ILLINOIS POLLUTION CONTROL BOARD
October 30, 1980

IN THE MATTER OF:	)	
	)	
PETITION TO AMEND CHAPTER 6:	)	R78-8
PUBLIC WATER SUPPLY, RULE 305,	)	
BY THE VILLAGE OF ORANGEVILLE	)	

Final Order of Dismissal:

OPINION AND ORDER OF THE BOARD (by J.D. Dumelle):

The Village of Orangeville (Orangeville) proposed that the Board exempt certain public water supplies from the mandatory chlorination requirement of Rule 305 of the Pollution Control Board Rules and Regulations, Chapter 6: Public Water Supplies (Rule 305). Public hearings were held in Freeport on December 19, 1978, and in Springfield on January 9, 1979. On January 23, 1980, an Economic Impact Study (EIS) was submitted to the Board by the Illinois Institute of Natural Resources in compliance with Public Law 79-790. Thereafter, two additional hearings were held to consider the EIS. One was held on February 8, 1980, in Oregon. The other was held on February 22, 1980, in Chicago. Over eight hundred pages of testimony and eighty exhibits were entered into the record.

In its present form Rule 305 requires all public water supplies, except those purchasing treated water containing adequate chlorine, to chlorinate the water before it enters the distribution system. Residuals of chlorine must be maintained at levels sufficient to provide adequate protection, as determined by the Environmental Protection Agency (Agency).

Rule 305 was enacted in December of 1974. Illinois, and the six other states which then required chlorination, did so based essentially on three factors:

1. Existing engineering knowledge indicated chlorination to be technically feasible and immediately adoptable;

2. Technical reports indicated overall effectiveness; and

3. Chlorination was deemed to be the best available safety measure against potential contaminants. (EIS 1-2).

The requirement was enacted despite the awareness of the potential hazard of carcinogens resulting from the reaction of chlorine with waste hydrocarbons in the water systems. At that time the Board found "that chlorination is needed to prevent very dangerous water-borne diseases... . 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."

However, the Board went on to point out that it "is well aware of its responsibility to change the regulation as more information becomes available and will endeavor to do so" (Opinion in R73-13, 15 PCB 145, January 3, 1975).

In an amended petition dated January 3, 1979, Orangeville proposed a change to Rule 305, which has given the Board the opportunity to look once more at the chlorination requirement. The amended rule, if adopted, would state that "Rule 305, may not apply to public ground water supplies that have demonstrated the ability to provide water that is safe for human consumption." The reasons for this change, and the subject of most of the testimony at the hearings, fell into three general areas of impact: economic, aesthetic, and health. Each of these areas is discussed below.

Economic Impact

The economic cost of chlorination is of considerable importance in evaluating the proposed amendment to Rule 305. It is also an area of significant dispute.

The Economic Impact Study includes a detailed analysis of the cost of chlorination based upon USEPA economic information (EIS 48). The total capital and operating cost of chlorination was found to be 3.25¢/1000 gallons at a one million gallons per day (gpd) design capacity (EIS 49). This was the smallest system considered, and larger systems had lower unit costs. Thus, based upon an average daily usage of 100 gpd/person, the additional cost per user for chlorination would be about $1.19/year. This figure corresponds with the testimony of Mr. Isoe, one of the authors of the study, that the average increase in cost per user would be in the range of one to three dollars per year (R.580).

There is some difficulty in applying these figures to the communities most affected by the mandatory chlorination requirement, however, since 76 of the 99 communities presently not chlorinating have fewer than 500 people (R.698). This translates to approximately 50,000 gpd, considerably under the lowest usage level upon which the EIS figures are based.

Fortunately, the record includes considerable testimony regarding the costs of small systems. Mr. Markwood, the Manager of the Agency's Division of Public Water Supplies, testified that the capital cost of chlorination for a system designed for a community of 500 people would be in the range of six or seven hundred dollars (R.188). Mayor Bostian of Orangeville, however, placed the costs considerably higher: $1,000 for a separate chlorination building, $800 for engineering fees, $500-$2,000 for equipment (depending on whether gas or liquid chlorination is used), and $30-$50 for a home filter to remove the chlorine (R.277-80). Bradley Heights has apparently spent $1,500 on engineering fees alone (R.297-8). Rock City, a town of 250, spent $4,000 for a complete system (R.168-9).

These higher figures for small towns appear to be greater than necessary for an effective system. One reason for this is that both Mayor Bostian and Mayor Welling of Rock City included the cost of a separate building, but that should not be necessary for a small system. Liquid chlorination, using a hypochlorinator, is generally recommended for such systems and does not require a separate facility (R.698). Quotes from consulting engineer's reports show total costs of $600-$2,000 for hypochlorination systems (Ex.44). It is even possible (although not recommended except for very small suppliers having difficulty funding chlorination equipment) to chlorinate using a Sears Roebuck system which costs under $140 for everything that is needed (R.702 and Ex. 80).

Another reason for these higher costs may be some unusual problem with the system. The $1,500 engineering costs cited for Bradley Heights may well result from this. The Bradley Heights distribution system is over 50 years old and has a substantial build-up of nuisance bacteria which would be attacked by the chlorine and slough off into the water (R.677). Because of this they had to look into two proposals to clean out their system prior to chlorination, and this may be responsible for much of the expense (R.681-2). The Board notes that where such unusual costs are necessitated by a Board rule, a variance may be requested from that rule. Such a request was, in fact, made by Bradley Heights and variance was granted on February 7, 1980, in PCB 80-107 (R.676).

Finally, many small communities do chlorinate their water and have been able to afford the expense (R.496).

Aesthetic Impact

Some of the reasons given for opposition to mandatory chlorination relate to the aesthetic impact, centering on the perceived bad taste and odor of chlorinated water. In this regard chlorination has both a positive and a negative effect. It removes some chemical compounds and kills taste-producing algae, but does impart a taste that some people find objectionable (EIS 13 and R.17). Mr. Wright, Chairman of the Water and Sewer Committee in Leaf River, testified to receiving thirty complaints about the taste and odor of the water when he began chlorinating (R.173, 177-8). Mr. Lewis, an Agency Manager, testified that these taste and odor problems of chlorinated ground water result from iron bacteria being killed by the chlorine (R.466).

Most of the testimony, however, indicates that taste and odor should not be much of a problem. Mr. Lewis continued his testimony by explaining that the iron bacteria which may build up in distribution systems which do not chlorinate will, after a two to four month period of continuous chlorination, be eliminated from the system. The system should then stabilize and the taste and odor problems should abate (R.466-467). This appears to have been the case in Kansas, Illinois, where six months after

chlorination began, there was only one complaint (R.487). This lack of taste and odor problems should be most apparent in ground water supplies, which are the supplies affected by the proposed amendment, in that such water is relatively constant in its chemical, mineral and organic content. Chlorine levels can, therefore, be well controlled, since the taste and odor problems are most apparent when the chlorine level fluctuates (R.468).

Other testimony countering the aesthetic problems of chlorination included that of David Loveland, Director of Public Works for the County of DuPage, who testified that chlorination should actually improve the taste and odor of water by removing hydrogen sulfide, iron bacteria, chloramines and chlororganics (R.857). There was also testimony that the chlorinated water in Minier, Illinois, tastes fine.

Finally, 99.7% of the Illinois population is presently being served with chlorinated water (EIS 5), most for an extended period of time, and there has been no public outcry against its taste or odor.

HEALTH IMPACT

The most serious objection to mandatory chlorination is based on the health impact. In this regard, the first question that must be faced is whether chlorination is an effective method of insuring sanitary drinking water. The record indicates little disagreement that it is.

The first continuous chlorination system in the United States was installed at the Bubbly Creek Filter plant of the Union Stock Yards in Chicago in 1908 (EIS 17). Since that time it has proven its effectiveness in disinfecting public water (EIS 6). Enteric diseases such as typhoid, cholera, and the dysenteries have been virtually eliminated since its general use in the United States (EIS 8). In earlier times public water systems were commonly responsible for epidemics of waterborne diseases. Severe outbreaks of typhoid and cholera struck Chicago, London, Pittsburgh, Hamburg (Germany), Lausen (Switzerland), Mankato (Minnesota) and numerous other cities (EIS 16).

Rather than questioning the effectiveness of chlorination, some of those opposing it do so on the grounds that these diseases are no longer a problem and, therefore, that chlorination is no longer necessary. Mayor Bostian testified that "the big spreaders of disease are food and contact"; that "common source epidemics are now infrequent;" that "cholera has vanished from the United States;" and that "typhoid is a rare disease" (R.664-6 and Ex. 42). However, even if these statements are generally true, they are true in a society which chlorinates most of its water. As the Economic Impact Study points out "chlorination of public water supplies... is so common in the U.S. that its importance is often forgotten, while in the remaining parts of the world many people die each year as a result of waterborne diseases" (EIS 17).

Mr. Langtrop, Coordinator of the Communicable Disease Program for the Illinois Department of Public Health, testified that E. Coli, shigella, and salmonella bacteria can be transported by water and can cause gastroenteritis, typhoid, septicemia fever, abdominal pain, and diarrhea (R.383). There were 16,000 cases of salmonellosis contamination in Riverside, California, in 1965 when the city did not have a chlorinated water supply (R.386). In the 1970's there were 300 cases of waterborne illness reported in two outbreaks in Illinois (R.387). These were a result of contamination of unchlorinated groundwater supplies (R.392, 395).

Dorothy Bennett, who has worked for both the Department of Public Health and the Division of Public Water Supplies of the Agency, testified that there are persons known to be carriers of typhoid who could infect a public water supply in Illinois and suspects that there are others who have not been identified (R.518). She feels that chlorination will help check the spread of typhoid (R.520). She also pointed out that once chlorine was added to the water in Riverside, California, the outbreak ended (R.515).

Even assuming that waterborne disease continues to be a health problem and that chlorination is an effective means of insuring sanitary drinking water, it is argued that if a public water supply is safe prior to chlorination, no benefit is added. Several witnesses testified to a lack of knowledge of any illness caused by their unchlorinated ground water supplies (R.19, 45, 139,143,161,293,365,423). As Mayor Bostian concluded, "water down in a deep well which has been filtered by the soil and sand" is pure (R.17).

That is generally true, but it is not sufficient to insure that safe drinking water reaches the consumer. It overlooks the fact that contamination may well occur at some point within the distribution system. Supporting this is the testimony of other witnesses who have known people to contract disease from unchlorinated groundwater supplies (R.412,516,842). This risk of contamination is confirmed by a study of the causes of waterborne disease in the U.S. from 1971-77 which shows that about half of the reported outbreaks were caused by groundwater systems (EIS xviii and Gp. Ex. 23).

While some of the causes of these outbreaks may not be applicable to a given ground water system, there are so many possible methods of contamination that it is difficult to conceive of a system which would not be susceptible to one or more of them. Ira Markwood testified that contamination could occur due to back siphonage, back pressure, repairs to the system, incorrect installation of water mains or hydrants, or defects in the system (R.181-3).

Back siphonage occurs when pressure in the water mains is reduced, which consequently allows "contamination to be sucked

in from any cross-connection or possibly from leaks, or by any other path by which contamination could enter the system" (R.181). Such a loss of pressure could result from power outages, water main breaks, or an excessive demand, as when fighting a fire (R.181,439).

Cross-connections in homes and factories can occur at any time (R.105-8,129,180-3,227-8,542-3,735). Even a regular cross-connection elimination program cannot avoid all accidental siphonage into a distribution system. Mr. Markwood was challenged to find a cross-connection in a factory which boasted of the effectiveness of its program, and he did (R.543). The USEPA "Cross-Connection Manual" includes diagrams of possible cross-connections and case histories of contamination caused by them (Ex.9). Given the difficulty of eliminating cross-connections in an environment as controlled and supervised as a factory's, it is hard to conceive of a town insuring that none would exist. If a homeowner simply leaves a hose on in a puddle of water, contamination could result if there were a water main break or if water was being used to fight a fire (R.182).

Back pressure occurs when an outside water source is connected to a public water supply (e.g. a well connected to a house which is also served by a public supply) and the pressure of the outside source becomes greater than that of the public supply. There have been a number of cases of contamination that resulted from this (R.181).

Mr. Schoena, an Agency engineer, testified concerning several problems with distribution systems that have resulted in contamination. These included defective systems and a contaminated replacement pump which in turn contaminated the well supply (R.441-60). Only through chlorination were these problems solved. Chlorination can also serve as a safeguard against operator mistakes and contamination through employee contact with the water supply (R.482-3, 519-20).

Since chlorination can protect a public water supply against all of these problems, the health benefits of it are apparent. However, these must be balanced against the possible adverse impacts.

Testimony in the record concerning adverse health impacts is considerable. It includes a wide range of hazards such as allergic reactions (R.800-811), heart disease (R.345), high blood pressure (R.347), high cholesterol (R.300), and cancer (R.190-3,203,220,340,361,535,704-7,715), among others (R.348-50). Many of these are also touched upon in various exhibits (Ex.22,29,32,35,40,55,56,et al.).

While the list is lengthy, few, if any, of the claims are well substantiated and of serious concern. The most researched of these claims appears to be the carcinogenic potential of chlorinated water.

The possibilty that carcinogens might be found in chlorinated water has been suspected for years, but only recently has gained national and international attention. In 1974 suspected chlorine-related carcinogens were reported in treated drinking water, and in 1976 a study by Page, et al., attributed 15 to 20 percent of the cancer deaths in southern Louisiana to the use of chlorinated Mississippi River water for drinking water (EIS 32-33). However, it should be noted that these are surface water related rather than ground water related, and studies in Ohio and North Carolina confirm that surface water supplies are considerably more contaminated than groundwater supplies (EIS 34). Mr. Markwood's testimony also supports this (R. 191-2).

The literature suggests that the most detrimental by-product of chlorinated drinking water is chloroform (a trihalomethane) which is formed by a reaction of the free chlorine with a "precursor." The precursor can be naturally present such as humic acid (formed through the decay of plant material) or culturally introduced organic material (EIS 35). Studies have found chloroform "capable of producing malignant and metastatic neoplasms (tumors) in both rats and mice" (EIS 37). Other studies have shown some statistical correlation between chloroform dose and carcinogenic effect (EIS 37). These studies indicate a potential carcinogenic risk to humans, and chloroform is presently classified as a possible carcinogen (R.203).

However, the National Academy's Safe Drinking Water Committee estimates (with a 95 percent confidence level) that a 2 liter per day lifetime consumption of drinking water with 0.02 mg/l chloroform will result in one excess death per 33,333 people (EIS 37-8 and R.615). Further, since chloroform arises from a combination of chlorine and an organic precursor, it is possible to inhibit chloroform formation without eliminating the use of chlorination.

Much of the other testimony regarding health effects derives from an article entitled "Learn to Live Without Chlorine," by DeCrosta (Ex.22). That article, while raising several important health issues, does not resolve those issues and admits that there is disagreement among experts. Other than cancer, the issues discussed include arteriosclerosis, high blood pressure and red blood cell problems (EIS 38-41).

DeCrosta cites an experiment by Dr. Price in which two groups of 12-week old cockerels (chickens) were placed on identical diets, except that one group was given distilled water and the other chlorinated water. After seven months all of those cockerels drinking chlorinated water developed arteriosclerosis, while none of the control group had. However, there is no indication of what chlorine levels were used, nor any indication that the experiment has been replicated (see R.345).

DeCrosta also reported that Russian scientists found that men drinking water with a 1.4 mg/l chlorine level showed higher

blood pressures than those drinking water containing 0.3-0.4 mg/l (see R. 347). However, the record indicates that a chlorine residual of 0.2 mg/l is sufficient to destroy contamination, such that levels of 1.4 mg/l are unnecessary (R.450).

Another study reported by DeCrosta was undertaken by John Eaton and seems to indicate that chlorine may have adverse effects upon red blood cells. However, Eaton is quoted as saying "I can't say anything for sure now. ...More studies will have to be done, as there were conflicting results between individuals" (see Ex.22 and EIS 41).

The above cited studies form the bulk of the substantiation of the alleged adverse health effects from chlorination, and much of the testimony in the record appears to be based upon them. A summary of these studies among others, is given in Table 8 of the Economic Impact Study (39-40).

One allegation not covered by the Study is that some people have an allergic reaction to chlorine (R.799-811). Dr. Randolph has, apparently, treated as many as 6700 people from around the country for allergic reactions to chlorine since 1956 (R.806). However, no studies have been made available to the Board, and Dr. Randolph has, apparently, been able to find waters for his patients that do not cause allergic reactions, though probably at some expense and inconvenience.

OTHER IMPACTS

There are several other allegedly adverse impacts of chlorination that were brought out in the course of the hearings. These include the lack of detection of problems within the water system (R.140), hazards to fish (R.166,295), hazards to plants (R.295), the failure of donuts and breads to rise (R.280), and the destruction of beneficial bacteria (R.279). None of these problems appear to be significant.

While fish can be killed by chlorine, "concentrations necessary to affect (sic) damages are not likely to exist as a result of the treatment of drinking water" in a natural environment (EIS xiii). Domestic fish will often be killed if placed in chlorinated water, but "mitigating measures are simple, efficient, and costs are insignificant" (EIS xiii). One such measure is to simply let the water sit out for 2 days (EIS 64).

Plants should not be harmed through contact with chlorinated water since the chlorine will not be assimilated by them (EIS 65).

Chlorine in a domestic water supply is not considered to be a problem in the making of donuts or yeast breads with the exception that taste could be affected by over-chlorination (EIS 66).

Kenneth Mayer, Manager of the Water Department of Monroe, Wisconsin, testified that hairline cracks in one of their reservoirs would not have been detected if chlorination had been used (R.140). After obtaining unsafe samples, he was alerted to the fact that there was some problem with the system. William Robinson, a mechanical engineer, also testified as to difficulties in discovering contamination when the water is chlorinated since there would not be bad samples and the taste and odor of chlorine will cover up the taste and odor of water that "has gone bad" (R. 323-329). Mr. Robinson, however, apparently misunderstood the testing procedures used in a chlorination program and finally stated that he "would have to do some more homework on this " (R.327).

Mr. Markwood, on the other hand, testified convincingly that the required daily testing of chlorine residual levels at various homes in the distribution system should function as an effective "tracer" test for contamination (R.183-6). Mr. Plienes, Public Works Director of the Village of Minier, also testified to this function (R.414-417). If the chlorine residual is low or nonexistent, it follows that the chlorine is being used up in attacking contamination, and that there is some problem in the system. This method of discovering problems in the system appears to be preferable in that often a problem will be found prior to any adverse health effects (R.185). Whereas, since small systems are only required to send one water sample per month for bacterial testing, a considerable number of people could be subject to contamination prior to discovery of the problem in a non-chlorinating system (R.414,477).

The allegation that chlorination adversely affects water treatment plants by destroying beneficial bacteria also appears to be unfounded. Bacteria are used in treatment plants to consume organic materials and change them into nutrients and other innocuous by-products such as carbon dioxide and water. There should, however, be no deleterious effect from the chlorine residual delivered at the tap because it would "either dissipate or react with organic materials before it would enter the treatment plant" (EIS 11). This is also discussed in the testimony of Mr. Pleinis (R.416).

Options Available

Under Procedural Rule 212, the Board is not bound to enact or dismiss the proposed regulations; it may, after hearing, "revise the proposed regulations before adoption in response to suggestions made at the hearing and written submissions received subsequent thereto." Thus, there are essentially three courses of action open to the Board:

1. To adopt the regulation as proposed;

2. To enact a regulation with alternatives to chlorination such as other disinfection methods or more frequent bacterial tests and/or cross-connection inspections of private homes and other buildings by licensed plumbers; or

3. To dismiss the proceeding and leave mandatory chlorination in place.

These alternatives are discussed below.

Adoption of the Regulation as Proposed

The Board declines to enact the regulation as proposed. The record clearly indicates the necessity of disinfection, or at the very least a strong inspection and sampling program, to insure the safety of public drinking water. The present sampling regulations are tailored to a mandatory chlorination system and are not adequate to insure the safety of a non-chlorinating system. Even if a ground water supply is pure and remains so, the numerous possibilities of contamination arising in the distribution system cannot be adequately protected against under a system in which samples may be analyzed only once per month, and in which there is no requirement for a cross-connection inspection program.

Adoption of Modified Regulation

The Board also declines to adopt a modified regulation, since neither requiring other forms of disinfection, nor a strong inspection regulation would be as effective and inexpensive as chlorination.

The Economic Impact Study contains a detailed examination of the various alternative disinfection technologies. Its findings are summarized in Table 24, pp. 75-6 (see also 47-61 and 93-112). A chloramine system is by far the least expensive, but its biocidal activity is considerably lower than the other systems and would have to be used in conjunction with another technology, thus making the total cost considerably higher than the alternatives (R.54). Ozone and ultraviolet technologies are also considerably more expensive, and ozone alone has been unsatisfactory in Europe, thus increasing its expense even more (R.196). Only bromine, which is very hard to handle and iodine, which caused severe taste, odor, and color problems, can maintain an adequate residual (R. 196). The high cost of chlorine dioxide has resulted in limited use (EIS 108).

An increase in sampling and a strong cross-connection elimination program would also be expensive. Even if these tasks could be successfully accomplished through the hiring of one additional employee at $10,000 in a town of 500 people, the cost per user would increase $20/yr. which is far in excess of the

cost of chlorination. Even at that, however, bad samples would remain an after-the-fact determination and many people could be made ill before the problem was discovered. Chlorination, on the other hand, provides constant insurance against such contamination while acting as a "tracer" to discover problems.

Dismissal of the Regulatory Proceeding

By balancing the benefits of mandatory chlorination against its costs, the Board finds that the R78-8 proceedings should be dismissed. Based upon the record, it is clear that chlorination is an effective method of insuring a safe water supply; that the economic cost is justified; that the aesthetic, and other non-health impacts are not sufficiently detrimental to warrant the weakening of the mandatory chlorination requirement; and, as the Board found in R73-13, that not requiring chlorination "would be turning its back on a known danger to protect against a potential one."

The Board is not overlooking the potential health dangers presented by chlorination, which appear to be substantial, especially with respect to the possible carcinogens produced through chlorination. The other potential adverse health problems (heart disease, arteriosclerosis, high cholesterol and high blood pressure) appear to be highly speculative at this time and have not been found to be a problem by the American Heart Association, American Medical Association, or the American Public Health Association (R. 633).

The carcinogenic effect, on the other hand, is becoming well established as a potential problem. However, ceasing chlorination is not the only solution to that problem. Since the carcinogenic effect of chlorinated water has been traced to chloroform and other trihalomethanes, it is possible to reduce or eliminate the problem by setting a trihalomethane standard to adequately protect the public health. This standard could be met by removing the precursors from the water supply to be chlorinated. A Federal standard for trihalomethanes will soon be adopted by the Board as a "pass-through" regulation. At that time the Board can tighten the standard if it does not give adequate protection. Thus, even this aspect of the health problem fails to warrant changing the mandatory chlorination requirement.

In dismissing this proceeding, the Board is acting in accordance with recommendations of the vast majority of those who testified who are responsible for the safe operation of public water supplies and who support chlorination (R.235, 246,260,406,413,715,817,824,850,865).

JURISDICTION OF THE BOARD

During the course of the hearings Mayor Bostian and others have questioned whether the Board has complied with Section 27(a) on the Environmental Protection Act by imposing mandatory

chlorination on all public water supplies in the State (R.368,374,796). That Section indicates that the Board shall take into account the conditions of the areas involved and the technical feasibility and economic reasonableness of compliance with the regulation.

It is alleged that the Board has not considered the differences between various water supplies in the state, but that is not, in fact, the case. The Board is aware that many ground water supplies provide "safer" water than surface supplies. The Board is also aware that there are areas of the state where no disease has been documented to be a result of contamination of the public water supply. However, the Board is also aware that cross-connections, back siphonage and back pressure are problems than can occur anywhere in the state at any time, and can cause any system to become contaminated. Further, many cases of illness are unreported and may not be linked to the water supply, even if they are a result of contamination. Finally, travelers around the state may be affected by bacteria in the water to which local residents may have built up an immunity (R.187,250,834).

Thus, testimony by citizens, or even by doctors, that they do not know of any disease being caused by their water supply does not mean that none has been caused. Further, despite differences in water supplies, possible contamination in the distribution system is a statewide problem, and travelers around the state should have the assurance that any public water they drink within the state will be safe.

Finally, the Board wishes to express its appreciation to Mayor Bostian and others who testified and commented during the course of these proceedings. Their research and interest in the mandatory chlorination regulation has resulted in a detailed re-examination of that regulation. The Board has a continuing duty to protect the health and welfare of the citizens of this state, and the re-examination of regulations in light of new evidence on the effects of them is part of that duty.

ORDER

Proceedings in R78-8 are hereby dismissed.

IT IS SO ORDERED.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 30th day of October, 1980 by a vote of 5-0.

Christan L. Moffett

Christan L. Moffett, Clerk
Illinois Pollution Control Board