BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
Petition of Emerald Polymer	)	
	)	AS 19-002
Additives, LLC for an Adjusted	)	
	)	(Adjusted Standard)
Standard from 35 Ill. Adm. Code	)	
	)	
304.122(b)	)	

WRITTEN TESTIMONY OF GALEN HATHCOCK

I. INTRODUCTION

1. This Written Testimony is submitted to the Illinois Pollution Control Board ("Board") in the matter captioned as *In the Matter of: Petition of Emerald Polymer Additives, LLC for an Adjusted Standard from 35 Ill. Adm. Code 304.122(b)*, AS 19-002, and in accordance with the Hearing Officer's order dated November 25, 2019.

II. EXPERIENCE

2. My name is Galen Hathcock. I am currently employed as Site Director of the Henry Plant of Emerald Polymer Additives (Emerald) and have held that position since May 2017.

3. I began my career with a bachelor's degree in Chemical Engineering from Iowa State University. I went on to a number of engineering and operations management positions in a number of companies which include specialty chemicals and food ingredients.

4. For 13 years I worked for Nalco Chemical Company, now Ecolab, where I began as a Process Engineer and progressed through several positions to become the Plant Manager of the largest facility in Garyville, LA. After Nalco Chemical, I switched to the food industry

where I was the Plant Manager at Sensient Flavors, then Vice President of Operations at Indiana Sugars.

5. I then moved on to be Operations Manager at Quality Oil, and then prior to Emerald, I was the Director of North American Operations at the Beckers Group making coil coatings. In these positions, I have had the roles of engineer, supply chain specialist, and operations manager where I have been responsible for improvements, safety, and overall business performance.

III. COMPLIANCE WITH BOARD ORDER IN AS 13-2

6. On April 16, 2015, as modified on December 1, 2016, the Board entered orders setting certain conditions on the adjusted standard relief granted to the Henry Plant in the prior adjusted standard proceeding, AS 13-2. As Site Director, I have ultimate responsibility for managing and ensuring compliance with those conditions.

7. One condition in AS 13-2 sets emission limits for total ammonia nitrogen at the Henry Plant of daily maximums of 140 mg/L and 1,633 pounds/day (lbs/day) and 30-day averages of 110 mg/L and 841 lbs/day. Emerald has complied with those limits since issuance of the adjusted standard on April 15, 2015. Petitioner's Hearing Exhibit 2 are annual summaries of the daily monitoring results that Emerald used to file monthly DMR reports with the Illinois Environmental Protection Agency for 2013 through June 2019, including the following parameters: ammonia nitrogen as N (in both mg/L and lbs/day), biological oxygen demand (BOD), pH and temperature, among others. According to the definitions in the standard conditions in Attachment H to the Henry Plant's 2016 NPDES permit, a 30-day average value is calculated as the sum of all measured daily discharges during a calendar month divided by the

number of measured values during that month. We interpret the 30-day average limits specified by the Board in AS 13-2 in a similar manner.

8. Petitioner's Hearing Exhibit 3 is a summary of the ammonia sampling data reflected on Petitioner's Hearing Exhibit 2. According to that exhibit, from April 16, 2015 through June 2019, the highest daily maximum ammonia nitrogen concentration for each year ranged from 96.0 to 130.0 mg/L, but never exceeded the daily maximum limit of 140.0 mg/L established in AS 13-2. Over the same period, the highest daily maximum ammonia load in each year ranged from 454.3 to 553.4 lbs/day, but never exceeded the daily maximum limit of 1,633 lbs/day established in AS 13-2. From April 16, 2015 through June 2019, the highest 30-day average ammonia concentration in each year ranged from 74 to 102 mg/L, and the highest 30-day average ammonia load in each year ranged from 368.0 to 430.0 lbs/day. These highest 30-day average figures also complied with the limits set in AS 13-2.

9. Emerald continues to operate and discharge its wastewater to the Illinois River through the high-rate, multi-port diffuser and also operates the fluid bed dust collector that replaced the BBTS Wet Scrubber and the acetonitrile recovery column instrumentation upgrades.

10. Prior to my becoming Site Director, the Henry Plant conducted several evaluations of possible process changes and other changes to decrease the presence of Total Kjeldahl Nitrogen (TKN) and/or nitrification inhibitors into the wastewater stream. Many of those efforts are described in detail in the Written Testimony of David Giffin submitted to the Board in 2004. We have reviewed his written testimony in connection with our more recent efforts in this area and agree with his overall observation that source reduction efforts are preferable to end-of-pipe solutions.

11. After the granting of the first adjusted standard, the Henry Plant established a continuous project improvement team to evaluate potential process modifications and product formulations to recover mercaptobenzothiazole (MBT) as well as a few of the key organic compounds that serve as building blocks for most of Emerald's products, which would thus reduce their presence in the wastewater stream. Over the next several years, the Henry Plant completed a number of projects believed to achieve source reduction of either TKN or nitrification inhibitors and reported on those projects to IEPA. These included replacement of the BBTS scrubber with a dust collector (2007), treatment plant optimization training (2008), improvements to the tertiary butyl amine column that lowered loss of amines to the sewers (2009), instrumentation upgrades for the acetonitrile recovery column to better control absolute pressure that impacts recovery efficiency (2011-2012), and efforts to reduce t-butylamine loss from a product manufactured in Building 725 (2013-2015). Between 2016 and 2018, the project team did not identify specific process modifications that would further reduce TKN or nitrication inhibitor losses to the treatment system influent. Copies of Emerald's letter reports to the IEPA pursuant to AS 02-5 and AS 13-2 that include summaries of these source control efforts are in Petitioner's Hearing Exhibit 4.

12. Today, the primary members of our continuous project improvement team are myself, Chris Wrobel, our corporate Environmental Health, Safety & Sustainability Director, and Mark Winters, our wastewater treatment plant operator. Occasionally, we also consult technical staff working in support roles, which includes process and project engineers and our quality control laboratory staff. Highly qualified experts have attempted to identify end-of-pipe solutions to the level of ammonia in the Hentry Plant effluent. Their evaluations have consistently shown that those solutions either will not reliably achieve compliance, will have

other negative environmental side-effects or will be much more expensive than the costs typically incurred by facilities to achieve ammonia reduction. Our team, many of whom are new to the Henry Plant in the last 1-3 years, have brought fresh eyes to the problems and re-focused our efforts.

13. We are now trying to identify and quantify sources of ammonia, TKN and nitrification inhibitors, principally MBT from within various production areas of the plant. This is being done through a survey to sample levels of TKN, nitrate/nitrite, ammonia and MBT from various feed sources within the plant and at key locations in the wastewater treatment system. Once identified, our project team attempts to find solutions to achieve more complete process reactions so that ammonia, TKN and MBT loss to wastewater are reduced or to find approaches to destroy or convert these compounds at the process source or at a combined point prior to the wastewater treatment system.

14. An example of our current efforts began in the late summer of 2019, when we unexpectedly measured low levels of ammonia in our treatment plant effluent. We immediately launched a new project to identify the combination of factors that led to this result. A sampling plan was implemented to measure the flow and concentration of MBT from each process. Initial data indicated that there were two primary sources of MBT and we began optimizing the key processes to reduce MBT in the process effluent. The production of n-tert-butylbenzothiazole-2-sulphenamide (BBTS) was the largest identified source of MBT. BBTS is a large volume product that has undergone several continuous improvement steps which have substantially reduced the process effluent MBT levels. The process improvement team intends to apply this same approach to other manufacturing processes at the Henry Plant.

15. We believe that our process improvement efforts, particularly reductions of MBT into influent to the wastewater system, will have a positive effect on the levels of ammonia discharged from the Henry Plant. But, evaluating the effectiveness of the 2018 and 2019 continuous project improvement team efforts is difficult for a number of reasons. First, production at the Henry Plant during 2019 has been much lower than in 2017 and 2018. In particular, production involving MBT and other products that contribute to inhibition of nitrification has been substantially lower than in prior years. Second, drawing precise cause and effect conclusions from any short-term, experimental process changes is simply difficult with a complex chemical plant such as ours with some inherent variability that depends on product mix and a wide range of other factors. Third, as our consultants have advised us, MBT may inhibit nitrification at concentrations as low as 3 mg/L. Thus, it is difficult to evaluate whether process changes that reduce the loss of TKN or MBT into the wastewater stream have any significant impact on the concentration of ammonia discharged.

16. Emerald evaluated the technical feasibility and economic reasonableness of the specific alternative treatment technologies or approaches required by AS 13-2, Condition 2(e) and submitted reports on those evaluations to IEPA in April 2018. A copy of those reports is included in Petitioner's Hearing Exhibit 4. The alternatives evaluated were the treatment of the polymer chemicals equalization tank wastewater with granulated activated carbon to remove MBT, the dilution of MBT in the primary clarifier effluent with water from the Illinois River and spray irrigation of the Henry Plant treated effluent on land owned by Emerald near the plant. As explained in greater detail in those reports, Emerald did not consider any of those alternatives both technically feasible and economically reasonable.

17. Upon reviewing the reports in Petitioner's Hearing Exhibit 4, IEPA did not request a modification of the adjusted standard issued in AS 13-2. So, Emerald is in compliance with AS 13-2, Condition 2(g).

18. In addition, Emerald has operated the wastewater treatment plant in substantial compliance with the Clean Water Act, the Board's regulations and the NPDES permit issued to the Henry Plant. Since April 2015 when the Board granted the adjusted standard in AS 13-2, Emerald has received two violation notices from IEPA related to wastewater discharge issues. None of those notices have alleged violation of the ammonia standards set in AS 13-2.

19. Violation Notice W-2015-50227 alleged violations of numeric limits for total cyanide, total phenolics, chlorobenzene, TSS and carbonaceous BOD in 2015. Emerald explained the reasons for the exceedances to IEPA and proposed a compliance commitment agreement, which it approved. Emerald subsequently submitted a compliance statement to IEPA. Copies of the notice, the compliance commitment agreement and the compliance statement are in Petitioner's Hearing Exhibit 5.

20. Violation Notice W-2019-50007 alleged violations of numeric limits for TSS and fecal coliform during 2018 and the failure to submit the stormwater pollution prevention plan annual facility inspection report for 2018. Emerald again explained the reasons for the exceedances to IEPA, prepared and submitted the annual facility inspection report and proposed a compliance commitment agreement, which it approved. Emerald subsequently submitted a compliance statement to IEPA. Copies of the notice, the compliance commitment agreement and the compliance statement are in Petitioner's Hearing Exhibit 6.

21. Based on the above, I believe that Emerald has complied with the conditions established by the Board in AS 13-2.

IV. THE HENRY PLANT

22. The Henry Plant is located on 1550 County Road 1450 in Henry, Illinois in northwestern Marshall County. The facility was originally constructed and owned by the B.F. Goodrich Company and has long consisted of two operations: a polyvinyl chloride (PVC) resin facility and a specialty chemical facility. Today, the PVC resin facility is owned and operated by Mexichem Specialty Chemicals. Its products are sold to a variety of customers including those in the construction, household furnishings, consumer goods, electrical, packaging and transportation industries. The specialty chemical plant has been owned and operated by Emerald, or its corporate parent, Emerald Performance Materials, LLC, since 2006. Our plant produces accelerators used by the rubber industry and anti-oxidants used to inhibit the oxidation process in materials such as rubber, jet fuel, greases, oils and polypropylene.

23. The Mexichem and Emerald operations share utility operations consisting primarily of a boiler and a combined wastewater treatment system. That latter system is owned and operated by Emerald pursuant to a service agreement. During 2016 through 2018, the system treated approximately 500,000 gallons per day of combined effluent from Mexichem's operation, Emerald's operations and combined utility and potential contact storm water.

24. The vast majority of Emerald's production has historically been accelerators. Almost all of the accelerator production at Henry utilizes MBT as the key intermediate (73% of total plant production). MBT-based accelerators have been used in the rubber industry for well over 50 years and are the most common type of accelerator. MBT-based accelerators, which are relatively inexpensive and very efficient, are essential to the economic production of tires and industrial rubber products. Given the low cost and high value MBT-based accelerators provide customers, it is highly unlikely they will be replaced in the foreseeable future.

25. Emerald is the sole remaining manufacturer of MBT in the United States. As such, the Henry plant is now one of only two providers of MBT-based accelerators in the U.S. Lanxess is the other provider; they import MBT from their facility in Antwerp (Belgium) and produce accelerators at their Bushy Park, South Carolina plant. The Emerald Henry plant is the sole U.S. producer of the following accelerator chemicals: Cure-Rite 18®, OBTS, and MBDS.

26. Along with MBT, these accelerators are used by Emerald's customers as a critical component when they produce rubber, which is a national strategic product. In the production of accelerators there are several key raw materials: sulfur, aniline, carbon disulfide and amines. The manufacture of accelerators is a multi-step process including the manufacture of an intermediate (sodium mercaptobenzothiazole). This intermediate is then reacted with an amine and other raw materials to form an accelerator product. The product is then isolated through filtration and drying.

27. There are various types of antioxidants manufactured by Emerald at the Henry Plant which utilize either diphenylamine or one of several phenols as a starting material. The processes consist of both batch and continuous reactors, filtration operations and solidification.

28. Emerald has continued to produce most of the same products that were produced by Noveon (a prior owner in the early 2000's). There are a few exceptions. Emerald no longer produces X70 and GELTOL which contributed only a small portion of the total Noveon production. In addition, we currently produce much less of the products OBTS and Cure-Rite 18® in response to market conditions. Emerald does not produce any of the health care or personal care products that Noveon started to produce. Emerald completed the installation and began operation of the sodium hydrosulfide (NaSH) system in 2006 to significantly reduce hydrogen sulfide emissions, which previously were sent to an onsite flare. The NaSH system

does not produce any appreciable process wastewater and what is produced has no ammonia or ammonia precursors.

29. Ammonia is not a major raw material in any of the processes at either Mexichem or the Henry Plant. As an ingredient in the Henry Plant production processes, ammonia is only used in minor amounts in one low volume product. Mexichem uses ammonia as an ingredient to produce an emulsifier for use in one of the PVC processes and some ammonia is present in the PVC tank effluent to Emerald's treatment system. But, as explained in Houston Flippin's 2019 expert report, testing has shown that the source of the ammonia nitrogen in the effluent is not primarily related to the level of ammonia in the treatment system influent. Rather, the amines in the treatment system influent are converted to ammonia nitrogen in the wastewater treatment process and, because nitrification does not occur as the result of inhibition, the ammonia nitrogen is subsequently discharged from the wastewater treatment plant.

V. WASTEWATER TREATMENT SYSTEM DESCRIPTION

30. The wastewater treatment system at the Henry Plant is a multi-process system that treats process wastewater from both Emerald and Mexichem operations and also non-process discharges including potential contact stormwater and non-contact cooling water. Petitioner's Hearing Exhibit 7 is a block flow diagram of the current wastewater treatment system. The Henry wastewater treatment system has historically provided greater than 95% BOD reduction. In addition, from 2015 to mid-2019, the highest daily maximum ammonia nitrogen value in any month has ranged from 17 to 130 mg/L while the 30-day average ammonia nitrogen value has ranged from 8 to 102 mg/L. *See* Petitioner's Hearing Ex. 3. This broad range probably reflects routine variability in plant operations and changes in production volume and product mix. Average daily maximum concentrations for those years have ranged from 56 to 79 mg/L. *Id.*

31. All process wastewater is collected in equalization tanks prior to transfer to the primary treatment system. Wastewater from the Henry Plant's production of accelerators and antioxidants discharge to either the polymer chemicals equalization tank or to the Cure-Rite 18® (also known as the C-18) equalization tank. Waste activated sludge and solids from the Mexichem wastewater pretreatment system that are not captured by the solids filter press discharge to the PVC equalization tank. From time to time depending on plant conditions, the PVC equalization tank may also receive recycle streams from various wastewater treatment processes such as the overflow from the filter press feed tank in the press building, backwash from the traveling bridge sand filters and returning pond water. In the primary treatment system, wastewaters are mixed, pH is adjusted, coagulant and flocculent are added, and then wastewater is sent to the primary clarifier where suspended solids are separated. The solids are dewatered and sent to a landfill as a non-hazardous special waste.

32. After primary clarification, the wastewater is sent to activated sludge treatment for biological treatment in what we call "biotreaters." The biotreaters are tanks that range in size from about 270,000 gallons to roughly 1.4 million gallons and contain biomass to degrade the organic matter in the wastewater. The facility has four biotreater tanks. Only one is currently in service, but its capacity is sufficient to treat the current treatment system flow. The Henry Plant currently is conducting design engineering to begin modifications to put some of those biotreaters back in service to provide redundant capacity for the treatment system. Simply restoring this capacity is not expected to improve ammonia reduction in the treatment system. The addition of air into the biotreaters ensures that the biomass has sufficient oxygen to complete the degradation of organic materials and also ensures through agitation that the biomass comes into adequate contact with the organic matter contained in the wastewater.

33. After biological treatment in the biotreaters, the wastewater flows into the secondary clarifier where more coagulant and flocculant are added. The solids removed during secondary clarification are primarily biomass and are returned to the biotreaters.

34. The wastewater from the secondary clarifier is then sent to a traveling bridge sand filter. As the wastewater passes through the sand bed, additional solids removal occurs and the effluent flows into a concrete sump leading to the outfall. Backwash from the sand filter is recycled back into the primary treatment system.

35. Non-process wastewater, including non-contact cooling water, potential contact stormwater, water from the boilerhouse demineralizer and water treatment works, is discharged to two holding ponds. Water from the ponds is then pumped into the primary treatment system.

36. The City of Henry operates a municipal POTW adjacent to the Henry Plant. The City of Henry municipal treatment system consists of an aerated lagoon followed by a sedimentation basin and effluent disinfection. The treated discharge from the City of Henry municipal wastewater treatment system combines with the treated Henry Plant effluent and is discharged together through the Henry Plant's outfall via the high-rate, multiport diffuser into the Illinois River. Compliance sampling of the Henry Plant and City of Henry waste streams is performed before the waste streams are combined.

VI. ENVIRONMENTAL IMPACT OF RENEWING THE ADJUSTED STANDARD

37. Both prior to my becoming Site Director and during my tenure, Emerald has conducted tests that demonstrate the ammonia in the Henry Plant wastewater is not having any significant negative effect on the Illinois River or the environment or human health.

38. Emerald conducted whole effluent toxicity (WET) testing in 2011, 2012, 2017 and twice in 2019 pursuant to conditions in its then-effective NPDES permits. All of the test

results were reported to IEPA. Petitioner's Hearing Exhibit 8 are Emerald's cover letters to IEPA along with the laboratory reports of the WET test results. Special Condition 14 of Emerald's current NPDES permit only requires further toxicity evaluation if the acute LC_{50} is found at less than 2.1% effluent. Looked at another way, an LC_{50} greater than 2.1% effluent is deemed acceptable given Emerald's approved ZID and mixing zone and indicates that the effluent is not toxic due to ammonia. Overall, the test results estimated LC_{50} values for the test organisms (*pimephales promelas*, fathead minnow, and *ceriodaphnia dubia*, water flea) at an effluent dilution ranging from 2.6% to 31.86% over the course of seven tests. So, the results showed that the effluent would not be toxic at the dilution factor achieved at the edge of Emerald's zone of initial dilution (about 39.7:1) by the multi-port diffuser installed and operated pursuant to the Board's adjusted standards. To my knowledge, IEPA has never communicated to Emerald that the WET test results were unacceptable or required further toxicity evaluation.

39. Emerald also conducted quarterly water quality testing in the Illinois River from 2007 to 2015 pursuant to conditions in its prior NPDES permit and reported those results to IEPA. Over the course of 9 years and 35 samples, ammonia was only detected on 6 occasions with the highest test result being 1.1 mg/L. Copies of the letter reports to IEPA that include the test results are in Petitioner's Hearing Exhibit 4. To my knowledge, IEPA has never advised Emerald that the water quality testing results were unacceptable or suggested a violation of the ammonia water quality standards.

40. Based on these test results, Emerald does not believe the ammonia in its wastewater discharge is causing any significant environmental harm or impact to the Illinois River or human health.

41. In addition, over the last several years, the combined plants have significantly reduced the volume of water discharged. The combined wastewater treatment plant has a design maximum flow of 1.4 million gallons per day (MGD) and a design average flow of 0.917 MGD. In 2002 and 2013, the plant reportedly discharged approximately 0.8 MGD. From 2016 through June 2019, the combined plants have reduced the wastewater flow discharged. Over those 3.5 years, the daily maximum flow has ranged from 0.486 to 0.764 MGD with an average of 0.598 MGD. Over the same period, the 30-day average flow has ranged from 0.398 to 0.678 MGD with an average of 0.500 MGD. We have not specifically studied the reasons for this decline in discharge flow, however, we generally attribute it to lower production volumes across all products and some general improvements in manufacturing processes that have reduced water usage.

VII. COMMUNITY AND OTHER ENVIRONMENTAL CONTRIBUTIONS

42. During 2019, the Mexichem facility employed approximately 70 individuals.

43. During 2019, Emerald employed approximately 66 individuals, most of whom live within a 30-45 minute drive of the City of Henry. Emerald annual payroll is about $7.3 million. Emerald's annual local real estate taxes are presently about $158,000. Emerald also spends about $2.5 million with local contractors on maintenance and improvements.

44. As noted above, in 2006, Emerald installed the NaSH system to reduce air emissions of hydrogen sulfide by using the exhaust gas stream from MBT production rather than sending that stream to a flare. That addition was installed at a cost of more than $10 million.

VIII. APPROPRIATE DISCHARGE LIMITS

45. IEPA's Recommendation suggested that if a new adjusted standard is issued the daily maximum limit should be set at 110 mg/L and the 30-day average should be set at 89.6

mg/L. Its justification for this was their belief that improvements to the MBDS process had been made since the fall of 2018 and their analysis of the maximum daily and 30-day average values for the Henry Plant from September 2018 to May 2019. Recommendation of Illinois EPA, 25-26. This analysis has several flaws.

46. The Henry Plant did not make any changes to the MBDS process in the fall of 2018 or early 2019. That statement in the Recommendation is wrong. The Henry Plant did make changes to the BBTS process between September 2018 and early 2019 that significantly reduced the loss of BBTS into wastewater. The BBTS process uses MBT, which inhibits nitrication, as a key intermediate. While this might improve the plant's ammonia discharge, we are unable to reliably reach that conclusion at this point in time for the reasons discussed below.

47. Since the early 2000's and before, our experts have told us that MBT inhibits nitrification if it is present at more than 3 mg/L in the wastewater system. As I understand it, the Board relied upon this testimony in issuing the adjusted standards for the Henry Plant in 2004 and 2015. Our data indicates that MBT has always been present in the primary clarifier effluent at levels far greater than 3 mg/L. Thus, regardless of any process changes reducing BBTS and/or MBT in the wastewater system, the reductions have not been sufficient to justify disregarding data prior to September 2018.

48. Also, we know that production levels at the Henry Plant have been significantly reduced in 2019 due to market conditions. So, the 2019 data is not representative of effluent ammonia concentrations that the plant could discharge when it is operating at much higher production volumes. While ammonia discharge data for the first half of 2019 is somewhat lower than in 2018 and prior years, we are unable to determine if that decrease is due to lower

production volumes or the BBTS process improvements or changes in product mix or other factors.

49. If we look at all the data since April 2015, the highest daily maximum reported in any month is 130 mg/L (July 2015). The plant also twice reported a daily maximum of 120 mg/L (July 2016 and April 2018), reported a daily maximum of 110 mg/L in 8 months and there were another 6 months in which the plant reported a daily maximum of 100 mg/L. Petitioner's Hearing Exhibit 3 provides monthly summaries of the discharge data. These data show that the plant would not be able to reliably achieve a daily maximum discharge limit of 110 mg/L. A discharge limit in a permit should be set so that a facility has sufficient leeway for variations in production capacity and product mix. The data continue to justify the daily maximum discharge concentration of 140 mg/L established by the Board in 2015.

50. IEPA's analysis for the 30-day average is flawed, too. Since April 2015, the plant has reported 30-day averages in excess of the 89.6 mg/L suggested by IEPA in 6 months with highs of 101 and 102 mg/L in May and July 2016 and a 30-day average of 99 mg/L as recently as March 2018. These data justify the Board in keeping the 30-day average concentration limit at 110 mg/L.

51. In contrast, over the last four years, despite the variability in the discharge, the Henry Plant's ammonia discharge measured as load has never been more than 34% of the daily maximum load limit (1,633 lbs/day) and has never been more than 51% of the 30-day average load limit (841 lbs/day). These calculations are reflected on Petitioner's Hearing Exhibit 3, EP003099. While we cannot identify any precise cause and effect for these results, we generally attribute the load reductions to a number of source control projects (see paragraphs 10-11 above) that allowed the plant to reduce flow and reduce the loss of nitrogen-containing compounds or

nitrification inhibitors into the treatment system influent. This data has convinced us that Emerald can reliably meet load limits reduced by 25% from the limits set in AS 13-2 even considering routine variability in plant operations and product mix and possibly increased production. These reduced load limits that we believe can be reliably achieved are a daily maximum load of 1,225 lbs/day and a 30-day average load of 631 lbs/day.