

TULLY VALLEY MUDBOILS
LONG-TERM MANAGEMENT NEEDS
December 2008

Introduction

Located approximately 18 miles south of Syracuse, the Tully Valley has unique hydrogeologic features, called mudboils, which have contributed significant amounts of sediment to Onondaga Creek, the Inner Harbor and Onondaga Lake (see Figure 1). Mudboils are artesian-pressured geologic features that discharge turbid, fresh to saline water at the land surface, which is eventually discharged into the creek. Historically, fine-grained sand settled to the creek bottom while the finer-grained silt and clay remained in suspension and made the creek turbid (cloudy), sometimes all the way down to the Onondaga Lake. During high flow events, the sandy sediment became re-suspended and eventually was deposited at the Inner Harbor of Onondaga Lake.

The sediment from the mudboils impacts water clarity and quality within Onondaga Creek and subsequently Onondaga Lake. Sedimentation is of particular concern because it reduces habitat for aquatic insects, fish spawning and plant growth within the creek. Historically, Onondaga Creek has contributed more than 50% of the annual tributary sediment load to the lake.

This paper attempts to summarize the Tully Valley Mudboil problem, history and future needs with the hope that long-term funding sources can be identified and secured to prevent detrimental past conditions from recurring.

Background

In 1991, the Onondaga Lake Management Conference (OLMC) - precursor to the Onondaga Lake Partnership (OLP) - created the "Mudboil Working Group." This group of local, state and federal agency representatives was tasked with the planning efforts to identify the cause of mudboil activity and to formulate ways to reduce or eliminate damaging sediment associated with mudboil discharges.

During the 1990s, the U.S. Geological Survey and other agencies and organizations identified artesian pressure within the underlying aquifer as the driving force behind mudboil flow. Flow from the mudboils is affected seasonally by changes in artesian pressure associated with groundwater recharge; in spring, the mudboils are more active whereas in summer mudboils are less active as recharge to the aquifer declines.

Three types of control measures were implemented by the OLMC and OLP to address the mudboil problem: 1) diversion of tributary flow, 2) depressurizing well installation, and 3) construction of a sediment impoundment dam. Beginning in 1992, flow from the upper 0.7 square miles of drainage above the mudboils was diverted south to a nearby tributary. Depressurizing wells were installed in 1992 and 1996 to reduce artesian pressure and slow nearby mudboil activity. A temporary impoundment dam constructed in 1993 and then a permanent impoundment dam constructed in 1996 captured sediment discharged from several mudboils.

The results of tributary diversion, depressurizing well installation, and the impoundment dam were positive. Diverting flow from the mudboil area reduced sediment loading to Onondaga Creek by half – from nearly 30 tons/day to about 15 tons/day. The impoundment dam reduced the average daily load of sediment discharged from the mudboil area to Onondaga Creek from 15 tons/day in 1992 to 1.5 tons/day

during 1993-94. **Currently, sediment discharge is about 0.5 tons/day – a 97% reduction from the early 1990s.**

Current Situation

Over four million dollars have been expended since the early 1990s to study, remediate, and maintain the mudboil remedial projects. And, remedial actions initiated to date require continuous attention. Periodic maintenance activities include dredging of sediment-filled containment areas and repairing of flow-measuring and flow-diversion structures. Depressurization wells require constant maintenance to assure continued well discharge and diminished mudboil activity.

Sources of federal maintenance funding are rapidly diminishing. Other sources of funding will be required to continue remedial efforts.

Without identification of new sources of necessary funds, these remedial projects will need to be closed down and the land restored to its former condition, as required by an access agreement with the landowner (Honeywell Corporation). Without maintenance and operation of ongoing actions, mudboil sediment discharge would return pre-project levels of 15 to 30 tons/day, into Onondaga Creek, the Inner Harbor and Onondaga Lake.

In anticipation of depletion of available federal funding, new studies were initiated in 2007, to determine if groundwater flow entering the mudboil aquifer upstream of the mudboils (at the southern end of the Tully Valley and potentially along the flanks of the valley walls) can be reduced, which would reduce the artesian pressure driving mudboil activity. If this approach is found to be successful, sediment discharge from the mudboils would be reduced significantly. In this situation, the funds required to maintain current levels of sediment discharge would be reduced but not eliminated.

Options for Future Mudboil Control

While the number of options available to address the problems resulting from the Tully Valley Mudboil may be extensive, in the end they tend to fall under three major categories which are described below.

Option 1 - Discontinue All Remedial Actions

Funding need: None

All monitoring equipment and the dam in the mudboil area would be removed, depressurizing wells would be grouted, and upper watershed flow may be returned to its original drainage (through the mudboil area). Mudboil impacts would return to pre-mitigation status (15-30 tons of sediment per day). Funds are currently available in escrow to cover all costs of this option.

Option 2 - Maintain Status Quo – Continue Ongoing Control Actions

Funding need: \$210,000/year

Continue present level of monitoring discharge from the mudboil area, determination of sediment discharge concentration, hourly rainfall, and other surface and ground water data on a semi-annual basis. Continue level of operations and maintenance as needed. Mudboil impacts reduced to current levels of approximately one ton per day.

Option 3 - Enhanced Mudboil Stewardship

Funding need: \$210,000/year O&M plus \$620,000 (one time) for mediation/studies

This option would incorporate Option 2 above (Status Quo for Monitoring and O&M) and would expand the remediation program to reduce mudboil discharges at source areas rather than at points of sediment discharge. Enhanced remediation would focus on eliminating daily sediment discharges, leaving only seasonal (spring and fall) discharges, reducing annual O&M costs. Ongoing (and possibly enhanced) monitoring would be used to evaluate the effectiveness of new remediation efforts. \$166,000 in OLP and other federal monies have already been approved to begin studying enhanced remediation options.

