Appendix E. National Pollutant Discharge Elimination System Noncompliance Summaries for 2006

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E.1 Y-12 Complex

E.1.1. Total Residual Chlorine at Outfall 201

Description and Cause

Total residual chlorine (TRC) field analysis was performed on several grab samples taken at outfall 201 on February 7, 2006, with elevated readings of 0.0542 mg/l and 0.0691 mg/L. Average of these readings results in a daily maximum concentration on February 7, 2006, of 0.0616 mg/L which is above the daily maximum allowed by the permit. A reading taken on the next day, February 8, 2006, was less than 0.05 mg/L or below detection.

Outfall 201 receives flow from the Y-12 National Security Complex outfalls 200 and 135, as well as raw water from the Clinch River. The elevated reading was in part caused by potassium permanganate added to the Clinch River water supplied by the city of Oak Ridge. Chlorine is no longer fed to the raw water and was not in the raw water on that day. An elevated reading taken the same day of the raw water was not chlorine but actually potassium permanganate, since most of the Environmental Protection Agency methods for residual chlorine are also affected by other oxidizers. Several readings taken this day at outfall 200 indicated presence of chlorine. Flow from this outfall will also influence TRC readings made at outfall 201. The dechlorination system was checked and found to be properly operating. The exact cause of elevated TRC readings is not known. Chlorine levels were normal when readings were made the next day.

E.2 East Tennessee Technology Park

E.2.1 Sanitary Water Line Break

Description and Cause

On November 27, 2006, during routine weekly sampling required by the East Tennessee Technology Park (ETTP) National Pollutant Discharge Elimination System (NPDES) Permit No. TN0002950, a noncompliance with the NPDES Permit limit for total residual chlorine (TRC) concentration was identified at storm water outfall 100. The sample result was 0.20 mg/L. This result exceeded the NPDES Permit limit for TRC for this outfall, which is a daily maximum concentration of 0.140 mg/L.

On November 27, 2006, field investigations were initiated to identify the source of the TRC in the discharge from outfall 100. Dechlorination tablets were placed in the outfall 100 drainage network immediately after the discovery of the noncompliance. Field investigations indicated that the source of the TRC was an underground sanitary water line break. On December 15, 2006, repairs to the broken sanitary water line were completed.

On December 11, 2006, during routine NPDES Permit compliance sampling activities, several dead fish were observed in the rip-rap lined channel that transports discharges from the outfall 100 storm drain network to the K-1007-P1 Pond. It was estimated that the total mortality was in excess of 1000 fish. The vast majority of the dead fish were determined to be shad. The cause of the fish kill is believed to be related to the sanitary water line break that discharged chlorinated water into the outfall 100 piping network.

Corrective Actions

The section of water line was immediately valved off, and repairs were effected. Subsequent monitoring of the outfall and the receiving waters revealed no detectable impacts.

E.3 Oak Ridge National Laboratory

E.3.1 No Observed Effect Concentration

Description and Cause

Toxicity tests required by the ORNL NPDES Permit were conducted on the effluent from the ORNL Sewage Treatment Plant (STP) in May, 2006. Survival was 100% for both fathead minnow larvae and *Ceriodaphnia dubia*. However, *Ceriodaphnia dubia* reproduction was significantly different from the control at all test concentrations, resulting in a NOEC being less than 9.8%, which was the lowest concentration tested. Investigation into this toxicity has not revealed a cause. As in occasional previous toxicity tests from this STP effluent, the concentration-response relationship was atypical with an essentially flat concentration-response curve. It appears this occasional flat concentration-response curve is unique to the STP effluent over other effluents at ORNL. Scientists at ORNL believe the test dilution series is the most likely explanation for these anomalous results. The concentration range required to be tested for the STP (9.8% to 41.1%) is highly appropriate for regulatory purposes, but might not be sufficient to produce a typical concentration-response curve in the case of this particular effluent.

Corrective Action

A confirmatory toxicity test of the STP effluent was conducted as required by the terms of the ORNL Permit. The effluent was evaluated for toxicity with *Ceriodaphnia dubia*. In this test, *Ceriodaphnia dubia* survival was 100% in all concentrations tested, and reproduction was not significantly different from the control at any of the test concentrations. This resulted in the NOEC of 41.1%, which was the greatest concentration tested according to the terms of the Permit. Based on the results of the confirmatory test, the toxicity indicated in the initial test appears to have been a temporary condition of unknown cause.

E.3.2 Temperature Change

Description and Cause

During the dry summer season, the discharge from outfall 281 (which is made up primarily of cooling tower blowdown) nearly constitutes the headwaters of the small tributary to which it discharges. In four rounds NPDES required of temperature measurements, the temperature of the tributary downstream of outfall 281 was greater than the upstream temperature in all measurements by amounts varying between 4.8 and 5.1º C, resulting in four NPDES noncompliances. Under narrative permit conditions, the discharge must not cause the instream temperature to change by more than 3ºC relative to an upstream control point.

Corrective Action

A number of actions have been implemented at ORNL in an effort to reduce the tower blowdown temperature. A blowdown heat exchanger was installed and is activated if the blowdown temperature approaches 30ºC. The system will automatically stop discharging blowdown if the temperature exceeds 30ºC. The cooling tower was replaced in 2001; at about the same time, the blowdown point in the secondary coolant system was moved from the “hot” leg (discharge of the primary heat exchangers) to the “cold” leg (discharge of the secondary coolant pumps following cooling of the water by the tower). In a separate corrective action, the effluent was rerouted so that it would flow through a longer, shallower

and wider flow path (shaded by tree canopy) before being discharged to the receiving stream. All of these corrective actions have made incremental improvements, but because the volume of tower blowdown overwhelms natural flow in the stream, they have not completely remedied the problem.

Since its installation, the blowdown heat exchanger has been operated primarily to ensure that the blowdown does not cause the instream temperature to exceed 30.5ºC. It is believed that by lowering the set point on the system and perhaps modifying other operational parameters, the blowdown heat exchanger can improve compliance with the 3ºC relative temperature change criteria during hot summer conditions. ORNL has initiated a study to test the capabilities of the heat exchanger system and to determine appropriate operational parameters.

With considerable effort, it may be possible to relocate the outfall 281 discharge to another receiving stream as a corrective action. However, because the flow rate in the existing receiving stream would be considerably diminished if the discharge were to be relocated, leaving it at its current location may be environmentally preferable. This option will continue to be evaluated.