OHIO E.P.A.

OCT 31 2011

ENTERED DIRECTOR'S JOURNAL

BEFORE THE
OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter of:

Waste Management of Ohio, Inc.:
P.O. Box 13506:
Dayton, OH 45413
Respondent

Director's Final Findings and Orders

Facility:

Seriff Road Landfill
1136 Seriff Road
Lima, OH 45805

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: [signature] Date: 10-31-11

PREAMBLE

It is hereby agreed by and among the parties hereto as follows:

I. JURISDICTION

These Director's Final Findings and Orders (Orders) are hereby issued to Waste Management of Ohio, Inc. (Respondent) pursuant to the authority vested in the Director of the Ohio Environmental Protection Agency (Ohio EPA) under Sections 3734.02(G), 3734.13 and 3745.01 of the Ohio Revised Code (ORC).

II. PARTIES BOUND

These Orders shall apply to and be binding upon the Respondent, its assigns, and successors in interest. No changes in ownership relating to the Seriff Road Landfill will in any way alter the Respondent's responsibilities under these Orders. Respondent shall provide a copy of these Orders to all contractors, subcontractors, laboratories and consultants retained as appropriate. Respondent shall ensure that all contractors, subcontractors, laboratories and consultants retained comply with the provisions contained herein. Respondent's obligations under these Orders may be altered only by written approval of the Director of Ohio EPA.

III. DEFINITIONS

Unless otherwise expressly stated herein, all terms in these Orders have the same meaning

as used in ORC Chapter 3734 and the rules promulgated there under.

IV. FINDINGS OF FACT

The Director of Ohio EPA makes the following findings:

1. Respondent is the owner and operator of the Seriff Road Landfill Facility, located at 1136 Seriff Road, Lima, Allen County, Ohio (Facility), which is identified in Deed Record Volume 581, Page 409, in the Allen County Recorder's Official Records.

2. The Facility is a "sanitary landfill facility" as defined in Ohio Administrative Code (OAC) Rule 3745-27-01(T) effective July 29, 1976.

3. The Facility began accepting waste for disposal as the City of Lima Dump in the 1940's. Terminal Service company of Cincinnati (TSCC operated the site as a landfill from 1963 until it went bankrupt in 1976 (a bank retained ownership). Plan approval for operation of the landfill was issued to TSCC on November 20, 1969, by the Ohio Department of Health. Astro Disposal Company a successor to TSCC operated the site for the bank for two months in 1976. The site was inactive from May of 1976 until SCA reopened the site in July 1984. Ohio Waste Systems, Inc. (OWS) a division of WMNA acquired the landfill in 1984 as part of the SCA acquisition. OWS operated the site until its closure.

4. Pursuant to OAC Rule 3745-27-10(A)(2), as that rule was effective on July 29, 1976, the Facility was deemed closed on December 31, 1986. Closure activities included installation of an in-waste active landfill gas control system. Except for ground water and explosive gas monitoring, post-closure care activities for the facility ended on December 31, 1989.

5. Respondent was notified by a letter from Ohio EPA on December 21, 1988, that the Facility was impacting the ground water beneath the site.

6. Respondent was notified by letter from Ohio EPA dated December 6, 1989, that the monitoring period, pursuant to OAC 3745-27-10(H)(3), as effective on July 29, 1976, was being extended beyond the three year period established by OAC Rule 3745-27-10(G), as effective on July 29, 1976.

7. An out-of-waste landfill gas control system was installed at the Facility in 1990. The system was comprised of seven active landfill gas control wells.

8. In September 1990, Respondent collected ground-water samples from wells at 10 residences on Seriff Road and Springview Drive. Analytical results from the residential samples were submitted to Ohio EPA on December 26, 1990.

9. In a letter to Respondent dated February 19, 1991, Ohio EPA concurred that the sampling results indicated that the ground-water quality of residential wells downgradient of the facility had not been affected by the facility.

10. A contaminant migration assessment report, dated February 1992, was submitted to Ohio EPA which documented the rate, extent, and concentration of contamination in the ground water. According to the Respondent's report, the contaminated ground water extended approximately 75 feet east of the site, beneath residential properties, and the ground water flow rate was calculated to be 40 feet per year toward the northeast.

11. On June 30, 1993, Director's Final Findings and Orders (June 30, 1993, Orders) were issued, ordering Respondent to submit a corrective measures study (CMS) within 180 days of the effective date of the orders due to the Director's determination that the Facility was impacting the underlying ground water. The June 30, 1993, Orders also required Respondent to achieve compliance with OAC Rule 3745-27-10, as the rule was effective March 1, 1990. Pursuant to the Director's June 30, 1993 Final Findings and Orders, Respondent submitted a CMS to Ohio EPA on December 23, 1993.

12. In October 1996, the seven out-of-waste gas control wells and nine in-waste landfill gas extraction wells were decommissioned. Nine new in-waste gas extraction wells were installed.

13. The final version (Revision 2) of the CMS was received by Ohio EPA on July 16, 1997. On March 20, 1998, Ohio EPA approved the CMS, which included the requirement to continue compliance monitoring with the following conditions set forth on page one of the Director's approval letter:

    a. "The owner/operator shall perform an Appendix II sampling event for all affected and upgradient wells in the ground water monitoring network. If any Appendix II parameters are detected from this event at any downgradient wells at concentrations greater than those at upgradient wells, the owner/operator shall re-implement ground water assessment monitoring activities in accordance with OAC 3745-27-10(E) for the well(s) of concern. If no Appendix II parameters are detected from this event at any downgradient wells at concentrations greater than those at upgradient wells, the owner/operator shall continue to perform the semi-annual and annual sampling events for the parameters noted in Revision 2 of the CMS."

    b. "The owner/operator shall perform compliance monitoring in accordance with the parameter list and schedule in Revision 2 of the CMS (dated July 1997). If the concentration levels shown on Table 6 of Revision 2 of the CMS are exceeded in two consecutive confirmed events, an Appendix II sampling shall be performed at that well. If a confirmed MCL or health-based risk is determined in two successive sampling events, then the ground-water conditions shall be reevaluated to determine if a specific remedial procedure(s) shall be implemented."

14. Respondent requested and Ohio EPA terminated the June 30, 1993, Orders as documented in correspondence from Ohio EPA to Respondent dated July 17, 1998.

15. In 1993, Respondent provided connections to the municipal water supply at

13 residences on Seriff Road and Springview Drive downgradient of the Facility. Wells at eight of the residences were decommissioned in 1998. Two of the eight residences had two wells on their respective properties so 10 residential wells were decommissioned in 1998. A "Residential Well Sealing Report" dated December 1998 was submitted to Ohio EPA by Respondent. One additional residential well was decommissioned in 1999. A Residential Well Abandonment Report was submitted to OEPA by the Respondent in November 1999.

16. In August and September 1999, five unused monitoring wells and two piezometers at the Facility were decommissioned. Decommissioning procedures were documented by the Respondent in the "Piezometer and Monitoring Well Decommissioning Report" (Eagon & Associates, Inc., February 2, 2000). Respondent represents that the residential well at 795 Seriff Road also was decommissioned in 2001.

17. A revision to the CMS to revise Proposed Concentration Levels was submitted by Respondent and approved by Ohio EPA on February 2, 2001.

18. The maximum contaminant level (MCL) for barium was exceeded at monitoring well SRD-04 during the October 16, 2001 semi-annual sampling event (4.4mg/L) and confirmed during the December 17, 2001 resampling event (3.6 mg/L). This represented the first sampling event during which an MCL was exceeded at the Facility.

19. The MCL for barium was again exceeded at monitoring well SRD-04 during the April 10, 2002, semi-annual sampling event (3.2 mg/L) and confirmed during the May 23, 2002, resampling event (4.4 mg/L). This represented the second successive sampling event during which an MCL was exceeded at the Facility.

20. Pursuant to the CMS, Respondent submitted a re-evaluation of the corrective measures to Ohio EPA on August 30, 2002.

21. In a letter dated December 6, 2002, Ohio EPA notified Respondent of Ohio EPA's determination that the barium concentration increases at SRD-04 indicated a new leachate release.

22. In January to March 2003, Respondent performed an investigation of the extent of elevated barium levels downgradient of SRD-04 including installation of two new monitoring wells, completion of six Geoprobe borings, and collection and analysis of 19 ground-water samples from the Geoprobe borings and four ground-water samples from monitoring wells. A "Barium Investigation" report documenting the Respondent's sampling activities and results of the investigation was submitted by Respondent to Ohio EPA on May 5, 2003.

23. In May and June 2003, 10 passive gas vents were installed between the landfill and Seriff Road. Installation of the gas vents was documented by Respondent in a "Gas Vent Installation" report dated August 6, 2003.

24. On June 11, 2003, Director's Final Findings and Orders (June 11, 2003; Orders) were issued in accordance with OAC Rule 3745-27-10(F)(4), as effective on March 1, 1990. The June 11, 2003, Orders required Respondent to complete interim measures including verifying the status of residential well use, collecting samples from identified residential wells downgradient of the contamination (pending well owner permission) and notifying the well owners of the contamination and the results of the sampling. The June 11, 2003, Orders addressed Ohio EPA's ongoing concerns regarding the continued detections of barium above MCLs in monitoring well SRD-04 and the resulting threat to human health or the environment due to the potential off-site migration of barium contamination and the identification of downgradient groundwater wells in proximity of the Facility. Pursuant to the Director's Final Findings and Orders, Respondent submitted a report (Residential Water Use and Water Quality, Eagon & Associates, Inc., August 25, 2003) documenting the results of residential water use investigations and water-quality analyses and demonstrating compliance with the June 11, 2003 Orders.

25. Respondent requested and Ohio EPA terminated the June 11, 2003, Orders as documented in correspondence from Ohio EPA to Respondent dated July 28, 2004.

26. In July and August 2004, Respondent performed additional field investigations of the extent of elevated barium levels downgradient of SRD-04. This investigation included completion of five Geoprobe borings; three on site and two off-site east of Seriff Road. The results of the Respondent's investigations were documented in a "2004 Addendum to Barium Investigation" report submitted to Ohio EPA in October 2004.

27. In September 2004, two passive gas vents were installed between the landfill and Seriff Road.

28. Respondent submitted a revised CMS to Ohio EPA for approval on December 21, 2004, pursuant to OAC Rule 3745-27-10, as effective March 1, 1990.

29. An observed gradual increasing trend for ammonia at MW-101, screened in the lower sand zone was documented in a letter from Ohio EPA to Respondent dated December 22, 2004.

30. Ohio EPA notified Respondent in a letter dated January 27, 2005, that Respondent had been in violation of OAC Rule 3745-27-10(F)(1)(c), as effective March 1, 1990, for twenty-five (25) months, for failing to revise the corrective measures program at the site in a manner that will control the source of the release of contaminants.

31. Respondent submitted a proposed revision to the CMS to Ohio EPA in March 2005.

32. Respondent met with Ohio EPA in April 2006 to discuss water quality at the Facility, the regulatory status of the Facility, and the proposed CMS revision.

33. OAC Rule 3745-27-10, as effective March 1, 1990, was subsequently amended on June 1, 1994.

34. Thereafter, OAC Rule 3745-27-10, as effective June 1, 1994, was subsequently amended on August 15, 2003.

35. Ohio EPA and Respondent desire to continue regulating compliance at the Facility in accordance with OAC Rule 3745-27-10, as effective March 1, 1990, in light of the previously issued June 30, 1993 Orders, the June 11, 2003 Orders, and the existing CMS, all of which were issued under the 1990 ground water monitoring regulations.

36. A copy of OAC Rule 3745-27-10, as effective March 1, 1990, is attached to this order as Exhibit A and incorporated as if fully written.

37. Ohio EPA has determined that compliance with OAC Rule 3745-27-10, as effective March 1, 1990, is protective of human health and safety and the environment, and appropriate for continued use at this Facility.

38. Respondent represents that the residential well at 3355 Springview Drive was decommissioned when the residence was demolished by Allen County as part of the Eastown Road Extension project.

39. In June 2003, Eagon & Associates investigated water use at residences within 1000 feet downgradient of the Landfill. A survey to determine the status of the residential wells was performed in October 2010. The residential well at 1145 Seriff Road is still in place and is not in use. The property owner will not grant respondent access to abandon the well. The residence is connected to the municipal water supply. The residential well at 3438 Springview Drive was abandoned in September 2011.

40. Respondent has prepared a revised corrective measures study dated October 2011 ("October 2011 CMS") including ground water monitoring pursuant to OAC 3745-27-10, effective March 1, 1990. The October 2011 CMS is attached to these Orders as Exhibit B. Table 1 of the October 2011 CMS includes the results of October 2010 survey of the residential water wells located within 1000 feet downgradient of the Landfill.

41. In June, 2009 Respondent installed three (3) passive gas vents in close proximity to ground water monitoring well SRD-04 pursuant to the plans and specifications provided for in the October 2011 CMS.

42. On January 8, 2010, Respondent submitted to Ohio EPA and to the Allen County Health Department a certification report regarding the installation of the three (3) passive gas vents pursuant to the October 2011 CMS.

43. Respondent initiated the annual sampling of all the off-site downgradient wells within 1000 feet of the facility in October 2010.

44. Pursuant to ORC Section 3745.02(G), Ohio EPA has determined that granting Respondent an exemption from the ground water monitoring procedures as required in OAC Rule 3745-27-10, as effective August 15, 2003, and allowing the Facility to continue ground water monitoring procedures in accordance with OAC Rule 3745-27-10, as effective March 1, 1990, and the October 2011 CMS (Exhibit B) is unlikely to adversely affect the public health or safety or the environment.

V. ORDERS

The Director hereby issues the following Orders:

1. Pursuant to ORC Section 3745.02(G), an exemption is granted to the Respondent from the requirements of OAC Rule 3745-27-10, as effective August 15, 2003 for the Facility.

2. The revised Corrective Measures Study dated October, 2011 ("October 2011 CMS") and submitted to Ohio EPA by Respondent is attached as Exhibit B to these Findings and Orders and is hereby approved. Respondent shall continue to implement the approved October 2011 CMS pursuant to these Orders.

3. Respondent shall comply with the requirements of OAC Rule 3745-27-10, as effective March 1, 1990, and the approved October 2011 CMS for the Facility. A complete copy of OAC Rule 3745-27-10, as effective March 1, 1990, is attached as Exhibit A and incorporated herein as if fully written. No other provision of the Ohio Solid Waste regulations effective March 1, 1990 applies to the facility.

4. Respondent shall measure the success of the approved October 2011 CMS identified in Order No. 2 on a semi-annual basis beginning on the third anniversary of the date of these Orders.

5. Any proposed revisions to the October 2011 CMS attached as Exhibit B shall be submitted to Ohio EPA, NWDO for review and approval. Ohio EPA may approve the proposed revisions to the October 2011 CMS or may send Respondent a notice of deficiency indicating where the proposed revisions to the October 2011 CMS are deficient. Upon receipt of a notice of deficiency to the proposed revisions to the October 2011 CMS, Respondent may further revise the October 2011 CMS to address all identified deficiencies and resubmit the revised October 2011 CMS to Ohio EPA for approval.

6. Unless otherwise specified herein, Respondent shall submit all documents or notifications required by these Orders to be submitted to Ohio EPA, to the following address:

Ohio Environmental Protection Agency
Northwest District Office
347 North Dunbridge Road
Bowling Green, Ohio 43402
ATTN: DMWM Inspector Supervisor

7. Unless otherwise specified herein, Respondent shall submit all documents or notifications required by these Orders to be submitted to the Allen County Health Department, to the following address:

Allen County Health Department
PO Box 1503
219 East Market Street
Lima, Ohio 45802-1503
ATTN: Environmental Health Director

VI. TERMINATION

Respondent's obligations under these Orders shall terminate when Respondent certifies in writing and demonstrates to the satisfaction of the Enforcement Coordinator for Ohio EPA's Division of Materials and Waste Management that all obligations under these Orders have been performed and the Ohio EPA approves the certification in writing. Satisfaction of the Ohio EPA is achieved once Respondent has demonstrated on a semiannual basis for a period of five years that the designated PCL's have not been exceeded per OAC 3745-27-10(F)(8), effective March 1, 1990.

The certification shall contain the following attestation from Respondent: "I certify that the information contained in or accompanying this certification is true, accurate and complete."

This certification shall be submitted by Respondent to Ohio EPA and shall be signed by a responsible official of Respondent.

VI. OTHER CLAIMS

Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person, firm, partnership or corporation, not a party to these Orders, for any liability arising from, or related to, Respondent or the Facility unless specifically identified.

VII. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to these Orders shall be undertaken in accordance with the requirements of all applicable local, state, and federal laws and regulations. These Orders do not waive or compromise the applicability and enforcement of any other statutes or regulations applicable to Respondent or the Facility.

Nothing in these Orders shall be construed to authorize any waiver from the requirements of applicable state solid waste laws or regulations. This authorization shall not be interpreted to release Respondent or others from responsibility under ORC Chapters 3704, 3714, 3734, or 6111; under the Federal Clean Water Act, the Resource Conservation and Recovery Act, the Toxic Substances Control Act, or the Comprehensive Environmental Response, Compensation, and Liability Act; or from other applicable requirements for remedying conditions resulting from any release of contaminants from the facility to the environment.

VIII. MODIFICATIONS

These Orders may be modified by agreement of the parties hereto. Modifications shall be in writing and shall be effective on the date entered in the journal of the Director of Ohio EPA.

IX. RESERVATION OF RIGHTS

Nothing contained herein shall be construed to prevent Ohio EPA from seeking legal or equitable relief to enforce the terms of these Orders or from taking other administrative, legal or equitable action as deemed appropriate and necessary, including seeking penalties against Respondent for noncompliance with these Orders. Nothing contained herein shall be construed to prevent Ohio EPA from exercising its lawful authority to require Respondent to perform additional activities pursuant to ORC Chapter 3734. or any other applicable law in the future. Nothing herein shall restrict the right of Respondent to raise any administrative, legal or equitable claim or defense with respect to such further actions which Ohio EPA may seek to require of Respondent. Nothing in these Orders shall be construed to limit the authority of Ohio EPA to seek relief for violations not addressed in these Orders.

X. WAIVER

Respondent hereby waives the right to appeal the issuance, terms and conditions, and service of these Orders, and Respondent hereby waives any and all rights Respondent may have to seek administrative or judicial review of these Orders either in law or equity.

Notwithstanding the preceding, Ohio EPA and Respondent agree that if these Orders are appealed by any other party to the Environmental Review Appeals Commission, or any court, Respondent retains the right to intervene and participate in such appeal. In such an event, Respondent shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated, or modified.

XI. EFFECTIVE DATE

The effective date of the Orders is the date these Orders are entered into the Ohio EPA Director's Journal.

XII. SIGNATORY AUTHORITY

Each undersigned representative of a party to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such party to these Orders.

ORDERED AND AGREED:

Ohio Environmental Protection Agency

Scott J. Nally, Director

AGREED:

Waste Management of Ohio, Inc.

Signature

20 Oct 2011
Date

James Feeney
Printed or Typed Name

Area Director - CSWG
Title

Exhibit A

OAC Rule 3745-27-10 (effective March 1, 1990)

3745-27-10 GROUND WATER MONITORING PROGRAM.

(A) ALL NEW SANITARY LANDFILL FACILITIES, ALL LATERAL AND VERTICAL EXPANSIONS OF SANITARY LANDFILL FACILITIES, AND ALL SANITARY LANDFILL FACILITIES UNDERGOING CLOSURE ACCORDING TO RULE 3745-27-11 OF THE ADMINISTRATIVE CODE, SHALL IMPLEMENT A PROGRAM CAPABLE OF DETERMINING THE IMPACT OF THE SANITARY LANDFILL FACILITY ON THE QUALITY OF GROUND WATER OCCURRING WITHIN THE UPPERMOST AQUIFER SYSTEM AND ALL SIGNIFICANT ZONES OF SATURATION ABOVE THE UPPERMOST AQUIFER SYSTEM UNDERLYING THE SANITARY LANDFILL FACILITY. THE GROUND-WATER MONITORING PROGRAM SHALL COMPLY WITH PARAGRAPHS (B) TO (F) OF THIS RULE. ALL FACILITIES WHICH ARE, OR WILL BE, SUBJECT TO PARAGRAPH (L) OF RULE 3745-27-11 OF THE ADMINISTRATIVE CODE SHALL IMPLEMENT A GROUND WATER MONITORING PROGRAM NO LATER THAN SEPTEMBER 30, 1991.

(B) (1) A GROUND-WATER MONITORING SYSTEM SHALL CONSIST OF A SUFFICIENT NUMBER OF WELLS, INSTALLED AT APPROPRIATE LOCATIONS AND DEPTHS, TO YIELD GROUND-WATER SAMPLES FROM BOTH THE UPPERMOST AQUIFER SYSTEM AND ANY SIGNIFICANT ZONES OF SATURATION THAT EXIST ABOVE THE UPPERMOST AQUIFER SYSTEM THAT:

(a) REPRESENT THE QUALITY OF THE GROUND WATER THAT HAS NOT BEEN AFFECTED BY PAST OR PRESENT OPERATIONS AT THE SANITARY LANDFILL FACILITY; AND

(b) REPRESENT THE QUALITY OF THE GROUND WATER PASSING DIRECTLY DOWNGRADIENT OF THE LIMITS OF SOLID WASTE PLACEMENT.

(2) WHERE THE UPPERMOST AQUIFER SYSTEM EXISTS MORE THAN ONE HUNDRED FIFTY FEET BENEATH THE RECOMPACTED CLAY LINER OF THE SANITARY LANDFILL FACILITY, THE GROUND-WATER MONITORING SYSTEM SHALL CONSIST OF A SUFFICIENT NUMBER OF

WELLS, INSTALLED AT APPROPRIATE LOCATIONS AND DEPTHS, TO YIELD GROUND-WATER SAMPLES FROM AN ADEQUATE NUMBER OF SIGNIFICANT ZONES OF SATURATION, IN ACCORDANCE WITH PARAGRAPHS (B)(1)(a) AND (B)(1)(b) OF THIS RULE, TO ENSURE DETECTION OF ANY CONTAMINANT RELEASE FROM THE FACILITY.

(3) ALL MONITORING WELLS SHALL BE DESIGNED, INSTALLED, AND DEVELOPED IN A MANNER THAT ALLOWS THE COLLECTION OF GROUND-WATER SAMPLES THAT ARE REPRESENTATIVE OF GROUND-WATER QUALITY IN THE GEOLOGIC UNIT BEING MONITORED. AT A MINIMUM:

(a) MONITORING WELLS SHALL BE CASED IN A MANNER THAT MAINTAINS THE INTEGRITY OF THE MONITORING WELL BOREHOLES; AND

(b) THE ANNULAR SPACE (I.E., THE SPACE BETWEEN THE BOREHOLE AND THE WELL CASING) ABOVE THE SAMPLING DEPTH SHALL BE SEALED TO PREVENT THE CONTAMINATION OF THE SAMPLES AND THE GROUND WATER; AND

(c) THE CASING SHALL BE SCREENED OR PERFORATED AND SURROUNDED BY SAND OR GRAVEL IN SUCH A WAY THAT ALLOWS:

(i) FOR THE MINIMIZATION OF THE PASSAGE OF FORMATION MATERIALS INTO THE WELL; AND

(ii) FOR THE MONITORING OF DISCRETE PORTIONS OF THE UPPERMOST AQUIFER SYSTEM OR ANY SIGNIFICANT ZONES OF SATURATION ABOVE THE UPPERMOST AQUIFER SYSTEM; AND

(d) THE DESIGN, INSTALLATION, DEVELOPMENT, AND ABANDONMENT OF ANY MONITORING WELLS, PIEZOMETERS, AND OTHER MEASUREMENT, SAMPLING, AND ANALYTICAL DEVICES SHALL BE DOCUMENTED IN THE OPERATING RECORD; AND

(e) THE MONITORING WELLS, PIEZOMETERS, AND OTHER MEASUREMENT, SAMPLING, AND ANALYTICAL DEVICES SHALL BE OPERATED AND MAINTAINED TO PERFORM TO DESIGN SPECIFICATIONS THROUGHOUT THE LIFE OF THE MONITORING PROGRAM.

(4) THE NUMBER, SPACING, AND DEPTH OF GROUND-WATER MONITORING WELLS SHALL BE:

(a) BASED ON SITE SPECIFIC HYDROGEOLOGIC INFORMATION; AND

(b) CAPABLE OF DETECTING A RELEASE FROM THE SANITARY LANDFILL FACILITY TO THE GROUND WATER AT THE CLOSEST PRACTICABLE LOCATION TO THE LIMITS OF SOLID WASTE PLACEMENT.

(5) UNLESS THE GROUND WATER IS MONITORED TO SATISFY THE REQUIREMENTS OF PARAGRAPHS (E) AND (F) OF THIS RULE, THE PERMITTEE SHALL, AT LEAST ANNUALLY, EVALUATE THE GROUND-WATER SURFACE ELEVATION DATA OBTAINED IN ACCORDANCE WITH PARAGRAPH (C)(2) OF THIS RULE TO DETERMINE WHETHER THE REQUIREMENTS OF PARAGRAPH (B) OF THIS RULE FOR LOCATING THE MONITORING WELLS CONTINUE TO BE SATISFIED. THE RESULTS OF THIS EVALUATION SHALL BE INCLUDED IN THE REPORT REQUIRED IN ACCORDANCE WITH PARAGRAPH (X) OF RULE 3745-27-09 OF THE

ADMINISTRATIVE CODE. IF THE EVALUATION SHOWS THAT PARAGRAPH (B) OF THIS RULE IS NO LONGER SATISFIED, THE PERMITTEE SHALL IMMEDIATELY MODIFY THE NUMBER, LOCATION, AND/OR DEPTH OF THE MONITORING WELLS TO BRING THE GROUND-WATER MONITORING SYSTEM INTO COMPLIANCE WITH THIS REQUIREMENT.

(C) (1) THE GROUND-WATER MONITORING PROGRAM SHALL INCLUDE CONSISTENT SAMPLING AND ANALYSIS PROCEDURES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND THAT ARE DESIGNED TO ENSURE MONITORING RESULTS THAT PROVIDE AN ACCURATE REPRESENTATION OF GROUND-WATER QUALITY AT THE BACKGROUND AND DOWNGRADIENT WELLS INSTALLED IN ACCORDANCE WITH PARAGRAPH (B) OF THIS RULE. SAMPLING AND ANALYSIS PROCEDURES EMPLOYED IN THE GROUND-WATER MONITORING PROGRAM SHALL BE DOCUMENTED IN A WRITTEN PLAN WHICH SHALL BE AVAILABLE FOR INSPECTION AT THE SANITARY LANDFILL FACILITY. THIS PLAN SHALL, AT A MINIMUM, INCLUDE A DETAILED DESCRIPTION OF THE EQUIPMENT, PROCEDURES, AND TECHNIQUES TO BE USED FOR:

(a) MEASUREMENT OF GROUND-WATER ELEVATIONS; AND

(b) DETECTION OF IMMISCIBLE LAYERS; AND

(c) COLLECTION OF GROUND-WATER SAMPLES, INCLUDING:

(i) WELL EVACUATION; AND

(ii) SAMPLE WITHDRAWAL; AND

(iii) SAMPLE CONTAINERS AND HANDLING; AND

(iv) SAMPLE PRESERVATION; AND

(d) PERFORMANCE OF FIELD ANALYSIS, INCLUDING:

(i) PROCEDURES AND FORMS FOR RECORDING RAW DATA AND THE EXACT LOCATION, TIME, AND FACILITY-SPECIFIC CONDITIONS ASSOCIATED WITH THE DATA ACQUISITION; AND

(ii) CALIBRATION OF FIELD DEVICES; AND

(e) DECONTAMINATION OF EQUIPMENT; AND

(f) ANALYSIS OF GROUND-WATER SAMPLES; AND

(g) CHAIN OF CUSTODY CONTROL, INCLUDING:

(i) STANDARDIZED FIELD TRACKING REPORTING FORMS TO RECORD SAMPLE CUSTODY IN THE FIELD PRIOR TO AND DURING SHIPMENT; AND

(ii) SAMPLE LABELS CONTAINING ALL INFORMATION NECESSARY FOR EFFECTIVE SAMPLE TRACKING; AND

(h) FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL, INCLUDING:

(i) COLLECTION OF REPLICATE SAMPLES; AND

(ii) SUBMISSION OF FIELD-BIAS BLANKS; AND

(iii) POTENTIAL INTERFERENCES.

(2) GROUND-WATER ELEVATIONS SHALL BE MEASURED IN EACH WELL IMMEDIATELY PRIOR TO PURGING AND SAMPLING. THE PERMITTEE SHALL DETERMINE, FOR THE UPPERMOST AQUIFER SYSTEM AND FOR ALL SIGNIFICANT ZONES OF SATURATION MONITORED, THE DIRECTION OF GROUND-WATER FLOW EACH TIME GROUND-WATER ELEVATION MEASUREMENTS ARE PERFORMED.

(3) THE PERMITTEE SHALL ESTABLISH BACKGROUND GROUND-WATER QUALITY, UNLESS THE EXCEPTION IN PARAGRAPH (C)(4) OF THIS RULE APPLIES, BY ANALYZING GROUND-WATER SAMPLES COLLECTED FROM HYDRAULICALLY UPGRADIENT WELLS(S) FOR EACH OF THE MONITORING PARAMETERS OR CONSTITUENTS REQUIRED IN THE PARTICULAR GROUND-WATER MONITORING PROGRAM THAT APPLIES TO THE SANITARY LANDFILL FACILITY AS DETERMINED BY PARAGRAPHS (D), (E), OR (F) OF THIS RULE.

(4) BACKGROUND GROUND-WATER QUALITY AT EXISTING SANITARY LANDFILL FACILITIES MAY BE BASED ON SAMPLING OF WELLS THAT ARE NOT HYDRAULICALLY UPGRADIENT WHERE:

(a) HYDROGEOLOGIC CONDITIONS DO NOT ALLOW THE PERMITTEE TO DETERMINE WHICH WELLS ARE UPGRADIENT; AND

(b) SAMPLING OF OTHER WELLS WILL PROVIDE AN INDICATION OF BACKGROUND GROUND-WATER QUALITY THAT IS AS REPRESENTATIVE OR MORE REPRESENTATIVE THAN THAT PROVIDED BY UPGRADIENT WELLS.

(5) THE PERMITTEE SHALL SPECIFY ONE OF THE FOLLOWING STATISTICAL METHODS TO BE USED, FOLLOWING THE APPROVAL OF THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE, IN EVALUATING GROUND-WATER MONITORING DATA. THE STATISTICAL METHOD CHOSEN SHALL BE CONDUCTED SEPARATELY FOR EACH OF THE PARAMETERS REQUIRED TO BE STATISTICALLY EVALUATED IN PARAGRAPH (D)(4) OF THIS RULE. IF THE PERMITTEE CHOOSES TO USE PRACTICAL QUANTIFICATION LIMITS (PQL'S) IN ANY OF THE FOLLOWING STATISTICAL PROCEDURES IN ORDER TO COMPLY WITH PARAGRAPH (C)(6) OF THIS RULE, THE PERMITTEE SHALL USE THE PQL'S AS PROVIDED FOR THE VOLATILE ORGANIC COMPOUNDS (VOCS) LISTED IN APPENDIX I OF THIS RULE. IF THE PERMITTEE CAN DEMONSTRATE THAT ANY ALTERNATE PQL IS MORE APPROPRIATE FOR THE VOCS LISTED IN APPENDIX I OF THIS RULE, OR IF THE PERMITTEE CHOOSES TO USE PQL'S FOR ANOTHER CONSTITUENT NOT LISTED IN APPENDIX I OF THIS RULE, THEN THE PQL MUST BE PROPOSED BY THE PERMITTEE AND APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE BEFORE THE PQL CAN BE USED. THE STATISTICAL METHOD SPECIFIED SHALL ENSURE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT AND SHALL COMPLY WITH THE PERFORMANCE STANDARDS OUTLINED IN PARAGRAPH (C)(6) OF THIS RULE. THE STATISTICAL METHOD SPECIFIED SHALL BE SELECTED FROM THE FOLLOWING:

(a) A PARAMETRIC ANALYSIS OF VARIANCE ("ANOVA") FOLLOWED BY MULTIPLE COMPARISONS PROCEDURES TO IDENTIFY STATISTICALLY SIGNIFICANT EVIDENCE OF CONTAMINATION. THIS SHALL INCLUDE ESTIMATION AND TESTING OF THE CONTRASTS BETWEEN EACH MONITORING WELL'S MEAN AND THE BACKGROUND MEAN LEVELS FOR EACH CONSTITUENT; OR

(b) AN ANALYSIS OF VARIANCE ("ANOVA") BASED ON RANKS FOLLOWED BY MULTIPLE COMPARISONS PROCEDURES TO IDENTIFY STATISTICALLY SIGNIFICANT EVIDENCE OF CONTAMINATION. THIS SHALL INCLUDE ESTIMATION AND TESTING OF THE CONTRASTS BETWEEN EACH MONITORING WELL'S MEDIAN AND THE BACKGROUND MEDIAN LEVELS FOR EACH CONSTITUENT; OR

(c) A TOLERANCE OR PREDICTION INTERVAL PROCEDURE IN WHICH AN INTERVAL FOR EACH CONSTITUENT IS ESTABLISHED FROM THE DISTRIBUTION OF THE BACKGROUND DATA, AND THE LEVEL OF EACH CONSTITUENT IN EACH MONITORING WELL IS COMPARED TO THE UPPER TOLERANCE OR PREDICTION LIMIT; OR

(d) A CONTROL CHART APPROACH THAT GIVES CONTROL LIMITS FOR EACH CONSTITUENT; OR

(e) ANOTHER STATISTICAL TEST METHOD SUBMITTED BY THE PERMITTEE AND APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE.

(6) ANY STATISTICAL METHOD CHOSEN IN ACCORDANCE WITH PARAGRAPH (C)(5) OF THIS RULE SHALL COMPLY WITH THE FOLLOWING PERFORMANCE STANDARDS AS APPROPRIATE:

(a) THE STATISTICAL METHOD USED TO EVALUATE GROUND-WATER MONITORING DATA SHALL BE APPROPRIATE FOR THE DISTRIBUTION OF CHEMICAL PARAMETERS OR LEACHATE AND LEACHATE-DERIVED CONSTITUENTS. IF THE DISTRIBUTION OF THE CHEMICAL PARAMETERS OR LEACHATE AND LEACHATE-DERIVED CONSTITUENTS IS SHOWN BY THE PERMITTEE TO

BE INAPPROPRIATE FOR A NORMAL THEORY TEST, THEN THE DATA SHOULD BE TRANSFORMED OR A DISTRIBUTION FREE THEORY TEST SHOULD BE USED. IF THE DISTRIBUTIONS FOR THE CONSTITUENTS DIFFER, MORE THAN ONE STATISTICAL METHOD MAY BE NEEDED; AND

(b) IF AN INDIVIDUAL WELL COMPARISON PROCEDURE IS USED TO COMPARE AN INDIVIDUAL MONITORING WELL CONSTITUENT CONCENTRATION WITH BACKGROUND CONSTITUENT CONCENTRATIONS OR A GROUND-WATER CONCENTRATION LEVEL, THE TEST SHALL BE CONDUCTED AT A TYPE I ERROR LEVEL NOT LESS THAN 0.01 FOR EACH TESTING PERIOD. IF MULTIPLE COMPARISONS PROCEDURES ARE USED, THE TYPE I EXPERIMENTWISE ERROR RATE FOR EACH TESTING PERIOD SHALL BE NOT LESS THAN 0.05; HOWEVER, THE TYPE I ERROR RATE OF NOT LESS THAN 0.01 FOR INDIVIDUAL MONITORING WELL COMPARISONS SHALL BE MAINTAINED. THIS PERFORMANCE STANDARD DOES NOT APPLY FOR TOLERANCE INTERVALS, PREDICTION INTERVALS, OR CONTROL CHARTS; OR

(c) IF A CONTROL CHART APPROACH IS USED TO EVALUATE GROUND-WATER MONITORING DATA, THE SPECIFIC TYPE OF CONTROL CHART AND ITS ASSOCIATED PARAMETER VALUES SHALL BE PROPOSED BY THE PERMITTEE AND APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE; OR

(d) IF A TOLERANCE INTERVAL OR A PREDICTION INTERVAL IS USED TO EVALUATE GROUND-WATER MONITORING DATA, THE LEVELS OF CONFIDENCE, AND FOR TOLERANCE INTERVALS, THE PERCENTAGE OF THE POPULATION THAT THE

INTERVAL MUST CONTAIN, SHALL BE PROPOSED BY THE PERMITTEE AND APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE. THESE PARAMETERS SHALL BE DETERMINED AFTER CONSIDERING THE NUMBER OF SAMPLES IN THE BACKGROUND DATA BASE, THE DATA DISTRIBUTION, AND THE RANGE OF THE CONCENTRATION VALUES FOR EACH CONSTITUENT OF CONCERN; AND

(e) THE STATISTICAL METHOD SHALL ACCOUNT FOR DATA BELOW THE LIMIT OF DETECTION WITH ONE OR MORE STATISTICAL PROCEDURES THAT ENSURE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. ANY PRACTICAL QUANTIFICATION LIMIT (PQL) APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE IN ACCORDANCE WITH PARAGRAPH (C)(5) OF THIS RULE THAT IS USED IN THE STATISTICAL METHOD SHALL BE THE LOWEST CONCENTRATION LEVEL THAT CAN BE RELIABLY ACHIEVED WITHIN THE SPECIFIED LIMITS OF PRECISION AND ACCURACY DURING ROUTINE LABORATORY OPERATING CONDITIONS THAT ARE AVAILABLE TO THE FACILITY; AND

(f) IF NECESSARY, THE STATISTICAL METHOD SHALL INCLUDE PROCEDURES TO CONTROL OR CORRECT FOR SEASONAL AND SPATIAL VARIABILITY AS WELL AS TEMPORAL CORRELATION IN THE DATA.

(7) THE PERMITTEE SHALL DETERMINE WHETHER OR NOT THERE IS A STATISTICALLY SIGNIFICANT INCREASE (OR DECREASE IN THE CASE OF PH) FROM BACKGROUND VALUES FOR EACH PARAMETER OR CONSTITUENT REQUIRED IN THE PARTICULAR GROUND-WATER MONITORING PROGRAM THAT APPLIES TO THE SANITARY LANDFILL FACILITY, AS DETERMINED IN ACCORDANCE WITH PARAGRAPH (D), (E), OR (F) OF

THIS RULE. THE PERMITTEE SHALL MAKE THIS DETERMINATION EACH TIME HE ASSESSES GROUND-WATER QUALITY. TO DETERMINE WHETHER A STATISTICALLY-SIGNIFICANT INCREASE OR DECREASE HAS OCCURRED, THE PERMITTEE SHALL COMPARE THE GROUND-WATER QUALITY OF EACH PARAMETER OR CONSTITUENT AT EACH DOWNGRADIENT GROUND-WATER MONITORING WELL TO THE BACKGROUND VALUE OF THAT PARAMETER OR CONSTITUENT ACCORDING TO THE STATISTICAL PROCEDURES SPECIFIED IN PARAGRAPHS (C)(5) AND (C)(6) OF THIS RULE.

(8) THE PERMITTEE SHALL PREPARE AN OUTLINE FOR A GROUND-WATER QUALITY ASSESSMENT PROGRAM WHICH SHALL BE AVAILABLE FOR INSPECTION AT THE SANITARY LANDFILL FACILITY. THE OUTLINE SHALL DESCRIBE A COMPREHENSIVE GROUND-WATER MONITORING PROGRAM CAPABLE OF DETERMINING:

(a) WHETHER LEACHATE OR LEACHATE-DERIVED CONSTITUENTS HAVE ENTERED THE GROUND WATER; AND

(b) THE RATE AND EXTENT OF MIGRATION OF LEACHATE OR LEACHATE-DERIVED WASTE CONSTITUENTS IN THE GROUND WATER; AND

(c) THE CONCENTRATIONS OF LEACHATE OR LEACHATE-DERIVED WASTE CONSTITUENTS IN THE GROUND WATER.

(D) (1) THE PERMITTEE SHALL DETERMINE THE CONCENTRATION OR VALUE OF THE FOLLOWING PARAMETERS IN GROUND WATER IN ACCORDANCE WITH PARAGRAPHS (D)(3) TO (D)(6) OF THIS RULE:

(a) TEMPERATURE; AND

(b) PH; AND

(c) SPECIFIC CONDUCTANCE; AND

(d) TOTAL ORGANIC CARBON; AND

(e) TOTAL DISSOLVED SOLIDS; AND

(f) CHEMICAL OXYGEN DEMAND; AND

(g) TOTAL ALKALINITY; AND

(h) AMMONIA; AND

(i) NITRATE-NITRITE; AND

(j) CHLORIDE; AND

(k) SODIUM; AND

(l) SULFATE; AND

(m) MAGNESIUM; AND

(n) CALCIUM; AND

(o) POTASSIUM; AND

(p) PHOSPHORUS; AND

(q) PHENOLS; AND

(r) CYANIDE; AND

(s) TURBIDITY; AND

(t) ZINC; AND

(u) COPPER; AND

(v) NICKEL; AND

(w) BARIUM; AND

(x) CADMIUM; AND

(y) CHROMIUM; AND

(z) LEAD; AND

(aa) MERCURY; AND

(bb) SELENIUM; AND

(cc) SILVER; AND

(dd) IRON; AND

(ee) MANGANESE; AND

(ff) ARSENIC; AND

(gg) THE VOLATILE ORGANIC COMPOUNDS (VOCS) LISTED IN APPENDIX I OF THIS RULE.

(2) THE PERMITTEE OF A SANITARY LANDFILL FACILITY, EXCLUSIVELY USED TO DISPOSE OF SOLID WASTES RESULTING FROM INDUSTRIAL OPERATIONS OR PUBLICLY-OWNED INCINERATORS, MAY PROPOSE AN ALTERNATE LIST OF PARAMETERS TO BE USED TO MEET THE REQUIREMENTS OF PARAGRAPHS (D)(3) TO (D)(6) OF THIS RULE. THE LIST OF ALTERNATE PARAMETERS SHALL BE SUBMITTED BY THE PERMITTEE AND APPROVED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE PRIOR TO USE. THE ALTERNATE PARAMETER LIST SHALL BE INDICATIVE OF THE WASTE STREAM(S) DEPOSITED AT THE SANITARY LANDFILL FACILITY AND SHALL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. IN PROPOSING THE ALTERNATE PARAMETER LIST, THE PERMITTEE SHALL, AT A MINIMUM, SPECIFY:

(a) WHICH PARAMETERS SHALL BE ANALYZED IN THE GROUND-WATER SAMPLES DURING THE INITIAL YEAR OF GROUND-WATER MONITORING IN ACCORDANCE WITH PARAGRAPH (D)(3) OF THIS RULE; AND

(b) WHICH PARAMETERS SHALL BE ANALYZED IN THE GROUND-WATER SAMPLES AT LEAST SEMIANNUALLY IN ACCORDANCE WITH PARAGRAPH (D)(4) OF THIS RULE; AND

(c) WHICH PARAMETERS SHALL BE ANALYZED IN THE GROUND-WATER SAMPLES AT LEAST ANNUALLY AFTER THE INITIAL YEAR IN ACCORDANCE WITH PARAGRAPH (D)(5) OF THIS RULE; AND

(d) WHICH OF THE PARAMETERS SPECIFIED IN PARAGRAPH (D)(2)(b) OF THIS RULE SHALL HAVE THEIR ANALYTICAL RESULTS STATISTICALLY EVALUATED IN ACCORDANCE WITH PARAGRAPH (D)(4) OF THIS RULE; AND

(e) THE CHEMICAL COMPOSITION OF THE SOLID WASTE(S) WHICH HAVE BEEN, AND ARE TO BE, DEPOSITED AT THE SANITARY LANDFILL FACILITY; AND

(f) THE CHEMICAL COMPOSITION OF LEACHATE, IF AVAILABLE, FROM AN EXISTING SANITARY LANDFILL FACILITY BEING USED TO DISPOSE OF A SIMILAR SOLID WASTE(S); AND

(g) ANY OTHER RELEVANT INFORMATION THAT THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE DEEMS NECESSARY.

(3) DURING THE INITIAL YEAR OF GROUND-WATER MONITORING, WHICH SHALL COMMENCE PRIOR TO WASTE PLACEMENT FOR NEWLY PERMITTED SANITARY LANDFILL FACILITIES, THE INITIAL BACKGROUND CONCENTRATIONS OR VALUES SHALL BE ESTABLISHED FOR ALL PARAMETES LISTED IN PARAGRAPH (D)(1) OF THIS RULE. THE SAMPLING FREQUENCY SHALL BE AT LEAST QUARTERLY FOR THE INITIAL YEAR OF GROUND-WATER MONITORING. THE MINIMUM FREQUENCY OF SAMPLING USED TO ESTABLISH BACKGROUND GROUND-WATER QUALITY FOR THE PARAMETERS SPECIFIED IN PARAGRAPH (D)(1)(b), (c), (d), (e), AND (gg) OF THIS RULE SHALL BE CONSISTENT WITH THE APPROPRIATE STATISTICAL PROCEDURES DETERMINED PURSUANT TO PARAGRAPHS (C)(5) and (C)(6) OF THIS RULE.

(4) AFTER THE INITIAL YEAR, ALL MONITORING WELLS SHALL BE SAMPLED AT LEAST SEMI-ANNUALLY AND THE SAMPLES ANALYZED FOR THE PARAMETERS SPECIFIED IN PARAGRAPHS (D)(1)(b), (c), (d), (e), AND (gg) OF THIS RULE. THE PERMITTEE SHALL STATISTICALLY ANALYZE THE RESULTS FOR THOSE PARAMETERS IN ACCORDANCE WITH PARAGRAPHS (C)(5) AND (C)(6) OF THIS RULE. THE MINIMUM FREQUENCY OF SAMPLING USED SHALL BE CONSISTENT WITH THE STATISTICAL METHOD USED TO ANALYZE THE DATA AND SHALL BE AS OFTEN AS NECESSARY TO ENSURE, WITH REASONABLE CONFIDENCE, THAT A CONTAMINANT RELEASE TO THE GROUND WATER FROM THE FACILITY WILL BE DETECTED.

(5) AFTER THE INITIAL YEAR, ALL MONITORING WELLS SHALL BE SAMPLED AT LEAST ANNUALLY AND THE SAMPLES ANALYZED FOR PARAMETERS SPECIFIED IN PARAGRAPHS (D)(1)(f) TO (D)(1)(ff) OF THIS RULE.

(6) THE PERMITTEE SHALL FIELD ANALYZE GROUND-WATER SAMPLES FOR THE PARAMETERS SPECIFIED IN PARAGRAPHS (D)(1)(a), (b), AND (c) OF THIS RULE WHENEVER THE PERMITTEE WITHDRAWS A SAMPLE FROM A MONITORING WELL.

(7) ALL GROUND-WATER ANALYSIS AND STATISTICAL ANALYSIS RESULTS GENERATED IN ACCORDANCE WITH PARAGRAPHS (D)(3) TO (D)(6) AND PARAGRAPH (C)(2) OF THIS RULE SHALL BE SUBMITTED TO THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE NOT LATER THAN SIXTY DAYS AFTER SAMPLING THE WELL OR NOT LATER THAN FIFTEEN DAYS AFTER RECEIVING THE ANALYSIS RESULTS, WHICHEVER IS SOONER. ALL GROUND-WATER DATA AND AN ACCOMPANYING TEXT SHALL BE SUBMITTED TO THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE IN A FORM SPECIFIED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE.

(8) IF, AT ANY MONITORING WELL, THE PERMITTEE DETERMINES THAT THERE HAS BEEN A STATISTICALLY SIGNIFICANT INCREASE (OR DECREASE IN THE CASE OF PH) FROM BACKGROUND VALUES FOR ANY PARAMETER SPECIFIED IN PARAGRAPHS (D)(1)(b), (c), (d), (e), OR (gg) OF THIS RULE, ACCORDING TO THE STATISTICAL METHOD SPECIFIED BY THE PERMITTEE PURSUANT TO PARAGRAPHS (C)(5) and (C)(6) OF THIS RULE, THE PERMITTEE:

(a) SHALL NOTIFY THE DIRECTOR NOT LATER THAN FIFTEEN DAYS AFTER RECEIVING THE STATISTICAL OR ANALYTICAL RESULTS INDICATING A STATISTICALLY SIGNIFICANT CHANGE. THE NOTIFICATION MUST INDICATE WHICH PARAMETERS HAVE SHOWN A STATISTICALLY SIGNIFICANT CHANGE FROM BACKGROUND LEVELS; AND

(b) SHALL RESAMPLE, NOT LATER THAN FIFTEEN DAYS AFTER NOTIFYING THE DIRECTOR, THE AFFECTED MONITORING WELL(S) FOR THOSE CONSTITUENTS DEMONSTRATING A SIGNIFICANT CHANGE IN CONCENTRATION OR LEVEL. THE PERMITTEE SHALL NOTIFY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE OF THE TIME OF RESAMPLING PRIOR TO RESAMPLING; AND

(c) SHALL, NOT LATER THAN SIXTY DAYS AFTER THE RESAMPLING REQUIRED IN PARAGRAPH (D)(8)(b) OF THIS RULE, CONFIRM OR REJECT THE ORIGINAL DETERMINATION OF A SIGNIFICANT CHANGE IN A WRITTEN NOTIFICATION TO THE DIRECTOR BASED ON THE RESULTS OF THE RESAMPLING.

(E) (1) THE PERMITTEE SHALL, WITHIN FIFTEEN DAYS OF CONFIRMING A SIGNIFICANT CHANGE IN ACCORDANCE WITH PARAGRAPH (D)(8)(c) OF THIS RULE, SUBMIT TO THE DIRECTOR A SPECIFIC PLAN, BASED ON THE OUTLINE REQUIRED IN PARAGRAPH (C)(8) OF THIS RULE, FOR A GROUND-WATER QUALITY ASSESSMENT PROGRAM AT THE SANITARY LANDFILL FACILITY.

(2) THE PLAN REQUIRED IN PARAGRAPH (E)(1) OF THIS RULE SHALL INCLUDE PROVISIONS:

(a) FOR SAMPLING THE AFFECTED AND BACKGROUND WELLS NOT LATER THAN FIFTEEN DAYS AFTER SUBMITTING THE PLAN AND ANALYZING THOSE SAMPLES FOR ALL LEACHATE OR LEACHATE DERIVED CONSTITUENTS, INCLUDING ALL CONSTITUENTS LISTED IN APPENDIX II OF THIS RULE; AND

(b) FOR SAMPLING ALL MONITORING WELLS NOT SAMPLED UNDER THE PROVISIONS OF PARAGRAPH (E)(2)(a) OF THIS RULE. THESE SAMPLES SHALL BE ANALYZED FOR THOSE LEACHATE OR LEACHATE-DERIVED CONSTITUENTS FOUND TO BE ABOVE BACKGROUND LEVELS IN THE AFFECTED MONITORING WELLS SAMPLED UNDER PARAGRAPH (E)(2)(a) OF THIS RULE; AND

(c) TO SUBMIT TO THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE NOT LATER THAN SIXTY DAYS AFTER SAMPLING THE WELL OR NOT LATER THAN FIFTEEN DAYS AFTER RECEIVING THE ANALYSIS RESULTS, WHICHEVER IS SOONER THE ANALYTICAL RESULTS GENERATED IN ACCORDANCE WITH PARAGRAPH (E) OF THIS RULE. ALL GROUND-WATER DATA AND AN ACCOMPANYING TEXT SHALL BE SUBMITTED TO THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE IN A FORM SPECIFIED BY THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE.

(3) THE PLAN TO BE SUBMITTED IN ACCORDANCE WITH PARAGRAPH (E)(1) OF THIS RULE SHALL INCLUDE, AT A MINIMUM, DETAILED DESCRIPTIONS OF THE FOLLOWING:

(a) HYDROGEOLOGIC CONDITIONS AT THE SANITARY LANDFILL FACILITY; AND

(b) THE DETECTION MONITORING PROGRAM IMPLEMENTED BY THE SANITARY LANDFILL FACILITY, INCLUDING:

(i) THE NUMBER, LOCATION, DEPTH, AND CONSTRUCTION OF DETECTION MONITORING WELLS WITH DOCUMENTATION; AND

(ii) A SUMMARY OF DETECTION MONITORING GROUND-WATER ANALYTICAL DATA WITH WRITTEN DOCUMENTATION OF THE RESULTS; AND

(iii) A SUMMARY OF STATISTICAL ANALYSES APPLIED TO THE DATA; AND

(c) THE INVESTIGATORY APPROACH TO BE FOLLOWED DURING THE ASSESSMENT, INCLUDING BUT NOT LIMITED TO:

(i) THE PROPOSED NUMBER, LOCATION, DEPTH, INSTALLATION METHOD, AND CONSTRUCTION OF ASSESSMENT MONITORING WELLS; AND

(ii) THE PROPOSED METHOD(S) FOR GATHERING ADDITIONAL HYDROGEOLOGIC INFORMATION; AND

(iii) THE PLANNED USE OF SUPPORTING METHODOLOGY (I.E., SOIL GAS OR GEOPHYSICAL SURVEYS); AND

(d) THE TECHNIQUES, PROCEDURES, AND ANALYTICAL EQUIPMENT TO BE USED FOR GROUND-WATER SAMPLING DURING THE ASSESSMENT, INCLUDING BUT NOT LIMITED TO:

(i) MEASUREMENT OF GROUND-WATER ELEVATIONS; AND

(ii) DETECTION OF IMMISCIBLE LAYERS; AND

(iii) COLLECTION OF GROUND-WATER SAMPLES, INCLUDING:

(a) WELL EVACUATION; AND

(b) SAMPLE WITHDRAWAL; AND

(c) SAMPLE CONTAINERS AND HANDLING; AND

(d) SAMPLE PRESERVATION; AND

(iv) PERFORMANCE OF FIELD ANALYSIS, INCLUDING:

(a) PROCEDURES AND FORMS FOR RECORDING DATA AND THE EXACT LOCATION, TIME, AND FACILITY-SPECIFIC CONDITIONS ASSOCIATED WITH THE DATA ACQUISITION; AND

(b) CALIBRATION OF FIELD DEVICES; AND

(v) DECONTAMINATION OF EQUIPMENT; AND

(vi) METHODS FOR GROUND-WATER SAMPLE ANALYSIS FOR ALL LEACHATE OR LEACHATE-DERIVED CONSTITUENTS, INCLUDING ALL CONSTITUENTS LISTED IN APPENDIX II OF THIS RULE; AND

(vii) CHAIN OF CUSTODY CONTROL INCLUDING:

(a) STANDARDIZED FIELD TRACKING REPORTING FORMS TO RECORD SAMPLE CUSTODY IN THE FIELD PRIOR TO AND DURING SHIPMENT; AND

(b) PREPREPARED SAMPLE LABELS CONTAINING ALL INFORMATION NECESSARY FOR EFFECTIVE SAMPLE TRACKING; AND

(viii) FIELD AND LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL INCLUDING:

(a) COLLECTION OF REPLICATE SAMPLES; AND

(b) SUBMISSION OF FIELD-BIAS BLANKS; AND

(c) POTENTIAL INTERFERENCES; AND

(e) DATA EVALUATION PROCEDURES, INCLUDING BUT NOT LIMITED TO:

(i) PLANNED USE OF STATISTICAL DATA EVALUATION; AND

(ii) PLANNED USE OF COMPUTER MODELS; AND

(iii) PLANNED USE OF PREVIOUSLY GATHERED INFORMATION; AND

(iv) CRITERIA WHICH WILL BE UTILIZED TO DETERMINE IF ADDITIONAL ASSESSMENT ACTIVITIES ARE WARRANTED; AND

(f) A SCHEDULE OF IMPLEMENTATION.

(4) THE PERMITTEE SHALL IMPLEMENT THE GROUND-WATER QUALITY ASSESSMENT PLAN WHICH SATISFIES THE REQUIREMENTS OF PARAGRAPHS (E)(2) AND (E)(3) OF THIS RULE AND, AT A MINIMUM, DETERMINE:

(a) THE RATE AND EXTENT OF MIGRATION OF THE LEACHATE OR LEACHATE-DERIVED CONSTITUENTS IN THE GROUND WATER; AND

(b) THE CONCENTRATIONS OF THE LEACHATE OR LEACHATE-DERIVED CONSTITUENTS IN THE GROUND WATER.

(5) ALL MONITORING WELLS NOT AFFECTED BY THE GROUND-WATER QUALITY ASSESSMENT PROGRAM REQUIRED BY PARAGRAPH (E) OF THIS RULE SHALL BE MONITORED IN ACCORDANCE WITH PARAGRAPHS (C) AND (D) OF THIS RULE.

(6) THE PERMITTEE SHALL MAKE A FIRST DETERMINATION ACCORDING TO PARAGRAPH (E)(4) OF THIS RULE WITHIN THE TIME FRAME SPECIFIED IN THE SUBMITTED GROUND-WATER QUALITY ASSESSMENT PLAN. THE PERMITTEE SHALL SUBMIT TO THE DIRECTOR, NOT LATER THAN FIFTEEN DAYS AFTER MAKING A FIRST DETERMINATION, A WRITTEN REPORT CONTAINING AN ASSESSMENT OF THE GROUND-WATER QUALITY INCLUDING ALL DATA GENERATED AS PART OF IMPLEMENTATION OF THE GROUND-WATER QUALITY ASSESSMENT PLAN.

(7) IF THE PERMITTEE DETERMINES, BASED ON THE RESULTS OF THE FIRST DETERMINATION MADE ACCORDING TO PARAGRAPH (E)(4) OF THIS RULE, THAT NO LEACHATE OR LEACHATE-DERIVED CONSTITUENTS FROM THE FACILITY HAVE ENTERED THE GROUND WATER, THEN THE PERMITTEE SHALL REQUEST THAT THE DIRECTOR APPROVE REINSTATEMENT OF THE INDICATOR EVALUATION PROGRAM DESCRIBED IN PARAGRAPHS (C) AND (D) OF THIS RULE. UNTIL THE DIRECTOR APPROVES REINSTATEMENT OF THE INDICATOR EVALUATION PROGRAM, THE PERMITTEE SHALL COMPLY WITH PARAGRAPHS (E)(8) AND (F) OF THIS RULE.

(8) IF THE PERMITTEE DETERMINES, BASED ON THE FIRST DETERMINATION MADE ACCORDING TO PARAGRAPH (E)(4) OF THIS RULE, THAT LEACHATE OR LEACHATE-DERIVED CONSTITUENTS FROM THE FACILITY HAVE ENTERED THE GROUND WATER, THEN THE PERMITTEE SHALL CONTINUE TO MAKE THE DETERMINATION REQUIRED IN ACCORDANCE WITH PARAGRAPH (E)(4) OF THIS RULE ON A QUARTERLY BASIS UNTIL RELEASED FROM THIS OBLIGATION BY THE DIRECTOR OR UNLESS AN ALTERNATE TIME INTERVAL IS ESTABLISHED BY THE DIRECTOR.

(F) (1) UNLESS EXCUSED IN ACCORDANCE WITH PARAGRAPH (E)(7) OF THIS RULE, THE PERMITTEE SHALL SUBMIT A CORRECTIVE MEASURES STUDY TO THE DIRECTOR NOT LATER THAN ONE HUNDRED EIGHTY DAYS AFTER MAKING A FIRST DETERMINATION IN ACCORDANCE WITH PARAGRAPH (E)(4) OF THIS RULE. THIS STUDY SHALL EVALUATE ALL PRACTICABLE REMEDIATION PROCEDURES WHICH ARE AVAILABLE FOR REMEDIATING ANY CONTAMINATION DISCOVERED DURING THE GROUND-WATER QUALITY ASSESSMENT. THE EVALUATED REMEDIATION PROCEDURES SHALL, AT A MINIMUM:

(a) BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT; AND

(b) ATTAIN THE PROPOSED GROUND-WATER CONCENTRATION LEVELS SPECIFIED IN ACCORDANCE WITH PARAGRAPH (F)(5) OF THIS RULE; AND

(c) CONTROL THE SOURCE(S) OF RELEASES TO REDUCE OR ELIMINATE, TO THE MAXIMUM EXTENT PRACTICABLE, FURTHER RELEASES OF LEACHATE OR LEACHATE-DERIVED CONSTITUENTS INTO THE ENVIRONMENT; AND

(d) COMPLY WITH STANDARDS FOR MANAGEMENT OF WASTES AS SPECIFIED IN PARAGRAPH (F)(12) OF THIS RULE.

(2) THE PERMITTEE SHALL EVALUATE EACH PROPOSED REMEDIATION PROCEDURE WITHIN THE CORRECTIVE MEASURES STUDY. THIS EVALUATION SHALL, AT A MINIMUM, CONSIDER:

(a) ANY POTENTIAL REMEDIATION PROCEDURE, WHICH SHALL BE ASSESSED FOR THE LONG-TERM AND SHORT-TERM EFFECTIVENESS AND THE PROTECTION IT AFFORDS. THIS SHALL INCLUDE THE DEGREE OF CERTAINTY THAT THE REMEDIATION PROCEDURE WILL PROVE SUCCESSFUL. FACTORS TO BE CONSIDERED INCLUDE:

(i) MAGNITUDE OF REDUCTION OF EXISTING RISKS; AND

(ii) MAGNITUDE OF RESIDUAL RISKS IN TERMS OF LIKELIHOOD OF FURTHER RELEASES DUE TO WASTE REMAINING FOLLOWING IMPLEMENTATION OF A REMEDIATION PROCEDURE; AND

(iii) THE TYPE AND DEGREE OF LONG-TERM MANAGEMENT REQUIRED, INCLUDING MONITORING, OPERATION, AND MAINTENANCE; AND

(iv) SHORT-TERM RISKS THAT MAY AFFECT THE COMMUNITY, WORKERS, OR THE ENVIRONMENT DURING IMPLEMENTATION OF SUCH A REMEDIATION PROCEDURE, INCLUDING POTENTIAL THREATS TO HUMAN HEALTH AND THE ENVIRONMENT ASSOCIATED WITH EXCAVATION, TRANSPORTATION, REDISPOSAL, OR CONTAINMENT; AND

(v) POTENTIAL FOR HUMAN AND ENVIRONMENTAL RECEPTOR EXPOSURE TO REMAINING WASTES, CONSIDERING THE POTENTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT ASSOCIATED WITH EXCAVATION, TRANSPORTATION, REDISPOSAL, OR CONTAINMENT; AND

(vi) LONG-TERM RELIABILITY OF THE ENGINEERING AND INSTITUTIONAL CONTROLS; AND

(vii) POTENTIAL NEED FOR REPLACEMENT OF THE REMEDIATION PROCEDURE; AND

(b) THE EFFECTIVENESS OF THE REMEDIATION PROCEDURE IN CONTROLLING THE SOURCE IN ORDER TO REDUCE FURTHER RELEASES, INCLUDING:

(i) THE EXTENT TO WHICH CONTAINMENT PRACTICES WILL REDUCE FURTHER RELEASES; AND

(ii) THE EXTENT TO WHICH TREATMENT TECHNOLOGIES MAY BE USED; AND

(c) THE NEED TO COORDINATE WITH, AND OBTAIN NECESSARY APPROVALS AND PERMITS FROM, OTHER AGENCIES; AND

(d) THE AVAILABLE CAPACITY AND LOCATION OF NEEDED TREATMENT, STORAGE, AND DISPOSAL SERVICES; AND

(e) THE PERFORMANCE, RELIABILITY, EASE OF IMPLEMENTATION, AND POTENTIAL IMPACTS OF THE POTENTIAL REMEDIATION PROCEDURES, INCLUDING SAFETY IMPACTS, CROSS-MEDIA IMPACTS, AND CONTROL OF EXPOSURE TO ANY RESIDUAL CONTAMINATION; AND

(f) A SCHEDULE FOR INITIATING AND COMPLETING EACH REMEDIATION PROCEDURE DISCUSSED IN THE STUDY. IN ESTABLISHING THIS SCHEDULE, THE PERMITTEE SHALL CONSIDER:

(i) THE EXTENT AND NATURE OF ANY CONTAMINATION; AND

(ii) THE PRACTICAL CAPABILITY OF REMEDIAL TECHNOLOGIES TO ACHIEVE COMPLIANCE WITH GROUND-WATER CONCENTRATION LEVELS ESTABLISHED IN ACCORDANCE WITH PARAGRAPH (F)(5) OF THIS RULE AND OTHER OBJECTIVES OF THE REMEDIATION PROCEDURE; AND

(iii) THE AVAILABILITY OF TREATMENT OR DISPOSAL CAPACITY FOR WASTES MANAGED DURING IMPLEMENTATION OF THE REMEDIATON PROCEDURE; AND

(iv) THE DESIRABILITY OF UTILIZING TECHNOLOGIES THAT ARE NOT CURRENTLY AVAILABLE, BUT WHICH MAY OFFER SIGNIFICANT ADVANTAGES OVER CURRENTLY AVAILABLE TECHNOLOGIES IN TERMS OF PROTECTION, RELIABILITY, SAFETY, OR THE ABILITY TO ACHIEVE REMEDIAL OBJECTIVES; AND

(v) POTENTIAL RISKS TO HUMAN HEALTH AND THE ENVIRONMENT FROM CONTAMINANT EXPOSURE PRIOR TO COMPLETION OF THE REMEDIATION PROCEDURE; AND

(vi) PRACTICABLE CAPABILITY OF THE PERMITTEE; AND

(vii) OTHER RELEVANT FACTORS; AND

(g) RESOURCE VALUE OF THE AQUIFER SYSTEM, INCLUDING:

(i) CURRENT AND FUTURE USES; AND

(ii) PROXIMITY AND WITHDRAWAL RATE OF USERS; AND

(iii) GROUND-WATER QUANTITY AND QUALITY; AND

(iv) THE POTENTIAL DAMAGE TO WILDLIFE, CROPS, VEGETATION, AND PHYSICAL STRUCTURES RESULTING FROM EXPOSURE TO WASTE CONSTITUENTS; AND

(v) THE HYDROGEOLOGIC CHARACTERISTICS OF THE FACILITY AND SURROUNDING AREA; AND

(vi) GROUND-WATER REMOVAL AND TREATMENT COSTS; AND

(vii) THE COST AND AVAILABILITY OF ALTERNATE WATER SUPPLIES.

(3) THE DIRECTOR OR HIS AUTHORIZED REPRESENTATIVE MAY REQUIRE THE PERMITTEE TO EVALUATE, AS PART OF THE CORRECTIVE MEASURES STUDY, ONE OR MORE SPECIFIC POTENTIAL REMEDIATION PROCEDURE(S).

(4) IF, AT ANY TIME DURING THE ASSESSMENT DESCRIBED IN PARAGRAPHS (E) AND (F) OF THIS RULE, THE DIRECTOR DETERMINES THAT THE FACILITY THREATENS HUMAN HEALTH OR THE ENVIRONMENT, THE DIRECTOR MAY REQUIRE THE PERMITTEE TO IMPLEMENT THE FOLLOWING MEASURES:

(a) NOTIFY ALL PERSONS, VIA CERTIFIED MAIL, WHO OWN THE LAND OR RESIDE ON THE LAND THAT DIRECTLY OVERLIES OR LIES ADJACENT TO ANY PART OF THE PLUME OF CONTAMINATION; AND

(b) TAKE ANY INTERIM MEASURES DEEMED NECESSARY BY THE DIRECTOR TO ENSURE THE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. INTERIM MEASURES SHOULD, TO THE EXTENT PRACTICABLE, BE CONSISTENT WITH THE OBJECTIVES OF AND CONTRIBUTE TO THE PERFORMANCE OF ANY REMEDIATION PROCEDURE THAT MAY BE REQUIRED PURSUANT TO PARAGRAPHS (F)(1), (F)(2), AND (F)(5) OF THIS RULE. THE FOLLOWING FACTORS MAY BE CONSIDERED BY THE DIRECTOR IN DETERMINING WHETHER INTERIM MEASURES ARE NECESSARY:

(i) THE AMOUNT OF TIME REQUIRED TO DEVELOP AND IMPLEMENT A FINAL REMEDIATION PROCEDURE; AND

(ii) ACTUAL OR POTENTIAL EXPOSURE OF NEARBY POPULATIONS OR ENVIRONMENTAL RECEPTORS TO LEACHATE OR LEACHATE-DERIVED CONSTITUENTS; AND

(iii) ANY FURTHER DEGRADATION OF THE GROUND WATER THAT MAY OCCUR IF REMEDIAL ACTION IS NOT INITIATED EXPEDITIOUSLY; AND

(iv) WEATHER CONDITIONS THAT MAY CAUSE LEACHATE OR LEACHATE-DERIVED CONSTITUENTS TO MIGRATE OR BE RELEASED; AND

(v) RISKS OF FIRE, EXPLOSION, OR POTENTIAL FOR EXPOSURE TO LEACHATE OR LEACHATE-DERIVED CONSTITUENTS AS A RESULT OF AN ACCIDENT OR FAILURE OF A CONTAINER OR HANDLING SYSTEM; AND

(vi) OTHER SITUATIONS THAT THREATEN HUMAN HEALTH AND THE ENVIRONMENT.

(5) THE CORRECTIVE MEASURES STUDY SHALL PROPOSE A CONCENTRATION LEVEL FOR EACH LEACHATE OR LEACHATE-DERIVED CONSTITUENT WHICH HAS BEEN DETECTED IN THE GROUND WATER AT A STATISTICALLY SIGNIFICANT LEVEL. THESE SHALL BE ESTABLISHED AS FOLLOWS:

(a) THE PROPOSED CONCENTRATION LEVELS IN THE GROUND WATER SHALL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT; AND

(b) UNLESS AN ALTERNATE LEVEL IS DEEMED NECESSARY TO PROTECT ENVIRONMENTAL RECEPTORS, THEN:

(i) FOR KNOWN OR SUSPECTED CARCINOGENS, THE PROPOSED CONCENTRATION LEVELS SHALL BE ESTABLISHED AT CONCENTRATION LEVELS BELOW THOSE THAT REPRESENT A CUMULATIVE EXCESS UPPER-BOUND LIFETIME RISK TO AN INDIVIDUAL OF 1×10^{-6}; AND

(ii) FOR NONCARCINOGENS, THE PROPOSED CONCENTRATION LEVELS SHALL BE REDUCED TO LEVELS TO WHICH THE HUMAN POPULATION (INCLUDING SENSITIVE SUBGROUPS) COULD BE EXPOSED ON A DAILY BASIS WITHOUT APPRECIABLE RISK OF DELETERIOUS EFFECTS DURING A LIFETIME; AND

(c) IN ESTABLISHING THE PROPOSED CONCENTRATION LEVELS THAT MEET THE REQUIREMENTS OF PARAGRAPH (F)(5)(b) OF THIS RULE, THE PERMITTEE SHALL CONSIDER THE FOLLOWING:

(i) MULTIPLE CONTAMINANTS IN THE GROUND WATER; AND

(ii) EXPOSURE THREAT TO SENSITIVE ENVIRONMENTAL RECEPTORS; AND

(iii) OTHER SITE-SPECIFIC EXPOSURE OR POTENTIAL EXPOSURE TO GROUND WATER; AND

(iv) THE RELIABILITY, EFFECTIVENESS, PRACTICABILITY, AND OTHER RELEVANT FACTORS OF THE REMEDIATION PROCEDURE; AND

(d) FOR GROUND WATER THAT IS A CURRENT OR POTENTIAL SOURCE OF DRINKING WATER, THE PERMITTEE SHALL CONSIDER THE FEDERAL SAFE DRINKING WATER ACT MAXIMUM CONTAMINANT LEVELS; AND

(e) IF THE PERMITTEE CAN DEMONSTRATE TO THE DIRECTOR THAT A LEACHATE OR LEACHATE-DERIVED CONSTITUENT IS ALREADY PRESENT IN THE GROUND WATER AT A BACKGROUND LEVEL, THEN THE PROPOSED CONCENTRATION LEVELS SHALL NOT BE SET BELOW BACKGROUND LEVELS UNLESS THE DIRECTOR DETERMINES THAT:

(i) CLEANUP TO LEVELS BELOW BACKGROUND LEVELS IS NECESSARY TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT; AND

(ii) SUCH CLEANUP IS IN CONNECTION WITH AN AREA-WIDE REMEDIAL ACTION UNDER OTHER AUTHORITIES.

(6) THE DIRECTOR SHALL SELECT FROM THE CORRECTIVE MEASURES REPORT, OR DESIGNATE ACCORDING TO PARAGRAPH (F)(3) OF THIS RULE, THE CORRECTIVE MEASURE WHICH BEST MEETS THE CRITERIA LISTED IN PARAGRAPHS (F)(1), (F)(2) and (F)(5) OF THIS RULE. THE PERMITTEE SHALL IMPLEMENT THE CORRECTIVE MEASURE DESIGNATED BY THE DIRECTOR IN ACCORDANCE WITH THE SCHEDULE OF IMPLEMENTATION SELECTED BY THE DIRECTOR.

(7) IN IMPLEMENTING THE REMEDIATION PROCEDURE APPROVED BY THE DIRECTOR IN ACCORDANCE WITH PARAGRAPH (F)(6) OF THIS RULE, THE PERMITTEE SHALL ACHIEVE THE DESIGNATED CONCENTRATION LEVELS, AS DETERMINED BY PARAGRAPH (F)(5) OF THIS RULE, AT ALL POINTS WITHIN THE PLUME OF CONTAMINATION THAT LIE BEYOND THE LIMITS OF SOLID WASTE PLACEMENT.

(8) UPON COMPLETION OF THE CORRECTIVE MEASURE ACTIVITY, WHEN THE GROUND-WATER QUALITY MEETS THE DESIGNATED CONCENTRATION LEVELS AS SPECIFIED IN PARAGRAPHS (F)(5) AND (F)(7) OF THIS RULE, THE PERMITTEE SHALL DEMONSTRATE ON A SEMIANNUAL BASIS FOR A PERIOD OF FIVE YEARS OR UNTIL THE SANITARY LANDFILL FACILITY'S POST-CLOSURE CARE PERIOD ENDS, WHICHEVER IS LONGER, THAT THE DESIGNATED CONCENTRATION LEVELS HAVE NOT BEEN EXCEEDED AS PROVIDED IN PARAGRAPH (F)(7) OF THIS RULE BEFORE BEING RELEASED FROM COMPLIANCE WITH THE GROUND-WATER MONITORING REQUIREMENTS.

(9) IF THE CONCENTRATIONS OF THE CONSTITUENTS MONITORED IN ACCORDANCE WITH PARAGRAPH (F)(8) OF THIS RULE EXCEED THE CONCENTRATION LEVELS DETERMINED IN ACCORDANCE WITH PARAGRAPH (F)(5) OF THIS RULE, THE PERMITTEE SHALL REIMPLEMENT THE DESIGNATED CORRECTIVE MEASURE OR SUBMIT NEW REMEDIATION PROCEDURES IN ACCORDANCE WITH THE CRITERIA IN PARAGRAPHS (F)(1) AND (F)(2) OF THIS RULE.

(10) THE DIRECTOR MAY DETERMINE, BASED ON INFORMATION DEVELOPED BY THE PERMITTEE AFTER IMPLEMENTATION OF THE REMEDIATION PROCEDURE HAS BEGUN, OR FROM OTHER INFORMATION, THAT COMPLIANCE WITH THE REQUIREMENTS(S) FOR THE REMEDIATION PROCEDURE SELECTED UNDER PARAGRAPHS (F)(1) AND (F)(2) OF THIS RULE IS NOT TECHNICALLY PRACTICABLE. IN MAKING SUCH A DETERMINATION, THE DIRECTOR SHALL CONSIDER:

(a) THE PERMITTEE'S EFFORTS TO ACHIEVE COMPLIANCE WITH THE REQUIREMENT(S); AND

(b) WHETHER OTHER CURRENTLY AVAILABLE OR NEW METHODS OR TECHNIQUES COULD PRACTICABLY ACHIEVE COMPLIANCE WITH THE REQUIREMENTS.

(11) IF THE DIRECTOR DETERMINES THAT COMPLIANCE WITH A REMEDIATION PROCEDURE REQUIREMENT IS NOT TECHNICALLY PRACTICABLE, THEN THE DIRECTOR MAY REQUIRE THAT THE PERMITTEE:

(a) IMPLEMENT ALTERNATE MEASURES TO CONTROL HUMAN OR ENVIRONMENTAL RECEPTOR EXPOSURE TO RESIDUAL CONTAMINATION, AS NECESSARY, TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT; AND

(b) IMPLEMENT ALTERNATE MEASURES FOR CONTROL OF THE SOURCES OF CONTAMINATION, OR FOR REMOVAL OR DECONTAMINATION OF EQUIPMENT, UNITS, DEVICES, OR STRUCTURES REQUIRED TO IMPLEMENT THE REMEDIATION PROCEDURE(S), THAT ARE:

(i) TECHNICALLY PRACTICABLE; AND

(ii) CONSISTENT WITH THE OVERALL OBJECTIVE OF THE REMEDIATION PROCEDURE.

(12) ALL SOLID WASTES THAT ARE MANAGED PURSUANT TO A REMEDIATON PROCEDURE REQUIRED UNDER PARAGRAPH (F)(6) OF THIS RULE, OR AN INTERIM MEASURE REQUIRED UNDER PARAGRAPH (F)(4) OF THIS RULE, SHALL BE MANAGED IN A MANNER:

(a) THAT IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT; AND

(b) THAT COMPLIES WITH APPLICABLE LAWS AND REGULATIONS.

(13) REMEDIATION PROCEDURES SELECTED PURSUANT TO PARAGRAPHS (F)(1) AND (F)(2) OF THIS RULE SHALL BE CONSIDERED COMPLETE WHEN THE DIRECTOR DETERMINES THAT COMPLIANCE WITH THE GROUND-WATER CONCENTRATION LEVELS ESTABLISHED UNDER PARAGRAPH (F)(5) OF THIS RULE HAS BEEN ACHIEVED, AND ALL ACTIONS REQUIRED TO COMPLETE THE REMEDIATON PROCEDURE HAVE BEEN SATISFIED.

(14) UPON COMPLETION OF THE REMEDIATON PROCEDURE, THE PERMITTEE SHALL SUBMIT TO THE DIRECTOR CERTIFICATION THAT THE REMEDIATION PROCEDURE HAS BEEN COMPLETED. THE CERTIFICATION MUST BE SIGNED BY THE PERMITTEE AND BY AN INDEPENDENT PROFESSIONAL(S) SKILLED IN THE APPROPRIATE TECHNICAL DISCIPLINE(S).

(15) WHEN, UPON RECEIPT OF THE CERTIFICATION AND IN CONSIDERATION OF ANY OTHER RELEVANT INFORMATION, THE DIRECTOR DETERMINES THAT THE CORRECTIVE ACTION REMEDIATON PROCEDURE HAS BEEN COMPLETED IN ACCORDANCE WITH PARAGRAPH (F)(13) OF THIS RULE, THE DIRECTOR SHALL RELEASE THE PERMITTEE FROM CONTINUING PERFORMANCE OF THE APPROVED REMEDIATON PROCEDURE. THIS APPROVAL SHALL NOT EXEMPT THE PERMITTEE FROM MEETING THE REQUIREMENTS OF PARAGRAPHS (F)(8) AND (F)(9) OF THIS RULE.

(16) THE PERMITTEE SHALL SUBMIT, UPON IMPLEMENTATION OF THE REMEDIATON PROCEDURE CHOSEN UNDER PARAGRAPH (F)(6) OF THIS RULE, A REPORT OF THE ACTIVITIES BEING CONDUCTED AT THE FACILITY AS PART OF IMPLEMENTATION OF THE CHOSEN REMEDIATION PROCEDURE. THIS REPORT SHALL BE SUBMITTED QUARTERLY AND CONTAIN:

(a) A NARRATIVE DESCRIPTION OF ALL REMEDIAL ACTIVITIES THAT HAVE OCCURRED SINCE THE PREVIOUS REPORT; AND

(b) ALL DATA GENERATED AS PART OF THE REMEDIAL ACTIVITIES AT THE FACILITY.

APPENDIX I- VOLATILE ORGANIC COMPOUNDS FOR GROUND-WATER MONITORING

COMPOUND	PRACTICAL QUANTIFICATION LIMITS (UG/L)
ACETONE	100
ACROLEIN	5
ACRYLONITRILE	5
BENZENE	2
BROMODICHLOROMETHANE	1
CIS-1,3-DICHLOROPROPENE	1
TRANS-1,3-DICHLOROPROPENE	5
ETHYLBENZENE	2
ETHYL METHACRYLATE	5
BROMOFORM	2
BROMOMETHANE	10
2-BUTANONE (METHYL ETHYL KETONE)	10
CARBON DISULFIDE	5
CARBON TETRACHLORIDE	1
CHLOROBENZENE	2
CHLOROETHANE	5
2-CHLOROETHYL VINYL ETHER	10
CHLOROFORM	0.5
CHLOROMETHANE	5
DICHLORODIFLUOROMETHANE	5
1,1-DICHLOROETHANE	1
1,2-DICHLOROETHANE	0.5
2-HEXANONE	50
METHYLENE CHLORIDE	5
4-METHYL-2-PENTANONE	50
1,1-DICHLOROETHENE	1
TRANS-1,2-DICHLOROETHENE	1
STYRENE	1
1,1,2,2-TETRACHLOROETHANE	0.5
TOLUENE	2
1,1,1-TRICHLOROETHANE	5
1,1,2-TRICHLOROETHANE	0.2
TRICHLOROETHENE	1
TRICHLOROFLUOROMETHANE	5
1,2,3-TRICHLOROPROPANE	5
VINYL ACETATE	5
VINYL CHLORIDE	2
XYLENE	5

ACENAPHTHYLENE
ACENAPHTHYLENE, 1,2-DIHYDRO-
ACETAMIDE, N-(4-ETHOXYPHENYL)-H
ACETAMIDE, N-9H-GLUOREN-2-YL
ACETIC ACID ETHENYL ESTER
ACETIC ACID, (2,4,5-TRICHLORO-PHENOXY)-
ACETIC ACID, (2,4-DICHLORO-PHENOXY)-
ACETRONITRITE
ALUMINUM
ANTHRACENE
ANTIMONY
AROCLOR 1016
AROCLOR 1221
AROCLOR 1232
AROCLOR 1242
AROCLOR 1248
AROCLOR 1254
AROCLOR 1260
ARSENIC
BARIUM
BENZ[A]ANTHRACENE, 7,12-DIMETHYL-
BENZ[J]ACEANTHRYLENE, 1,2-DIHYDRO-3-METHYL-
BENZ[E]ACEPHENANTHRYLENE
BENZAMIDE, 3,4-DICHLOROR-N-(1,1-DIMETHYL-2-PROPYNL)
BENZAMIDE, 3,4-DICLORO-N-(1,1-DIMETHYL-2-PROPYNYL)-
BENZ(A)ANTHRACENE
BENZENAMINE
BENZENAMINE, 2-METHYL-5-NITRO
BENZENAMINE, 2-NITRO
BENZENAMINE, 3-NITRO
BENZENAMINE, 4-CHLORO
BENZENAMINE, 4-NITRO
BENZENAMINE, 4,4'-METHYLENEBIS[2-CHLORO
BENZENAMINE, N-NITROSO-N-PHENYL
BENZENAMINE, N-PHENYL-
BENZENAMINE, N,N-DIMETHYL-4-(PHENYLAZO)-
BENZENE
BENZENE, 1-BROMO-4-PHENOXY-
BENZENE, 1-CHLORO-4-PHENOXY-
BENZENE, 1-METHYL-2,4-DINITRO-

BENZENE, 1,1'-(2,2,2-TRICHLORO-ETHYLIDENE)BIS[4-CHLORO-
BENZENE, 1,1'-(2,2,2-TRICHLORO-ETHYLIDENE)BIS[4-METHOXY-BENZENE,1,1'-(2,2-DICHLORO-ETHYLIDENE)BIS[4-CHLORO-
BENZENE, 1,1'-(2,2-DICHLORO-ETHENYLIDENE)BIS[4-CHLORO-
BENZENE, 1,2-DICHLORO-
BENZENE, 1,2,4-TRICHLORO
BENZENE, 1,3-DICHLORO
BENZENE, 1,4-DICHLORO
BENZENE, 1,4-DINITRO
BENZENE, 2-METHYL-1,3-DINITRO-
BENZENE, CHLORO
BENZENE, DIMETHYL-
BENZENE, ETHENYL-
BENZENE, ETHYL-
BENZENE-HEXACHLORO-
BENZENE, METHYL
BENZENE, NITRO-
BENZENE, PENTACHLORO-
BENZENE, PENTACHLORONITRO-
BENZENEACETIC ACID, 4-CHLORO-A-(4-CHLOROPHENYL)-A-HYDROXY-,ETHYL ESTER
1,2-BENZENEDICARBOXYLIC ACID, BIS (2-ETHYLHEXYL) ESTER
1,2-BENZENEDICARBOXYLIC ACID, BUTYL PHENYLMETHYL ESTER
1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER
1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER
1,2-BENZENEDICARBOXYLIC ACID, DIOCTYL ESTER
1,3-BENZENEDIOL
BENZENEETHANAMINE, A, A-DIMETHYL-
BENZENEMETHANOL
BENZENETHIOL
1,3-BENZODIOXOLE, 5-(1-PROPENYL)-
1,3-BENZODIOXOLE, 5-(2-PROPENYL)-
BENZO[K]FLUORANTHENE
BENZOIC ACID
BENZO[RST]PENTAPHENE
BENZO[GHI]PERYLENE
BENZO[A]PYRENE
BERYLLIUM
1,1'-BIPHEN[YL]-4,4'-DIAMINE, 3,3'-DICHLORO-

1,1'-BIPHEN[YL]-4,4'-DIAMINE, 4,4'-DIMETHOXY-
1,1'-BIPHEN[YL]-4,4'-DIAMINE, 3,3'-DIMETHYL-
1,1'-BIPENYL[-4-AMINE
1,1'-BIPENY[-4-DIAMINE
1,3--BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-
1,3-BUTADIENE, 2-CHLORO-
1-BUTANAMINE, N-BUTYL-N-NITROSO-
2-BUTANONE
2-BUTENE, 1,3-DICHLORO-,(E)
CADMIUM
CALCIUM
CARBON DISULFIDE
CHROMIUM
CHRYSENE
COBALT
COPPER
CYANIDE
2,5-CYCLOHEXADIENE-1,4-DIONE
CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1A,2A,3B,4A,
5B,6B)-
CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1A,2B,3A,4B,
5A,6B)-
CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1A,2A,3A,4B,
5A,6B)-
CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1A,2A,3B,4A,
5A,6B)-2-
CYCLOHEXENE-1-ONE,3,5,5-TRIMETHYL
1,3-CYCLOPENTADIENE, 1,2,3,4,5,5-HEXACHLORO-
DIBENZ[A,H]ANTHRACENE
DIBENZO[B,E][1,4]DIOXIN, 2,3,7,8-TETRACHLORO-
DIBENZO[B,DEF]CHRYSENE
DIBENZOFURAN
2,7:3,6-DIMETHANONAPHTH[2,3-B]OXIRENE, 3,4,5,6,9,9-
HEXACHLORO-1A,2,2A,3,6,6A,7,7A-
OCTAHYDRO-,LAA,2B,2AA,3A,6A,6AB,7B,7AA)-
1,4:5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXACHLORO-
1,4,4A,5,8,8A-HEXAHYDRO-, 1AA,4A,4AB,5B,8A,8AB)-
1,4-DIOXANE
ETHANAMINE, N-ETHYL-N-NITROSO-
ETHANAMINE, N-METHYL-N-NITROSO-
ETHANE, 1,1,-DICHLORO-

ETHANE, 1,1'-[METHYLENEABIS(OXY)]BIS[2-CHLORO-
ETHANE, 1,1'-OXYBIS[2-CHLORO-
ETHANE, 1,1'THRICHLORO-
ETHANE, 1,1,1,2-TETRACHLORO-
ETHANE, 1,1,2-TRICHLORO-
ETHANE, 1,1,2,2-TETRACHLORO-
ETHANE, 1,2-DIBROMO-
ETHANE, 1,2-DICHLORO-
ETHANE, CHLORO-
ETHANE, HEXACHLORO-
ETHANE, PENTACHLORO-
1,2-ETHANEDIAMINE, N,N-DIMETHYL-N'-'-2-PYRIDINYL-N'-
(2-THIENYLMETHYL)-
ETHANONE, 1-PHENYL-
ETHENE, (2-CHLOROETHOXY)-
ETHENE, 1,1-DICHLORO-
ETHENE, 1,2-DICHLORO-,(E)-
ETHENE, CHLORO-
ETHENE, TETRACHLORO-
ETHENE, TRICHLORO-
FLUORANTHENE
FLUORIDE
9H-FLUORENE
2-HEXANONE
HYDRAZINE, 1,2-DIPHENYL-
INDENO[1,2,3-CD]PYRENE
IRON
LEAD
MAGNESIUM
MANGANESE
MERCURY
METHANAMINE, N-METHYL-N-NITROSO-
METHANE, BROMO-
METHANE, BROMODICHLORO-
METHANE, CHLORO-
METHANE, DIBROMO-
METHANE, DIBROMOCHLORO-
METHANE, DICHLORO
METHANE, DICHLORODIFLUORO-
METHANE, IODO-
METHANE, TETRACHLORO-
METHANE, TRIBROMO-

METHANE, TRICHLORO-
METHANE, TRICHLOROFLUORO-
METHANESULFORIC ACID, METHYL ESTER
METHANETHIOL, TRICHLORO
4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTOACHLORO-2,3,3A,4,7,7A-HEXAHYDRO
4,7-METHANO-1H-INDENE, 1,4,5,6,7,8,8-HEPTACHLORO-3A,4,7,7A-HEXAHYDRO
2,5-METHANO-2H-IDENO[1,2-B]OXIRENE,2,3,4,5,6,7,7-HEPTACHLORO-1A,1B,5,5A,6,6A HEXAHYDRO-, (1AA,1BB,2A 5A,5AB,6B,6AA)
6,9-METHENO-2,4,3-BENZO-DIOXATHIEPIN 6,7,8,9,10,10-HEXACHLORO-1,5,5A,6,9,9A-HEXAHYDRO-3-OXIDE, (3A,5AB,6A,9A,9AB)
6,9-METHANO-2,4,3-BENZO-DIOXATHIEPIN 6,7,8,9,10,10-HEXACHLORO, 1,5,5A,6,9,9A-HEXAHYDRO-, 3-OXIDE, (3A,5AA,6B,9B,9AA) 1,3,4-METHANO-2H-CYCLOBUTAL[CD] PENTALENE-2-ONE, 1,1A,3,3A,4,5,5,5A,5B,6-DECACHLORO-OCTAHYDRO-
1,2,4-METHANOCYCLOPENTA[CD]PENTALENE-5-CARBOXALDEHYDE, 2,2A,3,3,4,7-HEXACHLORO-DECAHYDRO-, (1A,2B,2AB,4B,4AB 5B,6AB,6AB,7R)
MORPHOLINE, 4-NITROSO-
1-NAPHTHALENAMINE
2-NAPHTHALENAMINE
NAPHTHALENE
NAPHTHALENE, 2-CHLORO-
NAPHTHALENE, 2-METHYL-
1,4-NAPHTHALENEDIONE
NAPHTHO[1,2,3,4-DEF]CHRYSENE
NICKEL
OSMIUM
OXIRANE
2-PENTANONE, 4-METHYL-
PHENANTHRENE
PHENOL
PHENOL, 2-(1-METHYLPROPYL)-4,6-DINITRO-
PHENOL, 2-CHLORO-
PHENOL, 2-METHYL-
PHENOL, 2-METHYL-4,6-DINITRO

PHENOL, 2-NITRO
PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-
PHENOL, 2,3,4,6-TETRACHLORO-
PHENOL, 2,4-DICHLORO-
PHENOL, 2,4-DIMETHYL
PHENOL, 2,4-DIMETHYL
PHENOL, 2,4-DINITRO
PHENOL, 2,4,5-TRICHLORO
PHENOL, 2,4,6-TRICHLORO
PHENOL, 2,6-DICHLORO-
PHENOL, 4-CHLORO-3-METHYL-
PHENOL, 4-METHYL-
PHENOL, 4-NITRO-
PHENOL, PENTACHLORO-
PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-[(ETHYLTHIO) METHYL] ESTER
PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-[2-(ETHYLTHIO) ETHYL] ESTER
PHOSPHOROTHIOIC ACID, 0-[4[(DIMETHYLAMINO)SULFONYL] PHENYL] 0,0-DIMETHYLESTER
PHOSPHORODITHIORC ACID, O,O-DIETHYLO-(4-NITROPHENYL) ESTER.
PHOSPHORODITHIORIC ACID, O,O-DIETHYL O-PYRAZINYL ESTER
PHOSPHORODITHIORIC ACID O,O-DIETHYL O-(4-NITROPHENYL) ESTER.
PIPERIDINE, 1-NITROSO-
POTASSIUM
1-PROPANAMINE, N-NITROSO-N-PROPYL-
PROPANE, 1,2-DIBROMO-3-CHLORO
PROPANE, 1,2-DICHLORO-
PROPANE, 1,2,3-TRICHLORO-
PROPANE, 2,2'-OXYBIS[1-CHLORO-
PROPANEDINITRITE
PROPANENITRITE
PROPANENITRITE, 3-CHLORO-
PROPANOIC ACID, 2-(2,4,5-TRICHLOROPHENOXY)-
1-PROPANOL, 2,3-DIBROMO-PHOSPHATE(3:1)
1-PROPANOL, 2-METHYL-
2-PROPANONE
2-PROPENOL

1-PROPENE, 1,1,2,3,3,3-HEXACHLORO-
1-PROPENE, 1,3-DICHLORO-,(E)
1-PROPENE, 1,3-DICHLORO-,(Z)
1-PROPENE, 1,3-CHLORO-
2-PROPENENITRLE, 2-METHYL-
2-PROPENENITRLE
2-PROPENOIC ACID, 2-METHYL-,ETHYL ESTER
2-PROPENOIC ACID, 2-METHYL-,METHYL ESTER
2-PROPEN-1-OL
2-PROPYN-1-OL
PYRENE
PYRIDINE
PYRIDINE, 2-METHYL-
PYRIDINE, 2-NITROSO
SELENIUM
SILVER
SODIUM
SULFIDE
SULFUROUS ACID, 2-CHLOROETHYL 2-[4-(1,1-DIMETHYLETHYL) PHENOXY]-1-METHYLETHYL ESTER
THALLIUM
THIODIPHOSPHORIC ACID ([HO]2P(S)]2O), TETRAETHYL ESTER
TIN
TOXAPHENE
VANADUIM
ZINC

Effective: MAR 0 1 1990

Certification: Richard L. Shank

FEB 1 2 1990
(Date)

Promulgated under R.C. Ch. 119
Rule amplifies ORC Section 3734.02
Prior effective date: New Rule

Exhibit B

October 2011 Corrective Measures Study

EAGON & ASSOCIATES, INC.
Consulting Geologists

100 Old Wilson Bridge Road, Suite 115 / Worthington, Ohio 43085 / (614) 888-5760 / FAX (614) 888-5763

October 20, 2011

Mr. Jeremy Scoles
Division of Materials and Waste Management
Ohio EPA, Northwest District Office
347 Dunbridge Road
Bowling Green, OH 43402

RE: Closed Seriff Road Landfill, Lima, Allen County, Ohio
CMS Revision 3

Dear Mr. Scoles:

On behalf of Waste Management of Ohio, Eagon & Associates, Inc. is submitting the enclosed approved Corrective Measure Study, Revision 3, October 2011 (5 copies) for the closed Seriff Road Landfill. A copy of the CMS will be submitted by Waste Management to Marty Cooper, per her request, at the Ohio EPA Legal Office along with the signed consent Directors Final Findings and Orders.

Please call Robin Jones at (937)318-5342 if you have any questions or comments regarding this submittal.

Sincerely,

Stephen J. Champa, PG
Hydrogeologist

SJC/kj
Encl.

cc: Robin Jones, WMO, w/o encl.
Jim Forney, WM, w/encl.
Lou Bull, WM, w/o encl.
Robert Leininger, WM, w/o encl.
Bill Kelly, Allen Co. Health Dept., w/encl.
Marty Cooper, OEPA, w/o encl.

SOLID WASTE
APPROVED
OHIO ENVIRONMENTAL PROTECTION AGENCY

OCT 31 2011

AS EVIDENCED BY COPY OF
LETTER OF APPROVAL
HERETO ATTACHED

CORRECTIVE MEASURES STUDY

SERIFF ROAD LANDFILL

Prepared for

WASTE MANAGEMENT OF OHIO, INC.

Prepared by

RUST Environment & Infrastructure

December 23, 1993

Revision 3

Prepared by

EAGON & ASSOCIATES, INC.
Worthington, Ohio

October 2011

EAGON & ASSOCIATES, INC.
100 Old Wilson Bridge Road, Suite 115
Worthington, Ohio 43085
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CORRECTIVE MEASURES STUDY

SERIFF ROAD LANDFILL

1.0 INTRODUCTION

This document is Revision 3 to the approved December 1993 Corrective Measures Study (CMS). The CMS was prepared to identify and evaluate corrective measures to address the detection of leachate-derived constituents in ground water at the closed Seriff Road Landfill located near Lima, Ohio. This Corrective Measures Study (CMS) was prepared in accordance with the requirements outlined in OAC 3745-27-10(F), effective March 1990 and Ohio EPA Director's Final Findings and Orders effective October 2011.

RUST Environment & Infrastructure (RUST) prepared a CMS dated December 23, 1993. As a result of Ohio Environmental Protection Agency (Ohio EPA) comments (October 3, 1995) and meetings with Ohio EPA, the CMS was revised and submitted as Revision 1 (September 1996). As a result of additional Ohio EPA comments (December 4, 1996) and teleconferences, the CMS was further revised and was submitted as Revision 2 in July 1997. The July, 1997 CMS was approved by the Director of Ohio EPA on March 20, 1998. This revision, Revision 3, of the CMS includes remedies to address the detection of barium above the Federal Primary Drinking Water Maximum Contaminant Level (MCL) at monitoring well SRD-04 and to include additional on and off-site ground-water monitoring to ensure the protectiveness of the remedy.

2.0 BACKGROUND

The Seriff Road Landfill was first permitted to receive waste in 1969; however, it is believed that prior to that time, a junkyard/solid-waste landfill was operated north of the Ottawa River. The landfill was closed in December of 1986 and a closure cap was completed in June of 1987. Routine cap/closure maintenance has been ongoing since 1987 and an expansion of the existing landfill gas extraction system was completed in 1997.

The landfill property is owned by Waste Management of Ohio, Inc., and was previously owned by Ohio Waste Systems, Inc. (OWS). The landfill property covers an area of 67 acres, but only approximately 27 acres contain refuse. The majority of the refuse is located under the circular mound; however, refuse was also placed outside of the circular mound by a previous owner. The lateral extent of the refuse was determined by excavating test pits and trenches perpendicular to the waste-unit boundary using a backhoe (RUST, 1993). A map of the site showing the limits of waste is included as Plate 1.

Land use to the north and west of the site is agricultural and forested, and to the east is residential. Railroad tracks are located south of the site, with wooded, agricultural, and some forested land further to the south.

The Ohio EPA notified OWS in December of 1988 that the landfill appeared to be impacting the ground water in the upper part of the outwash unit beneath the site. The Ohio EPA based this observation on a comparison of parameter concentrations detected in downgradient wells versus concentrations detected at upgradient well SRD-03. No statistical evaluation was performed at that time.

Subsequent semi-annual ground-water monitoring showed higher concentrations of the leachate indicator parameters chloride and dissolved iron at downgradient wells, prompting the need for a hydrogeologic assessment. In the "Hydrogeologic and Contaminant Migration Assessment" report, completed in 1990 by Golder Associates, OWS concluded that the landfill had impacted the ground water, precipitating the requirements for a CMS.

The current CMS ground-water monitoring system consists of 10 monitoring wells. MW-102, MW-105, SRU-01, and SRD-04 are downgradient upper outwash monitoring wells. SRD-03 is the upgradient upper outwash monitoring well. MW-101, MW-103, MW-104, and MW-113 are downgradient monitoring wells completed in the lower outwash. MW-106 is the upgradient well for the lower outwash, but is completed across the top of the bedrock/outwash interface because the outwash pinches out in that part of the site.

Ground-water monitoring at the Seriff Road landfill has been performed, in accordance with the approved CMS (Revision 2) on a semiannual basis since 1997. Revision of the proposed concentration levels (PCLs) was approved on February 2, 2001. In October 2001, barium was reported at 4.4 mg/L at monitoring well SRD-04. SRD-04 was resampled for barium in December 2001 and the result was 3.6 mg/L. This was the first exceedance of an MCL at the facility. Barium has remained above the MCL at SRD-04 since October 2001. Analyses for Appendix II compounds have been performed annually on samples from SRD-04. Barium remains the only compound detected above an MCL. There have been no confirmed detections of volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) at SRD-04, or any other site monitoring well.

Investigations of the extent of elevated barium concentrations were performed in 2003 and 2004. These investigations included completion of on and off-site Geoprobe borings and the collection and analysis of water samples from the Geoprobe borings. Two new upper outwash monitoring wells (MW-120 and MW-121) also were installed near the eastern property boundary downgradient of SRD-04. The Geoprobe investigations showed that elevated barium concentrations are limited to a narrow north to south area of the upper outwash. The investigation determined that barium concentrations decline significantly between SRD-04 and the facility boundary.

On June 11, 2003, Director's Final Findings and Orders were issued in accordance with OAC Rule 3745-27-10(F)(4), as effective on March 1, 1990, requiring Respondent to complete interim measures including verifying the status of residential well use, collecting samples from identified residential wells downgradient of the contamination (pending well owner permission) and notifying the well owners of the contamination and the results of the sampling. The June 11, 2003, Orders addressed Ohio EPA's concerns regarding the detection of barium above the MCL at monitoring well SRD-04 and the potential effect to human health and the environment due to the potential off-site migration of barium. Waste Management complied with the Director's Final Findings and Orders and submitted a report (Residential Water Use and Water Quality, Eagon & Associates, Inc.,

August 25, 2003) documenting the results of residential water use investigations and water-quality analyses and demonstrating compliance with the June 11, 2003 Orders. The 2003 residential water use investigation identified three ground-water wells within 1000 feet downgradient of the facility. Two of the three wells are being used as a potable water supply. The residential sampling results showed no affect on residential water quality from the landfill and the results were consistent with results from residential well samples collected in 1990. The Director's Final Findings and Orders were terminated on July 28, 2004.

3.0 RESOURCE VALUE OF THE AQUIFER SYSTEM

The following text describes the resource value of the outwash aquifer as stipulated in OAC 3745-27-10(F)(2)(g)(i-vii).

The lower sand and gravel and underlying bedrock aquifer have been used as a source of drinking water downgradient of the landfill by residences on Seriff Road and Springview Drive. Waste Management provided connections to the City of Lima, Ohio public drinking water supply for 13 residences by the summer of 1993. In June 2003 Eagon & Associates investigated water use at residences within 1000 feet downgradient of the Landfill. A survey to determine the current status of the residential wells was performed in October 2010. The status of the residential wells is summarized on Table 1. The wells at 1145 Seriff Road and 3438 Springview Drive are still in place and are not in use. Both residences are connected to the municipal water supply. The homeowner at 3438 Springview Drive has signed an access agreement to allow Waste Management to abandon the well. The abandonment will be performed in 2011. The homeowner at 1145 Seriff Road has not signed the access agreement and wants to keep the well. The wells that serve as a potable source of water at 3360 and 3370 Springview Drive and 797 and 799 Seriff Road were sampled in October 2010.

Alternative water supplies include the City of Lima, Ohio public drinking water supply, the primary bedrock aquifer utilized in the site area consisting of the Tymochtee and Lockport

Formations. These aquifers are used for industrial, irrigation, and residential purposes, and are capable of yielding in excess of 300 gpm.

The glacial outwash and dolomite bedrock units are the main hydrostratigraphic units beneath the site and surrounding area. Regionally, aquifers occur in both the unconsolidated and bedrock sequences. The most significant aquifers in the unconsolidated materials are the outwash sands and gravels that fill the bedrock valleys. While these two units are separate geologic units, they are in direct contact and act as a single transmissive unit and can be referred to as the bedrock/outwash aquifer. This statement is evidenced by the small to nonexistent vertical gradients between nested wells installed in the outwash and bedrock (Golder Associates, 1992). The bedrock/outwash aquifer is confined underneath most of the site, but the upper outwash is unconfined at some locations on the east side of the site.

The yield of the aquifer is adequate for residential well use, providing at least 5 to 10 gallons per minute (gpm). Residents have never indicated that adequate yield has been an issue. According to the Ground Water Resources of Allen County, prepared by the Ohio Department of Natural Resources (Kostelnick, 1981), the unconsolidated sand and gravel deposits are capable of 10 to 20 gpm, and the carbonate aquifer may yield 100 to 500 gpm to properly constructed wells.

The quality of the ground water was characterized from samples collected from the residential wells. The Ohio EPA has indicated that the landfill has not affected any of the residential wells, as documented in letters to OWS dated February 19, 1991 and September 4, 1996. The analytical results from the residential well samples collected in 2003 were consistent with the previous results and Ohio EPA concurred with the conclusion from the Residential Well Data Report (Eagon & Associates, Inc., August 25, 2003) that water quality at the residential wells had not been affected by the landfill. The two residential wells that remain in use were sampled in October 2010. Results from the October 2010 samples were consistent with past results. Table 2 summarizes the analytical results from residential samples collected in September 1990, July 2003, and October 2010.

Figures 1 and 2 show a conceptual model of the hydrogeologic conditions at Seriff Road Landfill along north-south and west-east cross sections. The uppermost aquifer is the outwash unit that is present beneath the site at a depth of approximately 30 feet below land surface. The maximum thickness of the outwash unit is approximately 57 feet beneath the eastern part of the site. The unit thins to the west where it pinches out approximately 300 feet northeast of the part of the Ottawa River that bounds the facility's southern property boundary. The regional extent of the outwash aquifer is unknown, but the unit probably thickens to the east of the site toward the axis of the bedrock valley that underlies the City of Lima. The outwash consists of an upper and lower sand and gravel unit that is commonly separated by till and/or lacustrine deposits.

The ground-water flow direction in the outwash is to the east and northeast and is influenced by both the eastward dip of the bedrock and ground-water extraction in the City of Lima to the east. Ground-water elevation contours, shown on Figures 3 and 4, for the upper and lower outwash, respectively, indicate that the Ottawa River is hydraulically isolated from the flow system. The average horizontal gradient in the upper outwash downgradient of the landfill near the site boundary is approximately 0.009 ft/ft.

Golder Associates (Golder) installed 15 piezometers and 6 monitoring wells between 1989 and 1991. Field hydraulic conductivity (K) results from the piezometers and wells in the outwash range from greater than $1x10^{-2}$ cm/sec to $2.80x10^{-5}$ cm/sec. Hydraulic conductivities measured in the bedrock were consistently on the order of $1x10^{-4}$ cm/sec.

Using a conservative K value ($1x10^{-2}$ cm/sec) and a conservative effective porosity (N_e) value (25%), Golder calculated the average linear ground-water flow velocity in the outwash downgradient of the landfill to be 40 ft/yr ($v = KI/n_e$).

No potential damage to wildlife, crops, vegetation or physical structures exists from exposure to ground water. This conclusion is based on the 30-foot depth to ground water; the fact that the ground water does not recharge any local surface water bodies or streams; and the

field observation that the vegetation on and surrounding the landfill show no signs of stress related to ground water.

Table 3 is a summary of the laboratory analytical results for inorganic parameters monitored as part of the current corrective measures monitoring program. Table 3 shows the range, mean, and standard deviation for each parameter. Because some of the monitoring wells were installed at different times, the number of samples from each monitoring well is different. Trends plots for parameters that are regularly detected have been plotted to show changes over time. The trend plots are included in Appendix A. There have been no confirmed detections of a volatile organic compound (VOC) at any site monitoring well.

4.0 CONCENTRATIONS FOR LEACHATE DERIVED CONSTITUENTS

In 1996 the ground-water quality data were statistically analyzed using an interwell comparison of background concentrations to downgradient concentrations. In order to fulfill the requirements of OAC 3745-27-10(C)(5), the data from the downgradient wells in the upper outwash (MW-102, MW-105, SRD-04, and SRU-01) and the lower outwash (MW-101, MW-103, MW-104, and MW-113) were analyzed using the Kruskal-Wallace ANOVA method. The ANOVA method can cause problems with false positives; however, with previous suspected contamination an intrawell method was not appropriate for determining changes from background. For the upper outwash, MW-110, MW-114, and SRD-03 were used to represent upgradient or background conditions. For the lower outwash, MW-106 and MW-115 were used to represent upgradient or background conditions.

The data were analyzed using the GRITS/STAT software program. Tables 4 and 5 provide a summary of the results of the statistical analysis using the Kruskal-Wallace ANOVA test for parameters for the upper and lower outwash, respectively. As can be seen from the tables, many of the parameters at many of the wells in the upper outwash are statistically significant. In the lower outwash, most of the parameters pass at all of the downgradient wells, except MW-101. Note that only the parameters with less than 90% nondetect values were

statistically analyzed. Sixteen other parameters have laboratory analyses, but were never detected or rarely detected. There has never been a confirmed VOC detection.

As discussed in Section 2.0, barium has been detected above the MCL at SRD-04, so barium will be considered a parameter of concern along with the previously identified statistically elevated parameters.

The following discussion addresses specification of a PCL for leachate-derived constituents as stipulated in OAC 3745-27-10(F)(5)(a)-(e). The OAC stipulates that PCLs in the ground water shall be protective of human health and the environment, and the PCLs shall be reduced to levels to which the human population (including sensitive subgroups) could be exposed on a daily basis without appreciable risk of deleterious effects during a lifetime.

Based on the results of residential well sampling performed in 1991, 2003, and 2010, the concentrations of leachate-derived constituents detected in the aquifer downgradient of the landfill are not a threat to human health or the environment at Seriff Road Landfill or the surrounding area.

As a precautionary and voluntary measure by WMO, 11 residences on Seriff Road and two residences of Springview Drive were connected to the City of Lima, Ohio public drinking water supply in April of 1993. WMO abandoned the residential wells for which the owner's permission was obtained in 1998 and 1999. Table 1 indicates that only two wells remain in use for potable supply. Two other wells remain that are disconnected but have not been abandoned and are not in use. An access agreement has been signed by the homeowner at 3438 Springview Drive and the well at that location is scheduled to be abandoned in 2011.

The PCLs are the MCL for any parameter with an established MCL. However, other than barium, the parameters that have indicated a statistically significant increase have no established MCLs. Other parameters are "indicators" of conditions, such as COD, conductivity, TDS, and TOC that do not have a health based risk factor. The only parameter with a standard is

ammonia, which has a lifetime health advisory (LHA) level for a 70 kg adult of 30 mg/L. According to information from the U.S. EPA, the 30 mg/L standard is a taste threshold level and there is no health-based standard for ammonia in drinking water. The 30 mg/L LHA will be used as the PCL for ammonia in the lower outwash and the upper outwash wells except for SRD-04.

For parameters without an MCL, the PCL is the intrawell Parametric Prediction Limit (i.e., PPL at 99% confidence level) calculated based on background data through November 2008. If a background dataset for a parameter is comprised of 50 percent or greater nondetect results or the results of normality testing for original and log transformed data sets for a parameter are both below the 99 percent critical value, the PCL is the nonparametric prediction limit (NPPL) equal to the highest value in the background range. Table 3 contains the summary statistics and associated prediction limit for each parameter determined to be above background for each well.

The prediction limits were calculated using the statistical program ChemStat. The calculation for the prediction limit for a single future sample is:

$$PL = \overline{x} + K\sigma$$

where:

PL = Prediction Limit

$\overline{x}$ = Background mean

σ = Background standard deviation

$K = t_{(n-1,\ \alpha/k)}\sqrt{1 + 1/n}$

where:

t = student T test from statistical tables

n = number of background samples

α = confidence level = 0.01

k = future samples = 1

PCLs for each well and parameter are shown on Table 6. If a PCL is exceeded for two consecutive events, with confirmation resampling, the ground-water will be sampled for Appendix II parameters at that monitoring well. If no MCL exceedances or health based risks are determined, then the PCLs will be reevaluated. If a confirmed MCL or health-based risk is determined in two successive sampling events, site conditions will be reevaluated and the contingency remedial measures will be analyzed. The requirement for Appendix II sampling does not apply to MW-120 and MW-121. MW-120 and MW-121 are to be sampled for barium only. If there is a confirmed detection of an Appendix II parameter (other than barium) above an MCL or health based level at SRD-04 that compound will be added to the monitoring list for MW-120 and MW-121.

5.0 DEVELOPMENT OF REMEDIAL PROCEDURES

5.1 Introduction

This section presents remedial alternatives to address leachate-derived compounds in ground water and barium at SRD-04. The preferred remedy includes: continued ground-water monitoring, monitored natural attenuation (MNA), annual monitoring of the two remaining residential wells on Seriff Road and Springview Drive, and the installation of three additional passive gas vents between the landfill and SRD-04 to address barium at SRD-04 (i.e., affect local redox conditions). These remedy options are appropriate and protective given current site conditions. A number of contingent remedial alternatives are included should a change in site conditions warrant further action.

5.2 Selected Remedy

5.2.1 Ground-Water Monitoring and Monitored Natural Attenuation (MNA)

Continued ground-water monitoring in accordance with Revision 2 of the CMP is appropriate for the majority of parameters based on the known site conditions. Concentrations at

the downgradient lower outwash wells are generally at or near background levels and the trend plots show very little change over time in parameter concentrations. Concentrations at most of the upper outwash wells are also at or near background levels for most parameters, but can show some variation between sampling events. Ammonia, chloride, barium, sodium, and potassium are above background levels in the upper outwash at SRD-04.

The proposed ground-water monitoring system consists of 12 existing monitoring wells; seven in the upper outwash, and five in the lower outwash, as shown on Figure 5. The monitoring wells in the proposed monitoring system in the upper outwash are: MW-102, MW-105, SRD-04, SRU-01, SRD-03, MW-120, and MW-121; and in the lower outwash are: MW-101, MW-103, MW-104, MW-106, and MW-113. The ground-water monitoring system, except for MW-120 and MW-121, will be sampled semiannually and analyzed for the indicator parameter list shown on Table 7 and the VOCs on Appendix I from OAC 3745-27-10 (1990 Rules). MW-120 and MW-121 will be sampled for barium only as part of corrective measures monitoring. Ground-water sampling will be performed in accordance with the procedures specified in the Site Specific Ground-Water Monitoring Plan for the Seriff Road Landfill.

Ground-water monitoring will also include annual sampling of the two existing residential wells that are in use east of the landfill. Residential well sampling procedures will be in accordance with the procedures specified in the Site Specific Ground-Water Monitoring Plan for the Seriff Road Landfill. One of the wells serves 797 and 799 Seriff Road and the other well serves 3360 and 3370 Springview Drive. Waste Management will attempt to sample the water at one of the residences at each well location. Waste Management will also attempt to obtain permission to sample the unused well at 1145 Seriff Road. If the homeowner does not allow their well to be sampled, it will be documented in the sampling data submittal for that event. Residential well sampling will be for the inorganic parameters shown on Table 7. If there is a confirmed detection of a VOC at an on-site monitoring well, the VOC will be added to the residential monitoring parameter list. Residential well sampling will continue until water-quality results from the monitoring wells remain below PCLs for one year (i.e. two semiannual sampling

events). If concentrations at the monitoring wells later exhibit a confirmed increase to levels that exceed PCLs, residential sampling will be reinstated.

The laboratory analytical results for samples from the residential wells will be submitted to the residents, Ohio EPA NW District, and the Allen County Health Department no later than 75 days from the date of the sampling event.

Trend plots of the parameters from Table 7 will be submitted after each sampling event to evaluate comparisons with historical trends. In addition, indicator parameters and VOCs will be compared to the PCLs on Table 6. If the results of two consecutive confirmed events exceed a PCL then a sample for all Appendix I and Appendix II parameters will be collected from that well during the next semiannual sampling event. If no MCLs or health-based standards are exceeded, then the PCLs will be reevaluated. The requirement for Appendix II sampling does not apply to wells MW-120 and MW-121 which will be sampled for barium only. If there is a confirmed detection of an Appendix II parameter (other than barium) above an MCL or health based level at SRD-04, that parameter will be added to the monitoring list for MW-120, MW-121, and the residential wells.

The volatile organic compounds (VOCs) specified in Appendix I of the Ohio Administrative Code (OAC) 3745-27-10 (March 1990) that are currently part of the monitoring program will be compared to the laboratory specific practical quantification limits (PQL) for each parameter. If a VOC is detected above the PQL, verification resampling will occur. If there are confirmed detections of VOCs during two consecutive events, then a sample for all Appendix I and Appendix II parameters will be collected from that well during the next semiannual sampling event.

5.2.2 Passive Gas Vents

Waste Management has installed three new passive gas vents (GV-11, GV-12, and GV-13) west of SRD-04 at the locations shown on Plate 1 as a remedy for barium (i.e., to control

local redox affects that cause dissolution of barium into groundwater). A construction certification report documenting the gas vent installations was submitted to Ohio EPA on January 8, 2010 and is included in Appendix B of this report.

The circumstances surrounding the occurrence of the elevated barium levels at SRD-04 and the water-quality data indicate that the increase in barium is due to a decrease in sulfate in the ground water. The low sulfate levels in the vicinity of SRD-04 are evidence of strong reducing conditions in which sulfate is utilized by bacteria in an anaerobic environment to metabolize organic carbon. The increase in barium and decrease in sulfate were also accompanied by a decrease in calcium, iron, magnesium, and manganese and an increase in potassium and sodium. Trends in ammonia and chloride show no change coincident with the changes in other parameter concentrations at SRD-04. The presence of elevated barium in ground water correlates with the increased reducing conditions downgradient of the landfill that extend across a relatively small area. Outside this local reducing area, where sulfate concentrations are no longer suppressed, barium concentrations return to background levels.

Figure 6 shows barium concentrations at the upper outwash wells. Included on Figure 6 are dates of activities that have occurred at the Seriff Road Landfill relative to the landfill gas extraction system. As shown, an out-of-waste landfill gas control system was installed around 1990 and was decommissioned in October 1996. Barium at SRD-04 increased to approximately 1.0 mg/L in 1988, prior to installation of the out-of-waste landfill gas control system, and then declined to background levels. Barium at SRD-04 remained at background levels until early 1997, when the current increasing barium trend began. The increasing barium trend coincides with the decommissioning of the out-of-waste landfill gas control system. The out-of-waste landfill gas control system consisted of six gas extraction wells that were screened across the unsaturated part of the upper outwash along the eastern margin of the limits of waste.

Ulrich, et. al. (2003), reported that "The oxidation of iron sulfides to sulfate is important in shallow zones near the water table." They go on to say that "...iron sulfides are rather stable and are not easily oxidized to sulfate under anaerobic conditions..." Based on this information,

the circumstantial site data illustrated on Figure 6 indicate that it is possible that when the out-of-waste landfill gas control system was in operation, aerobic conditions existed in the upper outwash near the water table. Under these aerobic conditions, iron sulfide (FeS_2), was being oxidized to provide sulfate to support sulfate reduction. This possibility is supported by dissolved iron data from SRD-04. A trend plot that includes dissolved iron at the SRD-04 is included in Appendix A. Iron levels at SRD-04 were on a generally increasing trend prior to 1997. After 1997, iron levels at SRD-04 show a rapid decline and have been trending slightly downward since 1998. The downward trend in iron coincides with the upward trend in barium, the downward trend in sulfate, and the decommissioning of the out-of-waste landfill gas control system. These data indicate that after decommissioning of the out-of-waste landfill gas control system, aerobic conditions that allowed for oxidation of iron sulfide to sulfate changed to anaerobic conditions and induced barite dissolution as a sulfate source for ongoing sulfate reduction.

In May and June 2003, 10 passive gas vents, GV-1 through GV-10 were installed outside of the limit of waste along the eastern side of the site. The gas vent locations are shown on Plate 1. The gas vents were installed so that the entire zone of unsaturated outwash sand was within the screened interval of the vent at each location. To account for seasonal water-level fluctuation, which is approximately two feet throughout the site, the vents were completed approximately three feet into the saturated sand. Figure 6 shows that barium levels at SRD-04 declined after April 2006 and have remained in the range of 4.4 to 7.26 mg/L since October 2006. The passive vents were not initially installed as a remedy for the barium, but the decrease in barium concentrations at SRD-04 since the installation of the gas vents is consistent with the barium concentrations being associated with local redox conditions. The new passive vents have been installed much closer to SRD-04 and are anticipated to provide for more significant changes in oxygen levels in the unsaturated outwash, thereby reducing barium concentrations at SRD-04.

5.3 Evaluation of the Effectiveness of the Remedy

The remedy will be evaluated on a semi-annual basis beginning on the third anniversary of the date of the Ohio EPA Director's Final Findings and Orders effective October 2011, based on the following criteria.

- Barium results from SRD-04
- Barium results from MW-120 and MW-121

From the time that barium exceeded the MCL at SRD-04, it took five years to reach the highest concentration. Figure 7 is a representation of what barium trends at SRD-04 would look like in order for barium levels to reach the MCL after two to eight years from the date of the last sample result (October 2010). The passive remediation system may take at least that long to bring the concentration back down to the MCL. The new passive vents may not begin to show a positive impact until as much as one to two years following installation. Therefore, reduction of barium concentrations to below the MCL at SRD-04 may take several years to occur.

Figure 6 shows a mathematically derived linear regression (i.e. best-fit line) based on the barium data from SRD-04 since April 2004. The equation of the line and the fit statistics are included on Figure 6. The slope of the best-fit line is negative (approximately -0.03) indicating an overall downward trend to the barium data since April 2004. Beginning three years from the effective date of the approval of this revision (Revision 3) to the CMP, Figure 6 will be updated with the semiannual barium results from SRD-04 and the slope of the best-fit line shown on Figure 6 will be recalculated to include the new barium data. Ohio EPA will be provided with an updated version of Figure 6 with each semiannual ground-water data submittal.

The effectiveness of the remedy will be based on the following criteria.

1) The slope of the best-fit line. If the slope of the best-fit line to the barium data from SRD-04 becomes positive and remains positive for two consecutive semiannual events the remedy will be determined to be ineffective.

2) If, after six years from the beginning of the evaluation of the remedy, the slope of the best-fit line to the barium data from SRD-04 is not equal to or, more negative (indicating a more rapid decrease in barium concentrations) than the slope indicated on Figure 6, the remedy will be determined to be ineffective.

3) Barium results from MW-120 and MW-121. If there is a confirmed detection of barium above its MCL for two consecutive semiannual sampling events at MW-120 or MW-121, the remedy will be determined to be ineffective.

If the remedy is determined to be ineffective based on at least one of the criteria defined above, the ground-water conditions will be evaluated and one of the contingency remedies included in this plan will be implemented or another remedy will be proposed.

Implementation of a contingency remedy will be performed in accordance with the time frame indicated on Figure 8. The timeline for implementation of a contingency remedy includes one year for selection, design, Ohio EPA approval, and implementation of the contingency remedy and a three year time period to evaluate the effectiveness of the contingency remedy. The time frame for implementation could be longer than one year, depending on the time required for Ohio EPA to approve the contingent remedy.

5.4 Contingent Alternatives

The following contingent alternatives will be evaluated in the event that ground-water monitoring reveals the presence of contaminants above health-based MCLs or PCLs shown on Table 6 or in the event that the proposed remedy is not effective at reducing barium levels at

SRD-04. These alternatives will not be implemented at this time but are discussed as per OAC 3745-27-10.

5.4.1 Potential Downgradient Receptors Placed on Municipal Supply

In 1993, Waste Management completed the majority of this remedy by providing connections to the City of Lima municipal drinking water supply to 13 residences on Springview Drive and Seriff Road. The cost for these connections was reported to be approximately $6,525.00 per connection. That cost included City of Lima assessment and tap fees, design work, and extension of the water main along part of Springview Drive. Ground-water wells were decommissioned at residences where permission of the property owner was obtained.

As discussed earlier in this report, there are four residences east of the Seriff Road Landfill that are still using ground-water for potable use and are not connected to the City of Lima public drinking water supply. The residences at 3360 and 3370 Springview Drive are served by a single well that is reported to be 125 feet deep. At this depth, the well would be completed in the lower outwash or the carbonate bedrock. The residences at 797 and 799 Seriff Road also are served by a single well. This well is reported to approximately 75 feet deep and would most likely be completed in the lower outwash. The cost of public drinking water supply connections for these residences would have to be determined.

Ground-water samples were collected from these residences in July 2003 and October 2010. Water-quality results from the residential wells did not show any indication of influence from the landfill. However, connection of these residences to the municipal drinking water supply and decommissioning of the existing ground-water wells would eliminate any potential for exposure to residents at these locations.

5.4.2 Air Injection or Soil Vapor Extraction

This alternative could be implemented if the passive vents are effective at reducing barium levels at SRD-04, but barium levels do not come down to or remain below the MCL. Soil vapor extraction or injection of air into the unsaturated part of the upper outwash would cause a return to aerobic conditions near the water table. This should result in a decrease in barium levels in the upper outwash. It might be possible to use the passive vents as air injection or extraction wells or injection/extraction well(s) could be installed upgradient from SRD-04. The injection/extraction system would require a mechanical blower and an electrical connection. There would be very little risk of exposure to workers during installation of the system and system maintenance should not be excessive. However, there may be the possibility of biofouling of the injection well(s) that could require that the injection well(s) be periodically rehabilitated. Since the system does not provide for source control, operation of the system would have to be continued until the PCLs are met.

5.4.3 Air Injection into the Upper Outwash with Soil Vapor Extraction

This alternative incorporates air injection with soil vapor extraction to enhance air flow through the unsaturated zone. This alternative would only be implemented if air injection or soil vapor extraction alone were not effective at reducing and maintaining barium levels below the MCL. The passive vents could potentially be used for one part of the system and an additional well or wells could be installed for the other half of the system. Limitations and requirements of the system would be the same as for the remedy described in Section 5.4.2.

5.4.4 Leachate Extraction from Gas Extraction Wells

Installation of a leachate extraction system may involve modification or replacement of the existing wellheads and installation of pumps in the gas extraction wells. Pneumatic or electrical pumps with a low flow rate would be necessary in order to avoid clogging the gas well screens with silt and clay. The existing gas header system was designed for landfill gas and

condensate collection only. Air supply and/or electrical lines, an air compressor and compressor building, electrical panels, and a leachate collection tank would need to be installed. Leachate may be discharged to the local sanitary sewer system or taken to the local POTW upon approval. If modification of the existing gas extraction wells is determined not to be feasible, new dual extraction wells for leachate and gas extraction may have to be installed.

5.5 Evaluation of Contingency Alternatives

The contingency alternatives have been evaluated pursuant to criteria suggested by Ohio EPA in OAC 3745-27-10 and are presented in Tables 8 through 11.

6.0 SUMMARY

Collection and analysis of ground-water quality data from on-site monitoring wells has resulted in the determination that leachate-derived constituents have entered the ground-water system at Seriff Road Landfill. The leachate-derived constituents generally consist of commonly occurring inorganic constituents at concentrations that do not pose a health-based risk. Barium has been detected above the Primary Drinking Water MCL at SRD-04 since 2001. There have been no confirmed detections of VOCs.

The site ceased accepting waste in 1986, a clay cover was installed in 1987, and the majority of the nearby downgradient residences were placed on a municipal water supply in 1993. Ground-water monitoring has been ongoing since 1985. A landfill gas collection system is operating and has been maintained. The selected remedy includes:

- Continued monitoring of the site ground-water monitoring wells in accordance with the requirements of the Directors Final Findings and Orders dated October 2011, this revision (Revision 3) of the CMS, and the Site Specific Ground-Water Monitoring Plan.

- Monitoring of MW-120 and MW-121 for barium.

- Annual ground-water monitoring of the two wells that serve the residences at 797 and 799 Seriff Road and 3360 and 3370 Springview Drive. An attempt will be made to sample the unused well at 1145 Seriff Road. Residential monitoring will be performed in accordance with Section 5.2.1 of this CMS and the Site Specific Ground-Water Monitoring Plan.

- Three passive gas vents (GV-11, GV-12, and GV-13) were installed in June 2009 near SRD-04 to mitigate barium.

Barium data and the effectiveness of the remedy will be evaluated as described in Section 5.3 of this CMS. If the current remedy is determined to be ineffective, a contingency remedy will be implemented in accordance with the time line presented in Figure 8.

If the PCLs shown on Table 6 are exceeded in two consecutive confirmed ground-water monitoring events, an Appendix II sampling will occur at that well. If the results of the Appendix II sampling show that no MCLs or health based standards are exceeded, then the PCLs will be reevaluated. If two successive confirmed detections of VOCs occur, then an Appendix II sampling will be performed at that well. If none of the Appendix II results exceed an MCL or health-based risk level, the program will return to compliance monitoring. If a confirmed MCL or health-based risk is determined in two successive sampling events, then the ground-water conditions will be reevaluated and the remedial measures will be analyzed with respect to the specific problem and site conditions. The requirement for Appendix II sampling does not apply to MW-120 and MW-121 which will be sampled for barium only. If there is a confirmed detection of an Appendix II parameter (other than barium) above an MCL or health based level at SRD-04, that parameter will be added to the monitoring list for MW-120, MW-121, and the residential wells.

Corrective measures monitoring at the Seriff Road Landfill will be terminated when water-quality results are at or below the PCLs for five years of monitoring in accordance with OAC 3745-27-10 (1990) and the Director's Final Findings and Orders dated October 2011.

7.0 REFERENCES

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FIGURES

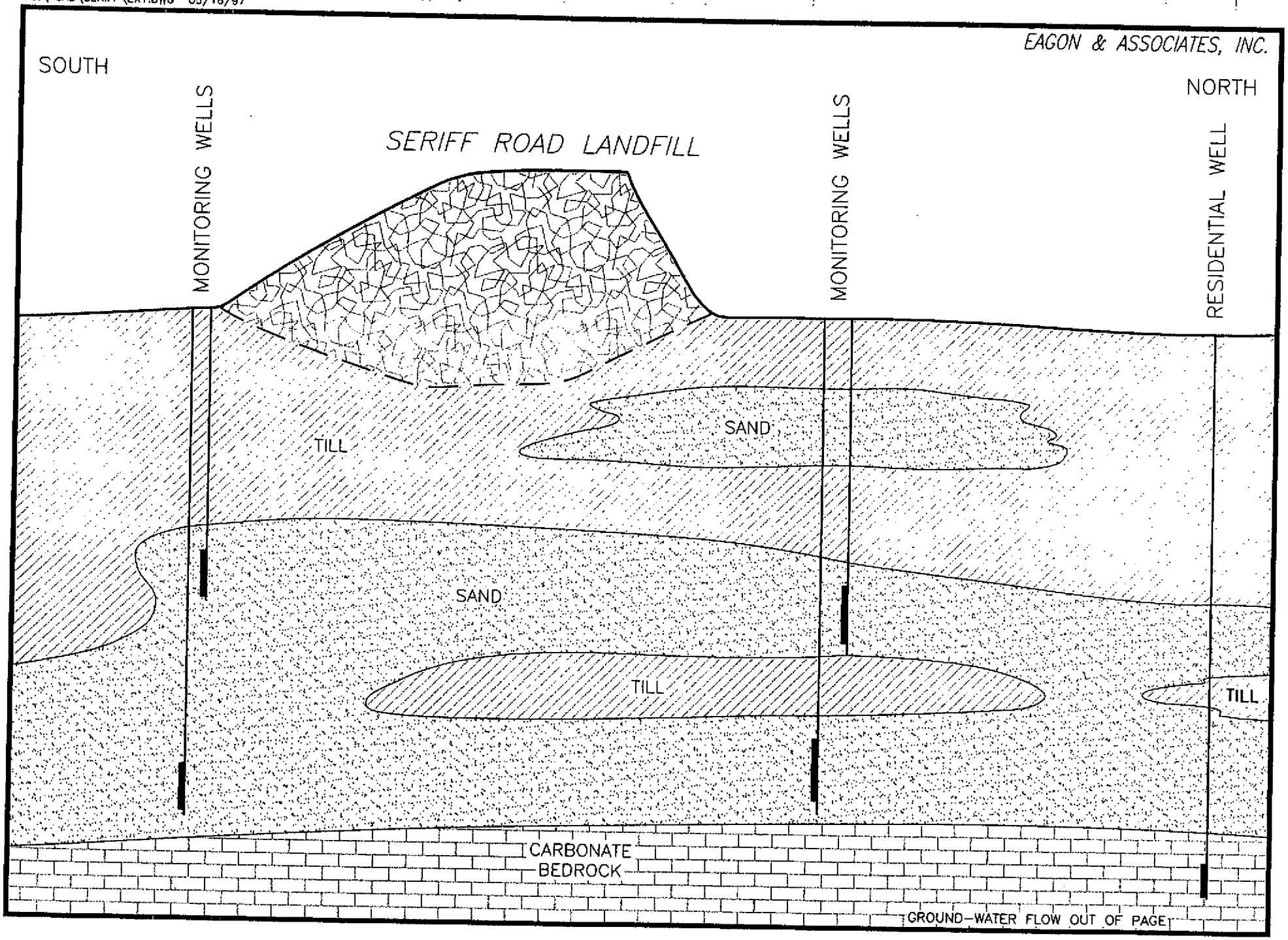

FIGURE 1. CONCEPTUAL NORTH-SOUTH CROSS-SECTION

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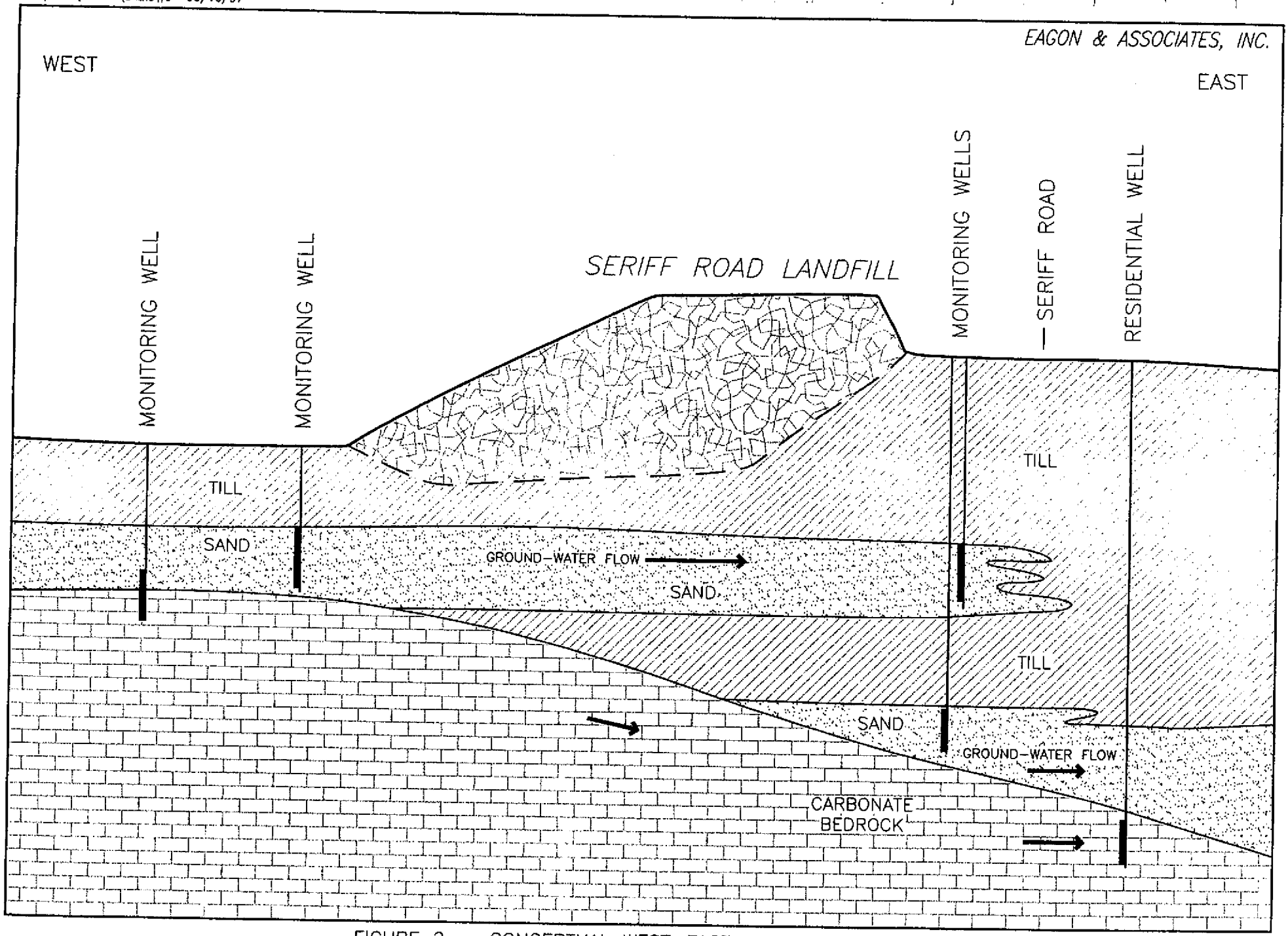

FIGURE 2. CONCEPTUAL WEST-EAST CROSS-SECTION

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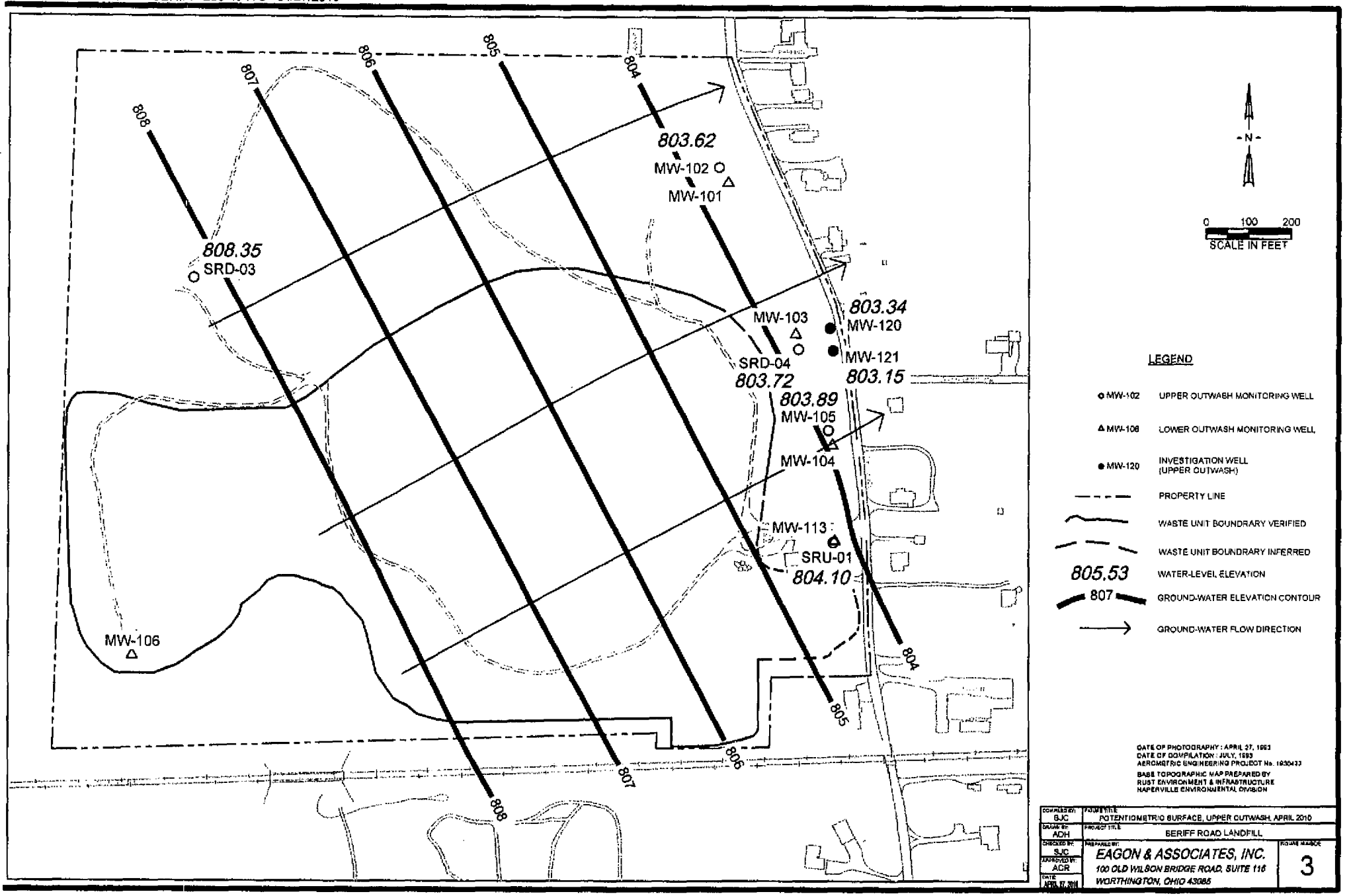

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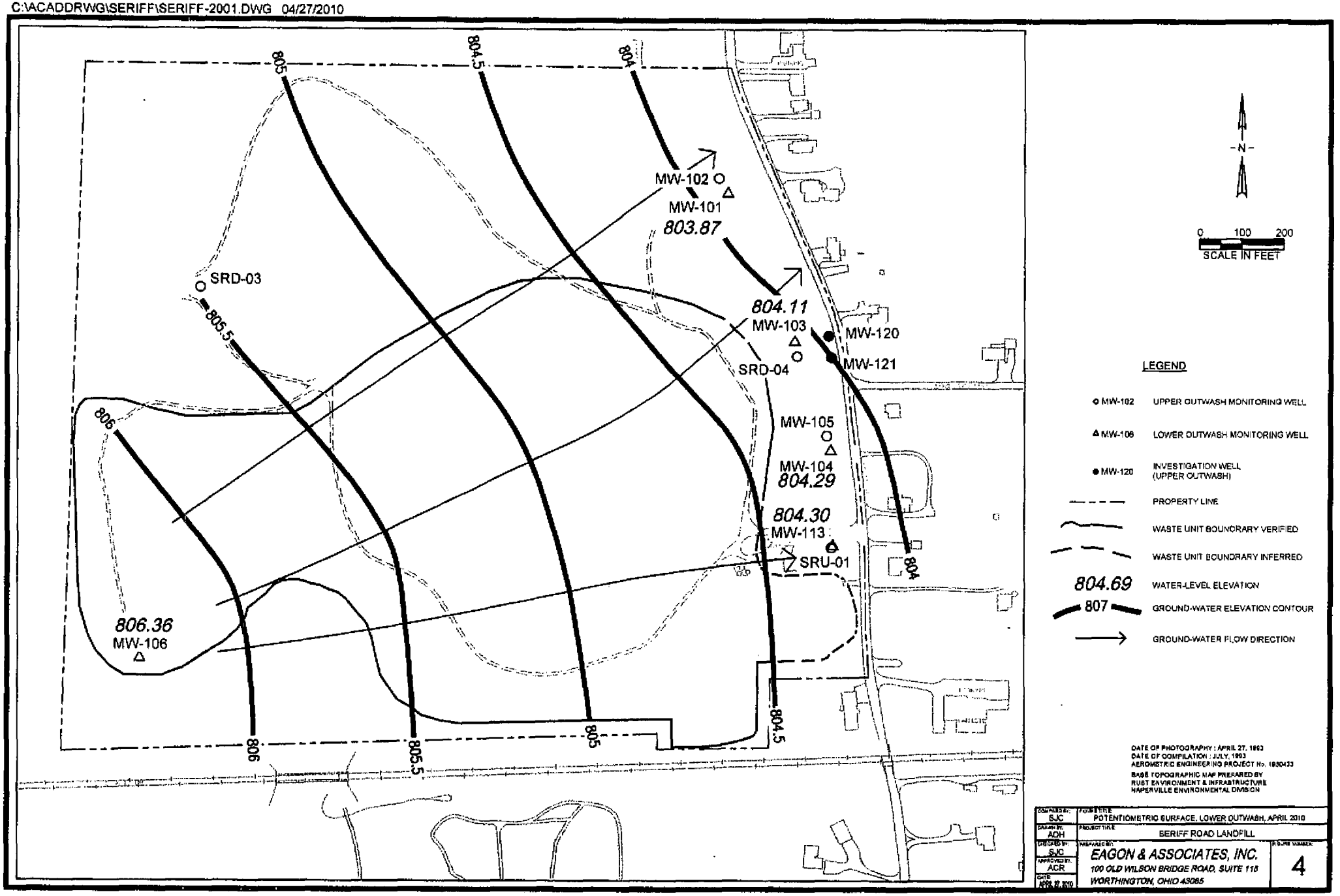

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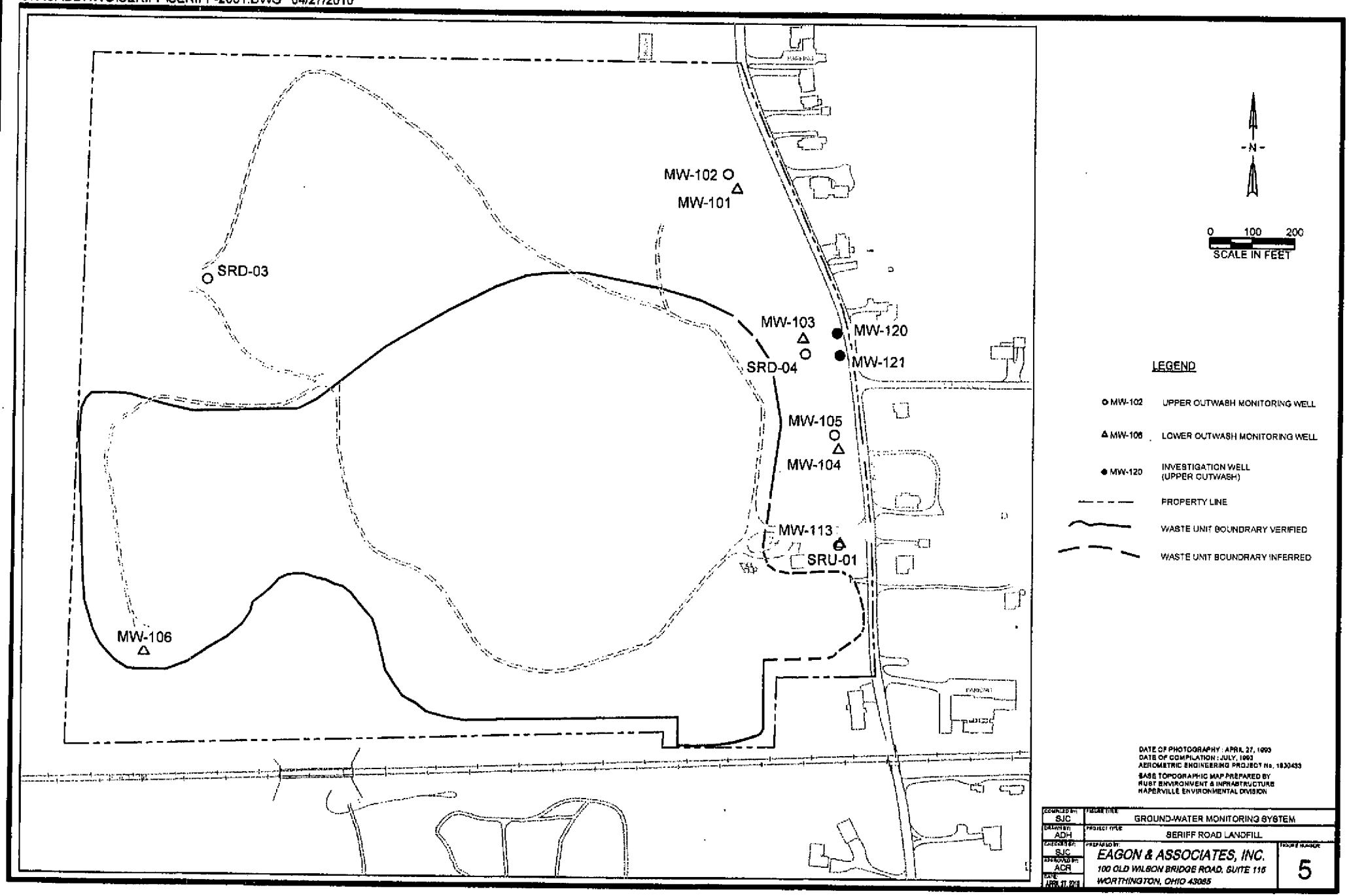
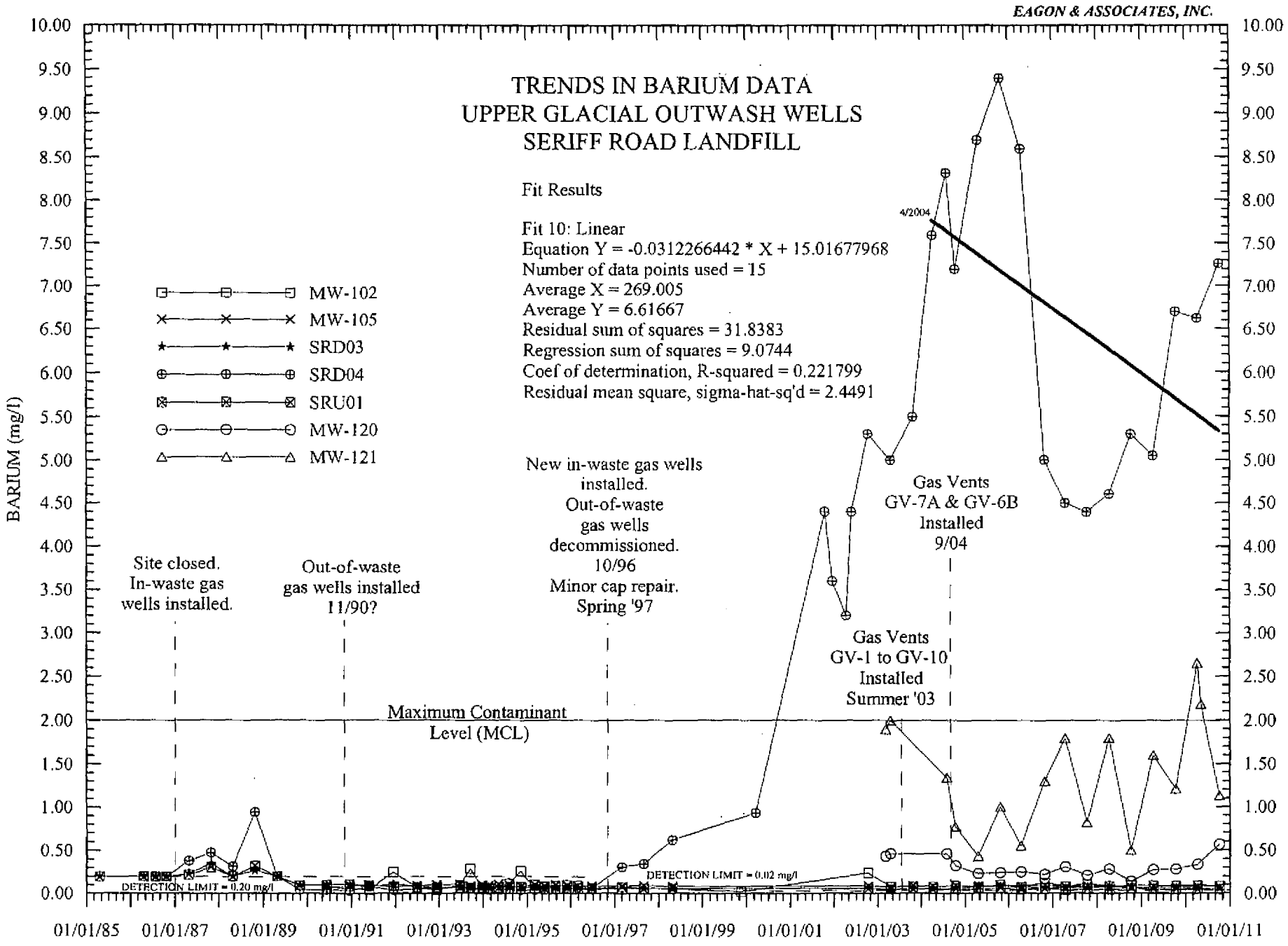
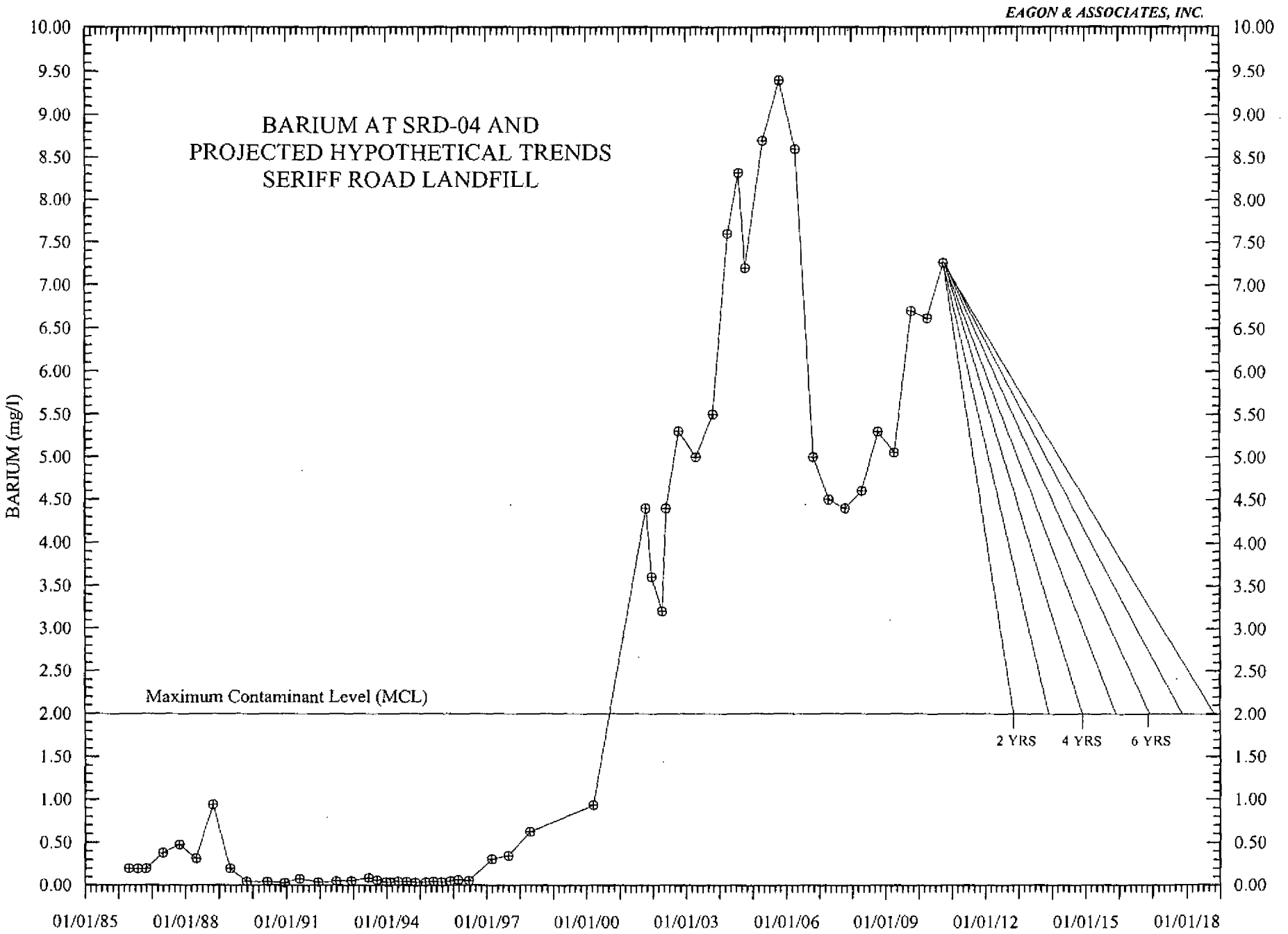




SERIFF/BAUPTL.GRF
10/28/2010

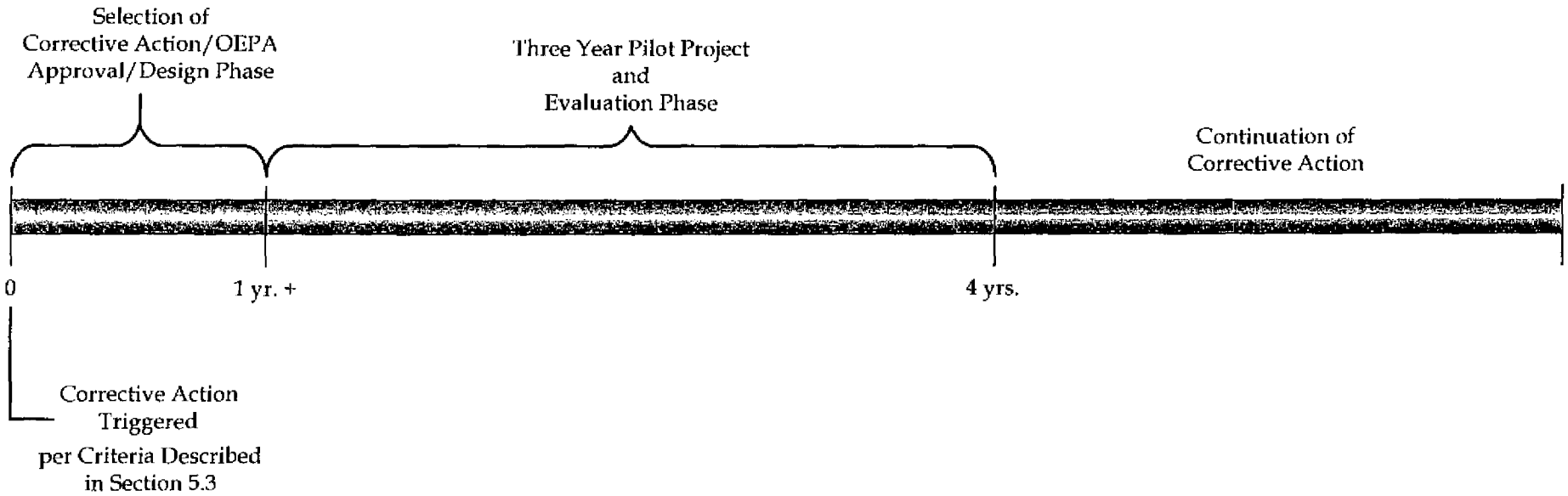
FIGURE 6.



SERIFF/BA SRD-04.GRF
11/16/10

FIGURE 7.

Figure 8. Timeline for Implementation of Corrective Action
Seriff Road Landfill



Note: Schedule after selection of Corrective Action dependent on time required for OEPA approval. Design phase begins after OEPA approval.

TABLES

TABLE 1.
RESIDENTIAL WATER USE
WITHIN 1000 FEET POTENTIALLY DOWNGRADIENT OF SERIFF ROAD LANDFILL
LIMA, OHIO

Owner/Occupant	Address		Hooked Up to City Water (Y/N) (Date of survey)	Well Status
Annie Stapleton	795	Seriff Rd.	Yes (6/19/03)	Well sealed in 2001
Joseph Lombardo	797	Seriff Rd.	**No (10/4/10)**	Well water used for all domestic purposes
Scott & Holly McHenry	799	Seriff Rd.	**No (10/4/10)**	Plumbed to well at 797 Seriff Rd; used for all purposes
Clint Kelly	801	Seriff Rd.	Yes (6/19/03)	No well
Dan Church	901	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Michelle Magness	923	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Mary Beth Beasley	945	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Nathan Combs	955	Seriff Rd.	Yes (10/4/10)	Well disconnected in 1998
Jean Owens	965	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Steve & Beth Hoover	1007	Seriff Rd.	Yes (2/5/03)	Both wells on property were sealed in 1998
Renato & Peggy Rigali	1011	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Ed Kelly	1101	Seriff Rd.	Yes (10/4/10)	Unused, disconnected well on property
Al Kelly	1115	Seriff Rd.	Yes (6/19/03)	Well sealed in 1999
David Johnson	1140	Seriff Rd.	Yes (6/19/03)	No well
Ed Kelly	1145	Seriff Rd.	Yes (6/19/03)	Unused, disconnected well on property
Allen Co. Animal Shelter	1165	Seriff Rd.	Yes (2/5/03)	Well sealed in 1998
Lindbergh Hampshire Sr.	3355	Springview Dr.	Yes (6/19/03)	Residence demolished.
Johnny Lee Wright	3360	Springview Dr.	**No (10/4/10)**	Plumbed to well at 3370 Springview; not used for drinking/cooking
Paul & Betty Owens	3370	Springview Dr.	**No (10/4/10)**	Well connected to all taps; not used for drinking/cooking
Jim & Marilyn Davis	3438	Springview Dr.	Yes (6/19/03)	Well sealed in 2011
Nathaniel Anderson	3466	Springview Dr.	Yes (2/5/03)	Both wells on property were sealed in 1998

Note: 2/5/03 & 6/19/03 verbal contact with Kent Shoemaker - City of Lima Water Dept. Ph. # (419) 221-5283 to verify connection to municipal water supply; 6/19/03 and 10/4/10 house to house survey

( ) - Date of most recent survey and/or verification of water use.

TABLE 2.
WATER QUALITY SUMMARY
SERIFF ROAD LANDFILL

	Units	MCL[3]	Range of Concentration Levels[4]		Seriff Road Landfill[6] Montioring Well Data		Statewide[7] Range for Sand & Gravel Aquifers	Range of Residential Results 9/90	Range of Residential Results 7/03	Range of Residential Results 10/10
			Upper Outwash[5] Aquifer	Lower Outwash Aquifer	Range in Upper Outwash Aquifer 10/10	Range in Lower Outwash Aquifer 10/10				
Ammonia	mg/L	--	30 - 119	30	2.64 - 134	0.58 - 2.2	<0.01 - 42.0	< 0.10 - 3.3	0.25 - 1.9	0.355 - 3.3
Barium	mg/L	2.0	2.0	2.0	0.0421 - 7.26	0.0164 - 0.101	<0.015 - 2160	NS[8]	0.055 - 0.085	0.0464 - 0.08
Chloride	mg/L	--	53.0 - 417	42.1 - 139	37.5 - 300	32.4 - 111	<2.0 - 420	< 50 - 80	32.1 - 49.7	34.4 - 60.2
Iron	mg/L	--	7.2 - 125	3.7 - 4.5	4.31 - 12.9	3.29 - 3.67	0.020 - 70.0	< 0.10 - 4.57	0.62 - 3.0	2.71 - 3.61
Sodium	mg/L	--	43.2 - 239	27.1 - 93.7	27.7 - 156	21.9 - 65.8	2 - 773	24 - 191	29.8 - 40.4	28.6 - 42.2
Sulfate	mg/L	--	224 - 1086	204 - 263	<5.0 - 220	124 - 176	< 5 - 1975	71.3 - 250	158 - 267	185 - 264
TDS[1]	mg/L	--	None	None	780 - 1150	613 - 783	<10 - 3050	706 - 1140	717 - 809	736 - 750

[1] - *TDS = Total Dissolved Solids*

[2] - *mg/L = milligrams per liter*

[3] - *MCL = Federal Primary Drinking Water Maximum Contaminant Level*

[4] - *Proposed in this revision of the Corrective Measures Study*

[5] - *Outwash = Sand and Gravel*

[6] - *Upper Outwash Wells are 42 to 54 feet deep, lower outwash wells are 77 to 85 feet deep*
Ranges of values are from downgradient site monitoring wells in October 2010

[7] - *From Ambient Ground Water Quality Monitoring Network Data Summary by Major Aquifer as of July 2005. Table 3 of Ohio EPA 2006 305(b) Report "Ohio's Ground Water Quality "*

[8] - *NS = Not Sampled*

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-101
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean (orig.)[1]	Background Std. Dev. (orig.)	Background Range	Normality Testing			Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
						99% Critical Value	Distribution Log	Distribution Original			
Alkalinity	43	0	656.28	49.94	545 - 759	0.923	0.954	0.963 [3]	PPL	--	778.45
Ammonia	43	0	1.18	0.47	.61 - 2.2	0.923	0.919	0.882	NPPL	2.2	--
Barium, dissolved	35	54	--	--	.0885 - <0.2	--	--	--	NPPL	0.1	--
Calcium, dissolved	43	0	162.47	13.96	138 - 186	0.923	0.946 [3]	0.945	PPL	--	199.89
Chloride, dissolved	44	0	116.79	9.07	93.5 - 140	0.924	0.965	0.977 [3]	PPL	--	138.94
Iron, dissolved	43	0	3.85	0.28	3.09 - 4.56	0.923	0.981	0.985 [3]	PPL	--	4.53
Magnesium, dissolved	43	0	86.70	8.10	73 - 104	0.923	0.967 [3]	0.966	PPL	--	108.47
Manganese, dissolved	39	0	0.042	0.0046	.034 - .0529	0.917	0.958 [3]	0.956	PPL	--	0.054
Potassium, dissolved	41	44	5.13	2.41	<5 - 8.0	0.92	0.695	0.729	NPPL	8.0	--
Sodium, dissolved	43	0	67.9	4.71	52.6 - 77.8	0.923	0.948	0.967 [3]	PPL	--	79.40
Sulfate, dissolved	43	0	119.15	27.42	55.8 - 203.1	0.923	0.978 [3]	0.964	PPL	--	204.45

[1] Background mean and standard devintion shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-102
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean[1] (orig.)	Background Std. Dev.[1] (orig.)	Background Range	Normality Testing 99% Critical Value	Normality Testing Distribution Log	Normality Testing Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	43	0	657.53	52.31	547 - 802	0.923	0.964 [3]	0.959	PPL	--	796.04
Ammonia	43	2	0.95	0.41	<0.4 - 2.2	0.923	0.902	0.823	NPPL	2.2	--
Barium, dissolved	35	46	0.110	0.058	0.052 - 0.29	0.910	0.799	0.638	NPPL	0.29	--
Calcium, dissolved	43	0	169.49	20.53	142 - 223	0.923	0.950 [3]	0.942	PPL	--	225.17
Chloride, dissolved	43	0	134.97	24.10	53.4 - 198	0.923	0.788	0.900	NPPL	198	--
Iron, dissolved	43	0	9.00	1.72	5.89 - 14	0.923	0.873	0.818	NPPL	14	--
Magnesium, dissolved	43	0	102.07	17.23	66.1 - 147	0.923	0.968	0.978 [3]	PPL	--	144.23
Manganese, dissolved	39	8	0.024	0.0067	0.0058 - 0.0392	0.917	0.873	0.951 [3]	PPL	--	0.040
Potassium, dissolved	40	35	4.85	2.07	<5.0 - 10.5	0.919	0.830	0.875	NPPL	10.5	--
Sodium, dissolved	43	0	77.72	8.25	53.8 - 93.2	0.923	0.877	0.922	NPPL	93.2	--
Sulfate, dissolved	43	0	191.01	90.50	60.5 - 541.7	0.923	0.990 [3]	0.902	PPL	--	524.29

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-103
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean (orig.)[1]	Background Std. Dev. (orig.)[1]	Background Range	Normality Testing: 99% Critical Value	Normality Testing: Distribution Log	Normality Testing: Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	42	0	366.12	22.46	284 - 406	0.922	0.883	0.915	NPPL	406	--
Ammonia	43	0	0.562	0.107	.38 - 1	0.923	0.918	0.831	NPPL	1	--
Barium, dissolved	35	54	--	--	0.0446 - <0.2	--	--	--	NPPL	0.06	--
Calcium, dissolved	43	0	136.21	9.64	112 - 157	0.923	0.965 [3]	0.963	PPL	--	161.57
Chloride, dissolved	43	0	37.82	2.22	32.4 - 42.5	0.923	0.934	0.947 [3]	PPL	--	43.26
Iron, dissolved	42	0	3.24	0.21	2.88 - 3.78	0.922	0.955 [3]	0.945	PPL	--	3.79
Magnesium, dissolved	44	0	47.64	3.43	40.5 - 55.6	0.924	0.948 [3]	0.945	PPL	--	56.64
Manganese, dissolved	38	8	0.026	0.0037	0.023 - 0.032	0.916	0.693	0.785	NPPL	0.032	--
Potassium, dissolved	39	82	--	--	3.7 - <5	--	--	--	NPPL	4.7	--
Sodium, dissolved	44	0	24.90	2.31	20.1 - 36.4	0.924	0.855	0.781	NPPL	36.4	--
Sulfate, dissolved	43	0	173.28	31.15	90.4 - 219	0.923	0.837	0.907	NPPL	219	--

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-104
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean (orig.) [1]	Background Std. Dev. (orig.) [1]	Background Range	Normality Testing			Statistical Method	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
						99% Critical Value	Distribution Log	Distribution Original			
Alkalinity	44	0	383.89	27.395	298 - 502	0.924	0.864	0.844	NPPL	502	--
Ammonia	43	2	0.418	0.066	.24 - .58	0.923	0.813	0.900	NPPL	0.58	--
Barium, dissolved	35	54	--	--	0.0496 - <0.2	--	--	--	NPPL	0.068	--
Calcium, dissolved	43	0	140.51	9.835	111 - 158	0.923	0.948	0.966 [3]	PPL	--	164.57
Chloride, dissolved	43	0	37.08	2.923	31.2 - 41.9	0.923	0.910	0.919	NPPL	41.9	--
Iron, dissolved	43	0	3.29	0.190	2.83 - 3.7	0.923	0.962	0.972 [3]	PPL	--	3.75
Magnesium, dissolved	43	2	43.50	7.01	<5 - 50	0.923	0.272	0.532	NPPL	50	--
Manganese, dissolved	39	8	0.026	0.0037	.023 - .03	0.917	0.683	0.769	NPPL	0.03	--
Potassium, dissolved	39	82	--	--	2.7 - <5	--	--	--	NPPL	3.4	--
Sodium, dissolved	43	0	22.73	1.763	16.8 - 27.2	0.923	0.932	0.956 [3]	PPL	--	27.04
Sulfate, dissolved	43	0	159.36	27.158	51.5 - 205	0.923	0.714	0.876	NPPL	205	--

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-105
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean (orig.)	Background Std. Dev. (orig.)	Background Range	Normality Testing: 99% Critical Value	Normality Testing: Distribution Log	Normality Testing: Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	42	0	629.71	63.90	419 - 780	0.922	0.930	0.968 [3]	PPL	--	786.20
Ammonia	43	0	20.24	3.91	12.4 - 30.8	0.923	0.989 [3]	0.978	PPL	--	31.86
Barium, dissolved	35	54	--	--	.056 - <0.2	--	--	--	NPPL	0.092	--
Calcium, dissolved	43	0	124.26	10.72	106 - 153	0.924	0.971 [3]	0.958	PPL	--	152.25
Chloride, dissolved	43	0	137.22	23.31	73 - 173	0.923	0.886	0.946 [3]	PPL	--	194.26
Iron, dissolved	43	0	5.42	0.63	4.3 - 6.73	0.923	0.962 [3]	0.955	PPL	--	7.14
Magnesium, dissolved	43	0	81.03	6.30	68.5 - 92.3	0.923	0.961 [3]	0.958	PPL	--	97.72
Manganese, dissolved	40	83	--	--	.011 - .028	--	--	--	NPPL	0.028	--
Potassium, dissolved	41	0	17.09	2.49	13.2 - 23.5	0.920	0.967 [3]	0.942	PPL	--	23.91
Sodium, dissolved	43	0	97.82	10.90	70.7 - 120	0.923	0.966	0.979 [3]	PPL	--	124.49
Sulfate, dissolved	44	0	149.33	27.22	90.5 - 258	0.924	0.950 [3]	0.890	PPL	--	223.35

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
MW-113
SERIFF ROAD LANDFILL
(All Results in mg/l)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean[1] (orig.)	Background Std. Dev.[1] (orig.)	Background Range	Normality Testing: 99% Critical Value	Normality Testing: Distribution Log	Normality Testing: Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	35	0	383.71	16.56	344 - 417	0.910	0.983	0.987 [3]	PPL	--	424.70
Ammonia	35	3	0.46	0.097	0.27 - 0.66	0.910	0.912	0.972 [3]	PPL	--	0.699
Barium, dissolved	27	41	0.073	0.023	0.0443 - <0.2	0.894	0.787	0.748	NPPL	0.063	--
Calcium, dissolved	35	0	143.86	8.86	125 - 166	0.910	0.968 [3]	0.958	PPL	--	166.91
Chloride, dissolved	35	0	40.95	4.54	33.8 - 48.4	0.910	0.940 [3]	0.938	PPL	--	53.61
Iron, dissolved	35	0	3.20	0.21	2.8 - 3.61	0.910	0.9713 [3]	0.971	PPL	--	3.75
Magnesium, dissolved	35	0	45.01	3.26	38 - 52.2	0.910	0.969 [3]	0.966	PPL	--	53.69
Manganese, dissolved	35	6	0.03	0.0054	0.026 - 0.0447	0.910	0.755	0.874	NPPL	0.0447	--
Potassium, dissolved	36	72	--	--	2.7 - 9.1	--	--	--	NPPL	9.1	--
Sodium, dissolved	36	0	23.42	1.48	20.1 - 26.6	0.912	0.970 [3]	0.966	PPL	--	27.3
Sulfate, dissolved	36	0	163.86	27.34	110 - 263	0.912	0.954 [3]	0.919	PPL	--	241.3

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
SRU01
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean[1] (orig.)	Background Std. Dev.[1] (orig.)	Background Range	Normality Testing: 99% Critical Value	Normality Testing: Distribution Log	Normality Testing: Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	52	0	440.65	55.26	315 - 605	0.938	0.978 [3]	0.966	PPL	--	591.61
Ammonia	55	0	2.53	1.66	.9 - 7.87	0.940	0.959 [3]	0.849	PPL	--	8.95
Barium, dissolved	45	58	--	--	0.38 - .322	--	--	--	NPPL	0.322	--
Calcium, dissolved	52	0	157.47	19.43	115 - 217	0.938	0.956 [3]	0.931	PPL	--	208.92
Chloride, dissolved	56	0	38.42	4.27	29.1 - 49	0.944	0.9898 [3]	0.9893	PPL	--	50.06
Iron, dissolved	56	0	5.00	1.33	.78 - 7.4	0.944	0.589	0.826	NPPL	7.4	--
Magnesium, dissolved	52	0	52.82	5.06	42.4 - 68.6	0.938	0.964 [3]	0.948	PPL	--	66.07
Manganese, dissolved	41	0	0.061	0.014	.04 - .091	0.920	0.847	0.815	NPPL	0.091	--
Potassium, dissolved	39	49	4.47	2.16	4.6 - 9.57	0.917	0.781	0.815	NPPL	9.57	--
Sodium, dissolved	53	0	29.55	5.82	15.2 - 42.9	0.938	0.971	0.978 [3]	PPL	--	43.64
Sulfate, dissolved	59	0	176.95	53.22	80 - 318	0.945	0.985 [3]	0.953	PPL	--	347.88

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 3.
SUMMARY OF STATISTICS AND PREDICTION LIMITS
SRD04
SERIFF ROAD LANDFILL
(All Results in mg/L)

Parameter	No. of Background Observations	Background Percent Non-Detect	Background Mean[1] (orig.)	Background Std. Dev.[1] (orig.)	Background Range	Normality Testing: 99% Critical Value	Normality Testing: Distribution Log	Normality Testing: Distribution Original	Statistical Method[2]	Non-Parametric Prediction Limit	99% Intrawell Parametric Prediction Limit
Alkalinity	53	0	945.85	146.96	358 - 1320	0.938	0.744	0.888	NPPL	1320	--
Ammonia	50	0	76.55	19.31	41 - 132	0.930	0.970 [3]	0.963	PPL	--	124
Barium, dissolved	47	51	--	--	.2 - 9.4	--	--	--	NPPL	9.4	--
Calcium, dissolved	49	0	188.17	130.02	16.2 - 482	0.929	0.878	0.896	NPPL	482	--
Chloride, dissolved	59	0	249.16	52.98	143.8 - 417	0.945	0.967 [3]	0.961	PPL	--	410.45
Iron, dissolved	50	0	17.53	5.99	8.11 - 29.6	0.930	0.953 [3]	0.907	PPL	--	37.44
Magnesium, dissolved	48	0	88.30	17.22	54.4 - 128	0.938	0.982 [3]	0.967	PPL	--	139.11
Manganese, dissolved	40	0	0.164	0.153	.035 - .581	0.919	0.885	0.781	NPPL	0.581	--
Potassium, dissolved	42	0	61.59	12.71	30.5 - 90.2	0.922	0.965	0.976 [3]	PPL	--	92.73
Sodium, dissolved	53	0	125.45	47.27	10.4 - 186	0.940	0.599	0.880	NPPL	186	--
Sulfate, dissolved	54	19	363.14	365.87	5 - 1086	0.940	0.863	0.863	NPPL	1086	--

[1] Background mean and standard deviation shown for parameters with less than 50% non-detect values.

[2] NPPL = Nonparametric Prediction Limit; PPL = Parametric Prediction Limit

[3] Distribution used to construct limit.

Note: NPPLs for all organic compounds are established at the PQL.

TABLE 4
UPPER OUTWASH
DOWNGRADIENT WELLS
NONPARAMETRIC ANOVA ANALYSIS*
SERIFF ROAD LANDFILL

Parameters	Number of Observations	% ND All Wells	MW-102	MW-105	SRD04	SRU01
Ammonia	159	1	Pass	Fail	Fail	Fail
COD	165	24	Fail	Fail	Fail	Pass
Calcium	144	0	Fail	Pass	Fail	Fail
Alkalinity	150	0	Fail	Fail	Fail	Fail
Chloride	166	1	Fail	Fail	Fail	Fail
Conductivity	76	0	Fail	Fail	Fail	Pass
Iron	161	2	Fail	Fail	Fail	Fail
Potassium	107	47	Pass	Fail	Fail	Pass
Magnesium	150	0	Fail	Fail	Fail	Pass
Manganese	110	14	Pass	Pass	Fail	Pass
Sodium	157	1	Fail	Fail	Fail	Fail
Nitrate	157	73	Pass	Pass	Pass	Pass
Sulfate	157	0	Fail	Pass	Fail	Pass
TDS	166	0	Fail	Fail	Fail	Fail
TOC	164	13	Fail	Fail	Fail	Fail

* Based on background wells MW-110, MW-114, SRD03. ANOVA analysis not performed on parameters with greater than 90% nondetect values. Based on data through 2/97.

TABLE 5
LOWER OUTWASH
DOWNGRADIENT WELLS
NONPARAMETRIC ANOVA ANALYSIS*
SERIFF ROAD LANDFILL

Parameters	Number of Observations	% ND All Wells	MW-101	MW-103	MW-104	MW-113
Ammonia	103	0	Fail	Pass	Pass	Pass
COD	103	21	Pass	Pass	Pass	Pass
Calcium	103	0	Fail	Pass	Pass	Pass
Alkalinity	103	0	Fail	Pass	Pass	Pass
Chloride	103	0	Fail	Pass	Pass	Pass
Conductivity	66	0	Pass	Pass	Pass	Pass
Iron	103	17	Fail	Fail	Fail	Fail
Potassium	87	79	Pass	Pass	Pass	Pass
Magnesium	103	1	Fail	Pass	Pass	Pass
Manganese	87	18	Fail	Fail	Fail	Fail
Sodium	103	0	Fail	Pass	Pass	Pass
Nitrate	103	84	Pass	Pass	Pass	Pass
Sulfate	103	0	Pass	Pass	Pass	Pass
TDS	103	0	Fail	Pass	Pass	Pass
TOC	103	3	Fail	Pass	Fail	Pass

* Based on background wells MW-106 and MW-115. ANOVA analysis not performed on parameters with greater than 90% nondetect values. Based on data through 2/97.

TABLE 6.
CONCENTRATION LEVELS
SERIFF ROAD LANDFILL
(all units are mg/L)

Parameter	MW-101	MW-102	MW-103	MW-104	MW-105	MW-113	MW-120	MW-121	SRU01	SRD04
Alkalinity	778	796	406	502	786	425			592	1320
Ammonia	30	30	30	30	30	30			30	124
Barium, Dissolved	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Calcium, Dissolved	200	225	162	165	152	167			209	482
Chloride, Dissolved	139	198	43.3	41.9	194	53.6			50.1	410
Iron, Dissolved	4.5	14.0	3.8	3.8	7.1	3.8			7.4	37.4
Magnesium, Dissolved	108	144	56.6	50.0	97.7	53.7			66.1	139
Manganese, Dissolved	0.054	0.04	0.032	0.03	0.028	0.045			0.091	0.581
Potassium, Dissolved	8.0	10.5	4.7	3.4	23.9	9.1			9.6	92.7
Sodium, Dissolved	79.4	93.2	36.4	27	124	27.3			43.6	186
Sulfate	204	524	219	205	223	241			348	1086

Note: Concentration levels for VOCs are laboratory PQLs.

TABLE 7.

PARAMETER LIST AND MONITORING WELLS

SERIFF ROAD LANDFILL

Parameters	Units	MCL	SDWR
SEMIANNUAL & ANNUAL			
pH - field	S.U.		6.5 - 8.5
Specific Conductance - field	umhos/cm		
Temperature - field	°C		
Alkalinity	mg/L		
Barium, Dissolved	mg/L	2.0	
Chemical Oxygen Demand	mg/L		
Nitrogen, Ammonia	mg/L		
Total Dissolved Solids	mg/L		500
Total Organic Carbon	mg/L		
Turbidity - field	NTU		5
Calcium, Dissolved	ug/L		
Chloride, Dissolved	mg/L		250
Iron, Dissolved	ug/L		300
Magnesium, Dissolved	ug/L		
Manganese, Dissolved	ug/L		50
Potassium, Dissolved	ug/L		
Sodium, Dissolved	ug/L		
Sulfate, Dissolved	mg/L		250
ANNUAL			
Appendix I VOCs	ug/L	(see regs)	

UPPER OUTWASH

MW-102	SRD-03
MW-105	SRD-04
MW-120*	SRU-01
MW-121*	

LOWER OUTWASH

MW101	MW106
MW103	MW113
MW104	

RESIDENTIAL WELLS

Annual

797/799 Seriff Road	3360/3370 Springview Drive

* MW-120 and MW-121 to be sampled for Barium only as part of CMS monitoring.

TABLE 8.
REMEDIATION PROCEDURE EVALUATION CRITERIA
IN ACCORDANCE WITH OAC 3745-27-10(F)(2)(a)
SERIFF ROAD LANDFILL

Alternative	Magnitude of Reduction of Existing Risks (i)	Magnitude of Residual Risk (ii)	Type and Degree of Long-Term Management (iii)	Short Term Risks (iv)	Potential for Human Exposure (v)	Long Term Reliability (vi)	Potential Need for Replacement (vii)	Comments
1 Semiannual Monitoring and Statistical Evaluation with Passive Vents	Passive vents will enhance attenuation of barium and reduce potential downgradient barium risks. Monitoring and statistical evaluation will reveal any potential increase in risks from other compounds.	Low due to no detection of VOCs, SVOCs, or MCL exceedances in lower outwash monitoring wells and no impact to existing residential wells.	Continued monitoring of designated monitoring wells, on a semiannual basis. Passive vents will not require regular maintenance.	None	Low with continuation of monitoring program and existing institutional controls.	High, as long as monitoring program is continued and existing institutional controls are maintained.	Low. Replacement of monitoring wells or passive vents would only be necessary due to physical damage or loss of well integrity.	Retained as an appropriate corrective measure.
2 Supply Potable Water to Downgradient Residences	Will eliminate possibility of exposure to downgradient residents.	Eliminates risk of exposure to downgradient residents.	None	None	None	Extremely reliable. Removes potential for exposure to downgradient residents.	None	Cost relatively low. Currently implemented at 13 residences.
3 Soil Vapor Extraction from or Air Injection into Upper Outwash	If passive vents are effective at reducing barium levels at SRD-04 and MW-121, could enhance remediation and further reduce risks.	Reduces risk to potential downgradient receptors.	Long-term maintenance of mechanical systems could be high. Biofouling of injection/extraction well is possible.	Low if injection/extraction well installed outside of waste boundary.	Low if injection/extraction well installed outside of waste boundary.	Moderate to high depending on mechanical reliability and biofouling problems.	May require replacement of mechanical systems or replacement of injection/extraction well.	If implemented, may need to operate indefinitely.
4 Air Injection into Upper Outwash with Soil Vapor Extraction	If passive vents are effective at reducing barium levels at SRD-04 and MW-121, could enhance remediation and further reduce risks.	Reduces risk to potential downgradient receptors.	Long-term maintenance of mechanical systems could be high. Biofouling of injection or extraction wells is possible.	Low if injection and extraction wells installed outside of waste boundary.	Low if injection and extraction wells installed outside of waste boundary.	Moderate to high depending on mechanical reliability and biofouling problems.	May require replacement of mechanical systems or replacement of injection or extraction well.	May be more effective than 3 at inducing more aerobic conditions in upper outwash. If implemented, may need to operate indefinitely.
5 Leachate Collection	Retrofit multi-point extraction systems will have limited impact on releases.	Limited risk reduction.	Long-term management level high due to pump & compressor maintenance, system monitoring, etc.	Potential exposure to landfill gas high during installation and maintenance.	Potential for human exposure high during installation and maintenance.	Moderately reliable. Wells, pumps, and compressor will need maintenance.	Pumps will need to be replaced over time, other system components may only require repairs.	Retrofit leachate collection systems are not generally effective at reducing contamination.

TABLE 9.
REMEDIATION PROCEDURE EVALUATION CRITERIA
IN ACCORDANCE WITH OAC 3745-27-10(F)(2)(b)-(e)
SERIFF ROAD LANDFILL

Alternative	Reduce Releases ((b)(i))	Utilizes Treatment Technologies ((b)(ii))	Required Permits (c)	Available Capacity and Locations of TDS Facility (d)	Potential Impacts of Remediation Procedures (e)	Comments
1 Semiannual Monitoring and Statistical Evaluation with Passive Vents	No, but will detect increases in leachate-derived constituents. Passive vents are designed to remediate barium at SRD-04.	No	No	Not Applicable	Reduction of barium levels.	Retain for CMS.
2 Supply Potable Water to Downgradient Residents	No, but eliminates potential for exposure to downgradient residents.	No	No	Not Applicable	Elimination of potential for exposure to downgradient residents.	Already implemented for 13 residences in 1993. Four other residences within 1000 feet of the limits of waste supplied by two private wells.
3 Soil Vapor Extraction from or Air Injection into Upper Outwash	Does not control releases from landfill. Could be used to enhance remediation of barium.	No	No	Not Applicable	If effective, will reduce barium levels in upper outwash.	Implement only as a contingency remedy.
4 Air Injection into Upper Outwash with Soil Vapor Extraction	Does not control releases from landfill. Could be used to enhance remediation of barium.	No	No	Not Applicable	If effective, will reduce barium levels in upper outwash.	Implement only as a contingency remedy.
5 Leachate Collection	Retrofit multi-point leachate extraction system will have limited impact on releases.	Yes, if leachate require treatment. No, if leachate can be discharged directly to sanitary sewer or POTW.	Will require construction permits and sewer discharge permits.	Vickery, Ohio facility for leachate, possibly local POTW.	Potential to reduce leachate contact with ground water.	Implement only as a contingency remedy.

TABLE 10.
REMEDIATION PROCEDURE EVALUATION CRITERIA
IN ACCORDANCE WITH OAC 3745-27-10(F)(1)(a)-(d)
SERIFF ROAD LANDFILL

Alternative	Protection of Human Health (a)	Attain Ground Water Concentration (b)	Control Source of Contamination (c)	Comply with Standards for Management of Waste (d)	Comments
1 Semiannual Monitoring and Statistical Evaluation with Passive Vents	Yes, given current site conditions and monitoring program.	Yes, if effective.	Yes, if effective.	Yes	Retain for CMS.
2 Supply Potable Water to Downgradient Residents	Yes, eliminates potential for exposure to downgradient residents.	Has no effect on ground water concentrations, but eliminates potential exposure to downgradient residents.	No, but eliminates potential exposure to downgradient residents.	N/A	Would eliminate potential for exposure to downgradient residents.
3 Soil Vapor Extraction from or Air Injection into Upper Outwash	Yes, if effective at reducing barium levels in the upper outwash at SRD-04 and MW-121.	Yes, if effective.	Yes, if effective.	Yes	A potential contingent alternative. Would be expensive and would require high maintenance.
4 Air Injection into Upper Outwash with Soil Vapor Extraction	Yes, if effective at reducing barium levels in the upper outwash at SRD-04 and MW-121.	Yes, if effective.	Yes, if effective.	Yes	A potential contingent alternative. Would cost about twice as much as 3 and would require high maintenance.
5 Leachate Collection	Yes, if effective at reducing downgradient concentrations in ground water.	Yes, if effective.	Yes, if effective.	Yes	A potential contingent alternative. Would be the most costly alternative. Would require a high level of operation and maintenance.

TABLE 11.
REMEDIATION PROCEDURE EVALUATION CRITERIA
IN ACCORDANCE WITH OAC 3745-27-10 (3)(F)(2)(f)-Schedule
SERIFF ROAD LANDFILL

Alternative	Remedial Design (1)	Remedial Action (2)	Operations and Maintenance (O&M) (3)
1 Semiannual Monitoring and Statistical Evaluation with Passive Vents	Monitoring currently in place. New passive vents were installed in June 2009.	Completed	Monitoring ongoing on a semiannual basis. Passive vents will require no maintenance unless physically damaged.
2 Supply Potable Water to Downgradient Residences	Dependant on City of Lima Water Department	Already implemented at 13 residences. Dependant on City of Lima Water Department for remaining residences.	None
3 Soil Vapor Extraction from or Air Injection into Upper Outwash	Three months	One month to install injection/extraction well and mechanical hardware plus six month pilot study.	O&M undefined. Assume at least monthly system checks and periodic maintenance.
4 Air Injection into Upper Outwash with Soil Vapor Extraction	Three Months	One month to install injection and extraction wells and mechanical hardware plus six month pilot study.	O&M undefined. Assume at least monthly system checks and periodic maintenance.
5 Leachate Collection	Six Months. Could be longer depending on permits required.	Six months to install pumps in existing gas extraction wells and install compressor, air supply lines, and collection tank if needed. Longer if new discharge lines or new wells are required.	At least monthly monitoring and system tuning, plus pump and compressor maintenance, inspection and repair. Pumps and compressor could require replacement.

Note: The specific criteria of OAC 3745-27-10 (F)(2)(f) will be incorporated in future schedule projections if required by monitoring program (Alternative 1) results.

SOLID WASTE
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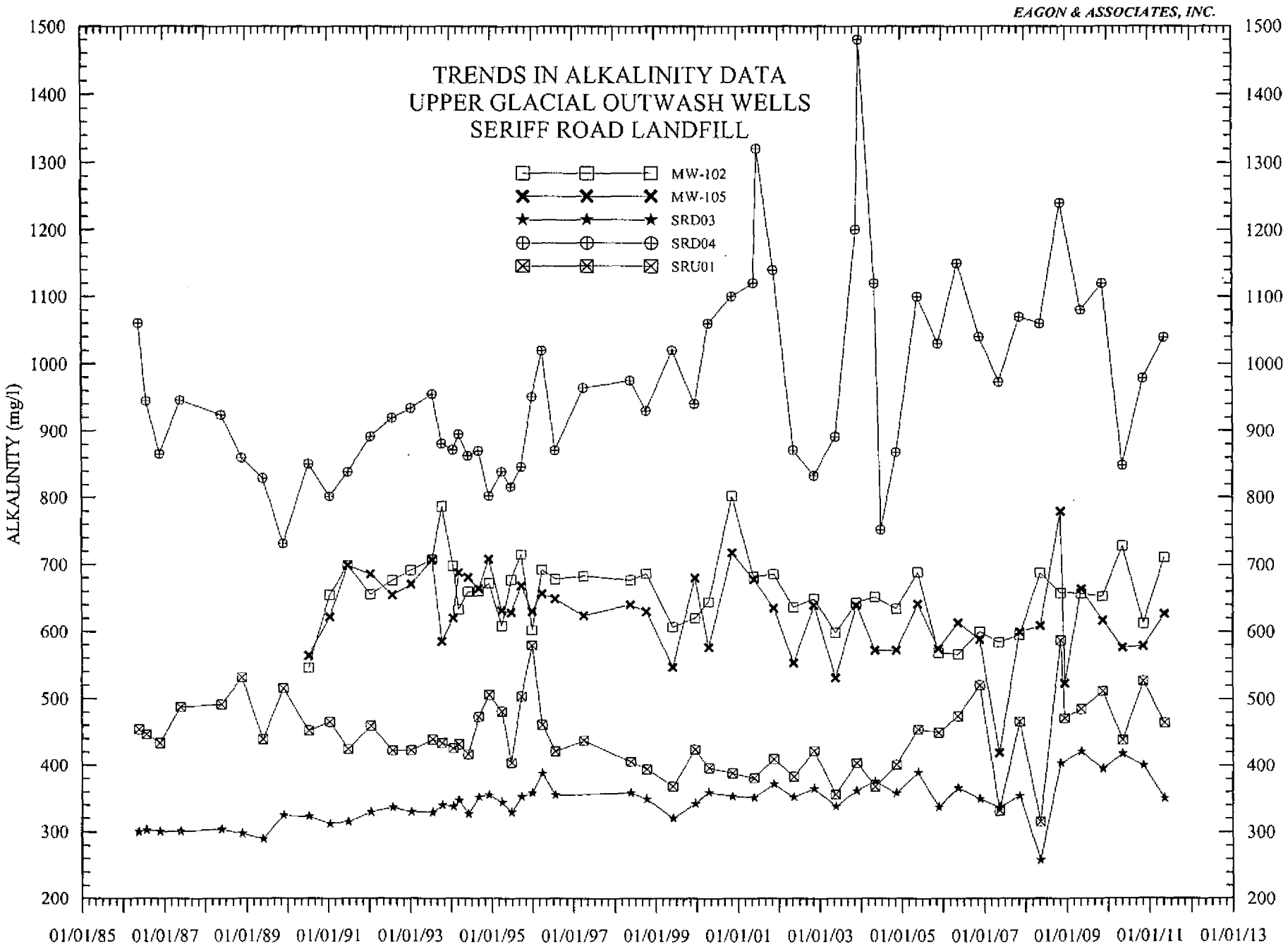
OHIO ENVIRONMENTAL PROTECTION AGENCY

OCT 31 2011

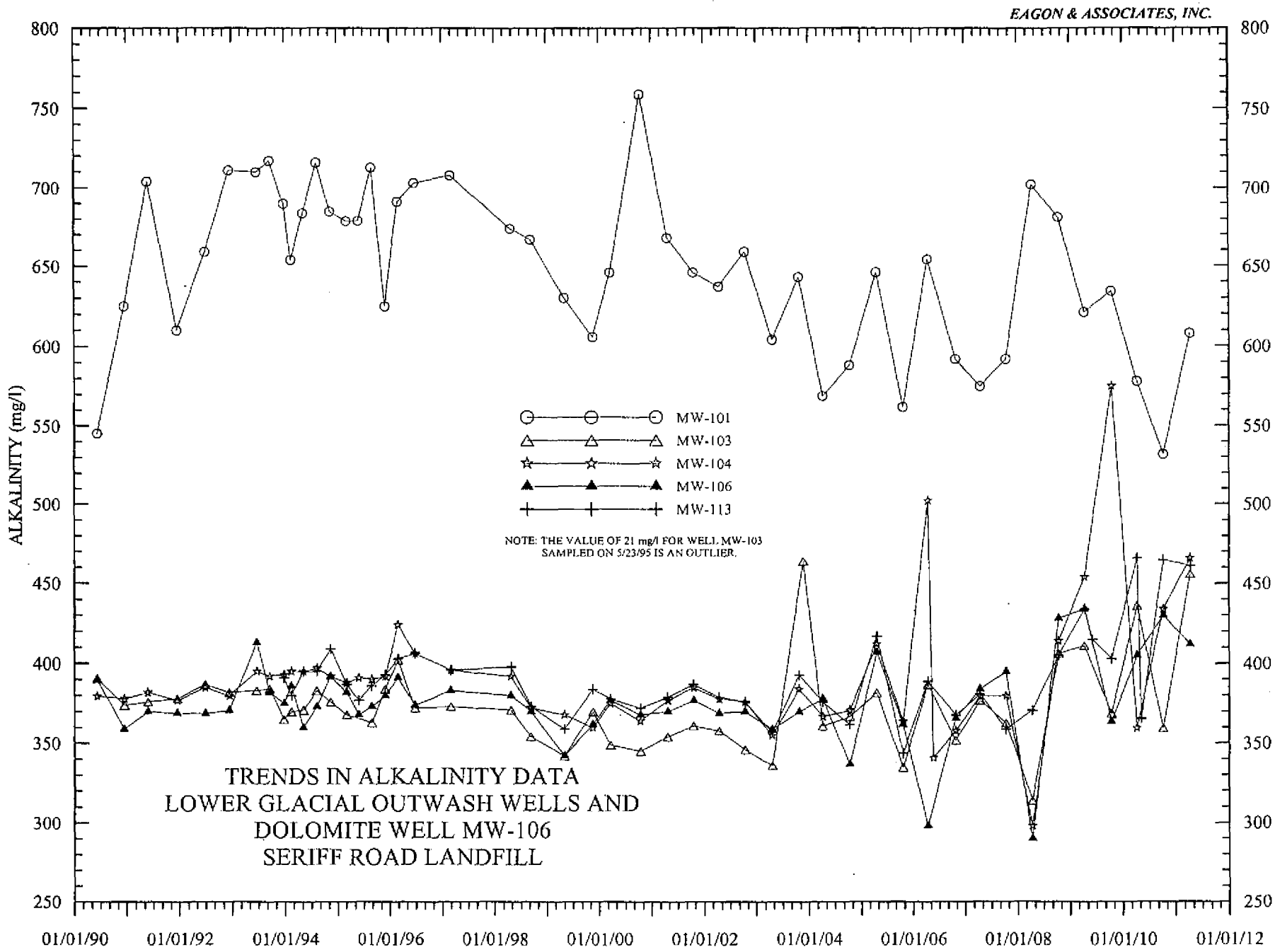
AS EVIDENCED BY COPY OF
LETTER OF APPROVAL
HERETO ATTACHED

APPENDIX A.

TREND PLOTS



SERIFF/ALKUP.GRF
4/27/11



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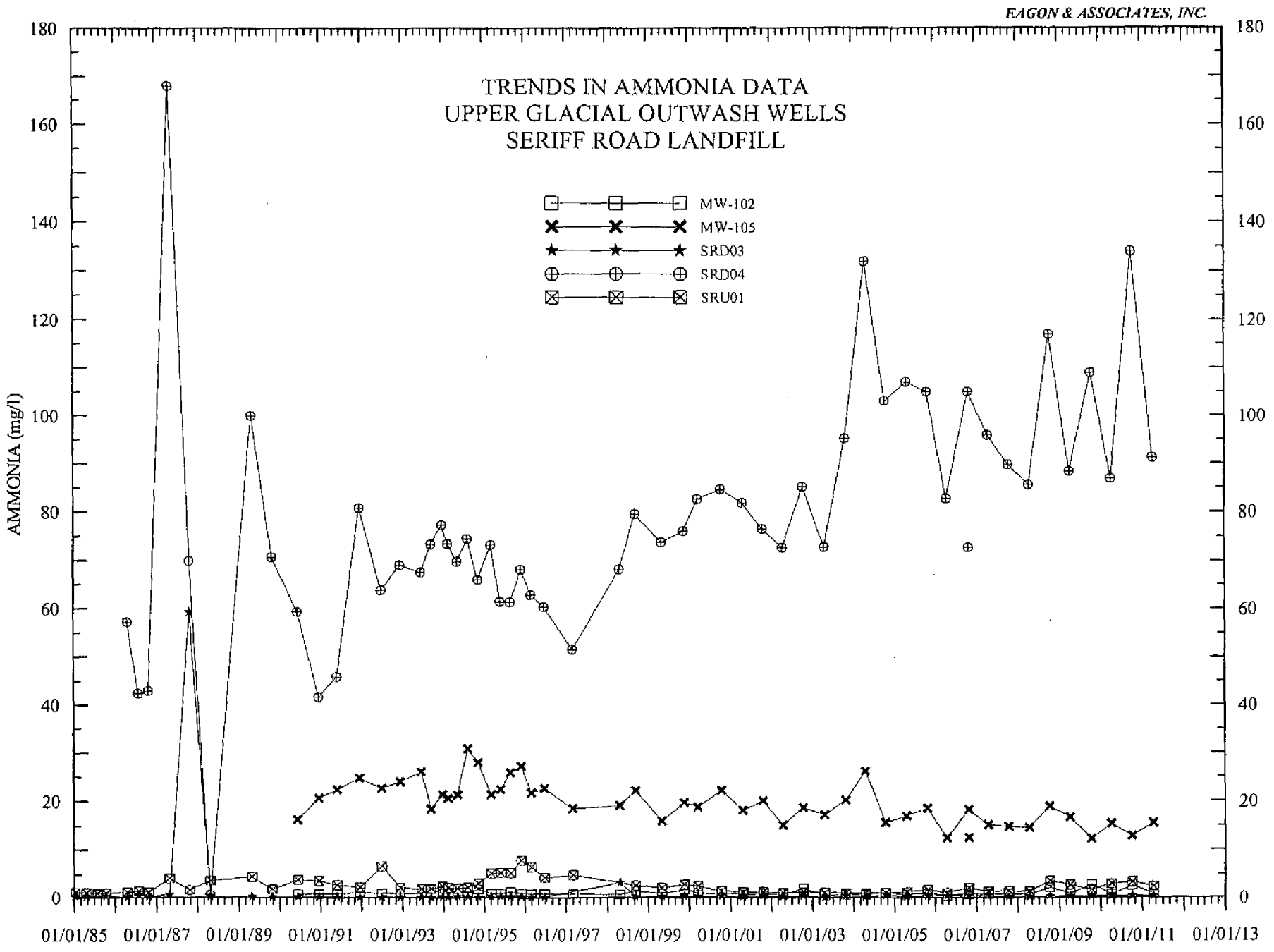

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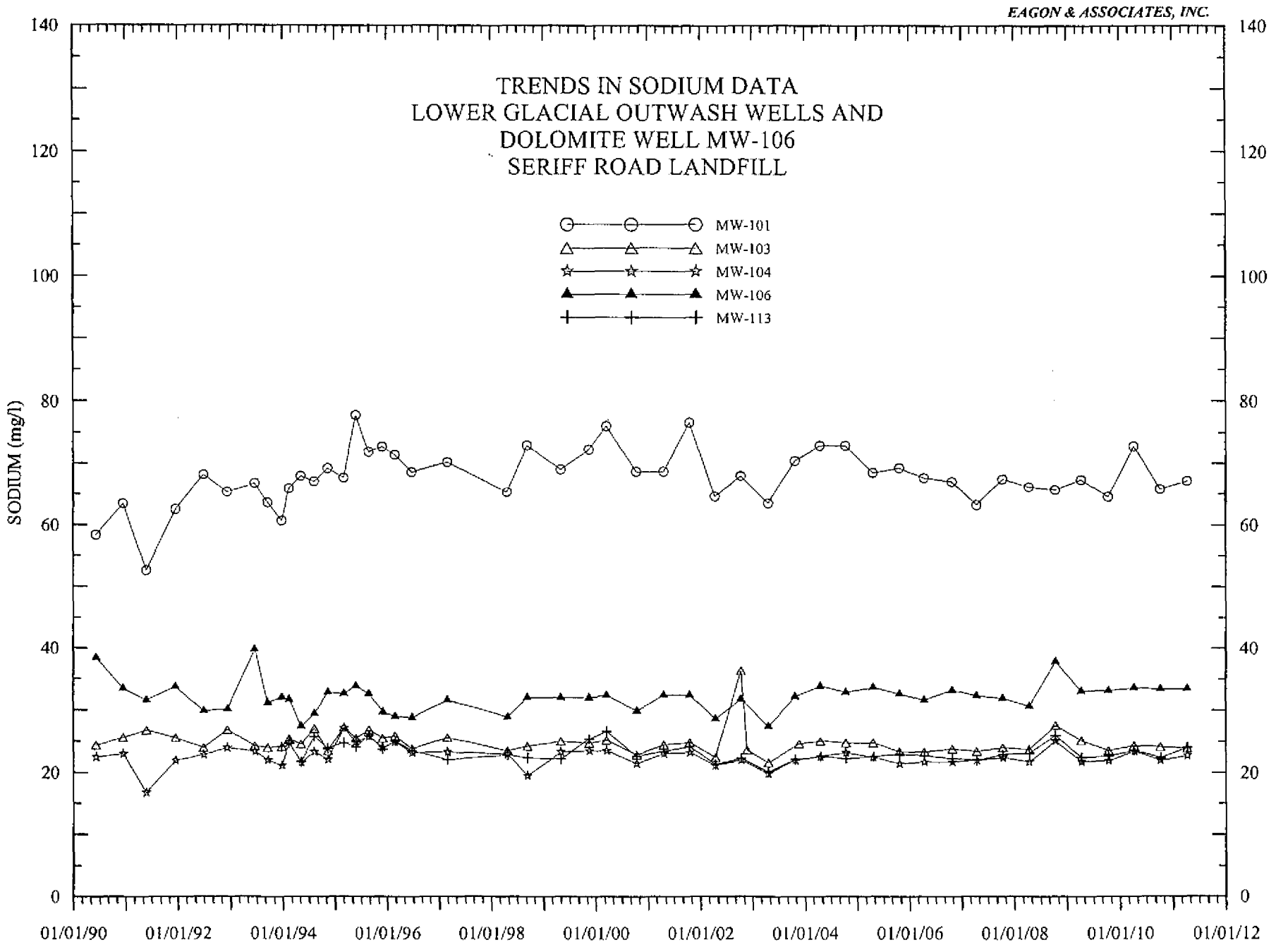

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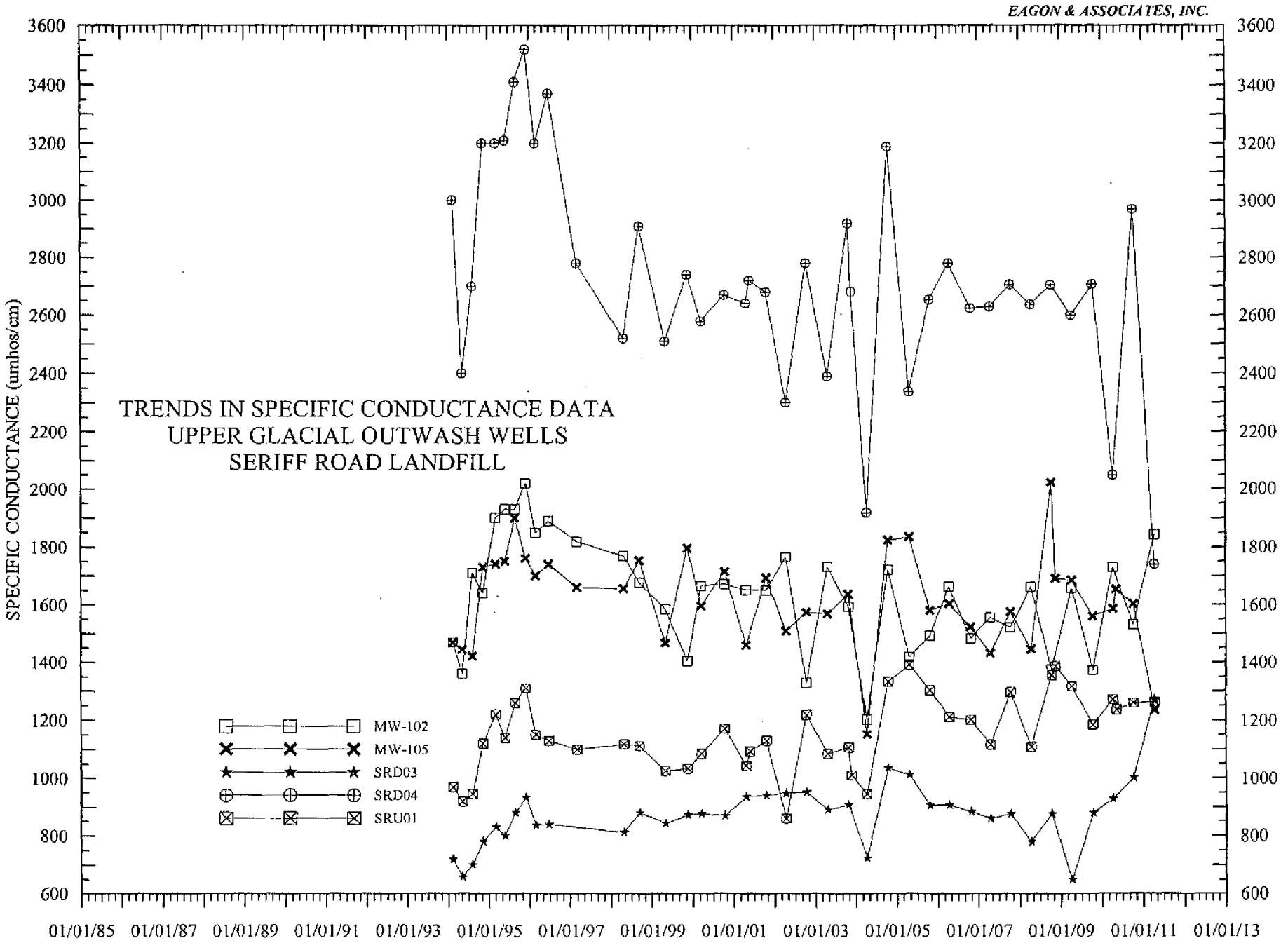

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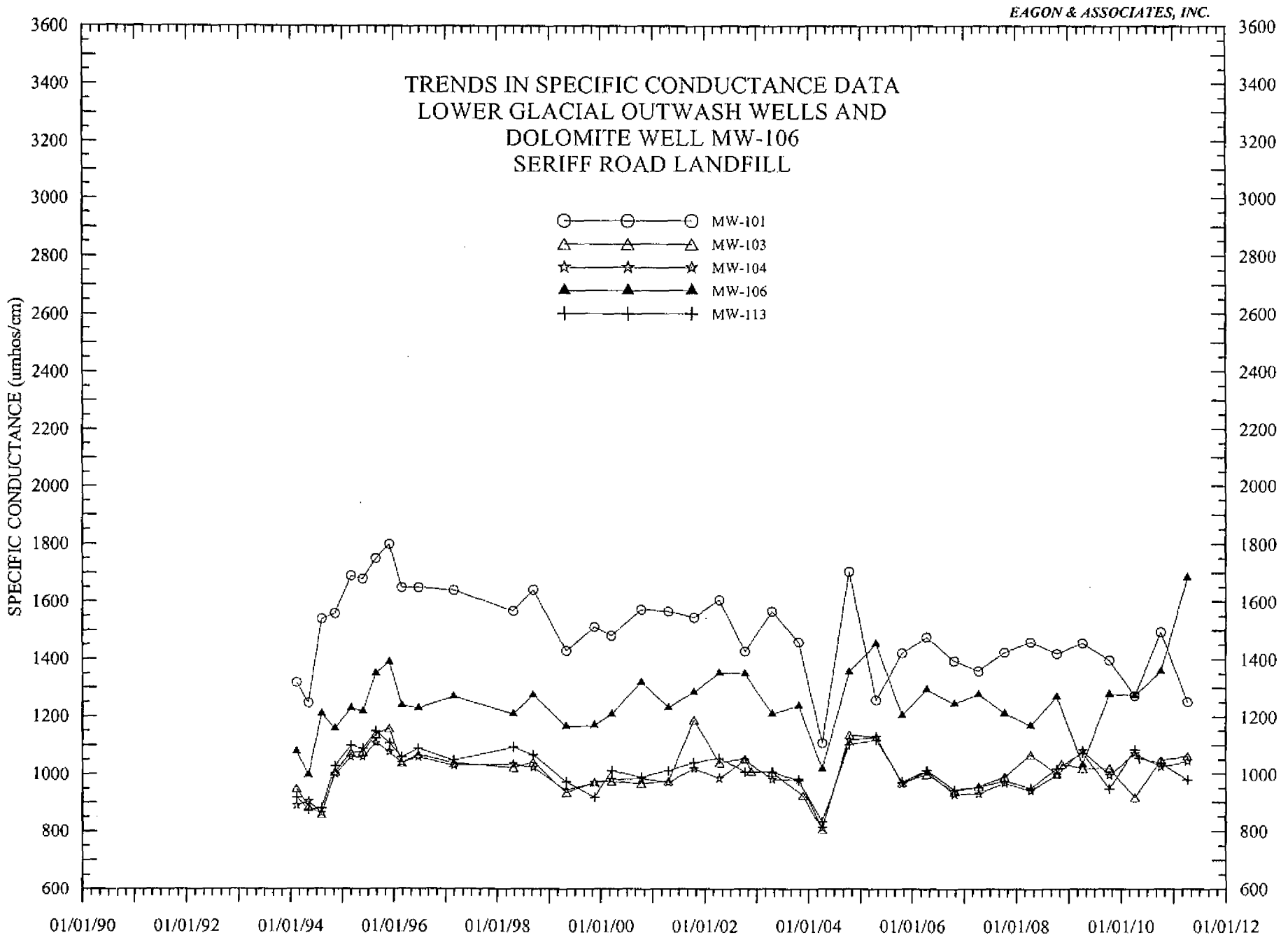

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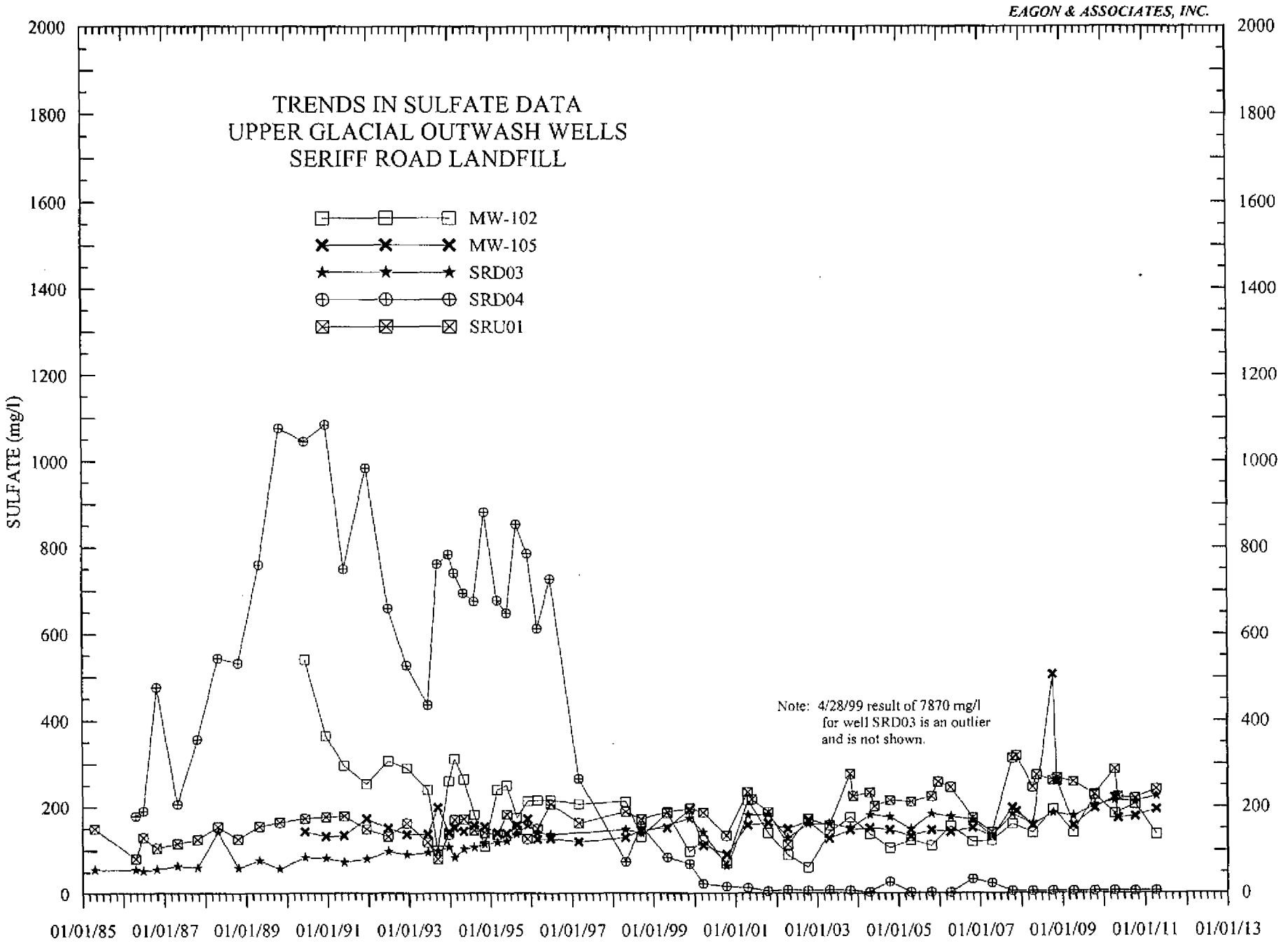

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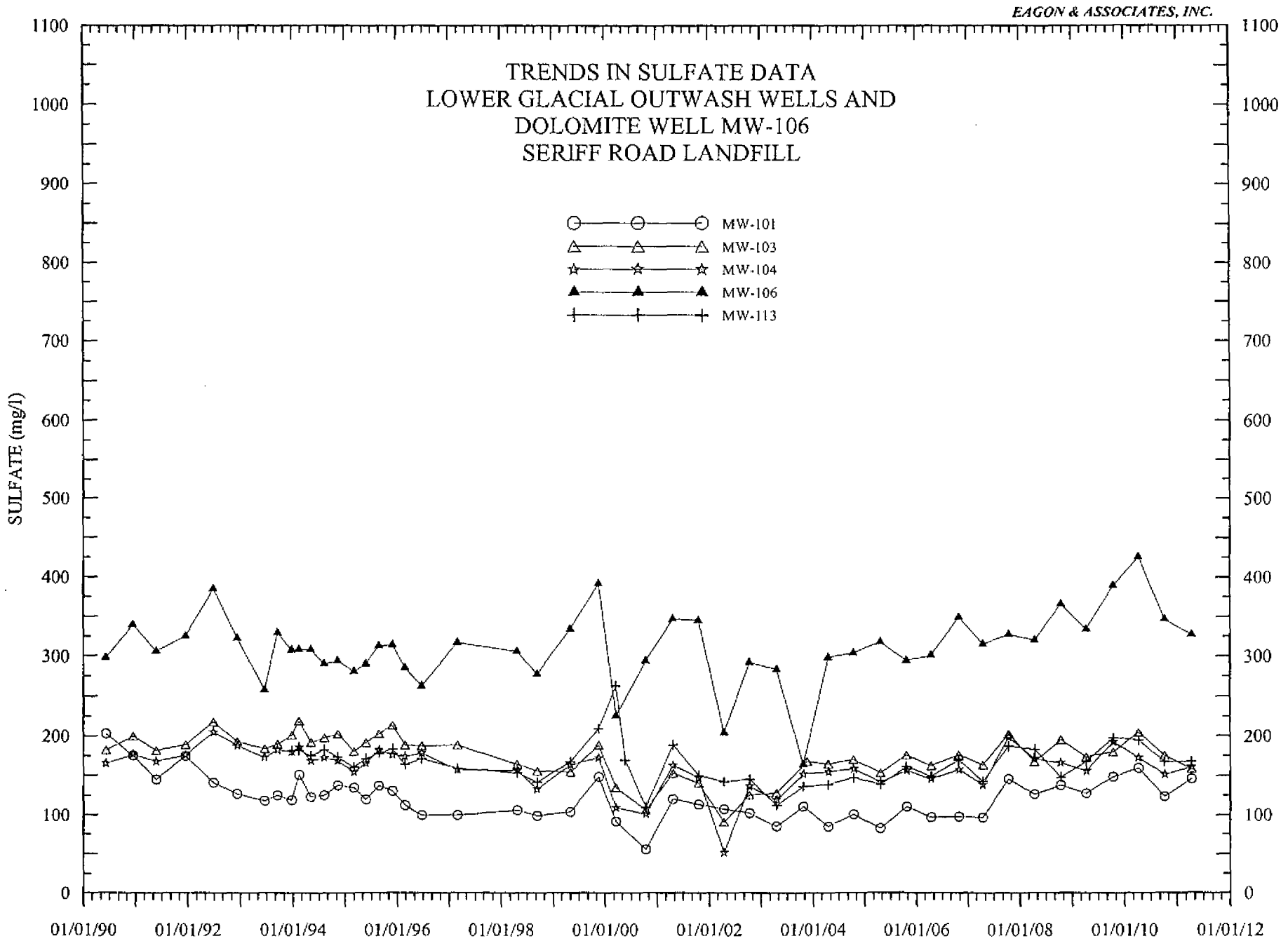

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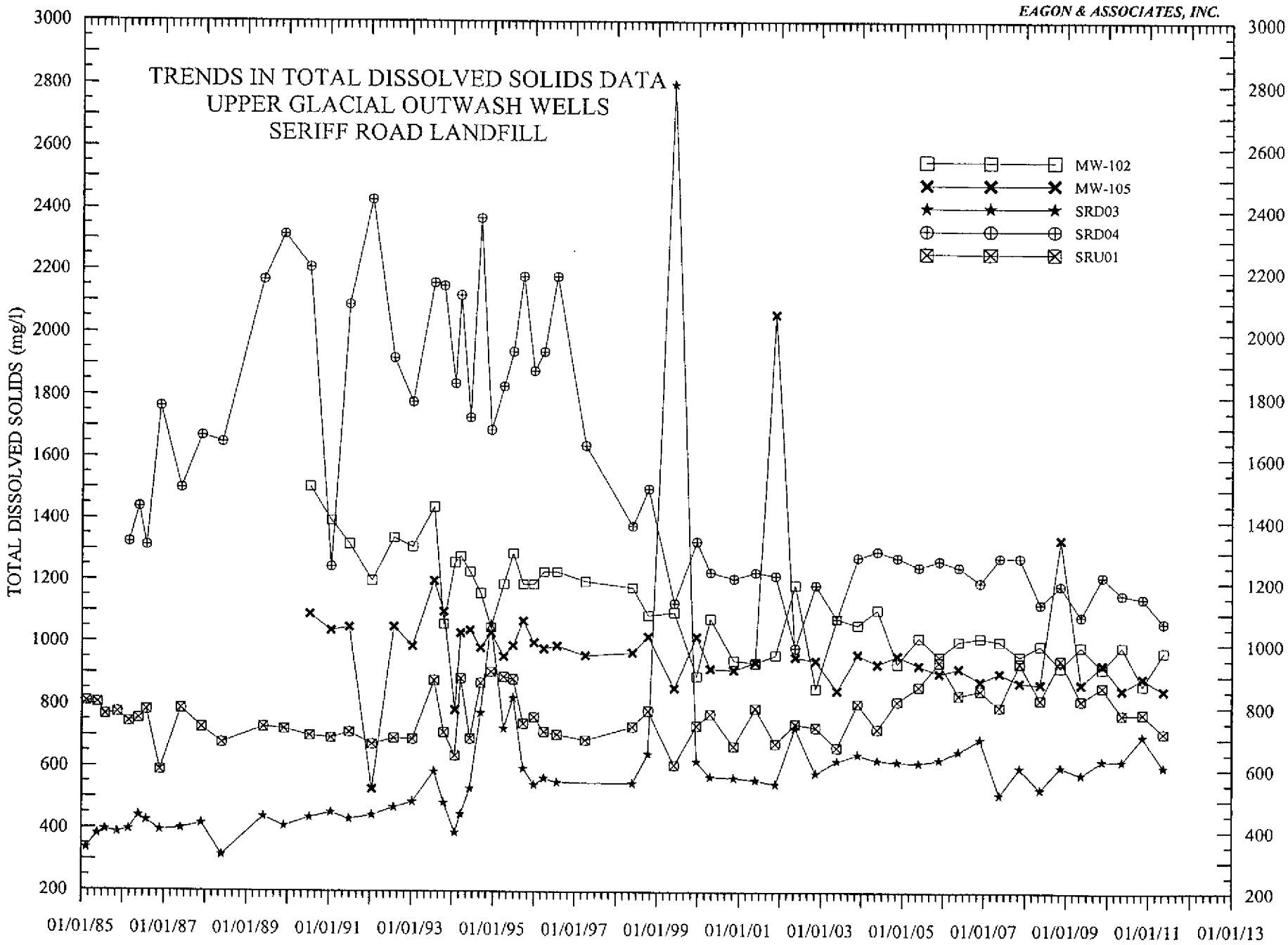

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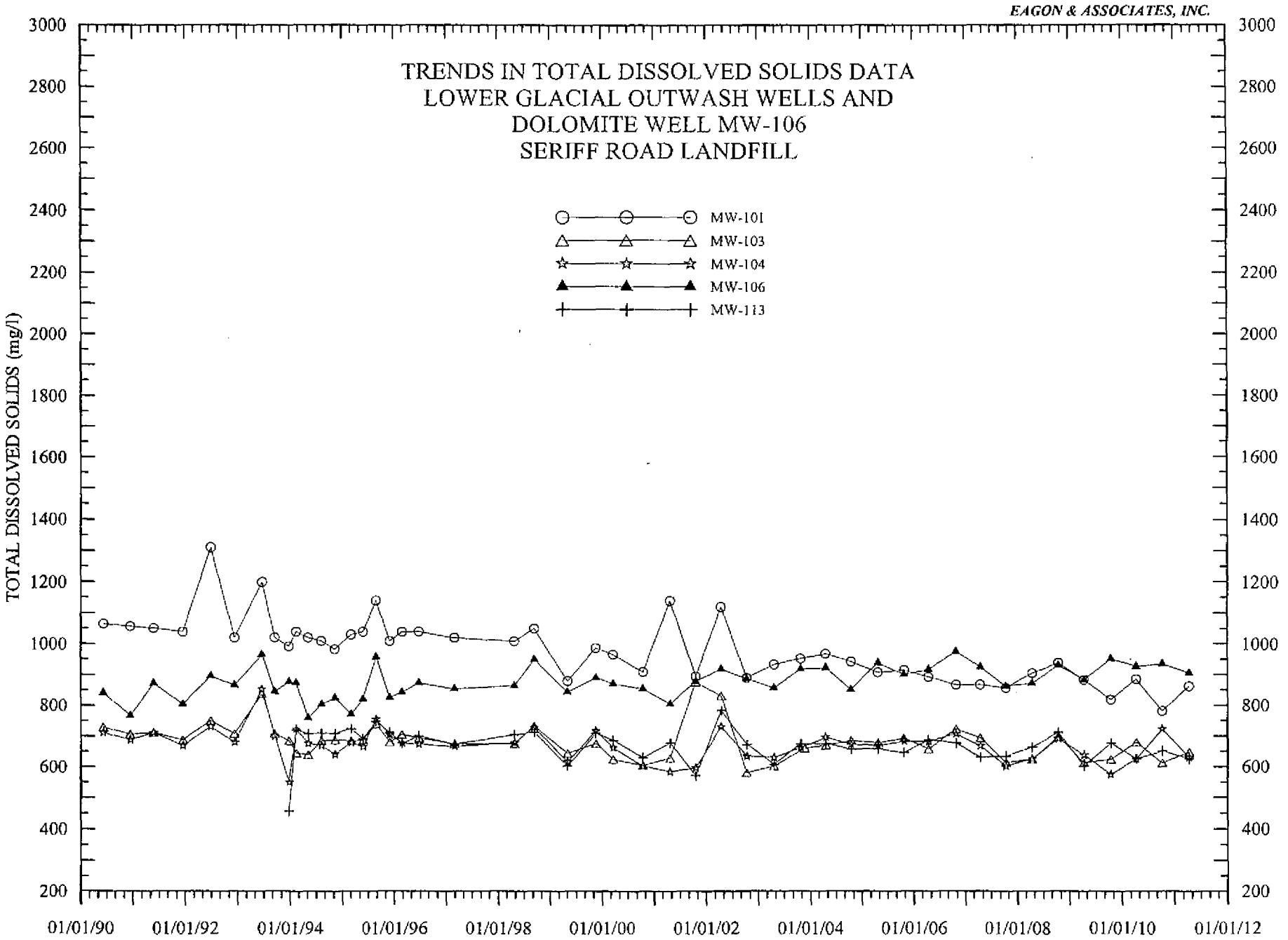

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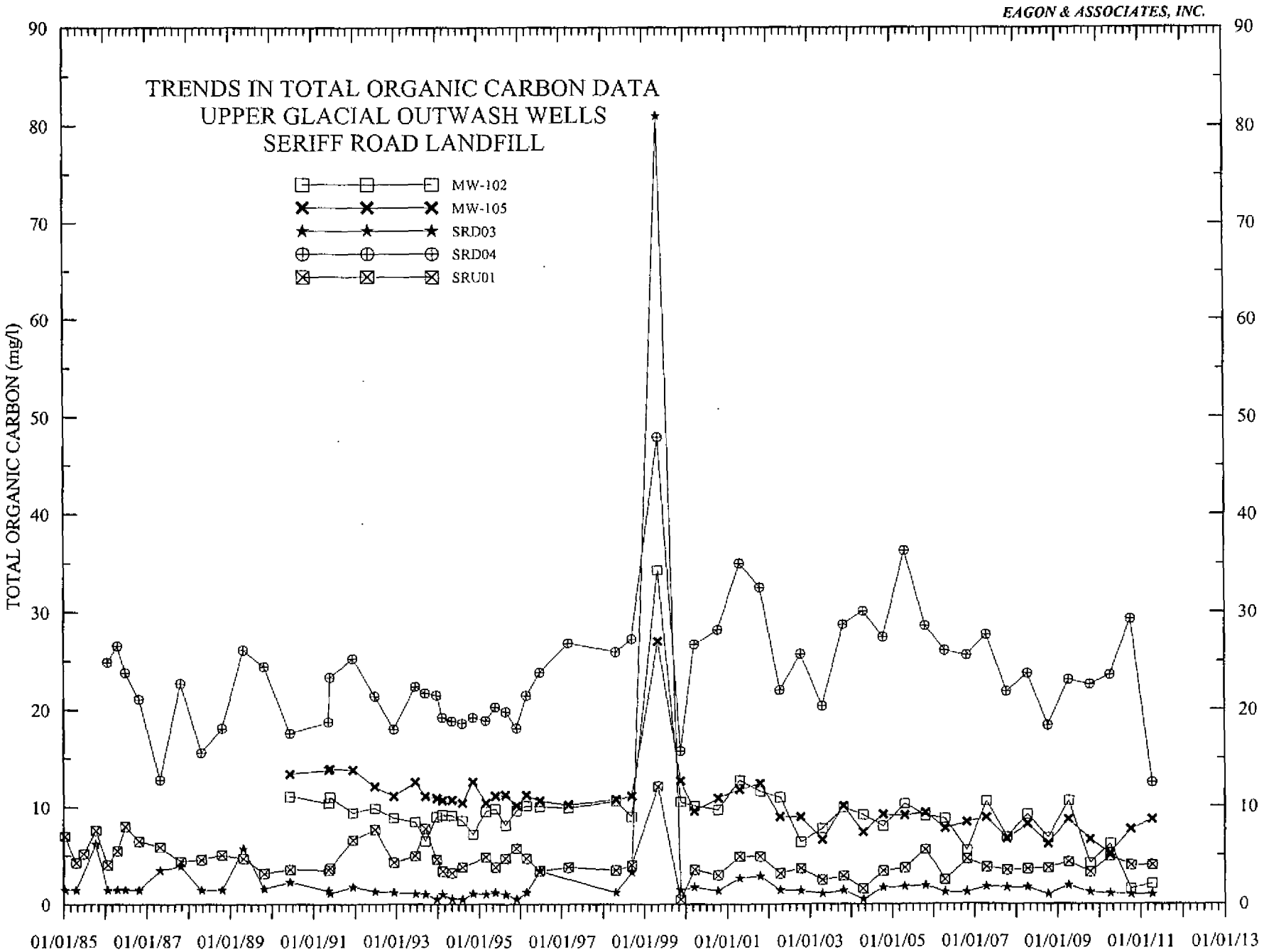
4/27/11



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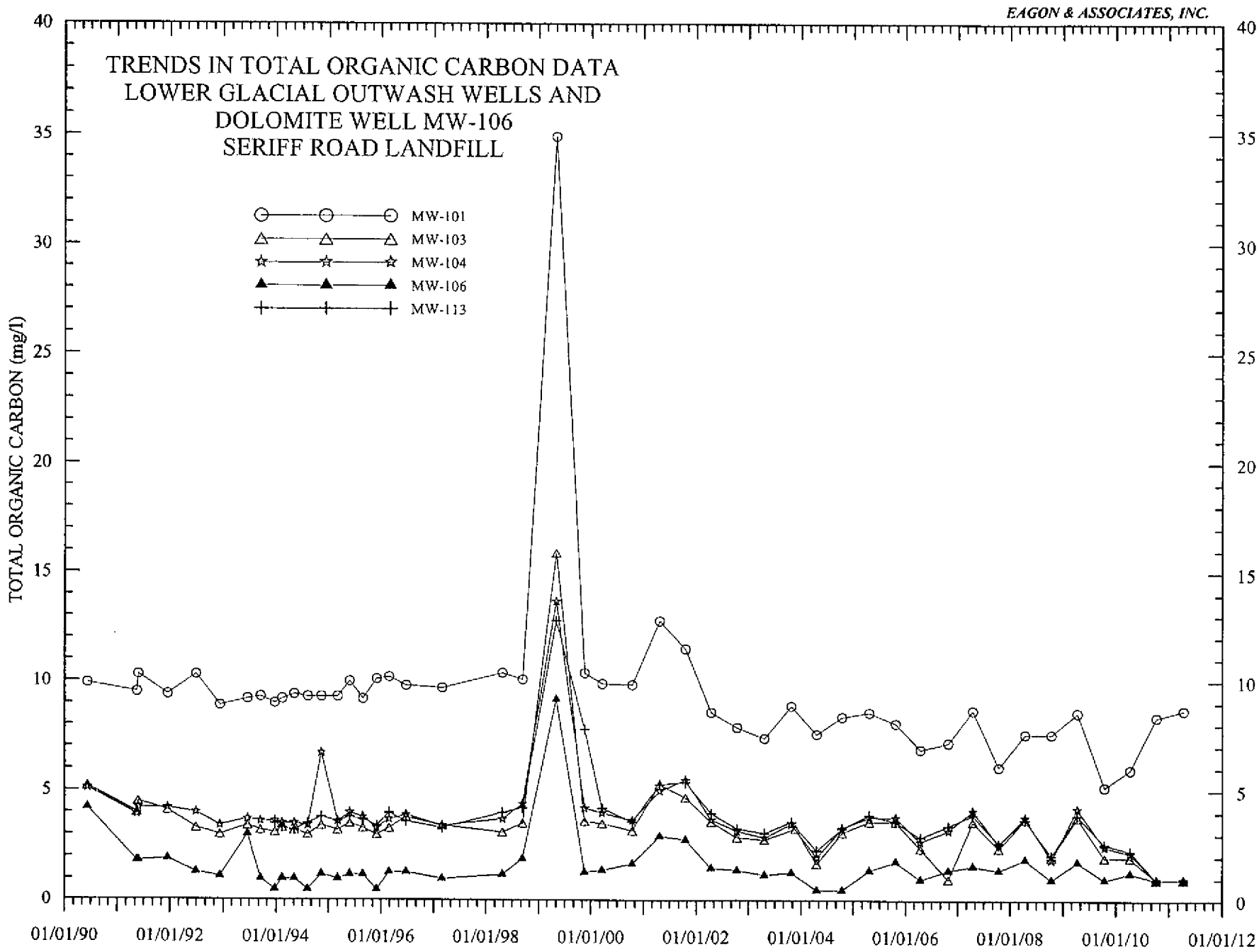
4/27/11



SERIFF/TOCLOW.GRF
4/27/11

APPENDIX B.

GAS VENT INSTALLATION CERTIFICATION REPORT

GAS VENT INSTALLATION
SERIFF ROAD LANDFILL

Prepared for:

WASTE MANAGEMENT OF OHIO, INC.

Prepared by:

EAGON & ASSOCIATES, INC.
Worthington, Ohio

January 8, 2010

Submitted By:

Stephen J. Champa, PG
Hydrogeologist

EAGON & ASSOCIATES, INC.
100 Old Wilson Bridge Road, Suite 115
Worthington, Ohio 43085
(614) 888-5760

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Figure 2. Ground Water and Gas Monitoring Networks

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Appendix A. Boring Logs
Appendix B. Construction Diagrams

INTRODUCTION

The purpose of this report is to document the installation of three new passive gas vents at the Seriff Road Landfill. Drilling and installation of the passive vents was performed June 22 through June 25, 2009. Seriff Road Landfill is located in Shawnee Township, Allen County, Ohio just west of the City of Lima. The property includes approximately 68 acres and is bordered by the Ottawa River to the west, Seriff Road to the east, the Spencerville and Elgin Railway to the south, and wooded land to the north. The landfill covers an area of approximately 27 acres in the central part of the property.

Ten passive gas vents GV-1 through GV-10 were installed outside of the limits of waste in 2003 to address potential landfill gas migration through the upper unsaturated part of the outwash sand and gravel beneath the site. Two more out-of-waste passive gas vents, GV-6B and GV-7A, were installed in September 2004.

As discussed in the proposed revision to the Corrective Measures Study (CMS Rev. 3), transmitted to Ohio EPA in May 2009, the investigation of barium levels at upper outwash monitoring well SRD-04 indicates that the elevated barium levels are due to a lack of sulfate in the ground-water. The lack of sulfate indicates strong reducing conditions which are mobilizing barium in the vicinity of SRD-04. The increasing trend in barium at SRD-04 coincided with the decommissioning of an out–of-waste gas control system at the site in 1997. While the gas vents installed in 2003 and 2004 were not intended to act as a remedy for the barium at SRD-04, barium levels at SRD-04 have declined since 2005.

In accordance with the proposed revision to the CMS, three new passive gas vents, GV-11, GV-12, and GV-13 have been installed between the limits of waste and SRD-04 to provide oxygen to the upper outwash in the vicinity of SRD-04, thereby further altering the reducing conditions in that area with the goal of causing additional declines in barium levels at SRD-04. The locations of GV-11, GV-12, and GV-13 are shown on Figure 1. The ground water and gas monitoring networks for the Seriff Road Landfill are shown on Figure 2. The new passive gas vents were constructed using the same specifications relative to procedures and

materials as the gas vents that were installed in 2003 and 2004. Drilling procedures and gas vent construction and installation are described in the following sections.

DRILLING PROCEDURES

The gas vents were installed so that the screened interval at each vent location is across the till/sand and gravel interface so that any unsaturated outwash sand and gravel is within the screened interval. To account for seasonal water-level fluctuation, which is approximately two feet throughout the site, the vents were completed approximately three feet into saturated sand.

Drilling was performed by Bowser-Morner using a Track Rig D-90 and was supervised by a geologist from Eagon & Associates, Inc. Boring locations were predetermined and staked prior to any drilling. Figure 1 shows the gas vent locations.

Borings were initially drilled at each location with $4^1/_4$-inch hollow stem augers (HSA). Split spoon samples were collected at each boring location to identify the till/outwash contact. Split spoon samples were logged by the geologist using Unified Soil Classification System (USCS) guidelines. After the till/outwash contact had been located, the $4^1/_4$-inch augers were advanced to the final boring depth. The boring logs are included in Appendix A. Once the final boring depth was achieved with the $4^1/_4$-inch HSA, the borehole was over-drilled with $12^1/_4$-inch HSA to the borehole completion depth. The depth of the borings ranged from 30 feet to 33.5 feet. After completion of each gas vent all augers were rinsed with potable water brought by the drillers to remove the heavy cuttings.

VENT INSTALLATION

The gas vents were constructed using 6-inch schedule 80 PVC pipe and well screens with $^1/_8$-inch slots. For each well a schedule 80 PVC slip cap was placed on the bottom of the screened section and secured with stainless steel screws. PVC screen and casing sections with slip joints were connected above ground and then inserted in the borehole using the drilling rig. The PVC pipe was placed at the bottom of the boring unless otherwise noted on the well

construction diagram. The bottom of the boring was backfilled with No. 5 sand, if PVC pipe was not placed at the bottom of the boring. Well construction diagrams for gas vents GV-11, GV-12, and GV-13 are located in Appendix B. The sand pack ($^1/_4$"x$^1/_2$" Best Sand) was placed to approximately three and a half feet above the top of the vent screen. Three to four feet of Cetco Volclay coarse bentonite chips were installed above the sand pack. The bentonite chips were hydrated if the amount of water in the boring was not above the level of bentonite placement. Baroid bentonite grout was tremied into the annular space above the bentonite chips to approximately two feet below ground surface. The grout was left to settle at least overnight and borehole cuttings were used to fill the remaining annular space.

The stick-up after the vent installations ranged from one foot to approximately two feet above ground surface. After installation of all 3 gas vents additional PVC was added to make the stick-ups approximately eight feet in height at each vent. American Environmental Group, Ltd. was contracted to complete the gas vents by placing wind ventilator caps and gas sampling ports on each vent. Vent locations and top of casing and ground elevations were surveyed by a licensed surveyor and are recorded on the boring logs and construction diagrams.

FIGURES

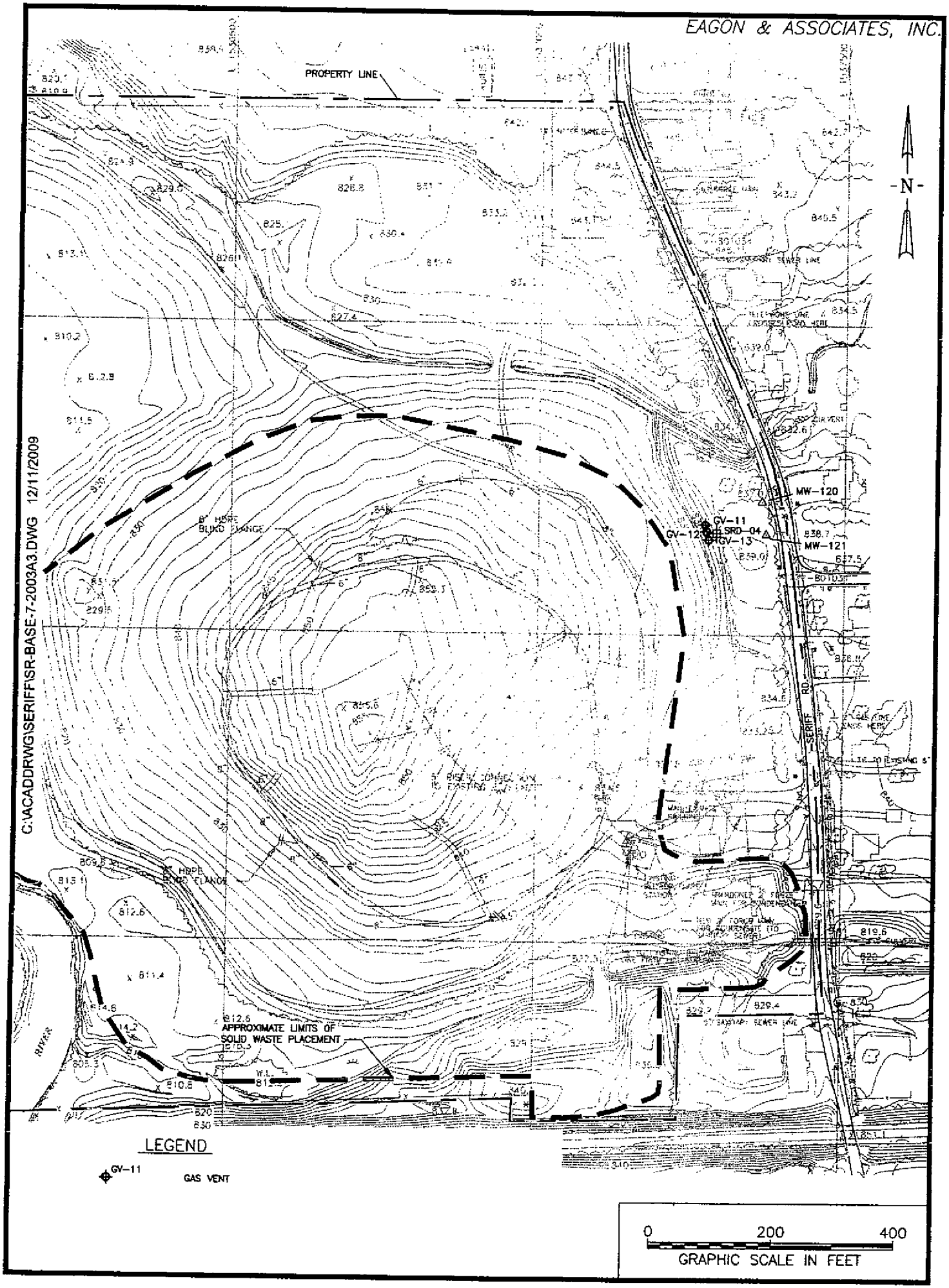


FIGURE 1. OUT-OF-WASTE GAS VENT LOCATIONS, INSTALLED JUNE 2009

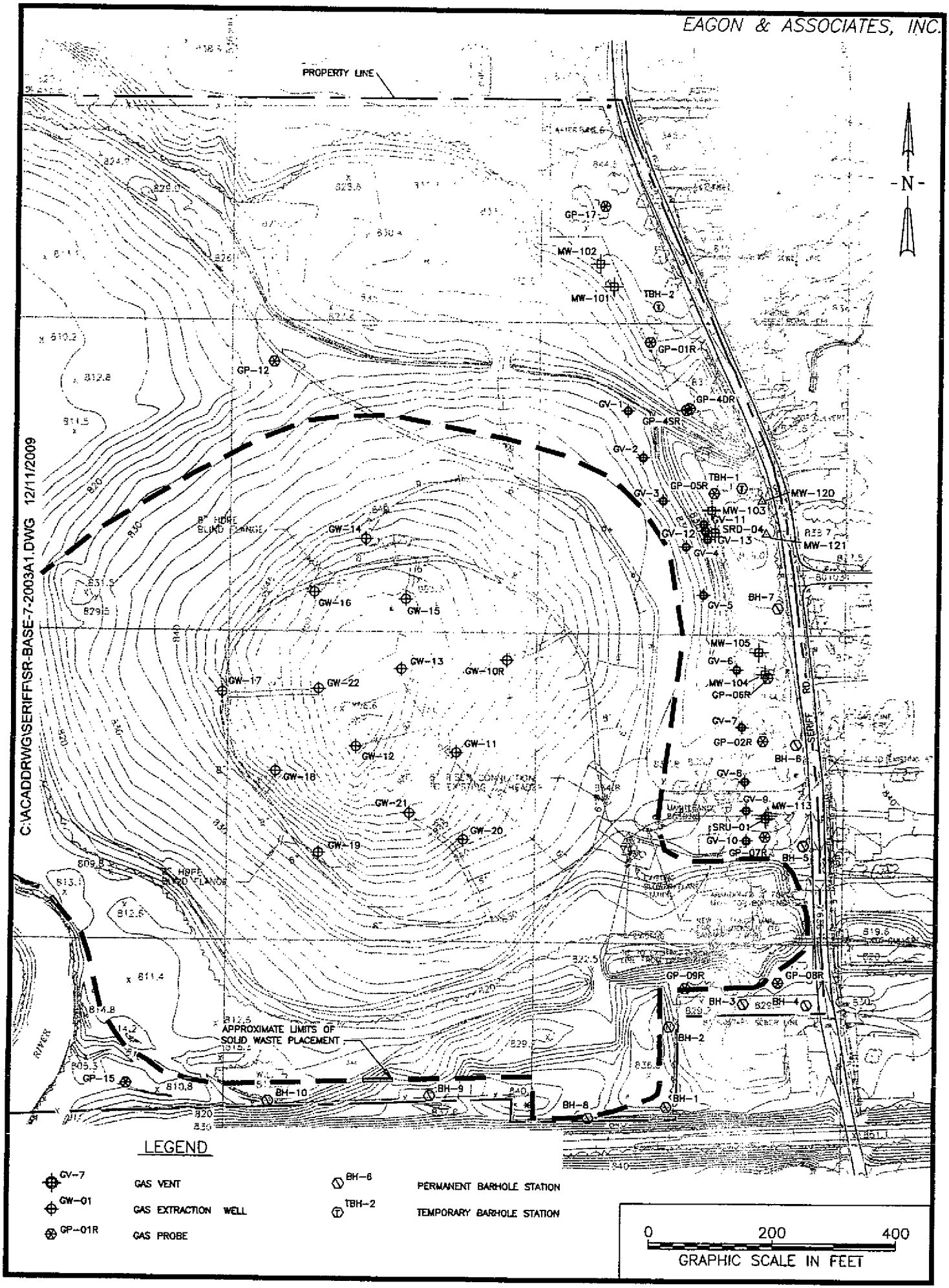


FIGURE 2. GROUND-WATER AND GAS MONITORING NETWORKS

APPENDIX A.

BORING LOGS

Eagon & Associates, Inc.

BOREHOLE LOG

Site Name and Location: **Seriff Road Landfill Lima, Ohio**	Drilling Methods: 4 1/4" ID HSA, Overdrilled with 12 1/4" HSA				Boring Number: **GV-11**
Drilling Firm: *Bowser-Morner*	DATE	TIME	DEPTH DRILLED (ft)	WATER LEVEL (ft)	
Driller / Rig: *Jim Walsh/Track Rig D-90*					*Page 1 of 2*
Logged by: *Megan Mitchell*	Sampling Methods: ST = Shelby Tube; WS = Waxed Sample; SP = Sand Pump; GP = Geoprobe; CT = Cuttings; SS = Split Spoon; CS = Continuous Sampler; C = Coring; NS = Not Sampled; B = Bailer				Start / Finish
Coordinates: *391177.60N 1537270.49E*					*Time 0830* / *Time 1440*
Surface Elevation: *829.0 ft/MSL*					*Date 6/25/09* / *Date 6/25/09*
Surface Conditions / Weather: *Grassy /Dry, Sunny 80°-90°F*					

Remarks:

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
				Dark gray to very dark gray (4/N-3/N) CLAY. Trace fine sand and gravel. Dry.		Logged from cuttings.	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10	NS			Reddish brown to yellowish red (5YR 4/4-4/6) SILTY CLAY. Trace fine to medium sand and gravel.			
11							
12							
13							
14							
15							
16							
17							
18							
19							

Eagon & Associates, Inc.

Seriff Road Landfill Lima, Ohio	**BOREHOLE LOG**	Boring Number GV-11

Remarks:

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
21 22	NS						
23 24	S-1	1.55	8 10 13 18	Gray (6/N-5/N) CLAY. Moist. Cohesive. Low to medium plasticity. Trace fine to coarse grained sand, overall mostly medium grained.			CL
25 26	S-2	2.00	2 5 8 12				
27 28	S-3	1.85	2 5 12 15	Change at 28.4'. Dark gray to black (4/N-2.5/N) SAND and GRAVEL. Fine to coarse grained sand, overall mostly medium grained. Trace gravel up to 0.05", subangular to subrounded. Wet. Non-cohesive. Non-plastic.			SW
29 30	S-4	1.9	2 4 8 9				
31 32	S-5	1.9	2 5 12 13				
33				Bottom of Borehole = 33.0'.		Installed Gas Vent GV-11 at 32.0'.	
34 35 36 37 38 39 40 41 42 43 44							

BOREHOLE LOG V.2 SERIFF ROAD.GPJ EAGON.GDT 12/11/09

Eagon & Associates, Inc.

BOREHOLE LOG

Site Name and Location: **Seriff Road Landfill Lima, Ohio**	Drilling Methods: 4 1/4" ID HSA, Overdrilled with 12 1/4" HSA				Boring Number: **GV-12**
Drilling Firm: *Bowser-Morner*	DATE	TIME	DEPTH DRILLED (ft)	WATER LEVEL (ft)	
Driller / Rig: *Jim Walsh/Track Rig D-90*					*Page 1 of 2*
Logged by: *Megan Mitchell*	Sampling Methods: ST = Shelby Tube; WS = Waxed Sample; SP = Sand Pump; GP = Geoprobe; CT = Cuttings; SS = Split Spoon; CS = Continuous Sampler; C = Coring; NS = Not Sampled; B = Bailer				Start / Finish
Coordinates: *391166.74N 1537272.86E*					*Time 0957* / *Time 1700*
Surface Elevation: *829.5 ft/MSL*					*Date 6/24/09* / *Date 6/24/09*
Surface Conditions / Weather: *Grassy /Dry, Sunny 80°-90°F*					
Remarks:					

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
				Dark gray to very dark gray (5YR 4/1-3/1) SILTY CLAY.		Logged from cuttings.	
1							
2							
3							
4							
5							
6							
7							
8				Silty clay with sand and gravel.			
9							
10	NS						
11							
12							
13							
14							
15							
16							
17							
18							
19							

Eagon & Associates, Inc.

Seriff Road Landfill Lima, Ohio	**BOREHOLE LOG**	Boring Number GV-12

Remarks:

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
21 22	NS						
23 24 25	S-1	1.73	4 8 12 13	Gray (6/N-5/N) SILTY CLAY. Trace fine to coarse sand and gravel, angular to subangular. Low to medium plasticity. Moist. Cohesive.			CL
26 27	S-2	2.0	4 6 10 21				
28 29	S-3	1.83	7 8 16 20				
30 31	S-4	0	8 10 12 10	Dark gray to very dark gray (4/N-3/N) SAND and GRAVEL. Medium to coarse grained, overall mostly medium grained. Subangular to subrounded. Wet. Non-cohesive. Non-plastic.			SW
32 33	S-5	1.94	10 14 12 10				
	NS						
34 35 36 37 38 39 40 41 42 43 44				Bottom of Borehole = 33.5'.		Installed Gas Vent GV-12 at 32.0'.	

BOREHOLE LOG V.2 SERIFF ROAD.GPJ EAGON.GDT 12/11/09

Eagon & Associates, Inc.

BOREHOLE LOG

Site Name and Location: **Seriff Road Landfill Lima, Ohio**	Drilling Methods: 4 1/4" ID HSA, Overdrilled with 12 1/4" HSA				Boring Number: **GV-13**
Drilling Firm: *Bowser-Morner*	DATE	TIME	DEPTH DRILLED (ft)	WATER LEVEL (ft)	
Driller / Rig: *Jim Walsh/Track Rig D-90*					*Page 1 of 2*
Logged by: *Megan Mitchell*	Sampling Methods: ST = Shelby Tube; WS = Waxed Sample; SP = Sand Pump; GP = Geoprobe; CT = Cuttings; SS = Split Spoon; CS = Continuous Sampler; C = Coring; NS = Not Sampled; B = Bailer				Start / Finish
Coordinates: *391153.46N 1537276.34E*					*Time 1520* / *Time 0827*
Surface Elevation: *829.6 ft/MSL*					*Date 6/22/09* / *Date 6/24/09*
Surface Conditions / Weather: *Grass Covered /Dry, Sunny 80°F*					
Remarks:					

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
				Dark gray to very dark gray (5YR 4/1-3/1) CLAY. Trace fine to medium sand and gravel.		Logged from cuttings.	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10	NS						
11							
12				Silty clay with sand and gravel. Wet.			
13							
14							
15							
16							
17							
18							
19							

Eagon & Associates, Inc.

Seriff Road Landfill Lima, Ohio	BOREHOLE LOG	Boring Number GV-13

Remarks:

Depth (feet)	Sample Method	Sample Recovery (feet or %)	Blows/6 in or RQD	SAMPLE DESCRIPTION	Graphic Log	Remarks	USCS
				Below 20.0' cuttings change to gray (6/N-5/N).			
21	NS						
22							
23							
24	S-1	1.95	4 7 9 10	Gray (6/N-5/N) CLAY. Trace gravel and sand, subangular to subrounded. Moist.			CL
25							
26	S-2	1.75	3 5 11 3	Change at 26.5'.			
27				Gray (6/N-4/N) SAND and GRAVEL. Subangular to subrounded. Fine to coarse grained, overall mostly medium grained. Wet. Non-cohesive. Non-plastic.			SW
28	S-3	1.19	5 8 9 12				
29	NS						
30				Bottom of Borehole = 30.0'.		Installed Gas Vent GV-13 at 29.0'.	
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							

BOREHOLE LOG V.2 SERIFF ROAD.GPJ EAGON.GDT 12/11/09

APPENDIX B.

CONSTRUCTION DIAGRAMS

Eagon & Associates, Inc.

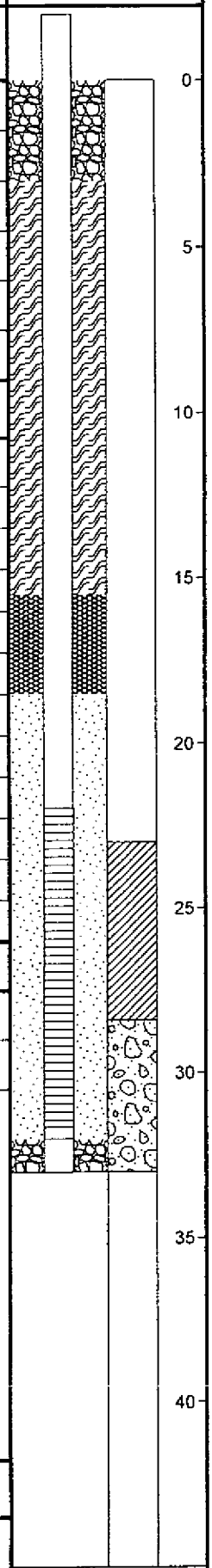
Vent No. GV-11

Gas Vent Installation Report

Site Name and Location: *Seriff Road Landfill, Lima, Ohio*	Completion Date: *6/25/09*
Coordinates: *391177.60N 1537270.49E*	Borehole Depth (ft): *33.0*
Elevation Top of Casing (ft/MSL): *836.41*	Borehole Diameter (in): *16"*
Elevation Ground Surface (ft/MSL): *829.01*	Drilling Methods: *4 1/4" ID HSA, Overdrilled with 12 1/4" HSA*
Installed By: *Jim Walsh/Bowser-Morner*	Completed Drilling: *6/25/09*
Supervised By: *Megan Mitchell/Eagon & Associates, Inc.*	Drilling Water Used (gals): *None*

Vent Design

Component	Materials	Depth (LSD)	Elevation
Riser	6" Schedule 80 PVC	-7.40 - 21.94	836.41 - 807.07
Natural Fill	Drill Cuttings	0.00 - 3.00	829.01 - 826.01
Grout Seal	Pure Gold Grout	3.00 - 15.50	826.01 - 813.51
Bentonite Seal	Volclay Coarse Chips	15.50 - 18.50	813.51 - 810.51
Sand Pack	Best Sand 1/4 x 1/2	18.50 - 32.00	810.51 - 797.01
Screen	6" Schedule 80 PVC	21.94 - 31.64	807.07 - 797.37
Well Point Blank	6" Schedule 80 PVC	31.64 - 32.00	797.37 - 797.01
Natural Fill	Drill Cuttings	32.00 - 33.00	797.01 - 796.01



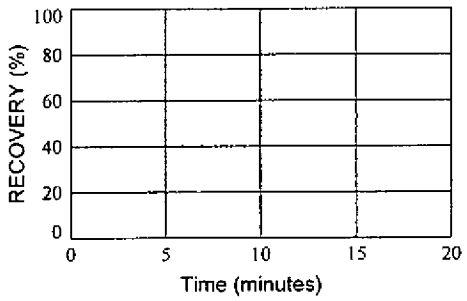
Vent Development

Well Depth (ft,TOC):	Depth to Water (ft,TOC):	Well Volume (gals):	Volume Purged (gals):
39.40			

Development Method:

Date	Time	Cumulative Volume Removed (gals)	Temp (°C)	Specific Conductivity (µmhos/cm)	pH (S.U.)	Turbidity (NTU)

Recovery Data



Sampling Equipment:

Comments:

Ventilator cap and gas sampling port installed by AEGL

GAS VENT REPORT SERIFF ROAD.GPJ ELIVER.GPJ 12/11/09

Eagon & Associates, Inc.

Vent No. GV-12

Gas Vent Installation Report

Site Name and Location: *Seriff Road Landfill, Lima, Ohio*	Completion Date: *6/24/09*
Coordinates: *391166.74N 1537272.86E*	Borehole Depth (ft): *33.5*
Elevation Top of Casing (ft/MSL): *837.00*	Borehole Diameter (in): *16"*
Elevation Ground Surface (ft/MSL): *829.50*	Drilling Methods: *4 1/4" ID HSA, Overdrilled with 12 1/4" HSA*
Installed By: *Jim Walsh/Bowser-Morner*	Completed Drilling: *6/24/09*
Supervised By: *Megan Mitchell/Eagon & Associates, Inc.*	Drilling Water Used (gals): *None*

Vent Design

Component	Materials	Depth (LSD)	Elevation
Riser	6" Schedule 80 PVC	-7.50 - 21.94	837.00 - 807.56
Natural Fill	Drill Cuttings	0.00 - 3.00	829.50 - 826.50
Grout Seal	Pure Gold Grout	3.00 - 14.50	826.50 - 815.00
Bentonite Seal	Volclay Coarse Chips	14.50 - 18.50	815.00 - 811.00
Sand Pack	Best Sand 1/4 x 1/2	18.50 - 32.00	811.00 - 797.50
Screen	6" Schedule 80 PVC	21.94 - 31.64	807.56 - 797.86
Well Point Blank	6" Schedule 80 PVC	31.64 - 32.00	797.86 - 797.50
Natural Fill	Drill Cuttings	32.00 - 33.50	797.50 - 796.00

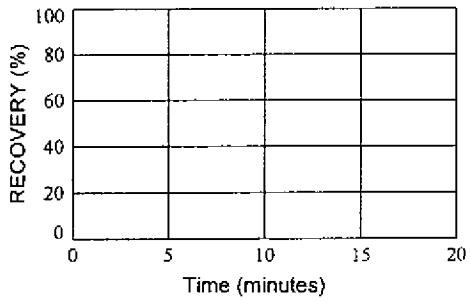
Vent Development

Well Depth (ft,TOC):	Depth to Water (ft,TOC):	Well Volume (gals):	Volume Purged (gals):
39.50			

Development Method:

Date	Time	Cumulative Volume Removed (gals)	Temp (°C)	Specific Conductivity (µmhos/cm)	pH (S.U.)	Turbidity (NTU)

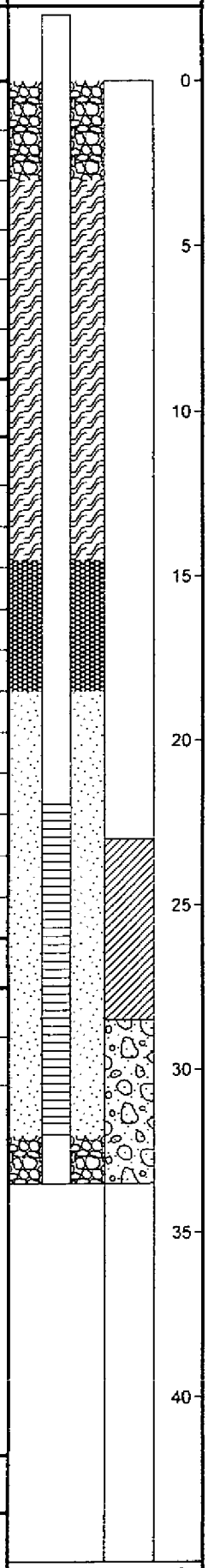
Recovery Data



Sampling Equipment:

Comments:

Ventilator cap and gas sampling port installed by AEGL



Boring depth=33.5 ft.

Eagon & Associates, Inc.

Vent No. GV-13

Gas Vent Installation Report

Site Name and Location: *Seriff Road Landfill, Lima, Ohio*	Completion Date: *6/24/09*
Coordinates: *391153.46N 1537276.34E*	Borehole Depth (ft): *30.0*
Elevation Top of Casing (ft/MSL): *837.71*	Borehole Diameter (in): *16"*
Elevation Ground Surface (ft/MSL): *829.56*	Drilling Methods: *4 1/4" ID HSA, Overdrilled with 12 1/4" HSA*
Installed By: *Jim Walsh/Bowser-Morner*	Completed Drilling: *6/24/09*
Supervised By: *Megan Mitchell/Eagon & Associates, Inc.*	Drilling Water Used (gals): *None*

Vent Design

Component	Materials	Depth (LSD)	Elevation
Riser	6" Schedule 80 PVC, Slip Joint	-8.15 - 17.90	837.71 - 811.66
Natural Fill	Drill Cuttings	0.00 - 2.00	829.56 - 827.56
Grout Seal	Pure Gold Grout	2.00 - 12.00	827.56 - 817.56
Bentonite Seal	Volclay Coarse Chips	12.00 - 15.00	817.56 - 814.56
Sand Pack	Best Sand 1/2 x 1/4	15.00 - 29.00	814.56 - 800.56
Screen	6" Schedule 80 PVC 1/8-slot	18.64 - 28.64	810.92 - 800.92
Well Point Blank	6" Schedule 80 PVC , Slip Cap	22.64 - 29.00	806.92 - 800.56
Natural Fill	Drill Cuttings	29.00 - 30.00	800.56 - 799.56

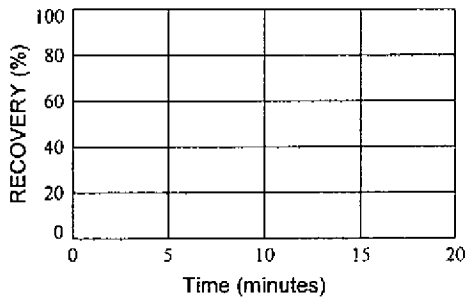
Vent Development

Well Depth (ft,TOC):	Depth to Water (ft,TOC):	Well Volume (gals):	Volume Purged (gals):
37.15			

Development Method:

Date	Time	Cumulative Volume Removed (gals)	Temp (°C)	Specific Conductivity (µmhos/cm)	pH (S.U.)	Turbidity (NTU)

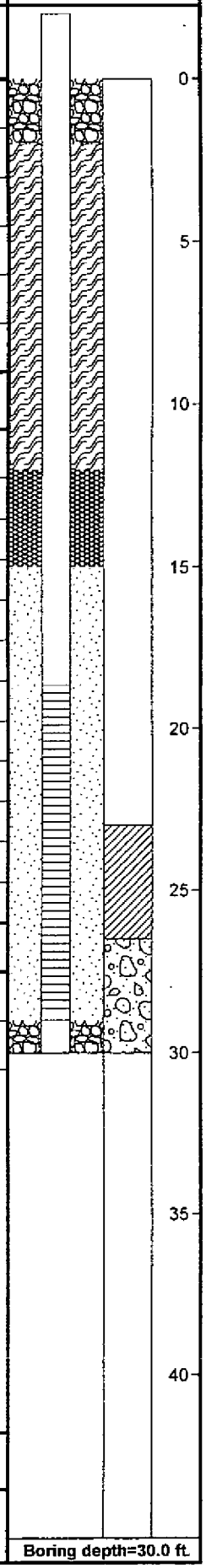
Recovery Data



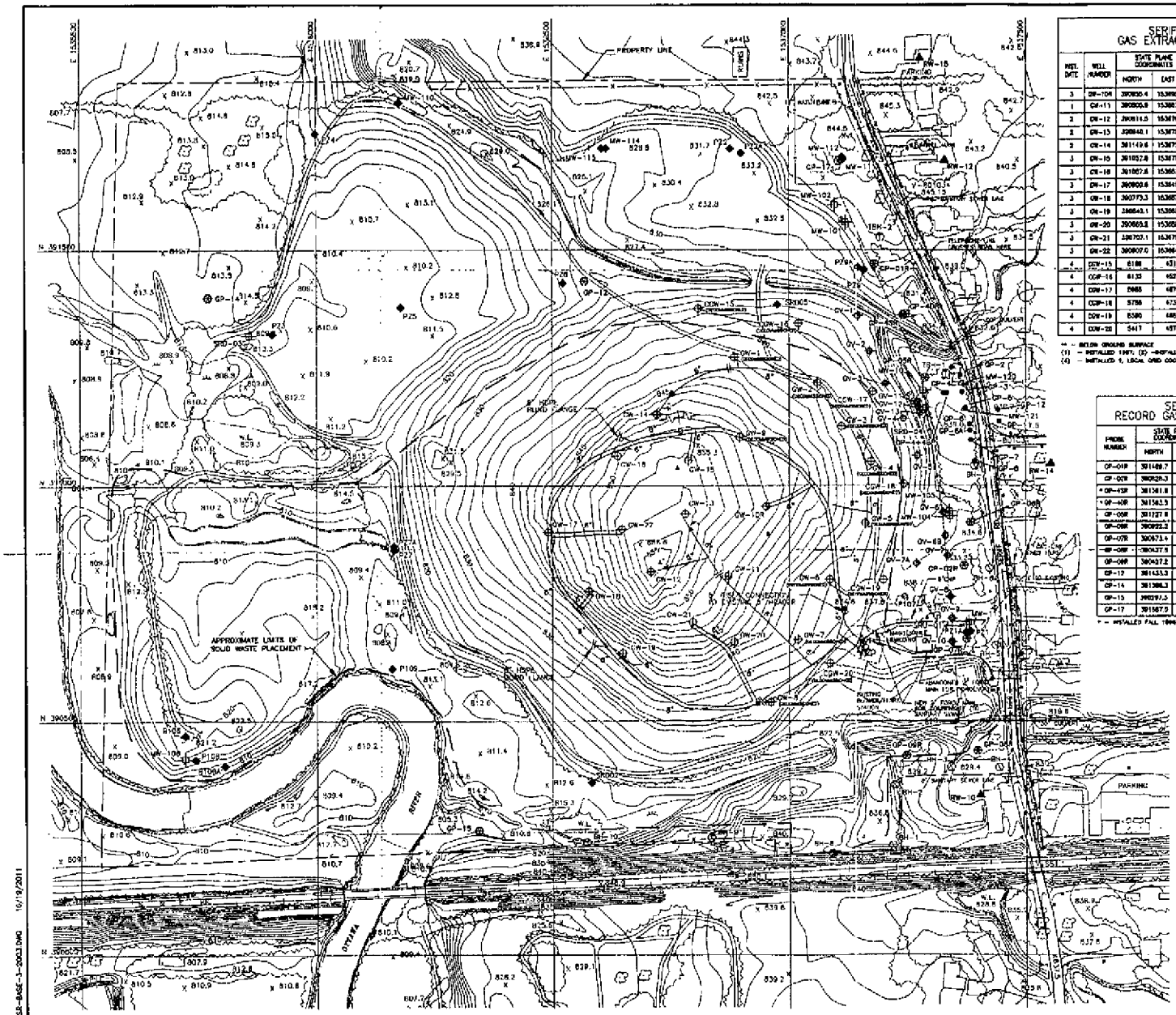
Sampling Equipment:

Comments:

Ventilator cap and gas sampling port installed by AEGL



PLATES



SERIFF ROAD RECORD GAS EXTRACTION WELL SCHEDULE

INST. DATE	WELL NUMBER	STATE PLANE COORDINATES NORTH	STATE PLANE COORDINATES EAST	SURFACE ELEVATION (FASL)	WELL DEPTH (FT)	LENGTH OF PIPE SOLID (FT)	LENGTH OF PIPE SLOTTED (FT)
3	GW-10R	390930.4	1538951.8	848.0	40	20	20
1	GW-11	390900.8	1538871.3	836.1	42	18	24
2	GW-12	390914.5	1538708.5	836.9	60	20	40
2	GW-13	390940.1	1538791.7	804.7	60	20	40
2	GW-14	391149.6	1538721.3	846.0	58	18	40
3	GW-15	391052.8	1538797.0	853.0	48	25	24
3	GW-16	391007.6	1538838.2	830.0	42	22	20
3	GW-17	390900.6	1538430.3	844.0	37	21	16
3	GW-18	390773.3	1538877.7	846.0	42	22	20
3	GW-19	390843.1	1538850.0	839.0	25	18	7
3	GW-20	390665.2	1538833.0	842.0	35	20	15
3	GW-21	390707.1	1538796.3	848.0	40	20	20
3	GW-22	390807.0	1538847.0	853.0	30	20	10
4	CGW-15	6188	4317	835.8	30	10	20
4	CGW-16	6133	4623	838.3	30	10	20
4	CGW-17	5985	4870	837.9	22	7	15
4	CGW-18	5798	4735	833.8	35	11	24
4	CGW-19	5580	4469	835.7	36	11	25
4	CGW-20	5417	4578	830.1	35	6	30

** - BELOW GROUND SURFACE
(1) - INSTALLED 1987; (2) -INSTALLED 1990; (3) -INSTALLED 1996
(4) - INSTALLED 9, LOCAL GRID COORDINATES

SERIFF ROAD RECORD GAS PROBE SCHEDULE

PROBE NUMBER	STATE PLANE COORDINATES NORTH	STATE PLANE COORDINATES EAST	TOTAL DEPTH (FT)	SCREENED INTERVAL (FT)
GP-01R	391489.7	1537180.8	19	15-18
GP-02R	390928.3	1537389.2	35	30-33
* GP-03R	391381.8	1537240.3	15	0-12
* GP-04R	391343.5	1537246.8	36	25-35
GP-05R	391127.8	1537286.7	12	8-12
GP-06R	390922.2	1537382.7	37	29-37
GP-07R	390873.4	1537374.5	35	30-35
* GP-08R	390437.8	1537387.8	30	25-30
GP-09R	390437.2	1537247.7	30	25-30
GP-12	391433.3	1538387.8	35	5-35
GP-14	391386.3	1537778.1	21	3-21
GP-15	390897.5	1538343.1	10	5-10
GP-17	391587.9	1537104.6	20	15-20

* - INSTALLED FALL 1996

SERIFF ROAD GAS VENT SCHEDULE

GAS VENT NUMBER	STATE PLANE COORDINATES NORTH	STATE PLANE COORDINATES EAST	GROUND SURFACE ELEV. (FASL)	TOTAL DEPTH (BGS) (FT)	SCREENED INTERVAL (FT,bgs)
GV-1	391384.17	1537411.87	836.07	37.8	20.0-28.7
GV-2	391308.11	1537487.49	835.18	42.0	23.0-32.5
GV-3	391238.51	1537530.29	835.89	41.3	23.0-32.7
GV-4	391165.73	1537578.43	836.94	40.3	22.3-31.1
GV-5	391095.10	1537627.89	832.14	41.4	23.0-32.5
GV-6	390987.70	1537652.46	831.88	43.1	23.0-28.3
GV-8B	390893.77	1537730.07	831.94	41.8	22.4-33.1
GV-7	390875.17	1537851.77	833.34	40.8	23.4-32.3
GV-7A	390853.83	1537968.74	833.33	40.8	23.0-32.7
GV-9	390787.87	1537957.85	834.02	44.3	27.2-36.1
GV-8	390743.73	1537875.84	837.33	44.8	28.3-36.7
GV-10	390692.00	1537879.82	835.43	43.8	23.6-34.5
GV-11	391177.60	1537278.49	829.01	29.4	21.84-31.64
GV-12	391158.74	1537272.69	829.30	30.8	21.84-31.64
GV-13	391153.46	1537278.34	828.56	31.15	21.84-31.64

LEGEND

- GW-01 — GAS EXTRACTION WELL
- MW-105 — GROUNDWATER MONITORING WELL
- GV-7 — GAS VENT
- GP-01R — GAS PROBE
- GP-8 — GEOPROBE LOCATION
- MW-121 — BARIUM INVESTIGATION WELL
- BH-6 — PERMANENT BARHOLE STATION
- TBH-2 — TEMPORARY BARHOLE STATION
- RW-12 — RESIDENTIAL WELL
- P25 — PIEZOMETER LOCATION
- SRD02 — DECOMMISSIONED BOREHOLE/WELL LOCATION
- PROPERTY LINE
- HEADER PIPE
- HEADER ABANDONMENT LOCATION
- REDUCER
- FLANGE CONNECTION
- BLIND FLANGE
- HEADER ACCESS RISER
- HIGH POINT IN HEADER
- 2" AIRLINE
- AIRLINE EXPANSION VALVE
- LIMITS OF WASTE PLACEMENT

NOTES:

1. MINIMUM ACCEPTABLE EXTRACTION HEADER INSTALLATION, DEPTHS, SLOPES AND TYPE INDICATED (THE MAIN LOCATED IN WASTE DISPOSAL AREAS AND SUB BRANCHES (1B) MUST LOCATED OUT OF WASTE DISPOSAL AREAS.
2. ALL GAS EXTRACTION WELL LATERALS ARE SIX (6) INCH DIAMETER COLLETTE WHERE INDICATED SUBJECTED. GAS EXTRACTION WELLS ARE OFFSET A MINIMUM OF TEN (10) FEET FROM THE HEADER PIPELINE.
3. THE BOTTOM OF EACH GAS EXTRACTION WELL WAS INSTALLED TO THE BASE OF REFUSE.
4. ELEVATIONS ARE U.S.G.S. MEAN SEA LEVEL DATUM.
5. GRID COORDINATES ARE STATE PLANE GRID COORDINATES (NAD 1927).
6. MATERIAL AND ASSEMBLY, BUTTER MA-BUILT INFORMATION FOR ENTIRE SYSTEM EXCEPT PROBE LOCATIONS AND VENTS WERE PROVIDED BY SHELDON ENGINEERING AND SURVEYING, INC. PREPARED OCTOBER, 1996 BY RUST ENVIRONMENT AND INFRASTRUCTURE, INC., LAGRANGE, GEORGIA.
7. SURVEY INFORMATION FOR PRIORO DOCUMENTATION OF GAS SYSTEM INSTALLED OCTOBER 1990 - DECEMBER 1996 PREPARED BY SHELDON ENGINEERING AND SURVEYING, INC.
8. ALL TEE CONNECTIONS INDICATED WITH HDPE MOLDED TEES WITH REDUCERS.

SOLID WASTE APPROVED
OHIO ENVIRONMENTAL PROTECTION AGENCY
OCT 31 2011
AS EVIDENCED BY COPY OF LETTER OF APPROVAL HEREIN ATTACHED

- N -

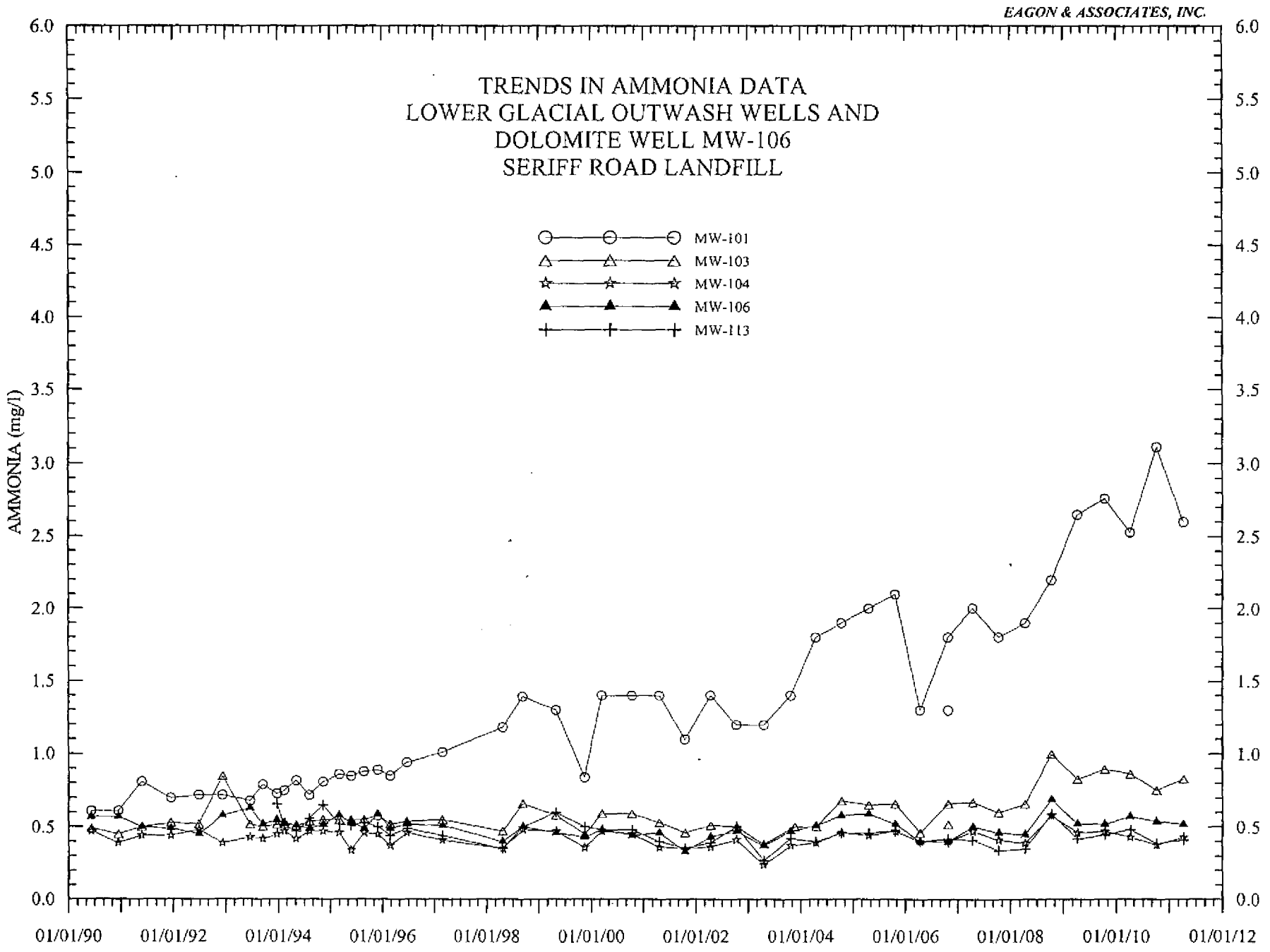
0 100 200 300 400
SCALE IN FEET

SURROUNDING TOPOGRAPHY:
DATE OF PHOTOGRAPHY : APRIL 27, 1983
DATE OF COMPILATION : JULY 1993
AERONETRIC ENGINEERING PROJECT No. 1930433

GAS SYSTEM TOPOGRAPHY:
DATE OF COMPILATION : SEPTEMBER 1996
SHELDON ENGINEERING AND SURVEYING, INC. PROJECT No. 18136

COMPILED BY: HKD	PLAN TITLE: SITE MAP
DRAFTED BY: RMH	PROJECT TITLE: SERIFF ROAD LANDFILL
CHECKED BY: SJC	PREPARED BY: EAGON & ASSOCIATES, INC. 100 OLD WILSON BRIDGE ROAD, SUITE 115 WORTHINGTON, OHIO 43085
APPROVED BY: SJC/HBE	PLAN NUMBER: 1
DATE: OCT. 19, 2011	

F:\ACADDWG\SERIFF\SR-BASE-1-20033.DWG 10/19/2011



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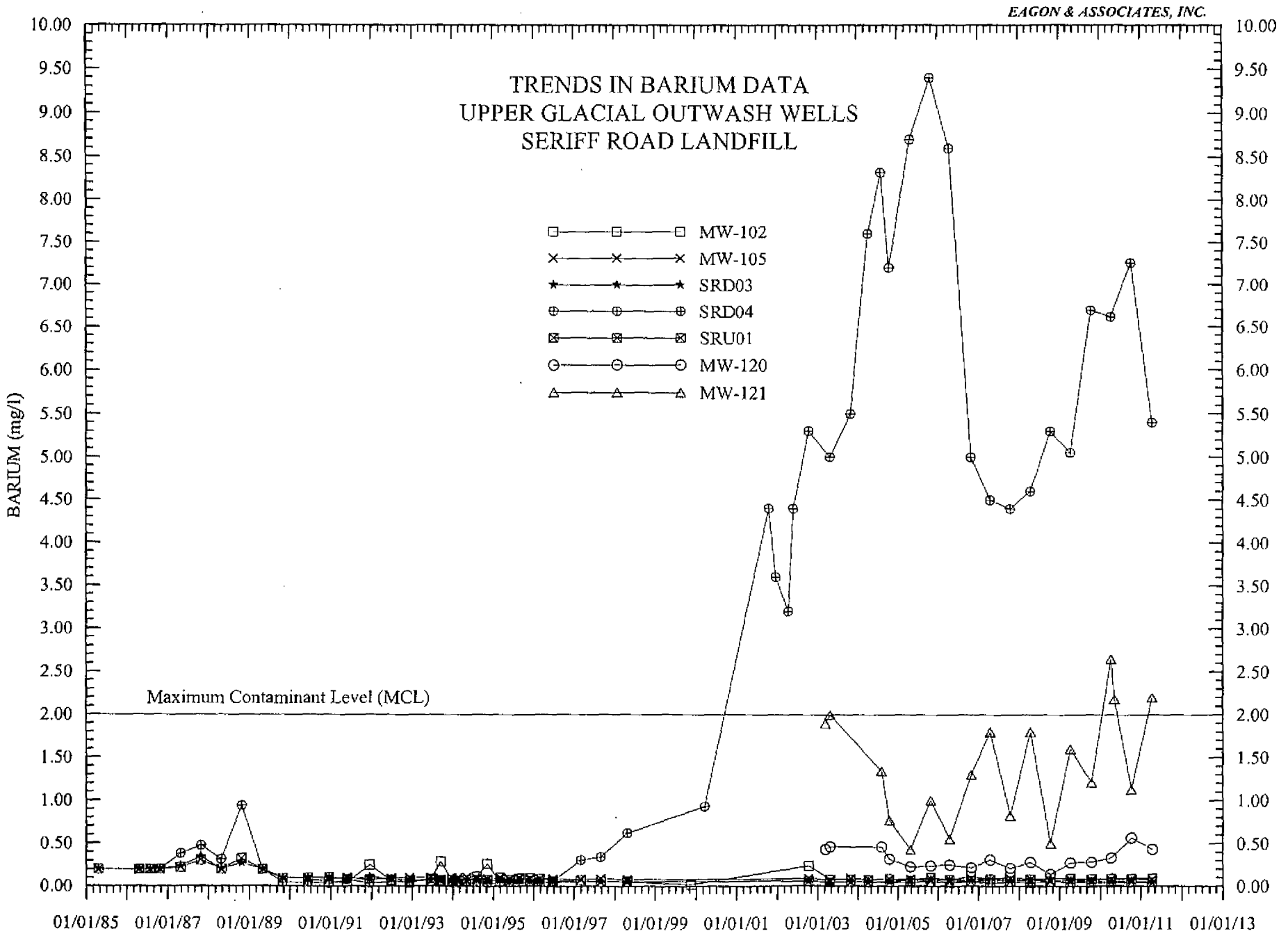

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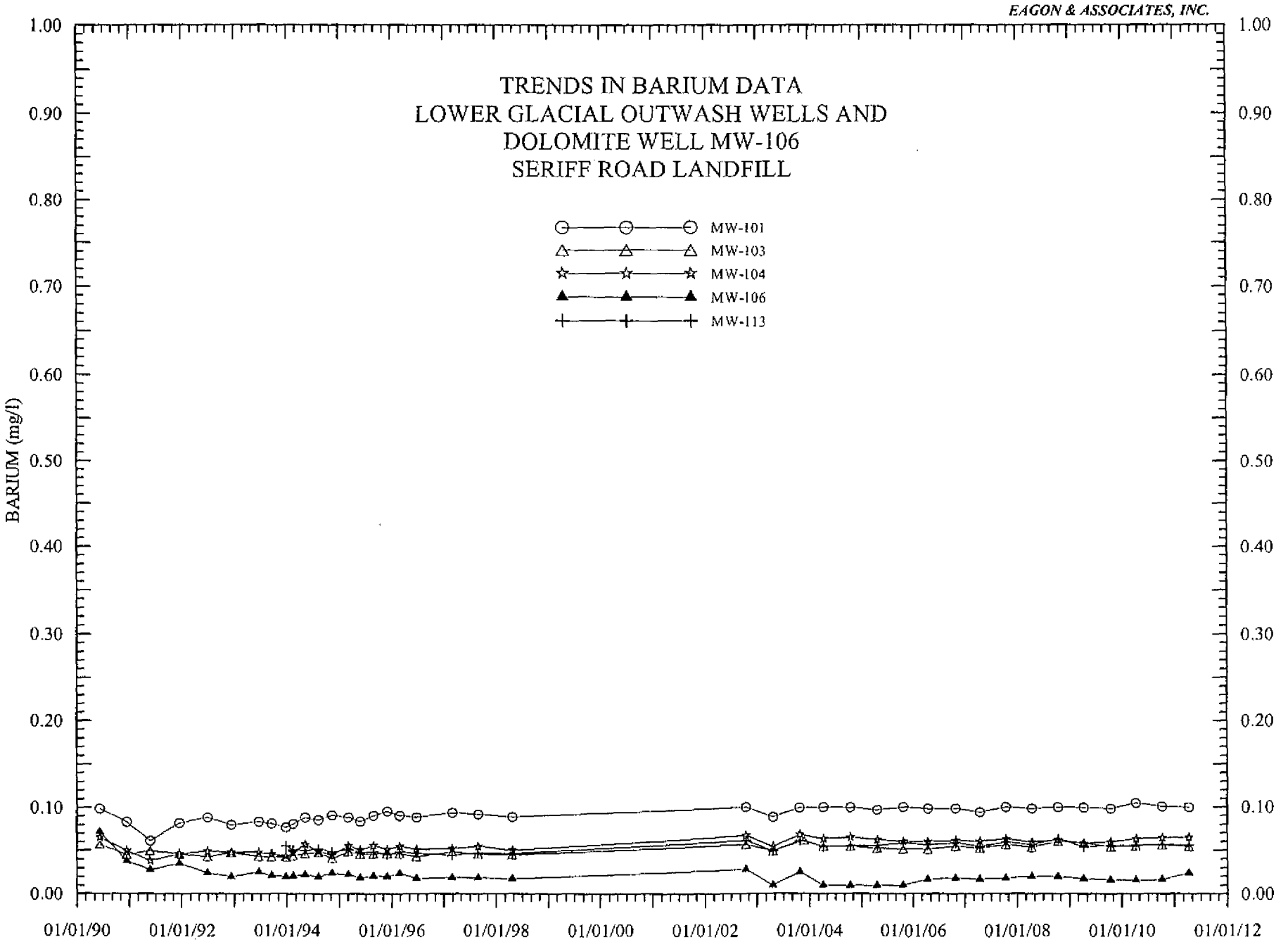

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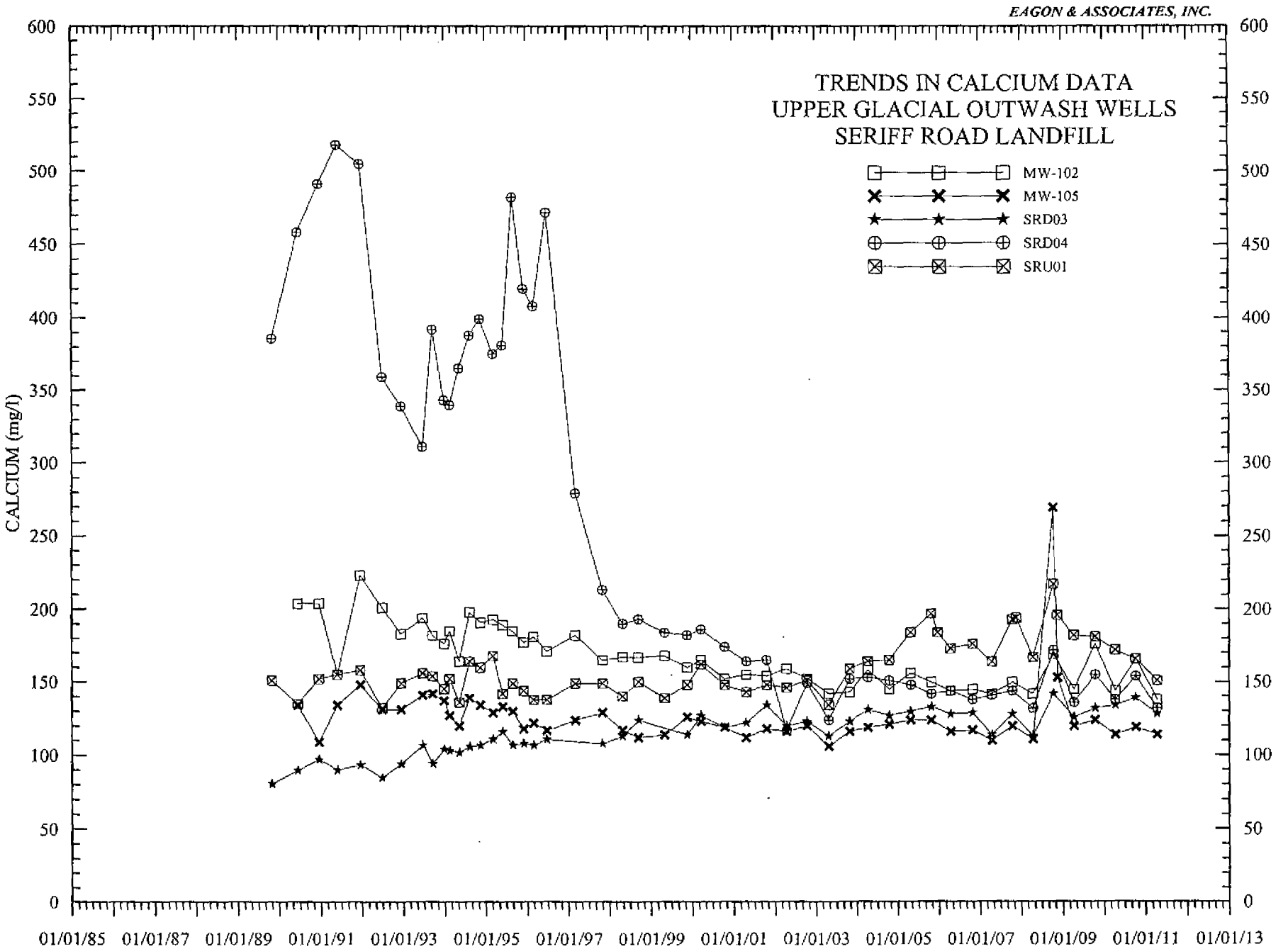

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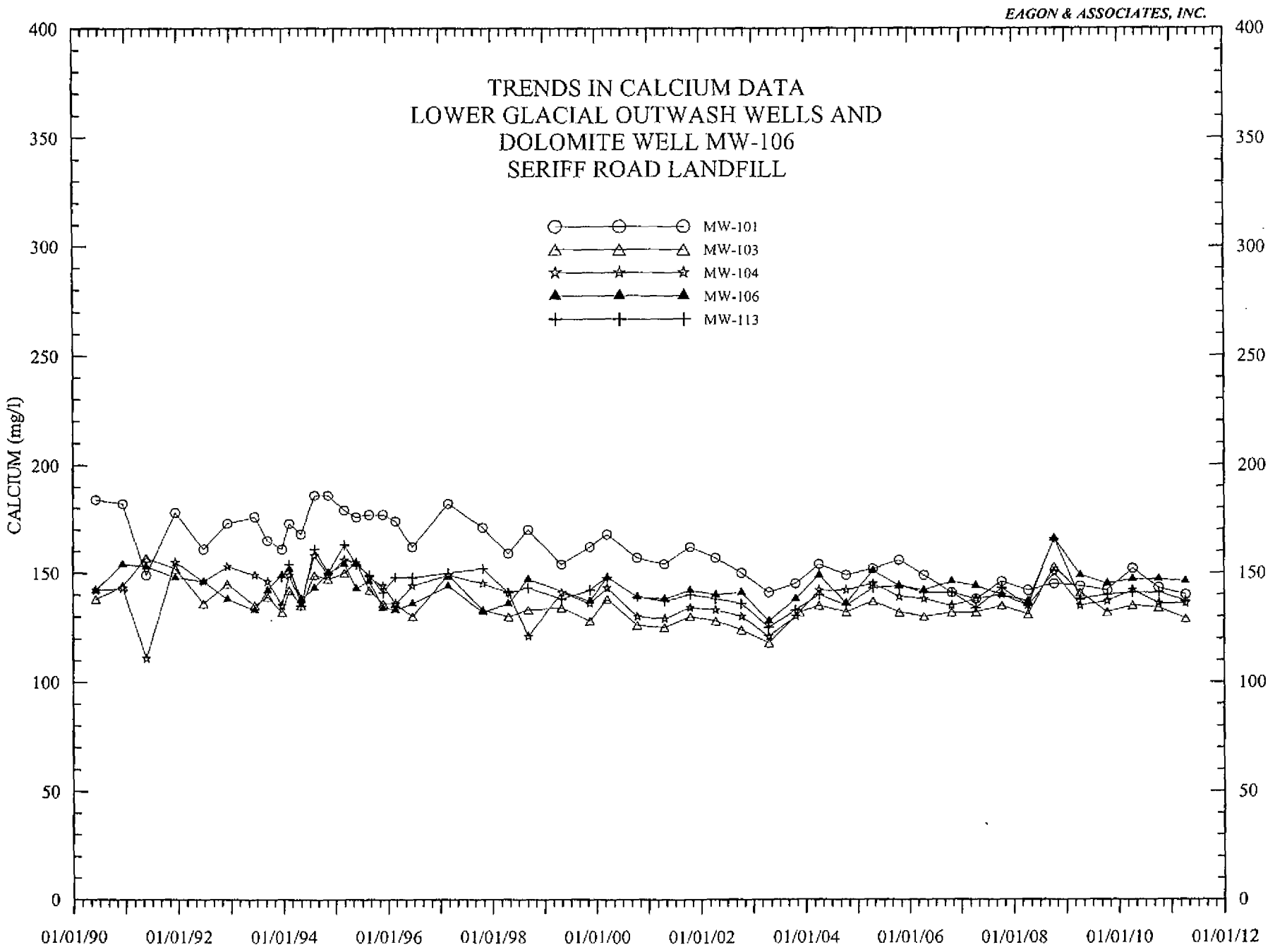

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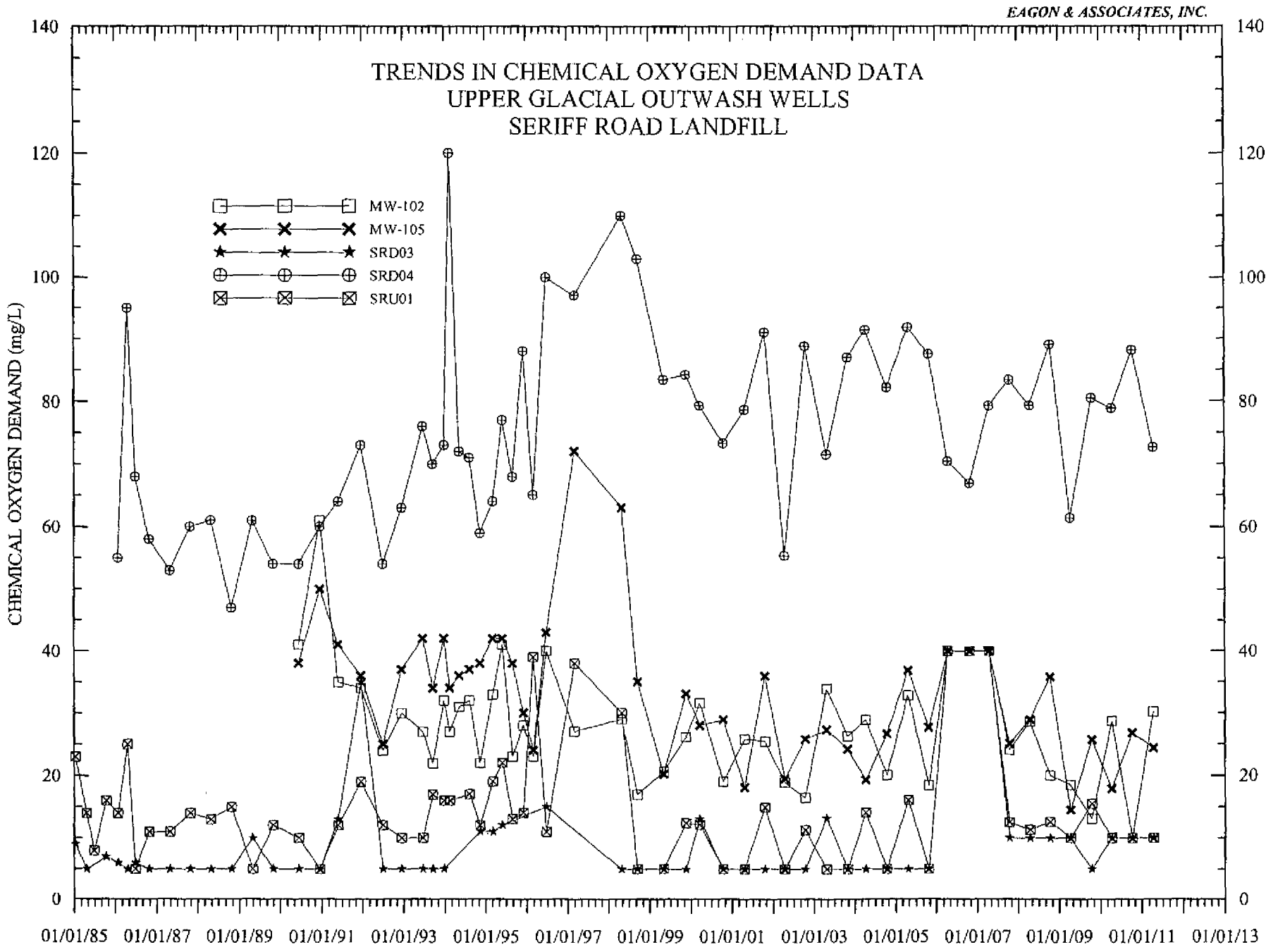

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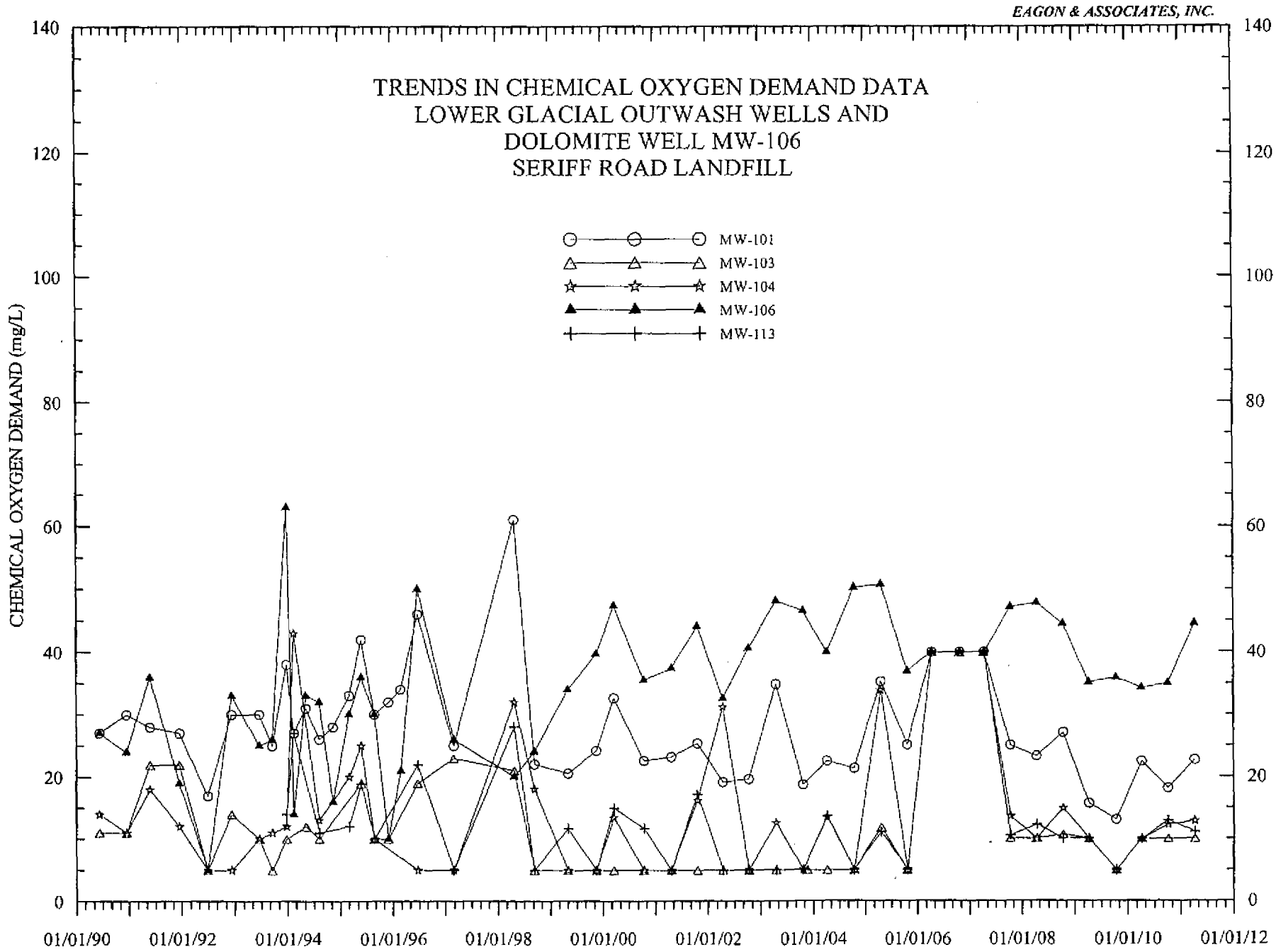

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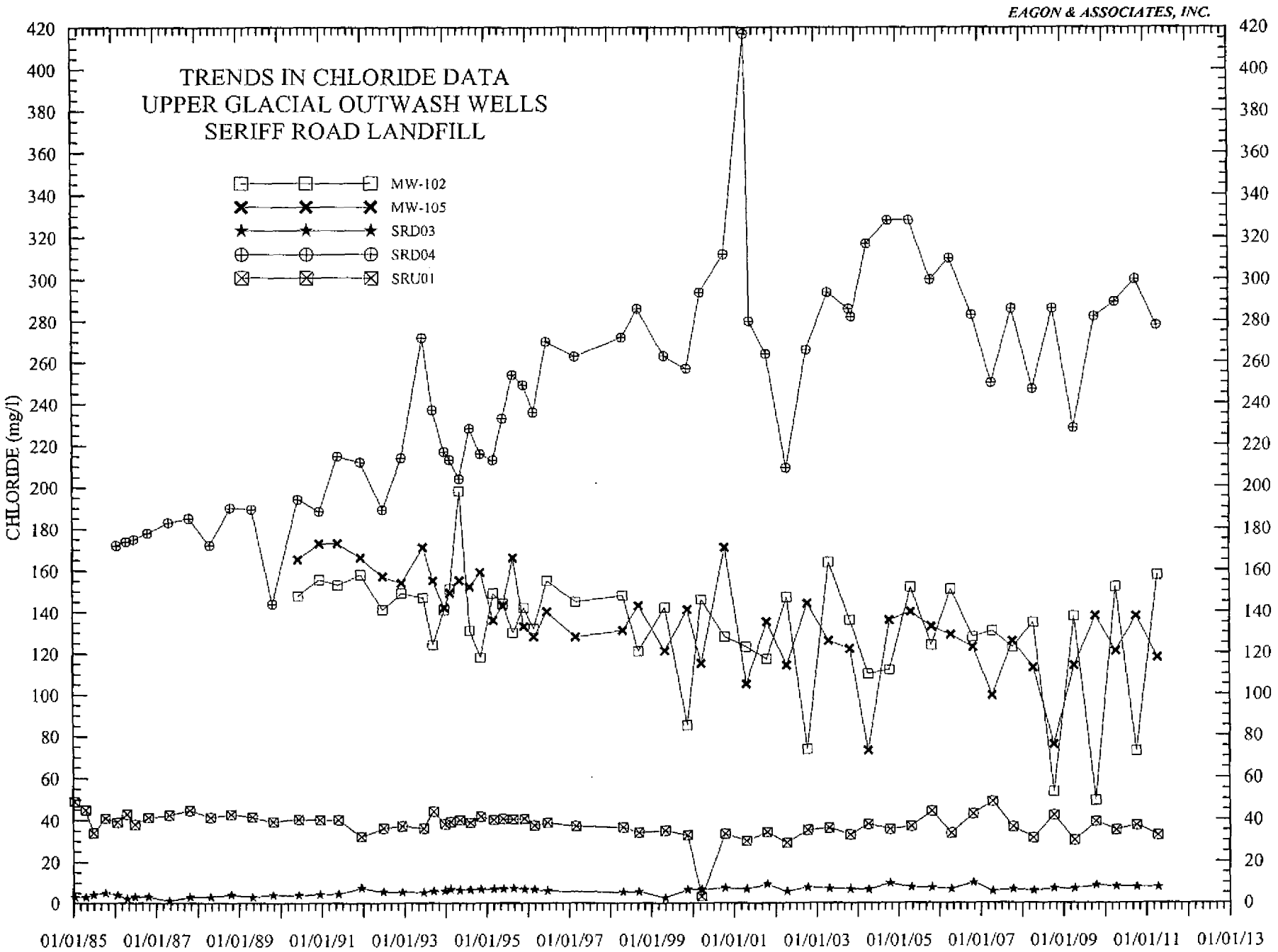

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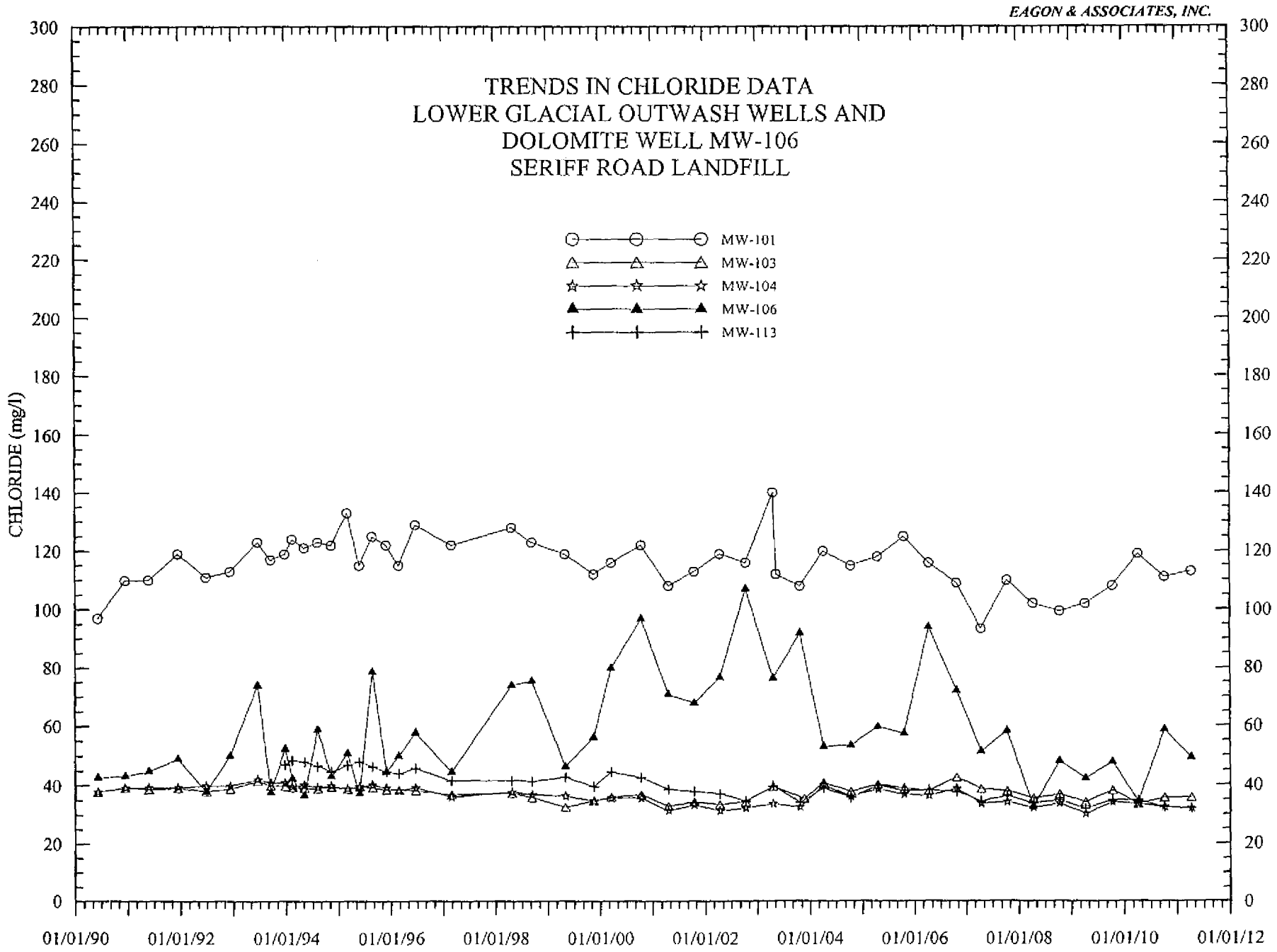

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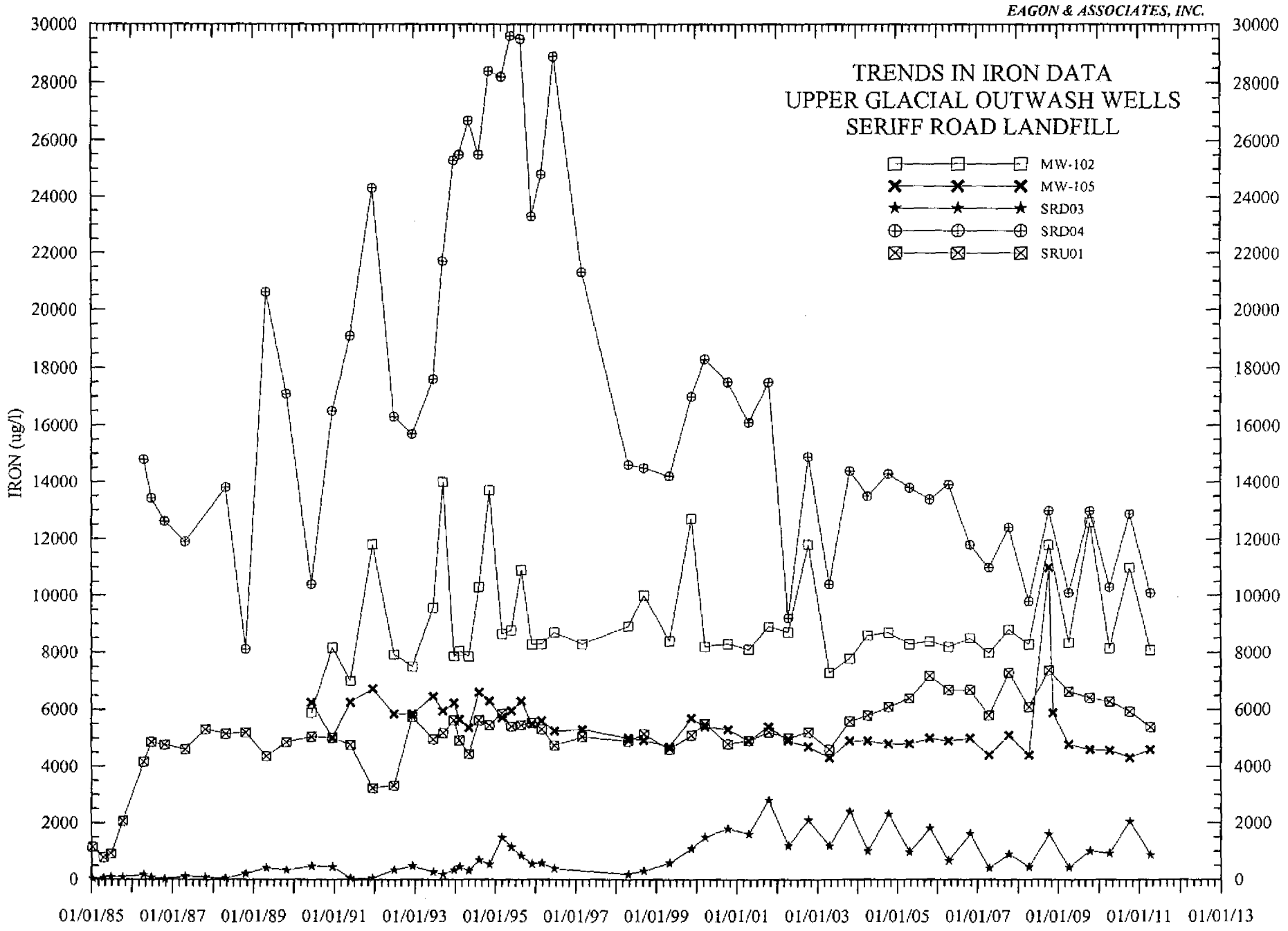

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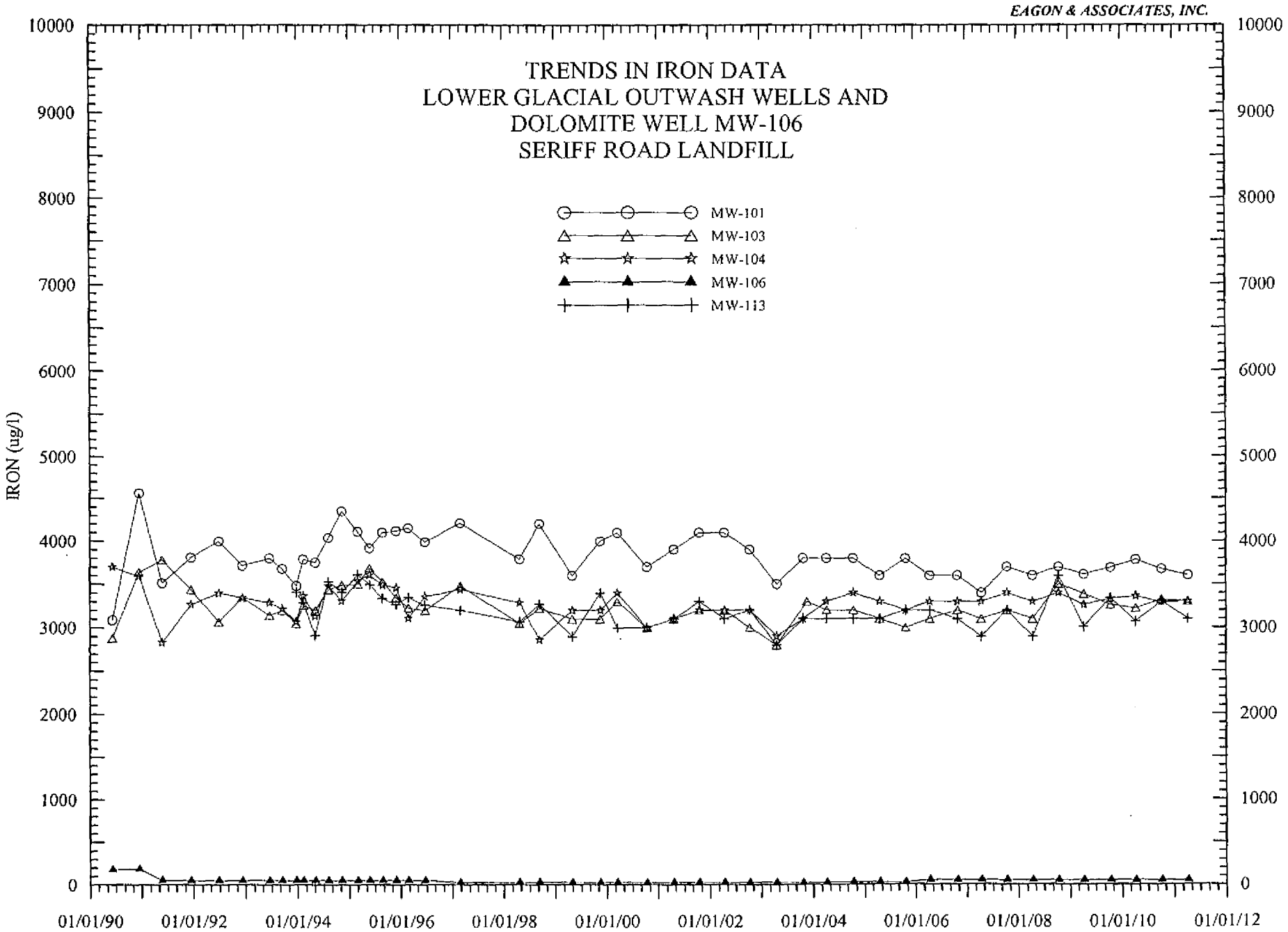

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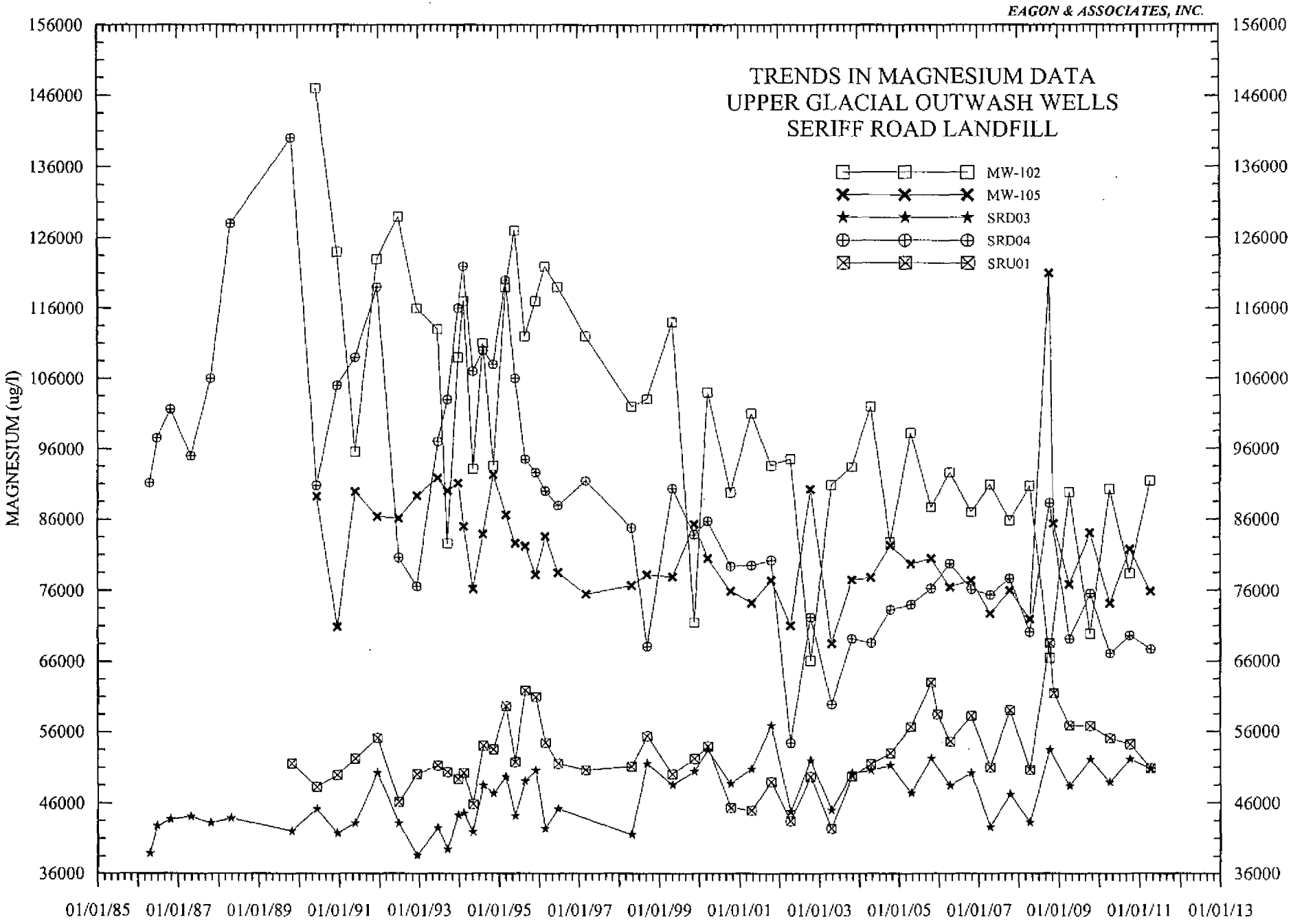

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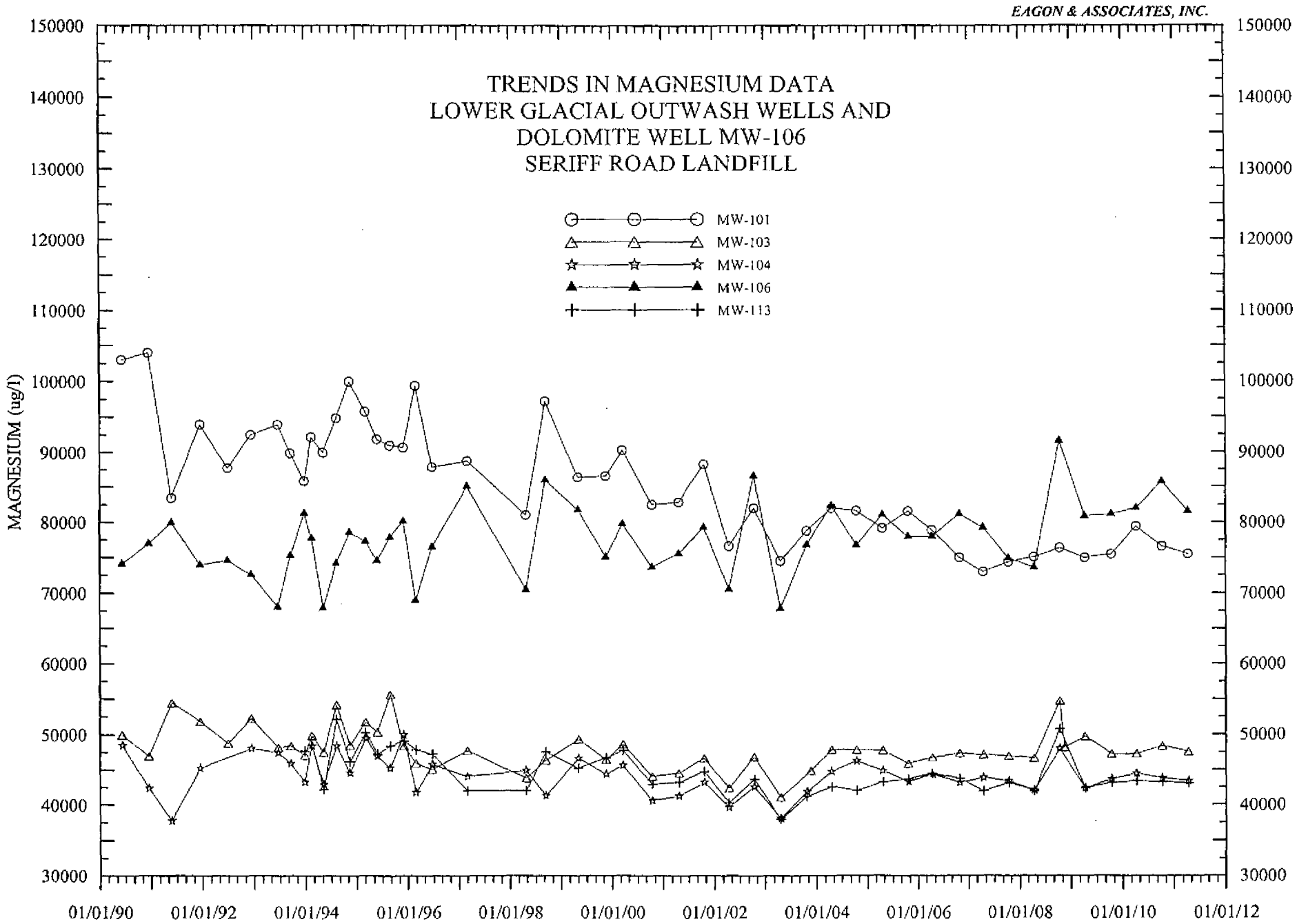

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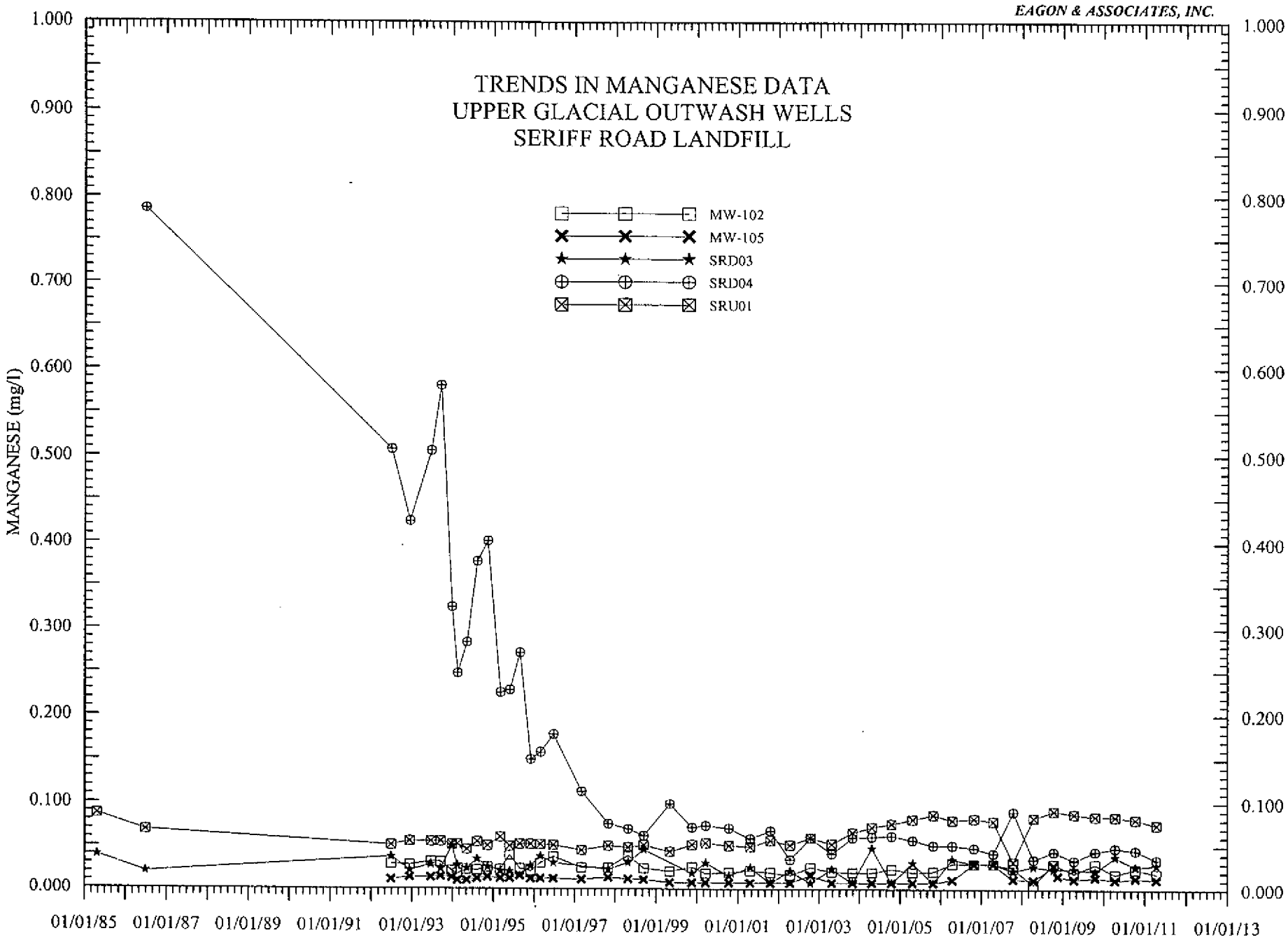

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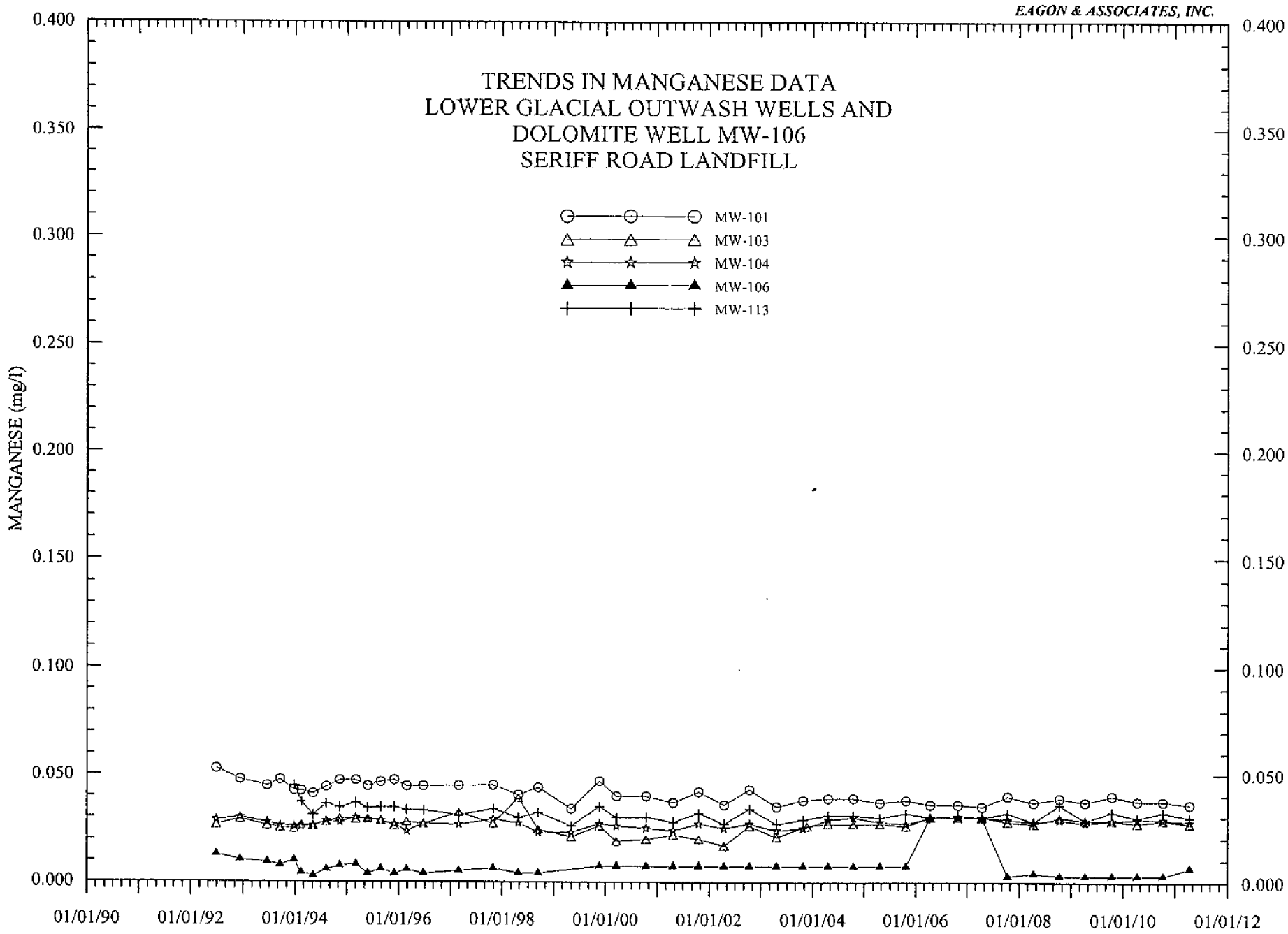

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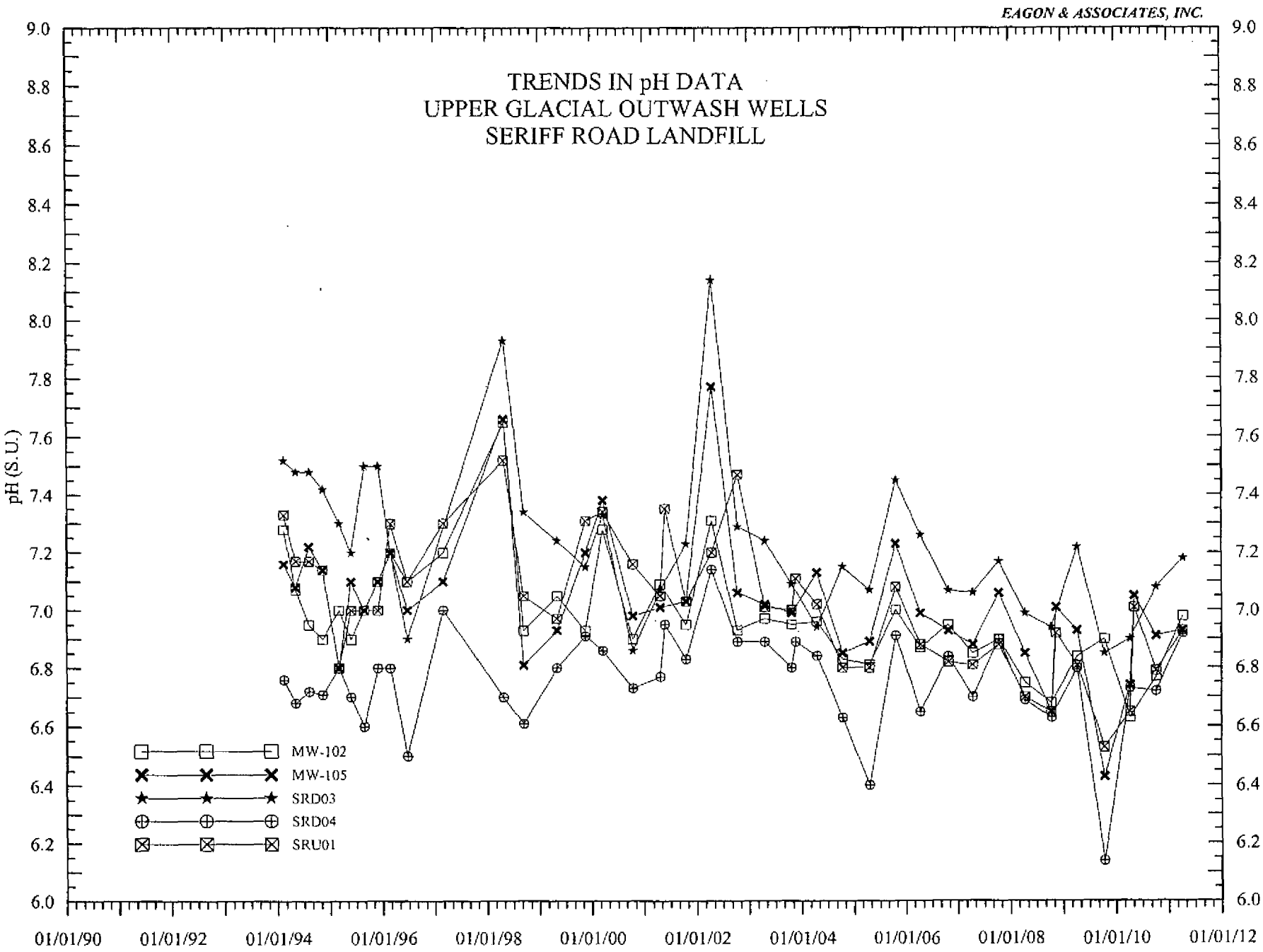

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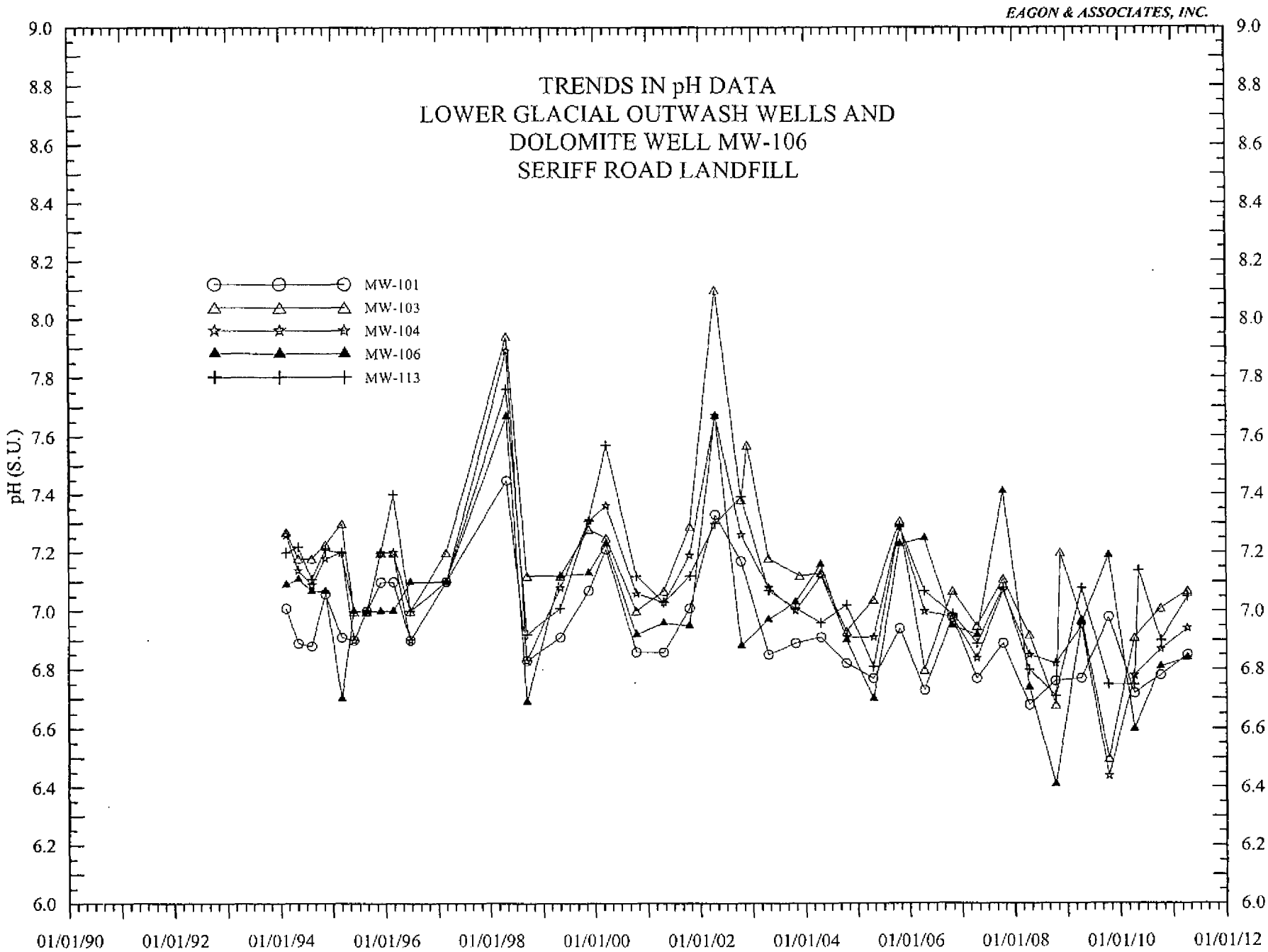

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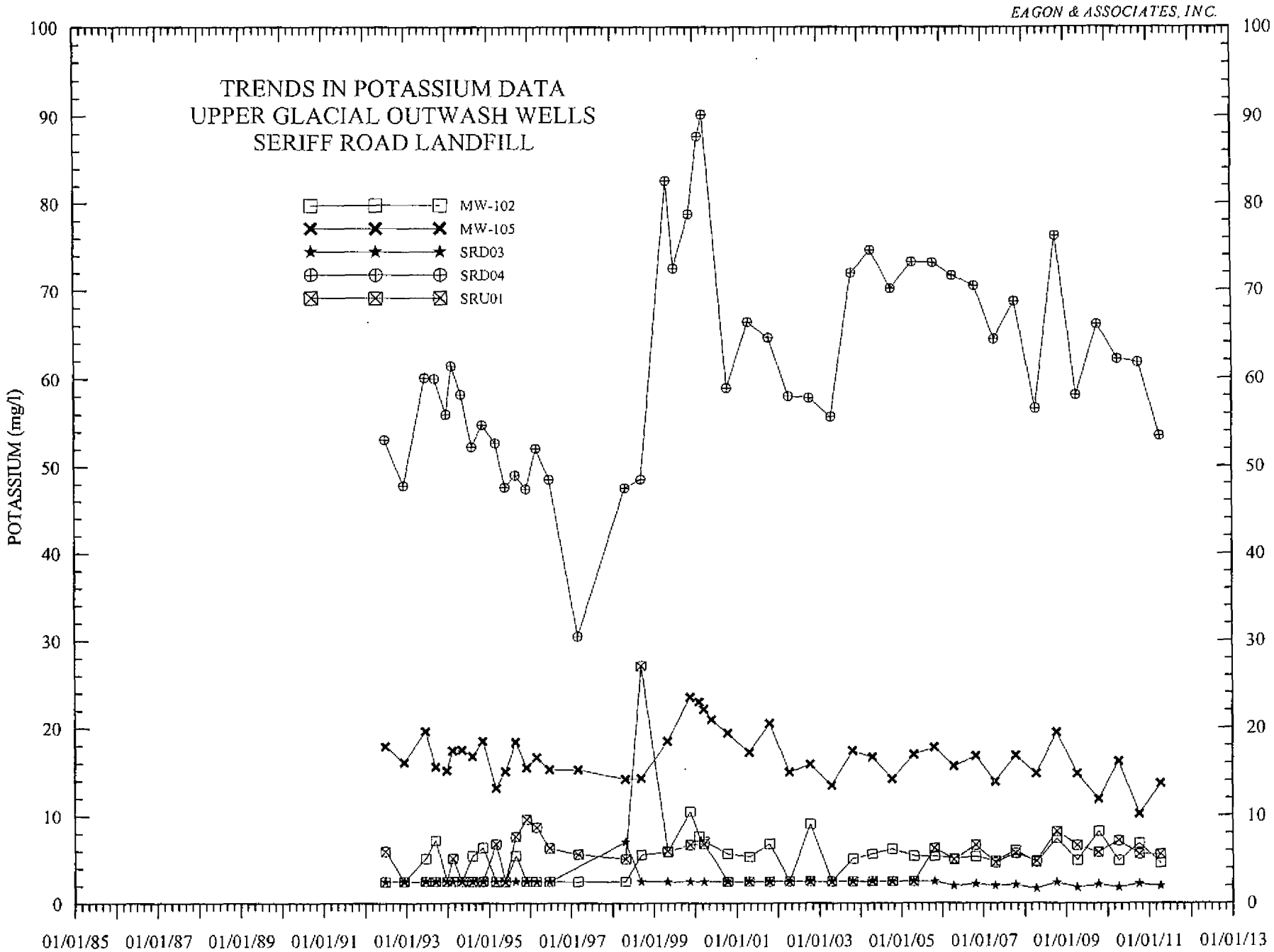

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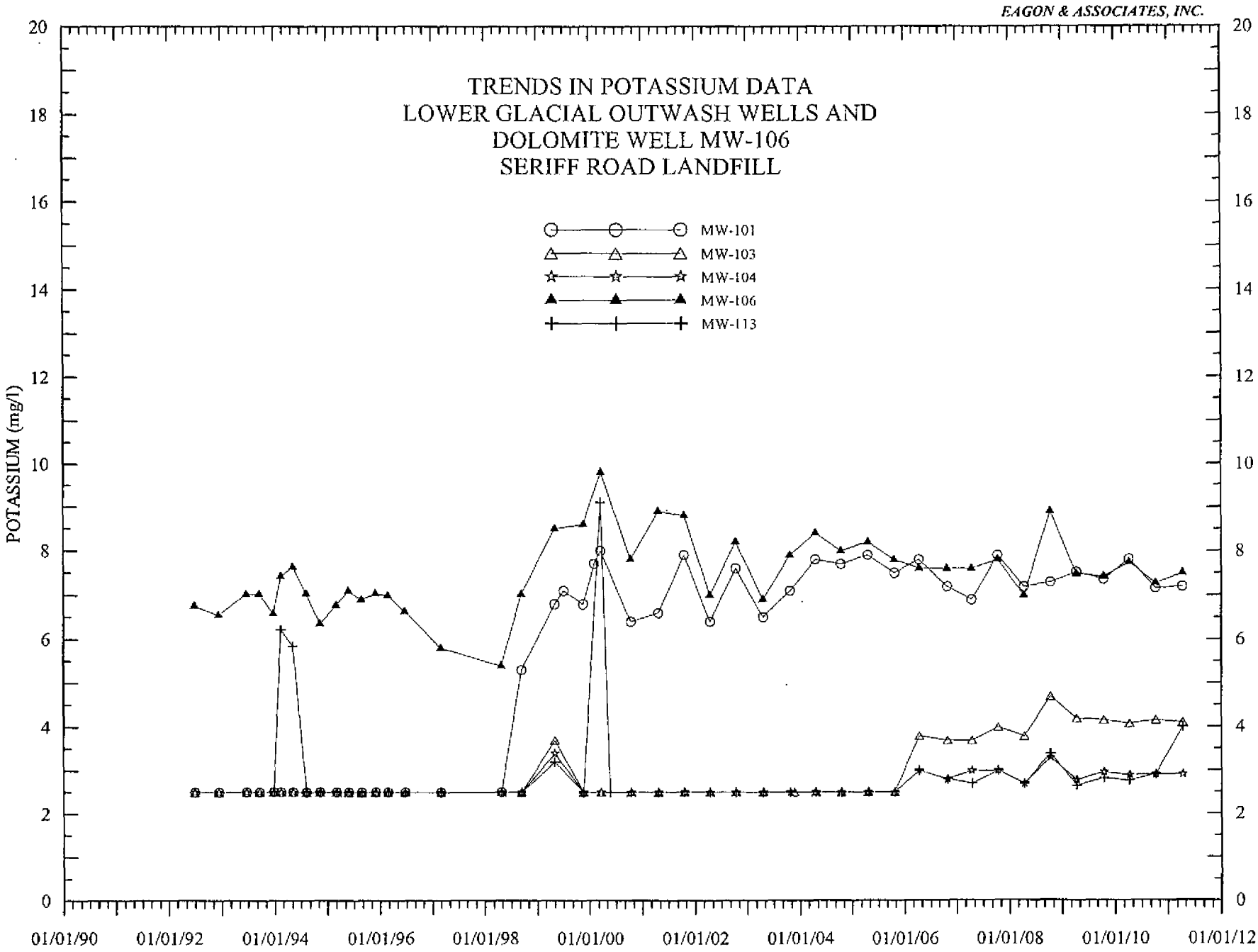

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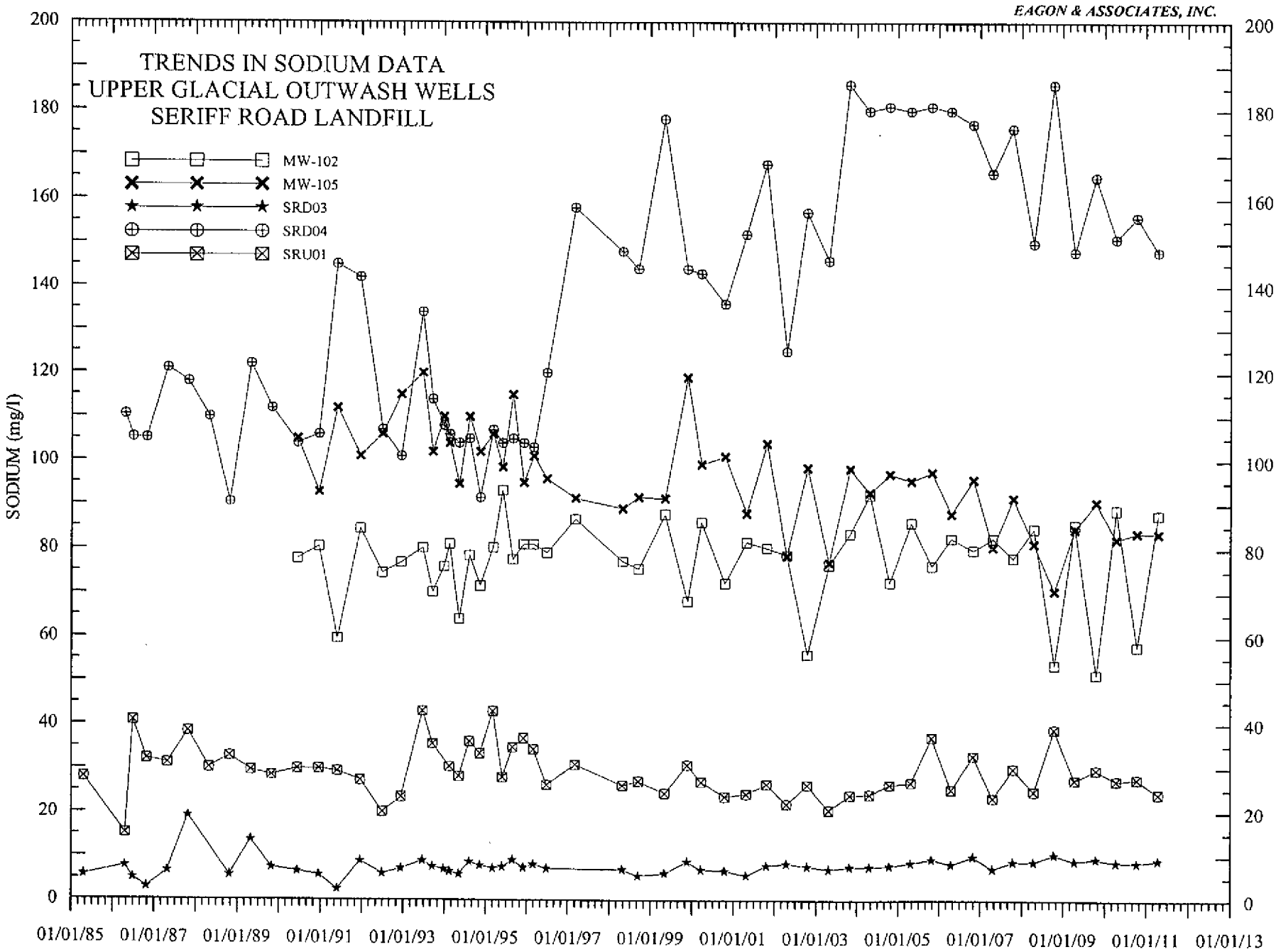

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