

Mount Monroe – Report on the investigation into concerns for runoff impact on Cuba Lake

By David E Shemeld, Commissioner, Water Quality Committee, Cuba Lake District Board of Commissioners

As the result of decisions made and recorded in the minutes of the Cuba Lake District's Board of Commissioners meeting of April 14, 2005, the writer has undertaken to determine actions, if any, that may be indicated over and above the planned installation of a sediment basin at the Mount Monroe Creek, to alleviate the problems reported of "junk" and toxic elements entering the lake allegedly the result of runoff from old landfills in the hills above the lake.

At the April 14th meeting, Mr. Slotman requested and was granted:

- The District's support in dredging out sediment and trash from the mouth of the Mount Monroe tributary and areas in front of and around the dock at leasehold #323.
- The District's approval for Slotman Plumbing and Heating, Inc to bid on the sediment removal.
- The District's support in providing testing of the soil before it's removal and finally to spearhead the effort to determine the impact of the runoff from Mount Monroe on the Cuba Lake Water Quality and the determination of what could be done to rectify the situation.

Actions Taken:

- Prior to the removal of the sediment (by Slotman Plumbing and Heating, Inc), the District contracted the services of the Alfred Analytical Laboratory, 4964 Kenyon Road, Alfred Station, NY 14803 to provide metals testing.
- Samples were taken on April 18, 2005. Sample locations attempted to duplicate the general areas sampled by the DEC in January 2005. Additionally samples were taken at the entrance of other tributaries to the Lake, in order to establish background levels.
- Specific metals requested to be identified and the associated costs were:
 - Cadmium: \$12.00 each (13)
 - Chromium: \$12.00 each (13)
 - Lead: \$12.00 each (13)
 - Mercury: \$25.00 each (13)
 - Metals prep. fee: \$6.50 per sample (13)
 - Sampling fee: \$100.00
 - Total: \$977.50
- Sediment was removed to the satisfaction of Mr. Slotman.
- Alfred Analytical Laboratory Test results were received in the form of 13 pages of "Certificates of Analysis" dated May 12, 2005.
- The writer met with Mr. Slotman on May 2, 2005 to receive data that had been previously developed on the issue. Information copies provided by Mr. Slotman are as follows:
 1. Timeline of events from December 19, 2003 through April 12, 2005.
 2. January 3, 2004, letter to the Cuba Lake District from Messrs. Ray Perkins, Oren Smith and David Slotman. This letter requests "*---the Cuba Lake District to approach the proper agencies to take the necessary steps to test the water and soil sediment at the mouth of the Mt. Monroe stream for possible contaminants, for the protection of the lake residents.*"
 3. February 10, 2004, Memorandum to file by Dave Bosworth, Lake Manager.

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4. February 10, 2004, letter to the Cuba Lake District from Simon F Manka, Attorney at Law.
5. February 20, 2004 letter to Simon F Manka, Attorney at Law from the District's Attorney, John M. Hart.
6. March 15, (sic)2003 [2004], letter to the Cuba Lake District from Simon F Manka, Attorney at Law.
7. Extracts from the 1988 report by Ecoscience including Fig 4; Pages 17 & 18; Tables 1 & 2.
8. April 13, 2004, Olean Times Herald article "Cuba Village Board adopts budget with tax increase".
9. February 6, 2004, "Chain of Custody" documents for surface water (2) and soil samples (3) taken by Mr. Slotman and received by the Alfred Analytical Laboratory.
10. March 11, 2004, Certificates of Analysis for the above samples.
11. March 14, 2004, Internet information from the NYS DEC, Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels.
12. January 4, 2005, Map of sediment sampling, Cuba Lake.
13. Jan 31, 2005, Analytical Report, Job # A05-0048 by Severn Trent Laboratories (STL), Buffalo. <http://www.stl-inc.com>.
14. April 8, 2005, Letter from Dennis Weiss, PE, Environmental Engineer II, NYS DEC, Region 9, to Mr. Slotman at Slotman Plumbing and Heating, Inc. transmitting "Sediment Sampling Results-Cuba Lake".

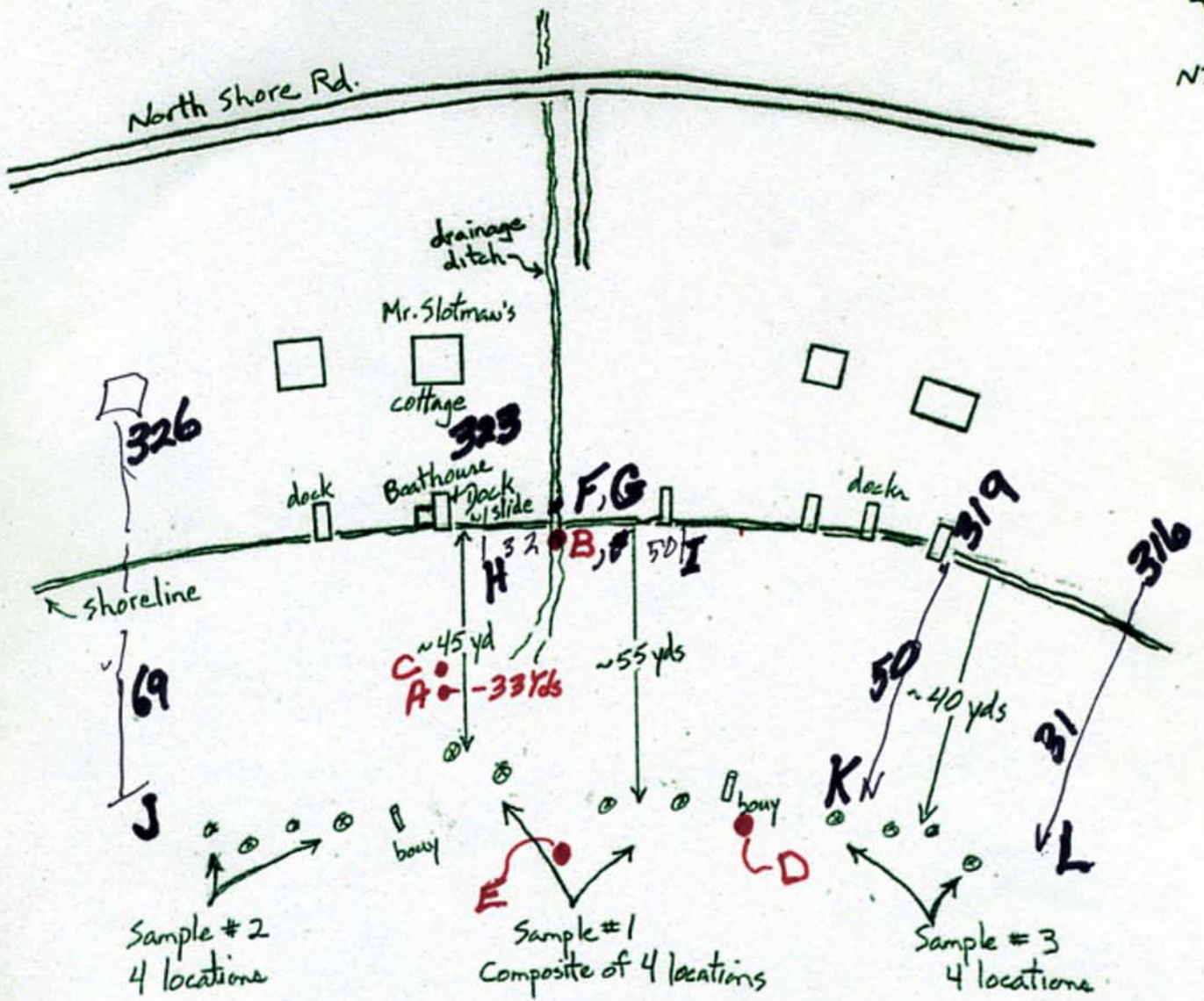
Test results Review:

The following **Figure 1**, is a copy of the chart of sampling sites used for the DEC/STL, Buffalo January 31, 2005 report. The three DEC sites are shown on the map as 1, 2, 3; the fourth DEC site was approximately 1/2 mile to the West of Site 2. The results are plotted on the charts from West to East, i.e. 4, 2, 1, 3 in order to provide some visual relationship between the sites. Sites identified as A through E are the approximate locations of the samples taken in 2004. Sites F through L are the approximate sites for the Alfred Analytical Lab samples taken in 2005. The 2005 samples included those from Rawson, Abbott's, and Munger tributary entries to the Lake.

It should be noted that the analysis included tests as follows:

1. Semi-volatiles (Method 8270)
2. Pesticides (Method 8081)
3. Herbicides (Method 8151)
4. PCB's (Method 8082)
5. Metals (Method 6010)

Results for Tests 1 through 4 above were unremarkable. Most measured values were listed as "U" meaning a compound was analyzed for, but not detected at or above the "reporting limit". Pages 6 and 7 (see appendix) of 1099 provide a "Non-conformance" Summary for more details on Semi-volatile and metals data.



A, B, C, D = 2/6/04 DATA
Cuba Lake
(open water)

FIG 1

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Since the original concern expressed was focused on so called “heavy metals”, the metals’ test results are presented below in chart form.

- **The first chart, Figure 2**, shows all recorded data for metals plotted to show the comparison of samples. The elements are plotted in descending order of the amounts from test results for Sample 4.

Sample 4 had been taken in an effort to establish a “background” value for the Lake.

In addition to the DEC reported test results on the January 2005 samples, points are shown for the “Eastern USA Background” values as defined in the NYS DEC “TAG Memorandum #4046”, Table 4 (see appendix). While this document should be consulted to better understand the terms used in this report, a brief definition of “background” is evident in this statement from the document:

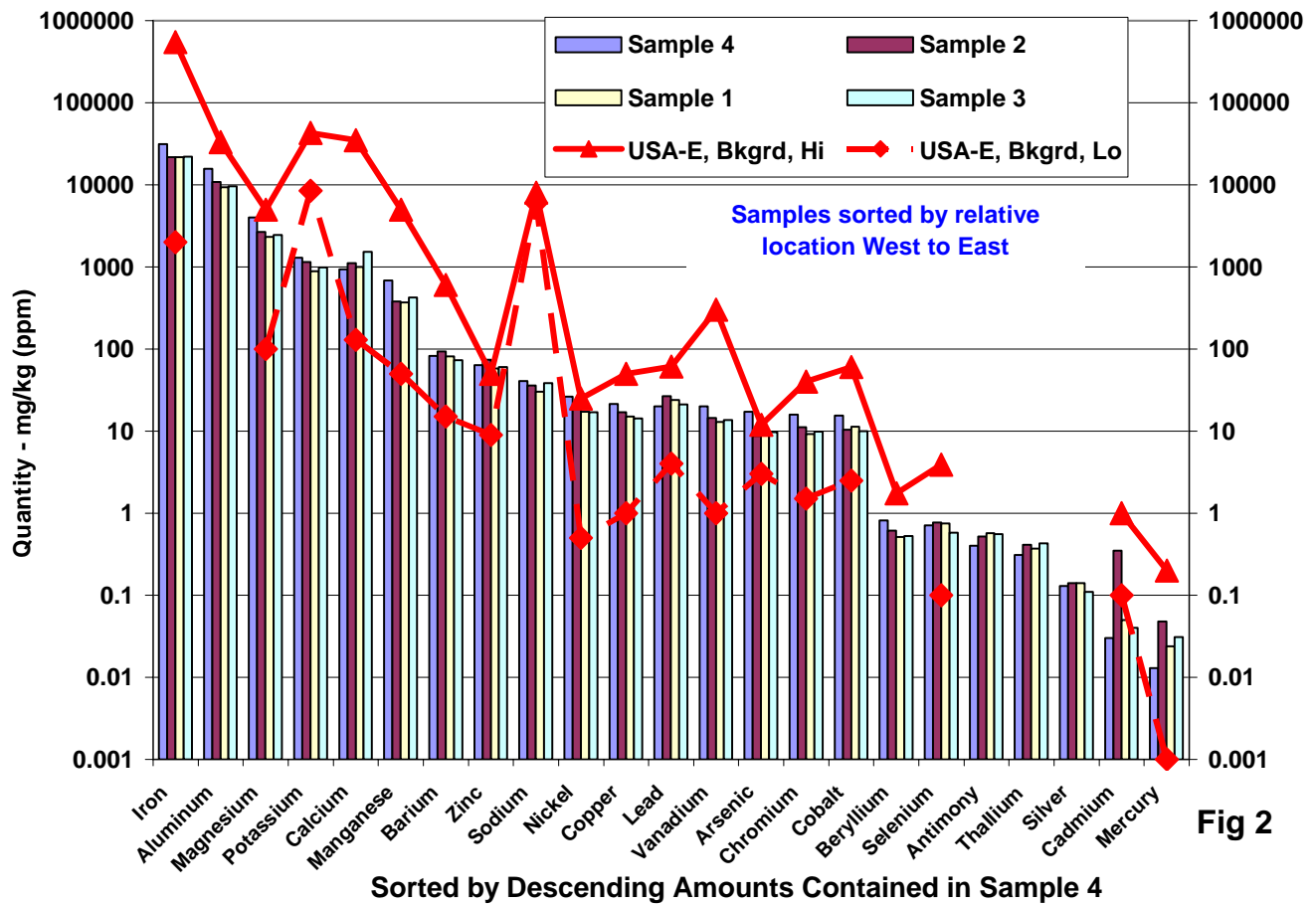
“For heavy metals, eastern USA or New York State soil background values may be used as cleanup objectives. A list of values that have been tabulated is attached. Soil background data near the site, if available, is preferable and should be used as the cleanup objective for such metals. Background samples should be free from the influence of this site and any other source of contaminants. Ideal background samples may be obtained from uncontaminated up gradient and upwind locations.”

Also, relative to the “Recommended Soil Cleanup Objective” shown in Table 4, a brief statement taken from the introduction to the document #4046 is as follows:

“Attainment of these generic soil cleanup objectives will, at a minimum, eliminate all significant threats to human health and/or the environment posed by the inactive hazardous waste site.”

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The data in **Fig 2** shows that all elements found from the DEC analysis, considering reasonable data scatter, are within expected levels as defined by the “Eastern USA Background” values previously mentioned. Zinc, Nickel and Arsenic are at the upper end of their respective ranges. If we consider the Sample 4 to have been the background for the Lake then the following comments may be pertinent:

1. Sample 4 compared to the other samples, shows higher levels of the following:
 - Beryllium, Cobalt, Chromium, Arsenic, Vanadium, Copper, Nickel, Sodium, Potassium, Manganese and Iron.

Some of these elements could support Mr. Slotman’s suggestion of the influence of a plating operation previously located on the hill above that sample site.
2. Levels that are higher than Sample 4 levels and show localized spike levels , are shown for elements:
 - Cadmium and Mercury

In both cases, the spikes are associated with Sample 2 data which is the site just to the West of the mouth of the Mount Monroe Tributary.

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- **The second chart, Figure 3**, shows results for selected elements. The elements selected were based on:
 - Those identified by Mr. Slotman and are included in the February 2004, Alfred Analytical Lab results. These are Cadmium, Lead and Chromium. Samples 44651, 44653, 44652 designated C, E, and D respectively on the site location map.
 - Mercury was added on general principle and was included in the request for analysis of the samples taken on April 18, 2005.

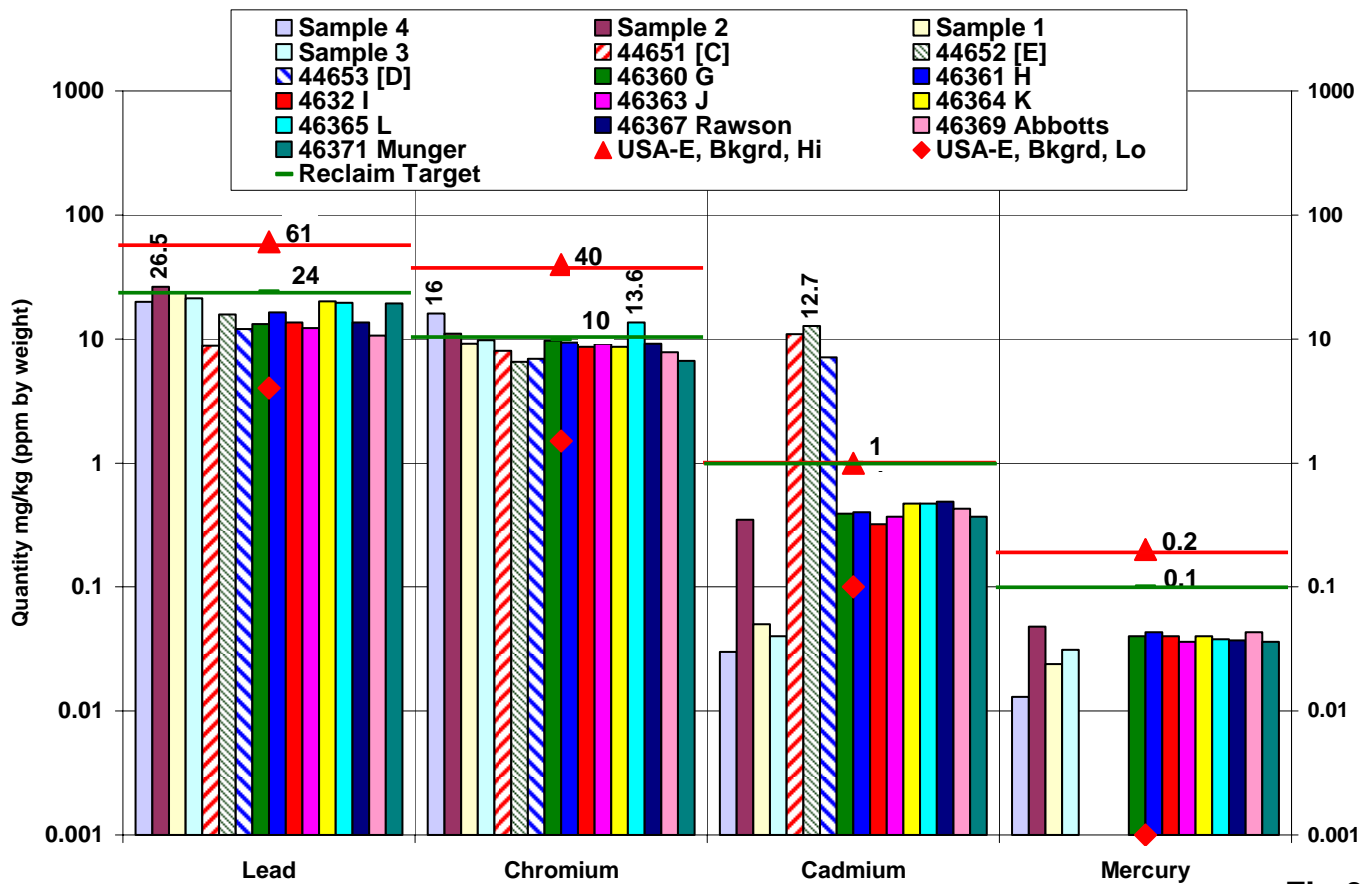


Fig 3

This chart adds the “reclamation target” values shown by the green line. Either these levels or the established site (SB) background levels become the target if reclamation is deemed appropriate. Refer to the NYS DEC TAG memorandum mentioned previously for more detail on reclamation.

The data shown are (columns from left to right):

- DEC, 2005, Data Results - first four solid color columns.
- Alfred Analytical, 2004, Data Results – next three crosshatch columns.
- Alfred Analytical, 2005, Data Results – last nine solid color columns.

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In the DEC data, if in fact the site 4 truly represented the Site Background (SB) levels, the Cadmium and Mercury results reflect a significant difference to that SB. However, these spikes are still well within the TAG Memorandum reclamation values.

The results of the Alfred Analytical Lab testing done in January 2004 prior to the sediment removal done by the District in that year are shown by the crosshatched columns. These results are consistent with those from the 2005 DEC results as well as the 2005 Alfred results except for Cadmium. In the 2004 results the values are well above any “background” references. This is the specific data that resulted in the Board of Commissioners agreeing to do testing in 2005. The plotting of the data has been checked for accuracy. The chart and data was sent to Alfred Analytical Laboratory for verification of the 2004 results. Their response restated the results of the testing as previously provided. To insure no misunderstanding of the chart information, the data for Cadmium is restated below:

Test Reported By	Date Reported	Element	Sample	Test Method	Detectable Level – mg/kg	Reported Level – mg/kg
Alfred Analytical	3/11/2004	Cadmium	44651	SW-846 6010B	0.820	10.9
Alfred Analytical	3/11/2004	Cadmium	44652	SW-846 6010B	0.787	12.7
Alfred Analytical	3/11/2004	Cadmium	44653	SW-846 6010B	1.960	7.1
DEC	4/8/2005	Cadmium	4	ASPOO 6010	Not Reported	0.03
DEC	4/8/2005	Cadmium	2	ASPOO 6010	Not Reported	0.35
DEC	4/8/2005	Cadmium	1	ASPOO 6010	Not Reported	0.05
DEC	4/8/2005	Cadmium	3	ASPOO 6010	Not Reported	0.04
Alfred Analytical	5/12/2005	Cadmium	46360	SW-846 6020	0.39	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46361	SW-846 6020	0.40	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46362	SW-846 6020	0.32	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46363	SW-846 6020	0.37	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46364	SW-846 6020	0.47	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46365	SW-846 6020	0.47	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46367	SW-846 6020	0.49	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46369	SW-846 6020	0.43	Undetectable
Alfred Analytical	5/12/2005	Cadmium	46371	SW-846 6020	0.37	Undetectable

So, in the latest Alfred Analytical tests for Cadmium, using a test method with a lower limit of detection, Cadmium is undetectable. It's interesting to note that the DEC reported findings are at values generally lower than the detection limit for the Alfred Analytical, 2005 results. This would tend to indicate reasonable consistency between both sources of 2005 data results although the detection limit was not reported in the documents provided.

It's noted that two different test methods were used by Alfred Analytical. When questioned, Alfred Analytical referred all questions to Friend Laboratory Services. Friend Laboratory Services advises that they no longer have the Test equipment that was used in 2004, it has been replaced by that used in 2005.

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Relative to variances in detection limit for a given test method, the Friend Laboratory Services reports:

Several factors come into play here. IF, every thing were to go exactly according to the method, i.e. 1.0000 gm of sample of Cd, the detection limit would be 0.50

In real life, labs weigh out samples that vary from 1.0000. For example, if we weighed out 1.300 gms, the detection limit would change accordingly:

$$\frac{1.0000 \times 0.50}{1.3} = 0.385$$

So the detection limit would be 0.385 instead of the 0.5. Total solids also comes into play here too. If the total solids were 80% you would have to divide again by 0.8

What you are seeing in this data in the Table are small changes in the volume of sample weighed out.

Friend Laboratory Services also provided references (listed below) for researching test methodology and test error influences. However, they could not, or would not, provide any direct comments to the difference between their 2004 results and their 2005 results. Nor has comment been made as to why two different test methods were employed.

References:

<http://www.epa.gov/SW-846/pdfs/6020.pdf> (*Inductively Coupled Plasma-Mass Spectrometry*)

<http://www.epa.gov/SW-846/pdfs/6010b.pdf> (*Inductively Coupled Plasma-Atomic Emission Spectrometry*)

<http://www-nehc.med.navy.mil/hhra/guidancedocuments/issue/pdf/FDI.pdf> (*Laboratory Detection and Reporting Limit Issues Related To Risk Assessments*)

While these documents have been scanned to try to determine an answer to specific test differences, they have only been useful in establishing a belief that the “same: test methods by the “same” laboratory should be specified for all future testing of this nature.

Other Notes:

The samples taken by Alfred Analytical in February 2004 included two surface water samples. The sample numbers are 44649 and 44650. The sample locations are noted as “A” and “B” respectively on the location map. Test results for these items are:

1. 44649 – Tested for Cd, Cr and Pb using method code EPA200.7. Results were below the detection limit of the method used. Detection limits are – Cd - 0.010; Cr – 0.020; Pb - 0.044 mg/l (ppm).
2. 44650 – Tested for Semivolatiles using method code EPA 625. results ranged from <5 ppb to <20 ppb depending on the analyte.
3. It must be noted that the testing done in 2004 deviated from the strict process of sampling. Samples were taken by a private owner, samples were not in laboratory supplied containers, the amount of mixing during collection is not known. All of these reportedly could have had an impact on the results. The 2005 sampling, while being done by the contracted lab, did have a deviation in that water containers rather than soil containers were used for sample collection. This could have also had an impact on the mixing of the samples when collected due to the narrow neck of the sample containers.

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The samples taken by Alfred Analytical in April 2005 included surface water samples at each major site. The sample numbers are 46359, 46366, 46368 and 46370. Testing was limited to the metals that were being sought in the soil samples. All results were reported as “undetectable”.

No ground water testing was done.

Discussion:

A letter was sent May 5, 2005 to the DEC’s, Dennis Weiss, P.E. The letter included data from the Alfred Analytical, 2004 results and was later updated with the Alfred Analytical, 2005 results.

At this writing, a written response has not been received to the direct questions raised in the letter.

From telephone conversation with Mr. Weiss, the writer understands the following:

1. There is nothing in the data that would cause someone in Mr. Weiss’ position to have cause for concern to the point of recommending any reclamation action.
2. Lakebeds tend to be sediment basins and therefore the data could be expected to be at the higher range of the “Eastern USA Background” values as defined in the NYS DEC “TAG Memorandum #4046”.
3. If there was any concern, additional, more thorough studies would have to be done to determine the need for reclamation or the need for a recommendation for a reclamation project.
4. Mr. Weiss can not reply directly to some of the questions in the letter and may have to defer to Albany.
5. Mr. Weiss would agree that prudent action would be to continue to pursue the installation of a sediment basin upstream of the tributary’s entry to the lake and then to monitor the “health” of the sediment basin.
6. Until establishment of the sediment basin, periodic monitoring of the lake bed might be a reasonable approach to anyone’s concerns.

Disclaimer:

It should be noted that the Author, while having an Engineering education and background, is not trained in testing and analysis of the type discussed in this report. It is the Author’s intent to provide a lay review of the facts at hand to the extent of suggesting further action to the Board of Commissioners. If the reader has concerns or opinions that are not answered by this report, they will have to be referred to experts in the field.

Conclusions:

There is no data associated with this report that would require any immediate action for soil reclamation of any area within the domain or jurisdiction of the Cuba Lake District.

The data is not conclusive as to the impact of the reported dump sites above the lake which are out of the District’s jurisdiction.

The Cadmium Data from 2004 testing appears to be an anomaly, or if it was real, the situation was resolved by the removal of sediment in 2004. In consideration of this data, the Board took reasonable action in doing the 2005 follow-up testing of the approximate area tested in 2004.

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Recommendations to the Board of Commissioners:

1. Proceed with establishment of the Mt Monroe sediment basin at the earliest possible date.
2. Establish a sediment monitoring program insuring that proper and consistent test procedures are employed. Suggest such testing be done every 3 years or immediately after a “flood” year, whichever comes first. The program should monitor the lake bed until such time as the sediment basin is installed at which time the sediment basin should be the point of measure. Barring any “flood” years, Testing is next recommended for January 2008.
3. If specific elements are to be monitored rather than the whole “spectrum” then it is recommended these specific elements be, Arsenic, Zinc, Nickel, Lead, Chromium, Cadmium and Mercury.
4. Work with the DEC to establish the above program and have it carried out by them.
5. Until the sediment basin is installed, remove sediment from the mouth of the tributary based on an annual review of the area and identification of a problem with the leaseholder.
6. Contact the Allegany County Health Department and the Soil and Water Department for further review of the “dump-site” situation.

Appended Items

1. NYSDEC letter of April 8, 2005 to Mr. David Slotman
2. Pages 6 and 7 of the report attached to the above letter.
3. Table 4 from NYS DEC, Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels
4. Alfred Analytical Test Results of 2005