ILLINOIS POLLUTION CONTROL BOARD
May 24, 1990

IN THE MATTER OF:	)	
	)	
SITE-SPECIFIC LIMITATION FOR THE	)	
MODINE MANUFACTURING COMPANY	)	R87-36
FACILITY, RINGWOOD, ILLINOIS	)	(Rulemaking)

ADOPTED RULE. FINAL ORDER.

OPINION AND ORDER OF THE BOARD (by R. C. Flemal):

This matter comes before the Board upon the October 15, 1987 Petition and May 24, 1989 Amended Petition of Modine Manufacturing Company ("Modine") for site-specific rulemaking applicable to its Ringwood[1], Illinois, facility. Today the Board adopts site-specific effluent standards for two parameters, five-day biochemical oxygen demand ("BOD") and total suspended solids ("TSS"), and a site-specific water quality standard for fluoride, as these apply to Modine.

SUMMARY OF ACTION

The effluent standards at issue are the Board's BOD and TSS standards found at 35 Ill. Adm. Code 304.120(c). These compare with the site-specific rules today adopted as follows:

Section 304.120(c):

	Monthly Composite (mg/l)	Daily Composite (mg/l)	Grab Sample (mg/l)
BOD	10	20	50
TSS	12	24	60

Today's Site-Specific:

	Monthly Composite (mg/l)	Daily Composite (mg/l)
BOD	25 (May-Sept)	35 (May-Sept)
	60 (Oct-Apr)	70 (Oct-Apr)
TSS	12	30

[1] Although located in Ringwood, the facility at issue is also commonly known and referred to as Modine's "McHenry Plant" or "McHenry facility".

Today's action regarding the fluoride water quality standard replaces the 1.4 mg/l General Use Water Quality Standard of 35 Ill. Adm. Code 302.208 with a value of 5.6 mg/l. The site-specific fluoride standard is applicable in the receiving stream for a distance of 1200 yards below Modine's outfall.

Both the rules of general applicability and the adopted site-specific rules differ from the concentration limits in Modine's current NPDES Permit, No. IL0001279 (Modine Exh. 26), issued July 17,1986:

	30-Day Avg (mg/l)	Daily Max (mg/l)
BOD	8.0	16.0
TSS	9.5	19.0
Fluoride	---	1.4

The NPDES limits for BOD and TSS are less than the existing general effluent standards because the Illinois Environmental Protection Agency ("Agency"), in writing the permit, has adjusted the standards to reflect mixing by Modine of non-contact cooling waters (see following) with its wastewaters prior to discharge. This adjustment is made pursuant to 35 Ill. Adm. Code 304.102. The fluoride limit is also less than the 15.0 mg/l identified at 35 Ill. Adm. Code 304.124(a) in recognition of the fact that Modine's discharge commonly constitutes the total flow in the receiving waterway.

Today's amendments differ in specifics from those initially proposed by Modine due to Modine's amendment of its original request (Amended Petition) and the determination by the Board at First Notice that certain requested relief related to barium, total ammonia, and un-ionized ammonia was unnecessary (see following).

STATUTORY AUTHORITY

The goals of water pollution control in the State of Illinois are set out in Title III of the Illinois Environmental Protection Act ("Act"; Ill. Rev. Stat. 1987, ch. 111½). It is there prescribed that:

> It is the purpose of this Title to restore, maintain and enhance the purity of the waters of this State in order to protect health, welfare, property, and the quality of life, and to assure that no contaminants are discharged into the waters of the State, as defined herein, including, but not limited to, waters to any sewage works, or into any well, or from any source within the State of Illinois, without being given the degree of treatment or control necessary to

prevent pollution, or without being made subject to such conditions as are required to achieve and maintain compliance with State and federal law.

Id. at par. 1011(b)

Section 13(a) of Title III further specifies that:

The Board, pursuant to procedures prescribed in Title VII of this Act, may adopt regulations to promote the purposes and provisions of this Title. Without limiting the generality of this authority, such regulations may among other things prescribe:

1. Water quality standards specifying among other things, the maximum short-term and long-term concentrations of various contaminants in the waters, the maximum permissible concentrations of dissolved oxygen and other desirable matter in the waters, and the temperature of such waters;

2. Effluent standards specifying the maximum amounts or concentrations, and the physical, chemical, thermal, biological and radioactive nature of contaminants that may be discharged into the waters of the State, as defined herein, including, but not limited to, waters to any sewage works, or into any well, or from any source within the State.

Id. at par. 1013(a)

Title VII of the Act prescribes the procedures by which the Board is to enact regulations. In pertinent part Title VII specifies that:

The Board may adopt substantive regulations as described in this Act. Any such regulations may make different provisions as required by circumstances for different contaminant sources and for different geographical areas; ... and may include regulations specific to individual persons or sites. In promulgating regulations under this Act, the Board shall take into account the existing physical conditions, the character of the area involved, including the character of surrounding land uses, zoning classifications, the nature of the existing air quality, or receiving body of water, as the case may be, and the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution.

Id. at par. 1027(a)

PROCEDURAL HISTORY

The instant proceeding is the second most-recent in a series of water-related actions brought by Modine (see Modine Exh. 4 at 9-11). Among the pertinent of these actions are two in which Modine successfully petitioned for variance from the same regulations at issue here, and a third variance petition whose disposition is pending. In the first of these, Modine v. IEPA, PCB 82-111 (58 PCB 207, May 29, 1984; Modine Exh. 6A) the Board granted Modine variance until March 1, 1985 from the same regulations at issue here. Additionally, the Board imposed effluent and water quality limitations for BOD and TSS which in general are less stringent than herein considered. In the second of the successful variance petitions the Board granted Modine a new variance, with similar limitations to those in PCB 82-111, to expire on December 31, 1987 (Modine v. IEPA, PCB 85-154, 84 PCB 735; Modine Exh. 7).

In the pending action, Modine v. IEPA, PCB 88-25, Modine seeks in the alternative a new variance, an extension of the PCB 82-111 and/or PCB 85-154 variances, or a declaration that the regulations at issue are without force or effect as applied to Modine. Various documents from the PCB 88-25 proceeding have been admitted into the record of the instant proceeding[2].

In addition to the pending PCB 88-25 variance proceeding, there is also a pending NPDES permit appeal, PCB 86-124, filed on August 15, 1986. In PCB 86-124 Modine petitions for review of certain conditions in its current NPDES Permit. Through an informal agreement between the Agency and Modine, the permit appeal has not been actively pursued by either party initially pending the resolution of PCB 85-154 and later the resolution of both PCB 88-25 and the instant action.

On February 23, 1989 the Board issued an Order pursuant to Section 27(a) of the Act declaring that an Economic Impact Study need not be conducted in this matter.

Prior to hearing, in response to a Hearing Officer Order thereto, Modine presubmitted testimony of its principal witnesses and the exhibits it intended to present at hearing. Modine witnesses were Mr. James H. Firestone, Director of Processes and Environmental Services at Modine's headquarters in Racine, Wisconsin; Mr. Gary A. Fahl, Manager of Environmental Engineering

[2] These include the Petition for Variance (Exh. 2), Second Amended Petition for Variance (Modine Exh. 3), Agency Variance Recommendation (Modine Exh. 4), and Modine's Response to Variance Recommendation (Modine Exh. 5).

at Modine's headquarters; Daniel J. Bosch, Manager of Modine's Manufacturing Engineering Department of the Automotive Division; Dr. J. W. Patterson, Chairman of the Pritzker Department of Environmental Engineering at the Illinois Institute of Technology and principal in the consulting firm of Patterson Schafer, Inc.; Mr. James E. Huff, Vice-President of the environmental consulting firm, Huff & Huff; and Mr. Jim Rulseh, Manager of the McHenry Plant. On February 24, 1989 the Agency prefiled the testimony of its principal witness, Timothy R. Kluge. All prefiled testimony was entered into the record of the hearing as if read.

The Agency and the Illinois Department of Natural Resources ("DENR") filed advance hearing questions on February 27 and 28, 1989, respectively. On March 8, 1989 Modine filed advance hearing questions.

Hearing was held in McHenry, Illinois on March 10, 1989. In addition to Modine, the Agency, and DENR, the hearing was attended by Mr. Gerald A. Paulson, Executive Director of the McHenry County Defenders, who participated in the questioning of witnesses.

By Order of April 27, 1989 the Hearing Officer established a post-hearing comment period extending to May 15, 1989. This comment period was extended to June 2, 1989 by Hearing Officer Order of May 8, 1989. Public Comments ("PC") were filed in the post-hearing comment period by Mr. Paulson on June 1, 1989 (PC #3), by Modine on June 2, 1989 (PC #4), and by the Agency on June 7, 1989 (PC #5).

On October 18, 1989 the Board proposed Modine's request for First Notice. First Notice publication occurred at 13 Ill. Reg. 17633 and 17661. Five Public Comments were received subsequent to First Notice publication: PC #6 and #7 filed by the Illinois Department of Commerce and Community Affairs, PC #8 filed by the Illinois Office of the Secretary of State, PC #9 (with exhibits) filed by Modine, and PC #10 filed by the Agency. Only the last two comments addressed the merits of the proposal.

On February 22, 1990 the Board adopted an initial Second Notice proposal. The principal feature of that proposal was a repositioning of the proposed fluoride site-specific rule to Section 304.221. However, prior to submitting this proposal to the Joint Committee on Administrative Rules ("JCAR"), the Board invited the participants to comment on this repositioning. On March 8, 1990 both the Agency and Modine filed additional comments which persuaded the Board that the form of the fluoride rule as proposed at First Notice was preferable. Accordingly, on March 22, 1990 the Board adopted a Supplemental Second Notice Opinion and Order, in which the First Notice form of the fluoride rule was reproposed. The rule in this form was subsequently filed with JCAR.

On May 8, 1990 JCAR issued certifications of no objection to the proposed rules.

FACILITY

Manufacturing Operations

Modine operates a manufacturing facility located on Ringwood Drive in Ringwood, McHenry County, Illinois. The facility employs approximately 280 people with an annual payroll of $5.2 million (R. at 31).

Modine characterizes its manufacturing operations as follows:

> Modine manufactures air conditioning condensors and evaporators at its Ringwood facility for use in automobile air conditioners. Modine utilizes two different processes for the manufacture of these products. On the condensor line, the condensor fin and tube type heat exchange products are primarily fabricated from aluminum parts, which are metalurgically [sic] bonded together using zinc and flouride [sic] salts, under the influence of heat. This process is known as the Alfuse process.
>
> The raw materials used to manufacture the condensors are aluminum tube and fin stock and a proprietary "slurry" composition used to metalurgically [sic] bond the tubes and fins together. The slurry consists of a saturated, non-halogenated hydrocarbon, plus zinc and flouride [sic] salts, and is applied to the tubes and fins in a "slurry house". From the slurry house, the tubes and fins move to a gas-fired tunnel oven where all the hydrocarbons in the slurry are effectively consumed or volatilized, leaving only the zinc and flouride [sic] salts to react with the aluminum. When bonding is complete, the product moves to a quench where it is doused with water. The condensors then pass through a dryoff oven, certain mechanical operations are performed, and the condensors go through a paint process before leaving the McHenry Plant as finished products.
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> The other process used by Modine to manufacture evaporators is known as the Nocolok process. ... The Nocolok binding process includes basically freon degreasing, slurry application and high temperature baking. The bonding slurry used in the process is a non-hazardous, water-based mixture which, upon

> heating, results in a bond between the aluminum tubes, fins and headers. ... Non-contact cooling water is required for temperature control; however, there are no process water discharges from the Nocolok process.
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> Petition, p. 3-5

The Nocolok process was installed by Modine in January 1986 (R. at 36). Although the Nocolok process was initially intended to be used for all products, Modine contends that it ultimately discovered that the Nocolok process could only partially supplant the Alfuse process (R. at 40). Accordingly, only the evaporators are now produced by the Nocolok process.

One of Modine's stated reasons for adopting the Nocolok process was "to improve the quality of effluent from the Plant's treatment system by eliminating the wastewater loading from the evaporator line" (R. at 36). Because there is no process wastewater produced by the Nocolok process, Modine contends that the conversion to the Nocolok process has decreased the quantity of process wastewater at the McHenry Plant by 15 percent (R. at 37).

Testimony at hearing also noted that Modine manufactures a third product, oil coolers, at its Ringwood Plant (R. at 32). However, the oil coolers are characterized as "a minor product" (Id.).

Nature of Wastewater

The McHenry Plant generates process wastewater from the wet scrubber, water quenches, slurry wash, and test tanks, all of which are associated with the Alfuse line; the major quantity of process wastewater is generated by the wet scrubber (Petition, p. 5). Current wastewater discharges are estimated to total approximately 300,000 gallons per day; this figure includes both sanitary wastewater and non-contact cooling water, in addition to process wastewater (Id.).

The Modine wastewater contains a matrix of both inorganic and organic constituents (R. at 164). The organic fraction has proven to be particularly recalcitrant in its treatability (R. at 166), in part due to its slow degradation rate (R. at 318-20).

Wastewater Operations

Modine applies various initial treatments to its different wastewaters. For the process wastewaters, these consist of combining the wastewaters and thereafter adjusting pH via the addition of lime. The pH adjustment facilitates the removal of fluoride, zinc, and aluminum as precipitates. Sanitary

wastewaters are initially treated in an extended aeration activated sludge system.

Following initial treatment, the process and sanitary wastewaters, plus the non-contact cooling waters, are passed through a series of three in-series lagoons. Modine characterizes the operation of the lagoons as follows:

> The first of the three lagoons is utilized for removal of both suspended solids and BOD. The second and third lagoons, utilized in series with the first, complete the reduction of BOD and accomplish additional suspended solids removal. The depth of these two lagoons is kept at about three to four feet, thus promoting the natural aeration necessary for sustaining the proper plant and animal life.
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> Petition, p. 6

The three lagoons have a retention time of 13 to 15 or 16 days (R. at 173) and a removal efficiency for BOD varying between 52% and 98% per month, with the lower efficiencies occurring in winter and the higher efficiencies in summer (R. at 162; Modine Exh. 41).

Despite this treatment program, Modine contends that it is unable to consistently meet all of the effluent limitations established by the Board. Further, the receiving stream does not meet the water quality standards for ammonia nitrogen (Petition, p. 6-7) and dissolved oxygen. The latter condition stems in part from the fact that for substantial portions of the time Modine's effluent constitutes the sole flow in the unnamed tributary. The water quality standards therefore become effective effluent standards (R. at 215-6).

Compliance Efforts

Modine has undertaken modifications of its treatment process during the time this matter, in its various forms, has been before the Board (R. at 188). Among these has been discontinuance of phosphorus additions into the three ponds. This action was taken, at the advice of Modine's engineering consultants, to reduce the amount of algal growth in the ponds, and hence the amount of algal TSS discharge from the ponds (R. at 179-80).

A second modification has been to increase the pH of the raw wastewater, which, in combination with more stringent operation and maintenance procedures, has substantially decreased the concentration of zinc in Modine's final effluent (R. at 54).

A third modification has been the addition of an air stripping system designed to dissipate ammonia into the air. This system has led to a decrease in the amount of ammonia discharged in Modine's effluent (R. at 55).

A fourth modification consists of dredging of the three lagoons. Although this apparently is done periodically, it was accomplished most recently in 1988 (R. at 57). Modine contends that the dredging has substantially increased the effective size of the lagoons, thereby resulting in greater retention time and possibly better biological activity (R. at 57, 362).

A fifth modification has been the discontinuance of chlorination as of early September 1988. Prior to this date Modine chlorinated the discharge from the third lagoon prior to its release into the receiving stream (R. at 216). Chlorination was practiced to allow compliance with the fecal coliform effluent standard of 400/100 ml. However, actual analyses of fecal coliform convinced Modine that it could meet the fecal coliform standard without chlorinating (R. at 57-8). Moreover, evidence from biological studies (R. at 58; see also following) indicated that residual chlorine was a limiting factor in the quality of the aquatic life in the receiving stream. Studies subsequent to the ceasing of chlorination appear to confirm this relationship (see following).

Two additional modifications have been proposed by Modine during the course of this proceeding. These were replacement of the Modine's submerged-pipe outfall structure by a spillway/cascade outfall and installation of a final pH adjustment system (Modine Brief at 14). The purpose of the outfall modification is to allow added aeration of the effluent, increasing its DO level by 1 to 3 mg/l (R. at 252), and thereby ameliorating some of the consequences of the effluent's BOD. The purpose of pH adjustment is to adjust the final pH to approximately 7.5, thereby decreasing the proportion of Modine's ammonia discharge which is in the un-ionized ammonia form. Modine reports that the modified outfall structure was installed in October 1989 (PC #9 at 2) and that applications for construction and operating permits for the pH adjustment system have been filed with the Agency (Id. at 7).

ENVIRONMENTAL IMPACT

Effluent Quality

Modine provides the following summary of the quality of its effluent, based on annual average concentrations over the years 1980 to 1988:

Parameter	1980	1981	1982	1983	1984	1985	1986	1987	1988
BOD	33.5	29.9	28.6	29.3	37.8	37.2	38.1	27.2	24.9
TSS	5	3	14	9	4	3	5	4	5
Ammonia	6.2	8.6	3.6	4.8	4.8	3.5	2.6	1.8	2.8
Fluoride	3.6	3.7	4.3	4.6	3.5	3.9	3.6	3.0	3.5

Modine Exh. 9 at 2; also graphically in Modine Exh. 16

Modine has calculated the maximum concentration of un-ionized ammonia in its discharge for the years 1985 to 1988, respectively, as 0.053, 0.057, 0.069, and 0.635 mg/l (Modine Exh. 9 at 2).

Modine has also carried out two priority pollutant analyses and has undertaken whole-effluent bioassays (R. at 60-1). The priority pollutant analyses showed no evidence of problems with any priority pollutant (Id.; Modine Exh. 21). Similarly, the toxicity analyses showed no mortality to either Daphnia magna or fathead minnows at 48 hour-exposure to the whole effluent (Modine Exh. 22).

Receiving Stream Character

Modine discharges to an unnamed tributary of Dutch Creek. The unnamed tributary begins as a defined channel just above the Modine outfall (R. at 112); thereafter it flows approximately 1½ miles to its confluence with Dutch Creek, which thereafter flow approximately two miles to its confluence with the Fox River. The unnamed tributary near the Modine outfall is typically two feet in width and one-foot deep (R. at 113); it gradually widens and deepens downstream, reaching widths up to twelve feet and depths of three feet near its confluence with Dutch Creek (Id.). The substrate of the unnamed tributary is predominantly silt in the vicinity of the Modine outfall; just prior to joining Dutch Creek a sand/gravel substrate is present (Id.). Channelization and stream widening has occurred along portions of the tributary, most recently in 1988 when a reach approximately 1,000 yards below Modine underwent a "major" channelization and widening (R. at 114). Land-use adjacent to the tributary is predominately agricultural, including row crop and pasture usage (Id.).

In addition to Modine's discharge, the unnamed tributary also receives the discharge from Morton Thiokol's manufacturing plant also located in Ringwood (Petition, p. 9). The Morton Thiokol discharge enters the Modine unnamed tributary, after itself following the course of another unnamed tributary, approximately 1200 yards downstream from Modine's outfall (Modine Exh. 32, p. 5, 12).

Dutch Creek is ten to fifteen feet wide, with a depth ranging from one to three feet. The substrate varies from sand/gravel to areas of heavy silt. Streamside land-use is also predominantly agricultural. Dutch Creek receives no industrial discharges other than those from Modine and Morton Thiokol (Petition, p. 9). Dutch Creek has been heavily channelized upstream of its confluence with the unnamed tributary, and to a lesser extent downstream (R. at 114; Modine Exh. 32, p. 3).

Modine submits that neither its current wastewater discharge nor the granting of the requested relief will have an adverse impact on the unnamed tributary, Dutch Creek, or the Fox River. Modine bases this conclusion on a series of biological and chemical studies conducted at its behest. The initial among these which is included in the instant record (as Modine Exh. 18-11) is a study completed by Camp, Dresser and McKee, Inc. ("CDM") in 1980 titled "Biological and Chemical Study of the Stream System Above and Below the Modine McHenry Plant Discharge". The CDM study concludes that the unnamed tributary contained "a balanced indigenous population of fish, shellfish and aquatic life" (Id. at 44). The study further concludes "[i]f the Modine discharge were not present, the small stream would not support the abundant life that is now present" (Id.).

Modine completed another biological monitoring study in October 1986, titled "Ecosystem Observations of the Unnamed Ditch Receiving Modine - McHenry Effluent" and conducted by Mr. Thomas Meitner, a Modine environmental engineer (Petition Exh.[3] C). The Meitner study consists of biological surveys at two stations above the Modine discharge, seven stations on the unnamed tributary below the Modine discharge, and two stations on Dutch Creek, one each above and below its confluence with the unnamed tributary. Among other matters, the Meitner study concludes that "[t]he benthic macroinvertebrate populations observed at the eleven stations during this investigation were typical of what would be expected in a stream having similar types of habitat" (Id. at 3). The Meitner study also compares the 1986 ecological condition of the unnamed tributary with the earlier CDM data, and notes that those organisms found by CDM were again observed at similar locations (Id.).

Modine's most recent biological monitoring study (Modine Exh. 32) was compiled in January 1989. It was undertaken by Huff & Huff, Inc. and is titled "Biological & Dissolved Oxygen Monitoring on the Unnamed Tributary to Dutch Creek Receiving

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[3] The Petition contains three attached exhibits identified as Exhibits A, B, and C. These are cited as "Petition Exh. ___". The Petition itself has been admitted into the record as Modine Exh. 1.

Modine's Wastewater Discharge". This study expands on an earlier Huff & Huff study compiled in June 1987 titled "Biological Monitoring of Dutch Creek and an Unnamed Tributary", which is Petition Exh. B in the instant record.

Like the Meitner study, the Huff & Huff studies sampled aquatic life at stations on the unnamed tributary upstream and downstream of the Modine discharge, as well as on Dutch Creek upstream and downstream of its confluence with the unnamed tributary. Among conclusions of the Huff & Huff studies are that the fish community is typical of small streams in northern Illinois (Modine Exh. 32 at 27), and that while fish were collected at all sites, the small size of the streams at their upstream sites was a limiting factor on the number of species collected (Id.) Among fish species identified were small-stream species such as creek chub, brook stickleback, and green sunfish at the headwater sites, and larger-stream species including northern pike, bluegill, and carp at the downstream Dutch Creek sites (Petition Exh. B at 36). The Huff and Huff studies also conclude that neither the unnamed tributary nor Dutch Creek appear to represent a commercial or sport fishery, although Dutch Creek may be a spawning ground for fish from the Fox River (Id. at 38).

The Huff & Huff work does note that benthic sampling, as opposed to fish sampling, indicates better water quality upstream of the Modine outfall than at the Modine discharge point. However, it also finds that recovery of the benthic community occurs "immediately downstream of the discharge point" (Id. at 36). Mr. James E. Huff, who participated in the Huff and Huff studies, attributes this apparently anomalous pattern in part to recent changes in Modine's chlorination practice (R. at 119, 278-82). Huff notes that in April 1987, when Modine was fully chlorinating its discharge, only 11 fish were collected at the Huff and Huff sampling site most immediately downstream (50 yards) from the Modine outfall. Conversely, during fall 1987, after Modine had reduced its chlorine usage by 72%, a total of 31 fish were collected at the same site, and, in October 1988, five weeks after Modine had ceased chlorinating entirely, 104 fish were collected at the site (R. at 119). Huff further notes that "this dramatic increase in fish population" was absent at sampling sites further downstream (Id.). Huff thereby concludes that the chlorine used for wastewater treatment (rather than impact of the parameters from which Modine requests relief) is the expected cause of the adverse impact in the vicinity of the Modine discharge (Id.). The discrepancy between the fish and benthic invertebrate data Huff attributes to the recentness of chlorine cessation and the inability, particularly under the drought conditions of 1988, of the benthic community to rapidly respond. Finally, the Huff & Huff studies also note that other factors adversely impact the aquatic system of both the unnamed tributary and Dutch Creek, including limited stream flow,

agricultural non-point source runoff, livestock watering, and dredging and channelization (R. at 129).

A special facet of the January 1989 Huff & Huff study is an investigation of dissolved oxygen ("DO") relationships in the unnamed tributary and Dutch Creek, a feature not extensively explored in earlier studies. Among the conclusions of this work is that the Modine discharge depresses DO for a distance between 1,300 and 2,400 yards downstream of the outfall (R. at 129); on two sampling dates in July 1987, in fact, DO levels were observed to be below the 5.0 mg/l dissolved oxygen standard for distances on the order of a mile to a mile-and-a-half below the Modine outfall (Modine Exh. 32 at 37-39).

However, Mr. Huff is of the opinion that even "[i]f Modine were to achieve an effluent quality of 10 mg/l BOD, this would not prevent dissolved oxygen levels below 5 mg/l on this tributary during the summer months, based on the large DO deficit that presently exists under hot, dry conditions" (R. at 128-9); the oxygen deficit is due to sediment oxygen demand and respiration of plants and algae during the evening hours (R. at 237). Mr. Huff supports this conclusion with modeling studies and observations on sources of oxygen demand other than the demand exerted by Modine's effluent. Mr. Huff contends that in a near worst-case condition, exemplified by the high temperatures and low flows of July 1987 and an unmodified outfall structure, reducing Modine's BOD levels to 10 mg/l would increase stream DO by less than 0.1 mg/l for the entire length of the unnamed tributary (R. at 176-7; 195-8); this would not be sufficient to eradicate the low DO levels actually observed under the modeling conditions (Id.). Moreover, Mr. Huff contends that modifying the outfall structure by introducing a cascade spillway, which in fact was accomplished subsequent to Mr. Huff's modeling studies, will "more than compensate" for this 0.1 mg/l depression (R. at 241).

Mr. Huff further contends that there is no adverse effect on the aquatic community during the winter months related to BOD, even given the elevated BOD discharges typical of that time of year, because the Modine discharge is insufficient to cause an oxygen depression below standard at cold temperatures (R. at 199). In total, Huff considers that "low DO's would be expected to occur for less than 30 days each year" (R. at 239).

Mr. Huff also considers the effect on DO that would follow should Modine discontinue its Alfuse production at the McHenry facility. Under these conditions, he concludes:

> wastewater discharge will decline from 285,000 gallons per day to approximately 69,000 gallons per day, or by 80 percent. This lower flow will reduce the stream's low flow by a similar percentage, as

Modine's discharge represents nearly all of the flow during low flow conditions. The lower flow translates into fewer pounds of dissolved oxygen carried by the stream to satisfy the sediment oxygen demand. Reaeration from the atmosphere is also retarded at low stream flows because of less turbulence.

Higher stream temperatures will also result, which increases sediment oxygen demand and reduces the reaeration rate. As a result, should Modine close down the Alfuse process, the dissolved oxygen levels under low flow conditions will likely decline from the present levels. Lower dissolved oxygen levels would have a negative impact on the biological community. The lower stream flows would also likely reduce the fish populations in the unnamed tributary because of the lack of water.

R. at 130-1

TECHNICAL FEASIBILITY AND ECONOMIC REASONABLENESS

The central issue in the instant matter is whether Modine could achieve compliance with the effluent and water quality standards of general applicability by some technically feasible and economically reasonable alternative to its current treatment system. Modine contends that there is no alternative which is simultaneously technically feasible and economically reasonable; the Agency contends that Modine has not adequately dismissed all alternatives as being technically infeasible or economically unreasonable.

The matter of treatment technologies and economics has focused almost exclusively on the matter of BOD removal, and then principally on the removal of BOD during the winter months. TSS is discussed by the participants only passingly; moreover, it is to be noted that Modine is in general compliance with the TSS effluent standard. Similarly, the participants agree that there is no additional technology which would allow Modine to produce an effluent which would allow in-stream fluoride concentrations to be consistently at or below 1.4 mg/l (R. at 334).

The Agency contests Modine's contention that compliance with the existing BOD and TSS effluent standards is not technically feasible. It argues that "the record does not indicate that Modine has ever investigated a treatment system which, based on commonly accepted design standards and criteria, can reasonably be expected to achieve compliance" (R. at 293). In support of this conclusion, the Agency contends that Modine's pilot activated sludge study was of too narrow a scope to warrant the

conclusion drawn by Modine. In particular, the Agency points out that Modine's study was conducted under conditions normal for municipal wastewater treatment plants, and not under the conditions appropriate to an industrial wastewater system, like Modine's (R. at 293-6).

The Agency notes that an activated sludge system by itself may be expected to achieve an effluent quality of 20 mg/l BOD and 25 mg/l TSS (R. at 295). The Agency additionally notes that most treaters of industrial wastewaters who use an activated sludge system and are required to achieve a 10/12 standard for BOD/TSS, as is Modine, also use some type of tertiary treatment, such as a sand filter, in conjunction with their activated sludge system. The Agency therefore concludes that it would be technically feasible for Modine to achieve compliance with the BOD and TSS standards by use of an activated sludge system in combination with a sand filter.

Aside from the activated sludge/sand filter combination, the Agency also concludes that a rotating biological contactor ("RBC") system, also used in conjunction with a tertiary treatment system, is a technically feasible means of compliance (R. at 297, 313).

The Agency also points out that a properly designed lagoon system is a technically feasible method for attaining compliance. The Agency notes that Modine's existing lagoon system is able to achieve effluent quality better than or at the effluent standards during warm weather (R. at 297). From this observation, the Agency concludes that Modine's lagoon treatment system "is a technically feasible means of treating wastewater, and is limited only by its inability to adequately reduce BOD during the winter months" (R. at 297-8). The Agency ventures that the reason why the existing lagoon system does not adequately reduce BOD during the winter months is that the size and retention time of the existing system "are well below those necessary to provide the degree of treatment expected from a properly designed lagoon system" (R. at 298).

Modine counters the Agency contentions by agreeing that there are technologies which are capable of achieving not only a 20/25 BOD and TSS, but also a 10/12. However, Modine contends that these are extraordinary technologies not normally utilized "except in very extreme conditions such as to reduce toxicity" (R. at 160). Dr. Patterson cites evaporation and granular activated carbon technology as examples of such technologies (Id.).

In response to the Agency's assertion that an activated sludge system should be capable of achieving compliance with the existing BOD and TSS standards, Modine contends that pilot studies indicate the contrary. In particular, Modine cites a

treatability study of the Modine effluent designed by Dr. Patterson and conducted by Dr. Charles Haas of the Illinois Institute of Technology. Dr. Haas concludes in part that "activated sludge operated in the normal ranges of hydraulic and sludge ages does not appear capable of being used to treat this [Modine's] waste" (Modine Exh. 18-6 at 6). The principal problem encountered was the inability of the activated sludge organisms to reproduce themselves at a sustaining level (R. at 168; 186; 200), even under controlled laboratory conditions and under both dilute and concentrated waste conditions (R. at 168-70). In summarizing the conclusions to be reached from this study, as well as his own related studies, Dr. Patterson observed that, while the Modine effluent is neither toxic nor unamenable to biodegradation (R. at 170-71, 186-7), activated sludge is not a viable, technical option for treatment of the Modine wastewater (Id.; R. at 352). He further discounts the viability of any fluidized system for the treatment of Modine's effluent (R. at 183-4).

Dr. Patterson likewise discounts the contention that sand filtration, or any filtration, would have an appreciable effect on the quality of Modine's discharge. He observes that the bulk of Modine's BOD is in a soluble form, so that it would not be removed by a filter (R. at 180-1).

Rather than being undersized, Modine contends that the existing lagoons are actually "somewhat oversized" based on actual treatment characteristics (R. at 346). Dr. Patterson believes that the Agency has reached the opposite conclusion based upon inappropriate use of equations and incorrect data. Dr. Patterson contends that the equations in question "were never meant or designed or developed to apply to an industrial type of waste" (R. at 361). Modine also notes that the Agency's assumption of a 3 to 5 foot depth in the lagoons underestimates the actual 5 to 9 foot depths (R. at 362), and hence underestimates the size of the lagoons. Modine adds that the critical underestimation of depth relates to the first of the three lagoons, within which the principal removal of BOD and TSS occurs (PC #9 at 1-2).

Dr. Patterson believes that Modine's effluent is amenable to a fixed-film treatment system (R. at 184). Among such systems are trickling filters and RBCs. However, Dr. Patterson believes that a trickling filter would be susceptible to the same extreme temperature effects as is the current lagoon system (R. at 185), and hence presumably would be susceptible to the same limitations in winter performance.

In Dr. Patterson's opinion, the one system, if any, which would be an appropriate replacement for Modine's current system is the RBC system (R. at 185). To this end Modine installed a pilot RBC unit at the Modine facility. This pilot study showed

that RBC treatment would achieve a BOD reduction of approximately 50% (R. at 101). On this basis, Dr. Patterson and the Agency both believe that even an RBC system would still not allow Modine to comply with the 10 mg/l BOD standard on a year-round basis (R. at 297, 312). Additionally, the Agency points out that it is reluctant to recommend RBC treatment based on a poor record of mechanical reliability of RBC units at other sites (R. at 296), and that it would probably not grant a construction permit to Modine for an RBC system for this reason (R. at 309-312).

An RBC system is estimated to have a capital cost of approximately $1 million and operational and maintenance costs of $200,000 per year (R. at 264). These costs Modine contends would increase the McHenry Plant's total depreciation and overhead expenses by 13% and 13½%, respectively (R. at 265). At present the McHenry Plant has the lowest profitability of Modine's thirteen U.S. plants (R. at 267). Modine contends that the added expense of the RBC units would therefore seriously damage the viability of an already "suspect" facility (R. at 266).

In overall summary, Dr. Patterson concludes that:

> There is already a [three-lagoon] technology in place, a series of technologies that work quite well in fact, are somewhat over-sized in my opinion for the facility. They operate, as the lagoons are prone to operate, in a seasonal fashion.
>
> By replacing that technology, throwing that technology out, and putting in a different biological technology, we could certainly make some reduction in the wintertime BOD discharge, and likely not to make any reduction in the summertime BOD discharge.
>
> If that expenditure and that replacement of one biological technology with another one would have a positive, and significant positive impact on stream quality, then I think it is warranted. If it does not have a significant positive impact on stream quality then I believe it is not appropriate, it is not reasonable to throw out one biological technology and put in another one that is really only going to extend by a few months per year the performance we have already seen now in summer.
>
> R. at 175-6

and

> I don't believe there is any accepted technology that is properly designed and properly operated, with or without filtration, that would meet ten milligrams per liter BOD and twelve milligram per liter suspended solids [for Modine's effluent].
>
> R. at 354

CONCLUSIONS

The Board is persuaded, based upon analysis of the rather voluminous record in this proceeding, that there is no alternative treatment method for Modine which is simultaneously technically feasible and economically reasonable. The Board is also persuaded that Modine's effluent, at least as regards the parameters at issue, is not a limiting factor in the quality of the receiving waterway. Accordingly, the Board today adopts appropriate relief. There follows a discussion of particular facets of today's action.

Point of Measurement and the Dilution Rules

Under the present configuration of its treatment system, Modine commingles its Nocolok non-contact cooling water with its process wastewater within the first lagoon. The question arises as to whether this configuration brings into play any provisions of the Board's dilution rules found at 35 Ill. Adm. Code 304.102.

The Agency questions whether the dilution rules require that the concentrations of Modine effluent be recomputed to exclude the effect of any dilution. The Agency has, for example, made such adjustments in calculating limits in Modine's current NPDES permit. The adjustment applied there is a 20% reduction in the allowed concentration, to account for the approximately 20% of the total effluent discharge which is non-contact cooling water (R. at 226).

Modine contends that it has proposed effluent limitations which the existing technology is capable of achieving, as measured at the point of discharge (R. at 210). These numbers can be either accepted unaltered as limits applicable at end-of-pipe, or written with a 20% inflation factor to account for non-contact cooling water additions (R. at 210; 225). In the later case, it would be necessary to define some point other than end-of-pipe as the compliance point.

The Board agrees with the Agency in that "the Agency's determination as to what limit was appropriate in the NPDES permit is largely irrelevant to this proceeding" (R. at 243-4), a contention similar to that of Modine (R. at 210). Furthermore, the Board sees no merit in specifying a compliance point at other than the point of discharge, principally because in the alternative there is nowhere in the system where it is possible to measure the adjusted parameters, and hence no place where compliance can be tested. Thus, to the extent that Modine has justified specific end-of-pipe limitations, the Board believes that these should be the numbers specified in the rule.

Similarly, the Board sees no merit in requiring Modine to separately discharge its non-contact cooling water. Modine is not here attempting to effectuate treatment via dilution, the practice which the dilution rules are intended to prevent.

TSS Standard

The 12 mg/l monthly composite limitation for TSS requested by Modine is in fact the same standard which is specified at 35 Ill. Adm. Code 304.120(c). On its face, therefore, Modine is not requesting a site-specific exemption from this rule. However, under the interpretation that the Nocolok non-contact cooling water must be subtracted pursuant to 35 Ill. Adm. Code 304.102, Modine's current NPDES permit contains an adjusted TSS limitation of 9.5 mg/l monthly average and 19.0 mg/l daily maximum (R. at 224). Thus, relative to the NPDES permit the 12 mg/l constitutes a less restrictive standard. Similarly, today's limit of 30 mg/l daily composite constitutes a less restrictive standard.

Modine's current treatment system would seem to achieve the current NPDES limits with substantial regularity, as is shown by the sampling record covering the last three complete years[3]:

TSS Monthly Average Concentration (mg/l)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	7	1	1	4	1	5	2	34	1	5	1	tr
1987	4	tr	tr	1	1	14	1	tr	tr	7	12	3
1988	4	3	2	2	2	6	20	4	3	4	6	5

BOD Standard

The ability of the Board to grant any relief to Modine is contingent upon assurance that Modine operates and configures its current wastewater treatment system in the most environmentally sound manner. In general, the Board looks favorably upon the many adjustments of the treatment system which Modine has undertaken over the pendency of this and the predecessor Modine wastewater proceedings. The Board believes that these adjustments have gone a long way towards alleviating the negative impact of Modine's effluent.

Modine opines that it would not require relief for either BOD or TSS if it were to receive a three-lagoon exemption pursuant to 35 Ill. Adm. Code 304.120(c). Modine contends that

[3] Supplemental Information filed March 16, 1989 by Modine in response to Board request. Record for 1986 and 1987 is based on one sample per month; record for 1988 is the average of 3 to 5 samples per month; tr = less than 1 mg/l.

it is eligible for such exemption (Modine Brief at 6-7). However, the Board takes administrative notice[4] of the denial by the Agency of Modine's exemption application. Among the reasons cited by the Agency is that Modine's existing facilities are not capable of consistently achieving the effluent quality allowable under a lagoon exemption. The Agency further adds that it recommends that Modine delay any further pursuit of an exemption until the instant site-specific proceeding is resolved.

Definitions of Summer and Winter

Modine originally requested that its two-number BOD effluent standard apply to "summer" and "winter" months. Namely, Modine requests that summer be defined as the months of May through September and winter as the months October though April. The Agency questions Modine's definition of these terms relative to the use given them in other Board regulations[5] (PC #10 at 1). Modine responds that northeastern Illinois, where Modine's facility is located, is the coolest region of the State, and that in the northeastern region the onset of low mean temperatures precedes that in the southern portion of the State by several weeks in the fall and the onset of warm mean temperatures in the northeast lags the south by more than a month in the spring (PC #9, exhibit 1). On this basis, Modine contends that the requested definitions of "summer" and "winter" are consistent with site-specific climatological data.

The Board accepts Modine's position concerning these particulars of climate. However, as observed at Second Notice (Opinion, p. 3), neither of the terms "winter" or "summer" is an appropriate label for the times periods in question. Accordingly, the Board today affirms its construction of the BOD rule in a form which simply cites the months within which the various standards apply.

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[4] See Modine's Unopposed Motion to Supplement Record, with attachment, filed July 17, 1989 in Modine Manufacturing Company v. IEPA, PCB 88-25. Also see the Board's Order of July 27 granting that motion.

[5] The concept of a "winter" season is used variously in different Board rules. For example, it is November though March with respect to ammonia nitrogen discharges to the Illinois River system at 35 Ill. Adm. Code 304.122 and 35 Ill. Adm. Code 304.201(b); it is December through March with respect to BOD and February through May with respect to TSS in the Galesburg SD site-specific rule at 35 Ill. Adm. Code 304.207; and it is November through March with respect to violations of the ammonia nitrogen water quality standard at 35 Ill. Adm. Code 304.301.

Fluoride Standard

Justification for the fluoride site-specific rule has been based largely on the record developed in R78-7 (In the Matter of: Proposed Amendments to Rule 203.1 of the Water Pollution Control Regulations, final action taken March 4, 1982), and introduced into the instant record by Modine as Exhibit 36. In R78-7 the Board found in a site-specific rulemaking that fluoride concentrations up to 5.0 mg/l would have no adverse environmental or health impact as applied to a portion of the Vermilion-Wabash River system in east-central Illinois. Although at First Notice the Board allowed that the conclusions reached in R78-7 might also be applicable to the waterway into which Modine discharges, the Board requested that Modine and the Agency address the similarities between the waterways considered in R78-7 and the instant waterway (First Notice Opinion at 22).

Modine responds that an important commonality between Modine's receiving waterway and the waters considered in R78-7 is that of the hardness of the waters (PC #9 at 3-5 and Exhibit 2). Modine notes, as does the Agency (PC #10 at 3), that fluoride toxicity is inversely proportional to hardness. In the Modine case hardness is of the order of 328 mg/l (PC #9 at Exhibit 2); in the R78-7 case hardness was ca. 350 mg/l (Id.). Thus, both streams are classified as "very hard" pursuant to standard hardness classifications. On this basis, Modine contends that the toxicity conclusions reached in R78-7 are equally applicable to the instant case (Id.). The Agency supports these general contentions (PC #10 at 3). Based on its own review of the record, including Exhibit 36 and the similarities between the facts of R78-7 and this proceeding, the Board concludes that the fluoride standard as adopted will be protective of aquatic life uses in the limited receiving waters specified.

As an associated matter, the Board noted at First Notice that it proposed to limit the site-specific fluoride water quality standard to only that portion of Modine's receiving waterway extending 1200 feet downstream from Modine's outfall (First Notice Opinion at 24-5). This position was based on the Board's determination that Modine had justified the site-specific standard only for that part of the unnamed tributary for which Modine constitutes the principal source of low-flow discharge (Id.). Modine has responded that it has no objection to this limitation (PC #9 at 6).

The Board also retains today a change in the manner in which the fluoride standard is defined, as such change was originally proposed at Second Notice. The Agency had questioned whether the use of a monthly average and daily maximum, as proposed at First Notice, is workable as a water quality standard. The Agency points out that water quality standards are generally not defined

in this manner due to the difficulty of assessing compliance where grab samples constitute the sampling norm (PC #10 at 3). The Board believes that the Agency makes a valid point. The First Notice phrasing of the fluoride standard was premised on sampling programs commonly employed in effluent monitoring. However, this perspective neglects the fact that effluents are monitored by the discharger, whereas the Agency is responsible for water quality sampling. Therefore, the water quality standard has to be phrased in a manner which is workable in the confines of the Agency's ability to monitor. Water quality standards are normally defined as instantaneous maxima, which are not to be equalled or exceeded at any time. The Board believes that this is the only appropriate way to phrase the instant rule.

Barium Effluent Standard

Modine had initially proposed relief with the barium effluent standard found at 35 Ill. Adm. Code 124(a). However, Modine also opined that it may not need relief from the barium effluent standard if the Board finds that the exception for background concentrations found at 35 Ill. Adm. Code 304.103 applies to Modine's circumstance. The exception for background concentrations reads (emphasis added):

> Because the effluent standards in this Part are based upon concentrations achievable with conventional treatment technology which is largely unaffected by ordinary levels of contaminants in intake water, they are absolute standards that must be met without subtracting background concentrations. However, it is not the intent of these regulations to require users to clean up contamination caused essentially by upstream sources or to require treatment when only traces of contaminants are added to the background. Compliance with the numerical effluent standards is therefore not required when effluent concentrations in excess of the standards result entirely from influent contamination, evaporation, and/or the incidental addition of traces of materials not utilized or produced in the activity that is the source of the waste.

Modine points out that barium is not used in any of Modine's processes, but rather is present in Modine's wastewater only by virtue of being present in the raw well water used by Modine. Modine further contends that its existing treatment processes do remove some of the influent barium, but by an amount insufficient to meet the barium effluent standard (R. at 74). As evidence thereof, Modine presents comparative analyses of source and effluent waters sampled during August to November of 1988 (Modine Exh. 28). These analyses show that source water concentrations of barium averaged approximately 60% higher than the effluent

concentrations (Id.; R. at 74). Specifically, 13 well-water analyses shows an average influent concentration of barium of 4.1 mg/l, whereas the 15 effluent concentrations of barium shows an average of 2.5 mg/l (versus the 2.0 mg/l effluent standard).

The Board finds that the Section 304.103 exception does apply to Modine's barium circumstance. Accordingly, Modine is not required to comply with the 2.0 mg/l barium effluent standard. Further, Modine does not require site-specific relief from the barium effluent standard, and Modine's request to that end is therefore denied as unnecessary.

The Board emphasizes that these findings are based upon circumstances as the Board currently finds them. These circumstances include demonstrably higher concentrations of barium in Modine's well-water source than in Modine's effluent, concentrations of barium in Modine's effluent which are less than the 5.0 mg/l General Use Standard, and no use by Modine of barium in any process which would cause the appearance of process barium in Modine's wastestream.

Ammonia Effluent Standard

In addition to barium, Modine had also originally requested a site-specific ammonia nitrogen effluent standard and a site-specific un-ionized ammonia water quality standard. These requests were subsequently withdrawn by Modine and determined to be unnecessary by the Board (see First Notice Opinion at p. 23-4).

Contributing to or Causing Water Quality Violations

In both its Petition and Amended Petition Modine makes reference to a request for exception from 35 Ill. Adm. Code 304.105, which prohibits any effluent from contributing to or causing a violation of a water quality standard. However, in neither instance did Modine propose language which would effectuate this exception other than for fluoride. Although the Board requested that this issue be addressed during the First Notice comment period, the issue has not been further addressed. The Board accordingly takes no action on this issue.

ORDER

The following site-specific rules are hereby adopted. The Clerk of the Board is directed to submit these rules to the Secretary of State for final notice.

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 303
WATER USE DESIGNATIONS AND SITE
SPECIFIC WATER QUALITY STANDARDS

Section 303.430 Unnamed Tributary to Dutch Creek

The general use water quality standard for fluoride contained in Section 302.208 shall not apply to the unnamed tributary of Dutch Creek which receives discharges from the manufacturing facility located on Ringwood Drive in Ringwood in McHenry County from the outfall of that facility for a distance of 1200 yards downstream. Instead this water shall comply with a fluoride standard of 5.6 mg/l not to be exceeded at any time.

PART 304
EFFLUENT STANDARDS

Section 304.221 Ringwood Drive Manufacturing Facility in McHenry County

The general effluent standards for deoxygenating wastes contained in Section 304.120 shall not apply to discharges from the manufacturing facility located on Ringwood Drive in Ringwood, McHenry County, which discharges to an unnamed tributary of Dutch Creek. Instead these discharges shall comply with the following effluent limitations as measured at the point of discharge after the third lagoon and prior to discharge to the unnamed tributary:

BOD_5	25 mg/l	May to September monthly average
	35 mg/l	May to September daily maximum
	60 mg/l	October to April monthly average
	70 mg/l	October to April daily maximum
TSS	12 mg/l	monthly average
	30 mg/l	daily maximum

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 24th day of May, 1990, by a vote of 7-0.

Dorothy M. Gunn

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board