The Application of CanalSentry™ To the Riverside Ditch July 29, 2009

Report Prepared By:

INNOVIUM
Combining Chemistry & Nature

Innovium LLC
1734 Clarkson Road, #244
Chesterfield, Missouri 63017
Ph: 314-607-0563

Executive Summary:

Innovium has developed a product which significantly reduces seepage in canals, is biodegradable and is much safer to use than polyacryamide in this application. CanalSentry™ is a carbohydrate based natural product which contains a small amount of polyacrylamide. When applied at a rate of 3ppm into the canal water, it effectively aggregates small clay, silt, and silicates particles which reside in the water as suspended solids. These small particles are attracted to the negatively charged polymer and form aggregates which drop out of the water and fill the small cracks and crevices in the canal where water is seeping from.

On July 29, 2009, with the assistance of personnel from the Colorado State University, Mark Hochwalt from Innovium LLC, and Del Smith and John Osterberg from the Bureau of Reclamation, treated a 2.2 mile reach of the Riverside Ditch. Prior to treating the canal, flow measurements were made at the top and bottom of the reach to assess the flow rates and leakage rate over the reach. The upper reach was flowing at 3.2cfs and the lower reach was flowing at 2.5cfs. Based on this information, the estimated seepage loss was pegged at 0.7cfs.

To treat the canal, a water sample was taken to assess the water turbidity which is an indicator of suspended solids. The sample showed the water's turbidity to be less than 50 NTU. This is very low and Innovium likes to treat waters in this application above 100 NTU to produce a sufficient bed of solids from the treatment. It was decided that additional turbidity needed to be added to the water to effectively seal the canal, so two truck loads of sediment was brought into the reach and strategically dispersed so it could be added during the treatment.

The dosage of CanalSentry™ need to treat the water and achieve 3 ppm was 4 pounds per lineal canal mile. 8 pounds of CanalSentry™ was evenly applied across the 2.2 mile reach. The CanalSentry was dissolved into five gallon buckets which were placed every 0.1 miles. Each 0.1 miles was treated with a 1% solution of CanalSentry which contained 0.4lbs of the product. Flow measurements made after the application showed the upper end of the canal was running at 3.2 cfs and the lower end of the canal was running at 2.9cfs. The loss after application was 0.3 cfs. The loss before the application was 0.7cfs, therefore the application showed a savings of 0.4 cfs or a 57% reduction in seepage.

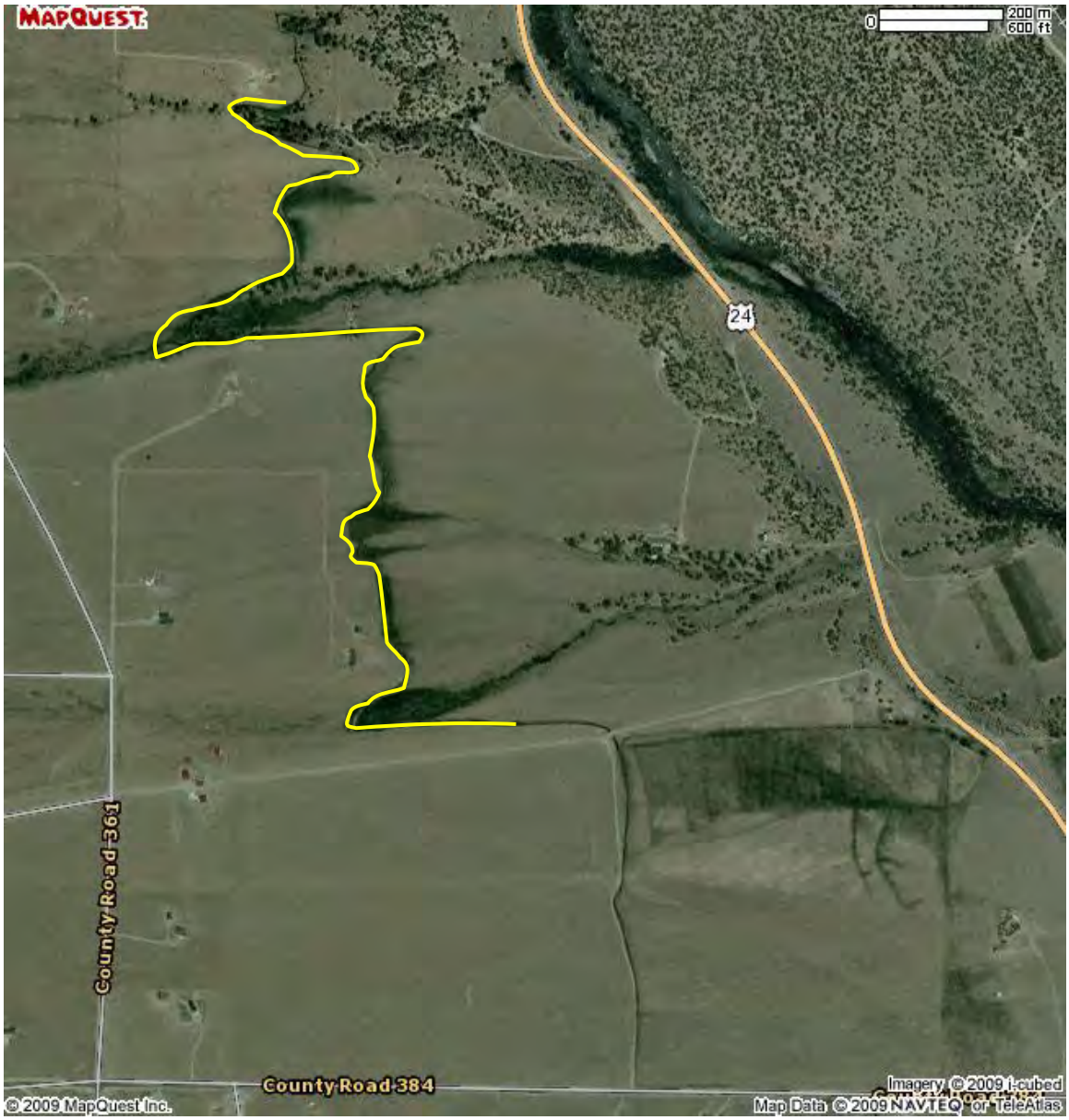
The calculated water savings for doing the treatment, assuming that one treatment will last the irrigation season is as follows:

Water Savings per day = 0.4 cfs X 3600sec per hour X 24 hours
= 34,560 cf per day / 43560 cf per acre ft
= 0.79 acre ft per day

Water savings per season = 0.79 acre ft per day X 120days
= 95 acre ft

Application Details:

A 2.2 mile reach of the Riverside Ditch was treated with CanalSentry™, a bio-friendly carbohydrate based canal sealant developed by Innovium LLC. Prior to the application, flow measurements were taken by the Bureau of Reclamation using a Sontek FlowTracker Handheld ADV (Acoustic Doppler Velocimeter). On the day of application the top of the reach had a flow rate of 3.2 cfs and the bottom of the reach had a flow rate of 2.5 cfs. There were no gates open in the reach, therefore the loss in the reach was calculated at 0.7cfs.



2.2 Mile Reach of the Riverside Ditch Treated with CanalSentry™

The map above shows the portion of the canal that was treated with CanalSentry™. The treatment was started at the lower end of the ditch near County Road 384 and preceded upstream to 2.2 miles. The total reach of application was 2.2 miles and 8 lbs of CanalSentry™ was evenly applied by walking up the reach and dispensing the dissolved product from a 1 gallon bucket.

Beginning of Application of CanalSentry

The application began at approximately 5:00 pm in the afternoon after being delayed by a shower. The application took approximately three and a half hours. Prior to the application, a sample of water was taken from the canal to check for turbidity. This is an indication of the level of suspended solids in the water which can be dropped out and used for sealing the canals. The measurement showed the turbidity to be less than 50 NTU, about half of what is desirable (100 NTU) to generate a good bed of solids for sealing. It was decided that additional turbidity was need to effectively seal the canal so several truckloads of fine soil was brought in and deployed along the reach so it could be shoveled into the canal.

CanalSentry™ being Dissolved in 5 Gallon Buckets

The dosage rate was targeted at 3ppm in the water which represents ½ half of the acrylamide level allowed in drinking water by the NSF 60 drinking water standard. The amount per canal mile was calculated using the flow rate and the velocity of the water with a target of 3 ppm for the concentration of the product in the water, and was determined that 4 pounds per lineal mile was required.

.

View Overlooking Treated Reach

Soil brought in to add to water Turbidity

Soil Being Deployed Along the Reach

CanalSentry™ being added to the Ditch

Soil being added to the Water to increase suspended solids

Results:

To validate the flow numbers after the application, a complete set of measurement were made after the application. The flow rate at the upper reach was measured at 3.2 cfs and the flow rate on the lower reach was measured at 2.9cfs. Before the application this reach was loosing 0.7 cfs. Therefore the application reduced the seepage by 0.4cfs, or a 57 percent reduction in seepage.

The calculated water savings for doing the treatment, assuming that one treatment will last the irrigation season is as follows:

Water Savings per day = 0.4 cfs X 3600sec per hour X 24 hours
= 34560 cf per day / 43560 cf per acre ft
= 0.79 acre ft per day

Water savings per season = 0.79 acre ft per day X 120days
= 95 acre ft