

product was mixed in four digesters in the sewage sludge processing module of the DRP. However, during this process the digesters emitted an objectionable odor. This is not surprising due to the composition of the materials involved and the nature of the process. To resolve this odor problem, Raytheon proposes to install a manifold system which would collect the gases from the digesters in a chemical chamber and emit them through a 150 foot dispersion stack ("Dispersion Stack").

The Dispersion Stack is subject to DNREC's air pollution regulations and permitting process. In the Odor Abatement Order, DNREC denied Raytheon's request to construct the Dispersion Stack/Air Pollution Control Device. DNREC concluded that Raytheon did not show that it would operate the DRP in accordance with Delaware law, or without constituting a nuisance. In the Operating Permit Order, DNREC granted a permit for Raytheon to operate the DRP as a solid waste facility, but it ordered the sewage sludge processing module (the digesters) to be closed. Raytheon's solid waste permit application and the Operating Permit Order arose under the new requirements contained in the 1989 DNREC Solid Waste regulations.

FINDINGS OF FACT

1. Raytheon operates the DRP under contract with the facility's owner, DSWA.
2. The DRP received municipal solid waste, recycled certain metallic materials and separated refuse derived fuel and organic wastes. The organic wastes were combined with sludge received

from Wilmington's waste water treatment facility and mixed in four digesters in the DRP. The digesters processed the wastes through decomposition in large metallic tanks. This mixture was processed and aged into a compost/fertilizer product for resale and also used by DSWA as landfill cover. The majority of the refuse derived fuel received in the DRP now is incinerated in a facility in Chester, Pennsylvania. The remaining portion is landfilled. The DRP had processed the majority of New Castle County's wastes and Wilmington's sludge.

3. During this process, the digesters and accelerated decomposition process emitted an objectionable odor. The digesters were the source of the strongest odor and therefore the problem at DRP. The primary odor causing compound was identified as dimethyldisulfide ("DMDS").

4. The testimony from nearby residents showed that the odors from the DRP caused a nuisance, although the nuisance was not present everyday. DNREC received numerous calls over time from nearby property owners who complained about the odors. See DNREC Exhibit No. 1. This exhibit may not be entirely accurate, but it evidences a substantial odor problem. Outdoor activities, such as swimming, parties, and cookouts, have been seriously affected by these odors.

5. Raytheon's proposed odor abatement system involves connecting the four digesters and existing emission stacks through ventilation pipes and pumping the emissions into a chemical neutralization chamber. Approximately one-half gallon

of deamine (a masking/neutralization agent) would be added each hour. The chamber air would then be vented using a fan out the 150 foot Dispersion Stack. Thus, Raytheon proposed a mix, dilute and disperse solution to the odor problem. The present emission stacks are 50 feet high.

6. There was no evidence that the odors independently caused health problems although nearby residents testified that the odors may augment existing headache, sinus or similar health problems.

7. While the testimony regarding real estate values conflicted in part, it is obvious that property values would benefit from elimination of the odor problem.

8. Since the closure of the sewage sludge processing module, the amount of sludge related material being landfilled has approximately doubled.

9. Raytheon's past attempts to reduce the odor problem have been unsuccessful and its past predictions on odor reduction have not been accurate. For these reasons, DNREC viewed Raytheon's proposal from the start with skepticism. After the public hearing below, DNREC concluded that Raytheon did not provide adequate evidence to justify approval of its permit application. Also, Raytheon cannot guarantee that its present proposal will eliminate the odor problem.

10. The odors from the DRP upon emission from the Dispersion Stack would generally be dispersed vertically due to the height from the stack to the ground. There would also be

horizontal dispersion. On days where an inversion layer exists, the odors may not disperse vertically, but they should continue to disperse horizontally. It is unlikely that odors will increase in concentration at any reference point near the ground after installation of the Dispersion Stack.

11. The evidence suggests that deamine may not be the appropriate chemical agent to control DMDS odors. Nevertheless, adding deamine and the ventilation improvements, when combined with the increased dispersion, should lead to a significant reduction in the odor problem. Raytheon's expert witness, D. Bruce Turner, a certified consulting meteorologist and atmospheric dispersion modeling expert, predicted that the Dispersion Stack would dilute the odor problems down to an acceptable level.

12. Odors are measured by units of dilutions to threshold ("D/T") and the measurement reflects the dilution necessary to reduce the concentration of an odor.

D/T of 300 means that one volume of the original concentration must be diluted with 300 volumes of clean air for the mixture to reach the point that half the members of an odor panel (persons selected to smell samples to see if they can detect an odor) can detect an odor and half cannot detect an odor. D/T of 1 means that no mixing with clean air is required for half the panel to detect an odor and the other half not detect an odor.

Review of Dispersion Modeling of the Delaware Reclamation Plant by D. Bruce Turner, CCM (February 4, 1994) at 1; Exhibit C to Raytheon's Pre-Hearing Submission.

13. Mr. Turner did not offer the 150 foot Dispersion Stack

as the ideal solution after independent review. Rather, he accepted Raytheon's proposed improvements and emissions data and analyzed the results of atmospheric dispersion computer models using these inputs. He concluded to a reasonable scientific certainty that the proposed 150 foot Dispersion Stack will greatly reduce odors.

14. Raytheon used 300 D/T and 160,000 CFM as input figures for the dispersion modeling tests. No specific input standards are prescribed by DNREC or generally accepted elsewhere. The Board finds Raytheon's figures to be reasonable since 300 D/T is approximately 50% higher than actual 1992 measurements and 160,000 CFM approximates actual measurements. DNREC's request to use 520 D/T reflects the higher 1991 test data which should not recur due to improvements. See Raytheon's Submission at 12-13. Also, DNREC's request to use a 99.73% confidence level appears excessive for an odor problem. See DNREC's Pre-Hearing Brief Appendix 23-26.

15. Mr. Turner testified about dispersion modeling through the integrated gaussian model ("IGM") and the "puff" model, a proprietary system. Both models are scientifically accepted. The IGM is designed to measure average odor concentrations over time. The "puff" model is designed to measure instantaneous concentrations. The IGM dispersion testing results yielded averages below 1.0 D/T at a distance of 1 km., the approximate distance to Holloway Terrace, whose residents have complained about odors in the past. Mr. Turner concluded that the

Dispersion Stack will reduce odors at 1 km. to 1/39th of their original concentration and 1/11th at 5 km. Exhibit C to Raytheon's Pre-Hearing Submission at 2. The puff model yielded a maximum predicted actual peak of 4.1 D/T at 1 km., but the meteorological data indicates that this result would be very rare. A much higher reading was found at 400 meters, which is within the industrial area near the DRP. Mr. Turner concluded that the IGM and puff test results were consistent and that odor concentrations which exceed 1.0 will be "extremely rare." Id. at 5; Transcript at 87.

CONCLUSIONS OF LAW

DNREC urges the Board to defer to the expertise of the Secretary and affirm his decision in the Orders. While the Board generally does defer to the Secretary's expertise on scientific issues, the Board concludes here that appellant Raytheon has satisfied its burden of proof to show that the Secretary's decision is not supported by the evidence before the Board. 7 Del. C. §6008(b). Raytheon has shown that it is entitled to a construction permit. While the evidence before the Board (and the Secretary) supported closure of the digesters, it also showed that Raytheon should be entitled to construct the Dispersion Stack and odor abatement system and determine whether the DRP, as improved, will continue to emit an unreasonable odor.

DNREC's Air Pollution Regulations define "Air Pollution" to include contaminants which "unreasonably interfere[] with the enjoyment of life and property...." Regulation No. 1.

Regulation No. 19 prohibits emissions of odorous air contaminants which constitute air pollution. The Board has rejected Raytheon's proposed standard of 7 D/T to show an objectionable odor. Rather, the Board adopts the more flexible unreasonable interference standard in the Regulations and finds that past odors at the DRP have violated this standard.

DNREC's witnesses did cast legitimate doubt on Raytheon's evidence and conclusions. DNREC's air dispersion modeling expert, Ali Mirzakhali, testified about the shortcomings in Raytheon's proposed solutions. See Transcript at 199-259; DNREC App. A-13-29. DNREC does not believe that deamine and the other improvements will prevent the DMDS odors. Also, Raytheon's past solutions to the odor problem have not been successful. DNREC was not convinced that Raytheon could operate the DRP, after the improvements, without creating a nuisance. DNREC wanted Raytheon to adopt active odor controls as opposed to passive controls, such as a Dispersion Stack. While DNREC's reservations are justified, Raytheon's responses and the evidence before the Board overcame these reservations. The Board found Raytheon's scientific testimony, testing and conclusions to be generally credible. Raytheon has employed modern scientific modeling techniques here. It is important to note that these are the only methods available to estimate the dispersion of odors prior to construction and testing. On paper, Raytheon has convinced the Board that its proposal is sound and that it will significantly reduce odors.

The evidence revealed that deamine may be unsuccessful in reducing DMDS odors and that it is intended for use with other odors. See the Hearing Officer's Report at 13, 19-21; Chronology, Exhibit 3. However, the issue here is not the propriety of deamine itself but rather the success of the DRP and the proposed improvements as a whole. Deamine does succeed against certain odors and the improvements should increase dispersion of the DRP odors. If it turns out that deamine is unsuccessful here, Raytheon should be required to select an appropriate chemical or another method of controlling these odors.

While DNREC's evidence shows that Raytheon has not demonstrated its entitlement to an unconditional operating permit, the question of whether Raytheon is entitled to an operating permit is premature. Raytheon has submitted sufficient factual and scientific evidence to demonstrate that the proposed odor abatement system will succeed. Whether the DRP actually functions properly and whether Raytheon will be able to operate it in compliance with DNREC regulations and permit conditions will have to be resolved in the future. Also, the threat posed by the odor problem is less than the threat posed by the discharge of hazardous or toxic wastes. The nuisance posed by the odors may be eliminated by dispersion, whereas dispersion of toxic discharges does not eliminate the inherent toxicity. While the Board is sympathetic to nearby residents subject to the odor problems, Raytheon has proved that it is entitled to a

construction permit. Further testing should be required after construction to protect nearby residents from a nuisance.

Also, the evidence revealed substantial questions about the economic viability of the DRP. It is clear, however, that a recycling and processing facility which decreases the amount of waste landfilled does perform a public service. The social utility of the DRP, or whether its results justify its high cost, is certainly an issue which should be addressed. However, the Board is not the appropriate entity to resolve this issue; this is a permit appeal.

Therefore, the Board reverses the decision of DNREC and remands this proceeding for issuance of an appropriate construction permit. Any operating permit which DNREC decides to issue in the future should include appropriate, enforceable conditions which allow DNREC to monitor the odors from the DRP and take remedial action. DNREC should keep the digesters closed if the Dispersion Stack and control measures do not substantially eliminate the nuisance caused by the digester odors. The Board recognizes that Raytheon/DSWA may not wish to construct the proposed improvements and expend the necessary funds in order to receive an operating permit which, by its terms, may be quickly terminated. However, Raytheon has not convinced the Board that its proposed solution will be entirely successful--only that it should have an opportunity to commence this project.

CONCLUSION

Therefore, by a vote of 4-1, the Board reverses the Secretary's decisions in the Orders and remands this appeal for issuance of an appropriate construction permit. The evidence before the Board revealed that Raytheon's proposal will significantly reduce the DRP's odor problems. Whether the reduction will be sufficient will not be known with certainty until after construction and testing. The question remains whether the cost of these improvements are justified given the risk that the DRP digesters may be shut down again. Ray K. Woodward dissents.

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