical policy changes, and allows ample opportunity for public comment.

The technical policy statements are the tools to be used to implement the intent of these rules: to maintain a safe and controllable water supply. These statements are analogous to electrical or piping codes and rightly belong as separate documents, rather than as part of these rules.

Exhibit 9 is a copy of Agency Technical Policy Statements and has been distributed for public comment. Technical policy statements have been in use in other departments of the Agency. For the sake of completeness, Rule 103 (b) was modified to make clearer the fact that the method for change of technical policy statements subsequent to adoption of these rules is via Rule 212.

Rule 104 Definitions

Most of the terms in this rule are self-explanatory; however, some

problems have arisen in the following.

1. "Operational Testing": This definition was added to clarify Rule 315. There was some confusion as to exactly what type of laboratory facilities is required. It is the intent of Rule 315 to insure that if a water supply is treating its water, it has adequate laboratory facilities to monitor and safeguard the water. It is not the intent to require each water supply to have facilities on hand to qualitatively or quantitatively analyze their water for constituents found in Table 1. While this is desirable, it is clearly beyond the financial scope of a small community (R. 683).

2. Public Water Supply System: (Deleted.) The original Agency proposal included this definition. Public comment (City of Springfield) pointed out that the proposed definition could lead to confusion when read in combination with Section 3 (j) of the Environmental Protection Act. In addition, the proposed definition did not specifically relate a population cutoff as does Section 3 (j). The Agency agreed to delete this definition and will rely on the definition found in the Act.

"(j) 'Public water supply' means all mains, pipes and structures through which water is obtained and distributed to the public, including wells and well structures, intakes and cribs, pumping stations, treatment plants, reservoirs, storage tanks and appurtenances, collectively or severally, actually used or intended for use for the purpose of furnishing water for drinking or general domestic use in incorporated municipalities; or unincorporated communities where 10 or more separate lots or properties are being served or intended to be served; State-owned parks and memorials; and State-owned educational, charitable, or penal institutions."

The word "Supply" is now defined as a public water supply as above (R. 198, 705).

3. "Twelve-Month-Running Average": Some confusion was apparent as to why this definition was incorporated, and how it is to be used. This definition is to be used by the Agency to define exactly what type of records it will be required to accumulate in order to prove a violation of Rule 304. It is not the intent of these regulations to mandate that each water supply maintain a twelve-month running average. This is not required by these regulations (R. 683).

Rule 105 Analytical Testing

This rule defines the acceptable methods which shall be used to analyze water. The phrase "to determine compliance with these rules and regulations, all sampling and" was added to make it clear that a laboratory was not required by these rules, but rather that any laboratory testing water, whether Agency or private, shall use standardized methodology.

Rule 106 Limit of Public Water Supplies

This rule is self-explanatory. It simply states that a public water

supply is responsible only up to the point at which it connects to the ultimate water user's supply. Some possible problems with this definition were raised at the Carbondale hearing (R. 1065-1074). Because of the fact that the water supply's responsibility ends at the property line, a multi-service distribution system was thought to be inadequately covered. For example, a large shopping center or industrial complex could have many services after the main tie-in. Under the definition in the Environmental Protection Act, such services could not be covered by these rules. Mr. Ira Markwood (Illinois Environmental Protection Agency) explained that such a contingency is covered in two ways: 1) a public water supply is still responsible for back contamination into its distribution system, and 2) the State Department of Public Health, through its administration of plumbing codes, could control any problems. This logic is acceptable to the Board and we accept the rule as proposed.

Rule 107 Severability

This rule protects the integrity of the entire package against default if any individual rule is held invalid.

PART II: PERMITS

Rule 201 Construction Permits

This rule was the subject of much heated comment. The basic problem was to write a regulation which would protect the public from faulty construction work, and at the same time allow public water supplies to maintain existing systems in an orderly manner. The main controversy centered around where maintenance ends and new construction begins.

The cities of Chicago, Springfield, and Galesburg were most vocal in their opposition to Rule 201 as originally proposed. The contention was that a construction permit would be required every time a water main break was repaired or a pump failed. Clearly this would be an impossible situation.

The City of Chicago stated that in ten months of 1973 they made a) 19,422 hydrant repairs, b) 2,498 valve repairs, c) 3,506 water main repairs, d) 17,090 service repairs, and e) repairs to 12,740 meters. (R. 455.) All parties would agree that if a permit were required for each of these changes, the Agency would be inundated and literally cease to function.

The other side of the coin is the potential disaster which could occur if faulty engineering was followed. The extreme case of a replacement of a six-inch main with a thirty-six inch main was raised. More realistically a pump of insufficient capacity could be installed, thereby allowing the distribution system, following the pump,to be pulled down and leave the whole system open to contamination by back siphonage.

The Agency amended Rule 201 to exempt a large number of items which can be adequately handled on a routine basis. It also allowed for replacement of equipment with "identical" parts. The word "identical" was ambiguous in that it implied a specific brand or model number was the only acceptable replacement (R. 1014, 939). The word was changed to "equivalent" (R. 1015), and this would seem to solve the problem.

The problem still exists when a water supply must, by necessity, for economic reasons, or to protect the system, go beyond the alterations allowed in Rule 201. The Agency stated, and will make a part of their Technical Policy, that a telephone number is available at all times for construction approval in such a case. If a situation arises under which emergency repair must be made at the time a failure of part of the system is noted, the owner of such a system may substitute a formal written permit with a verbal O.K. At this time the Agency will make a note of the telephone call, and its verbal decision. The Agency will then follow up with a formal written permit. Upon consideration, the Board felt that such a procedure should be an express part of the regulations. In this way this unique alternate would have equal standing (under special conditions) with the formal written procedure. The Board again emphasizes that this procedure is instituted because in some instances the delay caused by a permit would be a hazard to the public safety or cause an undue burden on the public water supply. Rule 213 now covers this contingency.

Rule 202 Operating Permits

The area of operating permits raised a storm of controversy at hearing. The reasons for this controversy centered about three points:

A) The requirement is a new one and the need for such a permit was questioned.

B) The possibility of construction being completed, and an operating permit then being refused.

C) The Agency's rationale for this requirement and the hardship such a system would impose.

The Agency took great pains to discuss and defend its position in regard to operating permits. The need for such a permit was pointed out by two major problems which have occurred in the past, for which no acceptable remedy was available (R. 33). This permit will simply be a final check of a facility to allow the Agency to determine if the conditions laid out in the construction permit have been followed. It seems reasonable that the Agency should insure that the original permit conditions have been followed and that the facility starting up is the same (physically) as the one for which permission to construct was granted. A second major point is that any construction permit requires proper disinfection of the facility before start up. The present permit system does not allow the Agency to insure that such disinfection has occurred. The new system would serve as a check to allow assurance that the system is safe for use by the public.

It is also important to note that this rule differs from the usual operating permit requirements in two very important ways. First, the operating permit is a one-time affair. It lasts for the life of the facility and has no renewable date. Secondly, only new facilities are required to obtain operating permits. Existing plants are exempt (R. 59). This is in the spirit of the system that the permit is an insurance policy that proper construction and disinfection have taken place. Analysis of operating reports is the continuing tool which would allow the Agency to monitor proper operations.

The fear that a facility could be constructed (in the case of municipalities financed by bonds) and then not allowed to operate was expressed by many witnesses (R. 589, Freeport; R. 876, Oak Lawn). This fear was reinforced by the originally proposed Rule 213 (Exhibit #5, Pg. 8). This proposed rule stated that the Agency may change any permit to bring it into conformance with a new regulation adopted by the Board. This proposed rule was deleted, in that it is not necessary. No permit can be issued unless all rules and regulations are followed. It was pointed out that if a regulation is to be changed, it would require the process described in the Board's Procedural Rules, Part II, and that ample opportunity for public comment would be available. This concept was summed up by Mr. John Anderson (Mgr. Public Water Div., EPA) as follows:

> "I would not think that we would have the authority to do that. The whole purpose of the operating permit pro-

> gram is to give us the opportunity to come out and look at a major midification of your plant and see that it was constructed in fact according to the plans that were initially submitted, and then probably the most important concern we have on the whole operating permit program is to insure that the equipment is properly disinfected prior to being placed in operation.
>
> "Now, that whole operating permit is based on the fact that you have followed the plans initially submitted for your construction permit. I can't see how we would have the authority to just throw in some change in the rules at that point without going back to the Board and getting authority to do that.
>
> "The operating permit is merely in there to help assure that the initial plan was followed and is going to be placed in operation according to proper methods." (R. 792-793)

The question of additional burden on the public water supplies was raised. A new permit system always has the potential of generating an undue amount of paper work. The Agency stressed the fact that this system would be as simple as possible (R. 33). The very concept of such a permit (e.g., could be termed a start-up permit) allows for simplification. The possibility, indeed probability, of a combined construction/operating permit application form was espoused by the Agency (R. 33, 1075). The entire concept is to generate a system with the minimum possible delay and the least possible paper work. After weighing all the facts of this controversy, the Board feels that the proposed operating permit is a needed safeguard and can be administered with a minimum of red tape.

Rule 203 Algicide Permits

The initiation of this type of permit system is a somewhat different concept than other systems. The best analogy here would be the case of open burning permits in the Air Pollution Control Division. The Agency is, by this system, given the right to allow additions of copper sulphate in order to control undesirable algae growth in surface water used for drinking water supplies. Through experience the Board has found that such additions of algicide are needed on some lakes each year; the variance route is unduly costly and may generate unnecessary delay. It was agreed by all parties that a permit system can be administered speedily and still preserve the public interest.

Comment was generated about the types of algicides available for use. Mrs. D. Bennett (Agency chemist) noted that while biodegradable algicides such as Hydrothol-47, Aquathol-K, and Diquat, have been found to be effective, each has a particular drawback. It was also noted that not enough is known about the products of degradation to allow their use with absolute safety. The only algicide which has been used for years (since 1900), and seemingly has no adverse effects, is copper sulphate. Rule 203 shall be limited to the use of copper sulphate.

Dr. Muchmore (Southern Illinois University) entered and spoke to Exhibit 65 which supported the establishment of a permit system for copper sulphate and the potential danger of same. Dr. Muchmore explained that a large percentage of copper added is precipitated out and settles to the bottom in the form of hydroxides and carbonates. Analysis of lake bottoms (Half Moon Lake, Wisconsin) has shown high copper concentrations at least ten inches deep. It has been proposed that the chemical forms of copper in the lake bottoms are of a low toxic nature, and the potential for aquatic harm is very low. In summary, Dr. Muchmore stated that between 1950 and 1969, 130 lakes have been treated with copper sulphate - a total of 1,585,059 pounds. No major problems have been encountered.

Dr. Muchmore also entered PC-54 into the record, which is a preliminary study of lakes in Illinois. This report tentatively shows that the same precipitation effect has been found in Lake DuQuoin and Little Grassy Lake as has been reported in the abovementioned Wisconsin lakes. Lake DuQuoin has a sediment copper concentration of 20 times what would be expected if no algicide were used (copper sulphate in use for 34 years). If algicide use were terminated, it is expected that future bottom sediments would return to background levels. Again, no aquatic damage due to these bottom concentrations was reported.

Rule 204 Applications - Contents

A) Specifies generally what type of information will be required along with an operating permit application. The five items are ones which should be available to anyone undertaking the design of a water system or addition, and should cause no undue inconvenience or expense. Item five calls for submission of specifications and warrants special discussion. The Agency encourages the submission of standard specifications (R. 1078). The response to a request to most suppliers and engineering firms for this information was sparse. If standard specifications are not submitted, each addition must be accompanied by its own specifications. It would seem a simple task to get these records on file. The Agency's service in this area could greatly reduce delay and should be used by anyone dealing in this area.

B) Reaffirms the Legislature's intent that all plans must be signed by a Registered Professional Engineer. There was some comment that such a procedure is unnecessary. All argument on this point comes to naught because neither the Agency nor the Board has the authority to supersede applicable state laws.

C) This subparagraph simply states which information is required on an operating permit application. The intent is to allow speedy compilation of construction and operating permits. The name and certificate number of a certified operator is required to insure that Rule 302 is being adhered to.

D) This subparagraph deals with information required when submitting an algicide permit. Because of the potential harm which could occur in the improper use of such algicides, it is incumbent on the Agency to gather as much data as it can. These data not only serve as a basis

for determining the issuance of the instant permit, but also build a sound backlog of information for the Agency to draw on in future cases.

The City of Springfield vigorously opposed (R. 699) the term, "the history of any past algae problems." It was argued that there is no time limit on these data, and if a city has been using algicides for a large number of years, it would be impossible to supply it all. The recommendation that "all historical data which is readily available" be used was made. The Agency commented that this interpretation could leave too large a loophole in the system. Perhaps more important is the Agency's comment that they expect to be reasonable in their requests for information. The Board sees no reason why the original language cannot be used when applied with the Agency's intent mentioned above.

E) This is a general proviso to allow the Agency to prescribe forms and adopt procedures to determine compliance with these regulations and the Act.

Rule 205 Applications, Signatures and Authorizations

This rule is self-explanatory and no public comment was received at any hearing in regards to it.

Rule 206 Applications - Filing and Final Action by Agency

This rule describes the methods under which a permit application is to be received and handled by the Agency.

A) Much discussion centered around when a permit application was to be considered received. The original Rule 206 (A) stated that the permit was not to be considered received until such time as all information and documents were received. The intent was to allow the Agency to request additional information without starting the 90-day clock. However, comment (R. 698, 709, 940) was entered that this procedure could become an unintentional delay. The final wording clearly states that the permit application shall be considered received upon the date of the initial receipt of the document.

B) This subparagraph mandates that the Agency take positive action on permits within a maximum of ninety days. Failure to take such action would result in an automatic permit grant. Subparagraph (C) allows for a waiver of the ninety-day limitation by the applicant.

There was some concern over the intent of this ninety-day time limit (R. 41, 1082). Comment was entered that ninety days is an inordinately long period of time for an applicant to wait for a permit. It is clearly not the intent of this rule to mandate a ninety-day review period for each permit, but rather to set a maximum time for review. This maximum time limit is consistent with past Board practices and the Environmental Protection Act (see Sect. 38, Environmental Protection Act, and Chapter 7, Rule 205 (g). Clearly, the intent of this rule is to insure an applicant that his application is being given speedy consideration, and that he will be given an answer within a reasonable time.

D) This subparagraph states the method in which notification of final action by the Agency will be transmitted to the applicant.

Rule 207 Standards for Issuance

This rule pertains to the standing rule that the Agency may not issue a permit unless it is proven that the public water supply conforms with the standard design criteria under Rule 212.

A question of intent was raised by the City of Springfield (R. 1182) and requires some clarification. The question was whether, when applying for a permit, the applicant must submit proof that the entire system is in compliance, or just the work to be done is in compliance. In the case of a water system the size of Springfield's, a showing of proof of compliance of the entire system as a prerequisite for work on a water main extension would be unduly burdensome. The intent of the Agency and the Board is best summed up in the following quote by Mr. Markwood:

> "The permit is issued strictly on the basis of the construction work which has been done. Nothing in the construction work posed can violate the rules. It bears no relationship to any other part of the system."
>
> "The operating permit only refers to the construction work for which it is issued. Obviously, in a complete new water supply there would have to be some type of assurance that there is a policy to eliminate cross-connections. On an existing water supply there is no provision for an operating permit. Therefore we would not be concerned with that." (R. 1184-1185)

This language should clear up any doubts as to what is required in the way of "adequate proof."

Rule 208 Duration of Permits

This rule caused quite a bit of concern at the early hearings. Mayor Bersted (Monmouth) expressed apprehension about this rule when coupled with the originally proposed Rule 213 (Exhibit 5, Pg. 8). The original combination of rules would have allowed the Agency to modify permits before construction began, but potentially after bonding was secured by a municipality. Mayor Bersted stated that the time to build a water tower from the issuance of a contract to the tower startup is on the order of 84-90 weeks (R. 730). Once bonding is received, the bonding institution would want some assurance that the job to be done will be done as initially proposed. Concern was also expressed that a major modification in the facility may run in excess of the bond limit and new financing would have to be secured.

After much discussion it was determined that Rule 213 as originally proposed and entitled "Modification of Permits" was the main stumbling block. It was this rule which led to the fear of arbitrary changes in a permit after bonding was secured. The intent of this rule was summed up by John Anderson as noted on pp. 8 and 9 of this Opinion.

Thereafter, Mr. John Parker (hearing officer) suggested that the best way to solve the problem would be to simply delete Rule 213 as originally proposed. This was indeed the best solution and was accepted by all parties involved.

Rule 209 "As Built" Plans

This section allows the Agency to determine if a facility was built in compliance with applicable rules and regulations. In the event that a project was constructed without a permit, the Agency may require "as built plans." On the basis of these plans, the Agency will determine whether there are any inconsistencies in construction. It is important to note that the submission of "as built" plans is not a shield from prosecution. Mr. Markel (Interurban Water Co.) noted what he felt was an inconsistency between this rule and Rule 213 (Permit under Emergency Conditions). The two conditions are very much different. Under Rule 213, the Agency will verbally allow construction based on a verbal understanding of how the work is to be accomplished, pending a submission of plans as soon as possible. This procedure will act as a construction permit and will indeed be a shield from prosecution (R. 1090-1092).

Rule 210 Conditions

This allows the Agency to set conditions on a permit which may be necessary to insure consistency with any Board rule or regulation. An example would be a condition on a permit detailing methods for sludge disposal from a public water treatment plant. Such sludge could be a potential pollutant under Chapter 3 or Chapter 7 of the Illinois Pollution Control Board Rules and Regulations.

The original language of this rule was somewhat misleading, as it did not accurately reflect that a conflict with any Board rule would be disallowed. The language of Rule 206 (a) of Chapter 7 concisely states the required facts and has been herein repeated as Rule 210 of this chapter.

Rule 211 Appeals from Conditions in Permits

This is the standard appeal route clause as found in all Illinois Pollution Control Board chapters. It assures the applicant the right to appeal any conditions imposed by the Agency. Under this rule a contested condition has the same weight as a permit denial and may be appealed under Section 40 of the Environmental Protection Act.

Rule 212 Design, Operation, and Maintenance Criteria

This section gives the Environmental Protection Agency authority to adopt technical policy statements. Part (A) outlines the rationale under which such a change should be made (e.g., change in the state of the art). Part (B) outlines the specific procedures under which such a change could be made.

Rule 103 (B) allows the adoption of the technical policy statements as published in accordance with these rules. Any new technical

policy statements will fall under the province of this rule.

Technical policy statements are the tools of the Agency to allow the proper administration of these rules. These statements detail what will be required of a public water supply so as to comply with these rules, and serve as a guide for proper construction and operation of facilities. Guidelines are also incorporated for the proper minimum chlorine residuals, fluoridation procedures, safety precautions, and any other pertinent specifications (R. 23, 943).

Certain witnesses expressed a fear that technical policy statements would allow the Agency to dictate all facets of public water supply and potentially interfere with normal maintenance (Ex. 29, P. 6, R. 860). This fear is unfounded. In the first instance, Rule 212 (B) allows ample time for public comment. In the second instance, if an owner of a public water supply feels that a condition to his permit was incorporated on the basis of an unjust technical policy statement, his appeal to the Illinois Pollution Control Board could very well raise this point. Technical policy statements have been used in other divisions of the Environmental Protection Agency, and would appear to be working satisfactorily.

Rule 212 (B) was the subject of minor controversy. 212 (B)(1) outlines the method of how notification of a proposed technical policy change shall be given. As proposed, the rule would have given the Agency the choice of publishing the change in either the Board Newsletter or in a comparable publication. This led to questions of what a comparable publication was (R. 1018, Ex. 21, P. 10). The Agency's response was that should the frequency of the Board's Newsletters change, delay might be caused in waiting for publication. The Newsletter is the generally accepted media for state environmental affairs and as such should be used for matters of this type. However, the Agency should be allowed the option of additionally publishing the proposed change in a comparable publication if it deems it necessary. The present rule reflects this option.

Rule 212 (B)(3) raised doubt as to the intent of the 45-day deferral of adoption clause (R. 720). The conflict was mainly a misinterpretation of the intent of the section. The intent is not to limit comment, but to allow ample time to receive and consider public comment.

Rule 213 Permits under Emergency Conditions

This rule was added to the original proposal as a response to a series of valid potential problems which were raised at hearing. (Mr. Pavia of the City of Chicago [Ex. 29, P. 6]) It became clear that a method to carry out emergency operations and still fulfill the requirements of Rules 201 and 202 was mandatory. Public water supplies are facilities which, if left inoperable for an indeterminant length of time, could potentially inflict much serious harm to the public health; it is also realized that lack of proper installation is a serious health hazard. Rule 213 allows for the best possible compromise. It allows the Agency to become aware of the proposed intent (and methodology) of a water works, while deleting the necessity for a pre-received permit.

The term "emergency" is, of course, open to discussion, and in the Board's opinion there is no satisfactory way to define it. Emergencies will vary from time to time and place to place, and can only be determined by direct discussion between the Agency and the applicant (by telephone). Both the Agency and the owner of a public water supply have the duty to conduct themselves in a manner which puts the public safety first. Nothing in these proceedings has led the Board to believe that the parties will act in any other manner. The Board feels that Rule 213 as written will amply serve its intended purpose.

Rule 214 Permit Revocation

This section as proposed by the Environmental Protection Agency is a major departure from past practice. The Agency felt that it should have the right to revoke a permit after issuance (R. 46). The Board finds no reason why the traditional revocation power of the Board should be transferred to the Agency. Permit revocation can only come about as a result of a violation of a rule or regulation, or if the permit was improperly obtained. These conditions leading to revocation should be determined at hearing before the Board in accordance with Title 8 of the Environmental Protection Act. A review of rules concerning revocation reinforces our position that the Board has held to this precept (see Chap. VI, Rule 206; Chap. VII, Rule 212; Chap. II, Rule 102 (f); Chap. III, Rule 942). Rule 214 herein now reflects this philosophy.

Rule 215 Permit Limitations

This rule is simply a proviso stating that all local laws shall be complied with before a permit will be considered valid. There was no public comment on this section of the rule, and it stands as proposed.

A question of whether it would be wiser to require receipt of other permits (e.g., Illinois Commerce Commission) before the grant of an Environmental Protection Agency permit was raised (Ex. 1, P. 2). The Agency responded that requiring such a grant would lead to unnecessary delay and red tape. The Agency stressed that the proposed rule follows past Agency practice, and no problems have resulted in the past (R. 49). Mr. A. Rae (Lane Western Corp.) pointed out that in order to get a well drilling permit from the Department of Mines and Minerals, the Department will check with the Environmental Protection Agency to find if the plans have been approved. The proposed change would put us on an endless belt. The rule was adopted as presented.

PART III: OPERATION AND MAINTENANCE

Rule 301 Required Supervision

This section outlines the standard logic pertaining to proof of ownership. Notice must be given each time ownership is changed. Although a comment was generated (R. 861) delineating undue paper work as a result of this rule, the Board finds that the advantages of such knowledge far outweigh the minor inconvenience on the part of the water supplier.

Rule 302 Operator's Certification

This rule specifies that each public water supply shall be under the supervision of a certified operator. This provision is important in that the certified operator is the first line of defense against plant upsets which could conceivably present a public hazard. This provision is also an extension of "An Act to Regulate the Operating of a Public Water Supply" (Ill. Rev. Stat., 1971, Ch. 111 1/2, §501 et seq.). This law states that all facets of a public water supply are to be under a certified operator's control.

It is the intent of this rule to cover connected supplies as well as initial supplies. The logic of this is that a connected supply may contain equipment and operations (e.g., tanks, chlorination) which are not under the control of the initial supplier. The potential for contamination in a connected supply is equally as great as it is in an initial supply. The Board realizes that this requirement may place a burden on the smaller communities; however, the advantages of having a competent operator dictate that the time and expense required to comply with this rule outweigh the inconveniences imposed.

Rule 303 Notification of Change of Ownership or Responsible Personnel

This rule is self-explanatory. It simply is a requirement that when a personnel change of significance occurs, the Agency shall be so notified. The City of Freeport (R. 303) objected to this clause on the grounds that it would be a needless waste of time (reference to change of certified operators), in that the operators are the agent of the public water supply, and, as long as they are certified, this should be the state's only concern. While this argument has merit, it overlooks the fact that the Agency should be able to have immediate contact with an operator in the event that this becomes necessary. The Agency should also be able to develop a rapport with the operators so that the benefit of their knowledge may be easily and quickly transferred. The minor inconvenience of notification is vastly outweighed by the potential gains.

Rule 304 Finished Water Quality

This rule is the heart of the regulation, and will be discussed in detail. It is the main function of these rules to provide a safe water for the residents of the state. As denoted by the title, this rule deals

with finished water quality; and as such is water after treatment has occurred. Rule 307 of this chapter and Rule 204 of Chapter 3 deal primarily with raw water quality. Detailed testimony and exhibit data have been accumulated to support each parameter included in this rule. This rule must be read in combination with Rule 307, which details how many and how often samples must be taken. As will be discussed later in this opinion, it is the intent of the Agency to lend its fullest assistance to communities in analytical work. The intent is to insure that every water supply will provide safe water. The Agency, through its laboratories, has absorbed and will continue to absorb a substantial portion of the financial burden as it pertains to analytical costs.

The major testimony regarding bacteriological testing and parameters came from Mr. Edwin E. Geldreich. Mr. Geldreich is a consulting bacteriologist for Water Supply Research Laboratory, National Environmental Research Center, U.S. Environmental Protection Agency, Cincinnati, Ohio. Perhaps the most significant fact regarding this facet of testimony is that, other than minor questions (mainly asking for clarification), no challenge was raised as to the validity of either the test procedures or the magnitude of the bacteriological limits. The logical conclusion is that the data presented are necessary, reasonable, and generally accepted in the field. The proposal initially presented by the Agency has been adopted in full.

Rule 304 (A) Bacteriological Quality

This part of the rule deals with methods of determining, and maximum quantities for, coliform allowable under these rules. Rule 304 (A)(1) sets guidelines for the standard samples to be used in performing analyses for the coliform group. Two methods are generally acceptable in the field. These methods have different absolute allowable numbers of coliform; however, when the amount of sample is taken into account, the degree of contamination is equivalent.

The fermentation tube method has been the traditional analytical tool in the field. It requires less equipment and is less expensive to operate than is the membrane filter technique (see below). Most municipalities which have their own laboratories utilize this method. The major drawback is that a sample takes 48 hours to run.

The second method of coliform detection is the membrane filter technique. This method has the disadvantage of being more expensive to run (capital costs) than the fermentation tube method; however, it has the significant advantage of allowing a result to be run in 24 hours rather than 48 hours. Rechecks can also be run in 24 hours.

The minimum allowable sample is 100 ml. As reported by Dr. Geldreich, (Ex. 26, Pg. 10) a larger sample would be beneficial, in that we are looking for a small amount of contamination.

The two main reasons for picking a 100 ml sample rather than a larger one are: The impracticability of shipping larger (e.g., 1 liter) samples; and the difficulty of filtering large samples when turbidity pluggage of membranes occurs. Dr. Geldreich concludes:

> "Establishment of a 100 ml minimum test sample for potable water may not be the ultimate volume desired, but does represent a realistic compromise between the problem of increased cost for transportation of large volume samples to the central or branch laboratory and the desire to tighten baseline sensitivity for coliform detection."

The allowable coliform counts are self-explanatory in the rules and will not be discussed in this opinion. Suffice it to say that there was no public disagreement with the validity of these numbers. The main point here is that the absence of the coliform group in potable water is evidence of a bacteriologically safe supply, and a low coliform level is also a good indication of a supply free of viruses (R. 277, Ex. 26, Pg. 8).

Rule 304 (A)(3) pertains to check samples required in the event that an excessive coliform level is detected. The rule is self-explanatory, and is generally accepted as valid.

Rule 304 (A)(4 and 5) deal with bacterial plate counts, and is an additional test which may be required by the Agency. Although this rule is somewhat of a departure from the normal "shall" rules because of the rationale shown, the Board feels that the Agency's proposed language is proper. Plate counts are an additional test which will uncover the many other micro-organisms (besides coliform) which could exist in finished water. When the M.F. or F.T. methods of analysis show the presence of such other groups, the Agency must have the option of either running or asking the municipality to run plate counts so as to try and determine the extent of these interfering groups. According to Dr. Geldreich, most of the other micro-organisms are non-pathogenic. Some may create taste, odor, or spoilage problems in manufactured products. It is also possible that the presence of such micro-organisms may mask the presence of the coliform group. Dr. Geldreich further reports that the plate count test is easy to conduct, economical, and requires no special equipment (Ex. 26, Pg. 13). It must be remembered that under Rule 309 most bacteriological testing for small communities will be conducted by the Agency.

Rule 304 (B) deals with the chemical and physical quality of finished water.

Rule 304 (B)(1) is a general proviso requiring that finished drinking water be of such quality so as to protect the health of the consumer and the stability of the water supply. While no absolute limits on any contaminants have been set in this subsection, it lays the ground rules for Table 1.

Rule 304 (B)(2): This subsection simply states that when chemicals are used in the ordinary treatment of water, excessive amounts of such chemicals shall be removed before the water is distributed. The typical example of such a problem would be the operation of a softening plant in which lime and alum are used to precipitate calcium and magnesium. Facilities must be designed to provide sufficient retention capacity or filtering capacity to remove all but a trace of the treating substances

Rule 304 (B)(3): This was the subject of much discussion and misunderstanding. The major misconception was the feeling that each water supply would be required to maintain a 12-month running average. This was never the Agency's position; the 12-month running average is a prerequisite that the Agency must comply with in order to prove a violation. The original wording indicating "compliance" was changed to "noncompliance" so as to better illustrate the intent. This rule then protects the owner of a water supply from an enforcement action should the Agency determine that a grab sample is slightly over the regulatory limit.

There must, however, be additional protection in the event of a gross violation of the standard. The figure of 1.5 times the regulatory value was thus set as the upper limit for a one-time excursion from the rule. This 1.5 rule in essence preempts the 12-month running average requirement for the initiation of action by the Agency.

One further comment is appropriate. The requirement of a 12-month running average puts the public water supply on notice that the Agency is aware of a problem. The Agency (as stated by Mr. Markwood, R. 29) will also maintain a very close surveillance on a particular problem area.

Rule 304 (B)(4) is the logical conclusion of the previous rule, simply stating that if after the Agency generates a 12-month running average, and finds a water supply to have a regulated parameter above that found in Table 1, this shall be grounds for enforcement.

Proposed Rule 304 (B)(5) has been deleted. The proposed rule would have allowed the Agency to add substances to Table 1 on an emergency basis for a six-months period. Permanent changes would be then made by the Board. While we agree in principle with the Agency's intent, we have serious reservations as to this rule's legality. The question of statutory provision for such a rule was raised in Exhibit PC-18. The Agency's response (Exhibit PC-20) states that there is no clear-cut provision in the Environmental Protection Act which would justify such a rule, but that Section 34 of the Act could allow this type of action. The Board must disagree with this rationale and therefore deleted said rule.

Table 1 Maximum Allowable Twelve-Month-Average Concentrations Finished Water Quality

Table 1 lists the various constituents which are to be regulated in all public water supplies. Compliance dates are listed for each constituent.

Certain constituents were originally included in the Agency's proposal and have since been deleted. Chlorides, carbon alcohol extract, and sulphates have been removed. Control of these contaminants either could not be economically justified when health effects were balanced against cost of compliance, or the test procedures were not accurate.

The U.S. Environmental Protection Agency (Exhibit PC-43) recommended that the standard for organophosphate was weak in that the chlorinesterase inhibition (C.I.) method of detection was of doubtful scientific value. Our original footnote (d) detailed the (C.I.) method as the preferable technique. The EPA now relates that gas chromatographic methods will be used "if a standard is to be included in the federal standards." The Board has deleted Note (d) but will retain the 0.1 standard for parathion.

As pointed out by Mr. Anderson (R. 360), aesthetic rationales are related to health rationales in that very high chlorides or sulphates (for example) could drive the consumer to an unsafe water supply. While this is a justifiable fear, testimony by Dr. Larson in regards to a person's adaptability to high levels of such parameters, coupled with the high cost of removal, have led the Board to strike all reference to these contaminants.

The following is an item-by-item discussion of the various substances listed in Table 1, or proposed. Certain parameters have footnotes added; in such a case, the note will be discussed along with the specific parameter.

Arsenic: Compliance date - effective date of these rules; maximum concentration - 0.1 mg/l; number of communities known to be exceeding this standard - 1.

Arsenic is a metalloid that occurs in nature and is acutely and chronically toxic to man. The U.S. Environmental Protection Agency has recommended 0.1 mg/l as a limit on this substance. Mr. McCabe (U.S. Environmental Protection Agency) offered testimony to support the limit proposed in Exhibit 23. He stressed that at the 1962 setting of a 0.01 mg/l standard, there was concern expressed that arsenic might be carcinogenic. Mr. McCabe stated that extensive testing (study in Chile where arsenic in the water supply was 0.8 mg/l) showed no adverse health effects. Mr. McCabe further pointed out that arsenic is not cumulative in the human body but is excreted (R. 341-343).

The Environmental Health Resource Center commented on the possible effect of arsenic on the human liver but offered no detailed cites. Business and Professional People for the Public Interest also voiced concern over the 0.1 mg/l level (Exhibit PC-21). Here we have received strong documentation for a reduced level. After due consideration of the data generated, the Board finds that the federal position is better supported and we will adopt the 0. mg/l level.

Barium: Compliance date - Jan. 1, 1978; maximum concentration 1.0 mg/l; number of communities known to be exceeding standard - 21 to 23, all in northern Illinois (Figure 1).

Barium is known to be highly toxic to man with effects on the heart, blood vessels, and nerves. The limit proposed by the U.S. Environmental Protection Agency is 1.0 mg/l (Exhibit 23, Pg. A-43). Mr. Tardiff (U.S. Environmental Protection Agency) reflected that in comparison to other constituents the data on barium are sparse, and that the proposed wat

FIGURE 1: CONTENT OF BARIUM ABOVE 1.0 mg/l IN PUBLIC WATER SUPPLIES

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standard is based on extrapolation from the "barium in air standard" with the application of a safety factor (barium in air 0.5 mg/m^3). Mr. Tardiff emphasized that experimentation is underway and if a need for change in the standard is discovered, such information should be acted on. Mr. Tardiff related that the factor of safety used was "about 10" (R. 353). The Environmental Health Resource Center comments in Exhibit 49 that a safety factor of two was not high enough. As mentioned above, the factor actually used was 10. As readily admitted because of limited data, an educated approximation was partially used in arriving at the 1.0 mg/l level.

Technical feasibility and economics must also be considered. An acceptable method of barium removal is ion exchange (R. 1435). Exhibits 85 and PC-7 are the only indication the Board has as regards the cost of barium removal. These figures range from $500 to $100,000, depending on the amount of barium present, the amount of flow, and other factors. The above figures do not reflect complete costs as they only cover capital equipment costs and disregard installation enclosures, operating costs, etc. In spite of the sparsity of economic information generated, the Board must carefully consider a reasonable compliance date. We note, however, that the health effects mandate an enforceable limit.

Because of the fairly sizable number of communities which exceed the 1.0 mg/l level (Exhibit 41) and the need for installation of equipment to remove this constituent, a future date was picked for compliance with this rule. The Illinois Environmental Protection Agency recommends June 1, 1976. Although no other comments on a reasonable deadline were given, Exhibit 46 sheds some light on the subject. Mr. A. Rae (Layne-Western Corp.) wrote that a 1979 date would be more feasible. Mr. Rae further reported (R. 1124-1125) that his discussions with the consulting firm of Warren and Van Sprague raised problems (time delays) due to municipal bonding as well as equipment delivery. Mr. John Anderson (Illinois Environmental Protection Agency) stated (R. 1127) that the June 1976 date would probably necessitate some variances. Because of the costs involved and the magnitude of the projects to be undertaken, the Board feels that a compliance date of January 1, 1978, would be reasonable. This would give communities sufficient time to be well underway with their programs before requesting a variance, if needed.

Cadmium: compliance date - effective date of these regulations; maximum concentration 0.01 mg/l; number of communities known to exceed standard - 0.

Various studies (see Exhibit 23, Pg. A-46 - A-49) have indicated that cadmium has been associated with bone and kidney disease. It has also been shown that the human body cannot excrete cadmium, and it would seem to accumulate in the tissue of man. Cadmium has been found to be a non-essential element biologically and thus should be held to an absolute minimum. The safety factor incorporated into the 0.01 figure is 7 (R. Pg. 366).

The Environmental Health Resource Center disputed the 0.01 mg/l figure and referenced the Federal Register, Thursday, December 27, 1973 wherein a proposed effluent standard of 0.004 mg/l was listed. The

Board takes note that this proposed level is in conflict with all data generated to date and has no knowledge of its validity. In light of the large amount of data supporting the 0.01 mg/l limit, the Board will adopt it.

Chlorides: Both chlorides and sulphates are constituents which add undesirable taste to water. Evidence exists that excessive amounts cause consumer reactions that may result in individual treatment or rejection of the supply. There was no evidence or suggestions entered which indicate that either sulphates or chlorides are a health hazard. These constituents are purely aesthetic, and any health hazards are indirect (e.g., use of inferior supplies by consumers).

In the above context, economics and technological feasibility are of paramount importance. Here the evidence strongly suggests that the cost of removing chlorides and sulphates is excessive, and the technology is at best in the infant stage. It is also noteworthy that this particular problem will most affect those least able to afford such abatement, as those supplies usually are in communities of less than 1500 population (R. 540, Dr. Larson). Dr. Larson further suggested that limits for these constituents not be made mandatory (R. 544). This would be in conformance with the federal approach to the problem.

The only cost data we have received was Exhibits 85 and PC-7. A typical capital investment for removal of chlorides would be $60,000 and for sulphates it would be about the same. This figure relates to a flow of approximately 80 gallons per minute. Clearly, with no health hazards the Board cannot under Sect. 27 of the Environmental Protection Act require mandatory removal of these substances.

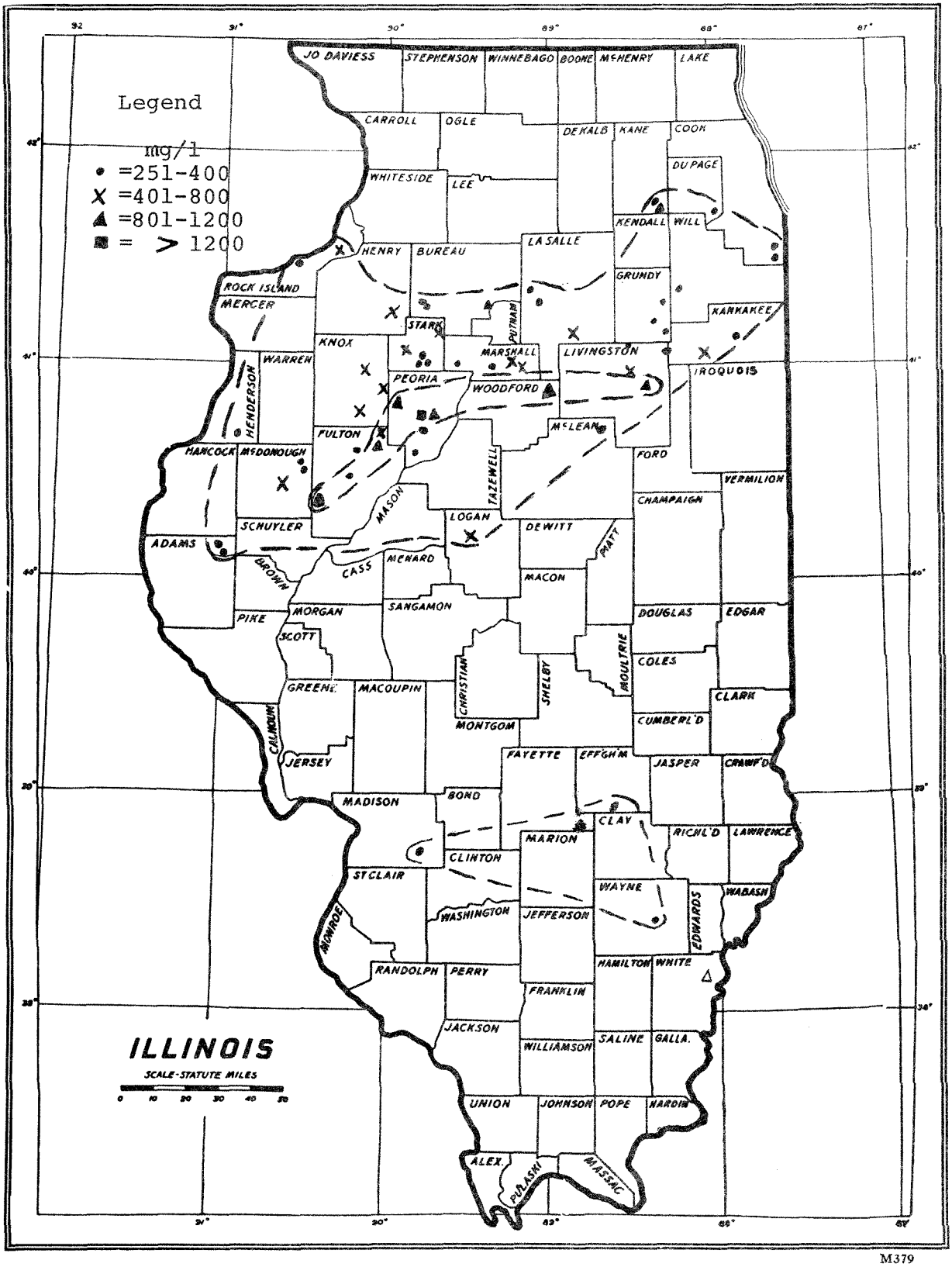
The Agency had recommended a proposal which called for a referendum to be held in the area serviced by a public water supplier. Should 51% of the users so vote, the limits then contained in Table 1 would have been enforceable against that supplier by the Agency. The plan also allowed the consumers to choose a level higher than that in Table 1 for the Agency to enforce. The reasons for this proposal, brought out at the hearing in Carbondale (R. 950-966), were that since chlorides and sulphates are in the regulation for basically aesthetic reasons, "the people using the water will be able to determine whether they want the limits enforced...This, we feel, gives the people who will have to pay for the removal of chlorides and sulphates the right to determine if they are willing to have a limit lower than that supplied, but higher than the Table 1 limits" (R. 950, Ira Markwood).

For the following reasons, the Board finds it necessary to delete this provision from the regulation.

The proposal speaks of using a referendum. Referendum is the right of the public to have submitted for their approval or rejection an act passed by the legislature. City of Litchfield v. Hart, 306 Ill. App. 621 (1940).

Initiative means the power of the people to propose laws and bills and to enact or reject them at the polls, independent of any legislative assembly. City of Litchfield v. Hart (supra).

FIGURE 2: CONTENT OF CHLORIDE ABOVE 250 mg/l
IN PUBLIC WATER SUPPLIES



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Chapter 46, Section 28-1, of the Illinois Revised Statutes (1973) provides for the method of holding an election on the Submission of Questions of Public Policy.

Referendum, as defined above, is clearly inappropriate for what the Agency wants to do. There would be no legislative action for the public to ratify.

At one time, Illinois did have an initiative statute for "commission" cities (24 S.H.A. 4-5-18). This section was repealed in 1965, leaving no initiative statute in Illinois. Initiative is probably closer to what the Agency had in mind in its proposal. Initiative would allow the public to enact an ordinance setting the levels of the constituents. Without an initiative statute in Illinois, we cannot put one into our regulations. A Board regulation cannot dictate to a city that initiative can be used to enact ordinances, without the legislature's approval.

Submission of a question of public policy is a method of the people informing their government of their opinion on a subject. It is not binding on the legislative body (City of Litchfield v. Hart [supra.]). Therefore, it would also be inappropriate to put this method in our Regulations.

To institute any measure that would require an election, there would also need to be a change in the Election Code (Chapter 46, Ill. Rev. Statutes, 1973) to hold such an election. The Board cannot rewrite the Election Code. This must be done by the legislature.

Second, the Board feels that it cannot delegate its authority to regulate to the general public. The Board is given express power to set up regulations for public water supplies under Sec. 37 of the Act.

The Act indicates that the Board has numerous conditions to consider before it is allowed to regulate. The Board must consider:

1) Physical conditions and the character of the area involved;

2) The nature of the present environmental quality;

3) Technical feasibility and economic reasonableness of control.

By allowing a referendum to do our rule setting, the Board is in fact abrogating its duty to consider these conditions. Though we would be setting a bottom line figure, the public is not the group to determine what the limits should be, as they will probably not consider these elements. It is also a possibility that under the criteria listed above, the Board will not be able to justify the limit as proposed.

For these reasons the Board must reject the Agency proposal.

As mentioned before, the Board has no reference to chlorides or sulphates in its formal regulation. However, we do note that the recommended levels for these two constituents are 250 mg/l. This value is chosen

to be slightly below the average taste threshold. Should a public water supply wish to remove sulphates or chlorides, the 250 mg/l number would be an excellent target to aim at. Figure 2 shows how chlorides are distributed in Illinois.

Chromium: Compliance date - effective date of these regulations; maximum concentration 0.05 mg/l; number of communities known to exceed this standard - 0.

There are data to prove that chromium is toxic to man, causing lung tumors when inhaled and inducing skin sensitization. One study showed that at levels of 0.5 mg/l no visible effects were noted. The problem (as pointed out by Mr. Tardiff, R. 372) is that there is indication that the human body can excrete chromium at levels below 10 mg/day. Basing intake on 2 liters/person/day, a 0.05 mg/l standard yields a safety factor of 100.

Color: Compliance date - effective date of these regulations; maximum concentration - 15 color units; number of communities known to exceed this standard - 0.

This is basically an aesthetic quality but a very important one. As pointed out by Mr. Robeck (R. 373), while color does not necessarily denote an unsafe supply, it could prompt certain people to turn to a potentially unsafe supply. Color is most typically caused by natural contaminants such as leaves and bark; however, high iron concentrations are also known to generate color bodies.

The value "15 color units" is a somewhat arbitrary but useful number. It is based on a standard solution used as a basis for comparison (see Ex. 23, A-60).

Copper: Compliance date - effective date of these regulations; maximum concentration 1.0 mg/l; number of communities known to exceed this standard - 1.

Copper is an element of known beneficial value to man, and is indeed required on the order of 2.0 mg/day for adults and 0.1 mg/day for preschool children. Deficiency of copper in infants' diets can lead to nutritional anemia. High concentrations of copper are postulated to have adverse side effects; fortunately, copper is readily excreted from the human body.

The primary criteria for controlling copper is aesthetic in that taste problems could result above about 3 mg/l (R. 375). Because of the fact that there is no economic burden to comply with the proposed limit, we will adopt the 1.0 mg/l level as mandatory. The one known community which exceeds this regulation is a moderate-sized community of about 10,000 people. Although an isolated economic burden may occur, the potential health effects outweigh a rule change. This community has a variety of options, including the Board's variance route, if additional time for compliance is needed.

Cyanide: Compliance date - effective date of these regulations; maximum concentration 0.2 mg/l; number of communities known to exceed this

tandard - 0.

Cyanide is a well-known toxicant and in 50-60 mg single doses is known to be fatal. However, in smaller amounts (10 mg or less) the human body can readily detoxify cyanide. This is accomplished by conversion to the thiocyanide form. The level proposed by the U.S. Environmental Protection Agency of 0.2 mg/l provides adequate safety for human consumption and the value of 0.01 mg/l found in Chapter 3, Rule 204, has been found to be unduly restrictive.

Furthermore, if a community is to chlorinate and the water is within a reasonable pH range, the interaction of chlorine with any cyanide which is present would further reduce the concentration of free cyanide by the destruction of the cyanide.

B.P.I. (Exhibit PC-21) took issue with the 0.2 mg/l proposal and urged retention of the 1962 0.01 mg/l level. It was pointed out that newer industrial isocyanides increase the overall exposure to cyanide and that this factor was not taken into account. However, when one applies a two l/day/person intake, the ingestion from water would be 0.4 mg/day or a safety factor of 25, which the U.S. Environmental Protection Agency deems adequate. Also, note the rationale in Exhibit 60, Pg. 40, for the 1962 Standards, agreeing that 0.2 is safe for human consumption.

Fluoride: Compliance date - January 1, 1978; maximum concentration - 2.0 mg/l; number of communities known to exceed the standard - 131, mainly in the southern part of the state (may not all be in excess at this time).

Fluoride is deemed an essential nutrient by the Food and Nutrition Board of the National Research Council; thus in 1967 the State Legislature amended the Public Water Supply Control Law to require that all public water supplies provide fluoridation between the limits of 0.9 mg/l to 1.2 mg/l (based on average ambient temperature). Studies have shown, however, (Ex. 23, A-66) that fluoride concentrations above the upper control level can induce fluorosis of the teeth (Ill. Environmental Protection Agency Exhibit 5 sets 3.0 mg/l as this threshold limit). Higher concentrations have been associated with bone changes (8-20 mg/l), crippling fluorosis (20+ mg/l), or death at single doses above 2,250 mg.

Mr. Robeck (U. S. Environmental Protection Agency) stated that for the climatic conditions in Illinois a maximum level of 1.5 mg/l (versus the adopted 2.0 mg/l) would be indicated. Mr. Robeck further stated that due to the difficulty of fluoride removal (see below) and the fact that small communities are mainly involved, coupled with the fact that fluorosis (tooth mottling) is not visible below the 3-4 mg/l level, the U.S. Environmental Protection Agency would be reluctant to push for a 1.5 mg/l limit in Illinois. Mr. Anderson stated that they would be willing to change their proposal to 1.5 mg/l (R. 387); however, this was based on the assumption that only a very few communities would be affected.

Fluoride is perhaps the most difficult of all the proposed health-related parameters to remove, and available technology and economics must be weighed along with health effects. Exhibit 93 shows one community

of 2974 persons with a fluoride level above 8.0 mg/l and many above 4.0 mg/l. As mentioned, most communities affected are small ones (exclusively ground water supplies), who will have significant difficulty in raising funds to abate the problem.

The alternates open to the community are to find an alternate water supply or to treat part of the supply so as to get the average final concentration to 2.0 mg/l. Activated alumina, softening, or ion exchange are the possible technologies available at this time (R. 387). Dr. Larson's testimony (R. 1332) to the effect that he does not know of any community that is removing fluoride successfully highlights the problem.

Exhibits 85 and PC-7 shed the only light on costs involved in this area. Again, the comments related to the shortcomings of these data as discussed under barium apply here. Base costs (capital equipment) range from $4000 to $300,000 (community over 20,000 population). While it was stated (R. 1436) by Mr. Rae that beneficial side effects (possible removal of iron and manganese) could exist, we are still in the area of relatively new technology. Mr. Anderson's comments that the technology may not have been fully utilized because of lack of legal necessity has merit (R. 1333); however, this Board must set a reasonable time for compliance. Fortunately the health effects of excess fluorides are not as great as other constituents, and a delayed compliance date can be adopted. A date of January 1, 1978, should give communities ample time to explore their alternatives, and is adopted.

Foaming Agents: Compliance date - effective date of these regulations; maximum concentration 0.5 mg/l; number of communities known to exceed this standard - 0.

This parameter is basically aesthetic. Foaming in water is unsightly and could cause one to seek an alternate, and while aesthetically pleasing, unsafe water supply. Foaming is generally formed by the presence of surfactants (e.g., synthetic detergents) and cannot be directly measured. However, a maximum level of 0.5 mg/l will prevent foaming in drinking water. The generally acceptable method for detecting foaming agents is the methylene-blue method. While this technique records more than just foaming agents, this is not considered a problem in public water supplies. This fact, however, can only serve to artificially set a more stringent standard for foaming agents in that any interference in the test will be recorded as foaming agents.

Iron: Compliance date - January 1, 1978; maximum concentration - 0.3 mg/l (see discussion on sequestering agents below); number of communities known to exceed this standard - over 200 (see Figure 3).

Iron is controlled purely for aesthetic reasons. It has been shown that different persons have different threshold taste limits for iron; however, 1.8 mg/l seems to be an average threshold (Exhibit 23, Pg. A-73) The major problem with iron is color; when iron reverts to an insoluble form, it leaves deposits (red-brown) on fixtures and laundry. The limits adopted today would protect against staining. This is a problem which can cause people to seek alternate supplies. When well water contains iron, it is in the soluble form; as soon as it is exposed to o

When in the air it reverts to the insoluble form and causes a color problem. Therefore, the two methods of control are removal at the source or sequestering (tying up the iron chemically so as to keep it in the reduced form). It is important to note that the limits imposed in Table 1 refer to total iron rather than only soluble iron as initially expressed in Exhibit 5, Pg. 13 rationale (R. 393-393).

Fortunately, iron removal techniques are well understood and are in use in Illinois. Here we are not faced with lack of available technology (R. 390). Again we turn to Exhibits 85 and PC-7 to ascertain the expense involved in this type of treatment. It should be noted that iron treatment goes hand-in-hand with manganese treatment (e.g., removal of iron also removes manganese). Costs range widely according to the amount of iron present and flow rates, but in light of the available technology a mandatory date in the future has been set. This will also allow communities to experiment with sequestering agents and allow time for the state of the art to improve.

Much heated controversy centered around the use of sequestering agents (note a). Mr. James F. Stiles (Stiles-Kem Corp.) vigorously debated the need for an upper limit on iron at which sequestering may be attempted (R. 1214). Mr. Stiles argued that note (a) as written provides sufficient safeguard so that the upper proposed limit of 0.8 mg/l is unwarranted.

Part of Note (a) -

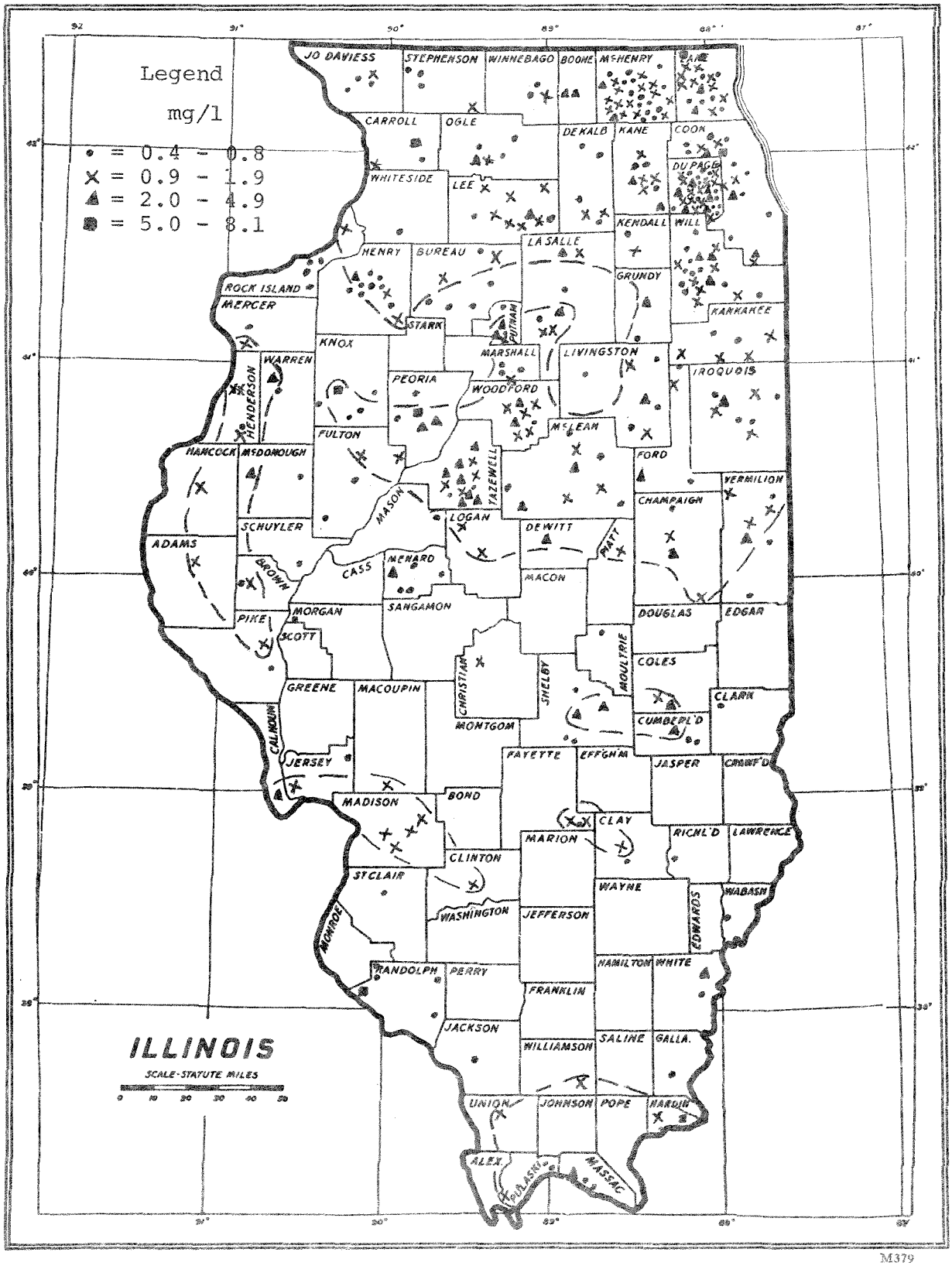
e.g.: "..may be allowed at the discretion of the Agency.."

"No experimental use of a sequestering agent may be tried without previous Agency approval."

These two clauses, in Mr. Stiles' opinion, would afford ample protection against abuse. The Agency and Dr. Larson countered by stating that a wealth of evidence was available to show that above 0.8 mg/l iron polyphosphates are ineffective (R. 1271, 1290 - Anderson; 1293 - Larson; Exhibits PC-8, 9, 10, 11). From these data (see also Robeck testimony, R. 391) there can be no doubt that to date sequestering is ineffective above the 0.8 mg/l level. This, however, does not say that it cannot be effective in the future. To set an absolute level would (or could) in effect stifle investigation and research into a potentially inexpensive and workable solution to a widespread problem. The rationale found in Exhibit PC-10 that polyphosphates will decay to orthophosphates and thus lose their ability to sequester is noted, and not disputed. However, Mr. Stiles' testimony as to the chemical composition of the McHenry water supply cannot be overlooked. Data in Exhibit PC-11 would seem to refute the utility of polyphosphates in the subject supply.

The above information left the Board with the opinion that all the answers are not known regarding polyphosphates. Fortunately, there are a number of considerations which allow us to better make a reasoned decision:

FIGURE 3: CONTENT OF IRON ABOVE 0.3mg/l
IN PUBLIC WATER SUPPLIES



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1. Iron is not a health hazard.

2. Many communities will be affected.

3. Chemical sequestering is much less expensive than treatment for removal.

4. Note (a) affords sufficient safeguard to prevent abuse. The Agency has the power to refuse to allow the use of sequestering agents.

5. Time is needed to explore all avenues.

For the above reasons the Board will set a compliance date of January 1, 1978, and delete the upper limit at which sequestering agents may be tried.

Lead: Compliance date - effective date of these regulations; maximum concentration 0.05 mg/l; number of communities known to exceed these standards - 0.

There is no question as to the toxicity of lead. Various studies have shown excess lead to result in lead intoxication and lead encephalopathy. Lead poisoning also results in permanent damage even if treated. Up to 94% of the survivors have been found to have psychological abnormalities (Ex. 23 P. A-78). Although there are indications that the amount of lead ingested in food has been dropping since 1940, the problem cannot be treated lightly. This is partially because tests have shown that lead is cumulative in the human body (concentrates in bones and blood).

The long-time safe ingestion limit is 0.6 mg/day, while 1.3 mg/day is the level which is generally thought to result in long-range lead intoxication. Normal food intake is thought to be about 0.3 mg/day. Assuming a daily water intake of 2 liters at 0.05 mg/l, the average lead intake from water would be 0.1 mg/day. This leads to about 25% of the total daily intake from water. The EHRC (Exhibit 49) raises the question of how this level correlates with intake from airborne lead. Mr. McCabe (U.S. Environmental Protection Agency) (R. Pg. 394) related that such factors were taken into account when drafting the revised rationale for lead (Ex. 28) and that the same conclusions were reached. The Board adopts the 0.05 mg/l level.

Manganese: Compliance date - January 1, 1978; maximum concentration - 0.05 mg/l; number of communities known to exceed this standard - 125+ (see Figure 4).

The limit for manganese is mainly aesthetic. Although some studies show that massive doses of manganese could yield harmful effects, the levels referred to are large enough so as not to be of concern in these regulations. Excessive amounts of manganese can give rise to laundry spotting and drive consumers to an alternate source, and discoloration due to manganese is in many respects worse than that due to iron (R. 400). The Board's rationale for adopting the above limit as regards technological feasibility and economic reasonableness is very similar to that for

iron. The reader is thus referred to that section for amplification of our reasons.

Mercury: Compliance date - effective date of these regulations; maximum concentration - 0.002 mg/l; number of communities known to exceed this standard - 0.

The toxicity of mercury is well known and documented. Detailed documentation can be found in Exhibit 23, Pg. A-86 to A-93. The following rationale appeared in Exhibit 5, Pg. 14:

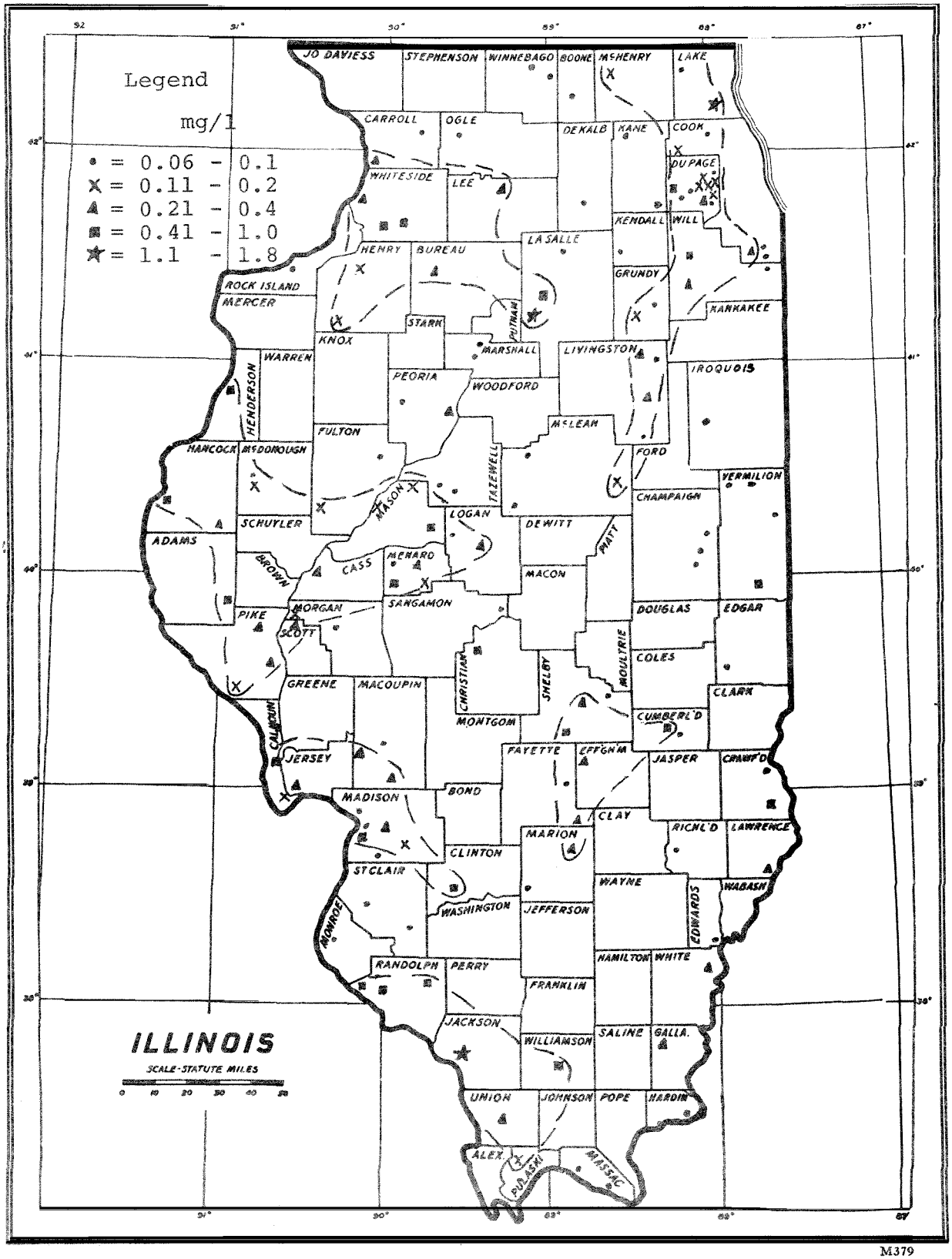
> "Mercury: Mercury is distributed naturally throughout the environment. As a result of industrial use and agricultural applications, significant local increases in concentrations above natural levels in water, soils, and air have been recorded. Aside from the exposure experienced in certain occupations, food, particularly fish, is the greatest contributor of mercury to the human body burden. Mercury poisoning may be acute or chronic. Generally, mercurous salts are less soluble in the digestive tract than mercuric salts and are consequently less acutely toxic. Chronic poisoning from inorganic mercurials has been most often associated with industrial exposure, whereas that from the organic derivatives has been generally the result of accidents or environmental contamination. The inorganic salts of mercury are generally less toxic than the alkyl compounds, which are organic derivatives of mercury. Inorganic mercury is converted by microbial action to the extremely toxic alkyl forms. These forms are readily incorporated into food chains of aquatic life, resulting in substantial concentration in the larger members of the food chain. It has been estimated that of the total mercury ingested, more than 98 percent is absorbed via the gastrointestinal tract when taken in the form of methyl mercury. Only two percent is absorbed if it is in the form of mercuric ion. On the basis of adverse physiological effects, total mercury in a public water supply should not exceed 0.002 mg/l."

The question was raised (Exhibit 49, Pg. 2, R. 400) as to why a 0.002 value was proposed rather than the 0.0005 mg/l value used in water quality standards. Mr. Tardiff explained that this limit is for human consumption and need not be concerned with accumulation in the food chain. He further explained that mercury can become methylated when left in contact with bottom sediments and therefore a water quality standard must take into account the high toxicity and ease of absorption of methyl mercury in fish. The potential for exposure of man to the highly toxic methylated form of mercury is low and thus the 0.002 mg/l limit (R. 401-403).

Nitrates-Nitrites: Compliance date - effective date of these regulations (with Note b); number of communities known to exceed standards - varies as to time of year for surface water supplies. A few ground water supplies are high in nitrates throughout the year (six locations ranging from 10.8 mg/l N to 29.3 mg/l N).

The subject of how best to regulate this potentially dangerous con-

FIGURE 4: CONTENT OF MANGANESE ABOVE 0.05mg/1
IN PUBLIC WATER SUPPLIES



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taminant engendered much debate among Board members. Our final decision will mandate treatment of water supplies which continuously violate the standard, while supplying a mechanism for those communities which only periodically exceed the standard for nitrate nitrogen. It is the Board's feeling that health studies should be made in the few towns having continuously high-nitrate water in comparison with similar towns which have water that is low in nitrates.

In the case of nitrates we have perhaps a classic case of the need for the Board to weigh all the factors prescribed in the Environmental Protection Act and formulate a rule which best protects the health of the people while not causing an economic burden which is beyond the financial ability of most communities. In gathering evidence on the subject of nitrates the following facts came to light:

1. The current 10 mg/l nitrate-nitrogen and 1 mg/l nitrite-nitrogen standard is a safe level as it applies to pregnant women and infant children, the most susceptible segment of the population.

2. The scientific bases and documentation of the above standards are not as firm as the Board could desire. Indeed, the numbers themselves are under attack from various experts (as being too tight).

3. The cost of nitrate removal is extremely expensive.

4. In some cases the excursions above the standard probably are caused by heavy fertilizer applications. As such, levels above standard are of brief duration, and only occur at certain times of the year.

During our deliberation the Board had to decide whether to strictly control nitrates above standards or whether a compromise could be worked out that would protect public health and still consider economic reasonableness and technological feasibility. In making such a decision the Board must not only consider theory but must also consider reality. To prescribe a rule which is economically unfeasible is to propose a rule that will be disregarded. Just issuing a regulation does not solve the problem; the regulation must be one which will (and can be) complied with. Although on paper it was tempting to declare that all excursions over the limit - no matter how brief - would require mandatory treatment, the facts are that a city such as Decatur, which has a population of 90,000, a water flow of 24 mgd, and exceeds the standard perhaps ten days a year, could not be realistically required to install total treatment. This decision is based in large part on the twin concepts that the scientific data base is subject to challenge and that the compromise Note (b) should be adequate in solving the problem.

The Problem and the Data Base: Nitrates in water (nitrites are seldom found naturally; nitrates may be converted to nitrites in the body of infants when certain flora are not present in the intestinal tract. These flora are normally present in children over the age of three months.) have been tied to incidents of methemoglobinemia. Many studies have been carried out to detect the relationship between nitrates and methemoglobinemia. The result of the many studies has all but concluded that the effects of nitrates (nitrites) are confined to very young infants and possibly fetuses. The first note of the relationship be-

tween NO_3 and infant methemoglobinemia was in 1945 (most of these data from IIEQ 74-5, Ex. 71). At this time, a study of Iowa well water pointed to the relationship. After this study, reports of the relationship cropped up in other studies in the U.S. and Europe.

Establishment of a standard (by the U.S. Public Health Service) was based on the criteria of infant susceptibility, increase in concentration due to boiling, daily intake, and duration of exposure. It is noted that recovery from this ailment is accomplished by use of an alternate supply and use of vitamin C. It is further noted that all definitive cases of methemoglobinemia had occurred at levels greater than 20 mg/l. All of the above led the U.S. Public Health Service to state in 1962:

> "..in light of the (above) information and because of the uncertainty introduced by tardy analyses, the frequent lack of attention to possible factors interfering in the analysis, the health of the infant, and the uncertain influence of associated bacterial pollution, 10 mg nitrate-nitrogen (or 45 mg nitrate) per liter of water is a limit which should not be exceeded."

The U.S. Public Health Service further warns that in areas where the standard is exceeded, alternate sources of water should be used for infant feeding (Ex. 71, Pg. 19). It is this concept of a limit and information urging the use of alternate supplies which has been endorsed by the Board (via Note b).

Since the 1962 finding by the U.S. Public Health Service, additional information has been generated (detailed in Ex. 71, Pg. 20-34). It is these studies which begin to cast doubt on the validity of the numbers. Many studies do not support the past conclusions. For example, a study conducted in Israel found:

> "A prospective study in Israel attempted to determine whether there was any association between MetHb levels and nitrates in drinking water. Information was gathered on the age, sex, weight, ethnic background, health status, nutritional regime, and water intake of 2473 infants in areas with medium-high (50-90 mg/l as NO_3) and low nitrate (5 mg/l as NO_3) concentrations in drinking water. There was no significant difference between the mean MetHb level in the study and control areas. However, MetHb levels in both study and control groups were highest in the first 60 days of life. That no difference was found between the study and control group may be due to the fact that only 6% of the infants consumed large amounts of tap water in their milk formula. Furthermore, the diet of 87% of the infants included vitamin C-rich foods which counteract the effect of nitrites."

A study by Dr. A. Gelperin of excess nitrates in Danville led him to the following conclusions:

> "The data were analyzed as stated above as well as by the covariance analysis method for nitrate level effects by each sex lev-

el. The F test with 5% and 1% levels of confidence was used for the significance testing. As expected, there was a difference between sexes. Of major significance is that the available data show no demonstrable lethal effect of ingestion during pregnancy of community water containing 'excess' nitrate upon infant mortality or fetal defects." (Ex. 89)

Dr. S. Aldrich (Ex. PC-32, 45) is a critic of the IIEQ document 74-5 (Ex. 71). Many points raised cast doubt on the objectivity of the study. While it is obvious that the intent of the IIEQ 74-5 is to point out the health effects of nitrates, it is also imperative that such data be presented in a clear, understandable, and completely objective way. After having reviewed the references in IIEQ 74-5 in some detail, we find that certain of Dr. Aldrich's comments are sound and must be very carefully considered.

The above information indicates that the medical evidence definitely needs additional work. Some studies indeed reveal that no adverse effects were apparent, while others show the opposite. This conclusion, when considered with the high cost of treatment, has persuaded the Board to adopt Note (b).

The Economics and the Technology: The only economic figures entered into testimony are found in Exhibit 85 and PC-7. Figures submitted by Mr. A. Rae (Layne-Western Co., Inc.) show the following:

Size, GPM	Equipment Costs
32	$40,000
100	$125,000

The $125,000 figure includes only equipment and not installation, enclosure, etc., and is thus a very low figure. It should be noted that according to Mr. Rae's exhibit, treatment for nitrates is the highest cost shown out of ten selected removals (tied with sulphate removal). The Illinois Environmental Protection Agency submitted costs which detail the per capita equipment outlay as follows:

Concentration	Population	Cost	Per Capita Cost
25 mg/l	160	$5000	$31.30
10.8 mg/l	40,000	$70,360	$1.80

Once again, this is equipment only, and does not include operating costs. Mr. Rae commented that total costs can run from two to fifteen times equipment costs (R. 1429).

The information on technology is very sparse. Mr. Ira Markwood mentioned that such technology would be ion exchange (R. 1436). There are, however, no communities in Illinois which have attempted to remove nitrates, and the Board has no information as to the effectiveness of such treatment. The only known case in the U.S. of such treatment oc-

curs in Garden City, L.I. The Board has no data on this installation, but notes that Garden City has a continuous nitrate problem, not an intermittent one such as Decatur.

All of the above reasons have led the Board to adopt a 10/1 standard for nitrate/nitrite, and adopt Note (b) which grants limited relief for short excursions over this standard.

Odor: Compliance date - effective date of these regulations; maximum concentration - 3 odor units; number of communities known to exceed this standard - 0.

Odor is a purely aesthetic quality which could serve to drive one to an alternate source. Absence of odor is also an indication that a water supply is free of phenolic compounds. The test used to measure odor is dilution of odorous water with three equal portions of odor-free water before the odor is undetectable. The standard of three means that it would require three equal parts of odor-free water to dilute the odorous water below detection.

Organics: Carbon-chloroform extract - compliance date - effective date of these regulations; maximum concentration - 0.7 mg/l; number of communities known to exceed this standard - 0.

Carbon-alcohol extract: Compliance date - deleted from regulation; maximum concentration - 3.0 mg/l (this is only a recommended value); number of communities known to exceed this standard - 0.

The carbon-chloroform extract is one which includes a large number of organics from both natural and industrial sources. Included are odor causing compounds (R. 424) and possible carcinogens (R. 431). Although it has its shortcomings in its ability to analyze and characterize the various organics present, it does give an indication of the total organ. load in a water supply. The previous standard of 0.2 mg/l found in Chapter 3 was the traditional value used. Due to newer analytical methods, the proposed value of 0.7 mg/l is at least as stringent, if not more stringent, than the 0.2 mg/l value.

The carbon-alcohol extract method was open to criticism by both the U.S. Environmental Protection Agency (R. 424) and Mr. Markel (Interurban R. 1384, Exhibit 86). Mr. Robeck stated that difficulties with the procedure led the U.S. Environmental Protection Agency to suggest deleting this parameter. Mr. Anderson stated that they do not have a firm position on this item (R. 426), but at a later date (R. 1385) the Illinois Environmental Protection Agency suggested keeping the standard, in that the Federal Government had not officially dropped it.

Even though it may cause difficulty in the future to reinstate this factor, if the Federal Government's research finds this parameter acceptable, the Board sees no justification in including a parameter as mandatory when its proponents doubt its validity. Therefore, it has been deleted from our regulation.

Pesticides: Compliance date - effective date of these regulations; maximum concentration - see Table 1; number of communities known to be

in violation of these standards - 0.

Pesticides are divided into two main categories: chlorinated hydrocarbon insecticides and organophosphate insecticides.

The chlorinated hydrocarbons contain such well-known insecticides as aldrin, chlordane, and DDT. These insecticides are not metabolized in the body, but are seemingly stored in the fat, and this storage phenomenon is currently under extensive examination. Symptoms of insecticide poisoning vary from mild headache to convulsions and death caused by cardiac arrest.

The numbers set in this rule have been calculated primarily on the basis of extrapolated human intake with varying safety factors depending on the amount and type of data available. A factor of 1/10 is used when the data are from human tests with no ill effects observed, 1/100 for the animal data if adequate human data are available for corroboration, and 1/500 if based only on animal data.

The standards have also taken into account possible exposure from other media. The most common input is from man's diet, although inhalation from insecticide spray is also a distinct possibility. The figure used to estimate the intake from drinking water is set at 20% of the allowable limit.

The only organophosphate specifically regulated is parathion; however, all of these types of insecticides have a similar biologically active molecule and may be considered as one class. Organophosphates have a high acute toxicity to man, and when ingested over a long period of time can result in adverse health effects. Estimates of a lethal dose range from 20 mg to 100 mg.

To set up a level for this compound, it was assumed that the most toxic agent of a group might be the source of contamination - and thus a 5 mg/l level was set as the maximum safe daily intake level. Applying a safety factor of 50 yields the standard of 0.1 mg/l that we adopted.

Chlorophenoxy herbicides are used to control aquatic weeds, and their use has won wide acceptance. Data to date show that rather large doses (3000 mg) are required before symptoms in man would be noticed. Some 63 million pounds of 2,4-D were produced in 1965 with no confirmed cases of occupational poisoning and few cases of illness due to ingestion. In order to determine a standard, animal experimentation was used. The minimum dose which caused ill effects was corrected with a 1/500 safety factor, which was then cut by 50% to allow for other possible sources of intake.

In PC-43 the U.S. EPA suggested new levels for 2,4-D, Silvex, and Endrin. In the case of 2,4-D and Endrin, looser standards were recommended; however, in the case of Silvex the recommendation was to go from 0.03 to 0.01. No substantive reasons were given for these changes. It is, however, well documented that Illinois waters have no signs of these components at any levels approaching the standard, and the Board will thus accept the tighter Silvex standard and reject any loosening of 2,4-D and Endrin.

Selenium: Compliance date - effective date of these regulations; maximum concentration - 0.01 mg/l; communities known to exceed these regulations - 0.

Selenium is considered to be an essential nutrient in small amounts. However, it has adverse health effects at levels of about three times the normal dietetic intake of approximately 0.2 mg/l (Exhibit 23, A-137). Although there was concern that selenium was potentially carcinogenic, data to support this have not been obtained. Selenium is insoluble in the elemental state and oxidation to the selenate or selenite form is required before the material becomes soluble in water. Organic forms of selenium are also found as a result of solution of seleniferous salts. Selenium is cumulative in the body and produces diseases of the liver and kidney (R. 433).

A further complicating factor of selenium toxicity is the fact that its toxicity can be increased when found in the presence of other contaminants. The most notable case is arsenic. Therefore, in setting a limit for selenium the levels of other contaminants must be considered.

At the maximum adopted level of 0.01 mg/l and a standard intake of 2 liters/day an increase of less than 10% over the normal dietetic intake would result. This level seems appropriate to maintain the rather narrow level between required and harmful doses of this element.

Silver: Compliance date - effective date of these regulations; maximum concentration - 0.05 mg/l; communities known to exceed this standard - 0.

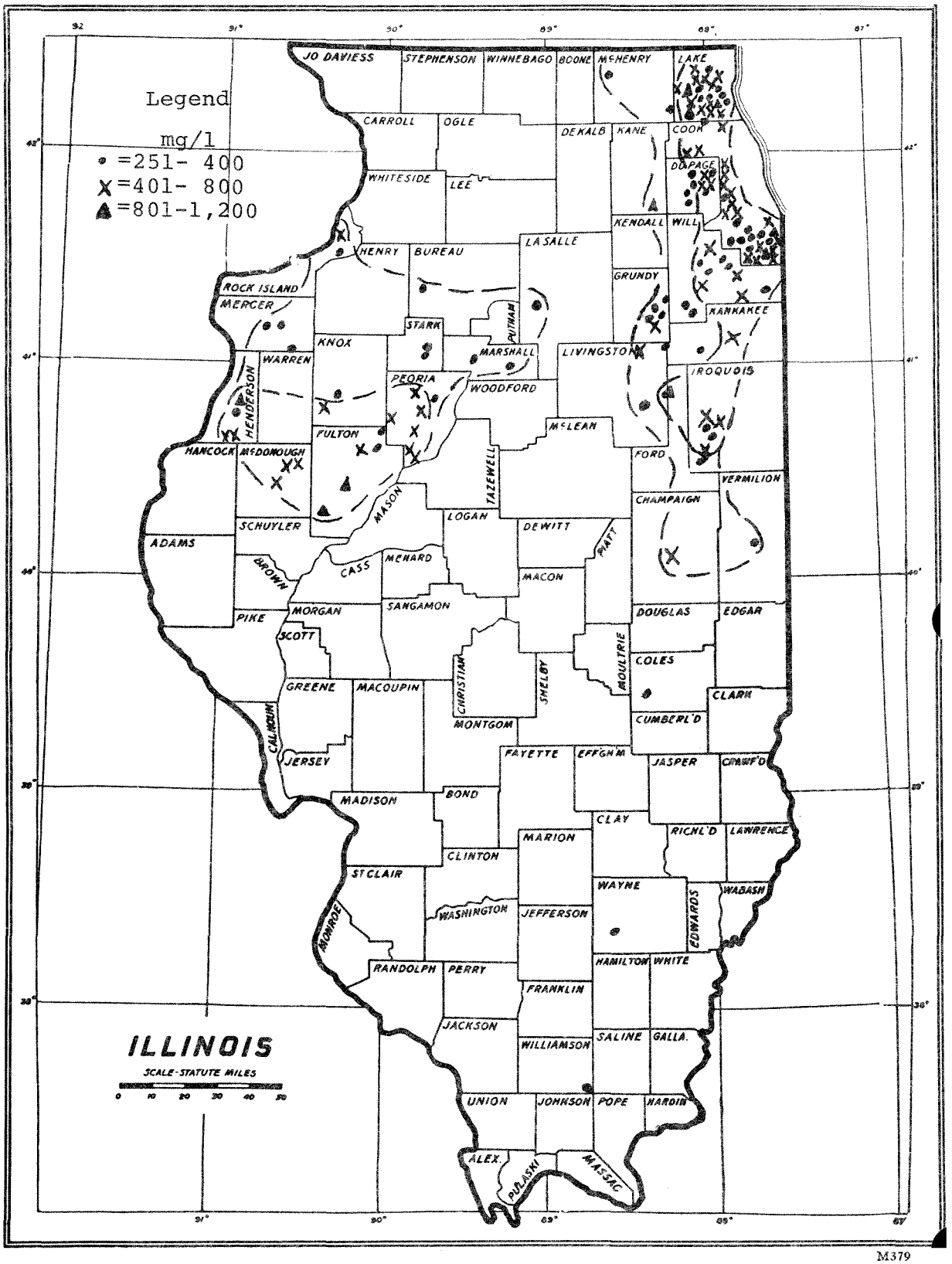
The main concern regarding silver ingestion is a cosmetic one. Silver in the body migrates to the skin and mucous membranes and precipitates there, leaving a gray coloration. This coloration is permanent. There are very few data regarding what level of silver will cause this condition. It is, however, known that doses far in excess of these proposed (0.05 mg/l) are required to produce this problem. Silver is used in some cases to disinfect water; it is therefore necessary to set a limit to avoid excessive treatment. While silver is rarely found naturally in water above one microgram, it is the purpose of this regulation to insure that levels above 0.05 mg/l are not exceeded in any way.

Sulphates: The discussion on chlorides (see above) is directly applicable to sulphates. The reader is referred to that discussion for the rationale in adopting the recommended criteria for this constituent. Figure 5 shows the location of the higher sulphate contents in Illinois.

Turbidity: Compliance date: effective date of these regulations; maximum concentration - 1.0 turbidity units; number of communities exceeding this standard - variable.

Turbidity is the presence of minute particles in water. These particles can be of almost any nature - rust, plankton, etc. The main concern regarding turbidity is the potential for entrapping bacteria and viruses and preventing the disinfecting agent from doing its work. To insure a safe supply, a limit of one turbidity unit has been set. This limit has been set to prevent accumulation of turbidity in dead spots

FIGURE 5: CONTENT OF SULFATE ABOVE 250 mg/l
IN PUBLIC WATER SUPPLIES



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distribution piping. As pointed out by Mr. Markel (Interurban Water Co., R. 1392), turbidity deposits can form even when finished water quality is below one-half a turbidity unit; however, it seems that complete removal of deposits is impossible to obtain.

Note (d) provides a built-in variance from the rule. As mentioned, the potential for bacteria or viruses being entrapped in pockets of turbidity is the main concern, rather than a slightly turbid final product. Both the state and the U.S. Environmental Protection Agency agree that a final turbidity of 5 can be accepted if certain criteria are met. The five items listed under Note (d) must all be demonstrated as accomplished before the Agency will allow this exception. All of these conditions seem reasonable and should suffice to maintain not only a safe but also a readily acceptable (aesthetic) water supply.

Zinc: Compliance date - effective date of these regulations; maximum concentration - 5 mg/l; communities known to exceed this standard - 0.

Zinc is a vital and beneficial element in human metabolism. The daily adult human intake of zinc is 10-15 mg, and this element is readily excreted in human wastes. The activity of insulin and other body enzymes is dependent on zinc and elimination of zinc from the diet can result in growth retardation in animals. High concentrations of zinc (30 mg/l) can yield minor transient ill effects or impart an unsatisfactory taste to water. In order to avoid even a possibility of these side effects, the recommended level of 5 mg/l has been adopted. This should also prevent excessive levels of cadmium and lead, which are common contaminants of zinc (Ex. 23, A-170).

Rule 305 Chlorination

Although it was thought at the outset of these hearings that this rule would be hotly debated, this was not, in fact, the case. The overwhelming testimony was in support of mandatory chlorination. Minor changes were made to incorporate testimony of Mr. R. Johnson (Superintendent of Parks and Memorials, Department of Conservation), and the American Water Works Association (PC-16). These changes would exempt hand pumps without distribution systems and supplies which purchase previously chlorinated water that contains adequate chlorine residual.

The rationale for requiring mandatory chlorination was stressed by representatives from the Illinois Environmental Protection Agency. Generally speaking, the presence of a free chlorine residual in a public water supply is an added measure of safety, especially in emergency situations. Free chlorine will attack biological contamination, and, if the contamination is not gross, will render the water safe to use. Mr. Franklin Lewis (Illinois Environmental Protection Agency) addressed himself to ten separate cases in which the lack of adequate chlorination was a major factor in the issuance of Boil Orders. These cases ranged from faulty equipment in the treatment plant to well and pump contamination and water tower contamination. It is generally conceded that if a municipality chlorinates, it will guarantee a safe water supply. It is, however, recognized that chlorination will offer additional protection against a major outbreak of illness such as the one suffered

in Florida (see Exhibit 90, Florida).

Having discussed the need for chlorination, one must now investigate the burdens that such a regulation will impose on municipalities. Presently there are about 340 communities in Illinois which do not chlorinate their water supplies. Of these communities, the majority pump below 0.5 mgd, 134 of these supplies pump between 500,000 gpd and one million gpd, and a very few are pumping over one million gpd.

Fortunately, there was a wealth of cost data generated in this area, both from the Illinois Environmental Protection Agency and from representatives of communities which have recently installed or are considering installation of chlorination equipment. The Illinois Environmental Protection Agency (Ira Markwood, R. 655, R. 1027) estimates the cost of chlorination equipment at $500-$1000 per water supply, and the cost per person for a small distribution system at about 2 cents/person/day (Markwood). Mayor Floyd Smart (City of Cuba, R. 808) installed chlorination equipment at a cost of $400 after a bacteriological problem. Cuba is a city of 1600 persons. Mr. Otto Roethe (Vienna Correctional Center) referenced a quote of $2000 for a chlorination system able to handle 1.5-2 mgd capacity, again at a cost of approximately 2 cents/person/day (Markwood). Mr. David Davis (City Engineer, O'Fallon, R. 1109) referenced a quote of about $1750 for installation of equipment and costs of about $1.50/day for chemicals (from Exhibit 63 - population 7268, pumpage 3.5 mgd).

From the above costs it does not seem that the costs of chlorinatio would inflict a serious burden on small municipalities. Water is a co modity which is sold to the public, and the price will vary as the costs vary. Economic arguments were raised against chlorination by Mr. Tom Deterding (City of Red Bud) and the City of Morrison (Exhibit 43). However, a study of Exhibit 63 (Public Water Supplies Data Book) would indicate that communities having chlorination do not seem to incur an excessive cost burden (e.g., compare costs: City of Red Bud at $0.28-.82/1000 gal., with Farmington, Grayslake, and Manteno, all in the $0.30-1.50/1000 gallon range).

The availability of chlorine was also explored. In light of the facts that the sanitary sector of the chlorine market consists of only 4 1/2% of the total market, the chlorine shortage is only temporary (see Exhibit 70), and that these regulations are for a long duration, this consideration cannot be given long-term weight.

Finally, a study (Exhibit 90) was introduced outlining the experience of six states which now require mandatory chlorination. Although in reading this report one could get the impression that enforcement in some states is less than adequate, those states that have a vigorous enforcement procedure report very little opposition. All states based the reason for requiring chlorination on engineering knowledge, technical reports, and as a safety measure against potential contaminants.

All of the above leads the Board to the conclusion that the benefits of mandatory chlorination far outweigh the costs imposed, and the Board adopts the final Agency proposal.

In very recent months a new problem regarding chlorination has arisen, which gave this Board considerable concern. The U.S. EPA has detected small quantities of potential carcinogens in the New Orleans drinking water supplies. It is postulated that chlorine may be reacting with waste (natural and manmade) hydrocarbons to form chlorinated hydrocarbons. In light of this potential hazard the Board must look to the U.S. EPA for the facts in this matter.

Mr. Gordon Robeck has stated that there is too little data and too much invested in chlorination equipment at this time to justify presently banning the most widely used disinfection method in the United States. He said it is uncertain whether the degree of chlorination has any impact on production of chlorinated hydrocarbons (Environmental Reporter, Vol. 5, #28, Pg. 109).

In a letter from J. Harrison (Chief, Water Supply Section, U.S. EPA) to Mr. Ira Markwood (Illinois EPA), the following was related:

> "We want to caution against any type of rash action. These trace amounts of halo organics that are being found in drinking water are not known to be dangerous and precipitous action at this time is not called for. On the other hand, we do know enough about these contaminants to be concerned."

What the Board does know is that chlorination is needed to prevent very dangerous water-borne diseases. This is a fact which must be contended with. The Board feels that not to require chlorination at this time would be turning its back on a known danger to protect against a potential one.

It is imperative to recall the Board's introductory language at this time, because this is indeed a case in point:

> "Therefore these regulations can best be termed an up-to-date starting point. The Board is well aware of its responsibility to change the regulations as more information becomes available and will endeavor to do so."

Rule 306 Fluoridation

This rule reinforces the existing law requiring fluoridation of public water supplies. The Environmental Protection Agency will by this rule cooperate with the Public Health Department, and by its field personnel insure proper operation of equipment and enforcement of the rule. The above section of "Fluoride" gives pertinent data on the amount of fluoride required.

Rule 307 Raw Water Quality

This section delineates the quality which is required for influent water. It must be remembered that these criteria are strictly to provide a source of water which can be treated under normal processes to give a safe supply. This concept raised some question when the fecal

coliform and coliform data in Rule 307 (C) were compared with Chapter 3 regulations. One must remember that the purpose of this chapter is to insure a safe drinking water supply, and the regulations for protecting the waters of the state for other purposes are a different matter. These other provisions were covered when the Board adopted Chapter 3, and are a separate entity (exception to this is Chapter 3, Rule 204).

Rule 307 (A) dictates that in addition to meeting the provisions of this chapter, if a water supply has the choice between alternate supplies, it should select the best supply available.

Rule 307 (B) prohibits the use of recycled sewage treatment plant effluent as a water supply. Mr. F. Soberski testified (R. 601-602, Exhibit #3) as to a projected recycling program at the Village of Hinsdale. Mr. Soberski urged the adoption of an amendment to this rule, which would allow the use of distilled tertiary effluent as a public water supply. Mr. Ira Markwood (R. 604) stated that the U.S. Environmental Protection Agency at this time cannot recommend the use of recycling as a viable solution. More research as to the carryover of viruses and other contaminants will be required before this technique can be allowed. The Board will hold with the U.S. Environmental Protection Agency's viewpoint and adopt the Illinois Environmental Protection Agency's proposal.

Rule 307 (C) delineates the maximum concentration of both fecal coliform and coliform. Testimony on this subject was generated by Mr. Geldreich (U.S. Environmental Protection Agency). Again, it is emphasized that those criteria have no relationship to what may be required by Chapter 3, but are determined as a level required to yield a safe supply after normal treatment.

Rule 307 (D) is self-explanatory and simply calls attention to the responsibility of a water supply owner to the general public.

Rule 308 Raw Water Quantity

This rule requires that each public water supply shall withdraw water from a source which is adequate to meet its present and future needs. Rules 308 (A) and (B) indicate that this requirement covers both surface and ground water supplies. The danger of back siphonage in the event of undersupply is the main point considered by this rule. In the event that demand on the supply exceeds that which can be introduced to the pumps, the likelihood of a partial vacuum in the lines exists. At this stage, contamination from various points along the distribution system can be introduced. Rule 308 (C) simply states that each individual source need not comply with 308 (A) or (B) but rather the aggregate supply must conform.

Rule 309 Frequency of Sampling

Much concern and testimony was elicited over how often one must sample water and who would run the samples. After much discussion, the intent of the Agency and its strong desire to work in close coordination with the public water supplies became apparent. The intent of this rule is to offer the aid of the Agency's laboratory facilities to communities

so that a constant check can be conducted on public drinking water. This procedure indicates that each municipality need not have its own laboratory facilities on site for either biological or mineral testing.

Rule 309 requires a minimum of two samples per month for submittal to the Agency. This minimum number of samples will suffice for a community of 1000 persons or less. A community of 10,000 persons will require about twelve samples per month (see Agency Tech. Policy Statements, T-38). Larger communities will require greater numbers of samples, depending on population. Larger communities (e.g., Chicago, Springfield) have their own certified laboratories and are routinely analyzing many samples. Rule 309 states that these sample results are acceptable to the Agency. The main point is that with the exception of rare cases, this rule should generate no additional burden on communities, but rather reinforce the important concept that a routinely monitored water supply is of utmost importance.

Rule 309 (B): The Agency intends to continue and upgrade the policy of monitoring water supplies for mineral content (including organics). Although it has been stated that no water supply is under regulation to run mineral tests, it is incumbent upon an owner to monitor these contaminants which he knows to be present. The Environmental Protection Agency will require a minimum of one sample every two years for analysis. This sample will then provide a record of trends in a water supply. In the event that a particular contaminant is suspected to be in excess of regulated parameters, the Agency may either require additional tests or require further samples.

Rule 310 Operating Reports

Operating reports have been required by the Environmental Protection Agency since 1970. This rule continues this in effect. Operating reports are normally prepared by plants as a method of following day-to-day operations, as well as long-term trends. Because it is impossible to have very frequent inspections, the Agency will require reports as an interim check on operations.

Rule 311 Protection During Repair Work

This rule simply states that when construction work is commenced, adequate protection must be afforded during this work. One instance of possible contamination would be if after a day's construction, lines were left open. If such a situation were to occur, back siphonage or other contaminating factors could readily be introduced into the system. The intent of this rule is to insure that proper engineering practices are followed. There was no comment on the rule during hearing and the Board will adopt it as presented.

Rule 312 Disinfection Following Repair or Reconstruction

This rule was the subject of some misunderstanding at hearing. The rule as proposed implies that approval must be secured from the Agency each time disinfection following repair work would be undertaken. This was not the intent. Concern was evidenced by the testimony of

Mr. Pavia (City of Chicago, R. 458), Mr. Madden (City of Freeport, R. 863), and Mr. Lux (Village of Oak Lawn, R. 876).

Mr. Ira Markwood responded to these comments at the Carbondale hearing as follows:

> "The next item is in Rule 312, which is disinfection following repair or reconstruction. That apparently has been misunderstood. The procedures must be approved. It does not require approval at each disinfection procedure. This is necessary because there are, at times, methods which are proposed on which either there is no definite information that they are satisfactory, or we have knowledge that that will not give complete disinfection. We, therefore, want to be sure that when a water supply proceeds to disinfect its system, it is actually disinfecting it by a means which is known to bring results. Once the method has been approved, they need not contact us each time they have to perform a procedure."

It is clear from the above remarks that acceptance of a procedure is the method postulated by the Agency in drafting these rules. It is also clear that the Agency should have the option to rescind its approval should new information become apparent. If the rule were written simply to state that once a procedure is granted by the Agency, it can be used in the future, this would lock in such a procedure until the Board changed its regulations. In order to clarify the rule and preclude a situation such as just discussed, the following sentence is added to Rule 312:

> "Upon receipt of such approval, the public water supply may use the accepted disinfection procedure in the future, unless the Agency, for good cause, notifies the owner of a public water supply that such a procedure is no longer acceptable."

Rule 313 Emergency Operation

As originally proposed (see Exhibit 5, Pg. 18), this rule generated a storm of controversy. It was argued that the rule as originally proposed would lead to a "cry wolf" attitude (R. 576) among citizens. Each instance under which water pressure fell below 20 psi would have mandated an immediate issuance of a boil order.

In response to the criticism raised, the Agency submitted a substitute rule which will be adopted. The rule is broken down into two categories under which a boil order is necessitated. The first category, 313 (A), met with little comment. Simply stated, when a water supply is found to be bacteriologically contaminated, a boil order shall be issued. There certainly can be no argument with such a rationale. Bacteria are a well-known prelude to disease, and boiling is an acceptable method of destroying bacteria. This paragraph was written to initiate a step which will quickly remove a hazard from public water and is thus not subject to dispute.

The second category, 313 (B), is a somewhat different story. Rather than alleviating a clear and present danger, it strives to provide a mechanism to prevent possible contamination from precipitating a health hazard. By necessity, this rule must first delineate what type of situation would constitute an emergency, and allow exemptions to the rule when it can be reasonably assured that such a situation will not constitute a health hazard.

Twenty pounds per square inch gauge water pressure is the figure below which there is a potential health hazard present. The vast majority of public water supplies operate well in excess of this value, and a drop to this pressure would indicate a serious break in the system. Chicago, however, is the major exception to the rule. The Chicago Public Water Department operates what is termed a low-pressure, high-volume system. Mr. Pavia (City of Chicago) testified (R. 46) that the 20 pound pressure requirement could be completely restrictive for many systems.

One of the main points which must be delineated at this time is the intent of the word "emergency." It is not the intent to require a boil order every time the pressure drops below 20 psig, but rather, as the rule says, "Any emergency which results in water pressure falling below twenty pounds." Thus, a drop in pressure because of a known use such as fire fighting or opening of water hydrants would not normally constitute an emergency. This intent is clearly stated by Mr. Ira Markwood:

> "It might drop in one location, not the entire system. It is normal to have low pressure. That wouldn't be considered an emergency situation."
> (R. 1114)

This reasonable approach would seem to be adequate to allay the fears of many who testified on this subject.

In addition to the above intent, Rule 313 (B) also outlines three conditions under which a boil order may be avoided, while still maintaining an adequate degree of public safety. In order to utilize this exception, all three of the conditions must be met. Rule 313 (B)(1) requires a history of safe operation as manifested by a twelve-month record of adequate chlorine residual and turbidity. Rule 313 (B)(2) requires samples to be taken immediately and twelve hours after the incident. Rule 313 (B)(3) requires the residual chlorine and turbidity tests be taken for several hours after an incident to insure that these two parameters do not significantly change.

As originally proposed, Rule 313 (B)(3) required a 12-hour continuum of samples after an incident. During the Ottawa hearing Mr. Markel (Interurban Water Co.) indicated that the twelve-hour criteria could be arbitrary and unreasonable (R. 1401). Mr. I. Markwood stated that the twelve-hour criteria was mainly a judgment factor (R. 1403) and that it was not mandatory from a health standpoint. Both parties agreed that responsible parties could work within the accepted criter- [redacted] of "several hours."

Rule 313 (C) details steps to be taken in the event of an unusual hazard. There was no comment on this subrule and it was adopted as proposed. There can be no argument that in the event of a contamination hazard, the Agency should be immediately notified. The Agency is in an excellent position to offer sound advice as to what steps should be taken to protect the public health. However, as the rule states, the owner or operator has the primary responsibility of notifying the consumer of a potential hazard, and if he fails to issue such warning, the Agency shall notify the public on its own volition.

Rule 314 Cross Connections

This rule delineates that public water supplies shall not be cross-connected with any supply of lesser quality than the major system. The rule specifies that it is the responsibility of the owner of such supply to monitor any cross connection and assure that such connection is safe and of acceptable quality. Discussions as to the restrictiveness of this rule were instituted by Mr. Henneberry (Springfield, R. 195-198). By comparisons with the existing Rule 3.60 and deletion of "Public water supply system" from the list of definitions, this problem was resolved. The accepted rule is now an extension of what has been in effect.

Some discussion as to whether this rule would eliminate the use of back pressure control devices was elicited (Madden, R. 864; Markel, R. 1090). Back pressure devices are installed before hospitals and other such areas to prevent the possibility of contamination entering the main system from one branch of that system; as such, they are desirable devices. Mr. Markwood (Ill. Environmental Protection Agency) stressed that the use of these devices would be covered in future Agency Technical Policy Statements.

Rule 315 Laboratory Testing Equipment

This rule sets up guidelines pertaining to the type of laboratory equipment which is required of a public water supply. It is this rule which prompted the inclusion of the definition, "Operational Testing." Each facility will be required to have adequate laboratory facilities to monitor the operational steps it performs. Methodology to monitor effluent quality from softening equipment, chlorination, etc., will be required. No argument was raised in opposition to this basic premise.

The subject of bacteriological and chemical testing is another problem. In order to comply with Rule 309 (Frequency of Sampling), a laboratory will be required to comply with Section 55.11 of "The Civil Administrative Code of Illinois." This section deals with certification of laboratories. Mr. A. T. Walther vigorously opposed such a requirement (R. 897), stating that while the laboratory at LaGrange cannot comply, it still meets all the basics of good practice. Mr. Walther stated that the necessity of hiring a chemist or biologist would constitute an unreasonable hardship. However, Mr. Walther seemed to be attacking the premise of Section 55.11 rather than Rule 315. As such, Rule 315 will be adopted, and subsequent changes in Section 55.11 will automatically be incorporated in the Board's Rules.

le 204, Chapter 3

The Agency had proposed rather sweeping changes to Rule 204, Chapter 3. The Board, after consideration of all the evidence, has decided to adopt the regulation as found in our final draft. In order to understand the logic behind such a conclusion, one must review the basis for a series of existing rules.

I. General Standards - Chapter 3, Rule 203

The preamble to this rule states that these standards will protect the state's waters for aquatic life, agricultural use, primary and secondary contact uses, and insure the aesthetic quality of the state's aquatic environment. A detailed description of each constituent in this rule may be found in Mr. Currie's March 7, 1972 Opinion (R70-8, 71-14, 71-20 Pg. 5-8). It is clear that these standards were based on the best available data, which would enact the intent of the above provisos. Mr. Currie, in his introduction, states "That all waters naturally capable of supporting aquatic life, with the exception of a few highly industrialized streams consisting primarily of effluents in the Chicago area, should be protected to support such life; and that waters that are used for public water supply should be clean enough that ordinary treatment processes will assure their potability (emphasis added)."

This logic would seem to indicate two major points:

1. The rule covers only waters which are naturally capable of supporting aquatic life, and therefore would seem to exclude ground water aquifers in many instances.

2. These standards could and should be tightened if such tightening would be required to assure potability. In light of this, Rule 204 (b) was enacted to set limits which would conform to this dictate.

II. Public and Food Processing Water Supply Standards Chapter 3, Rule 204 (b) (As it existed prior to the adoption of these Rules)

This table, as adopted in 1972, utilized the best available data in regards to potability. As will be noted from Page 9 of Mr. Currie's Opinion, standards found in Rule 203 (f) which are adequate to insure potability have been deleted from Rule 204 (b). The remaining standards are based on the Public Health Standards, as amplified by the Green Book.

It must also be noted that the P.H.S. Standards relate to finished water quality. Mr. Currie correctly stated these standards should apply to raw surface water as well. This is necessary for two very important reasons.

1. Many impurities are not removed by normal treatment and thus could pass through untreated. When dealing with public safety, we must take every precaution to insure that the delivered water quality meets the most rigorous standards.

2. Even if a plant is equipped to treat for a compound, there always exists the potential for unnoticed malfunctions and subsequent contamination of the water supply. In the event that constituents can be reasonably expected to be at safe levels before treatment (e.g., contaminants not naturally occurring as in ground waters), such a standard should be required.

The major point remains that Rule 204 (b) was intended to protect potability by imposing standards which are based upon the best available data. These standards are thus subject to change, either up or down. Standards may be loosened if in fact it has been established that such a new level is safe for consumption, but a level should never be made looser than existing general water quality standards.

III. Public and Food Processing Water Supply Standards - Chapter 3, Rule 204 (b) (See Exhibit 56, Pg. 24) (As adopted by these proceedings)

The reasons for changing Rule 204 (b) center around three main points: clarification of the intent of this rule; allowance for the use of algicides; and to insure that the finished drinking water standards are not more restrictive than the raw water standards.

1. Clarification of the intent of the rule: The adopted change in the preamble language to Rule 204 makes it clear that it would be a violation to add anything to water which would cause it to exceed the applicable standards. The previous language is not quite so clear, and would raise the question of whether it would also be a violation to use such water. The question of intent of an existing rule was not before us, and could be better answered in a separate proceeding - either a regulatory change or as a result of potential enforcement action. The intent of the existing rule was not a subject for consideration in these hearings. Our job was to promulgate regulations which will insure a safe and adequate supply of water for the general public.

2. Allowance for the use of algicides: Much data have been generated on the necessity and safety (or lack of safety) of copper sulphate as an algicide (Exhibit 65, R. 35-39, 159-165, 1132-1146). It has become apparent that there was general agreement that the use of copper sulphate is vital to the control of algae and its benefits far outweigh its detriments. As such, the adopted change in the language of Rule 204 (b) is required as it pertains to algicides.

3. To insure that the finished drinking water standards are not more restrictive than the raw water standards, consideration must be given two major points: the varied uses of waters; and the inherent difference between gr[redacted] and surface waters.

a) The varied uses of water: As mentioned above, waters covered in Rule 204 (b) must meet, as a minimum, general water quality standards. It has been postulated that a number of constituents can be tolerated at higher levels by humans than by fish or other aquatic life (e.g., cyanide, copper). This is due in part to the cumulative effect of contaminants in an aquatic environment versus the human body's ability to convert and expel various contaminants. It is the Board's finding that no constituent should be listed in Rule 204 (b) unless it is stricter than that found in Rule 203 (f). The determination of whether it should be stricter was based on the best available data. We relied heavily on Exhibit 23, which is the Federal Public Water Guidelines, in making our decisions.

b) The inherent differences between ground and surface waters: Ground waters may be contaminated by naturally occurring contaminants which would not be found in surface waters, and thus must be considered separately from surface waters. This fact in itself raises the possibility that finished water quality can be less stringent than raw water quality. Although on its face this would seem to be a gross inconsistency, upon investigation it is not. The best single example would be cyanide.

According to the best available data, a safe level of cyanide for human consumption would be 0.2 mg/l; however, the 1972 Currie Opinion states that 0.025 mg/l is required to protect the aquatic environment. Existing Rule 204 (b) lists cyanide as 0.01 mg/l. It is clear that new information has rendered this level (0.01 mg/l) unduly restrictive. The conclusions would then be that:

1. The cyanide level in Rule 203 (f) should remain at 0.025 mg/l.
2. The cyanide level in Rule 204 (b) should be deleted.
3. The cyanide level in finished drinking water should be 0.2 mg/l.

The maximum allowable level of cyanide in ground waters, which do not have an influence on aquatic life, is 0.2 mg/l.

It then becomes clear that the final drinking water standards are levels which regulate two different sets of input; they must make allowance for both naturally occurring contaminants and protection of aquatic life. It is therefore wholly consistent that the final water quality may indeed be less restrictive than the raw intake, when one considers the source of water.

The Board thus concludes that Rule 204 in Chapter 3 shall be changed to the extent of:

1. Allowing the use of copper sulphate as an algicide.

2. Keying this rule to our new Chapter 6 regulations.

3. Changing and adding constituents to the Table of Rule 204 (b) to reflect the latest technology.

Mr. Dumelle dissents.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, certify that the above Opinion was adopted by the Board on the 3rd day of January, 1975, by a vote of 4 to 1.

Christan L. Moffett (cjp)