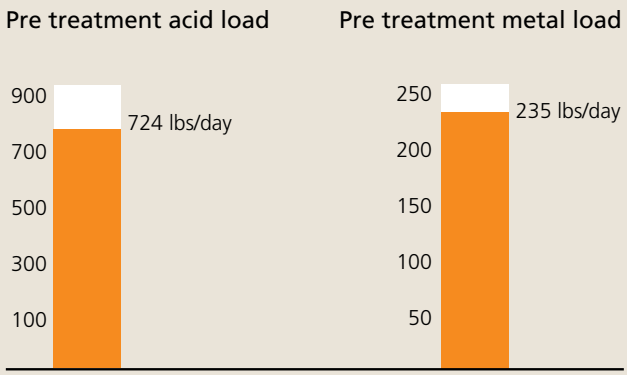
Project Status: Complete 3/31/2006 ODNR Project Number: HC-Wr-03

Pre-construction

Essex Doser, Photo by Monday Creek Restoration Project

SITE: SY00706

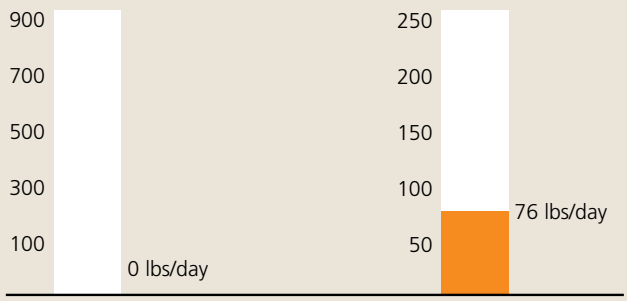


Data derived using the Mean Annual Load Method (Stoertz, 2004).

Post-construction

Essex Doser, Photo by Monday Creek Restoration Project

SITE: SY00706



Data derived using the Mean Annual Load Method (Stoertz, 2004).

Essex Doser is located in Section 18 of Ward Township in Hocking County and lies within the 14 digit HUC unit #05030204060040. The site is located along Sycamore Hollow, State Route 216. Abandoned underground deep mines and subsidence captures surround the area and discharge AMD into Sycamore Run through an open mine portal adjacent to State Route 216. Sycamore Hollow is a tributary to Snow Fork. The design was completed by ATC Associates for a cost of $32,320. The treatment was to install a lime doser. A problem encountered during design was that the funding for this project was originally intended to address Murray City Seeps. However the village of Murray City would not sign a right-of-entry form, so the project was moved to Essex Mine, further upstream of Murray City. The goal of the design was to neutralize acidity discharging from Essex Mine. The project goal, as indicated from initial post-construction sampling, has been met 100 percent. A major consideration encountered during the design was the close proximity of the doser to State Route 216. Construction was complete March 31, 2006, by AWT Services Inc. for a cost of $287,400. The funding sources for this project were ODNR-DMRM and EPA-319 for both the design and construction. Figure 3 & 4 (shown on page 3) estimate approximately 724 lbs/day of acid was reduced from entering into Sycamore Hollow and Snow Fork as a result of this AMD reduction project. In addition to the acid loading reduction measured at this site, there was approximately 871 lbs/day of alkaline addition to the headwaters of Sycamore Hollow. Total metal load reduction occurring at this site was approximately 159 lbs/day. The metals precipitate as a result of the high pH water and became part of the substrate. The doser was turned off during 2008 and is planned to be moved when the Army Corps of Engineers projects begin in 2010.

Water Quality report

Water quality data was collected at the project discharge as well as multiple stations pre- and post- construction. The graphs below show changes in pH (Figure 1) and acidity (Figure 2) along the mainstem of the receiving stream upstream and downstream of the project discharge as a result of the AMD reclamation project.

Figure 1. Pre and Post pH

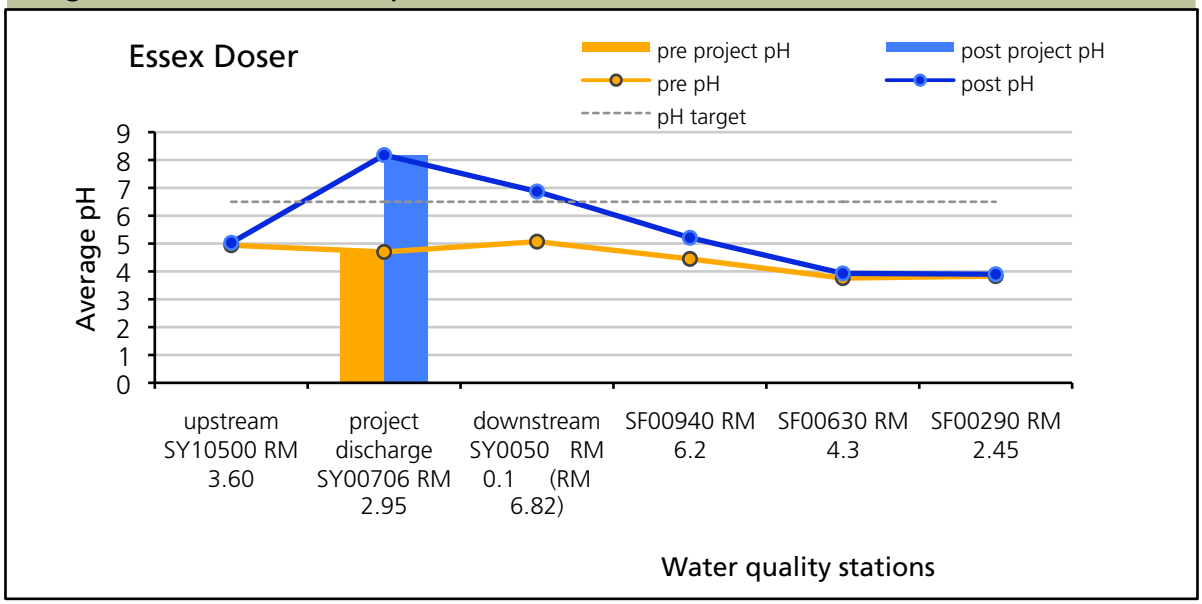
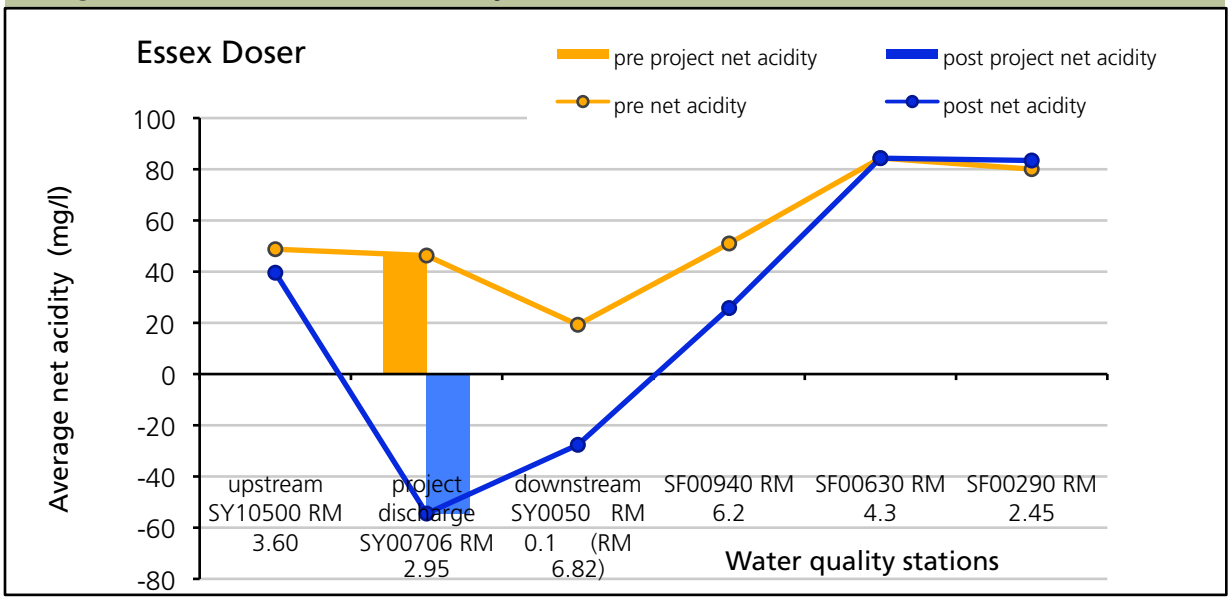


Figure 2. Pre and Post Acidity



As a result of the Essex Doser Project, pH and net acidity have improved downstream approximately 6.0 miles. Pre-construction data showed pH in the range of 3.7 – 5.1 at the project discharge and downstream. After installation of the Essex Doser Project, initial post-construction data shows pH values are in the range of 3.9 – 8.2 at the discharge and downstream. The net acidity concentration decreased 100 percent at the project discharge, resulting in net alkaline conditions on the mainstem of Sycamore Hollow for 2.95 miles.

Water Quality – load reductions

Using the Mean Annual Load Method (Stoertz, 2004), acid and metal load reduction occurring at this project were plotted and shown in Figure 3 and 4. Acidity, iron, aluminum and discharge were measured pre-, and post-construction at the project discharge from 7/10/2001 to 10/31/2005 for pre-construction and from 04/06/2006 to 12/31/2008 for post-construction.

Figure 3. Acid Load Reduction

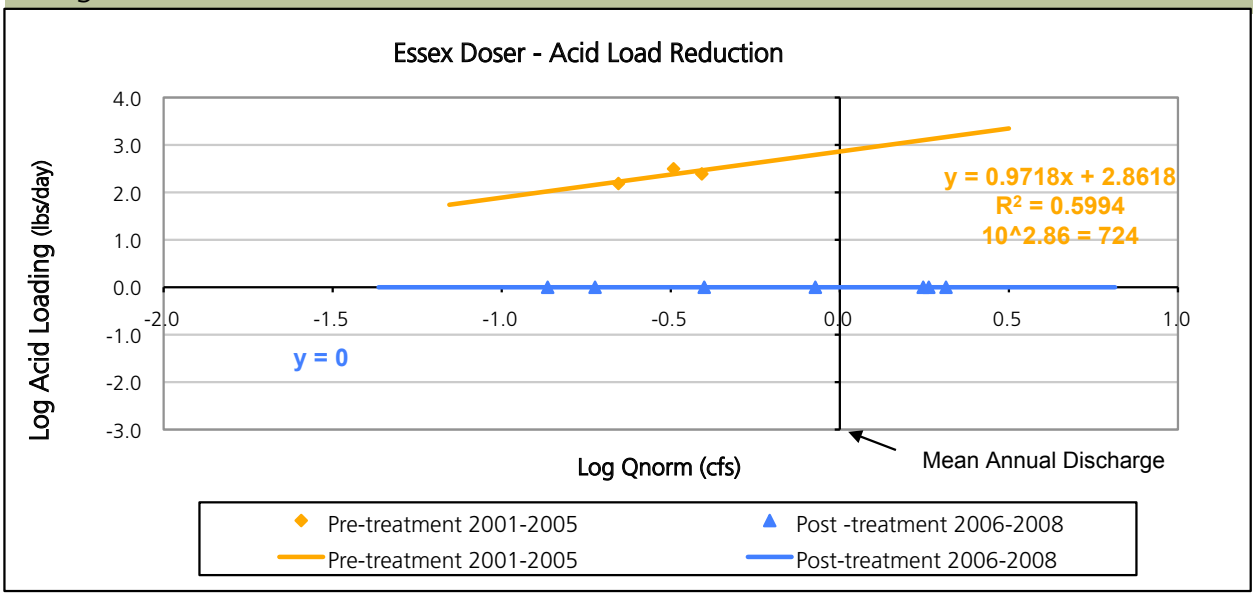
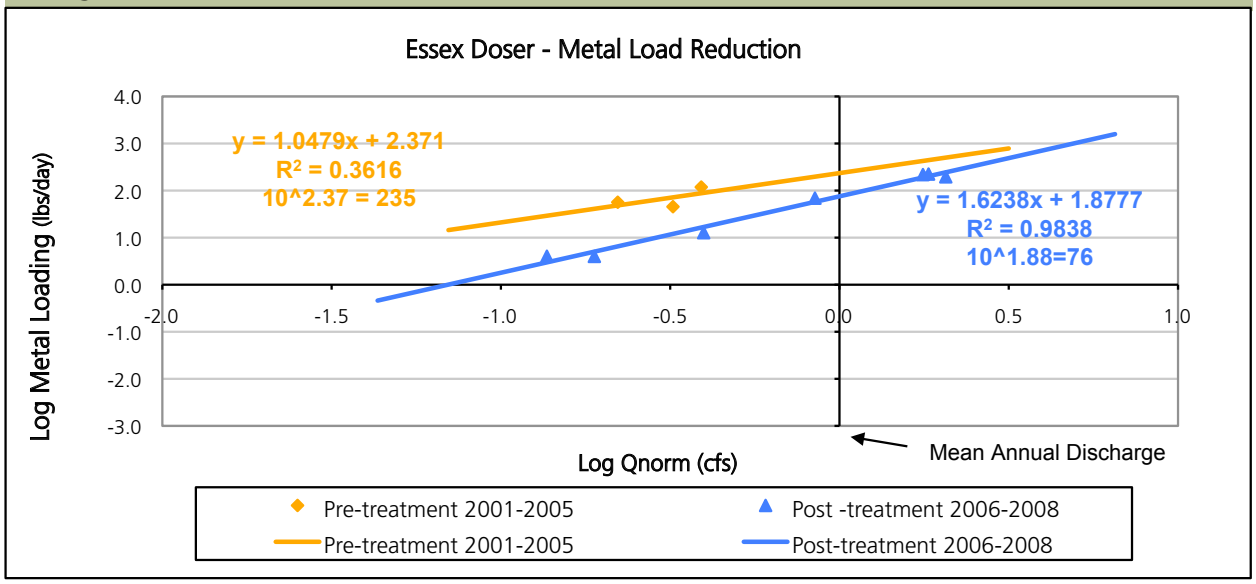


Figure 4. Metal Load Reduction



Stoertz, Mary W. and Douglas H. Green, 2004. Mean Annual Acidity Load: A Performance Measure to Evaluate Acid Mine Drainage Remediation. Ohio Department of Natural Resources Conservation and Restoration Innovations 2004 Applied Research Conference at Ohio University.

Similar to other environmental best management practices (BMPs), performance of acid mine drainage reclamation projects are also expected to decline with time. Currently, operation and maintenance plans are being designed for each existing system and for future projects. Figure 5 and 6 show the mean annual acid and metal load reduction (Stoertz, 2004) for each year (or group of years) during post-construction from the project effluent. These graphs show the rate of decline (and/or improvement) with time in the performance of the treatment system. Knowing this rate of decline will aid in the implementation of operation and maintenance plans for each site. Yearly load reductions are plotted and shown in Figure 5 and 6.

Figure 5. Yearly Acid Load Reduction

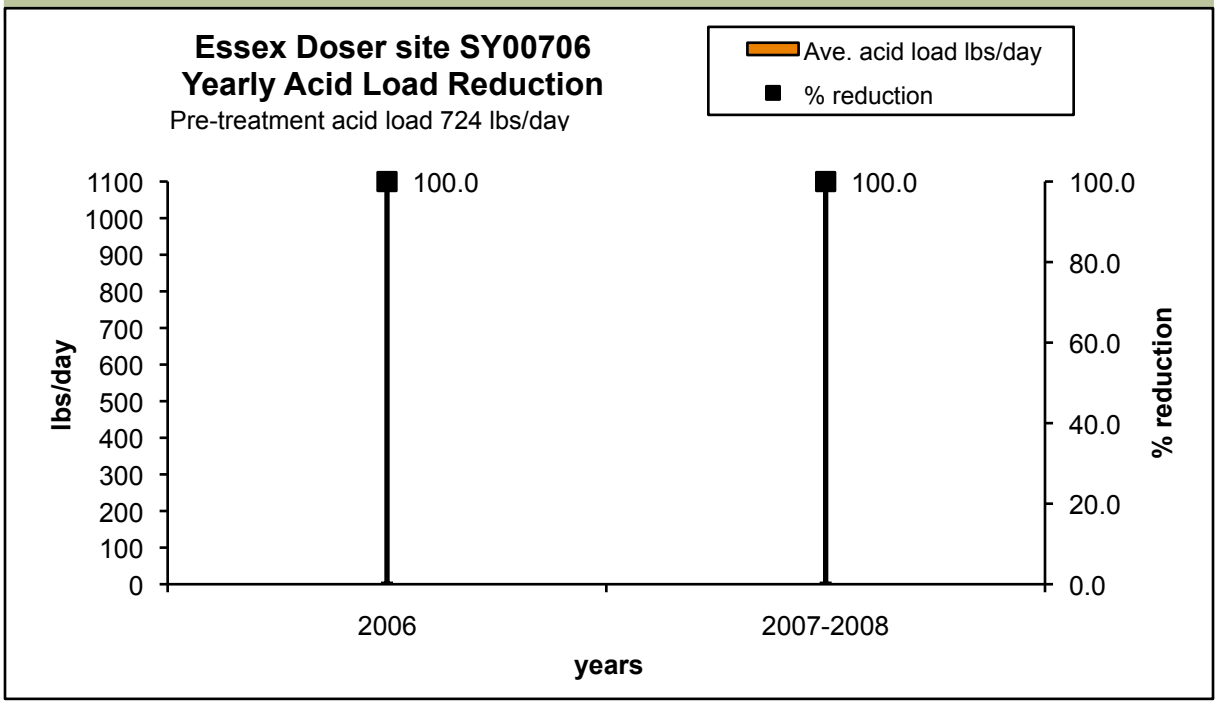


Figure 6. Yearly Metal Load Reduction