

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

IN RE: APPLICATION OF THE SOLID WASTE MANAGEMENT CORPORATION

This matter is before the Hearing Officer per an Order of the Director to reopen a hearing on the application of the Rhode Island Solid Waste Management Corporation (RISWMC) to construct and operate a major source of air pollution in an attainment area (a resource recovery facility at the Quonset Point/Davisville Industrial Park in the Town of North Kingstown); pursuant to the Clean Air Act, Chapter 23 of Title 23 of the Rhode Island General Laws and the Air Pollution Control Regulations adopted by the Department of Environmental Management and filed with the Secretary of State.

On February 7, 1989 the Director, Robert L. Bendick, Jr., Ordered the hearing in this matter reopened for the limited purposes hereinafter described. Parties of record were served with copies of this Order. Parties were advised in writing as to hearing dates and procedures by letters of the Hearing Officer dated February 10 and 15, 1989. Public Notice was provided in the Providence Journal and Bulletin on February 28, 1989.



Hearings were held at the North Kingstown High School and Library and at the Cannon State Office Building in Providence on March 6, 9, 17, 21, 24, 29 and 30 and April 13, 1989. All hearings were conducted pursuant to the Rhode Island Administrative Procedures Act, RIGL §42-35-1 et seq., and the Administrative Rules of Practice and Procedure adopted by the Department of Environmental Management.

The parties to the proceeding were: the applicant, Rhode Island Solid Waste Management Corporation (hereinafter "RISWMC"), represented by Attorneys Richard Sherman and Daniel Schatz, the Department of Environmental Management, Division of Air and Hazardous Materials (hereinafter "Division"), represented by Attorney Claude A. Cote, the Town of North Kingstown (hereinafter the "Town"), represented by Attorneys Mark McSally and Harlan Doliner, and Concern, Inc., represented at the March 6, 9, and 17 hearings by Paul Plunkett and not subsequently represented. Kendra L. Beaver served as Legal Counsel to the Hearing Officer. During the course of the reopened proceeding, ten witnesses testified. All parties were given an opportunity to voir dire expert witnesses and the Hearing Officer, in his discretion, qualified the witnesses as set forth below.

The following witnesses were called:

1. Richard C. Hittinger was previously qualified as an expert in PSD modelling, PSD Applications, PSD Application Preparation. (for the applicant).

2. Kenneth A. Rahn, PhD. was qualified as an expert in atmospheric chemistry and deposition to a receiving surface. (for the applicant).
3. Craig Swanson, PhD. was previously qualified as an expert in hydrodynamic modelling and water quality modeling. (for the applicant).
4. Mark D. Gould, PhD. was qualified as an expert in nematology and aquatic ecology. (for the applicant).
5. Stephen Majkut was previously qualified as an expert in air permitting requirements and implementation of RIDEM air regulations. (for the Division.).
6. Douglas McVay was previously qualified as an expert in air pollution control permit review, application of air quality models, review of air quality models and compliance with Air Pollution Control Regulations. (for the Division).
7. John R. Martin, was previously qualified as an expert in consulting meteorology, dispersion modeling, deposition modelling, PSD Application Preparation and review relating to the above. (for the Town).

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8. Dominique N. Brocard, PhD. was previously qualified as an expert in water quality modelling and analysis, but not including biological impact assessment. (for the Town).
9. Charles B. Cooper, was previously qualified as an expert in environmental assessment with particular emphasis on environmental assessment of industrial and waste management facilities. (for the Town).
10. James M. Osborn was previously qualified as an expert in the field of consulting engineering for resource recovery facilities, consulting engineering concerning permitting and program development phases of resource recovery facilities development and power plant design. (for the Town).

The following Exhibits were entered into the record of the reopened hearing for purposes of identification or as full exhibits, as noted:

- 89/1 (Applicant - Identification) Affidavit of John Norris and Janine Kelly (February 16, 1989).
- 89/2 (Applicant - Identification) Affidavit of Kurt W. Rieke (February 15, 1989).



- 89/3 (Applicant - Identification) Affidavit of Thomas E. Wright (February 16, 1989).
- 89/4 (Applicant - Full) Written Testimony of Richard Hittinger (February 15, 1989); Technical Information Presented in Response to Director's Order of February 7, 1989 (February 15, 1989).
- 89/5 (Applicant - Full) Written Testimony of Richard Hittinger (February 15, 1989); Determination of Trace Metal Impacts on Plants, Soils, and Animals Using the EPA Screening Procedure (February, 1989).
- 89/6 (Town - Full) A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, Argonne National Laboratory (December, 1980).
- 89/7 (Applicant - Full) Memorandum of Telecon (February 14, 1989).
- 89/8 (Applicant - Full) Written testimony of Kenneth A. Rahn (February 16, 1989); Refined Estimates of Worst-Case Deposition to Fry's Pond from the Quonset Point Resource Recovery Facility (February 15, 1989).
- 89/9 (Applicant - Withdrawn) Written testimony of Kenneth A. Rahn (February 16, 1989); Status Report on Development of the Environmental Monitoring Protocol for the Quonset Point Resource Recovery Facility (February 15, 1989).

- 89/18 (Town - Full) Review of Testimony of Mark D. Gould and Richard Hittinger, February, 1989 (Cooper) (February 28, 1989).
- 89/19 (Town - Full) Comment on the March 31, 1989 Written Testimony of Richard Hittinger on "Expanded Stack and Ambient Monitoring Program" (Cooper) (April 11, 1989).
- 89/20 (Applicant - Full) Written testimony of Richard Hittinger (March 31, 1989); Expanded Stack and Ambient Monitoring Program (March 31, 1989).
- 89/21 (Division - Full) Written testimony of Stephen Majkut (April 6, 1989).
- 89/22 (Town - Full) Review of Written Testimony of Richard Hittinger; Expanded Stack and Ambient Monitoring Program Response to the Memorandum of the Director dated March 21, 1989 (Osborn) (April 11, 1989).

SCOPE OF THE HEARING

1. The Director's Order of February 7, 1989:

In his Order of February 7, 1989 directing that this proceeding be reopened, Director Bendick concurred with this Hearing Officer's Decision and Order of October 3, 1988 as modified by his Decision and Order of February 3, 1989 "except with respect to the portion of the Decision relating to PSD Condition #21, which specified emissions limitations for several pollutants" (page 52). No other Conditions or requirements of the above referenced Orders are open to reconsideration.

The Director's Order of February 7, however, does not invite a blanket re-examination of the Condition #21 emission limitations, rather it directs that they be enforced as average emission levels as opposed to highest total levels:

"I find, therefore, that the proposed Quonset Point facility should be limited to the average emissions contained in Applicant's Exhibit #69 and Condition #21 of the Decision on this matter." (page 53.)

With regard to this finding by the Director as it relates to the reopening of this proceeding, it is clear that the Condition #21 emission limits as written are to be enforced as averages.



The testimony presented at the original hearing did not overtly discriminate between gaseous and particulate mercury emissions. However, the distinction was highlighted throughout the course of subsequent proceedings. Consequently, the Hearing Officer feels compelled to correct what may have been an oversight on his part and is not precluded from doing so by the Director's Order which refers to "average emissions" and not to "average total emissions." As testified to by applicant's witness, Mr. Hittinger, mercury is the only pollutant for which there is a significant difference between particulate and total emission levels.

The Director's Order further and unambiguously states that "the sole purpose" for reopening the hearing is to:

"... afford[ing] the applicant an opportunity to demonstrate at the highest total levels at which the proposed facility is projected to emit any and all pollutants an ability to comply with its obligations under Air Pollution Control Regulation 7 as to impacts on terrestrial and aquatic vegetation, birds, reptiles and marine and aquatic biota inhabiting Narragansett Bay and associated ponds and wetlands." (page 53).

Therefore; the applicant is required to identify and prove as reasonable the methods by which it identifies the maximum levels at which the proposed facility will emit all forms of each and every pollutant. Additionally, the

applicant is likewise required to demonstrate compliance with APC Rule 7 as regards to the various environmental parameters identified by the Director at those maximum total levels for all emitted pollutants.

The Director's Order also requires that the applicant submit "a monitoring protocol for insuring that average levels are actually achieved" (page 54). In a March 21, 1989 Memorandum to the Hearing Officer entered into the Record of the Hearing, Director Bendick further clarified his intent as requiring that the Division of Air and Hazardous Materials' stack testing requirements incorporated in the Decision and Order of October 3, 1988 as Condition #37 "be expanded to insure tracking of actual plant performance such that the plant achieves the average emissions."

Therefore, any monitoring protocol proposed by the applicant must include provisions for stack testing in addition to that required by Condition #37, although it may also include other forms of environmental monitoring. The "average" emission level which must be monitored is that set forth in Condition #21, as written with the aforementioned correction to accomodate total average mercury.



2. Testimony Determined to be Outside the Scope of the Reopened Hearing Per the Director's Order of February 7, 1989:

During the course of the reopened hearing the applicant introduced testimony in three areas which, pursuant to the Director's Order, are found to be outside the scope of the hearing for the reasons noted.

The first of these areas includes testimony purporting to demonstrate that certain exhibits relied on by the Hearing Officer in his finding of compliance with APC Rule 7, most particularly Exhibits #70 (Hittinger), #71 (Swanson) and #72 (French), were based on overly conservative and/or unrealistic worst case assumptions. The import of this testimony if believed by the Hearing Officer would be to demonstrate that given a more realistic set of assumptions, the underlying conclusions of Exhibits #70, #71 and #72 relative to environmental impacts could be supported at much higher emission levels than the Exhibit #69 emission levels employed by Mr. Hittinger and Drs. Swanson and French in generating those reports. Since the Hearing Officer had relied on Exhibits #70, #71 and #72 in finding compliance with APC Rule 7 relative to the environmental parameters identified in the Director's Order of February 7 he would

presumably be expected to find reason to make a comparable upward adjustment of his Condition #21 (average) emission limits since they too were extracted from Exhibit #69.

As noted in my discussion regarding the scope of this proceeding, however, I do not have the discretion to reconsider the Condition #21 emission limitations as averages except for total mercury. While I have heard the below described testimony I have consequently formed no opinion as to its veracity since to have done so could, given the parameters set by the Director's Order, serve no purpose beyond confirming that which I have already found in the Decision and Order of October 3, 1988 to be true; to wit, that Condition #21 emission limits are protective relative to APC Rule 7.

I, therefore, FIND the following testimony to be outside the scope of the reopened hearing and have not relied on it in preparing this Decision and Order:

- a. Testimony of Richard Hittinger relative to assumed emission particle size being too large;
- b. Testimony of Kenneth Rahn relative to:
 - . Pulsed inputs to Fry's Pond based on observations of other "South County" rivers and streams being too "spiked";

- .The duration of pollutant transfer to Fry's Pond being too short;
 - .The efficiency of pollutant transfer to Fry's Pond being too high;
 - .Instantaneous mixing in Fry's Pond being reasonable;
 - .The rate of decline of pollutant concentrations being reasonable;
 - .The assumed mean particle size being too large;
 - .Recalculation of peak concentrations in Fry's Pond;
 - .An independent check of modelled deposition to Fry's Pond; and
- c. Testimony of Craig Swanson relative to recalculation of runoff volume entering Fry's Pond.

The second area of testimony found to be outside the scope of the reopened hearing is that which purports to justify substituting the average emissions estimates employed in the PSD Application (Exhibit #6A) as being more credible than the Condition #21 levels for such purpose as calculating maximum emission levels, setting emission limits, and/or projecting environmental impacts of facility emissions. Again, the Hearing Officer has not been

authorized to substitute any other average for the levels set in Condition #21. Accordingly, I FIND that the following testimony is outside the scope of the hearing and was not weighed or considered in preparing this Decision and Order:

- a. Testimony of Richard Hittinger and Kenneth Rahn comparing and/or evaluating Exhibit #69 emissions data relative to PSD average emissions data.

A third and final general area of testimony is likewise outside the scope of the reopened hearing, and includes all testimony involving the calculation of maximum emission levels, the setting of emission limits, and/or the projection environmental impacts either employing directly or reflecting the manipulation of any average emissions levels other than those set in Condition #21. The following testimony was therefore not weighed or considered in preparing this Decision and Order:

- a. Testimony of Richard Hittinger and Kenneth Rahn relative to the calculation of 95% confidence upper bound emissions levels based on PSD average emissions data, but not excluding testimony on the methodology employed in calculating 95% confidence levels as compared to other methods of predicting maximum emissions;



- b. Testimony of Kenneth Rahn expressing his opinions relative to the impacts of PSD average emissions on air and water quality, and/or the inhabitants of Fry's Pond;
- c. Testimony of Craig Swanson expressing his opinions relative to short and long-term loadings and consequent water quality impacts on Fry's Pond and Narragansett Bay of PSD average and PSD 95% confidence level emissions levels calculated by Richard Hittinger (Exhibit #89/4); and
- d. Testimony of Mark Gould expressing his opinions relative to the impacts of PSD average and PSD 95% confidence level emissions on terrestrial, marine and aquatic biota.

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TOTAL EMITTED MERCURY LEVELS

1. Total Versus Particulate Mercury Emissions Levels:

Applicant's witness, Mr. Hittinger, testified at length through Exhibit #89/4 and under cross-examination as to the distinction between particulate and total emissions levels as reported in Exhibit #69. Under close examination by the Town, Mr. Hittinger testified that:

- a. The only projected facility pollutant for which there is any significant difference between particulate and total emissions levels is mercury;
- b. The non-particulate component of the total mercury emission is in the form of gaseous mercury, alternatively described as mercury vapor;
- c. Table 3 of Exhibit #69 which reports a "New Emission Estimate" for mercury of 1.48×10^{-1} mg/sec/flue, the value which is incorporated in Condition #21 as the limit for mercury reflects a particulate emissions value only;
- d. Total emissions estimates obtained from an averaging of data obtained from other RRFs are reported in Table 2 of Exhibit #69 and show a value for total mercury of 4.47 mg/sec/flue;



- e. An average ratio of 3.35% particulate to 96.65% of gaseous mercury can be shown to exist in the RRF emissions reported;
- f. The Exhibit #69 Table 2 total mercury emission level is higher than that reported in the PSD Application (Exhibit #6A) which is 4.0 mg/sec/flue. No evidence rebutting Mr. Hittinger's claims regarding what is reported in Exhibit #69 or the PSD Application was heard, although applicant's witness Dr. Rahn expressed his opinion based on recent emissions data obtained from a Belgian RRF that gaseous mercury emissions might actually constitute up to 100% of the total mercury emission.

2. Environmental Impacts of Gaseous Mercury Emissions:

Applicant's witnesses, Hittinger, Rahn, Swanson and to a very limited extent, Gould, all testified to the environmental effects of gaseous mercury emissions both in general and as regards the proposed Quonset Point RRF. Mr. John Martin testified on this matter for the Town.

Mr. Hittinger testified that gaseous mercury emissions from the proposed facility would have insignificant environmental impacts due to its propensity to be rapidly dispersed through the atmosphere and its limited propensity to be deposited out of the atmosphere and into the marine/aquatic and/or terrestrial environments. He traced both phenomena to mercury's stability as a gas, in turn a consequence of a high (1,000 to 1) vapor pressure to partial pressure ratio, and its insolubility which prevents its removal from the atmosphere by precipitation.

Mr. Hittinger testified to having performed air dispersion modelling in support of the PSD Application which based on the 4.0 mg/sec/flue total mercury emission reported in the Application showed that gaseous mercury emitted by the proposed facility would remain in that form for sufficient amounts of time to be dispersed in concentrations which would be insignificant relative to ambient atmospheric mercury levels. This was, in his opinion, confirmed by modelled results showing a rapid drop off in ground level pollutant concentrations with increasing distance from the facility stack.

Mr. Hittinger testified to having confirmed his findings regarding gaseous mercury impacts on terrestrial vegetation and herbivorous animals through application of an EPA approved PSD "Screening Procedure" (Exhibit 89/6) which employing the predicted total mercury emission of 4.0 mg/sec/flue taken from the PSD Application, and assuming as a worst case that all such mercury was soluble and taken up by plant life exposed to it nevertheless predicted that total mercury levels would remain below EPA criteria (warning) levels.

Mr. Hittinger testified that the impact of gaseous mercury on marine and aquatic biota could be expected to be quite small since the principal mechanism for conveying airborne pollutants into the marine and aquatic environments was wet or dry (particulate) deposition followed by precipitation driven runoff carrying accumulated pollutants into the nearest water body, in this instance Fry's Pond and indirectly Narragansett Bay. Since as already noted, Mr. Hittinger had testified to various reasons why he expected wet or dry deposition of gaseous mercury to be negligible, there would consequently be limited opportunities for or natural processes by which gaseous mercury could be introduced into an aqueous environment.

In light of the various testimony summarized herein and with reference to Dr. Rahn's testimony that gaseous mercury might actually constitute as much as 100% of the proposed facility's mercury emission, Mr. Hittinger concluded that the modelled assumption that 3.35% of total mercury would be in a particulate form was conservative and likely to overpredict impacts of the total mercury emission.

Under cross-examination by counsel for the Town, Mr. Hittinger conceded that the ISCST depositional model employed by him in support of Dr. Swanson's and Dr. French's various water quality and marine/aquatic biota impact analyses entered into the record of the main hearing as Exhibits 25-28 and 71 and 72 was not capable of accomodating and consequently did not reflect deposition of gaseous pollutants, including mercury. However, despite acknowledging that modelling procedures capable of accomodating gaseous emissions existed, but were not employed, he stood by his previously summarized arguments that the physical properties of gaseous mercury and the various natural processes which govern its behavior in the environmental all suggest that gaseous deposition will be insignificant.

Dr. Rahn's testimony confirmed the general parameters of Mr. Hittinger's testimony although he was considerably more reticent in sharing his opinions as a scientist given what he perceives to be the state of scientific knowledge as to the amount of mercury emitted by RRFs and its fate in the environment. Dr. Rahn testified that available data shows that the large majority of total mercury emitted by RRFs is gaseous, with, however, the issue of whether the gaseous emission is 97%, 100% or something in between not being conclusively established. He assigned considerable significance to this uncertainty as to exact gaseous emissions levels because he concludes that even a small fraction of particulate mercury may dominate total deposition, in turn because gaseous mercury is removed from the atmosphere and thereby introduced into the terrestrial and marine/aquatic environments much more slowly than is the case for the particulate form of mercury. He concludes, therefore, that the 3.35% particulate emission level assumed by Mr. Hittinger in Exhibit #89/4 may in fact be as conservative as argued by the author in the context of recent Belgian RRF emissions data showing no particulate component to total mercury emissions.

Under cross-examination, Dr. Rahn conceded that he had not attempted to estimate dry deposition of gaseous mercury projected to be emitted by the Quonset Point facility. While he testified that there existed protocols capable of modelling the proposed facility's gaseous mercury deposition, albeit more suitable for projecting larger scale regional deposition patterns, he expressed skepticism that gaseous mercury deposition could be calculated with a defensible degree of scientific certainty. He consequently declined to express any opinions beyond those general observations previously summarized as to the amount of gaseous mercury which would be deposited by the Quonset Point facility or its impact on the environment.

Dr. Swanson was cross-examined at some length by the Town regarding the impact of gaseous mercury emissions on water quality and the marine/aquatic environments in general. He confirmed that his various water quality assessments introduced into the main hearing as Exhibits #25, 26 and 71 focused on the behavior of particulate pollutants introduced into the water column and did not consider gaseous mercury emissions, a subject which he testified to as requiring an expertise in atmospheric chemistry which he did not possess.

Dr. Gould confined his testimony regarding gaseous mercury to citing a literature source which indicated that the concentration of gaseous mercury necessary to cause chlorosis in plants far exceeded that projected by the applicant to result from facility emissions (8,000 u.g./m³ vs. 0.0043 u.g./m³).

Mr. Martin testified on behalf of the Town in rebuttal to Mr. Hittinger's testimony regarding anticipated gaseous mercury levels and the stability of this pollutant. He focused on several perceived errors in Mr. Hittinger's assumptions or methods which he represented would result in an undercalculation of deposition. These included Hittinger's employment of annual emissions averages in the calculation of ground level concentrations for gaseous mercury as opposed to the considerably higher (10 times) one hour average which he testified would more closely approximate a worst case emission level. He further expressed his opinion that mercury concentrations should have been measured at the centerline of the emissions plume where they can be as much as one hundred times higher than at ground level as measured by Hittinger. If so measured he represented that the stability of mercury in its gaseous form as reflected in the ratio of partial pressure to vapor pressure would be dramatically reduced (from 7,800/1 to less than 10/1).

Under cross-examination by applicant's counsel, Mr. Martin conceded that ground level concentrations and plume centerline concentrations of gaseous mercury would be much closer if stack downwash was considered, as it was in Mr. Hittinger's modelling. Hittinger was reintroduced to testify that even when emission levels were corrected to reflect the worst case one hour average testified to by Mr. Martin his calculations showed that gaseous mercury remained stable and not susceptible to deposition.

3. Findings of Fact:

After review of all the documentary and testimonial evidence of record, I make the following specific

FINDINGS OF FACT:

1. The mercury emission limit of 1.48×10^{-1} mg/sec/flue set in Condition #21 of the Decision and Order of October 3, 1988 was, until this proceeding was reopened by the Director's Order of February 7, 1989, the highest level at which the applicant had demonstrated an ability to comply with APC Rule 7.
2. The applicant has demonstrated that mercury is the only pollutant affected by the Condition #21 emissions limits for which there is a significant difference between particulate emissions and total emissions.

3. The Exhibit #69 emission data from which the Condition #21 emissions limits were extracted reflects particulate emissions only.
4. Exhibit #69 emissions data for total mercury, which includes a significant gaseous component, indicates an average level of 4.47 mg/sec/flue. The applicant, however, employed a lower average total emission level for mercury of 4.0 mg/sec/flue obtained from emissions data reported in its PSD Application for purposes of modelling the environmental impacts of total mercury emissions.
5. Gaseous mercury is stable in its vapor phase with only limited potential to condense into a liquid or dissolve in water.
6. Ground level concentrations of gaseous mercury have been shown by EPA approved modelling protocols to decrease rapidly with distance from the facility at the assumed average total emission level of 4.0 mg/sec/flue.
7. Gaseous mercury is rapidly dispersed at concentration levels which are insignificant relative to ambient as it is transported through the atmosphere.

8. Application of an EPA recommended and approved PSD Screening Procedure (Exhibit 89/6) demonstrates that at an assumed average total emission level of 4.0 mg/sec/flue mercury emissions will not adversely effect terrestrial plants and herbivores. While the impact of such emissions on carnivorous terrestrial species was not separately addressed, no evidence was heard which would suggest that they would because of their feeding patterns and/or the behavior of gaseous mercury in the environment be any more susceptible to its effects than the species addressed by the screening procedure. They are consequently not found to be threatened.
9. Gaseous mercury is removed from the atmosphere and deposited on receptors such as the ground by natural processes which differ from and result in a much slower rate of deposition than is the case for those processes governing particulate deposition. The rate of deposition, although low, however, can not at this time be calculated with any reasonable degree of accuracy or certainty given the present state of scientific knowledge.



10. Given the absence of reliable data on total mercury deposition rates, prudence dictates that levels of total mercury emitted by the facility and into the environment be monitored regularly over time as part of the various stack testing and monitoring programs required by the Decision and Order of October 3, 1988, most particularly Conditions #22, 24, 36 and 37.
11. The low solubility of gaseous mercury and the natural processes which govern its movement through the atmosphere all mitigate against its entering and/or impacting the marine or aquatic environments and their plant and animal inhabitants. Again, however, given the paucity of hard data it would be prudent to monitor total mercury levels in the marine and aquatic environments as part of the above referenced testing and monitoring programs required by the Decision and Order of October 3, 1988.
12. The applicant's consideration of plume downwash according to established EPA procedure in its modelling of ground level pollutant concentrations accomodates differences in pollutant concentrations between the plume center line and the ground.

13. The ratio of partial pressure to vapor pressure as a measure of the stability of gaseous mercury decreases considerably at maximum (one hour) emission levels, but is still favorable; e.g., indicates continued stability.

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HIGHEST TOTAL EMISSION LEVELS

1. Estimates of Highest Total Levels:

Applicant's witness, Mr. Hittinger, led its case regarding the method by which highest total emission levels would best be calculated. He testified that a truly accurate prediction would require detailed data on RRF emissions variability from time to time and from facility to facility which simply does not exist. He went on to observe, however, that an estimate of maximum emissions could be obtained from a statistical manipulation of emissions data obtained from other RRFs to identify a so-called "95% confidence upper bound" emission level, described as the emission level at or below which the facility would operate 95% of the time.

Mr. Hittinger testified to having calculated 95% confidence emission levels based on the emission data obtained from other RRF's as reported in the PSD Application because he had concluded that this was a more complete data set than was reported in Exhibit #69 (and relied on by the Hearing Officer in setting the Condition #21 emissions limits). Under cross-examination by the Town, however, Mr. Hittinger also stood by his testimony introduced during the main hearing that the Exhibit #69 emissions data were more accurate for

purposes of predicting emissions from the proposed facility than were the PSD emissions data. He had no opinion as to whether the completeness of his data set was any more important than its accuracy for purposes of calculating 95% confidence emissions levels. The question is in any event rendered moot by the Director's Order of February 7 reaffirming the Condition #21 emissions limits as averages since it would obviously make little sense for the Hearing Officer to entertain the computation of maximum levels based on the much higher PSD averages suggested by Mr. Hittinger.

Applicant's witness, Dr. Rahn, testified to his agreement with Mr. Hittinger both with regard to the best method for computing maximum emission levels and as to the emissions source data best employed to support such computations.

While applicant's witnesses were questioned closely by the Town on their 95% confidence level calculations, this questioning revealed no basic flaws in the statistical underpinnings of the 95% methodology. No better alternative method for computing maximum level emissions was proposed.

2. Environmental Impacts of Highest Total Emission Levels:

Applicant's witnesses, Hittinger, Rahn and Swanson, all testified to their opinions regarding the environmental impacts of 95% confidence level emissions. All relied on two basic assumptions in predicting that such 95% level emissions would be short in duration and consequently limited in impact. These assumptions were; one, that by definition 95% level emissions could on the average occur only 5% of the time that the facility was operating; and two, that individual incidents of 95% level emissions would seldom exceed forty-five minutes to an hour in length, that according to Blount engineers being the average time required to incinerate a "slug" of waste.

The relatively short duration of these maximum emissions was then compared to the projected forty-day capacity of the Fry's Pond drainage basin to accumulate and in effect "store" pollutants emitted by the facility and deposited on the ground surface to later be carried to the Pond and eventually to Narragansett Bay dissolved in precipitation runoff. It was argued that this extended "storage capacity" of the drainage basin was even under worst case conditions so long relative to

anticipated fluctuations in emissions levels as to effectively buffer or average them out. As a consequence, applicant's witnesses represented that for all intents and purposes 95% level emissions would have no discrete environmental impacts, rather getting "lost" in short-term upward and downward fluctuations in emissions levels with impacts reflecting the effects of longer term average emission levels, not the fluctuations themselves.

The Town through cross-examination established that seasonal fluctuations in waste content might result in longer term fluctuations in emission levels than the forty-five minute to one hour excursions predicted by Blount's engineers. No applicant witness testified to any knowledge regarding projected seasonal emissions patterns or their possible environmental consequences, although Dr. Rahn testified that no such patterns were apparent in his review of recent emissions data from a Belgian RRF.

Town witnesses Brocard and Martin expressed their opinions that the applicant's assessment of environmental impacts was prone to underprediction for various reasons, but most notably that it did not

account for periods of maximum emissions coinciding with precipitation events. Dr. Swanson, however, was reintroduced by the applicant to testify that he had projected pollutant loadings and found no violations of EPA ambient water quality criteria for several scenarios, one a worst case scenario whereby 95% emission levels (based on PSD Application emissions data) were projected to persist during the entirety of a six-hour rain storm. Additionally, Mr. Martin in his written testimony agreed with the applicant's premise that emissions fluctuations should be averaged over a forty-day period to accommodate pollutant deposition patterns in the Fry's Pond watershed.

Applicant's witness, Dr. Mark Gould, was introduced to offer independent corroboration of Drs. Swanson's and Rahn's and Mr. Hittinger's testimony regarding environmental impacts on the terrestrial and marine environments.

In his closing argument for the applicant, Mr. Sherman represented that Dr. Gould's allegedly uncontradicted testimony regarding the means by which the scientific community weighs impacts on all forms of wildlife demonstrated conclusively that the AALs previously rejected by the Hearing Officer in his October 3, 1988 Decision and Order were, in fact, protective.

Because of limitations on Dr. Gould's qualification as an expert imposed by the Hearing Officer after extensive voir-dire and further due to the extremely general and largely unsubstantiated nature of the testimony proffered by this witness, he, however, failed to add very much of consequence to the applicant's case, Mr. Sherman's representations notwithstanding. Dr. Gould's efforts to defend his sweeping conclusions in regards to this application and the environmental consequences of its approval with few exceptions simply did not survive the rigorous scrutiny to which they were subjected.

3. Findings of Fact:

After review of all the documentary and testimonial evidence of record, I make the following specific

FINDINGS OF FACT:

1. The statistical manipulation of emissions data averages obtained from comparably equipped RRFs in order to compute 95% confidence upper bound emission levels provides an acceptable means of projecting highest total emissions levels per the Director's Order of February 7, 1989.



2. Computation of 95% confidence upper bound emission levels from average emissions levels other than those reported in Condition #21, as amended herein, is not authorized by the aforementioned Order of the Director. The applicant's employment of PSD Application emissions averages must, therefore, be rejected.
3. 95% confidence level emissions will be short in duration relative to the forty day depositional "carrying capacity" of the Fry's Pond watershed. As a consequence, short term up and down fluctuations in emissions levels even where coinciding with precipitation events will have minimal environmental impacts and the principal factor in generating such impacts will instead be the average of emissions over the forty day period measured on an annual basis.
4. The average emissions limits reflected in Condition #21 and as reported in Table 3 of Exhibit #69 have already in his Decision and Order of October 3, 1988 been found by the Hearing Officer to be protective per APC Rule 7 of the various environmental parameters referenced in the



Director's February 7, 1989 Order to reopen this proceeding. It consequently follows that 95% confidence upper bound level emissions based on Condition #21 annual average emission limits will be similarly protective.

5. Seasonal variations in waste content may impact on emission levels.
6. It has not been demonstrated that the proposed facility can operate in compliance with APC Rule 7 for any period of time at levels in excess of the 95% confidence upper bound.
7. No evidence has been introduced which would lead the Hearing Officer to reconsider Findings of Fact #16 or #19 on pages 55 and 56 of the Decision and Order of October 3, 1988.



STACK MONITORING PROTOCOL

1. Testimony:

Richard Hittinger testified for the applicant regarding its proposal to monitor compliance with average emissions limits per the Director's Order of February 7, 1989. Mr. Hittinger testified to a program which would involve both environmental monitoring and quarterly stack testing components and whose objective would be to demonstrate conformance with PSD Application emission levels as annual averages and PSD derived 95% confidence levels as emissions maximums.

The applicant's monitoring program as described by Mr. Hittinger further proposes to limit monitoring to nine "pollutants of concern" from among the nineteen pollutants identified in Condition #21, all identified because they exceed 10% of the applicable AAL set by the Division of Air and Hazardous Materials. This was justified as focusing effort and financial resources on those pollutants emitted at levels showing any probability of impact.



After one year of quarterly testing Mr. Hittinger testified that results would be forwarded to the Division along with a recommendation for a modified monitoring protocol which based on the first year's test results would further narrow down the number of pollutants monitored regularly. The applicant would also attempt to identify an emissions "signature" unique to the facility to facilitate continued monitoring.

Cross-examination of Mr. Hittinger on behalf of the Division and the Town extracted the admission that neither the Director's Order of February 7 nor his March 21, 1989 Memorandum authorized monitoring a "short list" of Condition #21 pollutants or monitoring for compliance with a higher emissions average that set forth in Condition #21. Mr. Hittinger, however, maintained that the proposed monitoring protocol could be employed to measure compliance with any emissions standard or limit.

Mr. Majkut, testifying on behalf of the Division, confirmed the Division's understanding of the Director's Order as requiring additional stack testing and then only for the purpose of establishing compliance with all Condition #21 emission averages. Mr. Majkut recommended that annual testing be continued and averaged with the results of the applicant's proposed first year quarterly testing to establish an annual emissions average for each Condition #21 pollutant.

2. Findings of Fact:

After review of all the documentary and testimonial evidence of record, I make the following specific

FINDINGS OF FACT:

1. Environmental monitoring of the sort proposed by the applicant is already required by various Conditions of the Decision and Order of October 3, 1988, specifically #22, 24, 36 and 37.
2. Quarterly testing of stack emissions provides a reasonable method of monitoring compliance with annual emissions averages. However, quarterly testing for one year is not sufficient to measure compliance on an on-going basis and testing against emissions limits other than those set by Condition #21 as amended herein or for anything less than the full compliment of pollutants identified in Condition #21 is not consistent with the Director's Order of February 7, 1989.
3. Employment of an "emissions signature" to test for compliance with Condition #21 annual average emissions limits is not consistent with the aforementioned Order of the Director.

CONCLUSIONS OF LAW

Based on all the documentary and testimonial evidence of record, I conclude the following as a matter of law.

1. Reasonable notice of the reopening of this proceeding was provided as required by the Administrative Procedures Act, RIGL §42-35-1 et seq., and Rule 13(d) of the Administrative Rules of Practice and Procedure for the Department of Environmental Management.
2. The applicant bore the burden of proving by a preponderance of the evidence that:
 - a. At highest total emission levels the proposed facility will comply with its obligations under APC Rule 7 as to impacts on terrestrial and aquatic vegetation, birds, reptiles and marine and aquatic biota inhabiting Narragansett Bay and associated ponds and wetlands, and
 - b. A monitoring protocol/stack testing procedure has been proposed which is capable of insuring that average annual emissions as set forth in Condition #21 as herein amended are actually achieved.
3. Subject to the following conditions, the applicant has demonstrated by a preponderance of the evidence that the facility will comply with the applicable General Laws and with Air Pollution control Regulation 7 adopted by the Department of Environmental Management.

ORDERED

Therefore, that the license to construct and operate a major source of air pollution in an attainment area which was issued on October 3, 1988 shall be modified to require strict compliance with all of additional conditions delineated below:

Condition '89/1.

Condition #21 of the October 3, 1988 Decision and Order shall be amended as follows (new language underlined):

21. Total emissions of state regulated (AAL) pollutants measured as an annual average shall not exceed those reported in Table 3 of Exhibit 69 except for cobalt, total mercury and vanadium which shall not exceed levels reported in the PSD Application, as follows: (Units are millograms per second per flue (mg/sec/flue) except for 2, 3, 7, 8 Total Toxic Equivalents (Dioxins/Furans) whch are micrograms per second per flue (ug/sec/flue).

Lead	5.53 E-01
Antimony	2.20 E-01
Arsenic	8.90 E-03
Beryllium	2.00 E-03
Cadmium	2.20 E-01
Chromium	7.56 E-02
Copper	1.26 E-01
Cobalt	3.00 E-02
Manganese	4.29 E-01
Mercury (Particulate)	1.48 E-01
<u>Mercury (Total)</u>	<u>4.00 E+00</u>
Molybdenum	1.25 E-02
Nickel	1.57 E+00
Selenium	9.84 E-03
Tin	1.24 E-02
Vanadium	3.10 E+00
Zinc	7.71 E-01
PAH	4.78 E-02
B (a) Pyrene	6.25 E-03
2, 3, 7, 8 TTE	2.80 E-06

Condition 89/2.

Applicant, RISWMC, shall incorporate the testing for and/or monitoring of both particulate and total mercury levels in the various testing and/or environmental monitoring plans and protocols required by Conditions #22, 24, 36 and 37 of the Condition and Order of October 3, 1988.

Condition '89/3.

Applicant RISWMC shall within thirty (30) days of receipt of this Decision and Order compute and forward to the Division of Air and Hazardous Materials for its review and approval 95% confidence upper bound emission limits for the Condition 21 pollutants based on the annual average emissions limits set forth in Condition '89/1 above.

Such submission shall contain all raw emissions data employed and all arithmetic/statistical manipulations of that data in addition to the results themselves.

The Division shall provide the parties of record a reasonable opportunity to review this submission and advise it of any perceived statistical/arithmetic errors.

The Division shall then certify an approved 95% confidence upper bound emission limit for all those pollutants set forth in Condition #21, as amended per



Condition '89/1 above, which limit shall be the highest permissible level at which the facility can emit all such pollutants for any period of time whatsoever. This highest permissible emission level for each pollutant shall be incorporated in this Decision and Order by reference.

Condition '89/4.

Applicant, RISWMC, shall measure stack emission levels for all Condition #21 pollutants as herein amended on a quarterly basis for a period of not less than five (5) years in length beginning with commencement of commercial operations. The testing methods employed shall be those approved by the Division of Air and Hazardous Materials, and each quarter's test results including all raw test data shall be forwarded to the Division.

The Division will calculate an annual emissions average based on the first four quarterly test reports submitted by the applicant and shall measure these against the Condition #21 emissions limits as amended herein to determine compliance.

After the first year of testing, the Division will calculate a "running" annual emissions average by averaging each quarter's test results with the results of tests

obtained during the preceeding three quarters, which average will be measured against Condition #21 as herein amended to determine on a quarterly basis compliance for the previous twelve months.

At the end of five years of quarterly stack testing as herein ordered, the Division in its sole discretion may modify this testing protocol as to the frequency of testing and/or the pollutants measured.

I hereby recommend the within Decision and Order to the Director for adoption as a final Order of the Director.

5/18/89
Date

Malcolm J. Grant
Malcolm J. Grant
in his capacity as
Hearing Officer

[Signature]
Date

Robert L. Bendick, Jr.
Robert L. Bendick, Jr.
Director, Department of
Environmental Management

CERTIFICATION

I hereby certify that a true and accurate copy of the within Decision and Order has been sent ~~first class mail~~, postage prepaid to Mark A. McSally, Esq., McSally & Taft, P. O. Box 8830, 21 Garden City Drive, Cranston, R.I. 02920, Richard A. Sherman, Esq., Tillinghast, Collins and Graham, One Old Stone Square, Providence, R.I. 02903, George West, Esq., Manning, West, Santaniello & Pari, 711 Fleet Bank Building, Providence, R.I. 02903, Harlan M. Doliner, Esq., McGregor, Shea & Doliner, P.C., 18 Tremont Street, Suite 900, Boston, MA 02108, and Paul O. Plunket, Concern, Inc., 2 First Street, North Kingstown, R.I. 02852 and by interoffice mail to Claude A. Cote, Esq., Department of Environmental Management, 9 Hayes Street, Providence, R.I. 02908 on this 19th day of May, 1989.

[Handwritten initials]

Robert L. Bendick, Jr.

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