SW176
Division of
Solid and Hazardous Waste
MAY 20 2015
2015-005874

Permit Renewal Application For

PAYSON CITY CORPORATION MUNICIPAL SOLID WASTE LANDFILL (CLASS V) UTAH COUNTY

PAYSON
EXPERIENCE THE MANY LAYERS

Payson City Corporation
Payson City Engineering

March 5, 2015

Division of
Solid and Hazardous Waste

MAY 20 2015
2015-005874

Utah Class I and V Permit Application Checklist

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

I. Landfill Type	☐ Class I ☒ Class V	**II. Application Type**	☐ New Application ☒ Renewal Application	☐ Facility Expansion ☐ Modification	

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 9703

III. Facility Name and Location

Name of Facility
Payson City Class V Landfill

Site Address (street or directions to site)
6220 W 10400 S

County
Utah

City Payson | Zip Code 84651 | Telephone 801-465-5295

Township 9 S | Range 1 E | Section(s) 15 | Quarter/Quarter Section NE | Quarter Section

Main Gate Latitude 40 degrees 02 minutes 26.59 seconds | Longitude 111 degrees 48 Minutes 4.92 seconds

IV. Facility Owner(s) Information

Name of Facility Owner
Payson City Corporation

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5200

V. Facility Operator(s) Information

Name of Facility Operator
Kent Fowden

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5230

VI. Property Owner(s) Information

Name of Property Owner
Payson City Corporation

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5200

VII. Contact Information

Owner Contact Name David C. Tuckett | Title City Manager

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5200

Email Address davet@payson.org | Alternative Telephone (cell or other) 801-404-6481

Operator Contact Name Kent Fowden | Title Superintendent

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5230

Email Address kentf@payson.org | Alternative Telephone (cell or other) 801-404-6511

Property Owner Contact Name Travis Jockumsen | Title Public Works Director

Address (mailing)
439 W Utah Avenue

City Payson | State UT | Zip Code 84651 | Telephone 801-465-5235

Part I General Information (Continued)

VIII. Waste Types (check all that apply)

☐ All non-hazardous solid waste (see R315-315-7(3) for PCB special requirements) **OR** the following specific waste types:

Waste Type	Combined Disposal Unit	Monofill Unit
☒ Municipal Waste	☐	☐
☐ Construction & Demolition	☐	☐
☐ Industrial	☐	☐
☐ Incinerator Ash	☐	☐
☐ Animals	☐	☐
☒ Asbestos	☐	☐
☐ PCB's (R315-315-7(3) only)	☐	☐
☐ Other _____	☐	☐

IX. Facility Area

Facility Area..... _____ acres

Disposal Area..... _____ acres

Design Capacity

Years..... _____

Cubic Yards..... _____

Tons..... _____

X. Fee and Application Documents

Indicate Documents Attached To This Application ☐ Application Fee: Amount $

☐ Facility Map or Maps ☐ Facility Legal Description ☐ Plan of Operation ☐ Waste Description
☐ Ground Water Report ☐ Closure Design ☐ Cost Estimates ☐ Financial Assurance

Class V Special Requirements

☐ Documents required by UCA 19-6-108(9) and (10)

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

Signature of Authorized Owner Representative	Title	Date
Name typed or printed	Address	
Email Address	Alternative Telephone (cell or other)	
Signature of Authorized Land Owner Representative (if applicable) David C. Tuckett	Title: City Manager	Date: 3-4-2015
Name typed or printed: DAVID C. TUCKETT	Address	
Email Address	Alternative Telephone (cell or other)	
Signature of Authorized Operator Representative (if applicable) Travis Jockumsen	Title: Public Works Director	Date: 3-4-2015
Name typed or printed: Travis Jockumsen	Address: 439 West Utah Ave, Payson, UT 84651	
Email Address: travis@payson.org	Alternative Telephone (cell or other): 801-953-5284	

Utah Class I and V Permit Application Checklist

Important Note: The following checklist is for the permit application and addresses only the requirements of the Division of Solid and Hazardous Waste. Other federal, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may include obtaining a conditional use permit, a business license, or a storm water permit. The applicant is reminded that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not exempt the facility from these other requirements. Please take note of the heading of each section for the facilities that the section applies to.

An application for a permit to construct and operate a landfill is the documentation that the landfill will be located, designed, constructed, operated, and closed in compliance with the requirements of Utah Administrative Code R315-301 through 320 (*Utah Solid Waste Permitting and Management Rules*) and Utah Code Annotated 19-6-101 through 123 (*Utah Solid and Hazardous Waste Act*). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the *Solid Waste Permitting and Management Rules*, the *Utah Solid and Hazardous Waste Act*, along with many other useful guidance documents can be obtained by contacting the Division of Solid and Hazardous Waste at 801-536-0200. Most of these documents are available on the Division's web page at www.hazardouswaste.utah.gov. Guidance documents can be found at the solid waste section portion of the web page.

When the Director has determined that the application is complete, submit two paper copies of the application as determined complete by the Director, and an electronic copy of the application.

Part II **Application Checklist**

I. **Facility General Information**	
Description of Item	Location In Document
Ia. Information Required for All Class I and V Landfills	
Completed Part I General information Form (See form above)	Page 1
General description of the facility (R315-310-3(1)(b))	Page 3
Legal description of property (R315-310-3(1)(c))	App. A
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	App. A
Area served by the facility including population (R315-310-3(1)(d))	Page 3
If the permit application is for a class I landfill a demonstration that the landfill is not a commercial facility	NA
Waste type and anticipated daily volume (R315-310-3(1)(d))	Page 3
Ib. Information Required for All New Or Laterally Expanding Class I and V Landfills	
Intended schedule of construction (R315-302-2(2)(a))	NA
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(a)(i))	NA
Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))	NA
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	NA

I. **Facility General Information**	
Description of Item	Location In Document
Ic. Location Standards for All New Or Laterally Expanding Class I and V Landfills (R315-302-1)	
Documentation that the facility has met the historical survey requirement of R315-302-1(2)(f)	NA
Land use compatibility (R315-302-1(2)(a))	NA
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	NA
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	NA
List of airports within five miles of facility and distance to each	NA
Geology (R315-302-1(2)(b))	NA
Geologic maps showing significant geologic features, faults, and unstable areas	NA
Maps showing site soils	NA
Surface water (R315-302-1(2)(c))	NA
Magnitude of 24 hour 25 year and 100 year storm events	NA
Average annual rainfall	NA
Maximum elevation of flood waters proximate to the facility	NA
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	NA
Wetlands (R315-302-1(2)(d))	NA
Ground water (R315-302-1(2)(e))	NA
Id. Plan of Operations Requirements for All Class I And V Landfills (R315-310-3(1)(e) and R315-302-2(2))	
Forms and other information as required in R315-302-2(3) including a description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	Appendix C Page C-6
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	Appendix C Page C-4
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	Page 7
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	Page 6
Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))	Page 7
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	Page 4

I. **Facility General Information**	
Description of Item	Location In Document
Plan for litter control and collection (R315-302-2(2)(h))	
Description of maintenance of installed equipment (R315-302-2(2)(i))	Appendix C Page C-5
Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))	Page 9
Procedures for controlling disease vectors (R315-302-2(2)(k))	Page 9
A plan for alternative waste handling (R315-302-2(2)(l))	Page 8
A general training plan for site operations (R315-302-2(2)(o))	Page 9
Any recycling programs planned at the facility (R315-303-4(6))	NA
Closure and post-closure care Plan (R315-302-2(2)(m))	Page 9-13
Procedures for the handling of special wastes (R315-315)	Page 5
Plans and operation procedures to minimize liquids (R315-303-3(1))	Page 9
Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4	Page 9
Any other site-specific information pertaining to the plan of operation required by the Director (R315-302-2(2)(p))	NA
Ie. Special Requirements for New Or Laterally Expanding Class V Landfill (R315-310-3(3))	
Submit information required by the *Utah Solid and Hazardous Waste Act* Subsections 19-6-108(9) and 19-6-108(10) (R315-310-3(2)(a))	NA
Note the following information must be provided following issuance of the permit but prior to Director approval to take waste for a new Class V facility.	
Approval from the local government within which the solid waste facility sits	NA
Approval from the Legislature and the Governor	NA

II **Facility Technical Information**	
Description of Item	Location In Document
IIa. Maps for All Class I and V Landfills	
Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))	Appendix F
Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	Appendix E
IIb. Geohydrological Assessment for All Class I and V Landfills (R315-310-4(2)(b))	
Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))	Appendix I

II **Facility Technical Information**	
Description of Item	Location In Document
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	Appendix I
Depth to ground water (R315-310-4(2)(b)(iii))	Appendix I
Direction and estimated flow rate of ground water (R315-310-4(2)(b)(iv))	Appendix I
Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	Appendix I
Tabulation of all water rights for ground water and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	Appendix I
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	Appendix I
Background ground water and surface water quality assessment and, for an existing facility, identification of impacts upon the ground water and surface water from leachate discharges (R315-310-4(2)(b)(viii))	Appendix I
Ground Water Monitoring (R315-303-3(7)(b) and R315-308)	Appendix I
Statistical method to be used (R315-308-2(8))	Appendix I
Calculation of site water balance (R315-310-4(2)(b)(ix))	Appendix I
IIc. Engineering Report - Plans, Specifications, And Calculations for All Class I and V Landfills	
Documentation that the facility will meet all of the performance standards of R315-303-2	Pages 4-9
Engineering reports required to meet the location standards of R315-302-1 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	Appendix G
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	Appendix D
Cell design to include liner design, cover design, fill methods, elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah (R315-303-3(3), R315-303-3(6) and (7)(a), R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	Appendix G
Leachate collection system design and calculations showing system meets the requirements of R315-303-3(2)	NA
Equipment requirements and availability (R315-310-4(2)(c)(iii))	Page 8
Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))	
Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))	Appendix H
Leachate collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))	NA

II **Facility Technical Information**	
Description of Item	Location In Document
Ground water monitoring plan that meets the requirements of Rule R315-308 including well locations, design, and construction (R315-310-4(2)(b)(x) and R315-310-4(2)(c)(vi))	Appendix J
Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))	Page 6
Slope stability analysis for static and under the anticipated seismic event for the facility (R315-310-4(2)(b)(i) and R315-302-1(2)(b)(ii))	Page 17
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	Appendix H
IId. Closure Plan for All Class I and V Landfills (R315-310-3(1)(h))	
Closure Plan (R315-302-3(2) and (3))	Page 10
Closure schedule (R315-310-4(2)(d)(i))	Page 11
Design of final cover (R315-303-3(4) and R315-310-4(2)(c)(iii))	Page 10
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	Page 11
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	Page 13
IIe. Post-Closure Care Plan for All Class I and V Landfills (R315-310-3(1)(h))	
Post-Closure Plan (R315-302-3(5) and (6))	Page 13
Site monitoring of landfill gases, ground water, and surface water, if required (R315-310-4(2)(e)(i))	Page 13
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(v))	Page 14
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	Page 7
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	Page 1
IIf. Financial Assurance for All Class I and V Landfills (R315-310-3(1)(j))	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv)) and (R315-302-2(2)(n))	Page 9
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	Page 14
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1))	Page 10

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TABLE OF CONTENTS

1. PART I - GENERAL REPORT 1

1.1. GENERAL DESCRIPTION - 1
1.2. RELATIONSHIP TO COUNTY SOLID WASTE MANAGEMENT PLAN 1
1.3. LEGAL DESCRIPTION - 1
1.4. PLAN OF OPERATION - 2
1.4.1. Schedule of Construction 2
1.4.2. Solid Waste Handling Procedures 2
1.4.3. Inspection Schedule 3
1.4.4. Operating Records 4
1.4.5. Ground Water Response Plan 4
1.4.6. Contingency Plans 4
1.4.7. Alternative waste handling 6
1.4.8. Equipment Maintenance 6
1.4.9. Vector Control 7
1.4.10. Exclusion of Hazardous Wastes 7
1.4.11. General Training Plan 7
1.4.12. Recycling Programs 7
1.5. FINANCIAL ASSURANCE PLAN 7
1.5.1. Cost Estimates for Closure and Post-closure Care 7
1.6. FINANCIAL ASSURANCE MECHANISM 8
1.7. CLOSURE PLAN 8
1.7.1. Final Cover 8
1.7.2. Capacity of Site in Volume and Tonnage 9
1.7.3. Projection of Time Intervals when Closure Will Occur 9
1.7.4. Closure Cost Estimates 10
1.8. POST CLOSURE PLAN 11
1.8.1. Groundwater Monitoring 11
1.8.2. Gas Monitoring 11
1.8.3. Maintenance 11
1.8.4. Final Cover 11
1.8.5. Time Intervals For Post Closure Activities 11
1.8.6. Changes to Title 12
1.8.7. Post closure care cost estimates 12
1.9. CLASS V LANDFILL MARKET INFORMATION 12
1.9.1. Proven Market 12
1.9.2. Public Benefits 12
1.9.3. State Compliance 13

2. PART II - TECHNICAL DATA 13

2.1. MAPS 13
2.2. TOPOGRAPHIC MAPS 13
2.3. ..... PLANS
DRAWINGS & SPECIFICATIONS 13
2.4. GEOHYDROLOGICAL ASSESSMENT 13
2.5. SLOPE STABILITY OF FINAL COVER 13
2.6. ENGINEERING REPORT 14
2.6.1. Location Standards 14
2.6.2. Unit Cell Design and Operation 16

2.6.3. Leachate Collection System *16*
2.6.4. Run-On And Run-Off Systems *16*
2.6.5. Closure And Post Closure *16*
2.6.6. Maintenance and Land Use *16*

LANDFILL LEGAL DESCRIPTION ..... APPENDIX A
FINANCIAL ASSURANCE MECHANISM FOR CLOSURE AND POST CLOSURE ..... APPENDIX B
LANDFILL OPERATING RECORDS ..... APPENDIX C
PROJECTED LIFETIME OF THE LANDFILL ..... APPENDIX D
U.S. GEOLOGICAL SURVEY TOPOGRAPHIC MAP ..... APPENDIX E
DETAILED TOPOGRAPHIC MAP ..... APPENDIX F
PLANS & SPECIFICATIONS ..... APPENDIX G
STORM WATER DRAINAGE PLANS/SLOPE STABILITY ..... APPENDIX H
GEOHYDROLOGICAL ASSESSMENT REPORT ..... APPENDIX I

1. PART II - GENERAL REPORT

1.1. General Description -

This renewal application is for a Class V landfill facility used for the disposal of municipal wastes. The landfill is owned and operated by Payson City Corporation, Payson Utah. The landfill is currently in use by Payson City and has been since the purchase of 120 acres at the current landfill site in 1951. The landfill is located in the foothills on the west side of the valley, approximately 2.5 miles west of Payson City.

The landfill occupies approximately 30 acres on a 170-acre site that is owned by Payson City. The landfill property is bounded on the east by the Strawberry Highline Canal and on the west by Bureau of Land Management property and on the north and south by private landholders.

The landfill accepts wastes that are generated from Payson City residences and are collected by the City. Wastes generated from Commercial and Industrial accounts within the city are deposited at the landfill as well. Residential wastes from some other south Utah County cities are deposited at the landfill. The landfill is also used by citizens in the unincorporated areas of the southern portion of Utah County. With data derived from the 2010 census, it is estimated that a population of 32,000 people utilize the Payson City Class V landfill. Daily volume of waste deposited at the landfill varies by the season of the year. Summer time waste deposited averages 54 tons per day, while winter time waste averages 40 tons per day.

Non-residents of Payson City are charged by the ton for wastes deposited at the landfill. Payson City residents can obtain a dump card that allows them to deliver three loads of waste to the landfill and dump free-of-charge.

During May of 1995, construction was completed on the class IV landfill located to the south of the municipal landfill on Payson City property. Since that time, construction and demolition waste has been diverted from the Class V landfill and into the class IV landfill. Annual report data has shown that utilization of the class IV landfill has reduced the waste stream quantities delivered to the class V landfill by 65 percent.

1.2. Relationship To County Solid Waste Management Plan

The Payson City landfill complies with the *Utah County Solid Waste Management Plan*. The County's plan dated May 17, 1993, page 105 states, "The Payson City landfill will continue to operate for 50 years". It is the intent of the City to manage and operate the landfill in accordance with current regulations. This will provide an convenient location for the South Utah County Cities to deposit solid waste as long as conditions allow.

1.3. Legal Description -

The landfill is located on property owned by Payson City Corporation. The property is located in the north 1/2 of the north east 1/4 section of section 15, township 9 South, Range 1 East, Salt Lake Base and Meridian. The landfill is also located on a portion of the northwest 1/4 section of section 14. Please refer to the drawing in Appendix A for a detailed

description of the property. Deeds obtained from the County Recorder's office at Utah County indicated ownership of the property is with Payson City. (Copies of those deeds are also included in appendix A.)

1.4. Plan of Operation -

1.4.1. Schedule of Construction

The Payson City Class V landfill is an existing landfill. As discussed in paragraph 1, Payson City has owned the landfill property since 1951. The current regulations allow for filling the existing footprint only. Any lateral expansion is not allowed without application and approval of the Division of Solid and Hazardous Waste.

Method

The landfill utilizes a "canyon fill" method with waste being deposited at the base of the lift and then pushed and compacted up the face of the lift by the bulldozer. The deposited waste is then covered with at least six inches of soil taken from the area on the up-hill side of the working face. This procedure is repeated until the level of the lift reaches 10 to 12 feet. A new lift is then started and the procedure repeated until the lift is full. Further discussion and drawings on the landfill plan is included in the technical data section of this application.

1.4.2. Solid Waste Handling Procedures

Hours of Operation

Summer: 1 April through 31 October
Monday through Saturday, 8:00 am to 7:00 p.m.

Winter: 1 November through 31 March
Monday through Saturday, 8:00 am to 5:00 p.m.

The landfill is closed on holidays.

Staff

Four Payson City full-time employees; two scale house operators and two bulldozer operators operate the landfill. One additional part-time employee is hired to help during the summer. The scale building operator is responsible for weighing the loads of waste received and logging it into the register. The bulldozer operator manages the waste area using the bulldozer to compact and cover the waste.

Daily Mode of Operation

Daily mode of operation is as follows: Operators arrive at the landfill site by 7:50 am and unlock the entrance gate. The scale building operator will unlock the

scale house and ensure that the scales are operating correctly. He will then log each load into the register and weigh it. After the trucks have been weighed and all information logged in the register, the operator directs the truck driver to the location of the working face where the waste is dumped.

Pre-operation Maintenance Check

The bulldozer operator performs a pre-operation maintenance check on the bulldozer before starting it. (See checklist in appendix C page C-1.) Once the checklist is completed, the bulldozer is started and taken to the waste dump area of the current cell. Waste will be dumped at the working face of the cell area by each truck entering the landfill. The bulldozer operator will work from the base of the deposited waste and spread and compact the waste up the working face as much as possible. This process will continue throughout the day until the gate is closed at night. After the last load of the day has been received, the operator will finish compacting and then cover the deposited waste with a minimum of 6 inches of soil. Soil will be taken from the area on the uphill side of the working face and spread over the deposited waste.

Asbestos Disposal

The landfill has a permitted disposal area for asbestos waste that is generated by an automobile brake manufacturer located in Payson. These wastes are disposed of when scheduled by the manufacturer. When needed, the manufacturer will notify and arrange a delivery time that the wastes will arrive at the landfill. After the notification, the bulldozer operator will prepare the disposal area for deposit of the wastes, ensuring that adequate cover materials are available. The asbestos waste is shipped in sealed 55-gallon drums to the landfill. Upon arrival at the landfill, the load is weighed and the barrels are counted. The weight and barrel count information is written on the waste shipment record (WSR), and the landfill operator and the truck driver sign the record. The barrels are then placed in the designated cell and immediately covered with 6 inches of soil. The waste shipment records are filed for future reference.

1.4.3. Inspection Schedule

Groundwater Monitoring

A total of six (6) groundwater monitoring wells have been installed at landfill. Water levels in the wells indicate that the underground water gradient is very flat. Ground water elevation data have been interpreted to indicate a condition of radial flow beneath the landfill. Sampling is performed in accordance with the *Payson City Landfill Ground Water Monitoring Plan* (URS, 2003) and the Utah Solid and Hazardous Waste Permitting and Management Rule under Utah Administrative Code (UAC) R315-308. (See Appendix J for a copy of Ground Water Monitoring Plan).

Ground water samples are taken quarterly as described in the above mentioned plan and analyzed for constituents specified in UAC aR315-308-4 amd 40 CFR Part 258 Appendix II as required by UAC R315-308-2(12)(d)

Methane Monitoring

Samples will be taken using a hand held gas monitor on a quarterly basis, with the sampling schedule being the first business day nearest 1 January, 1 April, 1 July, and 1 October of each year. (See appendix C, page C-3, for methane sampling log sheet.) Measurements of methane levels are taken in the field with a portable methane meter. If monitoring results indicate that more frequent monitoring is needed, the frequency of sampling will be increased.

Inspections

Periodic self-inspection of the landfill will be conducted at least once a month. These inspections will be used to determine if operations at the landfill are conducted as planned and also to determine the condition of the various areas of the landfill to see if any maintenance is required. A sample inspection log sheet is located in appendix C, page C-4.

1.4.4. Operating Records

Accurate records are kept and used to document all transactions and activities at the landfill. These records are kept at the landfill site in the scale house, with a duplicate copy made and kept at the City offices.

Forms

A set of the forms used to compile the records of the landfill is contained in Appendix C. The following forms are used for record keeping purposes:

Form	Page
Pre-operation checklist for Bulldozer	C-1
Methane Sampling Log	C-3
Landfill Inspections	C-4
Landfill Maintenance	C-5
Operating Logbook	C-6
Asbestos Waste WSR	C-8
Waste Inspection	C-9

1.4.5. Ground Water Response Plan

Specific response to groundwater contamination will be determined if contamination is found. The plan will be developed working with a consultant who has expertise in addressing and correcting the specified contamination.

Fire

Comprehensive measures are taken at the landfill to prevent fires from starting. Firebreaks are constructed and maintained around the perimeter of the landfill to prevent an outside fire from spreading into the landfill. The working face of the landfill is kept small to prohibit a large amount of combustible materials being available to burn.

Fires that have occurred in the past have been a result of hot ashes placed in the waste and combustion has occurred. These fires will be extinguished by the bulldozer operator by separating the burning waste from the working face and then spreading it out and/or covering it with soil.

In the event that a fire should occur at the landfill that cannot be extinguished by the bulldozer operator, the Payson City fire department would be notified by the use of the telephone that is located in the scale house or one of the operator's cell phones. Once the fire department has been notified, the operators will assess the extent of the fire. If the fire endangers those who are present in the landfill depositing waste, they will be directed to cease any operation and exit the landfill in an orderly manner. If the fire is small and doesn't present a risk to those in the landfill, they will be allowed to finish unloading the waste and then leave the landfill. If the operators feel that it is safe to continue operations at the landfill during the fire, incoming loads will be directed to another cell away from the fire to deposit the waste.

The fire department will respond and assess the fire and extinguish it with proper methods. Depending on the assessment of the trained fire officials, proper protective clothing, including respiratory protection will be used. Due to landfilling procedures used, it is felt that all fires that would occur at the landfill can be extinguished by the Payson City fire department.

Explosions

The methane gas monitoring system will be used to analyze the amount of methane concentrations to help prevent explosions from methane gas. In the unlikely event of an explosion from unknown wastes, response will be handled similarly to the fires listed above.

Release of Explosive Gases

It is unlikely that explosive gases would be encountered at the landfill. In the event that they did occur, contingency procedures similar to those used for a fire would be followed.

Failure of a Run-off Containment System

Work has been completed to ensure that adequate run-off collection and storage systems have been installed at the landfill. The collection ditches and storage basin were oversized and constructed so that they are basically fail-proof. The run-off system is inspected after each major storm and maintenance of the system is completed at that time if required.

The potential run-on from the west is currently diverted by roadside drainage ditches along a private road on the west side of the property. These triangular shaped drainage ditches average about 6 feet wide and 3 feet deep. The capacities of the roadside ditches are 39 cfs each. At the design runoff, the velocity would be about 4 fps (See Appendix H for the Details and Calculations). The ditches are more than adequately sized to handle the runoff flows. The ditches are constructed in graded silt to cobble soils, which have a recommend 5-fps maximum velocity to prevent scour. Therefore additional erosion control measures will not be need in these ditches.

The calculated peak runoff from the largest 2-acre landfill slopes is 1.3 cfs for the 24 hour 25 year event. The capacity of the runoff ditches is 4.2 cfs each (See Appendix H for the Details and Calculations). At the design runoff, the velocity would be about 3.3 fps. The ditches are more than adequately sized to handle the runoff flows. The ditches will be constructed of native soils capped with topsoil, which has a recommend 2.5-fps maximum velocity to prevent scour. Therefore erosion control measures will be need in these ditches. Coconut erosion control blankets will be placed in the runoff ditches.

The runoff control ditches on the perimeter of the landfill will serve the dual functions as runoff control and fire breaks. In areas where the slope is great enough to cause scour concerns, the ditches will be constructed with a terracing effect and rip-rap placed to create rock dams at selected intervals that will reduce the velocity of the runoff water and any potential for scour. On the interior of the landfill, the runoff ditches will be lined with the coconut erosion control blankets to prevent scour as discussed previously.

1.4.6. Alternative waste handling

It is anticipated that the only equipment items that have the potential to breakdown and cause the landfill to be inoperable would be the bulldozer and the scales. When the bulldozer fails, a rental unit will be obtained for use until the City's bulldozer can be repaired. A replacement bulldozer can be obtained within a day. The landfill has a dual set of scales (one set for incoming and one set for exiting). If one scale became inoperable, the second set could be used. If both scales become inoperable, loads of waste will be required to present a weigh bill from a commercial scale in the area before being allowed to dump at the landfill. It is expected that the maximum time the scale would be down would not exceed one week.

1.4.7. Equipment Maintenance

Landfill equipment will be maintained in accordance with vendor recommendations for the commercially procured items. The landfill site and installed systems will be maintained in conformity with good landfill practice. All maintenance performed at the landfill will be logged on the landfill maintenance log sheet (see appendix C, page C-5).

1.4.8. Vector Control

The daily compacting and soil cover of the deposited waste will control disease vectors. Keeping the open working face small and thoroughly compacting and covering the waste with soil at the end of each day has been effective in preventing disease vectors from becoming a problem at the landfill.

1.4.9. Exclusion of Hazardous Wastes

Payson City has established strict acceptance standards for non-hazardous solid waste streams. The landfill employees will supervise the unloading of all waste into the cell. Random inspections for hazardous waste, bulk liquids, used oil, automotive batteries, and any other prohibited waste will be conducted on approximately 10% of the loads. Any inspection form is completed for each inspection. (See inspection form in Appendix C, Page C-9)

Acceptance of Regulated Hazardous Waste

The landfill will not accept regulated hazardous waste, including PCB wastes. Wastes that are prohibited from being deposited at the landfill include the following:

A. Listed wastes (Subpart C, 40 CFR part 261)
B. Exhibits Hazardous Characteristics (Subpart C, 40 CFR Part 261)
C. A mixture containing a "listed" waste.
D. Wastes containing PCBs.

1.4.10. General Training Plan

Each landfill operator will receive the necessary training and safety orientation before being permitted to work in the landfill. Local seminars that are provided by SWANA will be used for the majority of the training. Bi-monthly supervisor and operator safety meetings will be held to keep safety issues current. These meetings also allow for an exchange of information between the landfill operators and management.

1.4.11. Recycling Programs

The Payson City landfill does not currently operate any recycling programs.

1.5. Financial Assurance Plan

1.5.1. Cost Estimates for Closure and Post-closure Care

2.5.1.1 Closure Cost Estimate

Payson City has budgeted money for the final closure of the landfill. Payson City is a municipality and will remain solvent and therefore will be capable of providing the closure and post-closure care of the landfill. The estimated cost for closure is $550,675. This amount is based on the largest area that would require cover at closure, approximately 32 acres. Closure will include an 18-inch layer of a clay material with a hydraulic conductivity of 1 X 10-7 cm/sec or less, covered by a

twenty-four-inch soil layer and a six-inch layer of top soil (for a total of 30 inches on top of the clay). The final fill profile will be constructed on a 3:1 slope. Once the clay layer and topsoil are in place, the topsoil will be seeded with a range grass mixture that is indigenous to the area. The cover surface of the landfill will be graded in such a manner as to prevent runoff from eroding the topsoil cover (See Appendix H Dwg. No. P-LF-EC. Costs associated with final closure are as follows:

Description		Cost
Place and compact clay material		$193,600
Place and spread top soil		$280,075
Provide erosion control		$38,000
Fertilize and seed with grass		$32,000
Certification by registered engineer		$7,000
	Total Cost	$550,675

2.5.1.2 Post closure cost estimate

Once the final cover has been placed on the landfill, periodic groundwater and methane gas samples will be taken. These samples will be taken on a semiannual basis, unless test results indicate a need for more frequent sampling. The costs for post-closure will be those associated with the maintenance of the run on/off systems, ground water and methane monitoring, and final cover stabilization, including residual settlement repair, erosion control or re-seeding. Yearly costs for these activities are estimated to be as follows:

Description	Cost
1. Ground water monitoring	$41,000.00
2. Methane monitoring	$4,000.00
3. Run on/off system	$10,000.00
4. Final cover stabilization	$13,800.00
Total Annual Cost:	$61,800.00

1.6. Financial Assurance Mechanism

Payson City Corporation currently meets the Local Government Financial Test requirements of R315-309-3(7).

1.7. Closure Plan

1.7.1. Final Cover

The final cover for the landfill will be an 18" layer of clay material with a hydraulic permeability of less than 1 X 10-7 cm/sec. The clay material is being excavated from the Class 4 landfill cell and stockpiled for use as closure of the Class V landfill takes place. Samples of the clay have been analyzed at the laboratory and results indicate that permeability is less than 1 X 10-7. A 30" thick layer of soil with the upper portion of that layer being topsoil that will be suitable to sustain low growing grasses will cover the

clay material. Topsoil that was removed when the cell was opened has been stockpiled and will be used. After the clay layer and topsoil layer have been placed over the waste, the soil will be fertilized and seeded with range grasses that are indigenous to the area. Runoff collection ditches will be strategically placed to prevent erosion of the final cover.

1.7.2. Capacity of Site in Volume and Tonnage

The current landfill cell has a capacity of 1,626,471 cubic yards of waste, or 569,265 tons, (calculated at 700 lbs. of waste per cubic yard).

Listed below are the capacities of the landfill at each 10' elevation.

Elevation	Tons	Elevation	Tons
4850	5,105	4940	26,445
4860	76,970	4950	19,780
4870	78,260	4960	14,620
4880	75,680	4970	11,395
4890	66,220	4980	7,955
4900	55,255	4990	7,095
4910	46,655	5000	4,730
4920	37,840	5010	3,225
4930	32,035		

1.7.3. Projection of Time Intervals when Closure Will Occur

Closure will occur as each 10' elevation is filled. The clay material and soil will be placed and the grasses seeded. Projections for the amount of waste to be received at the landfill are based on the population projections that have been determined by the Mountainland Association of Governments – December 2012. This report indicates that projected growth rates for Payson City will be approximately 2.0% per year for the period 2010-2050. Estimates for wastes generated were based on actual waste received in 1998 and increasing that amount by 2.03 percent each year thereafter. With the opening of the Payson City Class 4 Landfill in June of 1995, waste received into the Class V Landfill has been reduced by nearly 65%. A chart indicating the amount of cumulative waste received at the landfill is included in appendix D. The chart shows waste received at the projected growth of 2.0% and a growth rate of 5%.

The estimated time of closure is based on the filling of each 10' elevation. Based on the higher rates discussed above, closure at the various levels would occur according to the following schedule:

Elevation	Year of closure	Elevation	Year of closure
4860	2020	4920	2048
4870	2027	4930	2049
4880	2034	4940	2050
4890	2040	4950	2051
4900	2044	4960 to 5010	2052

1.7.4. Closure Cost Estimates

Closures cost estimates for the landfill have been based on using the clay materials and topsoil that are at the site for closure. The cost of closure will be for placing and spreading the materials. Currently there are 4000 tons of stockpiled clay soil and 4050 tons of stocked piled topsoil on-site. We are of the opinion that there is a sufficient supply of cover soil on-site and that there is no need to import/export soil to/from the sites. The inventorying of the stockpile quantities will be included as part of the quarterly inspections.

We estimate needing:

34 acre x 18 inches clay = 83,000 cubic yards clay
34 acre x 24 inches soil = 110,000 cubic yards soil
34 acre x 6 inches topsoil = 27,000 cubic yards topsoil

Clay material that is being excavated at the Class 4 landfill will be used for the cover layer of the Class V landfill. Samples have been taken and permeability has been analyzed. Hydraulic conductivity of the clay material is less than 1 X 10-7 cm/sec. This clay material will be placed to a depth of 18 inches. Approximately 83,000 cubic yards of the clay material will be required for closure. Estimated cost for placing the clay material is 83,000 yds. X $2.50/yd= $207,500.

After the clay material has been placed, it will be covered with a 30-inch layer of soil with the top 6 inches being top soil. Topsoil that has been stockpiled on site from when the cell was initially opened will be used for this cover. Approximately 137,000 cubic yards of soil will be required. Estimated cost for placing the topsoil layer is 137,000 yds X $2.50/yd= $342,500.

With the concurrent operations at the Class VI C&D Landfill, we will be able to generate the materials needed for the cover. The C&D landfill is a cut/fill terracing operation which generates large quantities of cut material that can then be used as cover material for both landfills. The average soil profile for the C&D site consists of 1-2 feet of Topsoil underlain by 5-10 feet of clay over sandy gravel and rock. The 5 cells will produce approximately 500,000 cubic yards of soil cover material, 200,000 cubic yards of clay material and 40,000 cubic yards of topsoil. The C&D Landfill will require about 83,000 cubic yards of cover soil and 20,000 cubic yards of topsoil. Additional topsoil if needed will be scalped off the adjoining 18 acres to the south of the land which is set aside at this time for future expansion of the Class VI landfill.

Grading of the cover layer and installation of strategically located storm water collection ditches will be provided to prevent erosion. The ditches will be coconut mat lined to prevent washout and damage. Estimated cost for erosion control is 32 acres X $1,187.50/acre= $38,000.

At the completion of all earthwork and installation of erosion control measures, the topsoil will be fertilized and seeded with range grasses that are indigenous to the area. Estimated cost for this work is 32 acres X $1000.00/acre= $32,000.

Closure Inspections

Closure activities will be inspected and certified by a third-party engineer, who is licensed to practice in the State of Utah. Estimated cost: Closure certification - $7,000.

Final Inspection by Regulatory Agencies

At least 60 days prior to implementing the closure plan, Payson City will notify the Executive Secretary of the Division of Solid and Hazardous Waste that closure activities will begin. Once final closure has taken place, the Executive Secretary will be notified and regulatory personnel can inspect the landfill and verify proper closure.

1.8. Post Closure Plan

1.8.1. Groundwater Monitoring

Groundwater monitoring at the landfill will be continued through the post-closure period until conditions are such that it is no longer needed. Sampling will be conducted in accordance with the ground water monitoring plan. Sample results will be analyzed for significant changes since the previous samples were taken.

1.8.2. Gas Monitoring

Quarterly explosive gas monitoring at the landfill will be conducted in accordance with R315-303-3(5)(a) UAC. The sample results will be kept in the operating log.

1.8.3. Maintenance

Closure of the landfill will be completed so that additional maintenance during the post-closure period will be kept to a minimum. The ground water and gas monitoring systems will be maintained to enable satisfactory samples to be taken and analyzed. The scale house facility will most likely be utilized for a new cell that will be developed to the west of the current landfill site.

1.8.4. Final Cover

The final cover and run-on/off systems will receive any needed maintenance twice yearly or more frequently if required. Any settlement in the final cover will be filled and the area re-seeded with grass. The run-on/off systems will be cleaned of any debris or materials that would prevent them from functioning as designed. Repairs that may be needed due to erosion will be completed. Scheduled maintenance will occur semiannually, during the first week of April and October of each year.

1.8.5. Time Intervals for Post Closure Activities

The majority of the post-closure care of the landfill will be completed twice yearly. Scheduled maintenance will take place during the first week in April and October

of each year. Ground water and gas samples will be taken and the final cover and run-on/off systems will be inspected and maintained. Periodic inspections of the landfill will take place monthly, and the run-on/off system will be inspected after each major storm to ensure that it is working properly and is in good repair.

1.8.6. Changes to Title

Notification will be made by the City to the Division of Solid and Hazardous Wastes of any changes to record of title, land use, and zoning restrictions of the landfill site.

1.8.7. Post closure care cost estimates

It is estimated that the cost of post-closure care of the landfill will be approximately $21,000 per year. Funds will be withdrawn from the Utah Public Treasurer's Investment Fund as needed to cover these costs.

1.9. Class V Landfill Market Information

1.9.1. Proven Market

Evidence that the commercial facility has a proven market of non-hazardous solid waste.

A. Payson Landfill provides a disposal area for the commercial waste haulers in the Southern Utah County area as well as the municipal waste collected within Payson City. The other disposal areas nearest to the city are the transfer stations located at Springville and Goshen. Commercial wastes deposited at the Payson Landfill average approximately 4,000 tons per year. Tipping fees for commercial waste is $36.84 per ton. Municipal wastes collected by the City average approximately 6000 tons per year. Asbestos wastes collected from Rayloc industries amount to approximately 62 tons per year. Asbestos wastes tipping fees are $105.25 per ton.
B. As stated above, the Payson Landfill is used for waste disposal for the south Utah County area and does not compete for regional or out-of-state business.
C. There are no other commercial waste facilities located directly in the Payson area.

1.9.2. Public Benefits

Description of the public benefits of the facility:

A. The Payson City Landfill provides a much-needed service for the residents of Payson City and the residents of the surrounding rural areas. Without the Payson City landfill, waste would have to be taken to either Springville or Goshen.

B. There are no known energy or other resources recoverable by the proposed facility.

C. There are no known reductions of solid waste methods that are made available by this facility.

1.9.3. State Compliance

Payson City Corporation has complied with State regulations in the operation of the landfill since the beginning of operations.

2. PART III - TECHNICAL DATA

2.1. Maps

See appendix E for drawing No. III-1: U.S. Geological Survey Topographic Map

2.2. Topographic Maps

See appendix F for drawing numbers:

III-2 Topographic Map - Site Layout
III-2A Cross Section A-A

2.3. Plans Drawings & Specifications

A. See appendix G for drawing numbers:
- III-3-a-1 Existing and final fill profiles, stations 0 through 4
- III-3-a-2 Existing and final fill profiles, stations 5 through 9
- III-3-a-3 Existing and final fill profiles, stations 10 through 127
- III-3-a-4 Fill unit and element details

B. See Appendix I for the Geohydrological report and groundwater monitoring well data

C. See appendix H for the drawing numbers:
- P-LF_SIT Site Plan
- P-LF_BASPlan & Profile
- P-LF_PIP Pipe System Layout
- P-LF_DETInlet Box Details

2.4. Geohydrological assessment

See the attached Geohydrological report prepared by Bingham Environmental

2.5. Slope Stability of Final Cover

Slope stability analysis for the landfill final proposed fill profile was performed using SLOPE/W. SLOPE/W is a proprietary software program that uses limit equilibrium theory to compute the factor of safety of earth and rock slopes. Three stability cases were analyzed using the Bishops Method for slope stability using conservative strength properties for both the native soils, cover soils and the refuse (see Appendix H for Graphical Representations).

Case 1: End of Construction

Case 1 was analyzed with a 40 pqf unit weight, 36^0 friction angle and 0 psf cohesion for the newly placed refuse. The computed factor of safety for this case was 1.98. A factor of safety of 1.5 or higher is considered acceptable for slope stability.

Case 2: End of Construction with Earthquake Loads (Most Critical Case)

Case 2 was analyzed with a 40 pqf unit weight, 36^0 friction angle and 0 psf cohesion for the newly placed refuse. Earthquake loads equivalent to both 0.25-g vertical and horizontal ground acceleration was applied for the analysis. The computed factor of safety for this case was 1.12. A factor of safety of 1.1 or higher is considered acceptable for temporary earthquake loading.

Case 3: Approximately 30 Years After Construction

Case 3 was analyzed with a 62 pqf unit weight, 33^0 friction angle and 3000 psf cohesion for the consolidated 30 years or older refuse. The computed factor of safety for this case was 2.12. A factor of safety of 1.5 or higher is considered acceptable for slope stability.

2.6. Engineering Report

The following engineering report addresses the facility's compliance with:

Location standards
Unit or cell design and operation
Leachate system
Run-on and run-off systems
Closure and post closure
Maintenance and Land use

2.6.1. Location Standards

The Payson City Class V Landfill meets the location standards as defined in R315-302-1. The landfill is located on the sloping foothills on the west side of the Utah valley in the southern end of Utah County. This location provides a area somewhat remote and isolated from urban areas, yet is close enough to provide efficient travel times for waste deliveries. The landfill is not within the distance restrictions for any parks, recreation areas, ecologically and scientifically significant natural areas, or farmland that has been identified as being of "statewide importance", or residential areas.

Separation Airport

The landfill far exceeds the separation distances from the nearest airport as required by regulation. The Spanish Fork Airport is the nearest airport, and it is approximately 10.5 miles northeast of the landfill.

Flood-Plain

The landfill is not located within any flood-plain areas according to the Utah County FEMA Flood Plain map. The landfill facility and structures will not restrict the flow of a 100-year flood nor will the 100 year flood washout any waste materials into streams, rivers, or off-site.

Wetlands

The landfill is located on the foothills, with the area sloping to the east. There are no naturally occurring streams, rivers, ponds, lakes, marshes, bogs, or other wetlands within the facility boundary. The facility meets the requirements of the wetland location criteria as defined by the regulations.

Seismic Zone

The landfill facility is located in a seismic impact zone. Figure 3.6.1.4.1 is a graph generated from the Seismic Design Parameters Version 3.10 2000 ICBO. The design parameters shown on Figure 3.6.1.4.1 should be used for the design of any structure to be built on the landfill site.

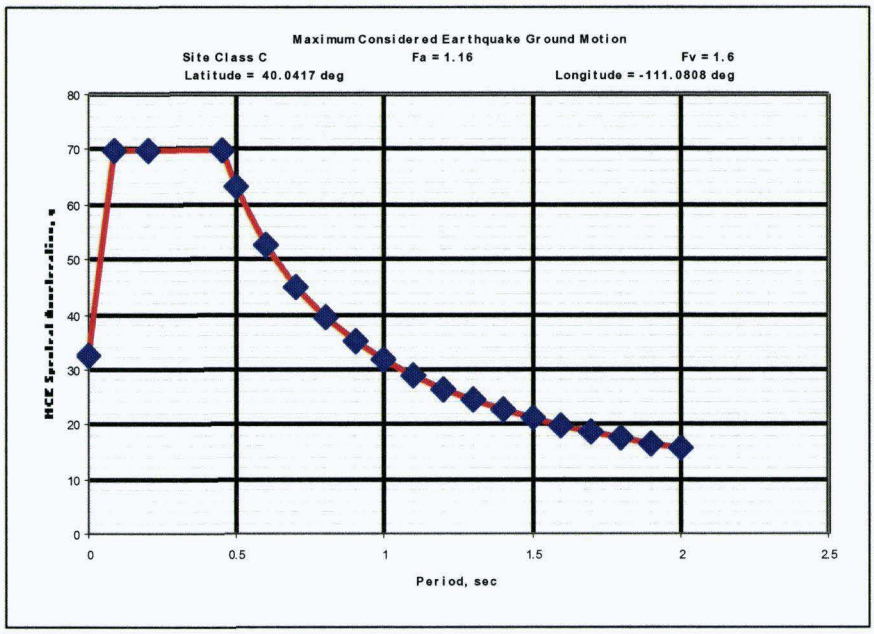


Figure 3.6.1.4.1 Seismic Design Parameters

2.6.2. Unit Cell Design and Operation

The unit and cell design details are as contained on Drawing III-3-a-4. (See appendix G) Information concerning the fill unit and cell can be found on the drawing.

2.6.3. Leachate Collection System

The landfill does not contain a Leachate collection system.

2.6.4. Run-On and Run-Off Systems

The existing run-on and run-off prevention system is as indicated on drawing numbers: III-3-c-1, III-3-c-2, III-3-c-3, and III-3-c-4. (These drawings are located in appendix G.)

2.6.5. Closure and Post Closure

The closure and post closure design of the landfill will be as discussed in Part II, sections 6 and 7 (pages 12 through 16 of this application). Closure will be completed in phases as various fill units are completed and closed.

2.6.6. Maintenance and Land Use

Maintenance of the landfill will take place on a daily basis through the remaining open life of the landfill. During post closure of the landfill, maintenance will take place on a quarterly basis and more frequently if conditions require. The final cover and run-on/run-off systems will be inspected and repaired as required. All landfill equipment, including ground water sampling equipment and methane sampling equipment will be maintained according to the manufacturers recommended schedule.

It is anticipated that after closure, the landfill area will be for used for grazing or other undeveloped uses.

End of report

APPENDIX A

1. Drawing of Landfill Property
2. Deeds for Landfill Property

REVISION	DATE	BY	DESCRIPTION	DESIGN JHJ	DRAWN JHJ	PAYSON CITY	PAYSON CITY LANDFILL DRAWING OF LANDFILL PROPERTY	SHEET 1 OF 1
				CHECKED	CHECKED	438 WEST UTAH AVE. PAYSON, UTAH 84651 PHONE 465-5300		DRWG NO
				SCALE 1"=200	DATE 01/29/98			
				F.B.NO.				

WHEN RECORDED, MAIL TO:

22157

Space Above for Recorder's Use

RECORDED AT THE REQUEST OF
1982 SEP -7 PM 2:25
UTAH COUNTY RECORDER
DEPUTY

22157

WARRANTY DEED

HARVEY L. and VARO C. HUTCHINSON, grantor

of Alpine, County of Utah, State of Utah;

hereby CONVEY and WARRANT to PAYSON CITY CORPORATION
437 W. Utah Ave.
Payson, Utah 84651

, grantee

of Payson City, County of Utah, State of Utah

for the sum of A TRADE and One Dollar DOLLARS,

the following described tract of land in Utah County, State of Utah, to-wit:

Commencing at the Northwest Corner of the Northeast Quarter of the Northwest Quarter of Section 14, Township 9 South, Range 1 East, Salt Lake Base and Meridian, said point being also North 89°32'04" East along the Section Line 1327.25 feet according to Utah Coordinate Bearings, Central Zone from the Northwest Corner of said Section 14, Thence South 00°08'43" West along the Quarter-quarter Section Line 2678.01 feet to the East-west Quarter Section Line, N 81°35'30" E to centerline of Highling Canal, North 57°18'09" West 178.38 feet along Highline Canal, North 33°27'37" West 303.63 feet, North 07°43'28" West 382.56 feet, North 25°36'15" West 382.69 feet, North 40°17'52" West 214.44 feet, North 16°08'07" West 217.05 feet, North 12°40'03" East 185.92 feet, North 13°54'07" East 200.77 feet, North 00°40'41" East 326.12 feet, North 13°28'30" West 160.67 feet, North 21°11'11" West 252.76 feet to the Section Line, thence parting from said canal centerline South 89°32'04" West along the Section Line 185.44 feet to the point of beginning. Area 26.62 acres.

Excepting therefrom for Blanch Whitelock a 20' easement immediately adjacent to the west side of the Highline Canal which traverses the east property boundary to her north property boundary for the purpose of ingress and egress to her property.

WITNESS the hand of said grantor, this 29 day of June, 19 82.

Signed in the presence of

Harvey L. Hutchinson
Varo C. Hutchinson

STATE OF UTAH,
County of Utah } ss.

On the 29th day of June 19 82 personally appeared before me the signer of the above instrument, who duly acknowledged to me that he executed the same.

Emily G. Beck
Notary Public.

My commission expires Oct 3, 1982 Residing in Alpine, Utah

APPROVED FORM — UTAH SECURITIES COMMISSION

FORM 101 — WARRANTY DEED — KELLY CO., 55 W. NINTH SO., S.L.C. L-1108

BOOK 5000 PAGE 346

THIS IS A LEGALLY BINDING CONTRACT. IF NOT UNDERSTOOD ? "COMPETENT ADVICE."

Recorded at Request of

at M. Fee Paid $

by Dep. Book Page Ref.

Mail tax notice to 15578 Address

RECORDED AT THE REQUEST OF
1982 JUN 23 AM 10 04
UTAH COUNTY RECORDER

15578

QUIT-CLAIM DEED

HARVEY L. HUTCHINSON and VARO HUTCHINSON grantor

of Alpine, County of Utah, State of Utah, hereby

QUIT-CLAIM to Payson City Corporation grantee

of Payson for the sum of DOLLARS,

Gift

the following described tract of land in Utah County, State of Utah:

Commencing at the NW Cor. of the NE¼ of Sec. 14, T 9 S, R 1 E, SLB & M, said point being also N 89°32'04" E along Section line 1327.25 according to Utah Coordinate Bearing Central Zone from the NW Corner of said Section 14 and S 0°08'43" W 2678.01'. Thence S 0°15'26" E. 724.5'; N 88°23'55" E 1325.70'; N 0°05'48" E 112.9' to the center of the Highline Canal; N 44°10'14" W 96.49' along centerline of the Highline Canal; N 33°10'01" W 260.69'; N 20°57'59" W 458.53'; S 81°35'30" W 958.52' to point of beginning. Containing approx. 20.38 acres.

WITNESS the hand of said grantor, this 22nd day of June, A. D. one thousand nine hundred and eighty-two.

Signed in the presence of

Harvey L. Hutchinson
Varo Hutchinson

STATE OF UTAH, } ss.
COUNTY OF Utah

On the 22nd day of June personally appeared before me

the signer of the within instrument, who duly acknowledged to me that he executed the same.

Emily G. Beck
Notary Public.

My commission expires Oct 3, 1982 Residing in Alpine, Utah

APPROVED FORM — UTAH SECURITIES COMMISSION

FORM 103—QUIT CLAIM DEED—KELLY CO., 83 W. NINTH SOUTH, S.L.C., UTAH

BOOK 1987 PAGE 469

containing One Hundred Twenty and 20/100 (120.20) acres according to the said certificate.

TO HAVE AND TO HOLD the above described and granted premises unto the said Lawson City Corporation

and to its successors and assigns forever, subject to any easement or right of way of the public, to use all such highways as may have been established according to law, over the same or any part thereof, and subject also to all rights of way for ditches, tunnels, and telephone and transmission lines that may have been constructed by authority of the United States.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the great seal of the State of Utah to be hereunto affixed.

Done at Salt Lake City, this Twenty-First day of June in the year of our Lord, one thousand nine hundred and Fifty-One, and of the independence of the United States of America the one hundred and Seventy-Fourth, and in the Fifty-Fifth year of the State of Utah.

By the Governor: Heber Bennion, Jr.

Wayne Christiansen
Deputy Secretary of State.

Lee E. Olmos
Executive Secretary, State Land Board.

Recorded Patent Book 34 Page 176

Certificate of Sale No. C-23468

J. Herbert Shiron

PAID IN FULL 7/6/51
Chas. Lundstrom
CASHIER

11095

No. 15370

To All to Whom These Presents Shall Come, Greeting:

WHEREAS, Payson City Corporation

Payson

of the County of Utah State of Utah heretofore purchased from the State of Utah, the lands hereinafter described, pursuant to the laws of said State in such case made and provided,

AND WHEREAS, the said Payson City Corporation

has paid for said lands, pursuant to the conditions of said sale, and the laws of the State duly enacted in relation thereto, the sum of Four Hundred Twenty and 70/100 ($420.70) Dollars, and all legal interest thereon accrued, as fully appears by the certificate of the proper officer, now on file in the office of the Secretary of State of the State of Utah;

NOW THEREFORE, I Heber Pennion, Jr. Acting, Governor, in consideration of the premises, and by virtue of the power and authority vested in me by the laws of the State of Utah, in such case made and provided, do issue this PATENT, in the name and by the authority of the State of Utah, hereby granting and confirming unto the said

Payson City Corporation

and to its successors ~~heirs~~ and assigns forever, the following piece or parcel of land, situate in the County of Utah State aforesaid, to-wit: Lot One (1); of Section Fourteen (14): North Half(N½) of the Northeast Quarter (NE¼) of Section Fifteen (15), Township Nine (9) South, Range One (1) East. Salt Lake Base and Meridian.

(Reserving to the State of Utah, all coal and other minerals, ~~in the above lands, and to it, or persons authorized by it,~~ the right to prospect for, mine and remove coal and other minerals from the same, upon compliance with the conditions and subject to the limitations of Title 96-Chapter 1 Revised Statutes of Utah 1933 and amendments thereto.)

APPENDIX B

Financial Assurance Mechanism for Closure and Post Closure:
Copy of Statement from Account

STATEMENT OF ACCOUNT

PTIF

UTAH PUBLIC TREASURERS' INVESTMENT FUND

Richard K. Ellis, Utah State Treasurer, Fund Manager
PO Box 142315
350 N State Street, Suite 180
Salt Lake City, Utah 84114-2315
Local Call (801) 538-1042 Toll Free (800) 395-7665
www.treasurer.utah.gov

ESC-PAYSON-CLASS 1 CLOSURE
ELAINE
439 W UTAH AVE
PAYSON, UT 84651

Account	Account Period
2143	January 01, 2015 through January 31, 2015

Summary

Beginning Balance	$ 317,072.78	Average Daily Balance	$ 317,072.78
Deposits	$ 136.61	Interest Earned	$ 136.61
Withdrawals	$ 0.00	360 Day Rate	0.5003
Ending Balance	$ 317,209.39	365 Day Rate	0.5073

Date	Activity	Deposits	Withdrawals	Balance
01/01/2015	FORWARD BALANCE	$ 0.00	$ 0.00	$ 317,072.78
01/31/2015	REINVESTMENT	$ 136.61	$ 0.00	$ 317,209.39
01/31/2015	ENDING BALANCE	$ 0.00	$ 0.00	$ 317,209.39

APPENDIX C

Landfill Operating Records

C-1	Pre-operation Checklist for Bulldozer
C-2	Ground Water Monitoring
C-3	Methane Sampling Log
C-4	Landfill Inspections
C-5	Landfill Maintenance
C-6	Sample Sheet of Operating Logbook
C-8	Asbestos Waste WSR

PAYSON CITY CORPORATION
CLASS V LANDFILL

Date: _____
Operator Signature:_____
Engine Hours: _____

PRE-OPERATION CHECKLIST
D7H BULLDOZER

Instructions: Please indicate with a check that the items identified below have been completed. If the item is not in the normal or operating range, indicate corrections taken or needed, to the right of the statement. List all maintenance performed and any comments you have in the sections provided.

1. _____ Check engine oil level.

2. _____ Check hydraulic system oil level.

3. _____ Check coolant fluid level.

4. _____ Check air filter.

5. _____ Lubricate at all grease fittings.

6. _____ Inspect belts and hoses.

7. _____ Inspect track, blade, ROP ,rails, and ripper for loose fasteners, damage, lodged waste, etc.

Maintenance Performed: _____

Comments:_____

PAYSON CITY CORPORATION
CLASS V LANDFILL

Date: _____
Operator Signature:_____
Ground Water Monitoring Well #: _____

GROUND WATER MONITORING

Instructions: Please fill in the requested information. Indicate in the comments section any abnormal conditions or events that occurred during the sampling process. Also note any maintenance or repair that may be needed.

1. Depth to static water level: _____

2. Approximate volume of water purged before sampling:_____

Purged Volume	pH	Temp. (OC)	Specific Conductance (mS/cm)	Observation

3. Control Number on sample bottle.

1._____ 3._____

2._____ 4._____

4. Laboratory to which sample bottles were sent for analysis:

Name: _____
Address: _____
_____
_____

Contact: _____

5. Method of sample shipment: _____
_____

6. Comments: _____
_____
_____

PAYSON CITY CORPORATION
CLASS V LANDFILL

Date: _____
Operator Signature: _____
Probe #: _____

METHANE SAMPLING LOG

Instructions: Please fin in the date. number of the probe being sampled, and time sample was taken. List the sample results in the area provided. In the comments section. list any abnormal items found during the sampling or maintenance that needs to be completed.

Sample results: _____

Comments: _____

March 2015

PAYSON CITY CORPORATION
CLASS V LANDFILL

Date:_____
Inspectors:_____
_____

LANDFILL INSPECTIONS

Instructions: Please fill in the requested information as outlined and check appropriate boxes. If changes in operation practices or maintenance are required, notify the Superintendent upon completion of the inspection. Schedule a follow up inspection after the time changes or repairs are to be made.

1. Type/area of inspection ☐Routine ☐Other (specify)_____

☐ Scales	☐ Scalehouse	☐ Run-on, run-off system
☐ Groundwater	☐ Methane Gas	☐ Blown litter
☐ Access Roads	☐ Fire Breaks	☐ Gates/Fences/Signs
☐ Soil cover stockpile	☐ Topsoil stockpile	☐ N. Side
☐ S. Side	☐ E. Side	☐ W. Side
☐ NE Corner	☐ SE Corner	☐ SW Corner
☐ NW Corner		

2. Results or findings of inspection:_____
_____
_____
_____
_____
_____
_____

3. Recommendations:_____
_____
_____
_____
_____
_____
_____

PAYSON CITY CORPORATION
CLASS V LANDFILL

Date:_____
Operator:_____

LANDFILL INSPECTIONS

Instructions: Check the appropriate box for the area or type of maintenance that was performed at the landfill. Describe the maintenance work completed in section 2.

1. Type/area of Maintenance (Check appropriate box)

☐ Scales	☐ Scalehouse	☐ Run-on, run-off system
☐ Groundwater	☐ Methane Gas	☐ Blown litter
☐ Access Roads	☐ Fire Breaks	☐ Gates/Fences/Signs

2. Indicate details of work completed: _____

Payson City Corporation
439 W Utah Avenue

Payson, UT 84651

Ticket No :25888
Date :2/28/15
Phone :(801)465-5230

Customer: S134
Business Decision DBA
P.O. Box 1156

Salem, Utah 84653

Truck :	S45	South Valley Roll Off 15 Yd	Gross :	18780	lb	Scale 1	In	10:46 am
			Tare :	16700	lb	STORED	Out	10:45 am
			Net :	2080	lb			
				1.040	tn			

Weigh Master: JUSTINO Justin Openshaw

Driver:

Remarks: Thanks

Material $	21.47
Delivery $	0.00
Misc $	0.00
Tax $	0.00
Total $	21.47

MATERIAL	QTY		UNIT-$	DELIVERY-$	MISC-$	TAX-$	TOTAL-$
CD	1.040	tn	20.640				21.47
							$21.47

Generator

1. Work site name and mailing address: RAYLOC, 700 N. 500 E., Payson, UT 84651
Owner's name: RAYLOC
Owner's telephone no.: (801) 465-4841

2. Operator's name and address:
Operator's telephone no.:

3. Waste disposal site (WDS) name, mailing address, and physical site location: PAYSON CITY LANDFILL, WEST MOUNTAIN AREA, PAYSON, UTAH 84651
WDS phone no.: (801) 465-9709

4. Name, and address of responsible agency
STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
1950 WEST NORTH TEMPLE
P.O. BOX 16690
SALT LAKE CITY, UT 84116-0690

5. Description of materials: ASBESTOS BRAKE LINING AND DUST GRINDING
6. Containers No. 23 Type Lining
7. Total quantity m^3 (yd^3) 5400 LBS

8. Special handling instructions and additional information

9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

Printed/typed name & title: JOHN PETERSON, PRODUCTION SUPERINTENDENT
Signature:
Month 5 Day 3 Year 95

Transporter

10. Transporter 1 (Acknowledgment of receipt of materials)

Printed/typed name & title: RAYLOC (801) 465-4841
Address and telephone no.: 700 N. 500 E., Payson, UT 84651
Signature:
Month 5 Day 3 Year 95

11. Transporter 2 (Acknowledgment of receipt of materials)

Printed/typed name & title:
Address and telephone no.:
Signature:
Month Day Year

Disposal Site

12. Discrepancy indication space

13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.

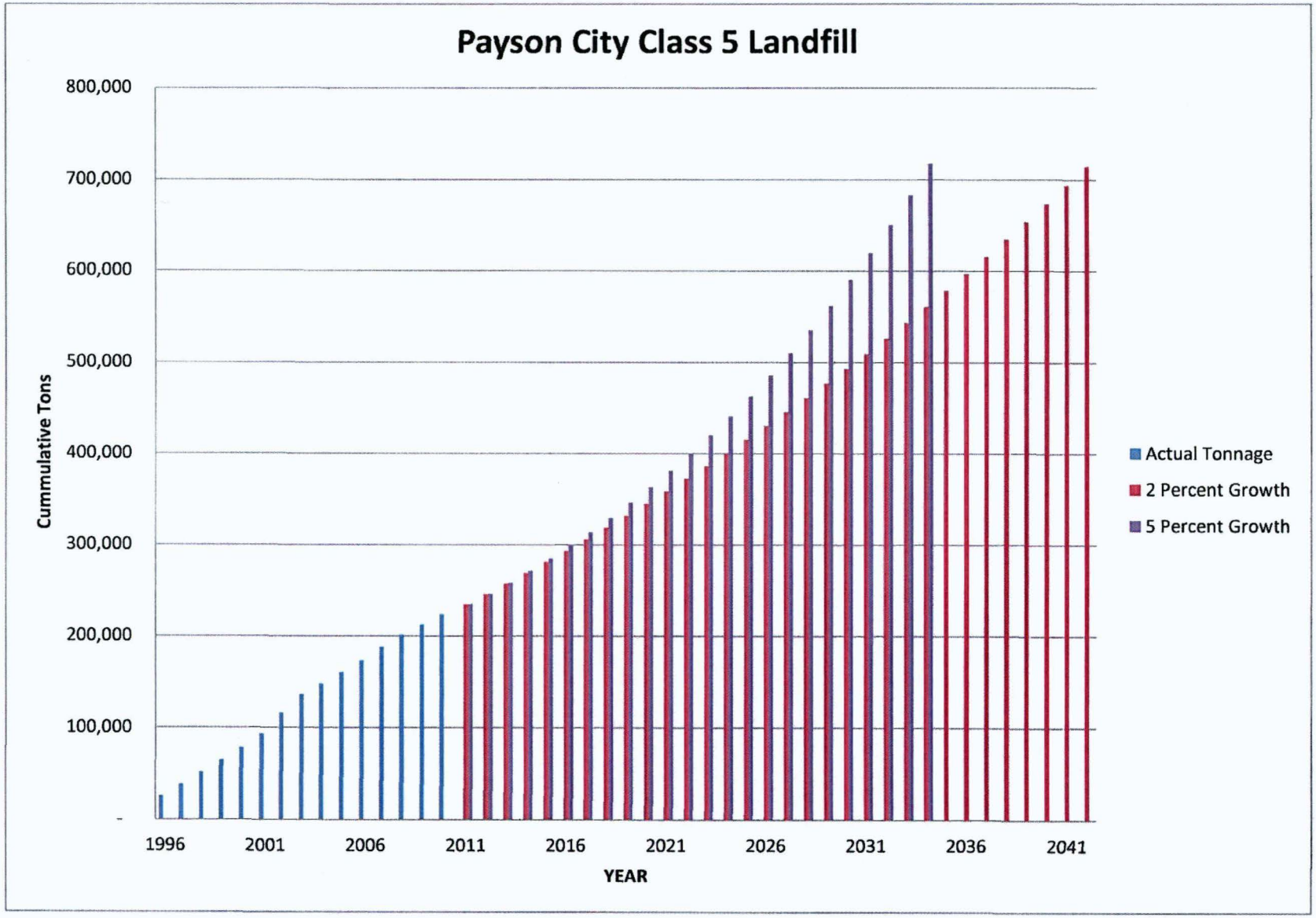
Printed/typed name & title: DAVID L. RAPER OPERATOR
Signature:
Month 5 Day 3 Year 95

(Continue

Figure 4. Waste Shipment Record

APPENDIX D

Graph of Cumulative Waste Projections


Payson City Class 5 Landfill
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
-
Cummulative Tons
1996
2001
2006
2011
2016
2021
2026
2031
2036
2041
YEAR
Actual Tonnage
2 Percent Growth
5 Percent Growth

APPENDIX E

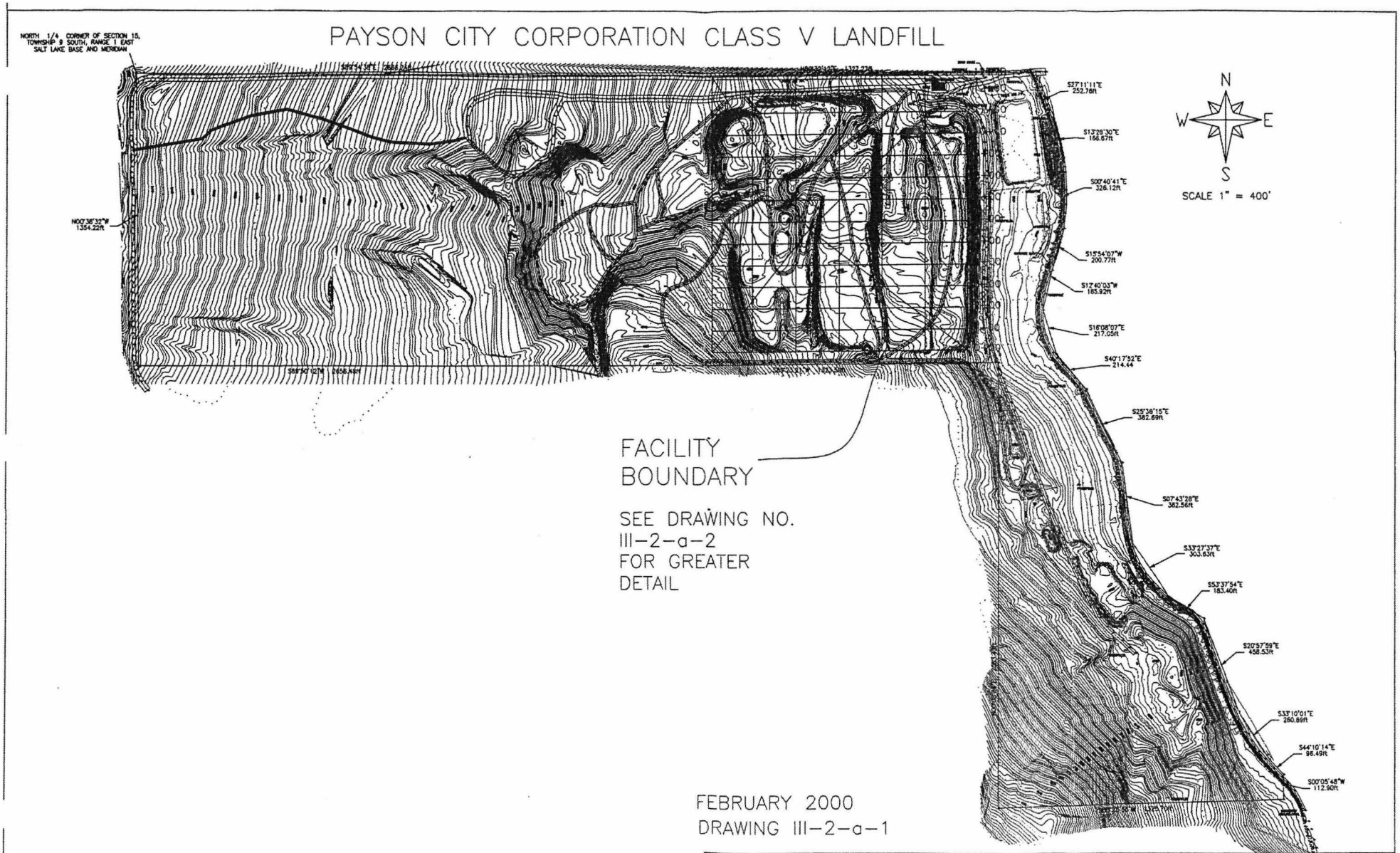
Drawing No. III-1 U.S. Geological Survey Topographic Map

APPENDIX F

Topographic Maps

Drawing No.	Drawing Description
III-2-a-1	Topographic Map – Site Layout
III-2-a-2	Topographic Map –Monitoring Wells

PAYSON CITY CORPORATION CLASS V LANDFILL



FEBRUARY 2000
DRAWING III-2-a-1

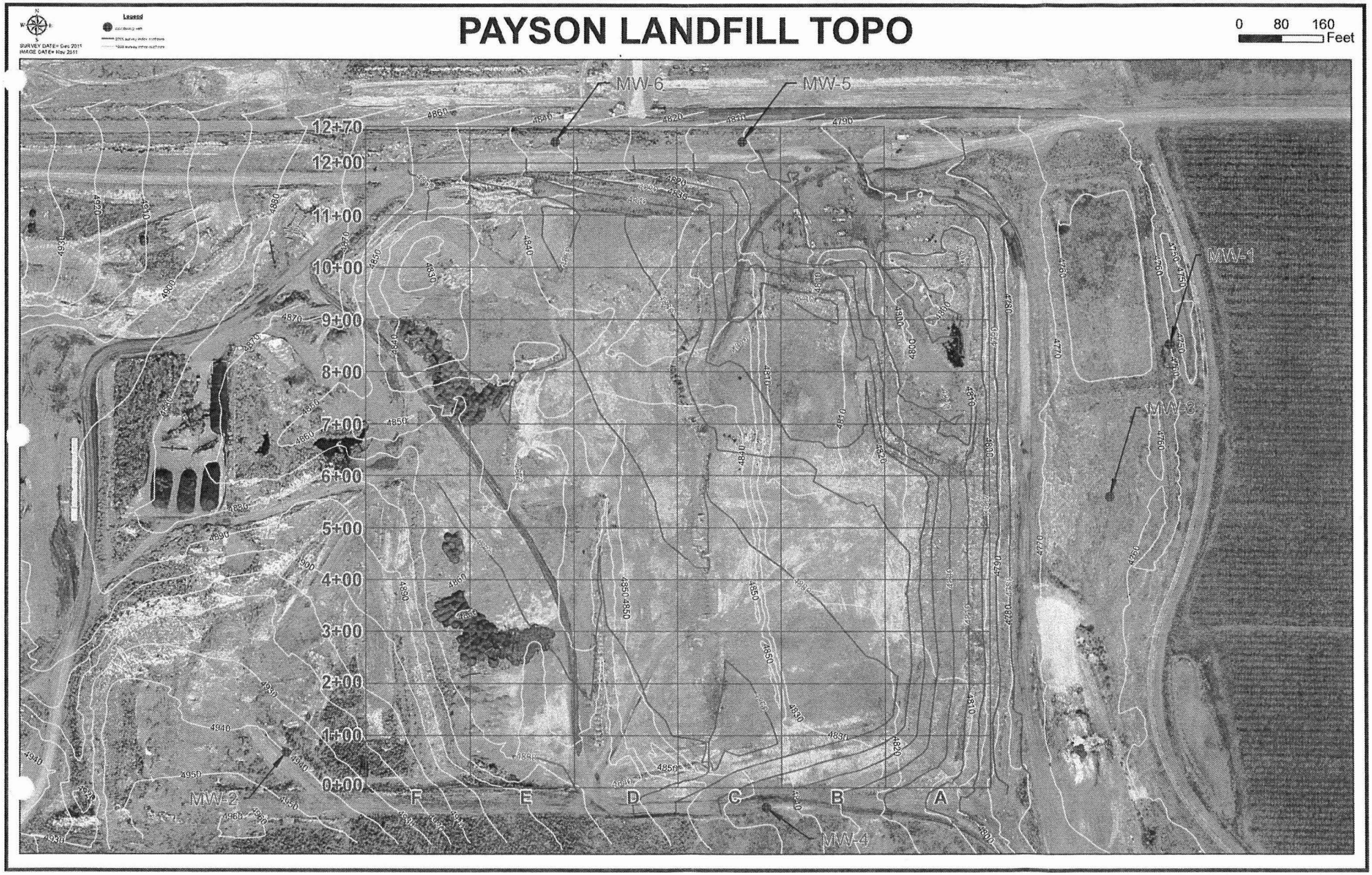
REVISION	DATE	BY	DESCRIPTION	DESIGN JHJ	DRAWN JHJ
				CHECKED	CHECKED
				SCALE 1"=200'	DATE 01/29/98
				F.B.H.G.	

PAYSON CITY
439 WEST UTAH AVE.
PAYSON, UTAH 84651
PHONE 465-5200

PAYSON CITY LANDFILL
TOPOGRAPHY MAP

SHEET 1 OF 1
DRWG NO

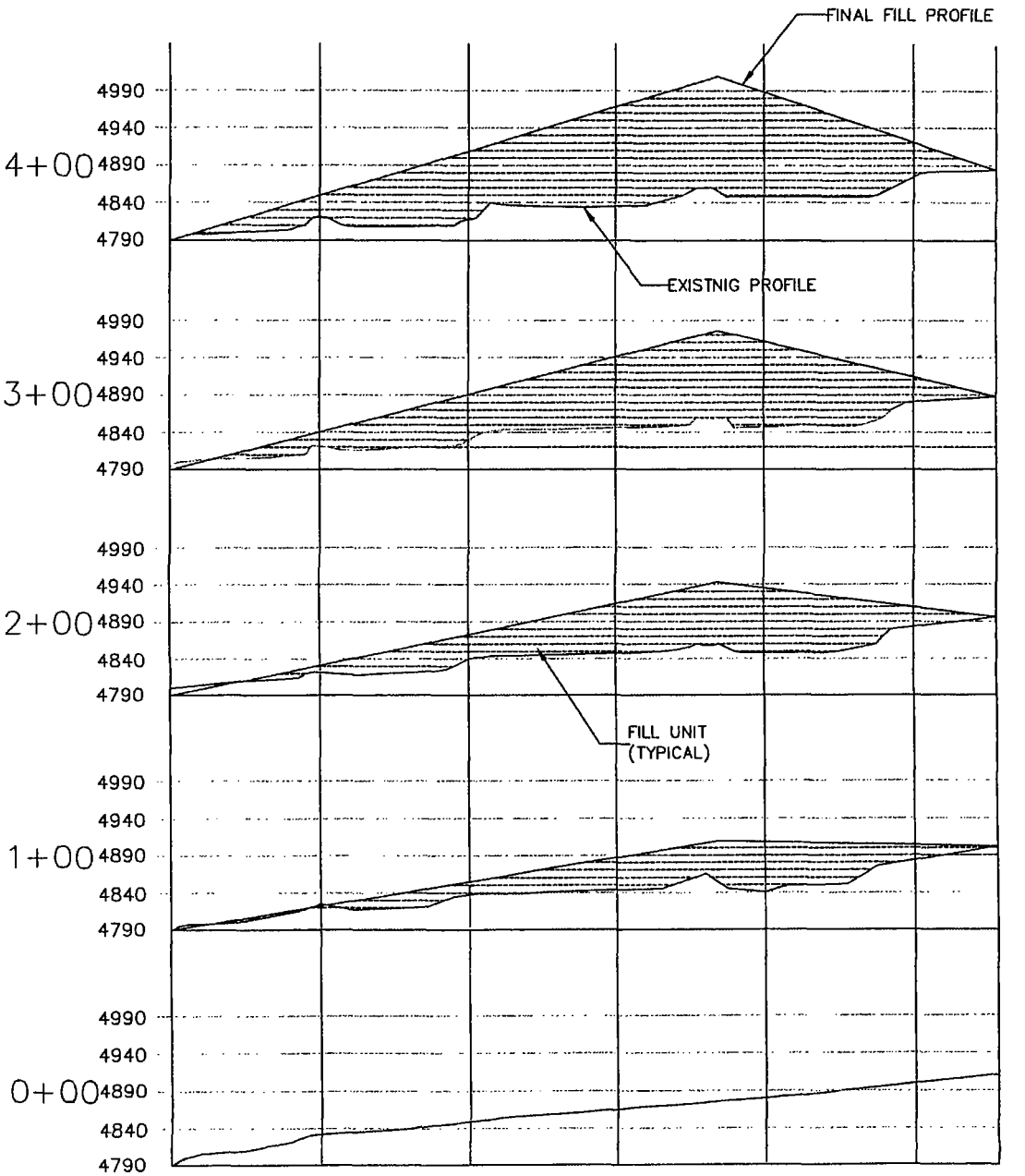
PAYSON LANDFILL TOPO



APPENDIX G

Plans & Specifications

Drawing No.	Drawing
III-3-a-1	Existing and final fill profiles, stations 0 through 4
III-3-a-2	Existing and final fill profiles, Stations 5 through 9
III-3-a-3	Existing and final fill profiles, Stations 10 through 12.7
III-3-b-4	Fill Unit and Element Details

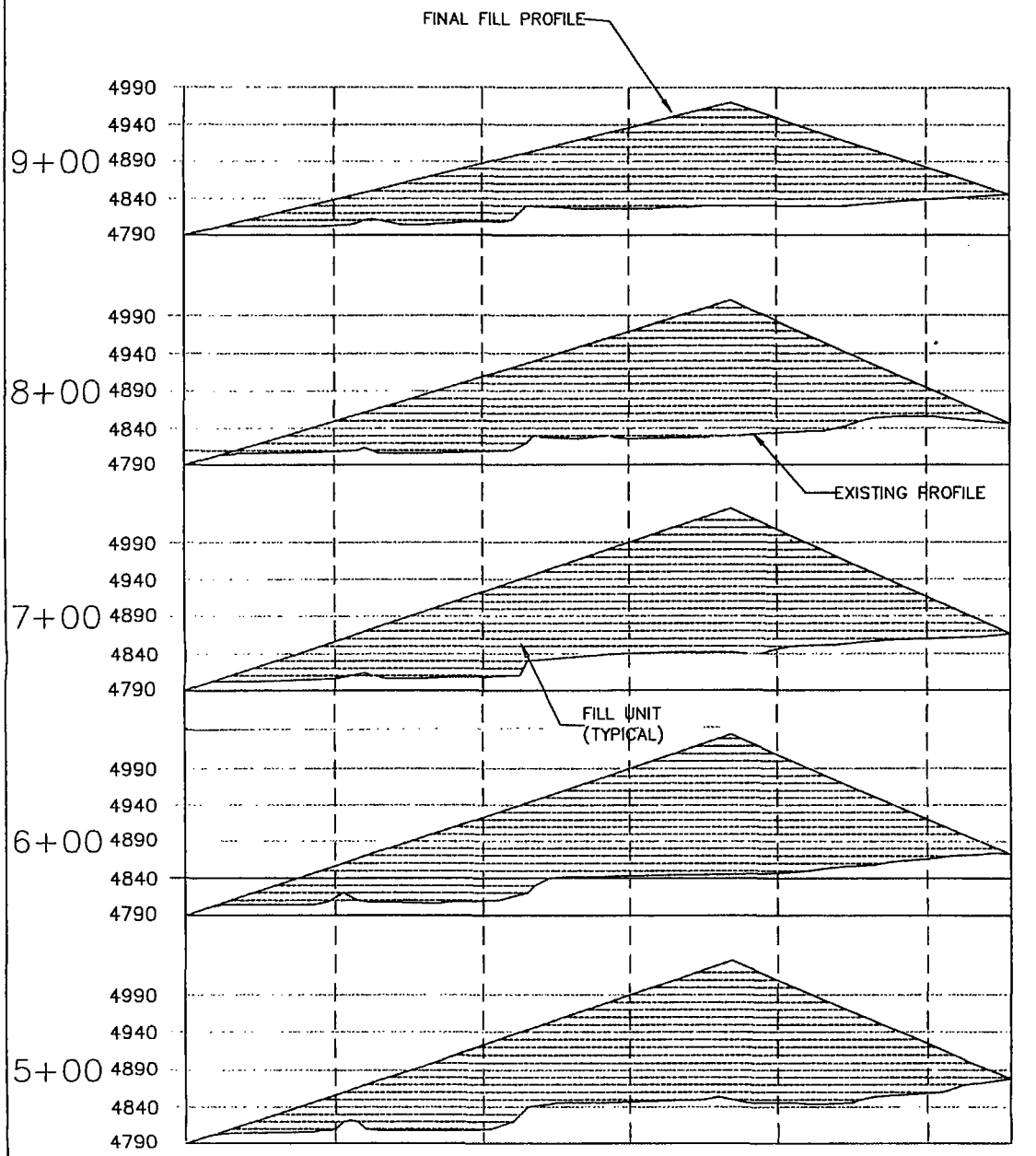


EXISTING AND FINAL FILL
PROFILES AT 100' INTERVALS

PAYSON CITY
CLASS V LANDFILL

SCALE: 1" = 150'

DRAWING NO. III-3-b-1 FEBRUARY 2000

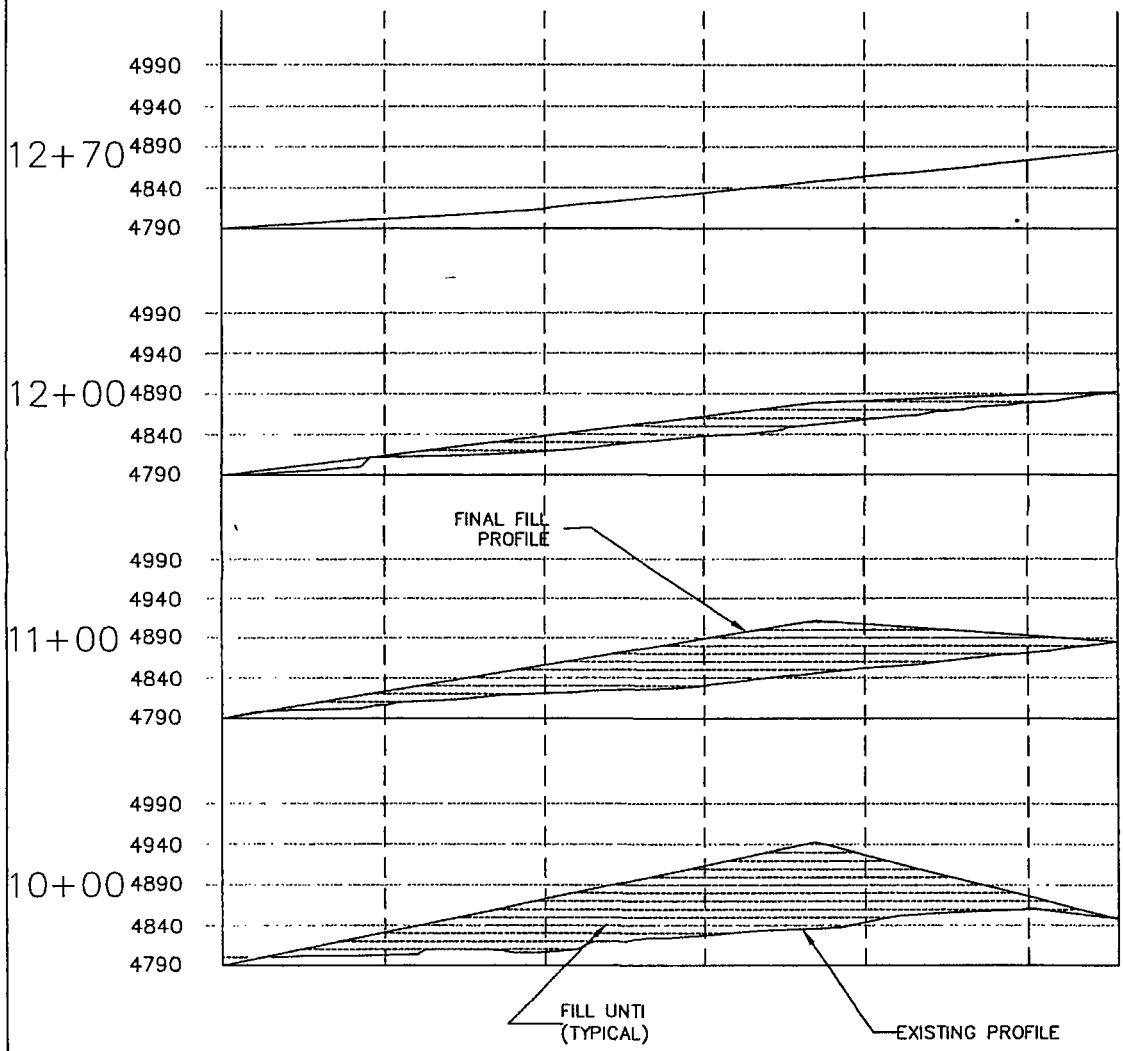


EXISTING AND FINAL FILL
PROFILES AT 100' INTERVALS

PAYSON CITY
CLASS V LANDFILL

SCALE: 1" = 150'

DRAWING NO. III-3-b-2 FEBRUARY 2000

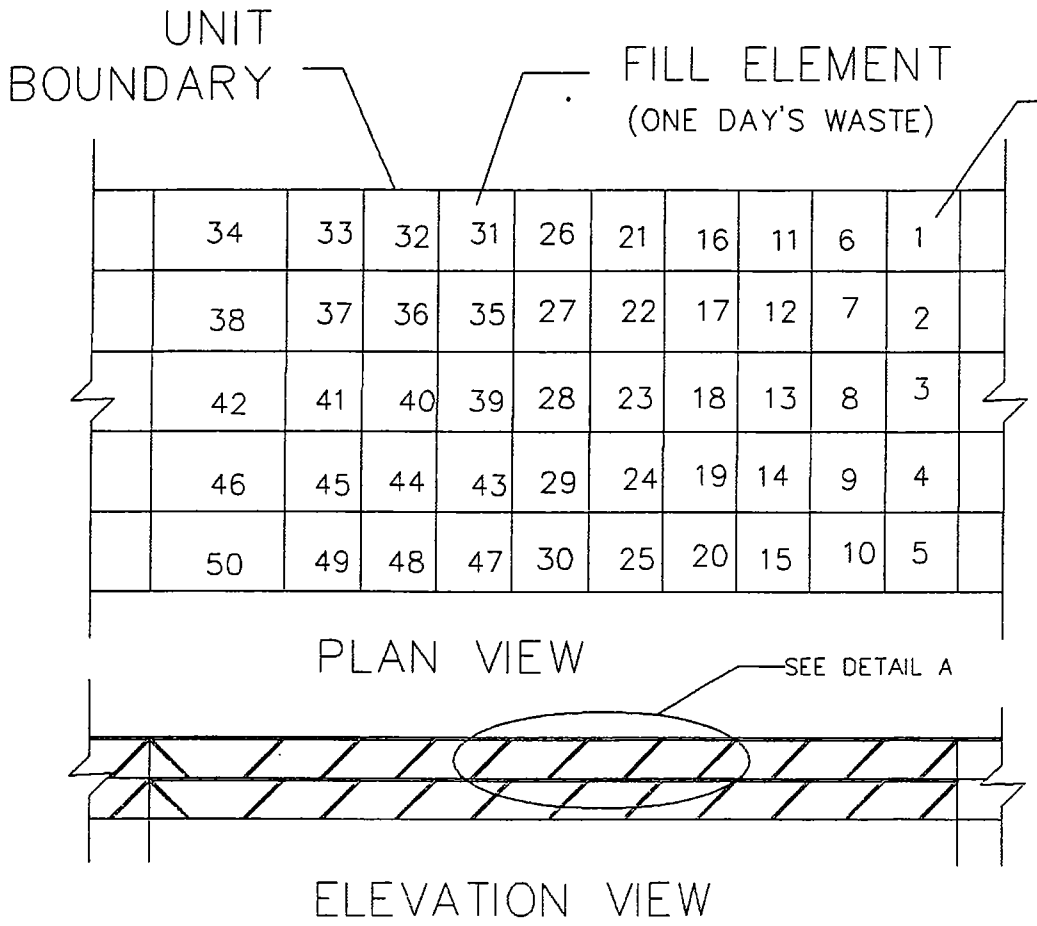


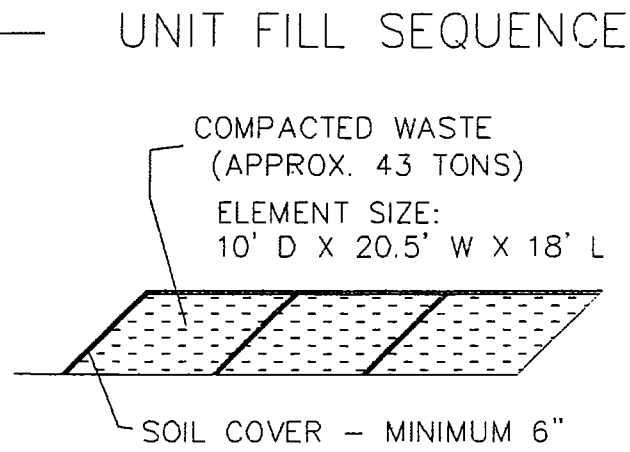
EXISTING AND FINAL FILL
PROFILES AT 100' INTERVALS

PAYSON CITY
CLASS V LANDFILL

SCALE: 1" = 150'

DRAWING NO. III-3-b-3 FEBRUARY 2000





PAYSON CITY CLASS V LANDFILL

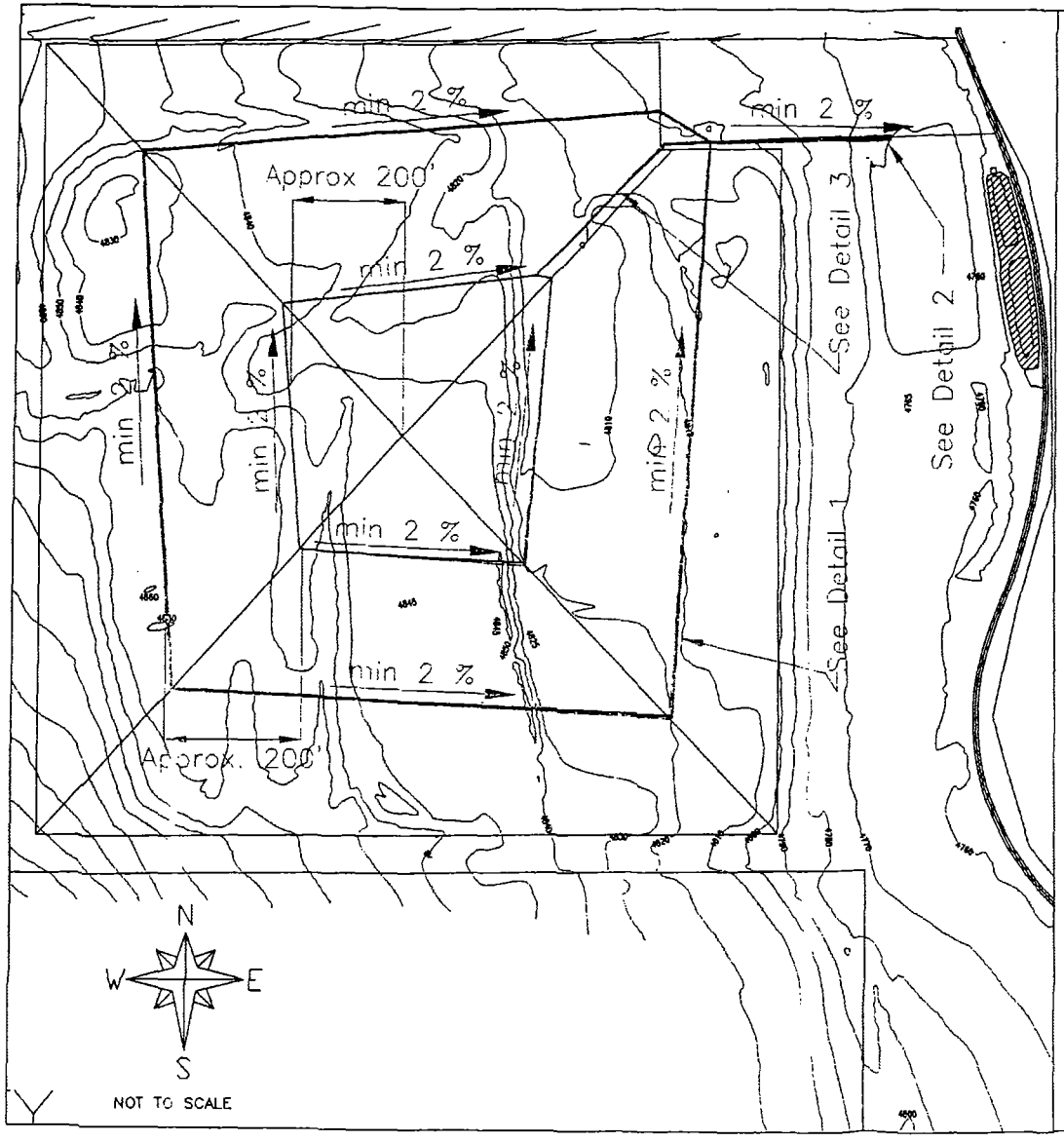
DRAWING NO. III-3-b-4 FEBRUARY 2000

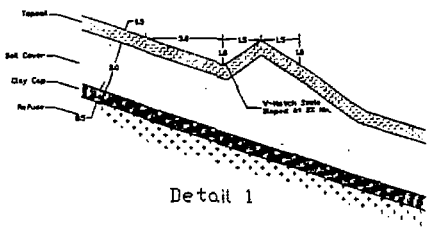
APPENDIX H

Design and Location of Run-on and
Run-off Control Systems

Drawing No.	Drawing
P-LF_ST	Site Plan
P-LF-EC	Erosion Control
P-LF_BAS	Retention Pond Plan & Profile
P-LF_PIP	Pipe System Layout
P-LF_DET	Inlet Box Details

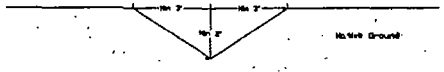
Storm Drain Calculations
Slope Stability Calculations



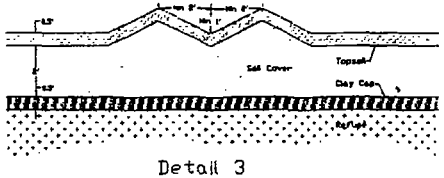


Detail 1

Slope V-Notch Swale Detail



Detail 2



Detail 3

Collector Ditch Details

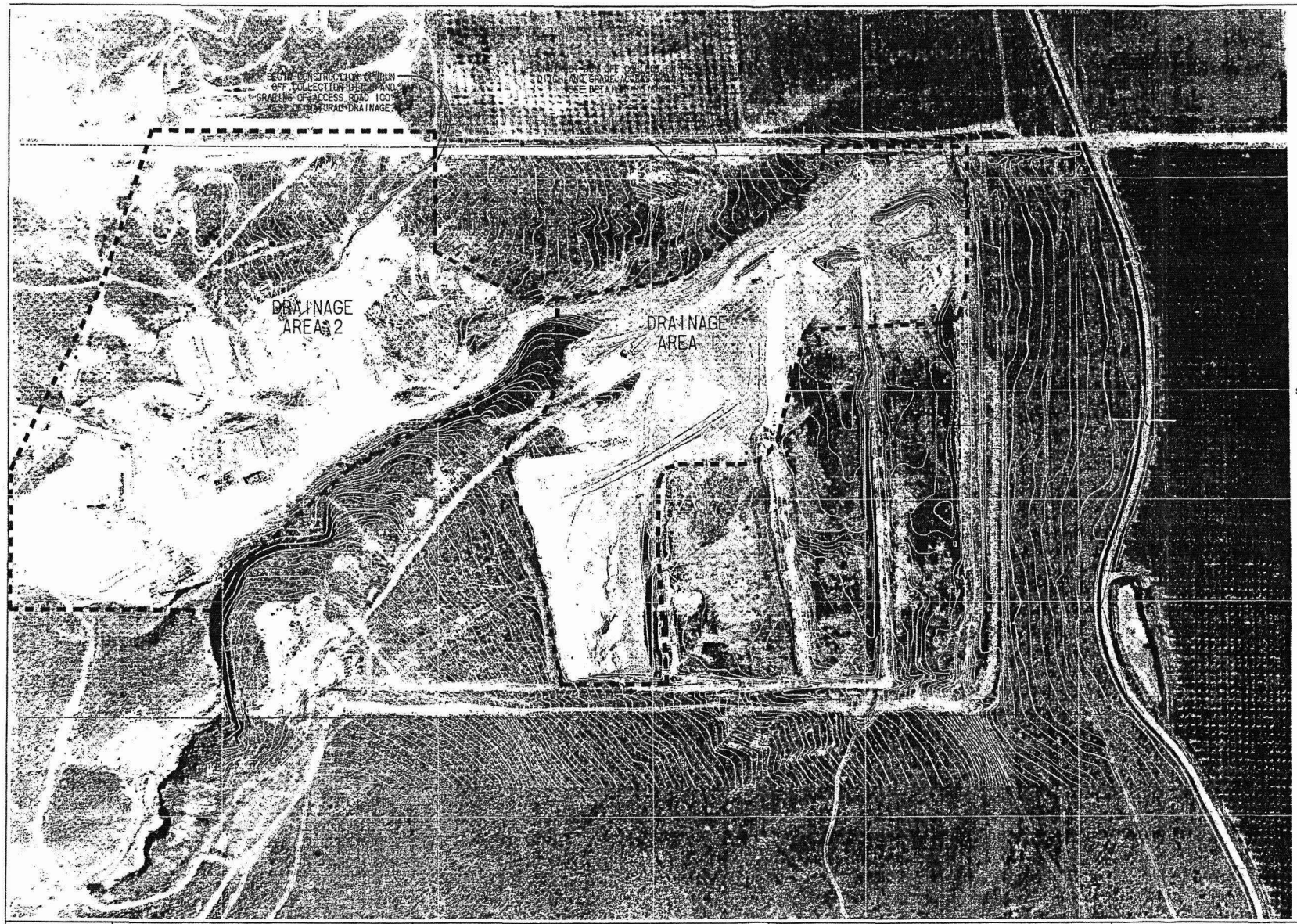
General Notes

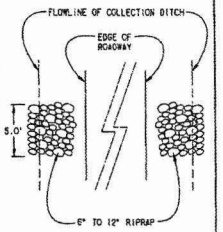
No.	Revision/Issue	Date

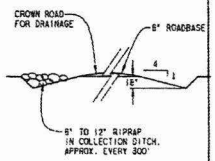
Payson City
439 Utah Ave.
Payson, Utah

Payson City
Class V Landfill
Payson, Utah

Project: Class V Landfill	Sheet: 1 of 1
Date: 12/28/91	Drawing #: P-LF-EC
Scale: Not to Scale	







ACCESS ROAD & COLLECTION DITCH
PLAN & PROFILE
SCALE = NONE

DRAWN	RJC			
CHECKED	BCT			
DESIGNED	RLA			
SCALE	1" = 100'	REVISIONS	BY	DATE

OLYMPUS AERIAL SURVEYS, INC. 92078

PERKINS–THURGOOD
CONSULTING ENGINEERS INC.

PAYSON CITY CORPORATION
SANITARY LANDFILL
STORM DRAINAGE AND RETENTION POND

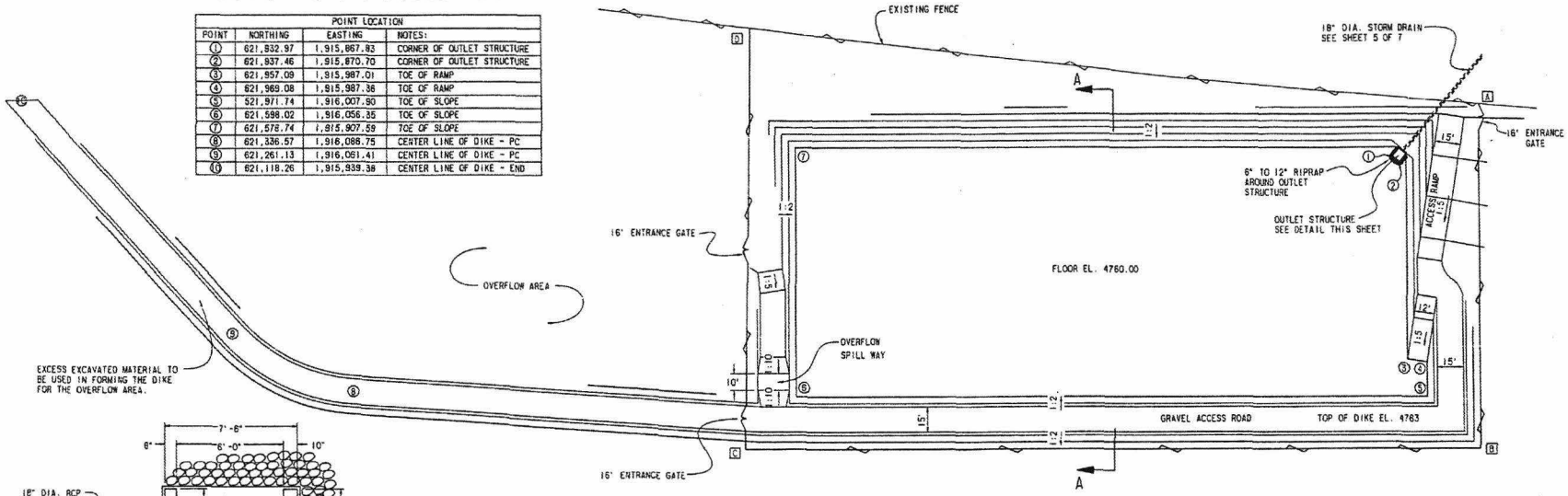
SITE PLAN

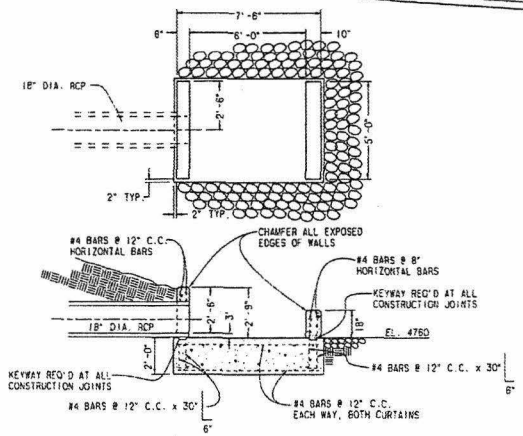
DRAWING #	P-LF-S17
PROJECT NO	9203P
DATE	AUG. 1993
SHEET NO.	3 OF 7

FENCE CORNER LOCATION		
POINT	NORTHING	EASTING
A	621,980.01	1,915,829.35
B	622,006.62	1,916,034.64
C	621,572.11	1,916,091.36
D	621,543.07	1,915,840.16

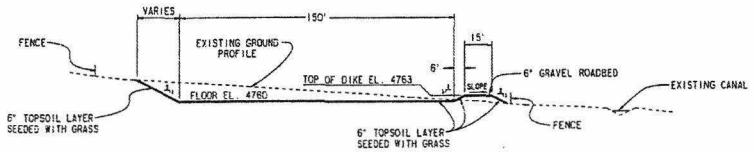
NOTE: ALL COORDINGAES ARE BASED FROM THE NORTH 1/4 CORNER OF SECTION 15, T9S, R1E, SALT LAKE BASE AND MERIDIAN.

POINT LOCATION			
POINT	NORTHING	EASTING	NOTES:
1	621,932.97	1,915,867.83	CORNER OF OUTLET STRUCTURE
2	621,937.46	1,915,870.70	CORNER OF OUTLET STRUCTURE
3	621,957.09	1,915,987.01	TOE OF RAMP
4	621,969.08	1,915,987.36	TOE OF RAMP
5	621,971.74	1,916,007.90	TOE OF SLOPE
6	621,598.02	1,916,056.35	TOE OF SLOPE
7	621,578.74	1,915,907.59	TOE OF SLOPE
8	621,336.57	1,916,088.75	CENTER LINE OF DIKE - PC
9	621,261.13	1,916,061.41	CENTER LINE OF DIKE - PC
10	621,118.26	1,915,939.38	CENTER LINE OF DIKE - END





OUTLET STRUCTURE DETAIL
SCALE: 1" = 3'



RETENTION POND
CROSS SECTION A-A

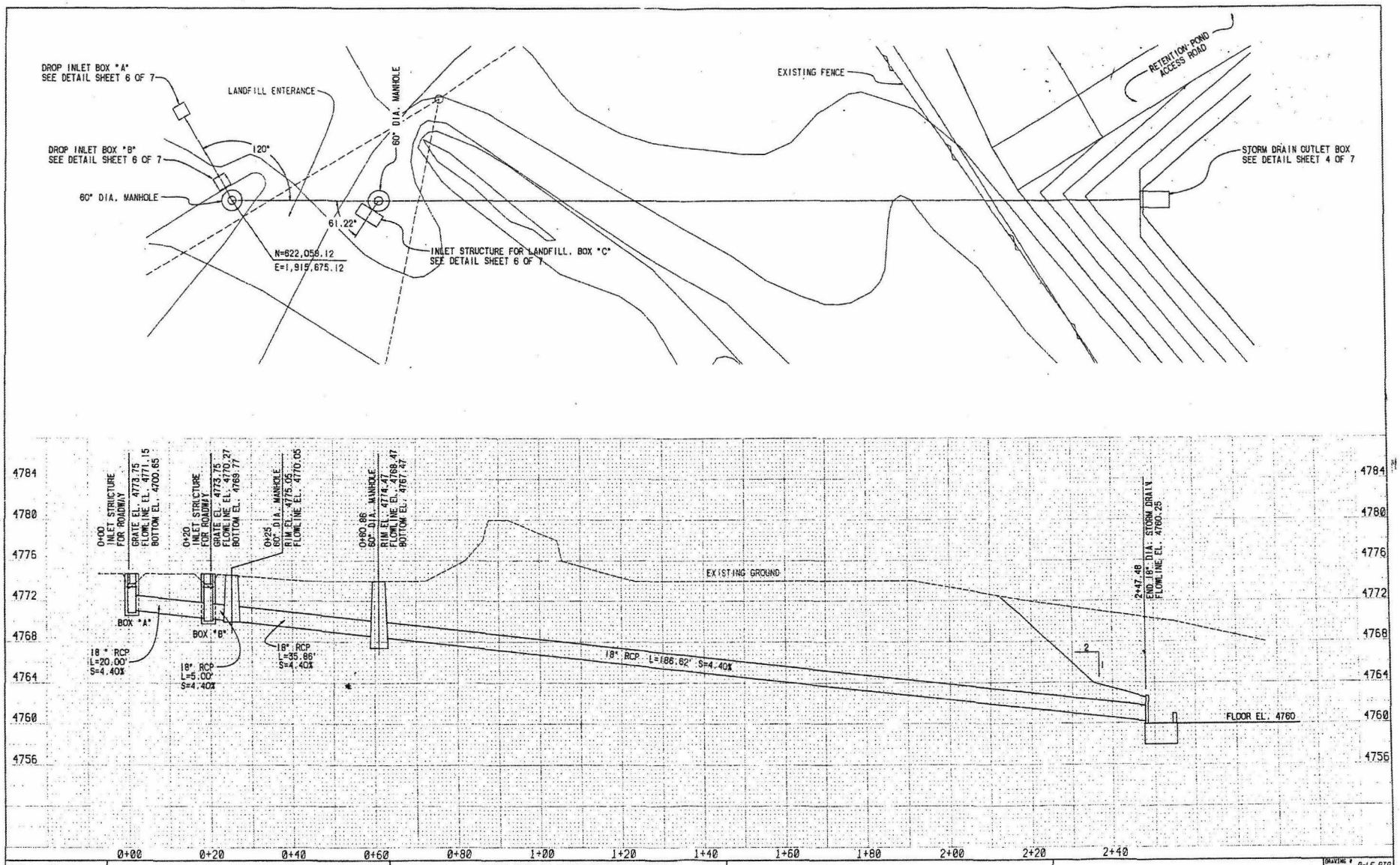
DRAWN	RJB		
CHECKED	BLH		
DESIGNED	BLH		
SCALE	1" = 30'	REVISIONS	BY DATE

PERKINS-THURGOOD
CONSULTING ENGINEERS INC.

PAYSON CITY CORPORATION
SANITARY LANDFILL
STORM DRAINAGE AND RETENTION POND

RETENTION POND
PLAN & PROFILE

DRAWING # P-LF.BAS
PROJECT NO. 92032
DATE AUG. 1993
SHEET NO. 4 OF 7



DRAWN	RJB				
CHECKED	BDT				
DESIGNED	BLH				
SCALE	HORIZ.: 1" = 10' VERT.: 1" = 4'	REVISIONS	BY	DATE	

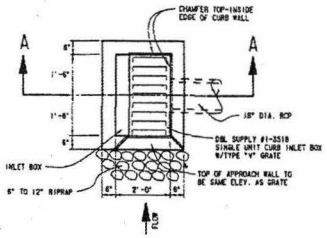
Certified Reply: 1-01-94

PERKINS-THURGOOD
CONSULTING ENGINEERS INC.

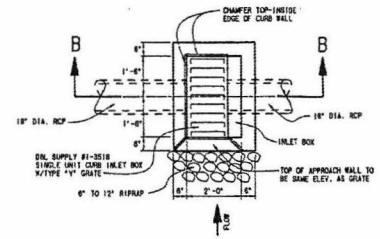
PAYSON CITY CORPORATION
SANITARY LANDFILL
STORM DRAINAGE AND RETENTION POND

PIPE SYSTEM LAYOUT

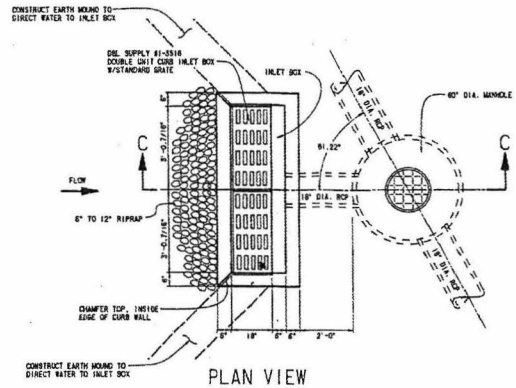
DRAWING # P-LF PIP
PROJECT NO. 92032
DATE AUG. 1993
SHEET NO. 5 OF 7



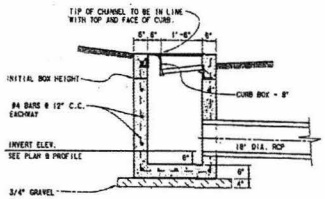
PLAN VIEW



PLAN VIEW

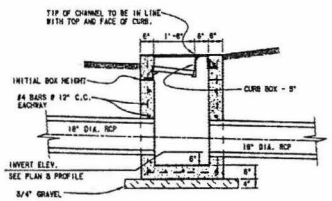


PLAN VIEW



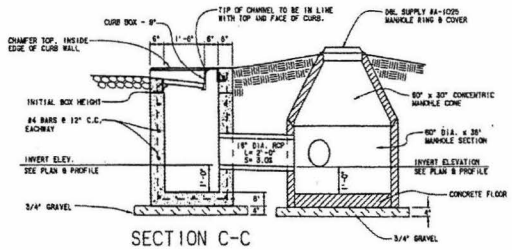
SECTION A-A

SINGLE UNIT
BOX "A" INLET DETAIL



SECTION B-B

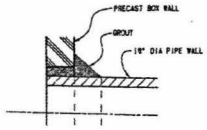
SINGLE UNIT
BOX "B" INLET DETAIL



SECTION C-C

DOUBLE UNIT
BOX "C" INLET DETAIL

NOTE:
PRECAST BOXES MAY BE USED FOR AN INLET BOX.
THE FOLLOWING SHALL APPLY...
1- MINIMUM HEIGHT 2'-0"
2- PRECAST HOLE DIAMETER TO BE 2" GREATER THAN THE OUTSIDE DIAMETER OF PIPE.
18" CONCRETE PIPE - 25.5" HOLE DIA.
3- FOLLOWING INSTALLATION OF PIPE, GROUT THE ANNULAR SPACE BETWEEN THE PIPE AND THE BOX WALL, AND GROUT A 2" WIDE FILLET/COLLAR AROUND THE PIPE ON THE OUTSIDE OF THE BOX.
SEE PRECAST HOLE DETAIL THIS SHEET.



PRECAST HOLE
DETAIL
SCALE = NONE

DRAWN RJB		PERKINS-THURGOOD CONSULTING ENGINEERS INC.	PAYSON CITY CORPORATION SANITARY LANDFILL STORM DRAINAGE AND RETENTION POND	INLET BOX DETAILS	DRAWING # P-LF-DET
CHECKED BDT					PROJECT NO. 92032
DESIGNED DLH					DATE AUG. 1993
SCALE 1" = 2'-0"	REVISIONS BY DATE				SHEET NO. 6 of 7

Manning Equation								
Q	V	A	d	ϕ	P	R	S	n
cfs	fps	ft^2	ft	^{0}	ft	ft	%	-
39.45	4.38	9.00	3.0	45	8.5	1.06	1%	0.025
36.04	4.29	8.41	2.9	45	8.2	1.03	1%	0.025
32.82	4.19	7.84	2.8	45	7.9	0.99	1%	0.025
29.79	4.09	7.29	2.7	45	7.6	0.95	1%	0.025
26.93	3.98	6.76	2.6	45	7.4	0.92	1%	0.025
24.26	3.88	6.25	2.5	45	7.1	0.88	1%	0.025
21.76	3.78	5.76	2.4	45	6.8	0.85	1%	0.025
27.47	5.19	5.29	2.3	45	6.5	0.81	1%	0.025
4.21	4.21	1.00	1	45	2.8	0.35	2%	0.025
3.18	3.93	0.81	0.9	45	2.5	0.32	2%	0.025
2.32	3.63	0.64	0.8	45	2.3	0.28	2%	0.025
1.63	3.32	0.49	0.7	45	2.0	0.25	2%	0.025
1.08	3.00	0.36	0.6	45	1.7	0.21	2%	0.025
0.66	2.65	0.25	0.5	45	1.4	0.18	2%	0.025
0.37	2.29	0.16	0.4	45	1.1	0.14	2%	0.025
0.17	1.89	0.09	0.3	45	0.8	0.11	2%	0.025
0.06	1.44	0.04	0.2	45	0.6	0.07	2%	0.025
0.01	0.91	0.01	0.1	45	0.3	0.04	2%	0.025

SMADA 6.0 for Windows
Watershed Information

atershed Total Area (acres)	:2.00
npervious Area (acres)	:0.00
ime of Concentration (min)	:6.0
mpervious Directly Connected	:00.00

dditional Abstraction

ver Pervious Area (inches)	:0.00
ver Impervious Area (inches)	:0.00

nfiltration Characteristics:

ax Infiltration Capacity (in)	:24.00
CS Curve Number for Pervious	:77
nitial Abstraction Factor	:0.20

Hydrograph Type :Santa Barbara Method

ime hr)	Time HHMM	Rain (in)	C Rain (in)	Infiltration (in)	Instant (cfs)	Outflow (cfs)
.250	00015	0.005	0.005	0.005	0.000	0.000
.500	00030	0.008	0.013	0.008	0.000	0.000
.	00045	0.008	0.021	0.008	0.000	0.000
.	00100	0.008	0.029	0.008	0.000	0.000
.250	00115	0.008	0.036	0.008	0.000	0.000
.500	00130	0.008	0.044	0.008	0.000	0.000
.750	00145	0.008	0.052	0.008	0.000	0.000
.000	00200	0.008	0.060	0.008	0.000	0.000
.250	00215	0.008	0.068	0.008	0.000	0.000
.500	00230	0.008	0.076	0.008	0.000	0.000
.750	00245	0.008	0.083	0.008	0.000	0.000
.000	00300	0.008	0.091	0.008	0.000	0.000
.250	00315	0.008	0.099	0.008	0.000	0.000
.500	00330	0.008	0.107	0.008	0.000	0.000
.750	00345	0.008	0.115	0.008	0.000	0.000
.000	00400	0.010	0.125	0.010	0.000	0.000
.250	00415	0.010	0.135	0.010	0.000	0.000
.500	00430	0.010	0.146	0.010	0.000	0.000
.750	00445	0.010	0.156	0.010	0.000	0.000
.000	00500	0.010	0.167	0.010	0.000	0.000
.250	00515	0.010	0.177	0.010	0.000	0.000
.500	00530	0.010	0.187	0.010	0.000	0.000
.750	00545	0.010	0.198	0.010	0.000	0.000
.000	00600	0.010	0.208	0.010	0.000	0.000
.250	00615	0.013	0.221	0.013	0.000	0.000
.500	00630	0.013	0.234	0.013	0.000	0.000
.750	00645	0.013	0.247	0.013	0.000	0.000
.000	00700	0.013	0.260	0.013	0.000	0.000
.250	00715	0.013	0.273	0.013	0.000	0.000
.500	00730	0.013	0.286	0.013	0.000	0.000
.750	00745	0.013	0.299	0.013	0.000	0.000
.000	00800	0.013	0.312	0.013	0.000	0.000
.250	00815	0.016	0.328	0.016	0.000	0.000
.500	00830	0.018	0.346	0.018	0.000	0.000
.750	00845	0.018	0.365	0.018	0.000	0.000
.000	00900	0.018	0.383	0.018	0.000	0.000
.25	00915	0.021	0.404	0.021	0.000	0.000
.5	00930	0.021	0.424	0.021	0.000	0.000
.7	00945	0.023	0.448	0.023	0.000	0.000
).00	01000	0.023	0.471	0.023	0.000	0.000
).25	01015	0.026	0.497	0.026	0.000	0.000
).50	01030	0.031	0.529	0.031	0.000	0.000
).75	01045	0.039	0.568	0.039	0.000	0.000
..00	01100	0.047	0.615	0.047	0.001	0.000
..25	01115	0.055	0.669	0.053	0.013	0.008
..50	01130	0.068	0.737	0.063	0.037	0.027
..75	01145	0.271	1.008	0.227	0.349	0.212
).00	01200	0.719	1.726	0.459	2.098	1.336
).25	01215	0.115	1.841	0.059	0.451	1.267
).50	01230	0.073	1.914	0.036	0.300	0.276
).75	01245	0.060	1.974	0.028	0.253	0.277
).00	01300	0.047	2.021	0.022	0.203	0.223
).25	01315	0.039	2.060	0.018	0.172	0.183
).50	01330	0.034	2.094	0.015	0.151	0.159
).75	01345	0.029	2.122	0.013	0.129	0.138
..00	01400	0.026	2.148	0.011	0.118	0.122
..25	01415	0.023	2.172	0.010	0.108	0.112
.50	01430	0.021	2.193	0.009	0.096	0.101
.75	01445	0.018	2.211	0.008	0.085	0.089
..00	01500	0.018	2.229	0.008	0.085	0.085
..25	01515	0.018	2.247	0.008	0.086	0.086
..50	01530	0.016	2.263	0.006	0.074	0.079
.75	01545	0.016	2.278	0.006	0.074	0.073
..00	01600	0.016	2.294	0.006	0.075	0.075
..25	01615	0.016	2.310	0.006	0.075	0.075
..50	01630	0.016	2.325	0.006	0.075	0.075
..75	01645	0.013	2.338	0.005	0.063	0.068
.00	01700	0.013	2.351	0.005	0.063	0.062
.25	01715	0.013	2.364	0.005	0.063	0.063
.50	01730	0.013	2.377	0.005	0.064	0.064
.75	01745	0.013	2.390	0.005	0.064	0.064
.	01800	0.010	2.401	0.004	0.051	0.057
.	01815	0.010	2.411	0.004	0.051	0.051
.5	01830	0.010	2.422	0.004	0.052	0.052
.75	01845	0.010	2.432	0.004	0.052	0.052
.00	01900	0.010	2.443	0.004	0.052	0.052
.25	01915	0.010	2.453	0.004	0.052	0.052
.50	01930	0.010	2.463	0.004	0.052	0.052
.75	01945	0.010	2.474	0.004	0.052	0.052
.00	02000	0.008	2.482	0.003	0.039	0.045
.25	02015	0.008	2.489	0.003	0.039	0.039

0.50	02030	0.008	2.497	0.003	0.039	0.039
0.75	02045	0.008	2.505	0.003	0.039	0.039
1.00	02100	0.008	2.513	0.003	0.040	0.040
1.25	02115	0.008	2.521	0.003	0.040	0.040
1.50	02130	0.008	2.528	0.003	0.040	0.040
1.75	02145	0.008	2.536	0.003	0.040	0.040
2.00	02200	0.008	2.544	0.003	0.040	0.040
2.25	02215	0.008	2.552	0.003	0.040	0.040
2	02230	0.008	2.560	0.003	0.040	0.040
2	02245	0.008	2.568	0.003	0.040	0.040
3.00	02300	0.008	2.575	0.003	0.040	0.040
3.25	02315	0.008	2.583	0.003	0.040	0.040
3.50	02330	0.008	2.591	0.003	0.040	0.040
3.75	02345	0.008	2.599	0.003	0.040	0.040
4.00	00000	0.005	2.604	0.002	0.027	0.033
4.25	00015	0.000	2.604	0.000	0.000	0.011
4.50	00030	0.000	2.604	0.000	0.000	0.001
			2.604	1.798	0.806	0.806

Totals for Watershed in inches over 2.00 acres

ational Coefficient = 0.310 Peak Flow (cfs) = 01.34

SMADA 6.0 for Windows
Watershed Information

atershed Total Area (acres)	:220.00
npervious Area (acres)	:0.00
ime of Concentration (min)	:20.0
Impervious Directly Connected	:00.00

dditional Abstraction

ver Pervious Area (inches)	:0.00
ver Impervious Area (inches)	:0.00

nfiltration Characteristics:

ax Infiltration Capacity (in)	:999.00
CS Curve Number for Pervious	:65
nitial Abstraction Factor	:0.20

Hydrograph Type :SCS 484 Hydrograph

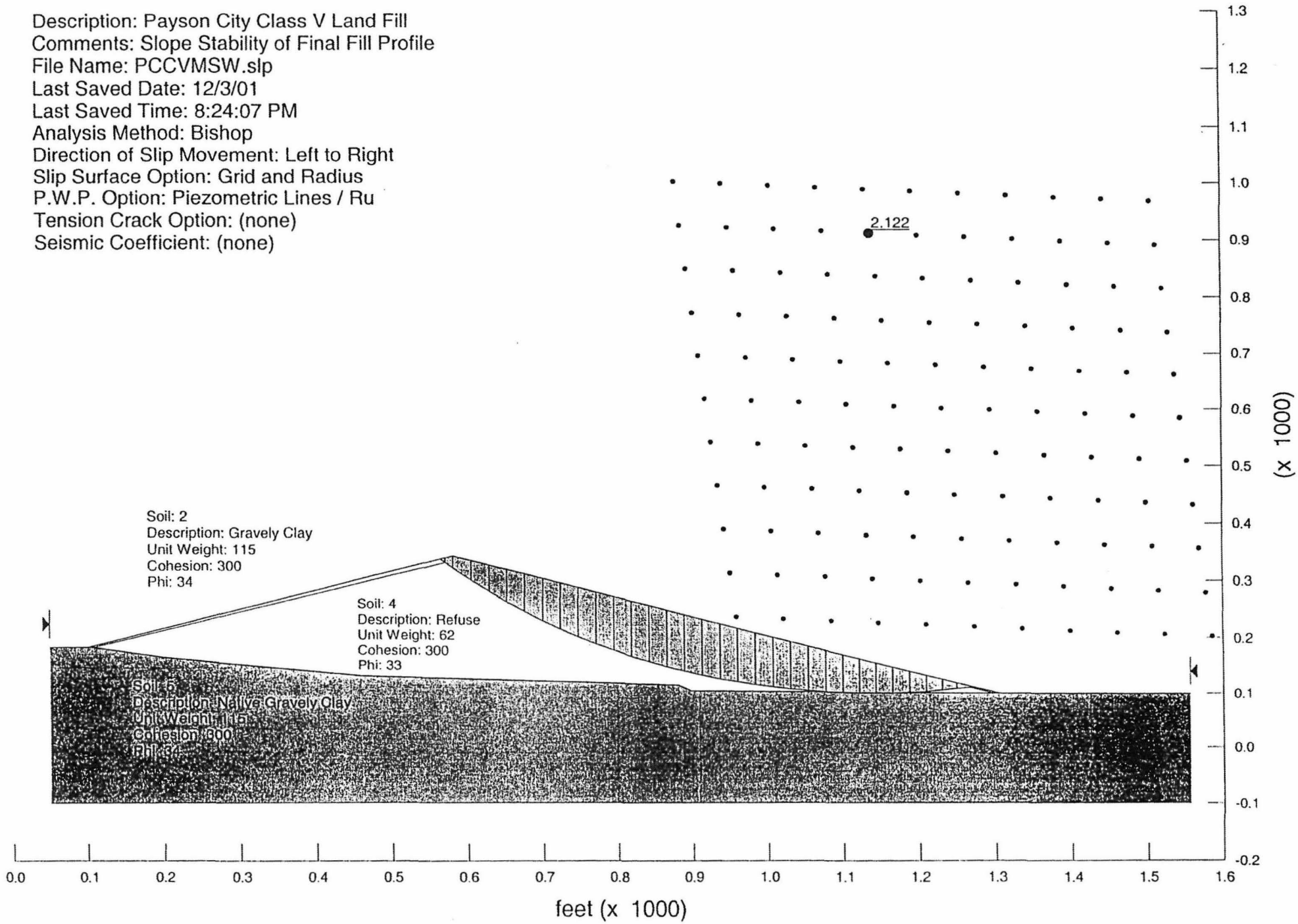
ime hr)	Time HHMM	Rain (in)	C Rain (in)	Infiltration (in)	Instant (cfs)	Outflow (cfs)
.250	00015	0.005	0.005	0.005	0.000	0.000
[illegible]	00030	0.008	0.013	0.008	0.000	0.000
.	00045	0.008	0.021	0.008	0.000	0.000
.	00100	0.008	0.029	0.008	0.000	0.000
.250	00115	0.008	0.036	0.008	0.000	0.000
.500	00130	0.008	0.044	0.008	0.000	0.000
.750	00145	0.008	0.052	0.008	0.000	0.000
.000	00200	0.008	0.060	0.008	0.000	0.000
.250	00215	0.008	0.068	0.008	0.000	0.000
.500	00230	0.008	0.076	0.008	0.000	0.000
.750	00245	0.008	0.083	0.008	0.000	0.000
.000	00300	0.008	0.091	0.008	0.000	0.000
.250	00315	0.008	0.099	0.008	0.000	0.000
.500	00330	0.008	0.107	0.008	0.000	0.000
.750	00345	0.008	0.115	0.008	0.000	0.000
.000	00400	0.010	0.125	0.010	0.000	0.000
.250	00415	0.010	0.135	0.010	0.000	0.000
.500	00430	0.010	0.146	0.010	0.000	0.000
.750	00445	0.010	0.156	0.010	0.000	0.000
.000	00500	0.010	0.167	0.010	0.000	0.000
.250	00515	0.010	0.177	0.010	0.000	0.000
.500	00530	0.010	0.187	0.010	0.000	0.000
.750	00545	0.010	0.198	0.010	0.000	0.000
.000	00600	0.010	0.208	0.010	0.000	0.000
.250	00615	0.013	0.221	0.013	0.000	0.000
.500	00630	0.013	0.234	0.013	0.000	0.000
.750	00645	0.013	0.247	0.013	0.000	0.000
.000	00700	0.013	0.260	0.013	0.000	0.000
.250	00715	0.013	0.273	0.013	0.000	0.000
.500	00730	0.013	0.286	0.013	0.000	0.000
.750	00745	0.013	0.299	0.013	0.000	0.000
.000	00800	0.013	0.312	0.013	0.000	0.000
.250	00815	0.016	0.328	0.016	0.000	0.000
.500	00830	0.018	0.346	0.018	0.000	0.000
.750	00845	0.018	0.365	0.018	0.000	0.000
.000	00900	0.018	0.383	0.018	0.000	0.000
.7	00915	0.021	0.404	0.021	0.000	0.000
..	00930	0.021	0.424	0.021	0.000	0.000
.7.	00945	0.023	0.448	0.023	0.000	0.000
).00	01000	0.023	0.471	0.023	0.000	0.000
).25	01015	0.026	0.497	0.026	0.000	0.000
).50	01030	0.031	0.529	0.031	0.000	0.000
).75	01045	0.039	0.568	0.039	0.000	0.000
..00	01100	0.047	0.615	0.047	0.000	0.000
..25	01115	0.055	0.669	0.055	0.000	0.000
..50	01130	0.068	0.737	0.068	0.000	0.000
..75	01145	0.271	1.008	0.271	0.000	0.000
!.00	01200	0.719	1.726	0.649	62.019	11.482
!.25	01215	0.115	1.841	0.090	22.211	27.075
!.50	01230	0.073	1.914	0.055	15.657	27.200
!.75	01245	0.060	1.974	0.044	13.712	23.285
).00	01300	0.047	2.021	0.034	11.252	16.816
).25	01315	0.039	2.060	0.028	9.718	12.666
).50	01330	0.034	2.094	0.024	8.668	10.734
).75	01345	0.029	2.122	0.020	7.510	9.296
..00	01400	0.026	2.148	0.018	6.965	8.176
..25	01415	0.023	2.172	0.016	6.380	7.353
..50	01430	0.021	2.193	0.014	5.758	6.669
.75	01445	0.018	2.211	0.012	5.105	6.042
..00	01500	0.018	2.229	0.012	5.167	5.544
..25	01515	0.018	2.247	0.012	5.228	5.295
..50	01530	0.016	2.263	0.011	4.529	5.084
.75	01545	0.016	2.278	0.010	4.574	4.834
..00	01600	0.016	2.294	0.010	4.618	4.689
..25	01615	0.016	2.310	0.010	4.661	4.624
..50	01630	0.016	2.325	0.010	4.704	4.640
..75	01645	0.013	2.338	0.009	3.953	4.536
.00	01700	0.013	2.351	0.009	3.983	4.283
.25	01715	0.013	2.364	0.008	4.013	4.113
.50	01730	0.013	2.377	0.008	4.042	4.027
.75	01745	0.013	2.390	0.008	4.071	4.028
.	01800	0.010	2.401	0.007	3.278	3.905
.	01815	0.010	2.411	0.007	3.296	3.627
.50	01830	0.010	2.422	0.007	3.315	3.437
.75	01845	0.010	2.432	0.007	3.333	3.336
.00	01900	0.010	2.443	0.007	3.351	3.324
.25	01915	0.010	2.453	0.007	3.369	3.342
.50	01930	0.010	2.463	0.007	3.387	3.361
.75	01945	0.010	2.474	0.007	3.405	3.379
.00	02000	0.008	2.482	0.005	2.566	3.238
.25	02015	0.008	2.489	0.005	2.576	2.937

0.50	02030	0.008	2.497	0.005	2.586	2.728
0.75	02045	0.008	2.505	0.005	2.596	2.613
1.00	02100	0.008	2.513	0.005	2.606	2.591
1.25	02115	0.008	2.521	0.005	2.616	2.601
1.50	02130	0.008	2.528	0.005	2.625	2.611
1.75	02145	0.008	2.536	0.005	2.635	2.621
2.00	02200	0.008	2.544	0.005	2.645	2.630
2.25	02215	0.008	2.552	0.005	2.655	2.640
2	02230	0.008	2.560	0.005	2.664	2.650
2	02245	0.008	2.568	0.005	2.674	2.660
3.00	02300	0.008	2.575	0.005	2.684	2.670
3.25	02315	0.008	2.583	0.005	2.693	2.679
3.50	02330	0.008	2.591	0.005	2.703	2.689
3.75	02345	0.008	2.599	0.005	2.713	2.698
4.00	00000	0.005	2.604	0.003	1.814	2.540
4.25	00015	0.000	2.604	0.000	0.000	1.875
4.50	00030	0.000	2.604	0.000	0.000	0.973
4.75	00045	0.000	2.604	0.000	0.000	0.370
5.00	00100	0.000	2.604	0.000	0.000	0.067
			2.604	2.267	0.337	0.337

Totals for Watershed in inches over 220.00 acres

ational Coefficient = 0.130 Peak Flow (cfs) = 27.20

Description: Payson City Class V Land Fill
Comments: Slope Stability of Final Fill Profile
File Name: PCCVMSW.slp
Last Saved Date: 12/3/01
Last Saved Time: 8:24:07 PM
Analysis Method: Bishop
Direction of Slip Movement: Left to Right
Slip Surface Option: Grid and Radius
P.W.P. Option: Piezometric Lines / Ru
Tension Crack Option: (none)
Seismic Coefficient: (none)



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Comments: Slope Stability of Final Fill Profile
File Name: PCCVMSW.slp
Last Saved Date: 12/3/01
Last Saved Time: 8:17:59 PM
Analysis Method: Bishop
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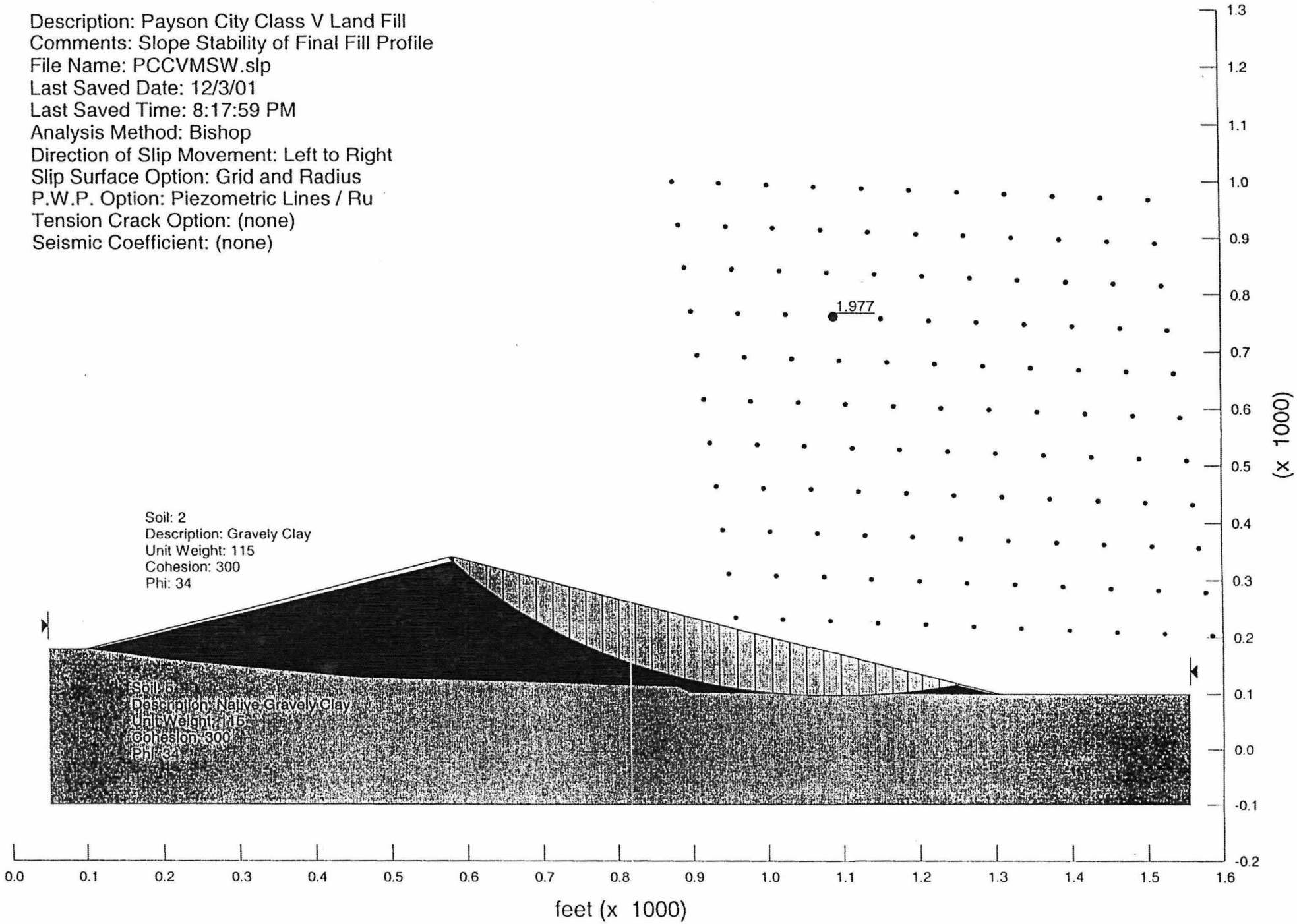
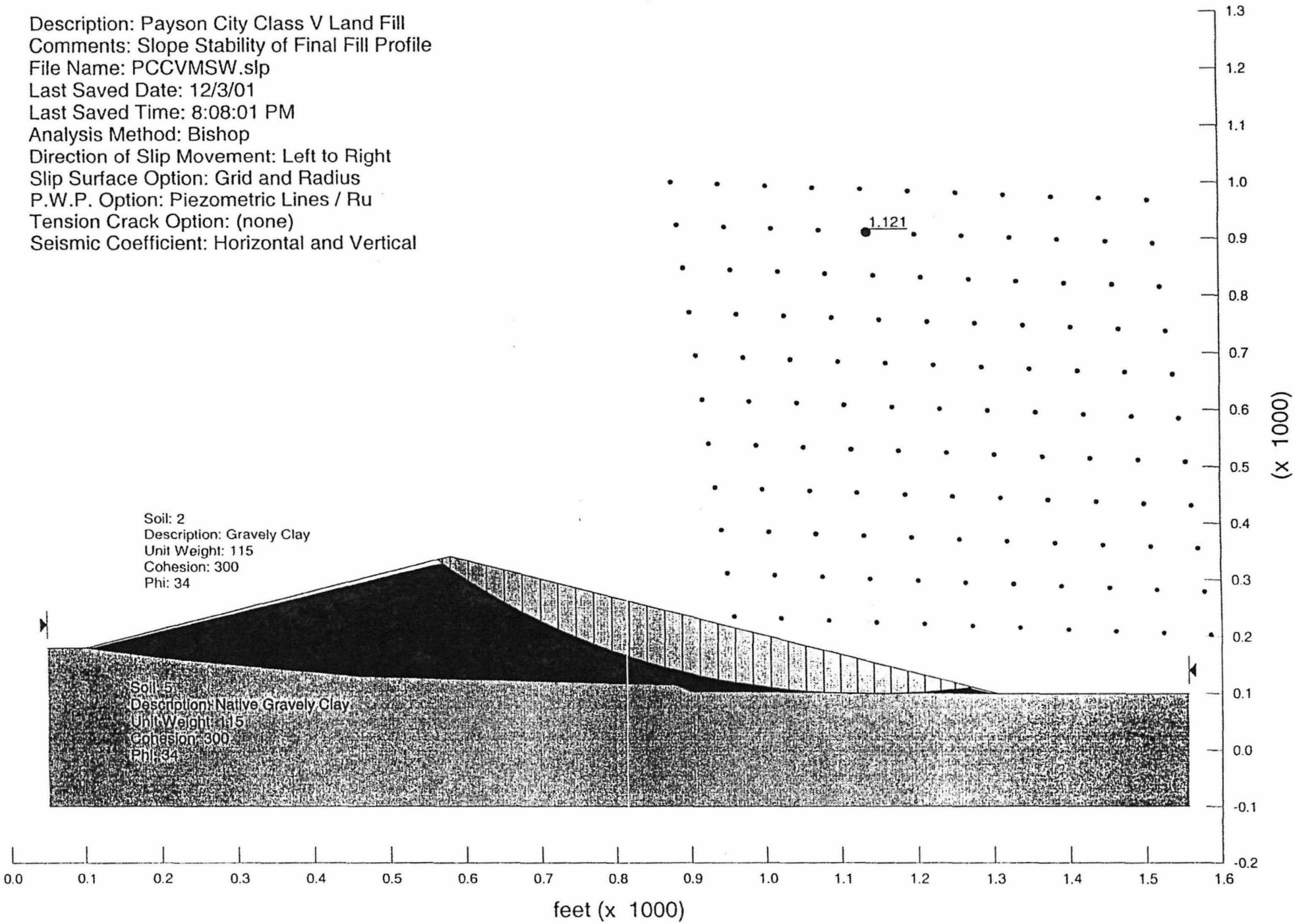
Slip Surface Option: Grid and Radius
P.W.P. Option: Piezometric Lines / Ru
Tension Crack Option: (none)
Seismic Coefficient: (none)



Description: Payson City Class V Land Fill
Comments: Slope Stability of Final Fill Profile
File Name: PCCVMSW.slp
Last Saved Date: 12/3/01
Last Saved Time: 8:08:01 PM
Analysis Method: Bishop
Direction of Slip Movement: Left to Right
Slip Surface Option: Grid and Radius
P.W.P. Option: Piezometric Lines / Ru
Tension Crack Option: (none)
Seismic Coefficient: Horizontal and Vertical

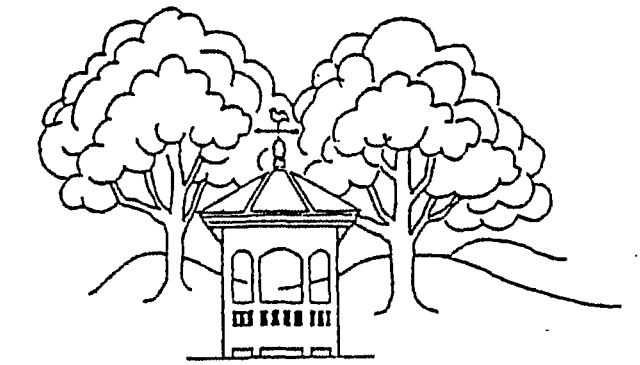


ENGINEERING STUDY

FOR

PAYSON CITY CORPORATION

SANITARY LANDFILL STORM DRAINAGE



NOVEMBER 1992

PERKINS-THURGOOD Consulting Engineers, Inc.

PERKINS-THURGOOD Consulting Engineers, Inc.

November 13, 1992

Kent Fowden
Solid Waste Superintendent
Payson City Corporation
439 West Utah Avenue
Payson, Utah 84651

Re: Sanitary Landfill Drainage Study

Dear Kent:

We have completed a study to define the quantity of storm water runoff from the Payson City Sanitary Landfill Property located on the eastern slope of West Mountain. This study was completed at the request of Payson City for the purpose of determining the runoff volume and of sizing storm water facilities to properly manage that runoff.

General

The property owned by Payson City, a portion of which is being used for the Sanitary Landfill, is a part of a 764 acre drainage basin located in portions of Sections 9, 10, 15, and 16 of Township 9 South, Range 1 East, Salt Lake Base and Meridian. The boundaries of the drainage basin and the boundaries of the property owned by Payson City, as well as that portion being used for the landfill, are shown on the following vicinity map.

The drainage basin is predominately covered with sagebrush with underlying grasses. The extreme westerly portion of the drainage basin rises to an elevation of 6,440 feet and the lowest point of the drainage basin is about 4,757 feet. The upper reaches have a steeper gradient and a sparser vegetation, gentling out as you move eastward through the drainage basin to a more gentle slope before reaching the valley floor. Drainage from the basin is from west to east. The total area owned by Payson City is approximately 195 acres of which 131.7 acres is presently planned for landfill use.

386 East 720 South / Orem, Utah 84058 / (801) 226-0393 / Fax (801) 226-0394

The runoff analysis was made using a 24-hour 25-year return frequency storm. The rainfall used in the analysis was taken from the NOAA Atlas 2, and is 2.2 inches. The analysis was made using the storm water simulation program TR-55 developed by the Soil Conservation Service. A Type II rainfall distribution was used.

Storm Water Analysis

Analysis showed that the most critical area to produce runoff was that area which has been and is presently being used for solid waste disposal. This is because the weighted curve number, which is an indicator of the amount of runoff to be expected, was highest using the smaller drainage basin. When analyzing the total area, 131.7 acres, planned for use for waste disposal the weighted curve number is 61 versus a weighted curve number of 65 for the area which has been or is now in use for disposal of wastes, 91.7 acres. In the analysis a hydrologic soil group B was used. This soil group was obtained from the Soil Survey of Utah County, Utah Central Part, prepared by the Soil Conservation Service.

The Drainage area was divided into those areas actively being used for waste disposal which have had the vegetative cover removed, and those areas which have natural vegetation still in place or have been revegetated following covering of the wastes. These areas are shown on the attached aerial topography maps. The area from which the vegetation has been removed is 35.81 acres, and the area which remains in natural vegetation or has been restored is 55.9 acres.

Examination of the aerial contour maps shows that the runoff is primarily channeled down the access roads and collects at the northeast corner of the property. This is the point that was used to determine the peak runoff as well as the runoff volume from the landfill.

The results of the analysis show that the peak discharge would be 11 cfs and that the runoff volume would be 1.84 acre/feet, a copy of the computer run and the storm runoff hydrograph are included herein. The storm water will be retained in a basin facility with the outlet from the basin to be by percolation into the subsurface soils. The range of percolation given by the Soil Conservation Service for the area in which the retention basin would be located was 0.8 to 2.5 inches per hour. Using the lower end of the permeability range and emptying the basin in a 24-hour period requires a bottom area of 1.25 acres. There is

sufficient space between the east end of the area being used for the landfill and the east property line of the city's property to construct this retention basin. A preliminary layout of the retention basin has been shown on the accompanying aerial contour maps. The maximum depth of water that might be expected in the pond during the design storm event is approximately 8 inches.

Conclusions and Recommendations

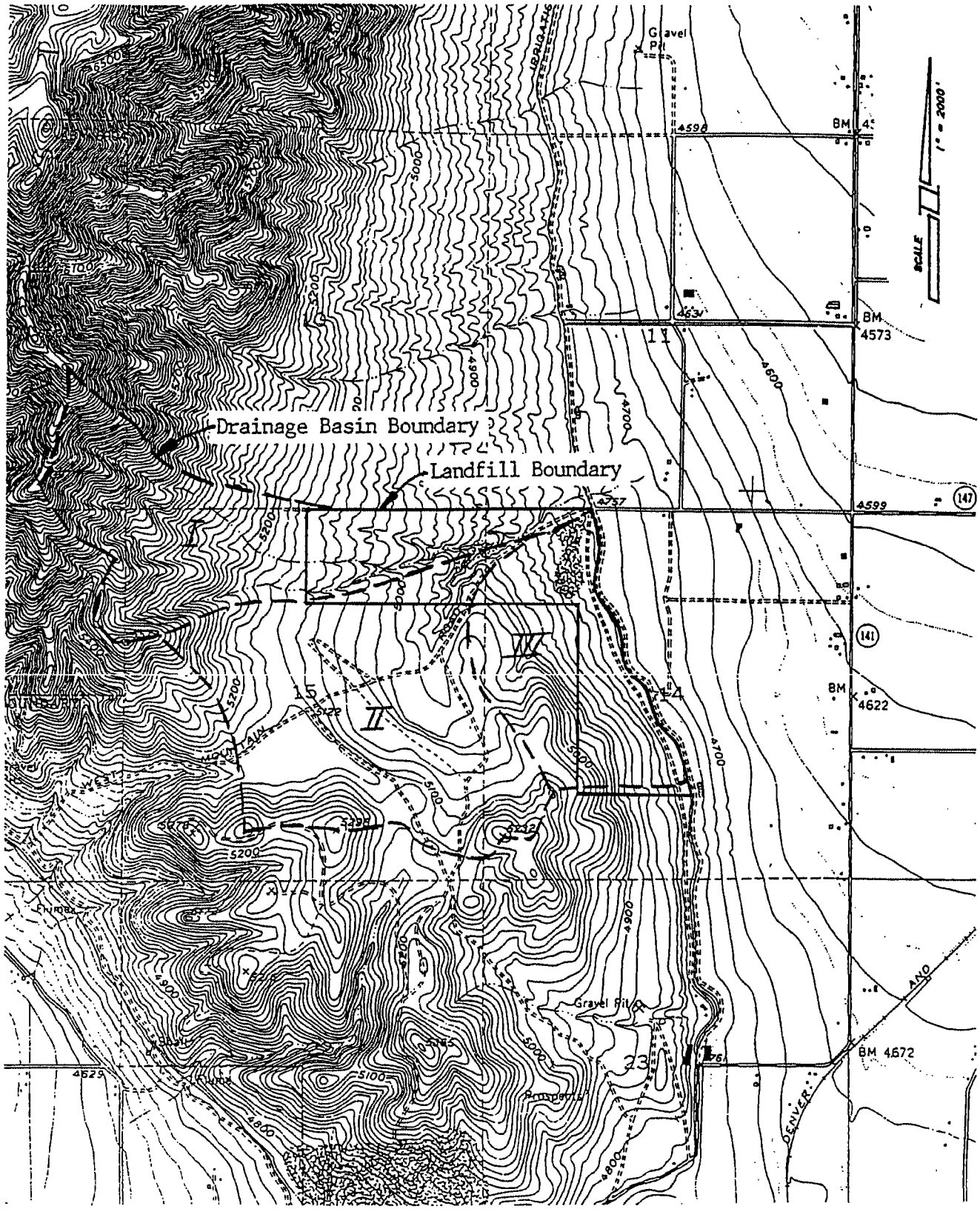
The conclusions are that a storm water retention pond be constructed in the area immediately east and downstream from the area being used as the landfill. The size of this pond needs to be that indicated on accompanying drawings and as stated above. The grading of the landfill area needs to be carried out in such a manner that all surface flow will be directed to the northeast corner of the property and that catch basins, manholes, and pipes be installed to carry all of the surface runoff to the retention basin. We would recommend that operation of the landfill be carried out in such a manner as to not increase the percentage of area from which natural vegetation has been removed. We would also recommend that grading of the peripheral area around the property being used as the landfill be done in such a manner as to prevent runon from upstream drainages. This primarily needs to be done along the west and south edges of the property.

Preliminary costs to construct the retention basin, catch basins, and associated piping have been estimated to be $63,705.00. A copy of the cost estimate is included herein.

We appreciate the opportunity to work with you regarding this study and are confident that the implementation of the recommendations contained herein will adequately handle the storm runoff from the landfill property.

Sincerely,
PERKINS-THURGOOD Consulting Engineers, Inc.

David C. Thurgood, P.E.
Area Manager



PERKINS–THURGOOD CONSULTING ENGINEERS INC.	PAYSON CITY CORPORATION SANITARY LANDFILL VICINITY MAP/DRAINAGE BASIN	DATE NOV 1992 SCALE 1"=2000' PROJECT NO. 92032

TR-55 CURVE NUMBER COMPUTATION VERSION 1.11

:oject : PAYSON LANDFILL User: DCT Date: 10-22-92
ɔunty : UTAH State: UT Checked: ____ Date: _____
ı tle: PRESENT LANDFILL WITH OPEN AND COVERED AREAS - SEPT 1992
ıbarea : USED

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
ILTIVATED AGRICULTURAL LANDS					
.llow Bare soil	----	-	35.8(86)	-	-
ID AND SEMIARID RANGELANDS					
.gebrush (w/ grass understory)	fair	-	55.9(51)	-	-
tal Area (by Hydrologic Soil Group)			91.7		

BAREA: USED TOTAL DRAINAGE AREA: 91.7 Acres WEIGHTED CURVE NUMBER:65

TR-55 Tc and Tt THRU SUBAREA COMPUTATION VERSION 1.11

·oject : PAYSON LANDFILL User: DCT Date: 10-22-92
ɔunty : UTAH State: UT Checked: ____ Date: _____
ı' ·tle: PRESENT LANDFILL WITH OPEN AND COVERED AREAS - SEPT 1992

---------- Subarea #1 - USED ----------

.ow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
ıeet	1.2	300	.0625	A					0.050
ıallow Concent'd		2010	.0587	U					0.143
ɔen Channel		210	.0667			.0112	4.47		0.003

Time of Concentration = 0.20*
=====

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense

--- Shallow Concentrated --- --- Surface Codes ---

P Paved
U Unpaved

- Generated for use by TABULAR method

TR-55 TABULAR DISCHARGE METHOD VERSION 1.11

·oject : PAYSON LANDFILL User: DCT Date: 10-22-92
ıunty : UTAH State: UT Checked: ____ Date: _____
:tle: PRESENT LANDFILL WITH OPEN AND COVERED AREAS - SEPT 1992

ıtal watershed area: 0.143 sq mi Rainfall type: II Frequency: 25 years

---------- Subareas ----------

	USED
·ea(sq mi)	0.14*
.infall(in)	2.2
rve number	65*
noff(in)	0.19
(hrs)	0.20*
meToOutlet	0.00
/P	0.49

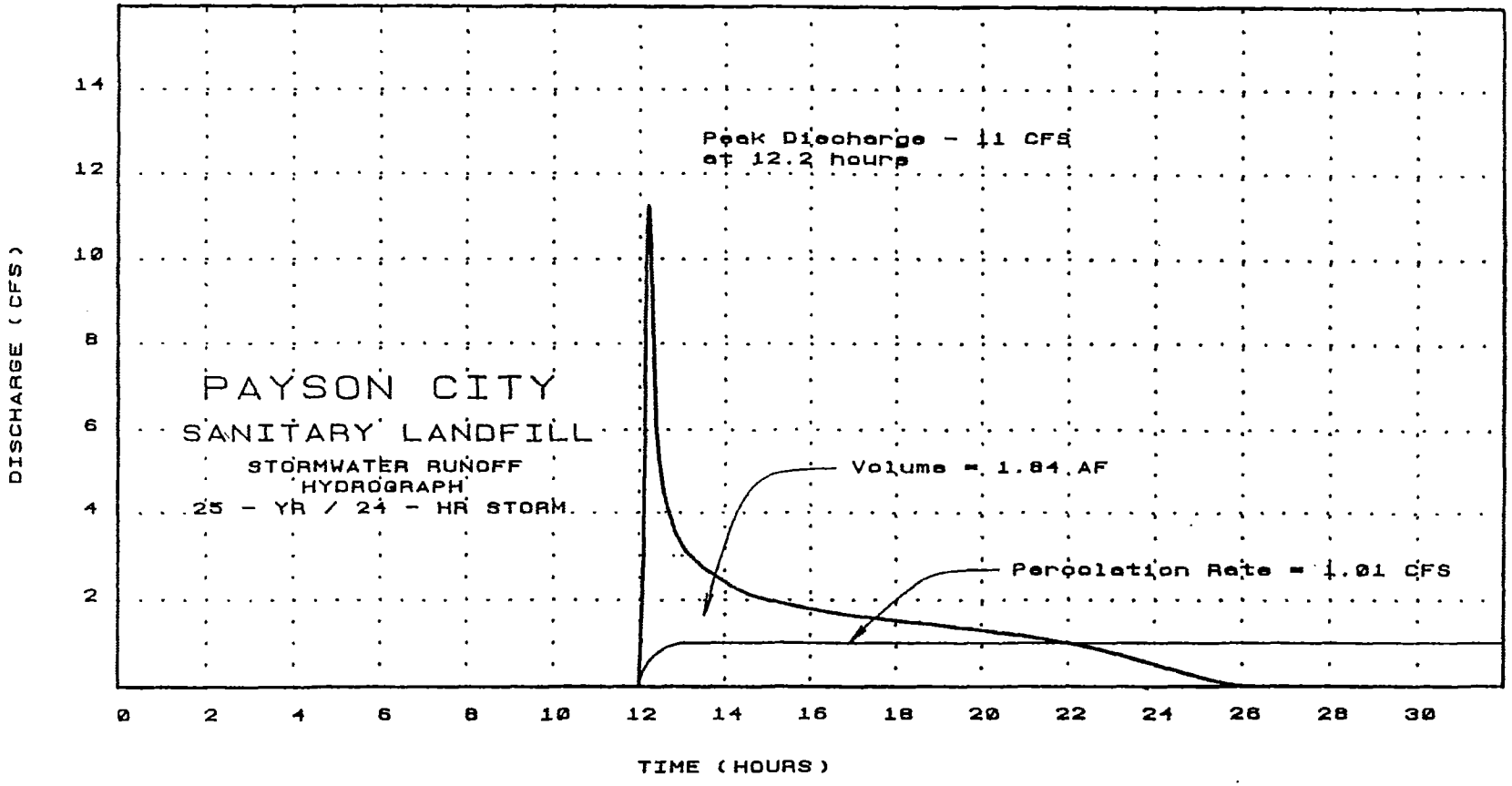
me r)	Total Flow	Subarea Contribution to Total Flow (cfs) USED
.0	0	0
.3	0	0
.6	0	0
.9	0	0
.0	0	0
.1	3	3
.2	11P	11P
.3	9	9
	6	6
..	5	5
.6	4	4
.7	4	4
.8	3	3
.0	3	3
.2	3	3
.4	2	2
.6	2	2
.8	2	2
.0	2	2
.3	2	2
.6	2	2
.0	2	2
.5	1	1
.0	1	1
.5	1	1
.0	1	1
.5	1	1
.0	1	1
.0	1	1
.0	1	1
.0	1	1
.·	0	0

- Peak Flow * - value(s) provided from TR-55 system routines

TR-55 STORAGE VOLUME FOR DETENTION BASINS VERSION 1.11

·oject : PAYSON LANDFILL User: DCT Date: 10-22-92
unty : UTAH State: UT Checked: ____ Date: _____
.tle: PRESENT LANDFILL WITH OPEN AND COVERED AREAS - SEPT 1992

Drainage Area: .1432813 Sq miles Rainfall Frequency: 25 years
Rainfall-Type: II
Runoff: 0.2 inches
Peak Inflow: 11 cfs
Peak Outflow: 1.1 cfs
Detention Basin Storage Volume: 0.11 inches or 0.8 acre feet


PAYSON CITY
SANITARY LANDFILL
STORMWATER RUNOFF
HYDROGRAPH
25 - YR / 24 - HR STORM
Peak Discharge - 11 CFS
at 12.2 hours
Volume = 1.84 AF
Percolation Rate = 1.01 CFS
DISCHARGE (CFS)
TIME (HOURS)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

PAYSON CITY CORPORATION
DRAINAGE STUDY - LANDFILL
PROJECT 92032
.NGINEERS OPINION OF PROBABLE COST
11/06/92 PRINTED

ENGINEER'S ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Clear, strip and grub the construction site. Approx. 2.22 acres.	1	JOB	$2,500.00	$2,500.00
2.	Remove and stockpile topsoil for later use. Approx. 3,600 cubic yards.	1	JOB	$4,500.00	$4,500.00
3.	Furnish and install 18" storm drain pipeline.	210	LF	$26.00	$5,460.00
4.	Furnish and construct storm drain inlet box.	2	EACH	$1,500.00	$3,000.00
5.	Furnish and construct 48-inch diameter drop manhole.	1	EACH	$2,000.00	$2,000.00
6.	Furnish and construct concrete splash block at storage basin.	1	JOB	$400.00	$400.00
7.	Storage basin earthwork, including excavation and construction of dike. Excavation is approximately 11,700 cubic yards.	1	JOB	$26,325.00	$26,325.00
8.	Place 6 inches of topsoil over all exposed cut and fill slopes.	1	JOB	$5,000.00	$5,000.00
9.	Furnish and construct 6-foot chain link fence.	1320	LF	$11.00	$14,520.00

TOTAL ESTIMATED PRICE: $63,705.00

APPENDIX I

Geohydrological Report

GEOHYDROLOGICAL ASSESSMENT REPORT

Prepared for

PAYSON CITY CORPORATION
439 West Utah Avenue
Payson, Utah 84651

Prepared by

BINGHAM ENVIRONMENTAL, INC.
5160 Wiley Post Way
Salt Lake City, Utah 84116

October 8, 1996

LIST OF FIGURES

Figure 1 Vicinity Map
Figure 2 Regional Geologic
Figure 3 Map Site Map
Figure 4 Cross Section A-A
Figure 5 Nearby Surface Water

LIST OF ATTACHMENTS

Attachment 1 Slug Test Results
Attachment 2 Water Rights Search Results
Attachment 3 HELP Modeling Results
Attachment 4 Monitor Well Completion and Drill Hole Logs Attachment

SECTION ONE

INTRODUCTION

Payson City operates a Class I municipal landfill west of the city on the southeast flank of West Mountain (see Figure 1). Payson City is in the process of completing the permit application required by the Utah Division of Solid and Hazardous Waste. This geohydrological assessment report has been prepared to satisfy requirements of the State of Utah Solid Waste Permitting and Management Rules (Rules), Section R315-310-4(2)(b) and provide detailed geohydrologic information for the site.

SECTION TWO

GEOLOGY

2.1 REGIONAL GEOLOGY

Payson City Landfill is located within Southern Utah Valley, which is part of a larger area called Utah Lake Valley. The area is located on the eastern edge of the Basin and Range physiographic province. The Wasatch Range (part of the Middle Rocky Mountain physiographic province) bounds the area to the east. The area is a typical basin and range environment, characterized by steep mountain fronts bounding a fairly level valley floor.

Utah Valley was formed by a dropped fault block bounded on the east by the Wasatch Fault and on the west by a concealed fault zone. Although the Wasatch Fault is traceable on the surface, the fault which would bound the west side of the valley (along the Eastern side of West Mountain) has only been indicated through the use of a gravity survey (Cook, 1961). The presumed fault zone extends from near Santaquin northward paralleling the east side of West Mountain (Cordova, 1970).

The valley fill is comprised of unconsolidated to cemented and compacted lacustrine, alluvial and fluvial material derived from the weathering of the bordering mountains during Tertiary and Quaternary time. The thickness of the basin till is variable. Tertiary and Paleozoic age rocks are exposed north and west of Payson, yet some geologists estimate that near Spanish Fork, the top of the Paleozoic formations may be at least 18,000 feet below the land surface (Brooks, 1995). During the Cenozoic Era, southern Utah and Goshen Valleys contained numerous lakes, the largest being Lake Bonneville. Southern Utah Valley has sediments deposited in ancient Lake Bonneville, in alluvial fans, and in stream channels. The valley floor deposits, which formed in Lake Bonneville, consist of tine grained lake bottom Sediments, and coarser grained spits, bars, and deltas which are found at altitudes below 5135 feet. Above this altitude are ancient and recent alluvial fans and stream channel deposits (Cordova, 1970).

2.2 LOCAL GEOLOGY

As indicated in Figure 2 (Regional Geologic Map) the facility is situated on the southeastern flank of West Mountain, which is composed mainly of Paleozoic Rocks, Cretaceous-Tertiary strata, and Tertiary Rocks (Davis, 1983). The Paleozoic rocks consist mainly of limestone, quartzite, shale, dolomite, and sandstone. The Cretaceous-Tertiary rocks consist of the North Horn Formation conglomerate. Several small outcrops of the Tertiary-aged Flagstaff Formation, a fresh water limestone, are located on the peak of West Mountain. The facility is situated on the Provo level of Lake Bonneville and shoreline deposits typically occur in the vicinity of the site.

The landfill site ranges in altitude from 4760 to 4940 feet (see Figure 3, Site Map). The landfill is situated mainly on the following formations (Davis, 1983):

- Pleistocene-age Alpine Formation, which is chiefly offshore facies of clay, silt, and fine sand in thin beds.
- Pleistocene-age Provo Formation and younger shore facies, consisting of sand and gravel in beach deposits, bars, spits, and deltas.
- Local outcrops of Cretaceous-age North Horn Formation, consisting of conglomerate,

shale and siltstone.

- Local outcrops of Pennsylvanian-age Oquirrh Formation, consisting of cherty limestone, quartzite, and quartzitic sandstone.

Bedrock underlying the site is composed of limestone with occasional sandstone layers, and was encountered approximately 150 feet below the ground surface in monitor well MW-2 (see Figure 3).

The nearest mapped fault in the vicinity of the landfill is an east-west trending normal fault located approximately 4,600 feet south of the site. The area of the site is designated as having very low liquefaction potential (Anderson, 1986). Two minor earthquakes which occurred during the time interval between 1962 and the present and exhibiting estimated Richter magnitudes of 2.0 are mapped within approximately 1,250 feet of the site (Hall, 1990). There is no evidence of any areas of subsidence near the landfill site.

SECTION THREE

HYDROGEOLOGY

3.1 REGIONAL HYDROGEOLOGY

The main groundwater system in southern Utah Valley is in the unconsolidated basin-fill deposits, which consist of interbedded lenticular deposits of gravel, sand, silt, and clay (Brooks, 1995). The deposits were formed by lacustrine, alluvial, and fluvial processes, depending upon the level of the valley lakes and location of streams at the time of deposition. Along the mountain fronts, colluvial processes have resulted in the deposition of poorly sorted clay, sand and gravel deposits. Away from the mountain fronts, on benches and alluvial fans, lacustrine processes resulted in the deposition of well-sorted sand and gravel deposits and well-sorted clay deposits (Brooks, 1995)

Groundwater within southern Utah Valley occurs under both unconfined and confined conditions. Groundwater is unconfined in the coarse-grained deposits near the mountain front, but becomes confined toward the center of the valley as clay lenses become more predominant (Brooks, 1995). The confined zones in the valley center are extensions of the unconfined zones near the mountains.

3.2 LOCAL HYDROGEOLOGY

Groundwater information in and adjacent to the Payson City Landfill, available prior to installing the monitor wells, indicated that the direction of groundwater flow was toward the east and/or northeast, which would parallel the surface topography at the site. Based on this information MW-2 was drilled on the west side of the landfill to provide and up gradient monitor well and MW-3 was drilled on the east side of the landfill to provide a second down gradient monitor well.

Groundwater at the site was encountered at a depth of221 to 225 feet below the ground surface east of the landfill cell within unconsolidated deposits of sandy gravel and 405 feet below the ground surface west of the landfill cell within the limestone bedrock (see the drilling logs included in Attachment 4). The deposits are typical of the Lake Bonneville shoreline depositional environment. The aquifer encountered in each of the wells is unconfined.

Three monitor wells presently exist at the site. Wells MW-1 and MW-3 are located east of the landfill cell and MW-2 is located west of the landfill cell (see Figure 3). The following table indicates the depth to water and corresponding elevation of the groundwater in each of the site wells on September 10, 1996.

Table 1 Groundwater Elevations

Well	TOC* Elevation (feet)	Depth to Water"""" (feet)	Groundwater Elevation (feet)
MW-1	4760.47	221.23	4539.24
MW-2	4944.59	404.72	4539.87
MW-3	4765.37	225.50	4539.87

* TOC-Top of PVC well casing; elevation measured in feet above mean sea level by Payson City.

**Depth to water measured from top of casing on September 10, 1996.

The groundwater elevation data indicates a very flat gradient across the site. It is likely that the groundwater elevation is seasonal and is influenced by run-off from West Mountain during the winter and spring months. As more information is gathered during the monitoring events, the gradient should be further evaluated and the estimated flow direction better defined. The likely direction of flow of the groundwater, based on the topography, is east-northeast: east from the mountain front into the valley and north toward Utah Lake. The present data is not sufficient to calculate and provide a groundwater contour map.

Slug tests were performed on each of the wells in order to estimate the hydraulic conductivity of the aquifer. The test results are included in Attachment 1. For the tests, a 5-gallon slug of water was introduced into each well and the water level was measured against time until the water level stabilized. Data is analyzed by computer using four separate methods: the Hvorslev method; the Cooper, Bredehoeft, and Papadopulos method; the Ferris and Knowles method; and the Bouwer method. The hydraulic conductivity was estimated for each well as follows:

MW-1 4.8 E-5 cm/sec
MW-2 6.4 E-8 cm/sec
MW-3 4.1 E-4 cm/sec

MW-1 and MW-3 were screened within unconsolidated deposits of gravelly sand (see drilling log, Attachment 4). MW-2 was screened within the limestone bedrock underlying the site. Figure 4 provides a geologic cross section through MW-2 and wfW-3.

3.1.1 Water Rights

A search of water rights on file with the Division of Water Rights was conducted for an area within a 2()(x) foot radius from the site. The results of the search are included in Attachment 2. The search encountered only two water rights:

- A well approximately 1400 feet northeast of the landfill front gate; 8-inch diameter and 174 feet deep used for irrigation, stockwatering, and domestic purposes.

- A well approximately 1500 feet east of the landfill front gate; 6-inch diameter and 500 feet deep used for irrigation, stockwatering, and domestic purposes.

3.3 GROUNDWATER QUALITY

Groundwater samples collected and analyzed from 1959 to 1991 from wells completed in the unconsolidated basin fill deposits in southern Utah Valley indicate total dissolved solids (TDS) concentrations between 200 and 400 mg/L, with a few samples having concentrations as high as 1,000 mg/L (Stolp, 1993). Shallower groundwater typically has higher concentrations of dissolved solids. Groundwater east of West Mountain is bicarbonate (HCO_3) type (Cordova, 1970). Based on the TDS concentrations, the groundwater would be classified as Class IA, pristine groundwater.

3.4 SURFACE WATER

Much of Southern Utah Valley and Goshen Valley drains to Utah Lake through sloughs and manmade drains. Utah Lake is located approximately 3.4 miles northwest of the site on the other side of West Mountain; however, drainage from the area of the site along the east side of West Mountain enters Utah Lake approximately 6.8 miles to the north. Many miles of closed and open drains empty water directly into Utah Lake or into natural waterways which drain to Utah Lake making farming possible in the lower parts of the plain, where a shallow water table was a major problem in the past. Utah Lake has been operated as a reservoir since 1884, when the first dam was constructed on the Jordan River (Brooks, 1995). The elevation of the lake surface is designed to be 4489 feet.

The nearest surface water to the site is the Strawberry Highland Lateral irrigation canal, located approximately 200 to 300 feet east of the landfill cell area (see Figures 3 and 5). An ephemeral stream is located approximately 2300 to 2800 feet north of the landfill cell area. No water flow has been observed in this stream. It is reported that ephemeral run-off from the mountains surrounding southern Utah Valley occurs only in direct response to spring melting of mountain snow or during intense summer thunderstorms, and that most of the flow infiltrates the unconsolidated basin-fill deposits as the flow crosses alluvial fans or gravel deposits adjacent to the mountains (Brooks, 1995)

Dissolved solids concentration of surface water within southern Utah Valley ranges from 359 mg/L to 3,410 mg/L. Samples collected from Benjamin Slough (approximately 6.2 miles from the site) had a dissolved solids concentration that ranged from 692 *mg/L* to 1,540 mg/L.

3.5 WATER BALANCE

The water balance of the disposal cell was modeled using version 3.05 of the Hydrologic Evaluation of Landfill Performance (HELP) computer model (Schroeder, 1995). HELP modeling of the proposed landfill cell was performed to evaluate the potential for water to percolate through the municipal solid waste (MS\\!) and into the subsurface soils below the site, eventually reaching groundwater below the site.

The landfill water balance was modeled for a time period of 30 years under post-closure conditions. Site specific values of climatological data, soil and waste profile, and surface conditions were used to construct the model. Some of the assumptions used in the model are:

- Post-closure conditions
- Modeling period of 30 years
- Synthetic precipitation record generated using monthly records from Payson weather station (Ashcroft, 1992)
- Synthetic temperature record generated using monthly records from Spanish Fork Powerhouse
  weather station (Ashcroft, 1992)
- Synthetic solar radiation record generated using site latitude of 40.04 degrees
- Surface slope of 33 percent with an average stand of grass
- Initial water content of layers specified by model as nearly steady state values

The soil profile used in the model is summarized in Table 2. Hydraulic conductivity numbers are the default values provided by the HELP model for the given soil types.

Table 2

HELP MODELING

Soil Profile

Layer	Description	Soil Type	Estimated Hydraulic Conductivity (cm/sec)	Thickness (inches)
1	Topsoil	Loam	3.7 E-1	12
2	Moderately Compacted Clay Cover	Clay	3.6 E-6	18
3	Intermediate Cover	Sandy Clay	2.7 E-5	12
4	Municipal Solid Waste	MSW	1.0 E-3	600
5	Native Soil	Sandy Clay	1.1 E-4	120

The HELP model provides annual values for; runoff, evapotranspiration, vertical percolation, and water storage in the soil profile based on the synthetic climatic data. Results of the HELP model are presented in Table 3.

SECTION FOUR

GROUNDWATER MONITORING SYSTEM

4.1 MONITOR WELL DESIGN AND CONSTRUCTION

Three groundwater monitor wells presently exist at the site. Two of the wells, MW-l and MW-3, are located east of the landfill cell area and the third well, MW-2, is located west of the landfill cell area. Well MW-l was installed by Zimmerman Well Service, Inc. in May of 1993. Monitor wells MW-2 and MW-3 were installed by Layne Environmental Services in February of 1996. Drilling logs of the wells are included in Attachment 4.

4.2 SAMPLE COLLECTION AND ANALYSIS

Samples were collected from site monitor wells using dedicated bladder pumps which were installed in the wells in September 1996. The pumps are Master-Flo Model 5625 PVC bladder pumps with polyethylene tubing. Air is supplied by either compressed air bottles or an air compressor. Air flow is regulated by a Master-Flo Model 5001 automatic cycle controller capable of regulating air pressure up to 200 psi.
The site wells were sampled on September 10 and 11, 1996 using the specified sampling equipment. The wells were purged using standard micro purging techniques. Conductivity and pH values were measured as water was purged from each well. When these parameters stabilized, the samples were collected. The water sampling data sheets are included in Attachment 5.
Samples were collected in approved certified clean sample containers and stored on ice in a cooler during shipment to a Utah State Certified analytical laboratories for analysis of the parameters listed in the table included in Attachment 5. Samples were shipped under proper chain of custody control. Level II QA/QC (matrix spike is performed on one of the project samples) was requested from the laboratory. QA/QC information is included in Attachment 5. A field blank and trip blank accompanied the samples during the entire sampling event and were submitted to the laboratory. The blanks were stored by the laboratory, to be used only as verification in the event of a contaminant hit. The blanks were not analyzed for this sampling event.

4.3 GROUNDWATER SAMPLE RESULTS

Groundwater sample results obtained from the September 10 and 11, 1996 sampling are included in Attachment 5 and summarized in Table 4. Section R315-308-2(4)(d) of the Rules states that "analysis for the heavy metals and (he organic constituents from Section R315-308-4 shall be completed on unfiltered samples." Heavy metals typically occur in the sediments which may be suspended in the groundwater samples. In order to determine the effect of suspended sediments in the groundwater from the site wells, analyses were performed for both total and dissolved metals. As Table 4 indicates, a substantial difference is noted between the total and dissolved metals results, particularly for well MW-2, which contained quite a bit of suspended solids. Total values for ten separate metals exceeded groundwater standards; however, none of the dissolved values exceeded the groundwater standards. It is apparent that the excessive metal concentrations which are observed occur within the suspended sediments within the groundwater.

The only organic compound observed above the analytical detection limits was methylene chloride, which had a concentration of76 ug/L in well MW-2. Occasionally methylene chloride is observed in samples as a laboratory contaminate; however, QA/QC data from the laboratory does not indicate laboratory contamination.

4.4 LANDFILL GROUNDWATER SAMPLING REQUIREMENTS

According to the Rules section *R31S-308-2* (Groundwater Monitoring Requirements), after background groundwater levels have been established, each well is to be sampled semiannually for the parameters listed in the table included in Attachment 5. Samples wiII be collected using the dedicated bladder pumps which have been installed in the site monitor wells.

The following procedures are to be followed at a minimum during each sampling event:

- Prior to sampling, the depth to groundwater in each well is to be measured to the nearest 0.01 feet from the top of the PVC well casing.
- The pH, conductivity, and temperature of the water is to be measured in each well.
- Each well is to be purged using the dedicated bladder pumps installed, Measure and note the pH and conductivity with time while the well is being purged.
- When the pH and conductivity values stabilize, collect groundwater samples using appropriate clean sample containers supplied by a State of Utah Certified analytical laboratory.
- Transport the samples on ice and submit to a State of Utah Certified analytical testing laboratory for analysis of the parameters listed in the table included in Attachment 5. The laboratory must be certified in the State of Utah for each of the required constituents at the required detection limit.

4.5 CONCLUSIONS AND RECOMMENDATIONS

Groundwater measurements from the three monitor wells are insufficient to define the gradient and direction of groundwater flow. Additional groundwater level measurements should be performed at least every two months for a year to define the seasonal fluctuations and direction of groundwater flow.

SECTION FIVE

REFERENCES

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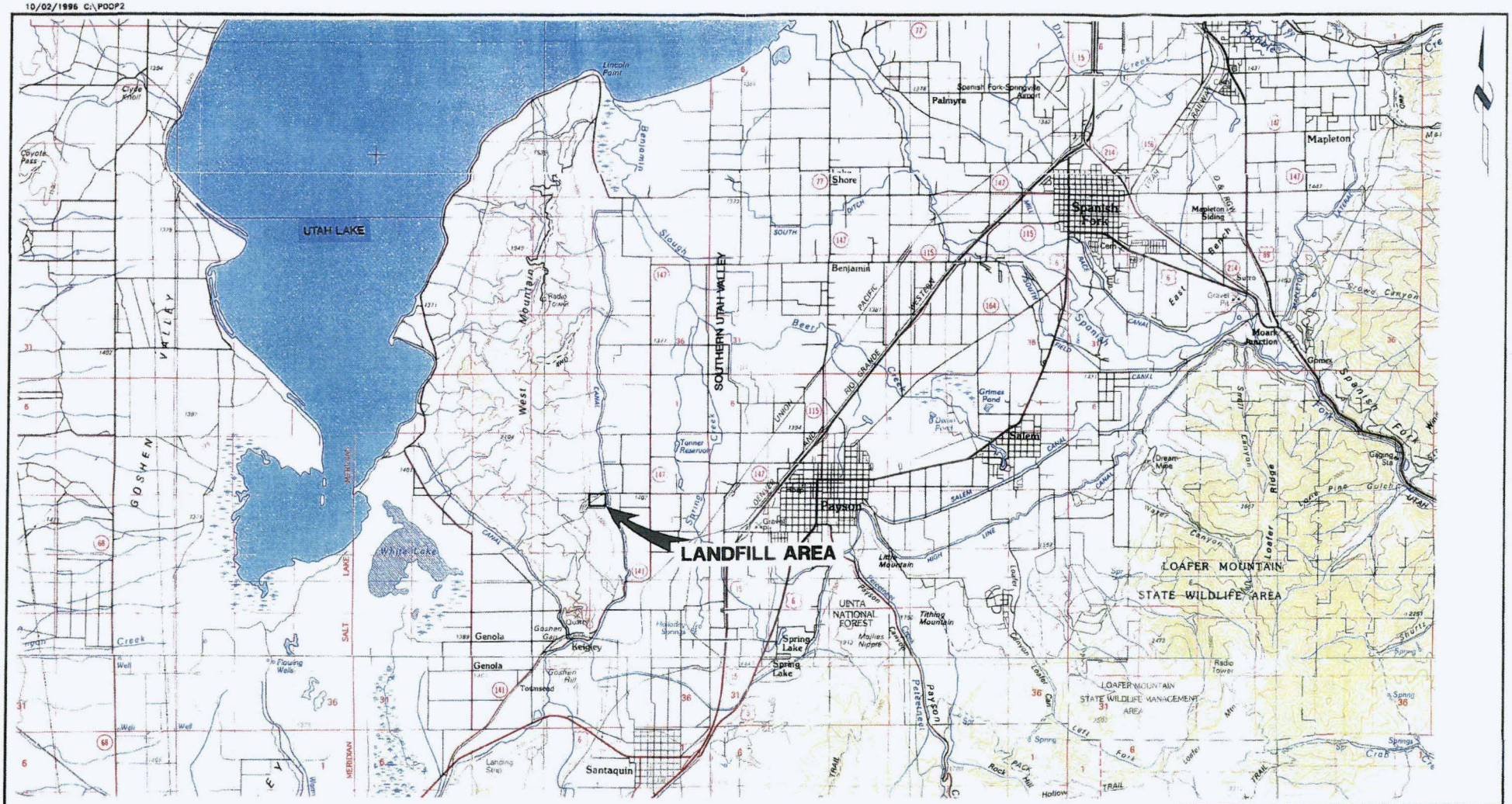


REFERENCE: 30 X 60 Minute Series Quadrangle, Provo, & Nephi, Utah

PAYSON CITY

PAYSON CITY LANDFILL

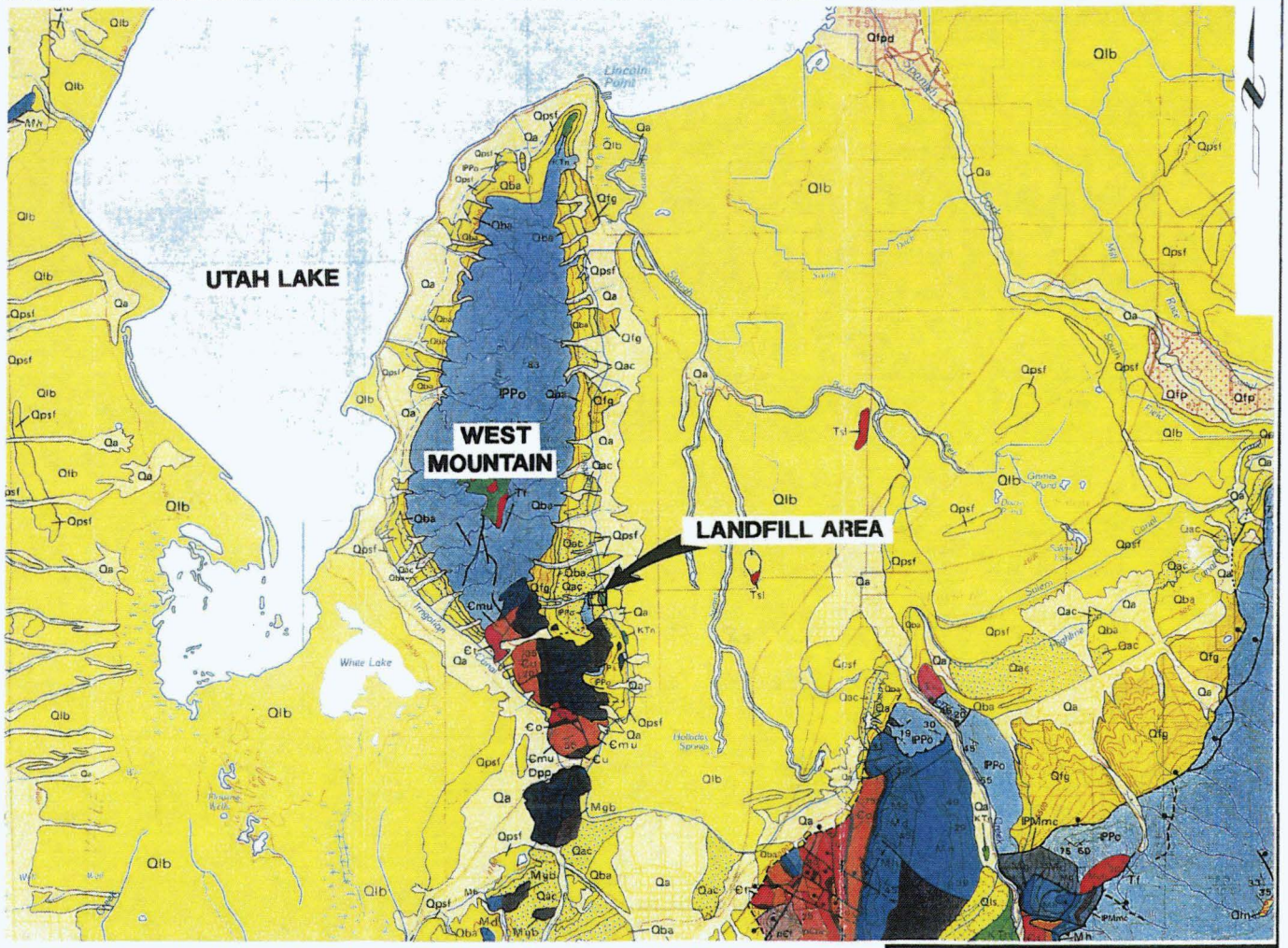
VICINITY MAP

BINGHAM ENVIRONMENTAL
SALT LAKE CITY - (801) 532-2230

FIGURE 1

Date OCT. 1996	Proj # 2469-001	JSR

Qa	Alluvial Deposits
Qpsf	Provo Formations and Younger Shore Facies
Qba	Bonneville and Alpine Formations
Qac	Alpine Formation
Qfg	Fanglomerate
Tf	Flagstaff Limestone
KTn	North Horn Formation
Pk	Kirkman Limestone
IPPo	Oquirrh Formation
Mgb	Great Blue Limestone
Mu	Mississippi Rocks Undivided
Mpp	Pinyon Peak Limestone
Cu	Upper Cambrian Rocks Undivided
Cmu	Middle Cambrian Rocks Undivided
Ou	Ophir Formation
Ct	Tintic Quartzite



NOTE: ONLY FORMATIONS PRESENT ON WEST MOUNTAIN ARE LISTED

MILES 1 0 1 2 3 4 5 6 7 8

FEET 5,000 0 5,000 10,000 15,000 20,000 25,000 30,000 35,000 40,000

KILOMETERS 1 0 1 2 3 4 5 6 7 8 9 10

REFERENCE: GEOLOGICAL MAP OF THE SOUTHERN WASATCH FRONT, UTAH MAP 55-A, UTAH GEOLOGIC AND MINERAL SURVEY

PAYSON CITY

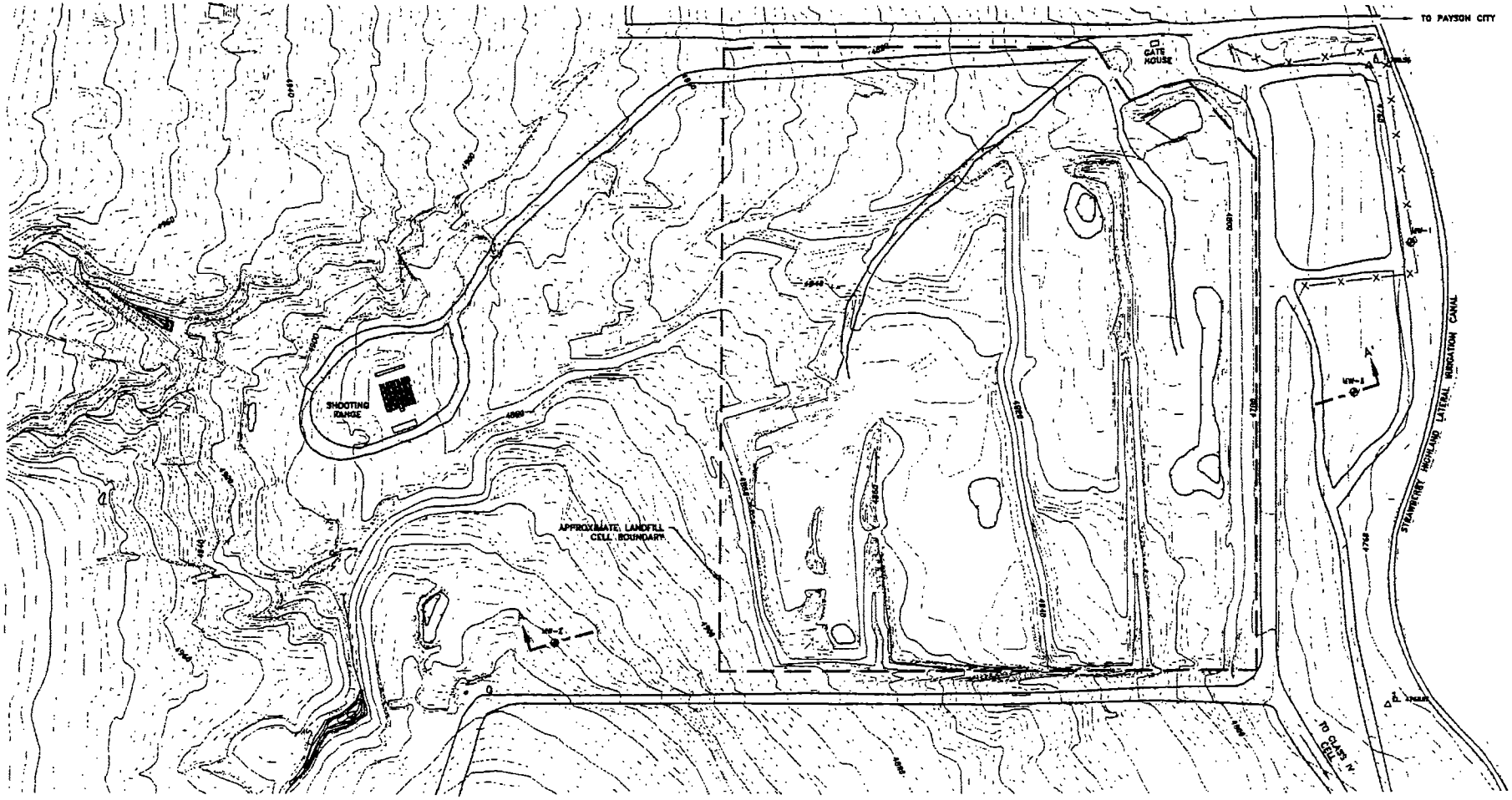
PAYSON CITY LANDFILL

REGIONAL GEOLOGIC MAP

BINGHAM ENVIRONMENTAL
SALT LAKE CITY - (801) 532-2230

FIGURE 2

Date OCT. 1996 | Proj # 2469-001 | JSR



PAYSON CITY CORPORATION

PAYSON CITY LANDFILL

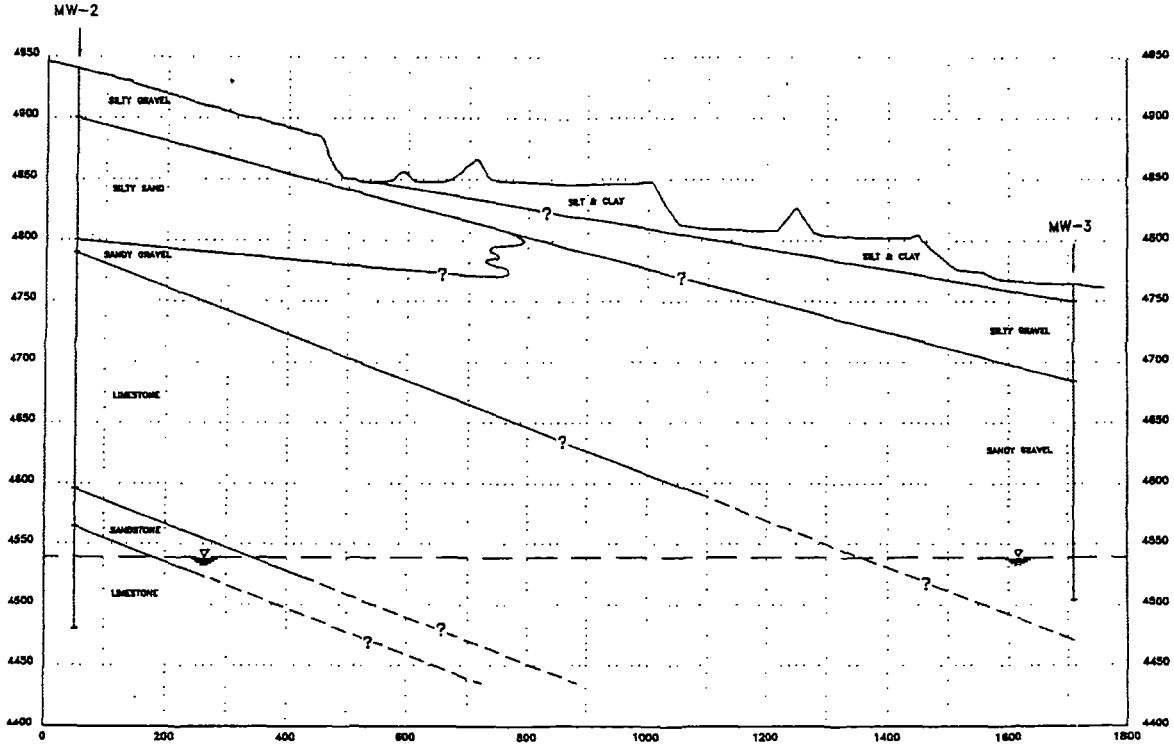
SITE MAP

BINGHAM ENVIRONMENTAL
SALT LAKE CITY - (801) 539-2230

Drawn: JGR
Checked:
Reviewed:

TOPOGRAPHIC CONTOURS PROVIDED BY PAYSON CITY CORPORATION
CONTOURS BASED ON AERIAL SURVEY PERFORMED BY OLYMPUS AERIAL SURVEYS, ON AUGUST 20, 1992

Rev.	By	Date	Remarks	Date OCT 1996	Proj # 2468-004	FIGURE 3



0 100 200
Scale in Feet
HORIZONTAL SCALE

0 50 100
Scale in Feet
VERTICAL SCALE

PAYSON CITY CORPORATION

PAYSON CITY LANDFILL

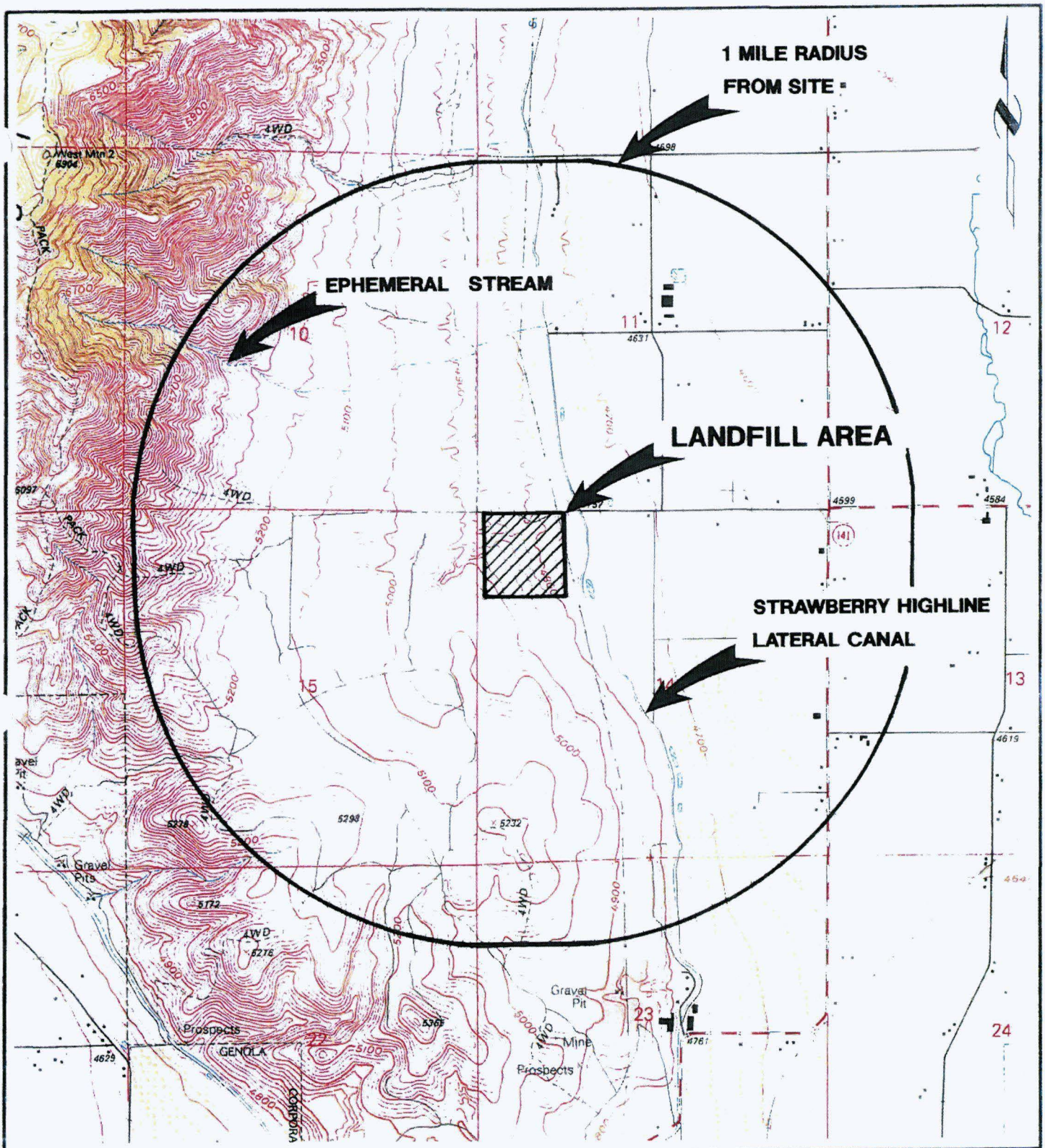
CROSS SECTION

A – A'

BINGHAM ENVIRONMENTAL
SALT LAKE CITY – (801) 532-3230

Designer
Drawn GR
Checked
Reviewed

Rev.	By	Date	Remarks	Date OCT 1996	Proj. # 2469-004	PHASE 4



0 2000 4000

Scale in Feet

Reference: U.S.G.S. 7.5 minute series Quadrangle
West Mountain, Utah

PAYSON CITY

PAYSON CITY LANDFILL

NEARBY
SURFACE WATER

BINGHAM ENVIRONMENTAL
SALT LAKE CITY - (801) 532-2230

FIGURE 5

Date OCT. 1996 | Proj. # 2469-004

ATTACHMENT 1

SLUG TEST RESULTS

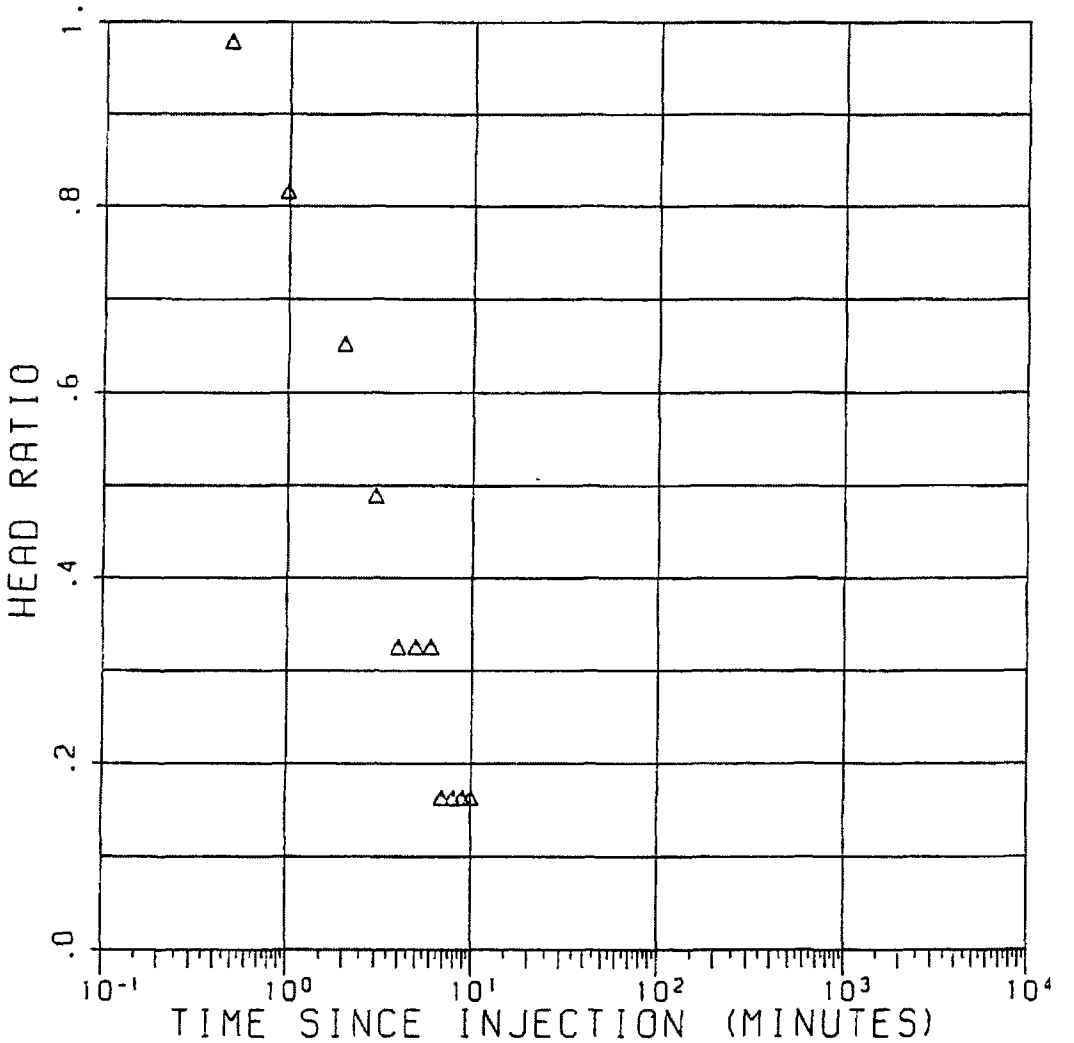
RAW DATA

WELL # MW-1

WELL DIAMETER= 6.00 INCHES
CASING DIAMETER= 2.00 INCHES
VOLUME OF WATER= .01 GALLONS
LENGTH OF AQUIFER TESTED= 30.00 FEET
VALUE OF H0= .06 FEET
STATIC WATER LEVEL= .01 FEET
LENGTH OF SCREEN= 30.00 FEET
WATER TABLE TO BOTTOM OF WELL= 51.00 FEET

SLUG TEST DATA:

TIME	WATER LEVEL (FEET)	TIME SINCE TEST BEGAN (MINUTES)
1. 0.30	.07	.48
1. 1. 0	.06	.98
1. 2. 0	.05	1.98
1. 3. 0	.04	2.98
1. 4. 0	.03	3.98
1. 5. 0	.03	4.98
1. 6. 0	.03	5.98
1. 7. 0	.02	6.98
1. 8. 0	.02	7.98
1. 9. 0	.02	8.98
1.10. 0	.02	9.98
1.11. 0	.01	10.98



SLUG TEST OF WELL MW-1

HEAD RATIO VS LOG TIME

PAYSON CITY LANDFILL

SUN 01-21-1996

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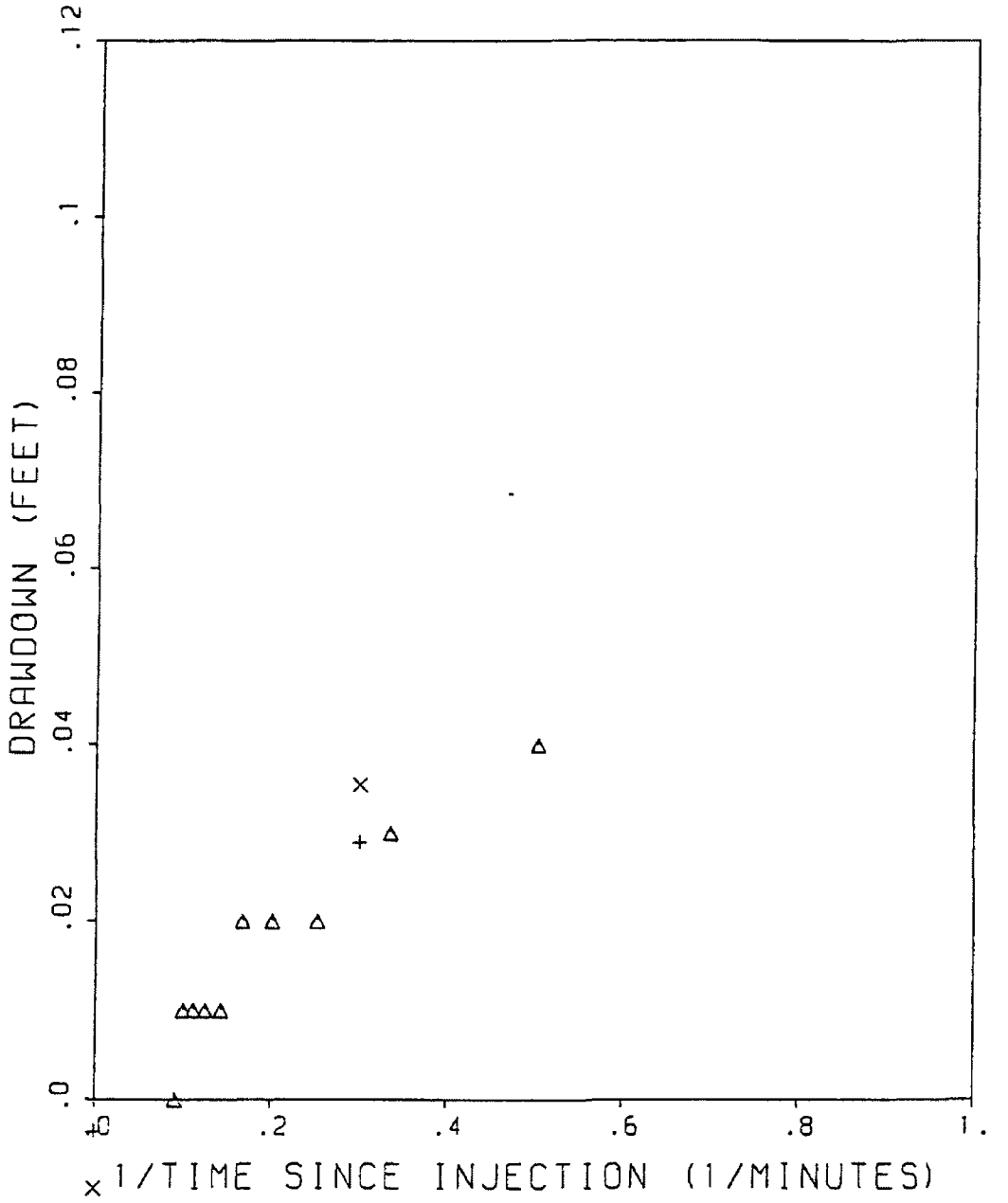


SLUG TEST OF WELL MW-1
DRAWDOWN VS RECIPROCAL TIME

PAYSON CITY LANDFILL

SUN 01-21-1996 11:22:50.07

WELL #	PERMEABILITY METHOD 1	PERMEABILITY METHOD 2	STORAGE COEF METHOD 2	PERMEABILITY METHOD 3	PERMEABILIT METHOD 4
MW-1	6.28E-05	8.96E-05	1.11E-06	1.42E-05	4.81E-05

* METHOD 1 IS HVORSLEV
METHOD 2 IS COOPER, BREDEHOEFT, AND PAPADOPULOS
METHOD 3 IS FERRIS AND KNOWLES
METHOD 4 IS BOUWER

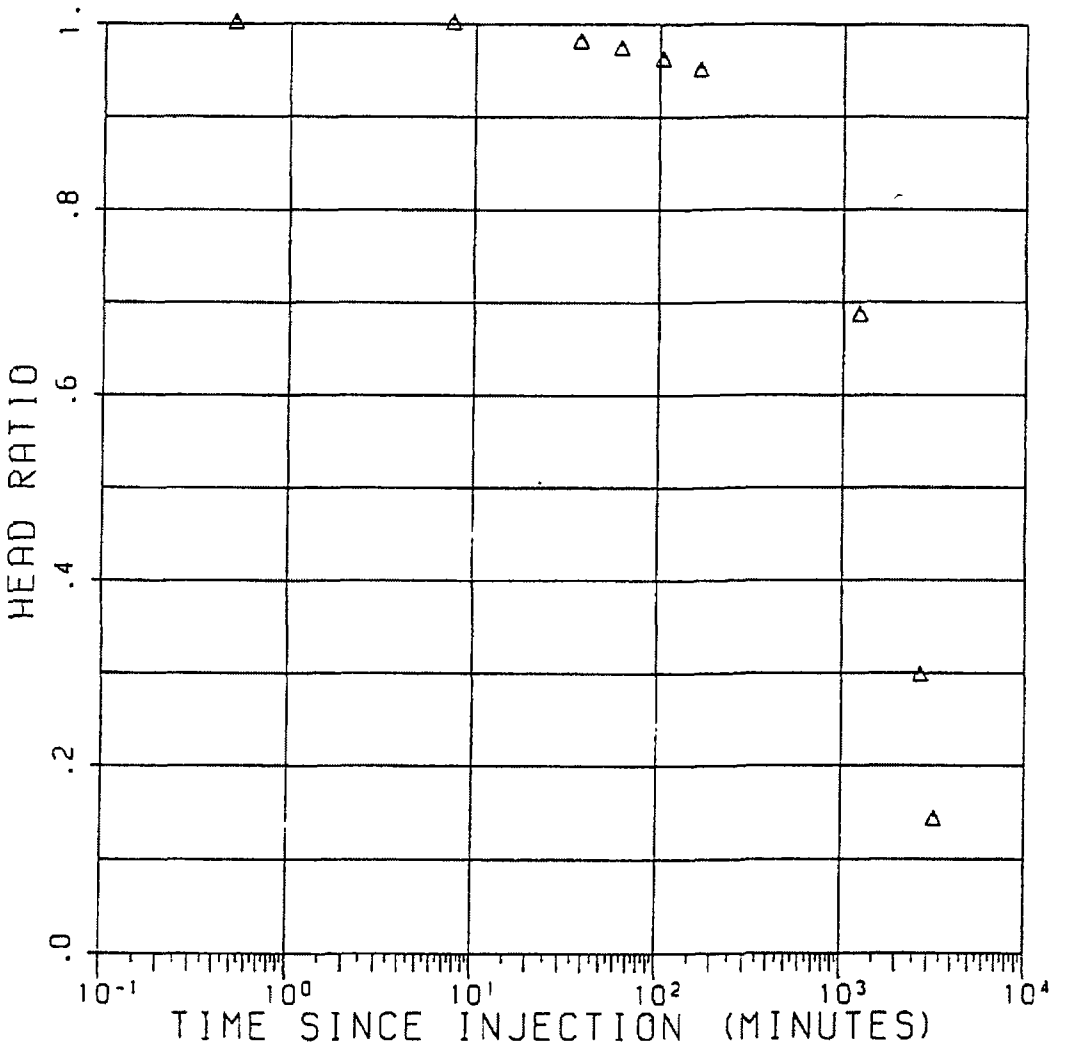
RAW DATA

WELL # MW-2

WELL DIAMETER= 6.00 INCHES
CASING DIAMETER= 2.00 INCHES
VOLUME OF WATER= .42 GALLONS
LENGTH OF AQUIFER TESTED= 46.00 FEET
VALUE OF H0= 2.57 FEET
STATIC WATER LEVEL= .01 FEET
LENGTH OF SCREEN= 70.00 FEET
WATER TABLE TO BOTTOM OF WELL= 46.00 FEET

SLUG TEST DATA:

TIME	WATER LEVEL (FEET)	TIME SINCE TEST BEGAN (MINUTES)
1. 0.30	2.59	.50
1. 7.30	2.59	7.50
1.37. 0	2.54	37.00
2. 2. 0	2.52	62.00
2.44. 0	2.49	104.00
3.47. 0	2.46	167.00
21.22. 0	1.78	1222.00
45.56. 0	.78	2696.00
55. 0. 0	.38	3240.00
65.51. 0	.01	3891.00



SLUG TEST OF WELL MW-2

HEAD RATIO VS LOG TIME

PAYSON CITY LANDFILL

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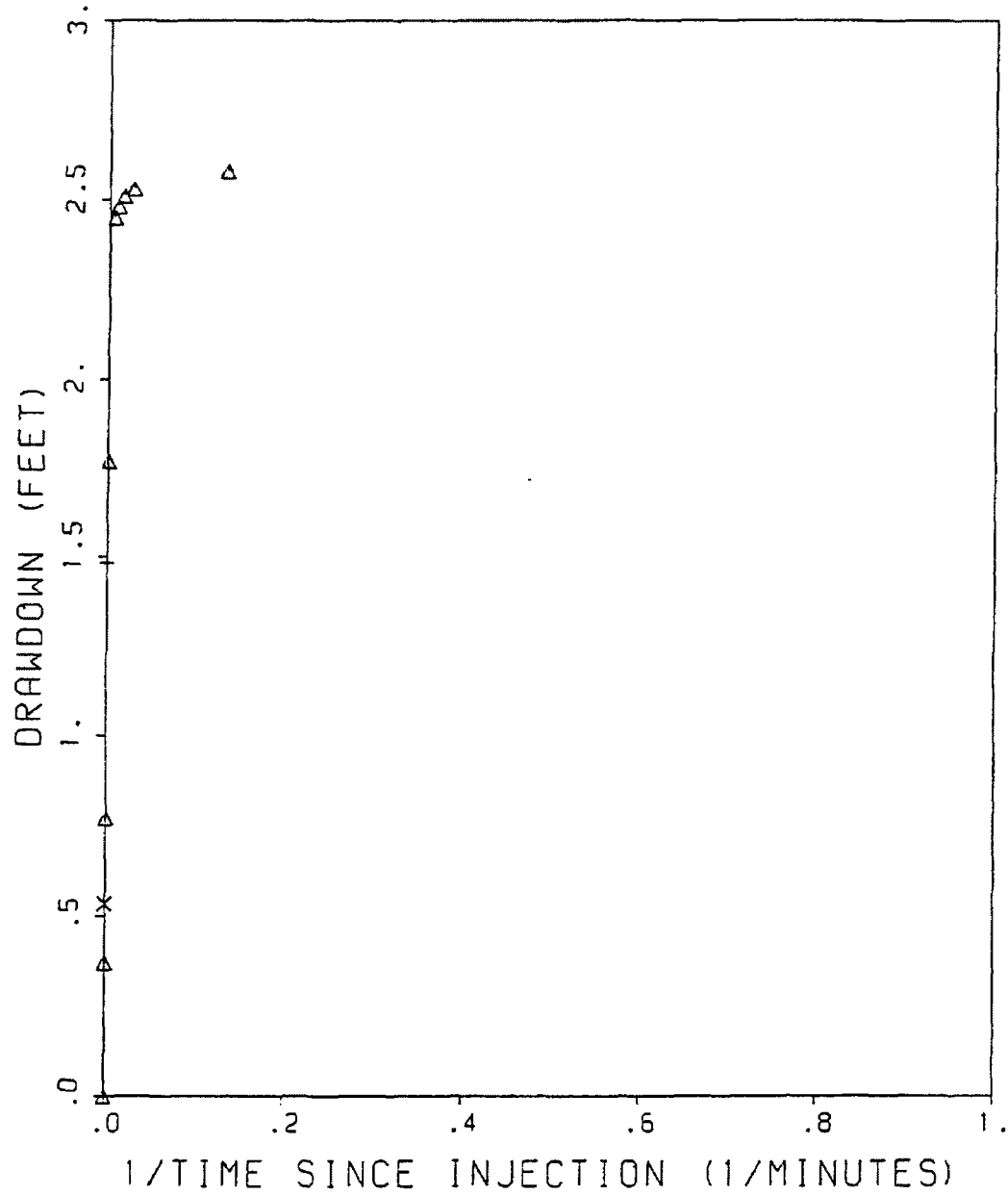


SLUG TEST OF WELL MW-2
DRAWDOWN VS RECIPROCAL TIME

PAYSON CITY LANDFILL

SUN 01-21-1996 11:55:28.66

WELL #	PERMEABILITY METHOD 1	PERMEABILITY METHOD 2	STORAGE COEF METHOD 2	PERMEABILITY METHOD 3	PERMEABILIT METHOD 4
MW-2	1.00E-07	7.36E-08	1.11E-06	2.71E-06	6.36E-08

* METHOD 1 IS HVORSLEV
METHOD 2 IS COOPER, BREDEHOEFT, AND PAPADOPULOS
METHOD 3 IS FERRIS AND KNOWLES
METHOD 4 IS BOUWER

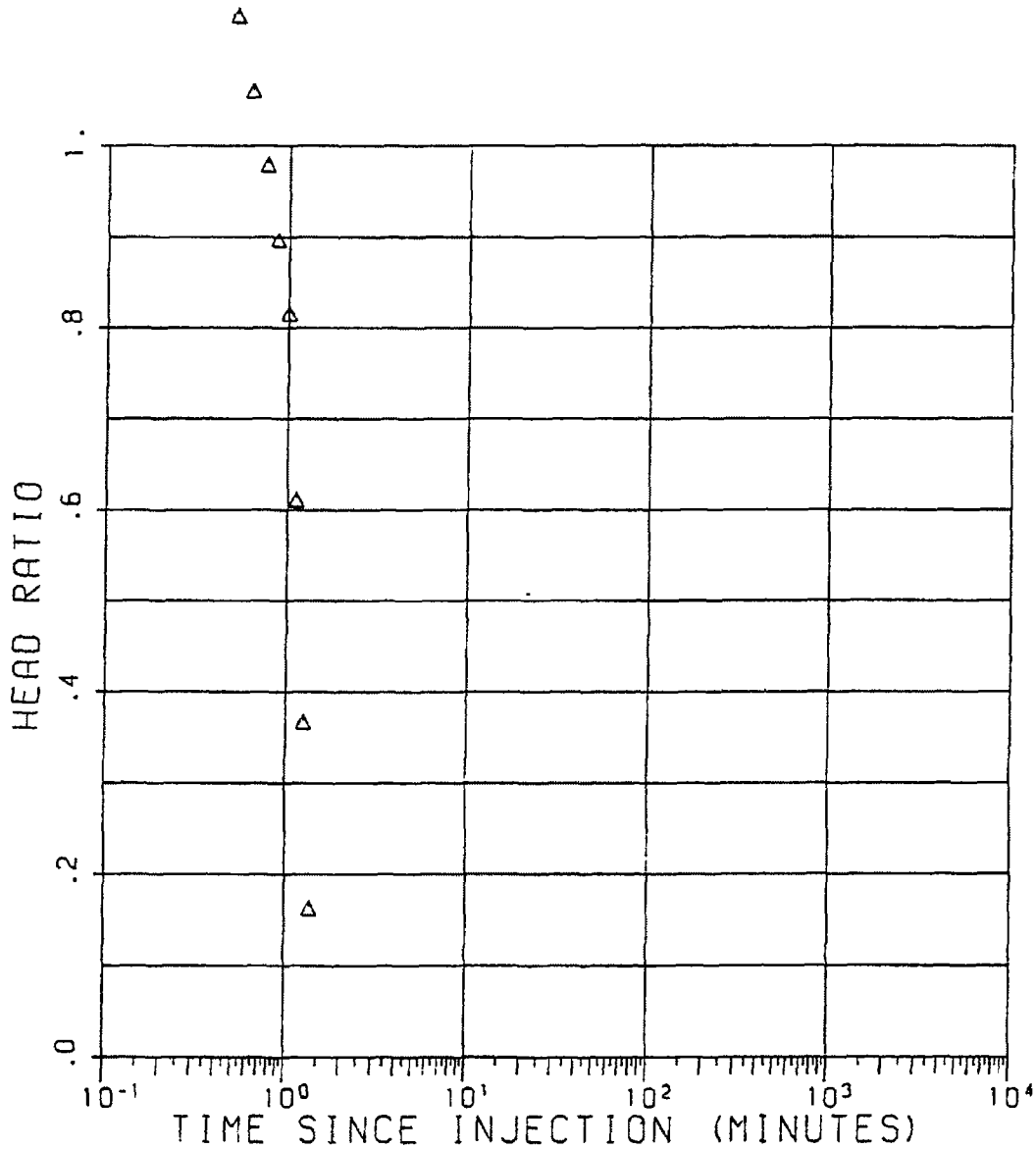
RAW DATA

WELL # MW-3

WELL DIAMETER= 6.00 INCHES
CASING DIAMETER= 2.00 INCHES
VOLUME OF WATER= .04 GALLONS
LENGTH OF AQUIFER TESTED= 33.00 FEET
VALUE OF H0= .25 FEET
STATIC WATER LEVEL= .01 FEET
LENGTH OF SCREEN= 60.00 FEET
WATER TABLE TO BOTTOM OF WELL= 33.00 FEET

SLUG TEST DATA:

TIME	WATER LEVEL (FEET)	TIME SINCE TEST BEGAN (MINUTES)
1. 0.30	.29	.50
1. 0.37	.27	.62
1. 0.45	.25	.75
1. 0.52	.23	.87
1. 1. 0	.21	1.00
1. 1. 7	.16	1.12
1. 1.15	.10	1.25
1. 1.22	.05	1.37
1. 1.30	.01	1.50



SLUG TEST OF WELL MW-3

HEAD RATIO VS LOG TIME

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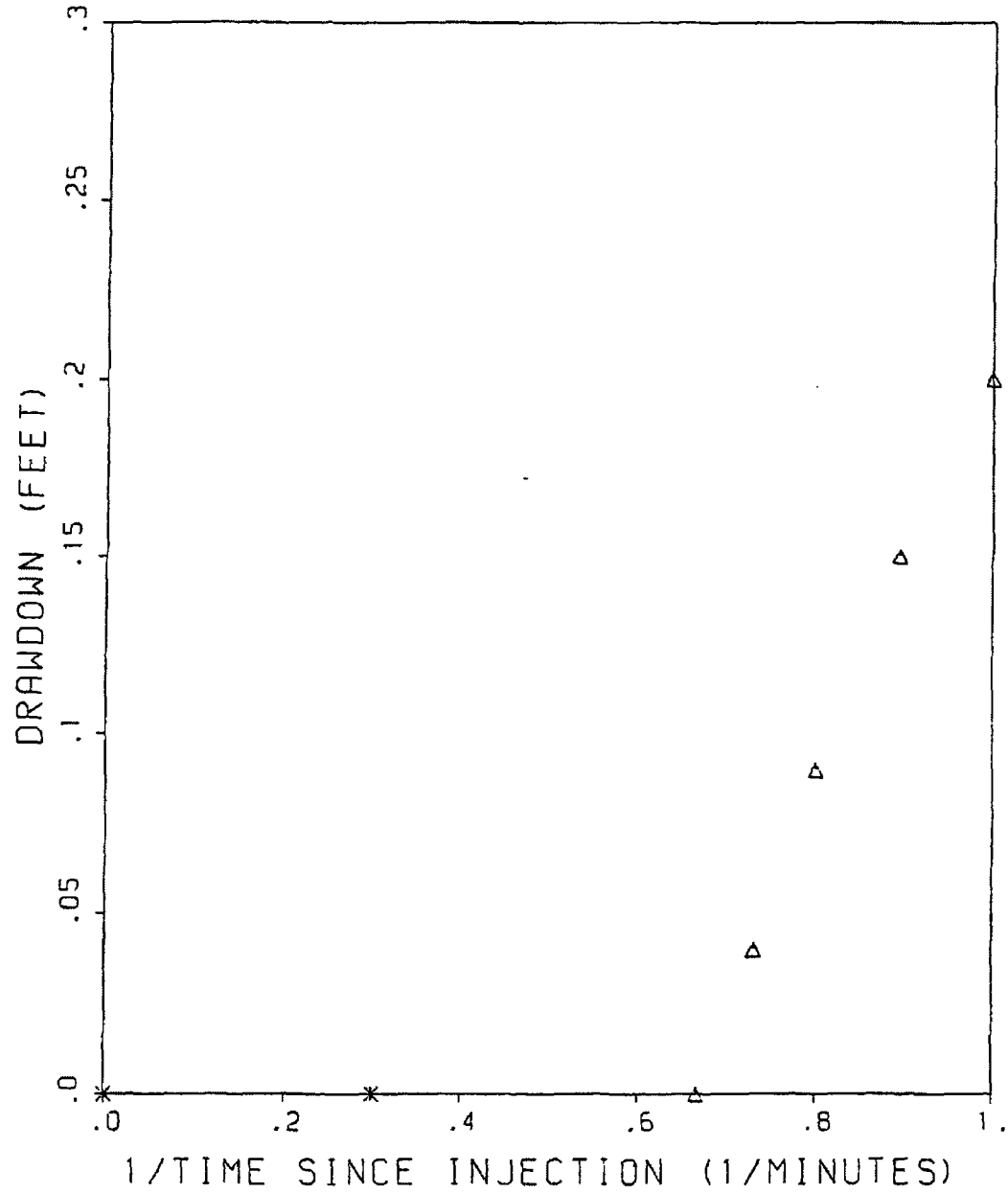
A:PAYSON CITY LANDFILL

SUN 01-21-1996



SLUG TEST OF WELL MW-3
DRAWDOWN VS RECIPROCAL TIME

A:PAYSON CITY LANDFILL
SUN 01-21-1996
12:12:49.77

WELL #	PERMEABILITY METHOD 1	PERMEABILITY METHOD 2	STORAGE COEF METHOD 2	PERMEABILITY METHOD 3	PERMEABILITY METHOD 4
MW-3	2.18E-04	1.46E-04	1.11E-06	.00	4.05E-04

* METHOD 1 IS HVORSLEV
METHOD 2 IS COOPER, BREDEHOEFT, AND PAPADOPULOS
METHOD 3 IS FERRIS AND KNOWLES
METHOD 4 IS BOUWER

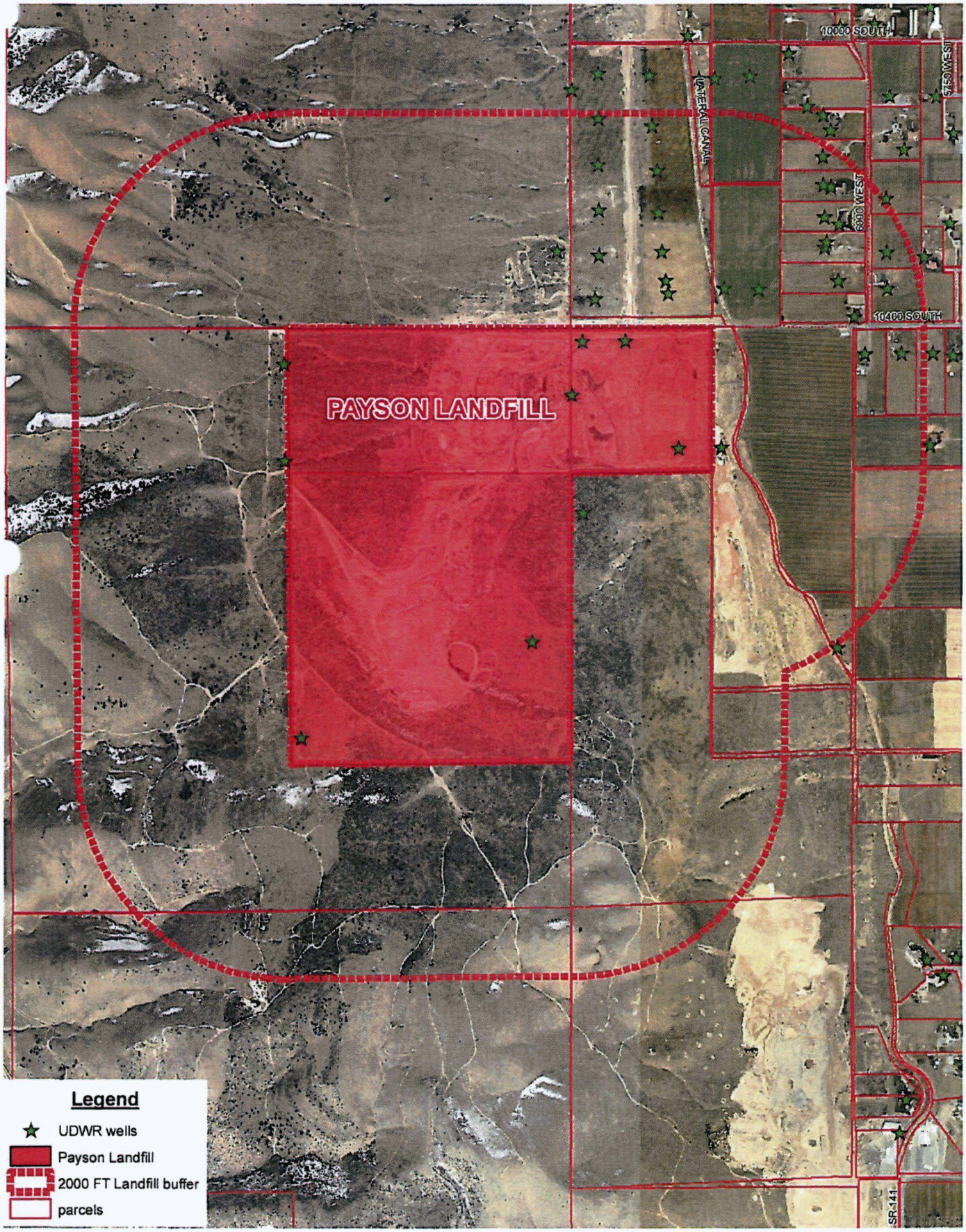
ATTACHMENT 2

WATER RIGHTS SEARCH RESULTS

PAYSON CITY LANDFILL
2000 FT WELLS BUFFER MAP

0 600 1,200 Feet

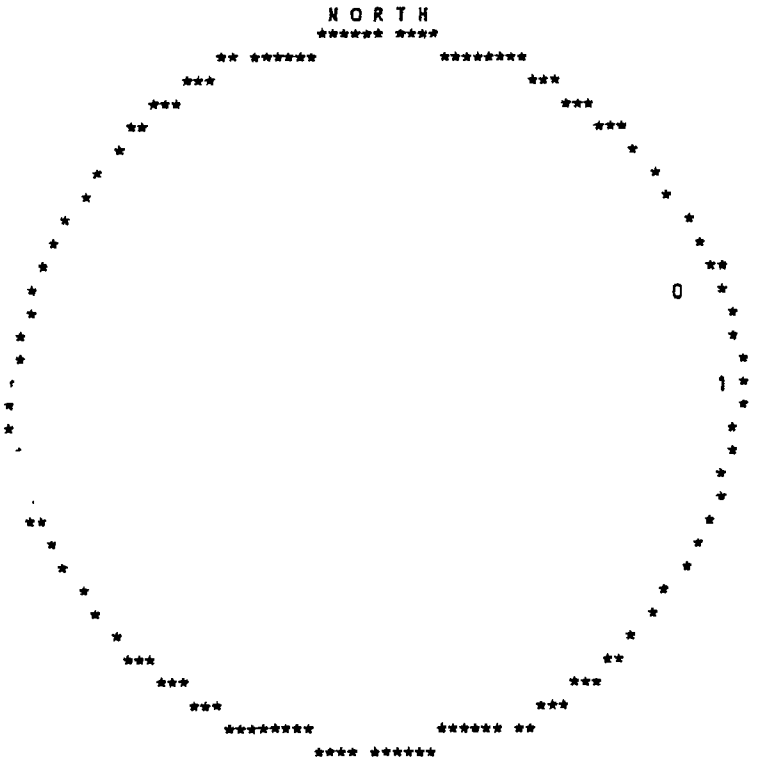
1-16-13



UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, SEP 25, 1995, 4:01 PM
PLOT SHOWS LOCATION OF 3 POINTS OF DIVERSION

PLOT OF AN AREA WITH A RADIUS OF 2000 FEET FROM A POINT
S 200 FEET, E 850 FEET OF THE NW CORNER,
SECTION 14 TOWNSHIP 9S RANGE 1E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR	LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PWP	RED
0	51 3028	.1120	4.54	8	174	1972	Y	N 440	W 150	S4	11	9S	1E	SL			X				X	
	WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING											PRIORITY DATE: 00/00/1928										
	Kester, Terry K.				RFD #1							Payson								UT	84651	
0	51 6481	.0000	1.76	8	174	1972	Y	N 440	W 150	S4	11	9S	1E	SL			X				X	
	WATER USE(S): STOCKWATERING											PRIORITY DATE: 00/00/1928										
	Kester, Terry K.				10336 South 6000 West							Payson								UT	84651	
1	a17377	.0150	.00	6	100 - 500			S 200	W 2550	NE	14	9S	1E	SL			X				X	
	WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING											PRIORITY DATE: 05/07/1993										
	Rucker, Roy L. and Mary C.				P. O. Box 352							Payson								UT	84651	

ATTACHMENT 3

HELP MODELING RESULTS

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**        HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                     **
**          HELP MODEL VERSION 3.05a  (5 JUNE 1996)                         **
**          DEVELOPED BY ENVIRONMENTAL LABORATORY                           **
**           USAE WATERWAYS EXPERIMENT STATION                              **
**        FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                   **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************
```

PRECIPITATION DATA FILE: C:\HELP3\PAYSON\PRECIP.D4
TEMPERATURE DATA FILE: C:\HELP3\PAYSON\TEMP.D7
SOLAR RADIATION DATA FILE: C:\HELP3\PAYSON\RAD.D13
EVAPOTRANSPIRATION DATA: C:\HELP3\PAYSON\EVAP.D11
SOIL AND DESIGN DATA FILE: C:\HELP3\PAYSON\SOIL.D10
OUTPUT DATA FILE: C:\HELP3\PAYSON\PAYSON.OUT

TIME: 10:30 DATE: 10/ 1/1996

****

TITLE: PAYSON CITY LANDFILL - CLOSED CELL WATER BALANCE

****

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 8
THICKNESS = 12.00 INCHES
POROSITY = 0.4630 VOL/VOL
FIELD CAPACITY = 0.2320 VOL/VOL
WILTING POINT = 0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2417 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.369999994000E-03 CM/SEC
NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 3.00 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 25
THICKNESS = 18.00 INCHES
POROSITY = 0.4370 VOL/VOL
FIELD CAPACITY = 0.3730 VOL/VOL
WILTING POINT = 0.2660 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.4370 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.359999990000E-05 CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 24
THICKNESS = 12.00 INCHES
POROSITY = 0.3650 VOL/VOL
FIELD CAPACITY = 0.3050 VOL/VOL
WILTING POINT = 0.2020 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3050 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.270000010000E-05 CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18
THICKNESS = 600.00 INCHES
POROSITY = 0.6710 VOL/VOL
FIELD CAPACITY = 0.2920 VOL/VOL
WILTING POINT = 0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.100000005000E-02 CM/SEC

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 10
THICKNESS = 120.00 INCHES
POROSITY = 0.3980 VOL/VOL
FIELD CAPACITY = 0.2440 VOL/VOL
WILTING POINT = 0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3980 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.119999997000E-03 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A
FAIR STAND OF GRASS, A SURFACE SLOPE OF 33.%
AND A SLOPE LENGTH OF 100. FEET.

SCS RUNOFF CURVE NUMBER = 81.90
FRACTION OF AREA ALLOWING RUNOFF = 100.0 PERCENT
AREA PROJECTED ON HORIZONTAL PLANE = 32.000 ACRES
EVAPORATIVE ZONE DEPTH = 12.0 INCHES
INITIAL WATER IN EVAPORATIVE ZONE = 2.900 INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE = 5.556 INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE = 1.392 INCHES
INITIAL SNOW WATER = 0.196 INCHES
INITIAL WATER IN LAYER MATERIALS = 237.386 INCHES
TOTAL INITIAL WATER = 237.582 INCHES
TOTAL SUBSURFACE INFLOW = 0.00 INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
SALT LAKE CITY UTAH

STATION LATITUDE = 40.04 DEGREES
MAXIMUM LEAF AREA INDEX = 2.00
START OF GROWING SEASON (JULIAN DATE) = 135
END OF GROWING SEASON (JULIAN DATE) = 279
EVAPORATIVE ZONE DEPTH = 12.0 INCHES
AVERAGE ANNUAL WIND SPEED = 8.80 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 67.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 48.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 39.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 65.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SALT LAKE CITY UTAH

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.11	1.39	1.60	1.60	1.59	1.07
0.73	0.81	1.18	1.48	1.56	1.54

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SALT LAKE CITY UTAH

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
27.50	33.50	41.40	49.70	59.20	68.40
76.20	73.70	64.40	53.20	40.20	29.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SALT LAKE CITY UTAH
AND STATION LATITUDE = 40.04 DEGREES

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.90	1498464.500	100.00
RUNOFF	0.015	1782.170	0.12
EVAPOTRANSPIRATION	12.613	1465092.250	97.77
PERC./LEAKAGE THROUGH LAYER 2	0.263016	30551.961	2.04
AVG. HEAD ON TOP OF LAYER 2	0.0005		
PERC./LEAKAGE THROUGH LAYER 5	0.263016	30551.965	2.04
AVG. HEAD ON TOP OF LAYER 5	0.0003		
CHANGE IN WATER STORAGE	0.009	1035.117	0.07

SOIL WATER AT START OF YEAR	237.386	27574802.000	
SOIL WATER AT END OF YEAR	237.395	27575838.000	
SNOW WATER AT START OF YEAR	0.196	22729.555	1.52
SNOW WATER AT END OF YEAR	0.196	22729.555	1.52
ANNUAL WATER BUDGET BALANCE	0.0000	2.974	0.00

****

****

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.96	1853913.370	100.00
RUNOFF	0.994	115509.898	6.23
EVAPOTRANSPIRATION	13.913	1616154.250	87.18
PERC./LEAKAGE THROUGH LAYER 2	1.798668	208933.250	11.27
AVG. HEAD ON TOP OF LAYER 2	0.0757		
PERC./LEAKAGE THROUGH LAYER 5	1.798668	208933.219	11.27
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	-0.746	-86683.492	-4.68
SOIL WATER AT START OF YEAR	237.395	27575838.000	
SOIL WATER AT END OF YEAR	236.845	27511884.000	
SNOW WATER AT START OF YEAR	0.196	22729.555	1.23
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.512	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.52	1222003.500	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	10.047	1167097.120	95.51
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
PERC./LEAKAGE THROUGH LAYER 5	0.000000	0.000	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0000		
CHANGE IN WATER STORAGE	0.473	54905.840	4.49
SOIL WATER AT START OF YEAR	236.845	27511884.000	
SOIL WATER AT END OF YEAR	236.230	27440488.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.087	126300.570	10.34
ANNUAL WATER BUDGET BALANCE	0.0000	0.457	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.11	2103658.000	100.00
RUNOFF	1.760	204455.812	9.72
EVAPOTRANSPIRATION	15.181	1763367.000	83.82
PERC./LEAKAGE THROUGH LAYER 2	1.346420	156400.156	7.43
AVG. HEAD ON TOP OF LAYER 2	0.0302		
PERC./LEAKAGE THROUGH LAYER 5	1.346420	156400.109	7.43
AVG. HEAD ON TOP OF LAYER 5	0.0012		
CHANGE IN WATER STORAGE	-0.177	-20562.387	-0.98
SOIL WATER AT START OF YEAR	236.230	27440488.000	
SOIL WATER AT END OF YEAR	237.075	27538590.000	
SNOW WATER AT START OF YEAR	1.087	126300.570	6.00
SNOW WATER AT END OF YEAR	0.066	7636.013	0.36
ANNUAL WATER BUDGET BALANCE	0.0000	-2.423	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.87	1494979.500	100.00
RUNOFF	0.638	74069.320	4.95
EVAPOTRANSPIRATION	11.147	1294888.500	86.62
PERC./LEAKAGE THROUGH LAYER 2	0.982115	114082.445	7.63
AVG. HEAD ON TOP OF LAYER 2	0.0105		

PERC./LEAKAGE THROUGH LAYER 5	0.982115	114082.461	7.63
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	0.103	11937.077	0.80
SOIL WATER AT START OF YEAR	237.075	27538590.000	
SOIL WATER AT END OF YEAR	237.181	27550914.000	
SNOW WATER AT START OF YEAR	0.066	7636.013	0.51
SNOW WATER AT END OF YEAR	0.062	7250.941	0.49
ANNUAL WATER BUDGET BALANCE	0.0000	2.153	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.99	2089718.620	100.00
RUNOFF	0.656	76242.469	3.65
EVAPOTRANSPIRATION	15.817	1837260.620	87.92
PERC./LEAKAGE THROUGH LAYER 2	0.625140	72616.242	3.47
AVG. HEAD ON TOP OF LAYER 2	0.0139		
PERC./LEAKAGE THROUGH LAYER 5	0.625140	72616.234	3.47
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	0.892	103600.703	4.96
SOIL WATER AT START OF YEAR	237.181	27550914.000	
SOIL WATER AT END OF YEAR	237.000	27529888.000	
SNOW WATER AT START OF YEAR	0.062	7250.941	0.35
SNOW WATER AT END OF YEAR	1.135	131876.578	6.31
ANNUAL WATER BUDGET BALANCE	0.0000	-1.482	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.23	1769117.120	100.00
RUNOFF	0.528	61288.551	3.46
EVAPOTRANSPIRATION	15.350	1783082.750	100.79

PERC./LEAKAGE THROUGH LAYER 2	0.582460	67658.562	3.82
AVG. HEAD ON TOP OF LAYER 2	0.0107		
PERC./LEAKAGE THROUGH LAYER 5	0.582460	67658.562	3.82
AVG. HEAD ON TOP OF LAYER 5	0.0005		
CHANGE IN WATER STORAGE	-1.230	-142914.187	-8.08
SOIL WATER AT START OF YEAR	237.000	27529888.000	
SOIL WATER AT END OF YEAR	236.287	27447058.000	
SNOW WATER AT START OF YEAR	1.135	131876.578	7.45
SNOW WATER AT END OF YEAR	0.618	71793.031	4.06
ANNUAL WATER BUDGET BALANCE	0.0000	1.412	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.18	1414829.000	100.00
RUNOFF	0.743	86291.203	6.10
EVAPOTRANSPIRATION	9.659	1121978.120	79.30
PERC./LEAKAGE THROUGH LAYER 2	0.871380	101219.539	7.15
AVG. HEAD ON TOP OF LAYER 2	0.0012		
PERC./LEAKAGE THROUGH LAYER 5	0.774515	89967.648	6.36
AVG. HEAD ON TOP OF LAYER 5	0.0007		
CHANGE IN WATER STORAGE	1.004	116591.648	8.24
SOIL WATER AT START OF YEAR	236.287	27447058.000	
SOIL WATER AT END OF YEAR	237.667	27607358.000	
SNOW WATER AT START OF YEAR	0.618	71793.031	5.07
SNOW WATER AT END OF YEAR	0.242	28083.312	1.98
ANNUAL WATER BUDGET BALANCE	0.0000	0.374	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.29	1892247.120	100.00
RUNOFF	2.129	247293.859	13.07

EVAPOTRANSPIRATION	13.457	1563218.120	82.61
PERC./LEAKAGE THROUGH LAYER 2	1.819940	211404.203	11.17
AVG. HEAD ON TOP OF LAYER 2	0.0765		
PERC./LEAKAGE THROUGH LAYER 5	1.916805	222656.094	11.77
AVG. HEAD ON TOP OF LAYER 5	0.0017		
CHANGE IN WATER STORAGE	-1.213	-140924.328	-7.45
SOIL WATER AT START OF YEAR	237.667	27607358.000	
SOIL WATER AT END OF YEAR	236.654	27489706.000	
SNOW WATER AT START OF YEAR	0.242	28083.312	1.48
SNOW WATER AT END OF YEAR	0.041	4811.394	0.25
ANNUAL WATER BUDGET BALANCE	0.0000	3.393	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.90	1730784.370	100.00
RUNOFF	1.038	120586.055	6.97
EVAPOTRANSPIRATION	12.541	1456739.500	84.17
PERC./LEAKAGE THROUGH LAYER 2	0.319995	37170.621	2.15
AVG. HEAD ON TOP OF LAYER 2	0.0035		
PERC./LEAKAGE THROUGH LAYER 5	0.319995	37170.621	2.15
AVG. HEAD ON TOP OF LAYER 5	0.0003		
CHANGE IN WATER STORAGE	1.001	116289.719	6.72
SOIL WATER AT START OF YEAR	236.654	27489706.000	
SOIL WATER AT END OF YEAR	237.275	27561906.000	
SNOW WATER AT START OF YEAR	0.041	4811.394	0.28
SNOW WATER AT END OF YEAR	0.421	48901.695	2.83
ANNUAL WATER BUDGET BALANCE	0.0000	-1.454	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT

PRECIPITATION	16.41	1906186.000	100.00
RUNOFF	1.195	138765.766	7.28
EVAPOTRANSPIRATION	13.602	1580003.370	82.89
PERC./LEAKAGE THROUGH LAYER 2	1.840823	213830.016	11.22
AVG. HEAD ON TOP OF LAYER 2	0.0294		
PERC./LEAKAGE THROUGH LAYER 5	1.684053	195619.625	10.26
AVG. HEAD ON TOP OF LAYER 5	0.0015		
CHANGE IN WATER STORAGE	-0.071	-8201.885	-0.43
SOIL WATER AT START OF YEAR	237.275	27561906.000	
SOIL WATER AT END OF YEAR	237.525	27590952.000	
SNOW WATER AT START OF YEAR	0.421	48901.695	2.57
SNOW WATER AT END OF YEAR	0.100	11652.721	0.61
ANNUAL WATER BUDGET BALANCE	0.0000	-0.845	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.77	1599523.000	100.00
RUNOFF	0.662	76955.312	4.81
EVAPOTRANSPIRATION	13.031	1513680.870	94.63
PERC./LEAKAGE THROUGH LAYER 2	1.189804	138207.656	8.64
AVG. HEAD ON TOP OF LAYER 2	0.0227		
PERC./LEAKAGE THROUGH LAYER 5	1.346574	156418.016	9.78
AVG. HEAD ON TOP OF LAYER 5	0.0012		
CHANGE IN WATER STORAGE	-1.270	-147532.922	-9.22
SOIL WATER AT START OF YEAR	237.525	27590952.000	
SOIL WATER AT END OF YEAR	236.116	27427198.000	
SNOW WATER AT START OF YEAR	0.100	11652.721	0.73
SNOW WATER AT END OF YEAR	0.240	27873.926	1.74
ANNUAL WATER BUDGET BALANCE	0.0000	1.759	0.00

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.14	1526342.500	100.00
RUNOFF	0.524	60923.469	3.99
EVAPOTRANSPIRATION	10.954	1272466.370	83.37
PERC./LEAKAGE THROUGH LAYER 2	0.725436	84266.680	5.52
AVG. HEAD ON TOP OF LAYER 2	0.0030		
PERC./LEAKAGE THROUGH LAYER 5	0.588908	68407.578	4.48
AVG. HEAD ON TOP OF LAYER 5	0.0005		
CHANGE IN WATER STORAGE	1.072	124547.617	8.16
SOIL WATER AT START OF YEAR	236.116	27427198.000	
SOIL WATER AT END OF YEAR	237.258	27559946.000	
SNOW WATER AT START OF YEAR	0.240	27873.926	1.83
SNOW WATER AT END OF YEAR	0.169	19674.852	1.29
ANNUAL WATER BUDGET BALANCE	0.0000	-2.437	0.00

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.40	1672704.500	100.00
RUNOFF	0.473	54906.383	3.28
EVAPOTRANSPIRATION	12.612	1465053.750	87.59
PERC./LEAKAGE THROUGH LAYER 2	1.232486	143165.594	8.56
AVG. HEAD ON TOP OF LAYER 2	0.0212		
PERC./LEAKAGE THROUGH LAYER 5	1.369014	159024.703	9.51
AVG. HEAD ON TOP OF LAYER 5	0.0012		
CHANGE IN WATER STORAGE	-0.054	-6284.463	-0.38
SOIL WATER AT START OF YEAR	237.258	27559946.000	
SOIL WATER AT END OF YEAR	236.495	27471308.000	
SNOW WATER AT START OF YEAR	0.169	19674.852	1.18
SNOW WATER AT END OF YEAR	0.878	102027.617	6.10
ANNUAL WATER BUDGET BALANCE	0.0000	4.154	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.07	1634371.250	100.00
RUNOFF	0.984	114348.922	7.00
EVAPOTRANSPIRATION	11.284	1310761.870	80.20
PERC./LEAKAGE THROUGH LAYER 2	1.589472	184633.047	11.30
AVG. HEAD ON TOP OF LAYER 2	0.0109		
PERC./LEAKAGE THROUGH LAYER 5	1.385326	160919.500	9.85
AVG. HEAD ON TOP OF LAYER 5	0.0013		
CHANGE IN WATER STORAGE	0.416	48340.883	2.96
SOIL WATER AT START OF YEAR	236.495	27471308.000	
SOIL WATER AT END OF YEAR	237.790	27621676.000	
SNOW WATER AT START OF YEAR	0.878	102027.617	6.24
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.069	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.07	1750531.000	100.00
RUNOFF	0.539	62598.812	3.58
EVAPOTRANSPIRATION	13.026	1513051.000	86.43
PERC./LEAKAGE THROUGH LAYER 2	1.572572	182669.984	10.44
AVG. HEAD ON TOP OF LAYER 2	0.0486		
PERC./LEAKAGE THROUGH LAYER 5	1.720979	199908.875	11.42
AVG. HEAD ON TOP OF LAYER 5	0.0015		
CHANGE IN WATER STORAGE	-0.215	-25027.148	-1.43
SOIL WATER AT START OF YEAR	237.790	27621676.000	
SOIL WATER AT END OF YEAR	237.574	27596650.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.457	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.62	1698259.620	100.00
RUNOFF	1.122	130294.562	7.67
EVAPOTRANSPIRATION	10.689	1241692.000	73.12
PERC./LEAKAGE THROUGH LAYER 2	2.449125	284490.406	16.75
AVG. HEAD ON TOP OF LAYER 2	0.0459		
PERC./LEAKAGE THROUGH LAYER 5	1.930149	224206.109	13.20
AVG. HEAD ON TOP OF LAYER 5	0.0017		
CHANGE IN WATER STORAGE	0.879	102065.633	6.01
SOIL WATER AT START OF YEAR	237.574	27596650.000	
SOIL WATER AT END OF YEAR	237.909	27635480.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.544	63234.559	3.72
ANNUAL WATER BUDGET BALANCE	0.0000	1.357	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.77	1831843.120	100.00
RUNOFF	1.744	202608.078	11.06
EVAPOTRANSPIRATION	12.584	1461752.870	79.80
PERC./LEAKAGE THROUGH LAYER 2	1.225495	142353.516	7.77
AVG. HEAD ON TOP OF LAYER 2	0.0570		
PERC./LEAKAGE THROUGH LAYER 5	1.800211	209112.500	11.42
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	-0.358	-41630.883	-2.27
SOIL WATER AT START OF YEAR	237.909	27635480.000	
SOIL WATER AT END OF YEAR	237.824	27625622.000	
SNOW WATER AT START OF YEAR	0.544	63234.559	3.45
SNOW WATER AT END OF YEAR	0.271	31462.102	1.72
ANNUAL WATER BUDGET BALANCE	0.0000	0.595	0.00

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.12	1059379.500	100.00
RUNOFF	1.471	170856.422	16.13
EVAPOTRANSPIRATION	7.535	875214.750	82.62
PERC./LEAKAGE THROUGH LAYER 2	1.330225	154518.875	14.59
AVG. HEAD ON TOP OF LAYER 2	0.0690		
PERC./LEAKAGE THROUGH LAYER 5	1.330224	154518.859	14.59
AVG. HEAD ON TOP OF LAYER 5	0.0012		
CHANGE IN WATER STORAGE	-1.216	-141210.453	-13.33
SOIL WATER AT START OF YEAR	237.824	27625622.000	
SOIL WATER AT END OF YEAR	236.228	27440266.000	
SNOW WATER AT START OF YEAR	0.271	31462.102	2.97
SNOW WATER AT END OF YEAR	0.651	75608.523	7.14
ANNUAL WATER BUDGET BALANCE	0.0000	-0.055	0.00

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.85	2189615.750	100.00
RUNOFF	0.952	110627.656	5.05
EVAPOTRANSPIRATION	14.024	1629049.870	74.40
PERC./LEAKAGE THROUGH LAYER 2	1.855860	215576.656	9.85
AVG. HEAD ON TOP OF LAYER 2	0.0177		
PERC./LEAKAGE THROUGH LAYER 5	1.164285	135243.359	6.18
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	2.709	314693.281	14.37
SOIL WATER AT START OF YEAR	236.228	27440266.000	
SOIL WATER AT END OF YEAR	239.550	27826138.000	
SNOW WATER AT START OF YEAR	0.651	75608.523	3.45
SNOW WATER AT END OF YEAR	0.038	4429.983	0.20

ANNUAL WATER BUDGET BALANCE	0.0000	1.606	0.00

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ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.19	1648310.620	100.00
RUNOFF	0.664	77153.062	4.68
EVAPOTRANSPIRATION	12.925	1501369.620	91.09
PERC./LEAKAGE THROUGH LAYER 2	2.665585	309634.344	18.78
AVG. HEAD ON TOP OF LAYER 2	0.1150		
PERC./LEAKAGE THROUGH LAYER 5	3.357159	389967.562	23.66
AVG. HEAD ON TOP OF LAYER 5	0.0031		
CHANGE IN WATER STORAGE	-2.756	-320177.187	-19.42
SOIL WATER AT START OF YEAR	239.550	27826138.000	
SOIL WATER AT END OF YEAR	236.624	27486286.000	
SNOW WATER AT START OF YEAR	0.038	4429.983	0.27
SNOW WATER AT END OF YEAR	0.208	24104.453	1.46
ANNUAL WATER BUDGET BALANCE	0.0000	-2.437	0.00

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ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.92	1965427.250	100.00
RUNOFF	0.752	87354.469	4.44
EVAPOTRANSPIRATION	13.044	1515150.500	77.09
PERC./LEAKAGE THROUGH LAYER 2	0.935772	108699.289	5.53
AVG. HEAD ON TOP OF LAYER 2	0.0014		
PERC./LEAKAGE THROUGH LAYER 5	0.891243	103526.742	5.27
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	2.233	259395.812	13.20
SOIL WATER AT START OF YEAR	236.624	27486286.000	
SOIL WATER AT END OF YEAR	237.405	27576922.000	

SNOW WATER AT START OF YEAR	0.208	24104.453	1.23
SNOW WATER AT END OF YEAR	1.660	192863.703	9.81
ANNUAL WATER BUDGET BALANCE	0.0000	-0.277	0.00

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ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.16	2457945.750	100.00
RUNOFF	2.062	239529.953	9.75
EVAPOTRANSPIRATION	17.176	1995153.870	81.17
PERC./LEAKAGE THROUGH LAYER 2	3.664921	425717.219	17.32
AVG. HEAD ON TOP OF LAYER 2	0.0839		
PERC./LEAKAGE THROUGH LAYER 5	3.520471	408937.937	16.64
AVG. HEAD ON TOP OF LAYER 5	0.0031		
CHANGE IN WATER STORAGE	-1.598	-185676.672	-7.55
SOIL WATER AT START OF YEAR	237.405	27576922.000	
SOIL WATER AT END OF YEAR	237.241	27557922.000	
SNOW WATER AT START OF YEAR	1.660	192863.703	7.85
SNOW WATER AT END OF YEAR	0.225	26187.809	1.07
ANNUAL WATER BUDGET BALANCE	0.0000	0.775	0.00

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ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.32	1895731.370	100.00
RUNOFF	0.605	70332.953	3.71
EVAPOTRANSPIRATION	12.906	1499164.000	79.08
PERC./LEAKAGE THROUGH LAYER 2	2.274625	264220.406	13.94
AVG. HEAD ON TOP OF LAYER 2	0.0589		
PERC./LEAKAGE THROUGH LAYER 5	2.382080	276702.375	14.60
AVG. HEAD ON TOP OF LAYER 5	0.0021		
CHANGE IN WATER STORAGE	0.426	49530.383	2.61
SOIL WATER AT START OF YEAR	237.241	27557922.000	

SOIL WATER AT END OF YEAR	237.595	27599046.000	
SNOW WATER AT START OF YEAR	0.225	26187.809	1.38
SNOW WATER AT END OF YEAR	0.298	34593.555	1.82
ANNUAL WATER BUDGET BALANCE	0.0000	1.717	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.03	1745885.370	100.00
RUNOFF	1.099	127661.969	7.31
EVAPOTRANSPIRATION	12.836	1491072.500	85.40
PERC./LEAKAGE THROUGH LAYER 2	1.314559	152699.187	8.75
AVG. HEAD ON TOP OF LAYER 2	0.0464	-	
PERC./LEAKAGE THROUGH LAYER 5	1.396084	162169.125	9.29
AVG. HEAD ON TOP OF LAYER 5	0.0012		
CHANGE IN WATER STORAGE	-0.301	-35019.020	-2.01
SOIL WATER AT START OF YEAR	237.595	27599046.000	
SOIL WATER AT END OF YEAR	237.352	27570776.000	
SNOW WATER AT START OF YEAR	0.298	34593.555	1.98
SNOW WATER AT END OF YEAR	0.240	27845.285	1.59
ANNUAL WATER BUDGET BALANCE	0.0000	0.789	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.08	1984013.250	100.00
RUNOFF	0.647	75209.500	3.79
EVAPOTRANSPIRATION	13.055	1516478.750	76.43
PERC./LEAKAGE THROUGH LAYER 2	3.532726	410361.500	20.68
AVG. HEAD ON TOP OF LAYER 2	0.0891		
PERC./LEAKAGE THROUGH LAYER 5	2.098783	243794.687	12.29
AVG. HEAD ON TOP OF LAYER 5	0.0019		

CHANGE IN WATER STORAGE	1.279	148532.312	7.49
SOIL WATER AT START OF YEAR	237.352	27570776.000	
SOIL WATER AT END OF YEAR	238.870	27747152.000	
SNOW WATER AT START OF YEAR	0.240	27845.285	1.40
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-1.939	0.00

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ANNUAL TOTALS FOR YEAR 27

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.69	1938710.250	100.00
RUNOFF	0.650	75502.633	3.89
EVAPOTRANSPIRATION	14.282	1658962.500	85.57
PERC./LEAKAGE THROUGH LAYER 2	1.209209	140461.719	7.25
AVG. HEAD ON TOP OF LAYER 2	0.0073		
PERC./LEAKAGE THROUGH LAYER 5	2.308994	268212.781	13.83
AVG. HEAD ON TOP OF LAYER 5	0.0021		
CHANGE IN WATER STORAGE	-0.551	-63968.641	-3.30
SOIL WATER AT START OF YEAR	238.870	27747152.000	
SOIL WATER AT END OF YEAR	237.729	27614632.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.590	68551.172	3.54
ANNUAL WATER BUDGET BALANCE	0.0000	0.969	0.00

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ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.38	2135021.500	100.00
RUNOFF	0.316	36690.281	1.72
EVAPOTRANSPIRATION	12.015	1395688.750	65.37
PERC./LEAKAGE THROUGH LAYER 2	6.159868	715530.250	33.51
AVG. HEAD ON TOP OF LAYER 2	0.1665		
PERC./LEAKAGE THROUGH LAYER 5	4.969362	577241.125	27.04

AVG. HEAD ON TOP OF LAYER 5	0.0044		
CHANGE IN WATER STORAGE	1.080	125401.227	5.87
SOIL WATER AT START OF YEAR	237.729	27614632.000	
SOIL WATER AT END OF YEAR	238.932	27754352.000	
SNOW WATER AT START OF YEAR	0.590	68551.172	3.21
SNOW WATER AT END OF YEAR	0.467	54232.840	2.54
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.09	1985174.620	100.00
RUNOFF	0.721	83702.898	4.22
EVAPOTRANSPIRATION	16.280	1891044.500	95.26
PERC./LEAKAGE THROUGH LAYER 2	1.293128	150209.703	7.57
AVG. HEAD ON TOP OF LAYER 2	0.0462		
PERC./LEAKAGE THROUGH LAYER 5	2.817791	327314.531	16.49
AVG. HEAD ON TOP OF LAYER 5	0.0025		
CHANGE IN WATER STORAGE	-2.728	-316886.750	-15.96
SOIL WATER AT START OF YEAR	238.932	27754352.000	
SOIL WATER AT END OF YEAR	236.671	27491698.000	
SNOW WATER AT START OF YEAR	0.467	54232.840	2.73
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.609	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.32	1431091.500	100.00
RUNOFF	0.771	89576.531	6.26
EVAPOTRANSPIRATION	10.735	1246966.370	87.13
PERC./LEAKAGE THROUGH LAYER 2	0.129527	15045.890	1.05

AVG. HEAD ON TOP OF LAYER 2	0.0002		
PERC./LEAKAGE THROUGH LAYER 5	0.129527	15045.890	1.05
AVG. HEAD ON TOP OF LAYER 5	0.0001		
CHANGE IN WATER STORAGE	0.684	79501.961	5.56
SOIL WATER AT START OF YEAR	236.671	27491698.000	
SOIL WATER AT END OF YEAR	237.355	27571200.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.739	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.96	1.25	1.83	1.48	1.36	1.13
	0.70	0.75	1.10	1.37	1.67	1.64
STD. DEVIATIONS	0.49	0.57	0.73	0.63	0.72	0.81
	0.49	0.70	0.77	1.06	0.93	0.67
RUNOFF						
TOTALS	0.173	0.427	0.224	0.000	0.000	0.000
	0.000	0.000	0.000	0.006	0.005	0.045
STD. DEVIATIONS	0.255	0.398	0.260	0.001	0.000	0.003
	0.001	0.000	0.000	0.029	0.014	0.108
EVAPOTRANSPIRATION						
TOTALS	0.544	0.627	2.094	1.637	1.376	1.412
	0.809	0.644	1.097	0.912	0.879	0.780
STD. DEVIATIONS	0.191	0.288	0.517	0.856	0.773	0.838
	0.494	0.691	0.694	0.756	0.378	0.175
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0776	0.1722	0.7099	0.0139	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0871	0.1983	0.3009
STD. DEVIATIONS	0.2802	0.4099	0.5084	0.0595	0.0000	0.0000
	0.0000	0.0000	0.0000	0.1874	0.4458	0.4903
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.2221	0.0633	0.5696	0.2950	0.0078	0.0000
	0.0000	0.0000	0.0000	0.0279	0.0925	0.2818
STD. DEVIATIONS	0.4621	0.1555	0.4777	0.3949	0.0194	0.0000
	0.0000	0.0000	0.0000	0.0774	0.1852	0.4248

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.0326	0.0594	0.2561	0.0009	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0125	0.0471	0.0568
STD. DEVIATIONS	0.1740	0.1759	0.2931	0.0046	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0549	0.1670	0.1576

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0024	0.0007	0.0060	0.0033	0.0001	0.0000
	0.0000	0.0000	0.0000	0.0003	0.0010	0.0030
STD. DEVIATIONS	0.0049	0.0018	0.0050	0.0043	0.0002	0.0000
	0.0000	0.0000	0.0000	0.0008	0.0020	0.0044

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	15.25	(2.552)	1770859.7	100.00
RUNOFF	0.882	(0.5225)	102437.30	5.785
EVAPOTRANSPIRATION	12.811	(2.0503)	1488088.50	84.032
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.56001	(1.23776)	181210.969	10.23294
AVERAGE HEAD ON TOP OF LAYER 2	0.039	(0.040)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	1.56001	(1.09057)	181210.969	10.23294
AVERAGE HEAD ON TOP OF LAYER 5	0.001	(0.001)		
CHANGE IN WATER STORAGE	-0.008	(1.2560)	-877.71	-0.050

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	1.76	204441.594
RUNOFF	0.790	91822.7578
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.160054	18591.91020
AVERAGE HEAD ON TOP OF LAYER 2	5.527	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.100163	11634.95210
AVERAGE HEAD ON TOP OF LAYER 5	0.033	
SNOW WATER	3.05	353782.0620

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3644
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1160

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	2.8694	0.2391
2	7.8660	0.4370
3	3.6600	0.3050
4	175.2000	0.2920
5	47.7600	0.3980

SNOW WATER 0.000

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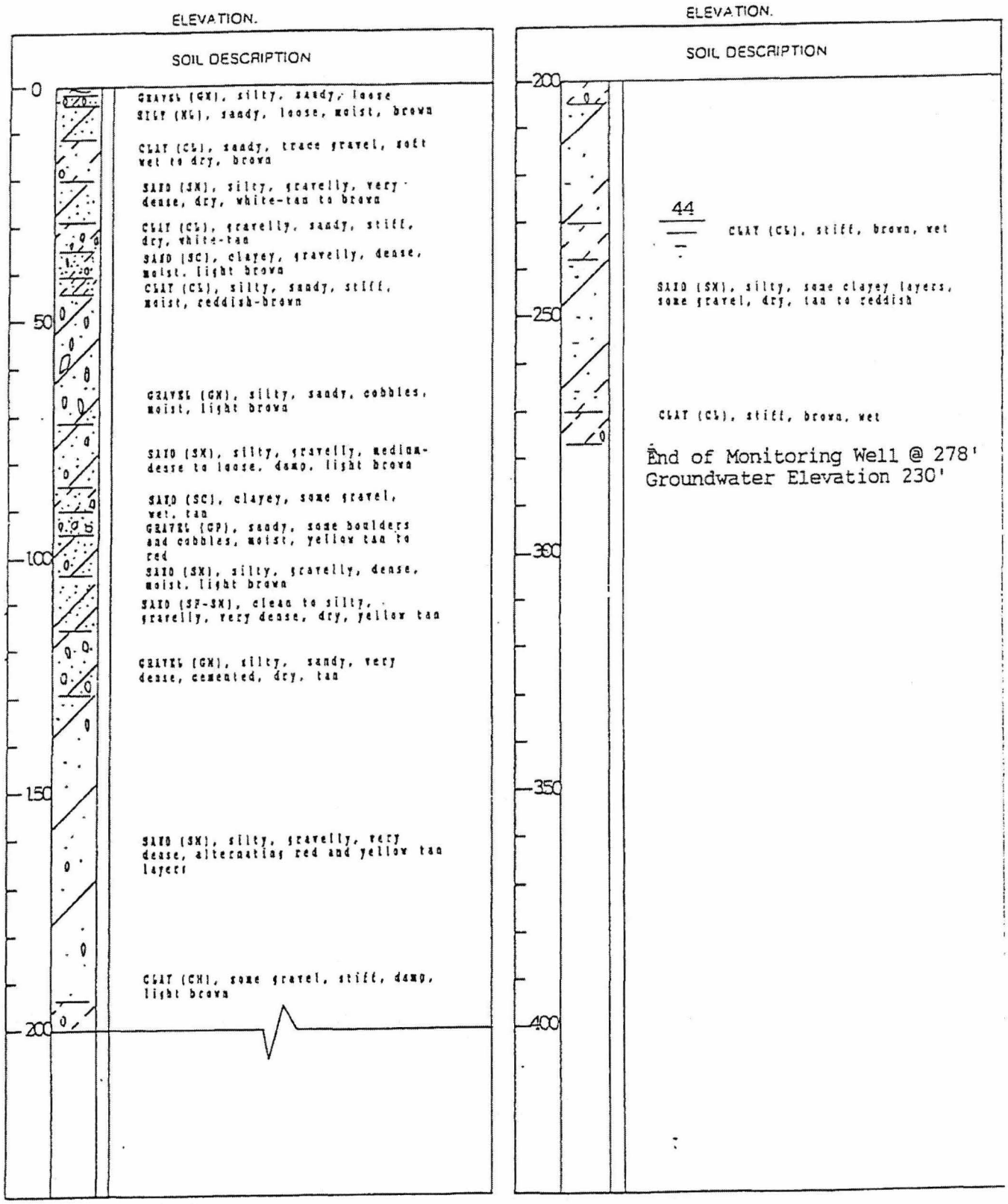
ATTACHMENT 4

MONITOR WELL COMPLETION
AND
DRILL HOLE LOGS

E/E

MONITORING WELL NO. 1



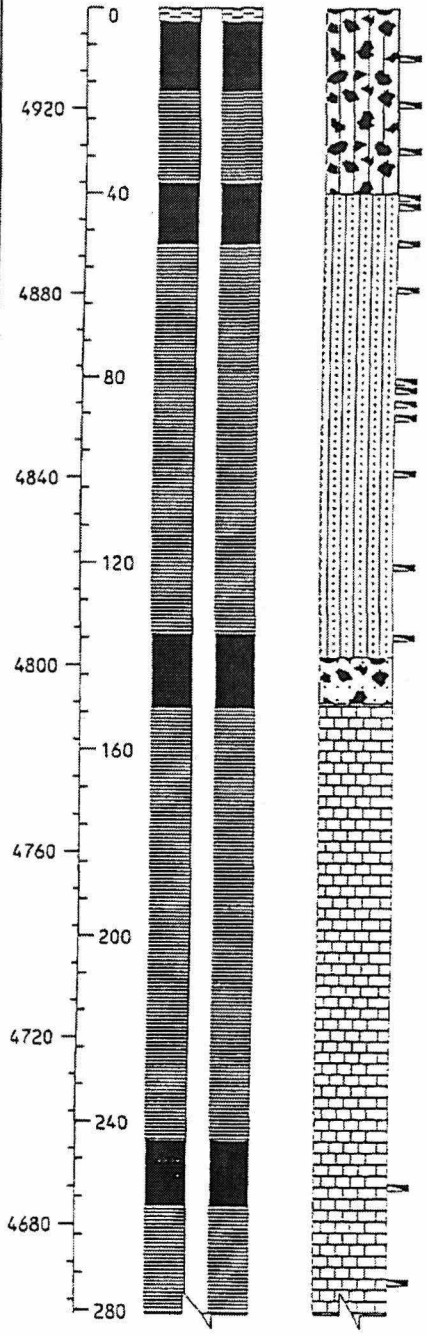
LOGS OF TEST HOLE

FIGURE 1

DRILL HOLE LOG
MONITOR WELL NO.: MW-2

PROJECT: Payson City Landfill
CLIENT/OWNER: Payson City Corp.
HOLE LOCATION: West of landfill
DRILLER: Layne Environmental
DRILL RIG: SCHRAMM 685
DEPTH TO WATER: 404.72' HOLE DIAMETER: 8"

PROJECT NO.: 2469-002
DATE: 2-12-96
TOC ELEV.: 4944.59
GS ELEV.: 4941.78
LOGGED BY: DCH
WELL NO.: MW-2



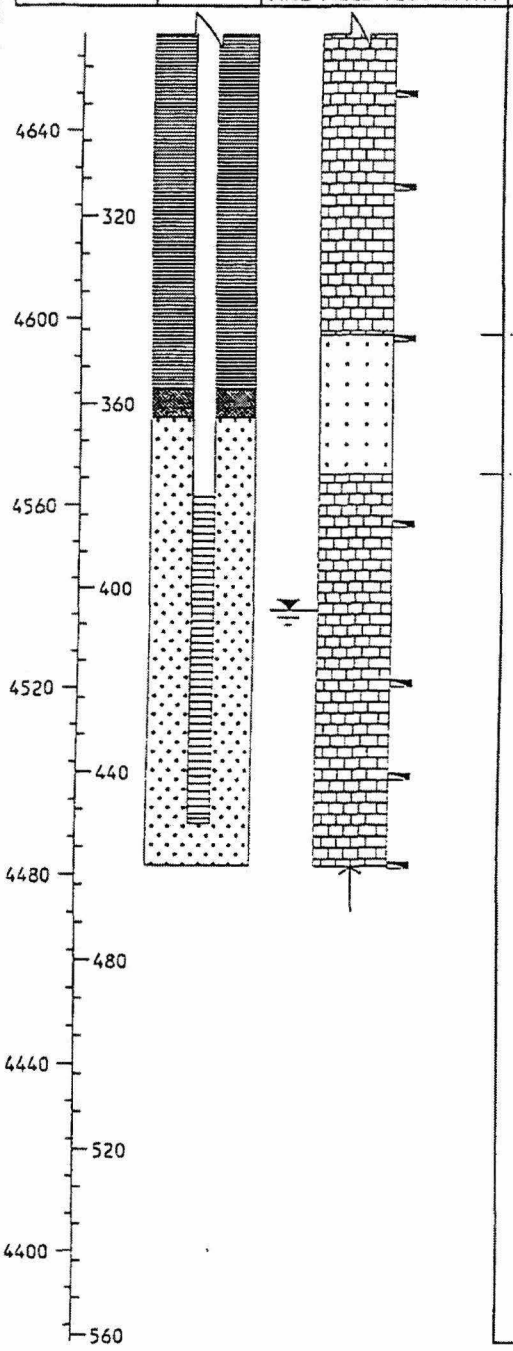
ELEVATION / DEPTH	WELL DETAILS	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
			GM	SILTY GRAVEL: Gray & brown, sandy fine to coarse, cobbles, slightly moist to dry.	B-1	10	
				...grades with occasional boulders.	B-2	20	
					B-3	30	
			SM	SILTY SAND: Gray, fine to coarse, gravely, dry.	B-4	40	
					B-5	42	
				...grades with occasional cobbles & boulders.	B-6	50	
					B-7	60	
				...grades with occasional reddish brown & yellowish brown lenses.	B-8	80	
					B-9	82	
					B-10	85	
					B-11	88	
					B-12	100	
					B-13	120	
					B-14	135	
			GP	SANDY GRAVEL: Gray, cobbles & bouldes, dry.			
				LIMESTONE: Gray with occasional reddish brown lenses, dry.			
					B-15	253	
					B-16	273	

Figure No. 1

DRILL HOLE LOG
MONITOR WELL NO.: MW-2

PROJECT: Payson City Landfill
CLIENT/OWNER: Payson City Corp.
HOLE LOCATION: West of landfill
DRILLER: Layne Environmental
DRILL RIG: SCHRAMM 685
DEPTH TO WATER: 404.72' HOLE DIAMETER: 8"

PROJECT NO.: 2469-002
DATE: 2-12-96
TOC ELEV.: 4944.59
GS ELEV.: 4941.78
LOGGED BY: DCH
WELL NO.: MW-2



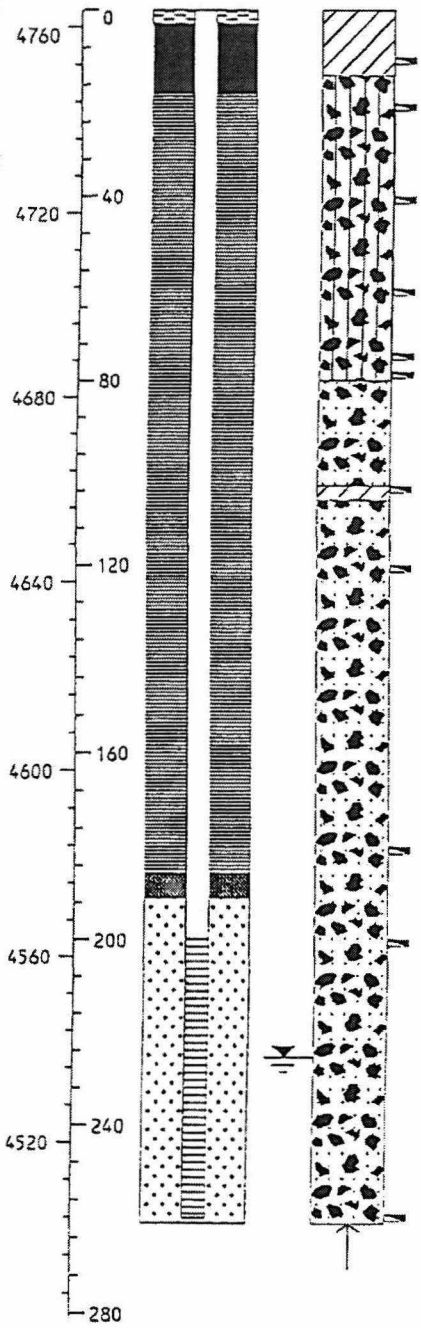
ELEVATION / DEPTH	WELL DETAILS	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
					B-17	293	
					B-18	313	
				SANDSTONE: Reddish brown, fine to coarse, dry to slightly damp.	B-19	345	
				LIMESTONE: Gray, dry to wet.	B-20	385	
				...grades wet.	B-21	420	
					B-22	440	
					B-23	460	

Figure No. 2

DRILL HOLE LOG
MONITOR WELL NO.: MW-3

PROJECT: Payson City Landfill
CLIENT/OWNER: Payson City Corp.
HOLE LOCATION: East of landfill
DRILLER: Layne Environmental
DRILL RIG: SCHRAMM 685
DEPTH TO WATER: 225.50' HOLE DIAMETER: 8"

PROJECT NO.: 2469-002
DATE: 2-20-96
TOC ELEV.: 4765.37
GS ELEV.: 4763.66
LOGGED BY: DCH
WELL NO.: MW-3



USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
CL	SILTY CLAY: Dark brown to brown, moist to dry.	B-1	10	
GM	SILTY GRAVEL: Gray and brown, dry.	B-2	20	
	...grades with occasional cobbles.	B-3	40	
		B-4	60	
		B-5	74	
		B-6	78	
GP	SANDY GRAVEL: Gray, fine to coarse, occasional cobbles & boulders, dry.			
CL	SILTY CLAY: Reddish brown, sandy, slightly moist.	B-7	103	
GP	SANDY GRAVEL: Gray with occasional reddish brown lenses, fine to coarse, occasional cobbles & boulders, dry. ...grades with a high concentration of boulders & cobbles; boulders & cobbles may be cemented.	B-8	120	
	...grades with occasional 2 to 4 foot reddish brown clay lenses.	B-9	180	
		B-10	200	
		B-11	260	

Figure No. 3

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty Gravel
	Silty sand
	Silty Gravel
	Limestone
	Sandstone
	Silty Clay
Misc. Symbols	
	Boring continues
	Water table
	Drill hole completion depth

Symbol	Description
Soil Samplers	
	Bulk/Grab sample*
Monitor Well Completion Details	
	Protective well cover set in concrete
	Bentonite-cement slurry blank 2" O.D. PVC pipe
	Bentonite hole plug blank 2" O.D. PVC pipe
	Bentonite pellets blank 2" O.D. PVC pipe
	Silica sand blank 2" O.D. PVC pipe
	Silica sand 20 slot 2" O.D. PVC pipe.
	Silica sand no PVC pipe

Notes:

1. Monitor wells MW-2 and MW-3 were drilled and installed on February 12 through 27, 1996. The holes were drilled with a truck mounted drill rig. The drilling method was the "casing under reaming advanced system" utilizing 8-inch O.D. drilling pipe.

2. Free water was encountered at the time of drilling. Water levels shown on the drill hole logs were measured on September 10, 1996.

3. Soil samples for soil identification were obtained from the drill cuttings.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

Payson City Class V Landfill
Permit Renewal Application March 2015

APPENDIX J

Ground Water Monitoring Plan

too big to print

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

April 2003

Prepared by

URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Background and Previous Investigations 1

2.0 GROUND WATER MONITORING PROGRAM OBJECTIVE AND SCOPE 5
2.1 Purpose of the SAP 5
2.2 Purpose of the QAPP 5
2.3 Purpose of the HASP 6

3.0 LANDFILL HYDROGEOLOGIC SETTING 7

4.0 REFERENCES 9

LIST OF FIGURES

Figure 1 – Vicinity Map
Figure 2 – Well Locations

LIST OF APPENDICES

Appendix A – Sampling and Analysis Plan
Appendix B – Quality Assurance Project Plan
Appendix C – Health and Safety Plan

1.0 INTRODUCTION

The purpose of this Ground Water Monitoring Plan is to describe the methods and procedures by which ground water detection and assessment monitoring will be conducted at the Payson City Landfill. Procedures for the collection of samples in the field are described in the Sampling and Analysis Plan (SAP) portion of this document (Appendix A). The data quality objectives for landfill assessment and detection monitoring and the procedures for the validation of analytical data are described in the Quality Assurance Project Plan (QAPP) portion of this document (Appendix B). The health and safety requirements that will be followed by field personnel performing sampling at the landfill are described in the Health and Safety Plan (HASP) portion of this document (Appendix C). The purpose of the ground water monitoring program is to monitor ground water for indications of potential chemical releases from the landfill. The ground water monitoring program has been designed to comply with Utah Solid Waste Permitting and Management Rule R315-308, Ground Water Monitoring Requirements. Data obtained will be used to evaluate ground water quality in the uppermost aquifer beneath the landfill.

1.1 Background and Previous Investigations

The Payson City Landfill is located approximately four miles west of the City of Payson in Utah County. The landfill is classified as a Class V Landfill, and accepts only non-hazardous municipal refuse and construction/demolition debris. The site is located on the eastern side of West Mountain, in the northwest corner of the northwest corner of Section 14, Township 9 South, Range 1 East, of the Salt Lake Base and Meridian (Figure 1).

1996 – Geohydrologic Assessment Report

In 1996, a Geohydrological Assessment Report was prepared for the Payson City Landfill by Bingham Environmental Inc. This assessment was an evaluation of both the regional and local geologic and hydrogeologic settings of the Payson City Landfill. In the assessment, three monitoring wells (wells MW-1, MW-2, and MW-3) were sampled by Bingham Environmental in September 1996. Well MW-1 was installed by Zimmerman Well Service in May of 1993 and wells MW-2 and MW-3 were installed by Lane Environmental Services in February of 1996 (Bingham Environmental, 1996).

1997/1998 – Well Installation and Ground Water Sampling

Dames & Moore installed and sampled three additional wells (MW-4, MW-5, and MW-6) in 1997 and 1998. Water samples were obtained from each of the monitoring wells after development. MW-4 was drilled to a total depth of 345 feet below ground surface (bgs) and completed at a depth of 340 feet bgs in December of 1997. Development and sampling took place in January 1998. MW-5 was drilled and completed to a depth of 295 feet bgs in November 1998, and MW-6 was drilled and completed to a depth of 335 feet bgs in December 1998. MW-4, MW-5 and MW-6 were completed with 50 feet of screened interval at the base of the wells (Dames & Moore, 1998; and Dames & Moore, 1999; Appendix A). MW-5 and MW-6 were developed and sampled in December 1998.

1999 through 2001 – Ground Water Detection Monitoring

In 1999, Dames & Moore conducted two additional sampling events at the Payson City Landfill where volatile organic compounds were detected in samples collected:

- September 15, 1999, samples were collected from wells MW-3 and MW-5; and
- December 15, 1999, samples were collected from wells MW-1, MW-3 and MW-5.

In 2000, URS/Dames & Moore completed five ground water sampling events at the Payson City Landfill where concentrations of tetrachloroethene, metals, and nitrate were detected at concentrations exceeding ground water quality standards:

- March 14, 2000, samples were collected from wells MW-4, MW-5, and MW-6;
- July 26, 2000, a sample was collected from well MW-4;
- September 6, 2000, samples were collected from wells MW-4, MW-5, and MW-6;
- November 2, 2000 and November 8, 2000, samples were collected from wells MW-4, MW-5 and MW-6 (November 2nd) , and well MW-3 (November 8th); and
- December 12, 2000, a sample was collected from well MW-4.

Prior to the December 2001 sampling, URS/ Dames & Moore completed three sampling events where concentrations of tetrachloroethene and nitrate were detected greater than the ground water quality standards in samples collected:

- February 27, 2001, samples were collected from wells MW-4, MW-5, and MW-6;
- April 5, 2001, a sample was collected from well MW-4; and
- June 13, 2001, samples were collected from wells MW-4, MW-5 and MW6.

2001/2002 – Ground Water Assessment Monitoring

Starting in December 2001 and for three subsequent quarters ending in September 2002, URS collected quarterly ground water samples from monitoring wells MW-4, MW-5, and MW-6 and analyzed these samples for assessment monitoring criteria as defined by UDSHW. Monitoring well MW-3 was sampled on a semi-annual basis for detection monitoring criteria as defined by UDSHW. The sampling was completed as follows:

- One sample per well was collected from wells MW-3, MW-4, MW-5, and MW-6 on December 6 and 7, 2001;
- One sample per well was collected from wells MW-4, MW-5, and MW-6 on March 5, 2002;
- One sample per well was collected from wells MW-3, MW-4, and MW-5 (well MW-6 was dry) on June 13, 2002; and
- One sample per well was collected from wells MW-4, MW-5, and MW-6 on September 6, 2002.

Results from the first quarter (December 2001) indicated none of the additional compounds on the 40 CFR Part 258 Appendix II list were detected. Therefore for subsequent quarters, the samples collected were only analyzed for the R315-308-4 analyte list (URS, 2002a).

The fourth quarter 2002 quarterly ground water monitoring report (URS, 2002b) contained a detailed statistical analysis of the ground water at the site. The fourth quarter report identified that:

- Due to similar ground water level response, the site monitoring well ground water elevations suggested that all of the wells are screened in the same unconfined aquifer.
- The prevailing patterns of flow over the past two years have been inconsistent with the hypothesis that a single dominant direction characterizes flow in the aquifer beneath the landfill. A more plausible explanation consistent with observations was a pattern of radial ground water flow away from the landfill. An important implication of this hypothesis was that there is no upgradient monitoring well at the landfill.
- Flow to south from the landfill would explain the observations of VOCs in MW-4. A claim not supported by observations is that MW-4 is upgradient of the landfill.
- Flow to the north of the landfill would explain the concentrations of VOCs above the reporting limit in ground water samples from monitoring wells MW-5 and MW-6 in each

sampling event since March 2000. Historically, the highest measured VOC concentrations have been observed in MW-5.

- Measured concentrations of tetrachloroethene in ground water samples from MW-4 show an increasing trend. If the trend continues, the tetrachloroethene concentrations predicted at the lower confidence level will exceed the Utah Ground Water Protection Standard (R315-308-4) in approximately 57 months.
- Measured concentrations of tetrachloroethene in ground water samples from MW-5 show no trend at the 95% confidence level, and a decreasing trend at the 85% confidence level. If no trend is assumed, the lower confidence level for tetrachloroethene in MW-5 is above the Utah Ground Water Protection Standard (R315-308-4).

2.0 GROUND WATER MONITORING PROGRAM OBJECTIVE AND SCOPE

The objective of this program is to monitor the quality of ground water at the Payson City Landfill in accordance with detection and assessment monitoring requirements. During 2003, detection monitoring is scheduled to be performed at monitoring well MW-3, and assessment monitoring is scheduled to be performed in wells MW-4, MW-5, and MW-6 (refer to Appendix A). It is anticipated that detection and/or assessment monitoring will continue through the active life, closure, and post-closure care periods at the Landfill.

2.1 Purpose of the SAP

The methods and procedures for collection of compliance samples at the landfill are described in the project SAP. The general purposes of the SAP are to:

- Serve as a field guide for the sampling program;
- Document the required protocols for field and analytical activities;
- Describe required documentation procedures for field and laboratory tasks; and
- Provide guidance and requirements for subcontracted laboratory services.

The SAP is provided in Appendix A of this Ground Water Monitoring Plan.

2.2 Purpose of the QAPP

The Quality Assurance Project Plan (QAPP) describes the methods and procedures that will be followed to assure that valid, useful data are obtained during detection and assessment monitoring. The general purposes of the QAPP are to:

- Define Data Quality Objectives (DQOs) for the program;
- Provide Data Quality Indicators (DQIs - precision, accuracy, completeness, comparability, and representativeness) for analytical data comparison;
- Provide activity-specific quality assurance objectives; and
- Serve as the primary guide for the integration of Quality Assurance (QA) and Quality Control (QC) functions for all sampling and analysis activities.

The QAPP is provided in Appendix B of this Ground Water Monitoring Plan.

2.3 Purpose of the HASP

The methods and procedures that personnel will follow to ensure their personal safety when performing the well sampling associated with the Ground Water Monitoring Plan are described in the Health and Safety Plan (HASP). The general purposes of the HASP are to:

- Summarize health and safety hazard information;
- Delineate procedures that will allow personnel to work safely at the landfill; and
- Provide specific guidance to respond quickly and appropriately to potential site emergencies.

The HASP is provided in Appendix C of this Ground Water Monitoring Plan.

3.0 LANDFILL HYDROGEOLOGIC SETTING

According to Anderson, et al., (1994) as many as four aquifers exist in the basin fill of Utah Valley. The basin-fill deposits are composed of deep (older) sediments that were eroded from the adjacent mountains and shallow (younger) lacustrine and alluvial sediments associated with Lake Bonneville. Typically, a shallow unconfined aquifer overlies three artesian aquifers which exist in Lake Bonneville sediments and older valley-fill deposits. The aquifers are separated by discontinuous low-permeability confining layers.

Ground water in the aquifers underlying the Payson City Landfill originates from precipitation and snow melt in recharge areas (i.e., the adjacent mountains and valley benches) and flows toward, and discharges to, the topographically lower Utah Lake. Ground water in the deeper confined aquifers has an upward (artesian) gradient, and discharges to the upper unconfined aquifer, and ultimately to Utah Lake.

A total of six monitoring wells have been installed at the Payson City Landfill (Figure 2) during the course of previous investigations. Of the six wells, five are completed in unconsolidated sedimentary deposits consisting of varying combinations of sand, silt, clay and gravel. These unconsolidated materials appear to be late Pleistocene Bonneville Formation, which is composed of thin beds of offshore clay, silt, and fine sand, and Provo Formation and younger lake bottom clay, silt, and some offshore sandbars (Davis, 1983). MW-2 is an exception, and is screened in Permian-Pennsylvanian Oquirrh Formation sandstone, quartzite, and limestone bedrock. Stratigraphic logs and completion details for the six on-site monitoring wells indicate that water-bearing strata were encountered at depths ranging from 260 to 315 feet below ground surface (Bingham Environmental, 1996; Dames & Moore, 1998; and Dames & Moore, 1999).

Of the six existing wells, three wells (MW-4, MW-5, and MW-6) will be sampled quarterly, and one well (MW-3) will be sampled semi-annually as part of the Landfill's ground water monitoring program, in accordance with the requirements of Utah Solid Waste Permitting and Management Rule R315-308.

In the fourth quarter 2002 monitoring report (URS, 2002b), it was determined that the prevailing patterns of flow had been inconsistent with the supposition that a single dominant direction characterized flow in the aquifer beneath the landfill. The data suggested components of flow to both the east and the west, observations that could not be reconciled with the idea of a single

flow direction. The report suggested that a pattern of radial ground water flow away from the landfill is a more plausible explanation and more consistent with observations.

4.0 REFERENCES

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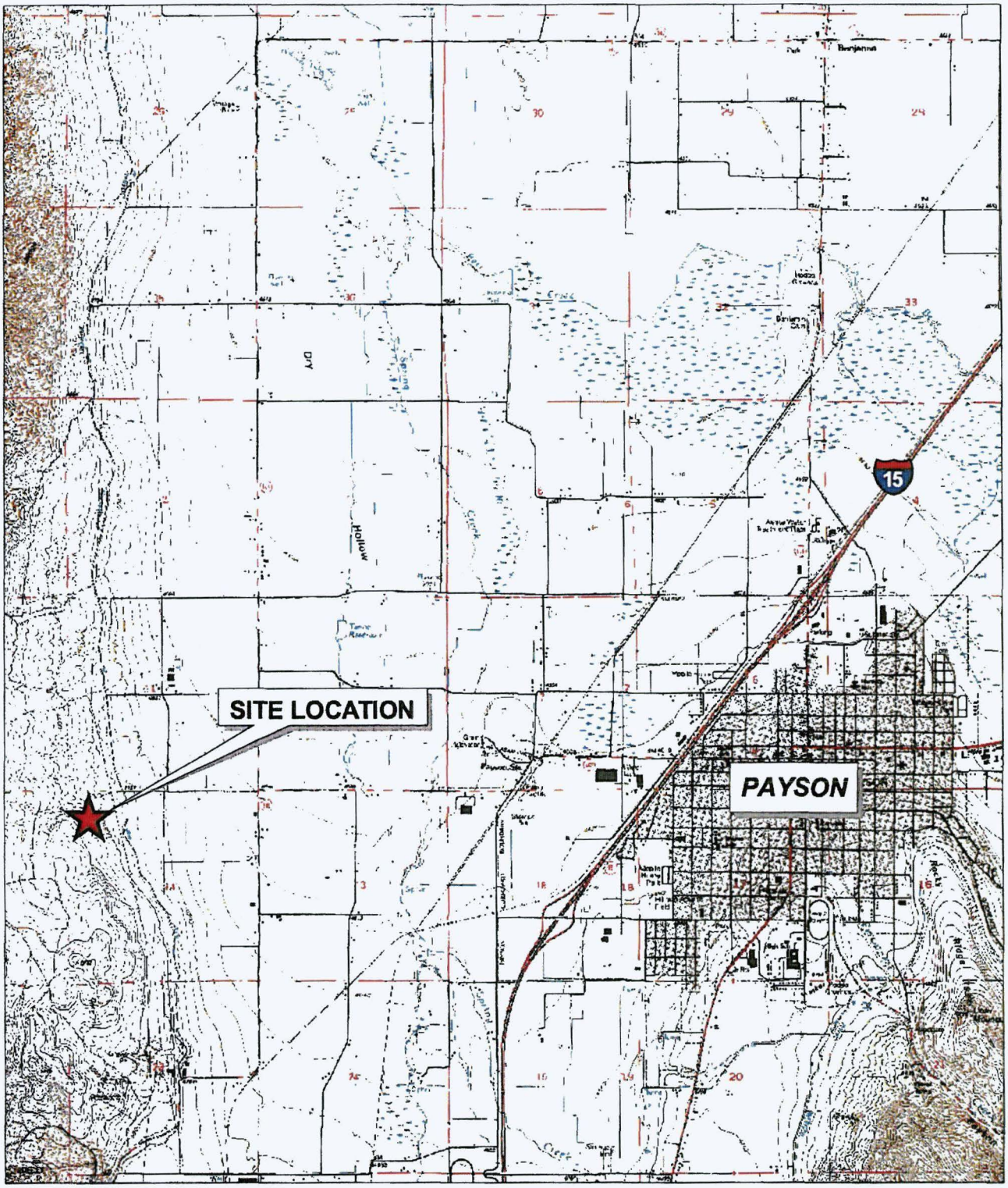
FIGURES



0.5 0 0.5 1 Miles

N
W E
S

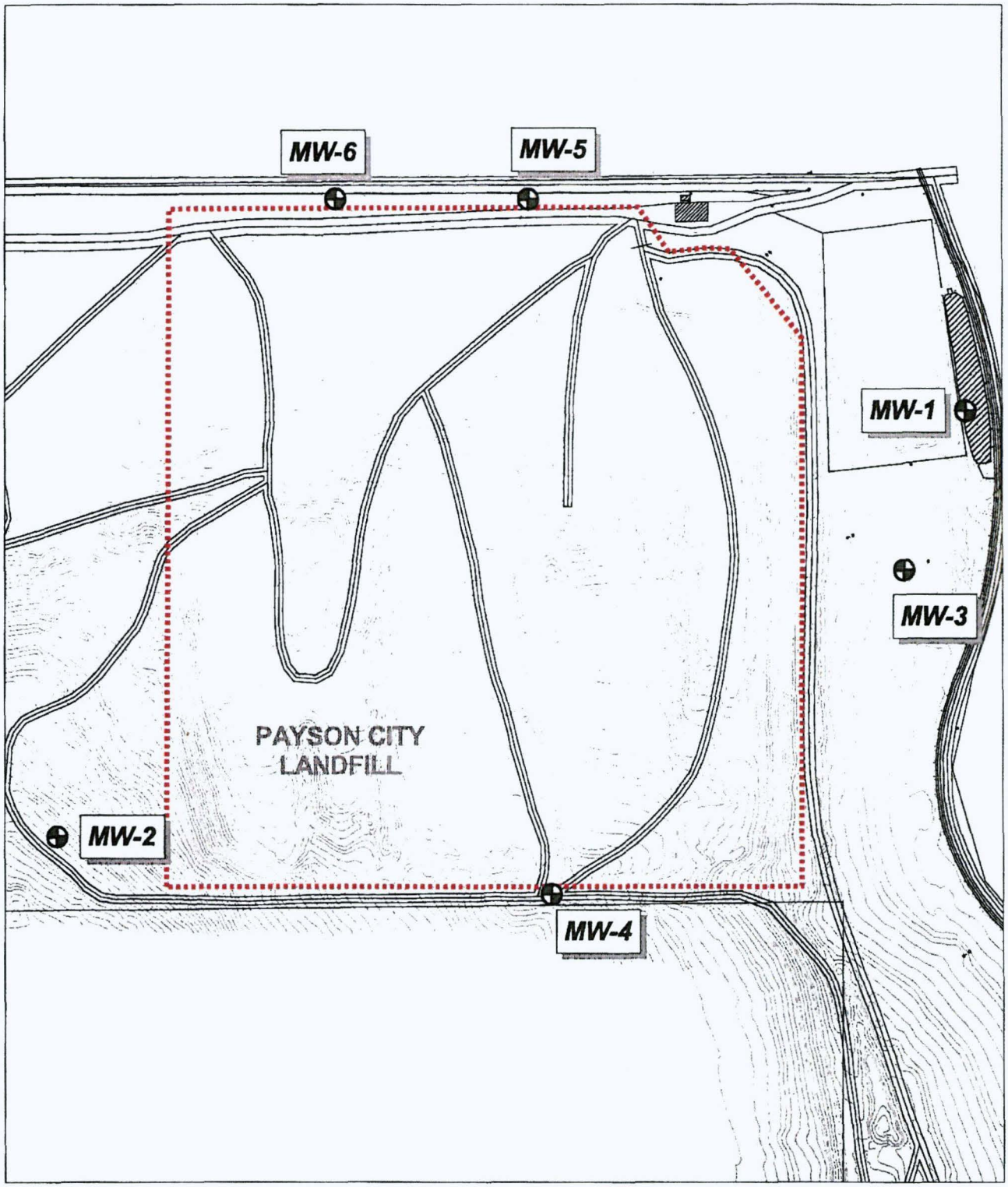
VICINITY MAP

Payson City Landfill
Payson, Utah

URS

Source:
USGS 7.5 min 1:24,000 Quadrangles
"West Mountain, UT" and "Spanish Fork, UT"

FIGURE 1



200 0 200 400 Feet

N
W E
S

MW-1 Monitoring Well

WELL LOCATIONS

Payson City Landfill
Payson, Utah

URS

FIGURE 2

APPENDIX A

SAMPLING AND ANALYSIS PLAN

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

SAMPLING AND ANALYSIS PLAN

April 2003

Prepared by

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756 East Winchester Street, Suite 400
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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Monitoring Well Sampling Rationale 1
1.2 2003 Schedule 1

2.0 GROUND WATER SAMPLING METHODS AND PROCEDURES 2
2.1 Site Access 2
2.2 Ground Water Sampling 2
2.2.1 Ground Water Level Measurement 2
2.2.2 Well Sampling Procedures 2
2.2.3 Sample Handling Procedures 3

3.0 EQUIPMENT 4
3.1 Sampling Equipment 4
3.2 Equipment Set-Up 4
3.3 Duties/Operational Staff 5
3.4 Field Instruments 5

4.0 QUALITY CONTROL SAMPLES 6

5.0 ANALYTICAL METHODS 7

6.0 SAMPLE HANDLING, LABELING, SHIPPING, DOCUMENTATION, PRESERVATION 8
6.1 Sampling Handling 8
6.2 Chain-Of-Custody Records 8
6.3 Sample Labeling 9
6.4 Sample Seals 9
6.5 Sample Shipping 9
6.6 Field Documentation 10
6.7 Sample Preservation 10

7.0 REFERENCES 11

LIST OF TABLES

Table A-1 – 2003 Quarterly Ground Water Sampling Schedule
Table A-2 – Analytical Methods for Ground Water Samples
Table A-3 – Sample Containers, Preservation, and Holding Times for Ground Water Samples

LIST OF ATTACHMENTS

Attachment A-1 – Regulatory Requirements
Attachment A-2 – Field Forms
Attachment A-3 – Pre-Field Work and Equipment Checklists

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) details the procedures to be followed for sampling and analysis of ground water from monitoring wells at the Payson City Landfill in accordance with Utah Solid Waste Permitting and Management Rule R315-308. Data collected during each sampling round will be reviewed by the project chemist, processed, analyzed, and included in a quarterly report for submittal to Utah Division of Solid and Hazardous Waste (UDSHW). A copy of the Solid and Hazardous Waste Rule R315-308 and 40 CFR Part 258 Appendix II is provided in Attachment A-1. Required project field forms are provided in Attachment A-2, and pre-field work and equipment checklists are provided in Attachment A-3.

1.1 Monitoring Well Sampling Rationale

Based on the fourth quarter 2002 ground water monitoring report (URS, 2002) and subsequent conversations with UDSHW, wells MW-4, MW-5, and MW-6 will continue to be sampled quarterly for assessment monitoring criteria, and one well (MW-3) will continue to be sampled semi-annually for detection monitoring criteria as part of the Landfill's ground water monitoring program in 2003.

1.2 2003 Schedule

During 2003, ground water samples will be collected and analyzed according to the quarterly schedule in Table A-1. All samples will be submitted to American West Analytical Laboratories to be analyzed for the inorganic, organic, and heavy metals constituents specified in Solid and Hazardous Waste Rule R315-308-4 and 40 CFR Part 258 Appendix II (provided in Attachment A-1). American West Analytical Laboratories (AWAL) is located in Salt Lake City, Utah, and is a State-certified analytical laboratory.

2.0 GROUND WATER SAMPLING METHODS AND PROCEDURES

Field sampling methods are described below, including site access, ground water sampling, and sampling equipment. Sample handling and custody procedures are discussed in Section 6.0. The project Health and Safety Plan that will be followed for the sampling events is provided in Appendix C.

2.1 Site Access

Payson City Corporation owns all of the land on which the landfill and associated monitoring wells are located. URS sampling personnel will coordinate with Landfill employees to arrange access to the property prior to sampling events. Refer to Attachment A-2 for pre-field work activities.

2.2 Ground Water Sampling

The following sub-sections detail the method and procedures for completing ground water level measurements and collecting ground water samples.

2.2.1 Ground Water Level Measurement

Ground water levels will be measured in all monitoring wells each quarter to evaluate the hydraulic gradient. The north side of the top of the well casing will be the reference point from which water-level measurements will be taken. Ground water elevations will be measured with an electronic water level indicator to the nearest one hundredth of a foot. To prevent potential cross-contamination between monitoring points, the water level indicator will be decontaminated prior to use at each well with a solution of Alconox detergent and deionized water, followed by a triple rinse with deionized water and dried with paper towel.

2.2.2 Well Sampling Procedures

Each well will be purged with either a dedicated Grundfos RediFlo-4 submersible pump, or a dedicated bladder pump. Purging will continue until three casing volumes of ground water have been removed. In instances where a monitoring well does not produce enough water to permit the purging of three well volumes in six hours, the well will be purged dry and samples will be collected when sufficient volume has been recharged. The purge volume will be calculated

based on the well casing diameter and length of the water column in the well. The temperature, pH, and conductivity of the ground water will be measured during well purging. Water quality parameters will be measured with a Horiba series U-22 or equivalent meter. Ground water quality parameters will be measured every three minutes during purging. Before well purging is considered complete, at least two consecutive field measurements made three minutes apart will fall within the ranges stated below:

- turbidity = ±10 percent or <5 NTU (nephelometric turbidity units);
- pH = ± 0.2 units change between individual readings;
- temperature = ± 1° C change between individual readings; and
- conductivity = ± 10 percent change between individual readings.

Well purge water will be discharged on the ground surface away from the wellhead. Ground water samples will be collected from the pump discharge tubing in the order of volatilization sensitivity as follows:

- VOCs;
- General Water Quality Analytes; and
- Metals

Table A-1 is a list of the analytes and analytical methods that will be performed.

2.2.3 Sample Handling Procedures

The ground water samples will be collected directly into laboratory-provided sample containers. All sample containers will be properly labeled at the time of collection with a permanent marker, as discussed in Section 6.0. After collection, sample containers will be immediately placed on ice in an insulated cooler for preservation. A chain-of-custody (COC) record will be initiated in the field and will accompany the samples during storage, transportation, and delivery to the analytical laboratory. The samples will either be in the possession of the field sampler, or securely stored at all times. Ground water samples will be delivered in custody-sealed coolers at the end of the sampling day to AWAL for analysis. Data collection and analysis will be evaluated by the project Data Quality Indicators discussed in the QAPP (Appendix B).

3.0 EQUIPMENT

Ground water sampling equipment is described below, including equipment set-up, operator duties, and field instruments. A sampling equipment checklist is provided in Attachment A-2.

3.1 Sampling Equipment

All sampling equipment that directly contacts the samples will either be dedicated, or disposable. The following equipment is required to perform ground water sampling at the landfill:

- 9-9.9 KW generator;
- Water level tape (located at the landfill weight station);
- Compressed air tank, or air compressor;
- Oakton pH and conductivity meter (calibrated prior to sampling);
- Grundfos Redi-Flo pump controller (wired for 220 volts prior to sampling);
- Bladder pump control box;
- Purge buckets; and
- Table.

A 9-9.9 KW generator, which has typically been rented prior to each sampling event, is required to run the dedicated pumps at the landfill. Wells MW-4, MW-5, and MW-6 have dedicated Grundfos pumps and well MW-3 has a dedicated bladder pump.

3.2 Equipment Set-Up

Wells MW-4, MW-5, and MW-6 have Grundfos Ready-Flo Pumps. To set-up, the dedicated pump power lead is attached to the pump control box, and the generator is placed to ensure that the generator exhaust is facing down wind and away from the well head. Next, the dedicated discharge tube is connected to the discharge outlet fitting on the well head. Finally, the pump controller is turned on with the controller dial used to establish the desired purge rate.

Well MW-3 contains a dedicated bladder pump. To set-up, the compressor tank (or compressed air cylinder) air hose is connected to the bladder pump control box inlet, and the control box recharge hose is connected to the pump recharge on the well head. Due to the depth of well MW-3, purge water may take up to ten minutes to travel to the surface and discharge from the

well. Once observable purge has started, the flow rate on pump control box is adjusted to desired rate.

3.3 Duties/Operational Staff

Upon arriving at the Payson City landfill, the sampler will check in at the weight station and pick up the well keys, bladder pump control box, and the water level measuring tape. The water level measuring tape is usually stored downstairs at the station.

Typically, the landfill operator provides a cylinder of compressed air to run the bladder pump, requiring prior coordination with the operator. Alternatively, there is an air compressor available at the site.

3.4 Field Instruments

Ground water quality parameters that will be measured during well purging include temperature, pH, conductivity, and turbidity. A Horiba series U-22 or equivalent meter will be used for measuring ground water parameters. All field instrumentation will be calibrated daily. Calibration will be documented on equipment calibration log forms. Water levels will be measured with an electronic well sounder that will be decontaminated before each use. Copies of field forms and checklists are provided in Attachments A-2 and A-3, respectively.

4.0 QUALITY CONTROL SAMPLES

To ensure overall data quality, the following quality assurance/quality control (QA/QC) samples will be collected during each sampling event:

QA/QC Samples	Requirement
Temperature Blank	One in each sample cooler
Trip Blank	One for each cooler containing samples for VOC analyses
Field Blank	One per sampling event
Blind Duplicate/Replicate	One per sampling event
Matrix Spike/Matrix Spike Duplicate	One per sampling event

The results of quality assurance samples will be reviewed by a qualified project chemist to assure that data are valid and usable in accordance with the Payson City Landfill QAPP. The Payson City Landfill QAPP is provided in Appendix B.

5.0 ANALYTICAL METHODS

Ground water samples will be analyzed for the constituents specified in Utah Solid and Hazardous Waste Permitting and Management Rule R315-308-4. The required analytical methods for ground water analyses are summarized in Table A-1. Ground water samples will be analyzed by American West Analytical Laboratories (AWAL), a Utah-certified laboratory. Data validation and verification methods are discussed in the QAPP, Appendix B.

6.0 SAMPLE HANDLING, LABELING, SHIPPING, DOCUMENTATION, PRESERVATION

This section presents the requirements for handling, labeling, shipping, and preserving environmental samples as well as field documentation practices necessary for reconstruction of the sampling event.

6.1 Sampling Handling

The possession and handling of all samples collected will be traceable from the time of collection, through analysis, until final disposition. Documentation of the sample history is referred to as chain-of-custody. Components of the chain-of-custody (sample seals, field records, and chain-of-custody records) and procedures for their use are described in the following sections.

A sample is considered to be in a person's custody if it is: 1) in a person's physical possession, 2) in view of the person after he or she has taken possession, 3) secured by the person so that no one can tamper with the sample, or 4) in a secure area. A person who has samples in custody must comply with the procedures described in the following sections.

6.2 Chain-Of-Custody Records

To establish the documentation necessary to trace sample possession from the time of collection, a chain-of-custody record must be filled out in triplicate and must accompany every sample or group of individually identified samples. Chain-of-custody records will contain the following information:

- Sample Identification Number;
- Date and Time of Sample Collection;
- Signature of Initials of Sample Collector;
- Matrix Type;
- Number of Containers;
- Signatures of People in the Chain-of-Custody;
- Date and Time of Each Change in Custody;
- Method of Shipment; and

- Condition of Samples when Received by Laboratory.

Each person who has custody must sign the form. Samples cannot be left unattended unless they are secured and sealed.

6.3 Sample Labeling

Sample labels are necessary to prevent misidentification of samples. Gummed paper labels or tags will be used and will include at least the following information:

- Sample number (referenced to a sampling location) including a sample code that distinguishes field samples, duplicates, spikes, or blanks. The laboratory should not be cognizant of the code;
- Date and time of sample collection; and
- Type of preservative used, or "None" as applicable.

Labels will be affixed to sample containers prior to or at the time of sampling. The labels will be filled out at the time of sample collection. The exact sample location and type of sample will be recorded on sampling forms and in a bound logbook.

6.4 Sample Seals

Sample seals are used to detect improper handling of samples following sample collection up to the time of analysis. Items such as gummed paper seals and custody tape will be used for this purpose. Signed and dated seals will be attached so that they must be broken to open either the individual sample containers or shipping containers. Seals will be affixed to containers before the samples leave the custody of sampling personnel.

6.5 Sample Shipping

Samples will be packaged and hand delivered by the sampler within 24 hours of sample collection to AWAL in Salt Lake City, Utah. Samples will be accompanied by the Chain-of-Custody record. Authorized laboratory personnel will acknowledge receipt of shipment by signing and dating the form and returning a copy to the URS Project Manager.

6.6 Field Documentation

Field personnel will record ground water sampling information on an appropriate sampling form, shown in Attachment A-1. All entries will be made in indelible ink and all corrections will follow the error correction protocol of one line through the error and initial and date of correction. At a minimum, cntries on field documentation shall include the following:

- Location and description of the sampling point;
- Details of the sampling site (for example, the elevation of the casing, casing diameter and depth, integrity of the casing, etc.);
- Identification of sampling crew members;
- Number and volume of samples taken;
- Sampling methodology;
- Sample preservation;
- Date and time of collection;
- Collector's sample identification number(s);
- Sample distribution and transportation method;
- Field observations;
- Any field measurements made (e.g., pH, conductivity, water depth);
- Signature and date by the personnel responsible for observations; and
- Decontamination procedures.

Sampling situations vary widely. No general rules can specify the extent of information that must be entered in a log. However, records shall contain sufficient information so that someone can reconstruct the sampling activity without relying on the collector's memory.

6.7 Sample Preservation

All samples will be collected in appropriate sample containers and preserved as indicated in Table A-2.

7.0 REFERENCES

URS, 2002. *Quarterly Ground Water Monitoring Report Fourth Quarter: September 2002,* November 2002.

Utah Division of Solid and Hazardous Waste, Solid Waste Program, 2002. *Ground Water Sampling Guidance*, 49 p.

TABLES

TABLE A-1
2003 Quarterly Ground Water Sampling Schedule

ANNUAL SAMPLING	MW-3	MW-4	MW-5	MW-6	Blind Duplicate
First Quarter					
UAC R315-308-4 full list	X	X	X	X	X
40 CFR Part 258 Appendix II full list		X	X	X	X
Second Quarter					
UAC R315-308-4 full list		X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X
Third Quarter					
UAC R315-308-4 full list	X	X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X
Fourth Quarter					
UAC R315-308-4 full list		X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X

Note: MW-3 is scheduled for semi-annual detection monitoring only. All other wells are scheduled for assessment monitoring.

TABLE A-2
Analytical Methods for Ground Water Samples

Parameter	Analytical Method
Ammonia	EPA 350.1
Antimony	SW846 7041/6020
Arsenic	SW846 7060A/6020
Bicarbonate, Carbonate	EPA 310.1
Chloride	SM 4500 CL B
COD	HACH
Cyanide	EPA 335.2, 335.4
EDB & DBCP	EPA 504
Herbicides (App.II)	SW846 8151A
Lead	SW846 7421/6020
Mercury	SW846 7470A
Metals (Total)	SW 846 6010B/6020
Nitrate (as N)	EPA 353.2
Pesticides (App.II)	SW846 8081A
pH	EPA 150.1
Selenium	SW846 7740/6020
Semivolatiles (App.II)	SW846 8270C
Sulfate	EPA 375.4
Sulfide	EPA 376.1
TDS	EPA 160.1
Thallium	SW846 7841/6020
TOC	EPA 415.1
Volatiles (App.I & II)	SW846 8260B

Note: Total metals include: barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, tin, vanadium, and zinc.

TABLE A-3
Sample Containers, Preservation, and Holding Times for Ground Water Samples

Parameter	Container	Preservation	Holding Time (Days)
Ammonia	1 – 500 ml poly bottle	pH<2 with H_2SO_4	28 days
Bicarbonate, Carbonate	1 – 250 ml poly bottle	4° C	14 days
Chloride	1 – 250 ml poly bottle	4° C	28 days
COD	1 – 50 ml poly bottle	pH<2 with H_2SO_4, 4° C	28 days
Cyanide	1- 500 ml poly bottle	pH>12 with 50% NaOH, 4° C	14 days
EDB & DBCP	3 – 40 ml glass vials	None	28 days
Herbicides (App.II)	1 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
Metals[1]	1 - 1 L poly bottle	Nitric, 4° C	180 days[2]
Nitrate (as N)	1 – 250 ml poly bottle	pH<2 with H_2SO_4, 4° C	48 hours
Pesticides (App.II)	1 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
pH	1 – 250 ml poly bottle	4° C	Analyze as soon as possible following receipt at the laboratory
Semivolatiles (App.II)	2 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
Sulfate	1 – 250 ml poly bottle	4° C	28 days
Sulfide	1 – 500 ml poly bottle	PH/9 NaOH, Zn Acetate, 4° C	7 days
TDS	1 – 100 ml poly bottle	4° C	7 days
TOC	1 – 25 ml poly bottle	pH<2 with HCl/H_2SO_4, 4° C	28 days
VOCs	3 - 40 mL glass vials	HCl, 4° C	14
VOCs	3 - 40 mL glass vials	None	7

Notes:
1 Metals include antimony, arsenic, lead, mercury, selenium, thallium, and the total metals list from Table A-1.
2 Mercury must be analyzed within 28 days of collection.

ATTACHMENTS

ATTACHMENT A-1

Regulatory Requirements

after the corrective action remedy has been selected in accordance with the requirements of § 258.58, until the owner or operator is released from the financial assurance requirements under §§ 258.71, 258.72 and 258.73.

(4) The financial assurance mechanisms must be legally valid, binding, and enforceable under State and Federal law.

[56 FR 51029, Oct. 9, 1991, as amended at 58 FR 51547, Oct. 1, 1993; 60 FR 40105, Aug. 7, 1995; 60 FR 52342, Oct. 6, 1995; 61 FR 60337, Nov. 27, 1996; 63 FR 17729, Apr. 10, 1998]

§ 258.75 Discounting.

The Director of an approved State may allow discounting of closure cost estimates in § 258.71(a), post-closure cost estimates in § 258.72(a), and/or corrective action costs in § 258.73(a) up to the rate of return for essentially risk free investments, net of inflation, under the following conditions:

(a) The State Director determines that cost estimates are complete and accurate and the owner or operator has submitted a statement from a Registered Professional Engineer so stating;

(b) The State finds the facility in compliance with applicable and appropriate permit conditions;

(c) The State Director determines that the closure date is certain and the owner or operator certifies that there are no foreseeable factors that will change the estimate of site life; and

(d) Discounted cost estimates must be adjusted annually to reflect inflation and years of remaining life.

[61 FR 60339, Nov. 27, 1996]

APPENDIX I TO PART 258—CONSTITUENTS FOR DETECTION MONITORING [1]

Common name [2]	CAS RN [3]
Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)
Organic Constituents:	
(16) Acetone	67–64–1
(17) Acrylonitrile	107–13–1
(18) Benzene	71–43–2
(19) Bromochloromethane	74–97–5
(20) Bromodichloromethane	75–27–4
(21) Bromoform; Tribromomethane	75–25–2
(22) Carbon disulfide	75–15–0
(23) Carbon tetrachloride	56–23–5
(24) Chlorobenzene	108–90–7
(25) Chloroethane; Ethyl chloride	75–00–3
(26) Chloroform; Trichloromethane	67–66–3
(27) Dibromochloromethane; Chlorodibromomethane	124–48–1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96–12–8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106–93–4
(30) o-Dichlorobenzene; 1,2-Dichlorobenzene	95–50–1
(31) p-Dichlorobenzene; 1,4-Dichlorobenzene	106–46–7
(32) trans–1,4-Dichloro-2-butene	110–57–6
(33) 1,1-Dichloroethane; Ethylidene chloride	75–34–3
(34) 1,2-Dichloroethane; Ethylene dichloride	107–06–2
(35) 1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75–35–4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156–59–2
(37) trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156–60–5
(38) 1,2-Dichloropropane; Propylene dichloride	78–87–5
(39) cis-1,3-Dichloropropene	10061–01–5
(40) trans-1,3-Dichloropropene	10061–02–6
(41) Ethylbenzene	100–41–4
(42) 2-Hexanone; Methyl butyl ketone	591–78–6
(43) Methyl bromide; Bromomethane	74–83–9
(44) Methyl chloride; Chloromethane	74–87–3
(45) Methylene bromide; Dibromomethane	74–95–3
(46) Methylene chloride; Dichloromethane	75–09–2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78–93–3
(48) Methyl iodide; Iodomethane	74–88–4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108–10–1
(50) Styrene	100–42–5
(51) 1,1,1,2-Tetrachloroethane	630–20–6
(52) 1,1,2,2-Tetrachloroethane	79–34–5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127–18–4
(54) Toluene	108–88–3
(55) 1,1,1-Trichloroethane; Methylchloroform	71–55–6
(56) 1,1,2-Trichloroethane	79–00–5
(57) Trichloroethylene; Trichloroethene	79–01–6
(58) Trichlorofluoromethane; CFC-11	75–69–4
(59) 1,2,3-Trichloropropane	96–18–4
(60) Vinyl acetate	108–05–4
(61) Vinyl chloride	75–01–4
(62) Xylenes	1330–20–7

[1] This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW–846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes Method 8260; and 15 metals for which SW–846 provides either Method 6010 or a method from the 7000 series of methods.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

APPENDIX II TO PART 258—LIST OF HAZARDOUS INORGANIC AND ORGANIC CONSTITUENTS [1]

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (μ g/L) [6]
Acenaphthene	83–32–9	Acenaphthylene, 1,2-dihydro-	8100	200
			8270	10
Acenaphthylene	208–96–8	Acenaphthylene	8100	200
			8270	10
Acetone	67–64–1	2-Propanone	8260	100
Acetonitrile; Methyl cyanide	75–05–8	Acetonitrile	8015	100
Acetophenone	98–86–2	Ethanone, 1-phenyl-	8270	10
2-Acetylaminofluorene; 2-AAF	53–96–3	Acetamide, N-9H-fluoren-2-yl-	8270	20
Acrolein	107–02–8	2-Propenal	8030	5
			8260	100
Acrylonitrile	107–13–1	2-Propenenitrile	8030	5
			8260	200
Aldrin	309–00–2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5α,8α,8aβ)-	8080	0.05
			8270	10 ...
Allyl chloride	107–05–1	1-Propene, 3-chloro-	8010	5
			8260	10
4-Aminobiphenyl	92–67–1	[1,1'-Biphenyl]-4-amine	8270	20
Anthracene	120–12–7	Anthracene	8100	200
			8270	10
Antimony	(Total)	Antimony	6010	300
			7040	2000
			7041	30
Arsenic	(Total)	Arsenic	6010	500
			7060	10
			7061	20
Barium	(Total)	Barium	6010	20
			7080	1000
Benzene	71–43–2	Benzene	8020	2
			8021	0.1
			8260	5 .....
Benzo[a]anthracene; Benzanthracene	56–55–3	Benz[a]anthracene	8100	200
			8270	10
Benzo[b]fluoranthene	205–99–2	Benz[e]acephenanthrylene	8100	200
			8270	10
Benzo[k]fluoranthene	207–08–9	Benzo[k]fluoranthene	8100	200
			8270	10
Benzo[ghi]perylene	191–24–2	Benzo[ghi]perylene	8100	200
			8270	10
Benzo[a]pyrene	50–32–8	Benzo[a]pyrene	8100	200
			8270	10
Benzyl alcohol	100–51–6	Benzenemethanol	8270	20
Beryllium	(Total)	Beryllium	6010	3
			7090	50
			7091	2
alpha-BHC	319–84–6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-.	8080	0.05
			8270	10 ...
beta-BHC	319–85–7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4β,5α,6β)-.	8080	0.05
			8270	20 ...
delta-BHC	319–86–8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-.	8080	0.1
			8270	20 ...
gamma-BHC; Lindane	58–89–9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-.	8080	0.05
			8270	20 ...
Bis(2-chloroethoxy)methane	111–91–1	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-.	8110	5
			8270	10
Bis(2-chloroethyl) ether; Dichloroethyl ether.	111-44-4	Ethane, 1,1'-oxybis[2-chloro-	8110	3
			8270	10
Bis-(2-chloro-1-methylethyl) ether; 2,2'-Dichlorodiisopropyl ether; DCIP, See note 7	108–60–1	Propane, 2,2'-oxybis[1-chloro-	8110	10
			8270	10
Bis(2-ethylhexyl) phthalate	117–81–7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.	8060	20
Bromochloromethane; Chlorobromomethane.	74–97–5	Methane, bromochloro-	8021	0.1
			8260	5 .....
Bromodichloromethane; Dibromochloromethane.	75–27–4	Methane, bromodichloro-	8010	1
			8021	0.2
			8260	5 .....

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
Bromoform; Tribromomethane	75–25–2	Methane, tribromo-	8010	2
			8021	15
			8260	5
4-Bromophenyl phenyl ether	101–55–3	Benzene, 1-bromo-4-phenoxy-	8110	25
			8270	10
Butyl benzyl phthalate; Benzyl butyl phthalate.	85–68–7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester.	8060	5
			8270	10
Cadmium	(Total)	Cadmium	6010	40
			7130	50
			7131	1
Carbon disulfide	75–15–0	Carbon disulfide	8260	100
Carbon tetrachloride	56–23–5	Methane, tetrachloro-	8010	1
			8021	0.1
			8260	10 ...
Chlordane	See Note 8	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	8080	0.1
			8270	50 ...
p-Chloroaniline	106–47–8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108–90–7	Benzene, chloro-	8010	2
			8020	2
			8021	0.1
			8260	5 .....
Chlorobenzilate	510–15–6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	8270	10
p-Chloro-m-cresol; 4-Chloro-3-methylphenol.	59–50–7	Phenol, 4-chloro-3-methyl-	8040	5
			8270	20
Chloroethane; Ethyl chloride	75–00–3	Ethane, chloro-	8010	5
			8021	1
			8260	10
Chloroform; Trichloromethane	67–66–3	Methane, trichloro-	8010	0.5
			8021	0.2 ..
			8260	5 .....
2-Chloronaphthalene	91–58–7	Naphthalene, 2-chloro-	8120	10
			8270	10
2-Chlorophenol	95–57–8	Phenol, 2-chloro-	8040	5
			8270	10
4-Chlorophenyl phenyl ether	7005–72–3	Benzene, 1-chloro-4-phenoxy-	8110	40
			8270	10
Chloroprene	126–99–8	1,3-Butadiene, 2-chloro-	8010	50
			8260	20
Chromium	(Total)	Chromium	6010	70
			7190	500
			7191	10
Chrysene	218–01–9	Chrysene	8100	200
			8270	10
Cobalt	(Total)	Cobalt	6010	70
			7200	500
			7201	10
Copper	(Total)	Copper	6010	60
			7210	200
			7211	10
m-Cresol; 3-methylphenol	108–39–4	Phenol, 3-methyl-	8270	10
o-Cresol; 2-methylphenol	95–48–7	Phenol, 2-methyl-	8270	10
p-Cresol; 4-methylphenol	106–44–5	Phenol, 4-methyl-	8270	10
Cyanide	57–12–5	Cyanide	9010	200
2,4-D; 2,4-Dichlorophenoxyacetic acid ..	94–75–7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4'-DDD	72–54–8	Benzene 1,1'-(2,2-dichloroethylidene)bis[4-chloro-.	8080	0.1
			8270	10 ...
4,4'-DDE	72–55–9	Benzene, 1,1'-(dichloroethylidene)bis[4-chloro-.	8080	0.05
			8270	10 ...
4,4'-DDT	50–29–3	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-.	8080	0.1
			8270	10 ...
Diallate	2303–16–4	Carbamothioic acid, bis(1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester.	8270	10
Dibenz[a,h]anthracene	53–70–3	Dibenz[a,h]anthracene	8100	200
			8270	10
Dibenzofuran	132–64–9	Dibenzofuran	8270	10
Dibromochloromethane; Chlorodibromomethane.	124–48–1	Methane, dibromochloro-	8010	1
			8021	0.3
			8260	5 .....

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibrome-3-chloro-	8011	0.1
			8021	30
			8260	25
1,2-Dibromoethane; Ethylene dibromide; EDB.	106-93-4	Ethane, 1,2-dibromo-	8011	0.1
			8021	10
			8260	5
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester.	8060	5
			8270	10
o-Dichlorobenzene; 1,2-Dichlorobenzene.	95-50-1	Benzene, 1,2-dichloro-	8010	2
			8020	5
			8021	0.5
			8120	10
			8260	5
			8270	10
m-Dichlorobenzene; 1,3-Dichlorobenzene.	541-73-1	Benzene, 1,3-Dichloro-	8010	5
			8020	5
			8021	0.2
			8120	10
			8260	5
			8270	10
p-Dichlorobenzene, 1,4-Dichlorobenzene.	106-46-7	Benzene, 1,4-dichloro-	8010	2
			8020	5
			8021	0.1
			8120	15
			8260	5
			8270	10
3,3'-Dichlorobenzidine	91-94-1	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-.	8270	20
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8260	100
Dichlorodifluoromethane; CFC 12;	75-71-8	Methane, dichlorodifluoro-	8021	0.5
			8260	5
1,1-Dichloroethane; Ethylidene chloride.	75-34-3	Ethane, 1,1-dichloro-	8010	1
			8021	0.5
			8260	5
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,1-dichloro-	8010	0.5
			8021	0.3
			8260	5
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.	75-35-4	Ethene, 1,1-dichloro-	8010	1
			8021	0.5
			8260	5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene.	156-59-2	Ethene, 1,2-dichloro-, (Z)-	8021	0.2
			8260	5
trans-1,2-Dichloroethylene trans-1,2-Dichloroethene.	156-60-5	Ethene, 1,2-dichloro-, (E)-	8010	1
			8021	0.5
			8260	5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8040	5
			8270	10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane; Propylene dichloride.	78-87-5	Propane, 1,2-dichloro-	8010	0.5
			8021	0.05
			8260	5
1,3-Dichloropropane; Trimethylene dichloride.	142-28-9	Propane, 1,3-dichloro-	8021	0.3
			8260	5
2,2-Dichloropropane; Isopropylidene chloride.	594-20-7	Propane, 2,2-dichloro-	8021	0.5
			8260	15
1,1-Dichloropropene	563-58-6	1-Propene, 1,1-dichloro-	8021	0.2
			8260	5
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8010	20
			8260	10
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8010	5
			8260	10
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β,7aα)-.	8060	0.05
			8270	10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester.	8060	5
			8270	10
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin.	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester.	8141	5
			8270	20
Dimethoate	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S-[2-(methylamino)-2-oxoethyl] ester.	8141	3
			8270	20

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
p-(Dimethylamino)azobenzene	60–11–7	Benzenamine, N,N-dimethyl-4-(phenylazo)-.	8270	10
7,12-Dimethylbenz[a]anthracene	57–97–6	Benz[a]anthracene, 7,12-dimethyl-	8270	10
3,3'-Dimethylbenzidine	119–93–7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-.	8270	10
2,4-Dimethylphenol; m-Xylenol	105–67–9	Phenol, 2,4-dimethyl-	8040	5
			8270	10
Dimethyl phthalate	131–11–3	1,2-Benzenedicarboxylic acid, dimethyl ester.	8060	5
			8270	10
m-Dinitrobenzene	99–65–0	Benzene, 1,3-dinitro-	8270	20
4,6-Dinitro-o-cresol 4,6-Dinitro-2-methylphenol.	534–52–1	Phenol, 2-methyl-4,6-dinitro	8040	150
			8270	50
2,4-Dinitrophenol;	51–28–5	Phenol, 2,4-dinitro-	8040	150
			8270	50
2,4-Dinitrotoluene	121–14–2	Benzene, 1-methyl-2,4-dinitro-	8090	0.2
			8270	10 ...
2,6-Dinitrotoluene	606–20–2	Benzene, 2-methyl-1,3-dinitro-	8090	0.1
			8270	10 ...
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol.	88–85–7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150	1
			8270	20
Di-n-octyl phthalate	117–84–0	1,2-Benzenedicarboxylic acid, dioctyl ester.	8060	30
			8270	10
Diphenylamine	122–39–4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298–04–4	Phosphorodithioic acid, 0,0-diethyl S-[2-(ethylthio)ethyl] ester.	8140	2
			8141	0.5
			8270	10 ...
Endosulfan I	959–98–8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,	8080	0.1
			8270	20 ...
Endosulfan II	33213–65–9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aα,6β,9β,9aα)-.	8080	0.05
			8270	20 ...
Endosulfan sulfate	1031–07–8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-,3-3-dioxide.	8080	0.5
			8270	10 ...
Endrin	72–20–8	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-, (1aα, 2β,2aβ,3α,6α,6aβ,7β,7aα)-.	8080	0.1
			8270	20 ...
Endrin aldehyde	7421–93–4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4β,4aβ,5β,6aβ,6bβ,7R*)-.	8080	0.2
			8270	10 ...
Ethylbenzene	100–41–4	Benzene, ethyl-	8020	2
			8221	0.05
			8260	5 .....
Ethyl methacrylate	97–63–2	2-Propenoic acid, 2-methyl-, ethyl ester	8015	5
			8260	10
			8270	10
Ethyl methanesulfonate	62–50–0	Methanesulfonic acid, ethyl ester	8270	20
Famphur	52–85–7	Phosphorothioic acid, 0-[4-[(dimethylamino)sulfonyl]phenyl] 0,0-dimethyl ester.	8270	20
Fluoranthene	206–44–0	Fluoranthene	8100	200
			8270	10
Fluorene	86–73–7	9H-Fluorene	8100	200
			8270	10
Heptachlor	76–44–8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	8080	0.05
			8270	10 ...
Heptachlor epoxide	1024–57–3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1aα, 1bβ, 2α, 5α, 5aβ, 6β, 6aα).	8080	1
			8270	10
Hexachlorobenzene	118–74–1	Benzene, hexachloro-	8120	0.5
			8270	10 ...
Hexachlorobutadiene	87–68–3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	8021	0.5
			8120	5 .....
			8260	10 ...
			8270	10 ...

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
Hexachlorocyclopentadiene	77–47–4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-.	8120	5
			8270	10
Hexachloroethane	67–72–1	Ethane, hexachloro-	8120	0.5
			8260	10 ...
			8270	10 ...
Hexachloropropene	1888–71–7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270	10
2-Hexanone; Methyl butyl ketone	591–78–6	2-Hexanone	8260	50
Indeno(1,2,3-cd)pyrene	193–39–5	Indeno(1,2,3-cd)pyrene	8100	200
			8270	10
Isobutyl alcohol	78–83–1	1-Propanol, 2-methyl-	8015	50
			8240	100
Isodrin	465–73–6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a hexahydro-(1α,4α,4aβ,5β,8β,8aβ)-.	8270	20
			8260	10
Isophorone	78–59–1	2-Cyclohexen-1-one, 3,5,5-trimethyl-	8090	60
			8270	10
Isosafrole	120–58–1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143–50–0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	8270	20
Lead	(Total)	Lead	6010	400
			7420	1000
			7421	10
Mercury	(Total)	Mercury	7470	2
Methacrylonitrile	126–98–7	2-Propenenitrile, 2-methyl-	8015	5
			8260	100
Methapyrilene	91–80–5	1,2-Ethanediamine, N,N-dimethyl-N[1]-2-pyridinyl-N1/2-thienylmethyl)-.	8270	100
Methoxychlor	72–43–5	Benzene,1,1[1]-(2,2,2,trichloroethylidene)bis[4-methoxy-.	8080	2
			8270	10
Methyl bromide; Bromomethane	74–83–9	Methane, bromo-	8010	20
			8021	10
Methyl chloride; Chloromethane	74–87–3	Methane, chloro-	8010	1
			8021	0.3
3-Methylcholanthrene	56–49–5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-.	8270	10
Methyl ethyl ketone; MEK; 2-Butanone	78–93–3	2-Butanone	8015	10
			8260	100
Methyl iodide; Iodomethane	74–88–4	Methane, iodo-	8010	40
			8260	10
Methyl methacrylate	80–62–6	2-Propenoic acid, 2-methyl-, methyl ester.	8015	2
			8260	30
Methyl methanesulfonate	66–27–3	Methanesulfonic acid, methyl ester	8270	10
2-Methylnaphthalene	91–57–6	Naphthalene, 2-methyl-	8270	10
Methyl parathion; Parathion methyl	298–00–0	Phosphorothioic acid, 0,0-dimethyl	8140	0.5
			8141	1 .....
			8270	10 ...
4-Methyl-2-pentanone; Methyl isobutyl ketone.	108–10–1	2-Pentanone, 4-methyl-	8015	5
			8260	100
Methylene bromide; Dibromomethane	74–95–3	Methane, dibromo-	8010	15
			8021	20
			8260	10
Methylene chloride; Dichloromethane	75–09–2	Methane, dichloro-	8010	5
			8021	0.2
			8260	10 ...
Naphthalene	91–20–3	Naphthalene	8021	0.5
			8100	200
			8260	5 .....
			8270	10 ...
1,4-Naphthoquinone	130–15–4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134–32–7	1-Naphthalenamine	8270	10
2-Naphthylamine	91–59–8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	6010	150
			7520	400
o-Nitroaniline; 2-Nitroaniline	88–74–4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline; 3-Nitroaniline	99–09–2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline; 4-Nitroaniline	100–01–6	Benzenamine, 4-nitro	8270	20
Nitrobenzene	98–95–3	Benzene, nitro-	8090	40
			8270	10

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
o-Nitrophenol; 2-Nitrophenol	88-75-5	Phenol, 2-nitro-	8040	5
			8270	10
p-Nitrophenol; 4-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040	10
			8270	50
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	20
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8070	2
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8070	5
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-propyl-	8070	10
N-Nitrosomethylethalamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	20
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	40
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester.	8141	0.5
			8270	10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270	20
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040	5
			8270	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenl)	8270	20
Phenanthrene	85-01-8	Phenanthrene	8100	200
			8270	10
Phenol	108-95-2	Phenol	8040	1
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10
Phorate	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl] ester.	8140	2
			8141	0.5
			8270	10
Polychlorinated biphenyls; PCBs; Aroclors.	See Note 9	1,1'-Biphenyl, chloro derivatives	8080	50
			8270	200
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-.	8270	10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015	60
			8260	150
Pyrene	129-00-0	Pyrene	8100	200
			8270	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-	8270	10
Selenium	(Total)	Selenium	6010	750
			7740	20
			7741	20
Silver	(Total)	Silver	6010	70
			7760	100
			7761	10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-.	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020	1
			8021	0.1
			8260	10
Sulfide	18496-25-8	Sulfide	9030	4000
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid.	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-	8150	2
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010	5
			8021	0.05
			8260	5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8010	0.5
			8021	0.1
			8260	5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene.	127-18-4	Ethene, tetrachloro-	8010	0.5
			8021	0.5
			8260	5
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10
Thallium	(Total)	Thallium	6010	400
			7840	1000
			7841	10
Tin	(Total)	Tin	6010	40
Toluene	108-88-3	Benzene, methyl-	8020	2
			8021	0.1
			8260	5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	See Note 10	Toxaphene	8080	2

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
1,2,4-Trichlorobenzene	120–82–1	Benzene, 1,2,4-trichloro-	8021	0.3
			8120	0.5
			8260	10
			8270	10
1,1,1-Trichloroethane; Methylchloroform	71–55–6	Ethane, 1,1,1-trichloro-	8010	0.3
			8021	0.3
			8260	5
1,1,2-Trichloroethane	79–00–5	Ethane, 1,1,2-trichloro-	8010	0.2
			8260	5
Trichloroethylene; Trichloroethene	79–01–6	Ethene, trichloro-	8010	1
			8021	0.2
			8260	5
Trichlorofluoromethane; CFC–11	75–69–4	Methane, trichlorofluoro-	8010	10
			8021	0.3
			8260	5
2,4,5-Trichlorophenol	95–95–4	Phenol, 2,4,5-trichloro-	8270	10
2,4,6-Trichlorophenol	88–06–2	Phenol, 2,4,6-trichloro-	8040	5
			8270	10
1,2,3-Trichloropropane	96–18–4	Propane, 1,2,3-trichloro-	8010	10
			8021	5
			8260	15
0,0,0-Triethyl phosphorothioate	126–68–1	Phosphorothioic acid, 0,0,0-triethylester	8270	10
sym-Trinitrobenzene	99–35–4	Benzene, 1,3,5-trinitro-	8270	10
Vanadium	(Total)	Vanadium	6010	80
			7910	2000
			7911	40
Vinyl acetate	108–05–4	Acetic acid, ethenyl ester	8260	50
Vinyl chloride; Chloroethene	75–01–4	Ethene, chloro-	8010	2
			8021	0.4
			8260	10
Xylene (total)	See Note 11	Benzene, dimethyl-	8020	5
			8021	0.2
			8260	5
Zinc	(Total)	Zinc	6010	20
			7950	50
			7951	0.5

Notes

[1] The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

[4] CAS Index are those used in the 9th Collective Index.

[5] Suggested Methods refer to analytical procedure numbers used in EPA Report SW–846 "Test Methods for Evaluating Solid Waste", third edition, November 1986, as revised, December 1987. Analytical details can be found in SW–846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW–846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.

[6] Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[7] This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2'-oxybis[2-chloro- (CAS RN 39638–32–9).

[8] Chlordane: This entry includes alpha-chlordane (CAS RN 5103–71–9), beta-chlordane (CAS RN 5103–74–2), gamma-chlordane (CAS RN 5566–34–7), and constituents of chlordane (CAS RN 57–74–9 and CAS RN 12789–03–6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 µg/L by method 8270.

[9] Polychlorinated biphenyls (CAS RN 1336–36–3); this category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674–11–2), Aroclor 1221 (CAS RN 11104–28–2), Aroclor 1232 (CAS RN 11141–16–5), Aroclor 1242 (CAS RN 53469–21–9), Aroclor 1248 (CAS RN 12672–29–6), Aroclor 1254 (CAS RN 11097–69–1), and Aroclor 1260 (CAS RN 11096–82–5). The PQL shown is an average value for PCB congeners.

[10] Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001–35–2), i.e., chlorinated camphene.

[11] Xylene (total): This entry includes o-xylene (CAS RN 95–47–6), m-xylene (CAS RN 108–38–3), p-xylene (CAS RN 106–42–3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330–20–7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

PART 259 [Reserved]

specified by Subsection R315-308-2(4), the CAS number for the constituents, and the ground water quality standard for the constituents for any facility that is required to monitor ground water under Rule R315-308.

TABLE

Constituents for Detection Monitoring

Inorganic Constituents	CAS	Ground Water Protection Standard (mg/l)
Ammonia (as N)	7664-41-7	
Carbonate/Bicarbonate		
Calcium		
Chemical Oxygen Demand (COD)		
Chloride		
Iron	7439-89-6	
Magnesium		
Manganese	7439-96-5	
Nitrate (as N		
pH		
Potassium		
Sodium		
Sulfate		
Total Dissolved Solids (TDS)		
Total Organic Carbon (TOC)		
Heavy Metals		
Antimony	7440-36-0	0.006
Arsenic	7440-38-2	0.05
Barium	7440-39-3	2
Beryllium	7440-41-7	0.004
Cadmium	7440-43-9	0.005
Chromium		0.1
Cobalt	7440-48-4	2
Copper	7440-50-8	1.3
Lead		0.015
Mercury	7439-97-6	0.002
Nickel	7440-02-0	0.1
Selenium	7782-49-2	0.05
Silver	7440-22-4	0.1
Thallium		0.002
Vanadium	7440-62-2	0.3
Zinc	7440-66-6	5
Organic Constituents		
Acetone	67-64-1	4
Acrylonitrile	107-13-1	0.1
Benzene	71-43-2	0.005
Bromochloromethane	74-97-5	0.01
Bromodichloromethane[1]	75-27-4	0.1
Bromoform[1]	75-25-2	0.1

Carbon disulfide	75-15-0	4
Carbon tetrachloride	56-23-5	0.005
Chlorobenzene	108-90-7	0.1
Chloroethane	75-00-3	15
Chloroform[1]	67-66-3	0.1
Dibromochloromethane[1]	124-48-1	0.1
1,2-Dibromo-3-chloropropane	96-12-8	0.0002
1,2-Dibromoethane	106-93-4	0.00005
1,2-Dichlorobenzene (ortho)	95-50-1	0.6
1,4-Dichlorobenzene (para)	106-46-7	0.075
trans-1,4-Dichloro-2-butene	110-57-6	
1,1-Dichloroethane	75-34-3	4
1,2-Dichloroethane	107-06-2	0.005
1,1-Dichloroethylene	75-35-4	0.007
cis-1,2-Dichloroethylene	156-59-2	0.07
trans-1,2-Dichloroethylene	156-60-5	0.1
1,2-Dichloropropane	78-87-5	0.005
cis-1,3-Dichloropropene	10061-01-5	0.002
trans-1,3-Dichloropropene	10061-02-6	0.002
Ethylbenzene	100-41-4	0.7
2-Hexanone	591-78-6	1.5
Methyl bromide	74-83-9	0.01
Methyl chloride	74-87-3	0.003
Methylene bromide	74-95-3	0.4
Methylene chloride	75-09-2	0.005
Methyl ethyl ketone	78-93-3	0.17
Methyl iodide	74-88-4	
4-Methyl-2-pentanone	108-10-1	3
Styrene	100-42-5	0.1
1,1,1,2-Tetrachloroethane	630-20-6	0.07
1,1,2,2-Tetrachloroethane	79-34-5	0.005
Tetrachloroethylene	127-18-4	0.005
Toluene	108-88-3	1
1,1,1-Trichloroethane	71-55-6	0.2
1,1,2-Trichloroethane	79-00-5	0.005
Trichloroethylene	79-01-6	0.005
Trichlorofluoromethane	75-69-4	10
1,2,3-Trichloropropane	96-18-4	0.04
Vinyl acetate	108-05-4	37
Vinyl Chloride	75-01-4	0.002
Xylenes	1330-20-7	10

[1] The ground water protection standard of 0.1 mg/l is for the total of Bromodichloromethane, Bromoform, Chloroform, and Dibromochloromethane.

R315-5. Solid Waste Ground Water Quality Protection Standards for 40 CFR 258 Appendix II Constituents.

The table lists the CAS number for each constituent and the ground water quality protection standards which are currently available for the 40 CFR 258 Appendix II constituents required for assessment monitoring of ground water at a solid waste facility as specified by Subsection R315-308-2(11).

TABLE

Appendix II Protection Standards

Appendix II Constituent	CAS	Ground Water Protection Standard (mg/l)
2,4-D	94-75-7	0.07
2,4,5-T	93-76-5	36.5
2,4,5-TP	93-72-1	0.05
Benzo[a]pyrene	50-32-8	0.0002
bis(2-Ethylhexy)phthalate	117-81-7	0.006
Chlordane	57-74-9	0.002
Cyanide	57-12-5	0.2
Dinoseb	88-85-7	0.007
Endrin	72-20-8	0.002
Heptachlor	76-44-8	0.0004
Heptachlor epoxide	1024-57-3	0.0002
Hexachlorobenzene	118-74-1	0.001
Hexachlorocyclopentadiene	77-47-4	0.05
Lindane	58-89-9	0.0002
Methoxychlor	72-43-5	0.04
Pentachlorophenol	87-86-5	0.001
Polychlorinated biphenyls(PCBs)	1336-36-3	0.0005
Tin	7440-31-5	21.9
Toxaphene	8001-35-2	0.003
1,2,4-Trichlorobenzene	120-82-1	0.07

KEY: solid waste management, waste disposal
June 15, 2002 **19-6-105**
Notice of Continuation April 20, 1998 **40 CFR 258**

TABLE B-2
Data Validation and Verification Methods

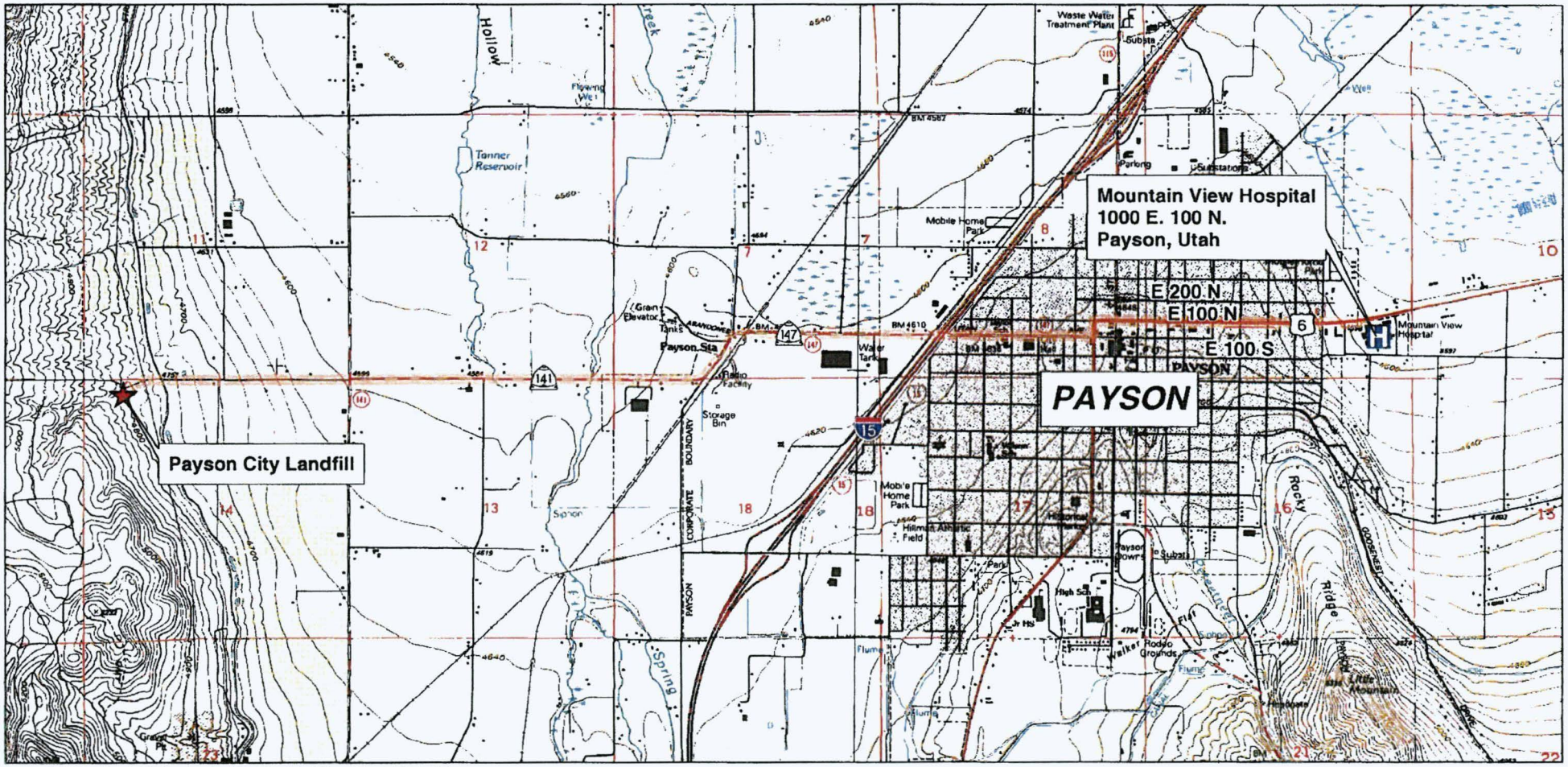
Data Validation and Verification Requirements	Data Validation and Verification Methods
• Samples were collected as per scheduled locations and frequency.	• Comparison with Site Monitoring Plan
• Sample collection and handling followed specified procedures (i.e., relevant SOPs and chain-of-custody procedures).	• Review of field notes, sampling logs and COCs. • Surveillance-level oversight of field procedures to maximize consistency in field.
• Appropriate analytical methods were used, and internal laboratory calibration checks were performed according to the method-specified protocol.	• Review of analytical methods and case narratives provided with laboratory reports. • Maintain documentation of communications with laboratory regarding problems/corrective actions.
• Required holding times and laboratory reporting limits were met.	• Comparison with specified holding times and DLs.
• Recovery acceptance limits for field and laboratory QC samples were met.	• Tabulating RPDs and percent recoveries, and direct comparison with laboratory acceptance limits. • Comparison with DQIs.
• Appropriate steps were taken to ensure the accuracy of data reduction, including reducing data transfer errors in the preparation of summary data tables and maps.	• Maintaining a permanent file of hard copies of laboratory data reports. • Minimizing retyping of data. • Double checking values entered into databases, tables and maps against laboratory data reports.

SOP = Standard Operating Procedures
RPD = Relative Percent Difference
DQI = Data Quality Indicator
DL = Detection Limit
COC = Chain of Custody

TABLE B-1
Data Quality Assurance Objectives In Terms of Data Quality Indicators

Parameter	QC Program	Evaluation Criteria	Summary of QA/QC Goals
Precision	Field Duplicate Pairs Matrix Spike/Matrix Spike Duplicate Method Duplicate	Relative Percent Difference (RPD) Reproducibility	Method Duplicate, for waters: +/- 20% if >5x LRL, +/- LRL if < 5x LRL Field Duplicate, for waters: +/- 30% if >5x LRL, +/- 2x LRL if < 5x LRL
Accuracy	Surrogate Spike Laboratory Control Samples Matrix Spike/Matrix Spike Duplicate	Percent Recovery	Within laboratory historical control limits provided in the Appendix
Representativeness	Hold Times Method Blanks Field Duplicates	Representative of Environmental Conditions Qualitative Degree of Confidence Standard Operating Procedures(SOPs)	Holding times meet 100 percent No method blank contamination 90 percent of field duplicates meet RPD goals SOPs are followed
Comparability	Standard Units of Measure Standard Analytical Methods Field Duplicate Pairs	Qualitative Degree of Confidence	Laboratory Methods Followed SOPs Followed
Completeness	Complete Sampling	Percent Valid Data	90% valid data

LRL = Laboratory Reporting Limit
RPD = Relative Percent Difference
SOP = Standard Operating Procedure



Source. USGS 7.5 min 1:24 000 Quadrangles, "West Mountain, UT", and "Spanish Fork, UT"

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0.25 0 0.25 0.5 Miles

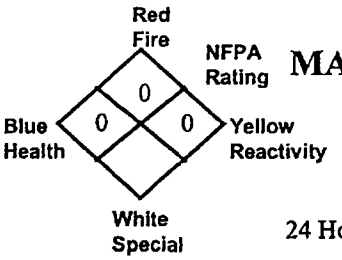
HOSPITAL LOCATION MAP

Payson City Landfill
Payson, Utah

URS

FIGURE C-1

Alconox ®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO_2, foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO_2 on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

ACTIVITY HAZARD ANALYSIS: Ground Water Sampling

Physical and Biological Hazards and Controls	
Potential Hazards	**Controls**
Heavy equipment	• Minimize the use of ground personnel • Notify operators if ground personnel are present • Verify that backup alarms are operating • Make eye contact with the operator before approaching equipment • Wear a bright orange vest, hard hat and safety glasses • Refer to SMS 19 *Heavy equipment*
Noise	• Wear hearing protecting when working near noisy equipment • If it is too loud for voice communication at normal volume you should be wearing protection • Refer to SMS 26 *Noise*
Hand tools and portable equipment	• Inspect tools prior to use • Use tools for their intended use • Don't use damaged tools • Push, don't pull wrenches • Refer to SMS 16 *Hand tools and portable equipment*
Lifting	• Get help and/or use proper equipment to lift heavy objects • Bend at the knees; do not use your back • Keep objects close to your body • Do not twist • Minimize movement of heavy objects • Refer to SMS 45 *Back injury prevention*
Driving and vehicle traffic	• Obey traffic rules • Do not operate vehicles in unsafe conditions (e.g. steep slopes, mud) • Do not use cell phones when operating vehicles • Secure all loads • Wear seat belts • Use caution and wear orange vests if working near equipment or roads • Leave enough time to get to your destination without hurrying! • Refer to SMS 57 *Vehicle Safety Program* • Refer to SMS 32 *Work Zone Traffic Control*

Physical and Biological Hazards and Controls	
Potential Hazards	**Controls**
Slips, trips, and falls	• Avoid steep and uneven terrain • Watch where you step • Be especially cautious around construction debris • Maintain good housekeeping • Refer to SMS 21 *Housekeeping*
Biting animals, poisonous plants	• Use caution when lifting objects that may provide shelter for spiders, snakes and rodents • Rattlesnakes, scorpions and black widow spiders may be present at the site
Vector borne disease	• Stay away from animals that may carry fleas • Hanta virus may be present in mouse droppings • Histoplasmosis may be present in bird droppings • Do not generate dust from areas impacted by animal droppings
Severe weather	• Listen to radio for warnings • Discontinue all site activities and seek shelter if severe weather is approaching
Cold Stress	• Stay dry • Dress in layers • Have a warm hat and socks available • Take breaks in heated areas
Heat stress	• Train workers regarding heat stress prevention and symptoms • Use vehicles for shelter and take breaks as needed • Drink plenty of fluids • Use cooling devices if necessary • Use acclimatized workers • Create shaded work areas if appropriate • If necessary schedule heavy work for cooler times of day • Refer to SMS 18 *Heat Stress* (attached)

URS Safe Work Plan
SMS Checklist

The following URS Safety Management Standards (SMS) generally apply to all field projects. Review the requirements of each SMS and determine appropriate steps to ensure project compliance with the requirements.

Determine the applicability of these SMS's to your project	Yes	See SMS #	Determine the applicability of these SMS's to your project	Yes	See SMS #
Emergency Action Plan	Yes	003	Sanitation	Yes	030
Housekeeping	Yes	021	Regulatory Inspections	Yes	001
Vehicle Safety	Yes	057	Health and Safety Training	Yes	055
New Employee Safety Orientation	Yes	025	Incident Reporting and Investigation	Yes	049
			Injury Management	Yes	065

The following URS SMS' only apply when specific activities are conducted by URS and URS subcontractor personnel. If you answer Yes to any of the questions below, review the SMS indicated and determine the appropriate steps necessary to ensure project compliance with the requirements.

Will project activities involve any of the following?	Yes	See SMS #	Will project activities involve any of the following?	Yes	See SMS #
Abrasive blasting or exposure to abrasive blasting media or waste?	☐	006	Excavations or exposure to excavation hazards?	☐	013
Potential exposure to ticks, snakes, poisonous plants, and other biological hazards	☒	047	Flammable or combustible materials used or stored which could constitute a fire hazard?	☐	014,015
Use of aerial lifts?	☐	007	Use of portable, gas powered, electric, and/or powder actuated hand tools?	☒	016
Potential exposure to air contaminants in hazardous concentrations?	☐	043,042 ,050	Hazardous materials shipping?	☐	048
Asbestos surveys or abatement oversight?	☐	008	Hazardous substances – physical, chemical or health hazards?	☐	002
Potential exposure to Bloodborne Pathogens (i.e. blood or other bodily fluids)?	☐	051	Hazardous waste activities (investigative or remedial)?	☐	017
Work over or near water?	☐	027,053	Heat Stress potential to employees working in: • Hot environments; or • Impermeable Chemical Protective Clothing?	☒	018
California job activities?	☐	005	Heavy equipment in use at this project site?	☒	019
Corrosive materials used or handled?	☐	009	Hot Work (welding, cutting, grinding)	☐	020
Confined space entries?	☐	010	Industrial site access of any kind?	☐	004

URS Safe Work Plan
SMS Checklist

Will project activities involve any of the following?	Yes	See SMS #	Will project activities involve any of the following?	Yes	See SMS #
Cranes or hoists?	☐	038,041	Lead exposures (lead paint removal, lead in dust, etc)?	☐	022
Demolition activities of any type of structures?	☐	011	Exposure to uncontrolled energy sources including electrical, fluid, pneumatic, fuel, steam, gravity, and hazardous material?	☐	023
Drilling activities?	☐	056	Use of Manbasket (Crane Suspended Personnel Platforms) for working at heights?	☐	037, 038, 041
Use of watercraft (i.e. boats, canoes, barges, vessels)	☐	053	Work on or near streets and/or roadways?	☐	032
Exposure to chemical/physical/biological agents and/or activities that require Medical Surveillance? Examples would include exposures to: Noise, Asbestos, Lead, Hazardous Waste, High Altitudes, Carcinogens, Respirator Use.	☐	024	Travel to remote locations and/or developing countries?	☐	036
Noise exposures?	☒	026	Potential exposure to subsurface and/or overhead utilities?	☐	034
Portable ladder use?	☐	028	Potential exposure to Unexploded Ordnance/Chemical Warfare agents?	☐	039
Exposure to eye, head, hand, foot, or other hazards that require the use of personal protective equipment?	☐	029	Underground Storage Tank investigation, removal, etc.	☐	033
Nuclear Density Gauge use?	☐	044	Work with live electrical systems	☐	012
Respiratory protection use – required and/or voluntary?	☐	042	Work at altitudes greater than 7,000 feet (~ 2,100 meters)	☐	035
Scaffolding?	☐	031	Working at heights of greater than 6 feet?	☐	040
Manual lifting and/or material handling?	☒	045	Use of computer workstations for data entry, CADD, word processing, etc.	☐	054
Work near railroad transportation systems?	☐	063	Exposure to recognized Hand hazards?	☐	064
Work at a client site requiring compliance with the OSHA Process Safety Management Standard?	☐	058	Potential personnel exposure to temperatures below 32°F	☒	059
Subcontractors to perform construction (including drilling and excavation) with their own personnel and/or equipment?	☐	046	Potential exposure to ionizing radiation?	☐	052

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

April 2003

Prepared by

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Background and Previous Investigations 1

2.0 GROUND WATER MONITORING PROGRAM OBJECTIVE AND SCOPE 5
2.1 Purpose of the SAP 5
2.2 Purpose of the QAPP 5
2.3 Purpose of the HASP 6

3.0 LANDFILL HYDROGEOLOGIC SETTING 7

4.0 REFERENCES 9

LIST OF FIGURES

Figure 1 – Vicinity Map
Figure 2 – Well Locations

LIST OF APPENDICES

Appendix A – Sampling and Analysis Plan
Appendix B – Quality Assurance Project Plan
Appendix C – Health and Safety Plan

1.0 INTRODUCTION

The purpose of this Ground Water Monitoring Plan is to describe the methods and procedures by which ground water detection and assessment monitoring will be conducted at the Payson City Landfill. Procedures for the collection of samples in the field are described in the Sampling and Analysis Plan (SAP) portion of this document (Appendix A). The data quality objectives for landfill assessment and detection monitoring and the procedures for the validation of analytical data are described in the Quality Assurance Project Plan (QAPP) portion of this document (Appendix B). The health and safety requirements that will be followed by field personnel performing sampling at the landfill are described in the Health and Safety Plan (HASP) portion of this document (Appendix C). The purpose of the ground water monitoring program is to monitor ground water for indications of potential chemical releases from the landfill. The ground water monitoring program has been designed to comply with Utah Solid Waste Permitting and Management Rule R315-308, Ground Water Monitoring Requirements. Data obtained will be used to evaluate ground water quality in the uppermost aquifer beneath the landfill.

1.1 Background and Previous Investigations

The Payson City Landfill is located approximately four miles west of the City of Payson in Utah County. The landfill is classified as a Class V Landfill, and accepts only non-hazardous municipal refuse and construction/demolition debris. The site is located on the eastern side of West Mountain, in the northwest corner of the northwest corner of Section 14, Township 9 South, Range 1 East, of the Salt Lake Base and Meridian (Figure 1).

1996 – Geohydrologic Assessment Report

In 1996, a Geohydrological Assessment Report was prepared for the Payson City Landfill by Bingham Environmental Inc. This assessment was an evaluation of both the regional and local geologic and hydrogeologic settings of the Payson City Landfill. In the assessment, three monitoring wells (wells MW-1, MW-2, and MW-3) were sampled by Bingham Environmental in September 1996. Well MW-1 was installed by Zimmerman Well Service in May of 1993 and wells MW-2 and MW-3 were installed by Lane Environmental Services in February of 1996 (Bingham Environmental, 1996).

1997/1998 – Well Installation and Ground Water Sampling

Dames & Moore installed and sampled three additional wells (MW-4, MW-5, and MW-6) in 1997 and 1998. Water samples were obtained from each of the monitoring wells after development. MW-4 was drilled to a total depth of 345 feet below ground surface (bgs) and completed at a depth of 340 feet bgs in December of 1997. Development and sampling took place in January 1998. MW-5 was drilled and completed to a depth of 295 feet bgs in November 1998, and MW-6 was drilled and completed to a depth of 335 feet bgs in December 1998. MW-4, MW-5 and MW-6 were completed with 50 feet of screened interval at the base of the wells (Dames & Moore, 1998; and Dames & Moore, 1999; Appendix A). MW-5 and MW-6 were developed and sampled in December 1998.

1999 through 2001 – Ground Water Detection Monitoring

In 1999, Dames & Moore conducted two additional sampling events at the Payson City Landfill where volatile organic compounds were detected in samples collected:

- September 15, 1999, samples were collected from wells MW-3 and MW-5; and
- December 15, 1999, samples were collected from wells MW-1, MW-3 and MW-5.

In 2000, URS/Dames & Moore completed five ground water sampling events at the Payson City Landfill where concentrations of tetrachloroethene, metals, and nitrate were detected at concentrations exceeding ground water quality standards:

- March 14, 2000, samples were collected from wells MW-4, MW-5, and MW-6;
- July 26, 2000, a sample was collected from well MW-4;
- September 6, 2000, samples were collected from wells MW-4, MW-5, and MW-6;
- November 2, 2000 and November 8, 2000, samples were collected from wells MW-4, MW-5 and MW-6 (November 2nd) , and well MW-3 (November 8th); and
- December 12, 2000, a sample was collected from well MW-4.

Prior to the December 2001 sampling, URS/ Dames & Moore completed three sampling events where concentrations of tetrachloroethene and nitrate were detected greater than the ground water quality standards in samples collected:

- February 27, 2001, samples were collected from wells MW-4, MW-5, and MW-6;
- April 5, 2001, a sample was collected from well MW-4; and
- June 13, 2001, samples were collected from wells MW-4, MW-5 and MW6.

2001/2002 – Ground Water Assessment Monitoring

Starting in December 2001 and for three subsequent quarters ending in September 2002, URS collected quarterly ground water samples from monitoring wells MW-4, MW-5, and MW-6 and analyzed these samples for assessment monitoring criteria as defined by UDSHW. Monitoring well MW-3 was sampled on a semi-annual basis for detection monitoring criteria as defined by UDSHW. The sampling was completed as follows:

- One sample per well was collected from wells MW-3, MW-4, MW-5, and MW-6 on December 6 and 7, 2001;
- One sample per well was collected from wells MW-4, MW-5, and MW-6 on March 5, 2002;
- One sample per well was collected from wells MW-3, MW-4, and MW-5 (well MW-6 was dry) on June 13, 2002; and
- One sample per well was collected from wells MW-4, MW-5, and MW-6 on September 6, 2002.

Results from the first quarter (December 2001) indicated none of the additional compounds on the 40 CFR Part 258 Appendix II list were detected. Therefore for subsequent quarters, the samples collected were only analyzed for the R315-308-4 analyte list (URS, 2002a).

The fourth quarter 2002 quarterly ground water monitoring report (URS, 2002b) contained a detailed statistical analysis of the ground water at the site. The fourth quarter report identified that:

- Due to similar ground water level response, the site monitoring well ground water elevations suggested that all of the wells are screened in the same unconfined aquifer.
- The prevailing patterns of flow over the past two years have been inconsistent with the hypothesis that a single dominant direction characterizes flow in the aquifer beneath the landfill. A more plausible explanation consistent with observations was a pattern of radial ground water flow away from the landfill. An important implication of this hypothesis was that there is no upgradient monitoring well at the landfill.
- Flow to south from the landfill would explain the observations of VOCs in MW-4. A claim not supported by observations is that MW-4 is upgradient of the landfill.
- Flow to the north of the landfill would explain the concentrations of VOCs above the reporting limit in ground water samples from monitoring wells MW-5 and MW-6 in each

sampling event since March 2000. Historically, the highest measured VOC concentrations have been observed in MW-5.

- Measured concentrations of tetrachloroethene in ground water samples from MW-4 show an increasing trend. If the trend continues, the tetrachloroethene concentrations predicted at the lower confidence level will exceed the Utah Ground Water Protection Standard (R315-308-4) in approximately 57 months.
- Measured concentrations of tetrachloroethene in ground water samples from MW-5 show no trend at the 95% confidence level, and a decreasing trend at the 85% confidence level. If no trend is assumed, the lower confidence level for tetrachloroethene in MW-5 is above the Utah Ground Water Protection Standard (R315-308-4).

2.0 GROUND WATER MONITORING PROGRAM OBJECTIVE AND SCOPE

The objective of this program is to monitor the quality of ground water at the Payson City Landfill in accordance with detection and assessment monitoring requirements. During 2003, detection monitoring is scheduled to be performed at monitoring well MW-3, and assessment monitoring is scheduled to be performed in wells MW-4, MW-5, and MW-6 (refer to Appendix A). It is anticipated that detection and/or assessment monitoring will continue through the active life, closure, and post-closure care periods at the Landfill.

2.1 Purpose of the SAP

The methods and procedures for collection of compliance samples at the landfill are described in the project SAP. The general purposes of the SAP are to:

- Serve as a field guide for the sampling program;
- Document the required protocols for field and analytical activities;
- Describe required documentation procedures for field and laboratory tasks; and
- Provide guidance and requirements for subcontracted laboratory services.

The SAP is provided in Appendix A of this Ground Water Monitoring Plan.

2.2 Purpose of the QAPP

The Quality Assurance Project Plan (QAPP) describes the methods and procedures that will be followed to assure that valid, useful data are obtained during detection and assessment monitoring. The general purposes of the QAPP are to:

- Define Data Quality Objectives (DQOs) for the program;
- Provide Data Quality Indicators (DQIs - precision, accuracy, completeness, comparability, and representativeness) for analytical data comparison;
- Provide activity-specific quality assurance objectives; and
- Serve as the primary guide for the integration of Quality Assurance (QA) and Quality Control (QC) functions for all sampling and analysis activities.

The QAPP is provided in Appendix B of this Ground Water Monitoring Plan.

2.3 Purpose of the HASP

The methods and procedures that personnel will follow to ensure their personal safety when performing the well sampling associated with the Ground Water Monitoring Plan are described in the Health and Safety Plan (HASP). The general purposes of the HASP are to:

- Summarize health and safety hazard information;
- Delineate procedures that will allow personnel to work safely at the landfill; and
- Provide specific guidance to respond quickly and appropriately to potential site emergencies.

The HASP is provided in Appendix C of this Ground Water Monitoring Plan.

3.0 LANDFILL HYDROGEOLOGIC SETTING

According to Anderson, et al., (1994) as many as four aquifers exist in the basin fill of Utah Valley. The basin-fill deposits are composed of deep (older) sediments that were eroded from the adjacent mountains and shallow (younger) lacustrine and alluvial sediments associated with Lake Bonneville. Typically, a shallow unconfined aquifer overlies three artesian aquifers which exist in Lake Bonneville sediments and older valley-fill deposits. The aquifers are separated by discontinuous low-permeability confining layers.

Ground water in the aquifers underlying the Payson City Landfill originates from precipitation and snow melt in recharge areas (i.e., the adjacent mountains and valley benches) and flows toward, and discharges to, the topographically lower Utah Lake. Ground water in the deeper confined aquifers has an upward (artesian) gradient, and discharges to the upper unconfined aquifer, and ultimately to Utah Lake.

A total of six monitoring wells have been installed at the Payson City Landfill (Figure 2) during the course of previous investigations. Of the six wells, five are completed in unconsolidated sedimentary deposits consisting of varying combinations of sand, silt, clay and gravel. These unconsolidated materials appear to be late Pleistocene Bonneville Formation, which is composed of thin beds of offshore clay, silt, and fine sand, and Provo Formation and younger lake bottom clay, silt, and some offshore sandbars (Davis, 1983). MW-2 is an exception, and is screened in Permian-Pennsylvanian Oquirrh Formation sandstone, quartzite, and limestone bedrock. Stratigraphic logs and completion details for the six on-site monitoring wells indicate that water-bearing strata were encountered at depths ranging from 260 to 315 feet below ground surface (Bingham Environmental, 1996; Dames & Moore, 1998; and Dames & Moore, 1999).

Of the six existing wells, three wells (MW-4, MW-5, and MW-6) will be sampled quarterly, and one well (MW-3) will be sampled semi-annually as part of the Landfill's ground water monitoring program, in accordance with the requirements of Utah Solid Waste Permitting and Management Rule R315-308.

In the fourth quarter 2002 monitoring report (URS, 2002b), it was determined that the prevailing patterns of flow had been inconsistent with the supposition that a single dominant direction characterized flow in the aquifer beneath the landfill. The data suggested components of flow to both the east and the west, observations that could not be reconciled with the idea of a single

flow direction. The report suggested that a pattern of radial ground water flow away from the landfill is a more plausible explanation and more consistent with observations.

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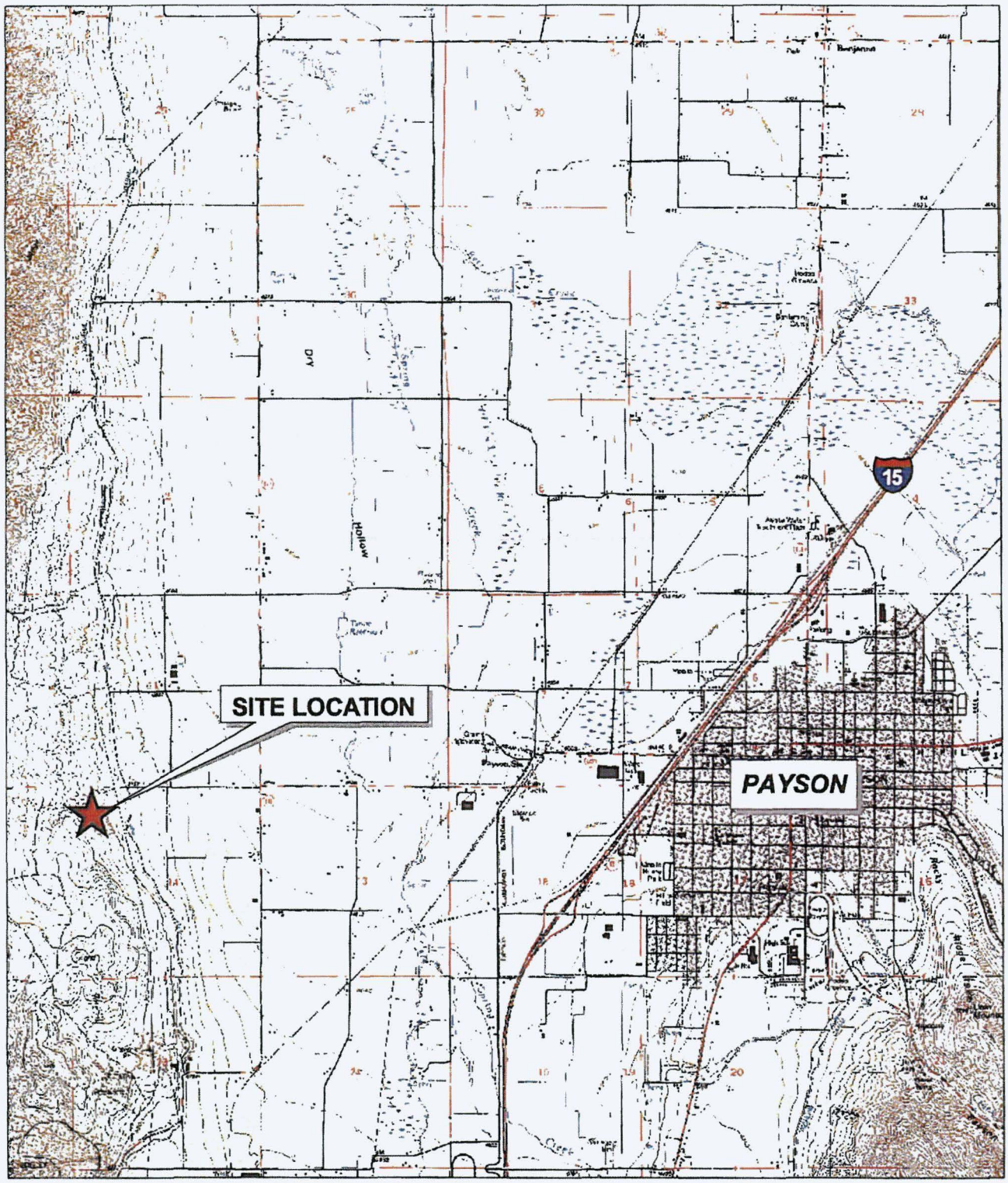
FIGURES



0.5 0 0.5 1 Miles

N
W E
S

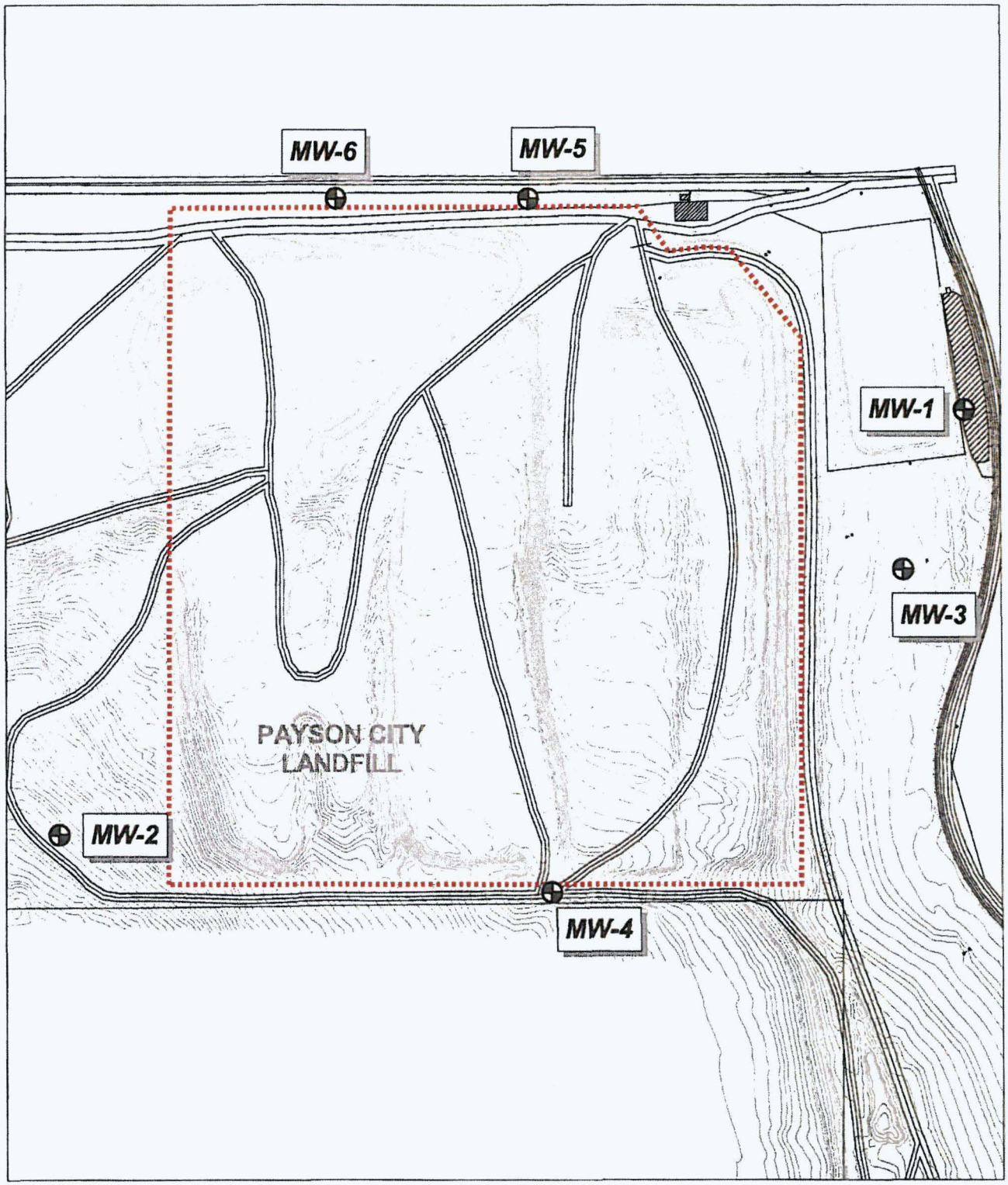
VICINITY MAP

Payson City Landfill
Payson, Utah

URS

Source:
USGS 7.5 min 1:24,000 Quadrangles
"West Mountain, UT" and "Spanish Fork, UT"

FIGURE 1



200 0 200 400 Feet

N
W E
S

MW-1 Monitoring Well

WELL LOCATIONS

Payson City Landfill
Payson, Utah

URS

FIGURE 2

APPENDIX A

SAMPLING AND ANALYSIS PLAN

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

SAMPLING AND ANALYSIS PLAN

April 2003

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Monitoring Well Sampling Rationale 1
1.2 2003 Schedule 1

2.0 GROUND WATER SAMPLING METHODS AND PROCEDURES 2
2.1 Site Access 2
2.2 Ground Water Sampling 2
2.2.1 Ground Water Level Measurement 2
2.2.2 Well Sampling Procedures 2
2.2.3 Sample Handling Procedures 3

3.0 EQUIPMENT 4
3.1 Sampling Equipment 4
3.2 Equipment Set-Up 4
3.3 Duties/Operational Staff 5
3.4 Field Instruments 5

4.0 QUALITY CONTROL SAMPLES 6

5.0 ANALYTICAL METHODS 7

6.0 SAMPLE HANDLING, LABELING, SHIPPING, DOCUMENTATION, PRESERVATION 8
6.1 Sampling Handling 8
6.2 Chain-Of-Custody Records 8
6.3 Sample Labeling 9
6.4 Sample Seals 9
6.5 Sample Shipping 9
6.6 Field Documentation 10
6.7 Sample Preservation 10

7.0 REFERENCES 11

LIST OF TABLES

Table A-1 – 2003 Quarterly Ground Water Sampling Schedule
Table A-2 – Analytical Methods for Ground Water Samples
Table A-3 – Sample Containers, Preservation, and Holding Times for Ground Water Samples

LIST OF ATTACHMENTS

Attachment A-1 – Regulatory Requirements
Attachment A-2 – Field Forms
Attachment A-3 – Pre-Field Work and Equipment Checklists

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) details the procedures to be followed for sampling and analysis of ground water from monitoring wells at the Payson City Landfill in accordance with Utah Solid Waste Permitting and Management Rule R315-308. Data collected during each sampling round will be reviewed by the project chemist, processed, analyzed, and included in a quarterly report for submittal to Utah Division of Solid and Hazardous Waste (UDSHW). A copy of the Solid and Hazardous Waste Rule R315-308 and 40 CFR Part 258 Appendix II is provided in Attachment A-1. Required project field forms are provided in Attachment A-2, and pre-field work and equipment checklists are provided in Attachment A-3.

1.1 Monitoring Well Sampling Rationale

Based on the fourth quarter 2002 ground water monitoring report (URS, 2002) and subsequent conversations with UDSHW, wells MW-4, MW-5, and MW-6 will continue to be sampled quarterly for assessment monitoring criteria, and one well (MW-3) will continue to be sampled semi-annually for detection monitoring criteria as part of the Landfill's ground water monitoring program in 2003.

1.2 2003 Schedule

During 2003, ground water samples will be collected and analyzed according to the quarterly schedule in Table A-1. All samples will be submitted to American West Analytical Laboratories to be analyzed for the inorganic, organic, and heavy metals constituents specified in Solid and Hazardous Waste Rule R315-308-4 and 40 CFR Part 258 Appendix II (provided in Attachment A-1). American West Analytical Laboratories (AWAL) is located in Salt Lake City, Utah, and is a State-certified analytical laboratory.

2.0 GROUND WATER SAMPLING METHODS AND PROCEDURES

Field sampling methods are described below, including site access, ground water sampling, and sampling equipment. Sample handling and custody procedures are discussed in Section 6.0. The project Health and Safety Plan that will be followed for the sampling events is provided in Appendix C.

2.1 Site Access

Payson City Corporation owns all of the land on which the landfill and associated monitoring wells are located. URS sampling personnel will coordinate with Landfill employees to arrange access to the property prior to sampling events. Refer to Attachment A-2 for pre-field work activities.

2.2 Ground Water Sampling

The following sub-sections detail the method and procedures for completing ground water level measurements and collecting ground water samples.

2.2.1 Ground Water Level Measurement

Ground water levels will be measured in all monitoring wells each quarter to evaluate the hydraulic gradient. The north side of the top of the well casing will be the reference point from which water-level measurements will be taken. Ground water elevations will be measured with an electronic water level indicator to the nearest one hundredth of a foot. To prevent potential cross-contamination between monitoring points, the water level indicator will be decontaminated prior to use at each well with a solution of Alconox detergent and deionized water, followed by a triple rinse with deionized water and dried with paper towel.

2.2.2 Well Sampling Procedures

Each well will be purged with either a dedicated Grundfos RediFlo-4 submersible pump, or a dedicated bladder pump. Purging will continue until three casing volumes of ground water have been removed. In instances where a monitoring well does not produce enough water to permit the purging of three well volumes in six hours, the well will be purged dry and samples will be collected when sufficient volume has been recharged. The purge volume will be calculated

based on the well casing diameter and length of the water column in the well. The temperature, pH, and conductivity of the ground water will be measured during well purging. Water quality parameters will be measured with a Horiba series U-22 or equivalent meter. Ground water quality parameters will be measured every three minutes during purging. Before well purging is considered complete, at least two consecutive field measurements made three minutes apart will fall within the ranges stated below:

- turbidity = ±10 percent or <5 NTU (nephelometric turbidity units);
- pH = ± 0.2 units change between individual readings;
- temperature = ± 1° C change between individual readings; and
- conductivity = ± 10 percent change between individual readings.

Well purge water will be discharged on the ground surface away from the wellhead. Ground water samples will be collected from the pump discharge tubing in the order of volatilization sensitivity as follows:

- VOCs;
- General Water Quality Analytes; and
- Metals

Table A-1 is a list of the analytes and analytical methods that will be performed.

2.2.3 Sample Handling Procedures

The ground water samples will be collected directly into laboratory-provided sample containers. All sample containers will be properly labeled at the time of collection with a permanent marker, as discussed in Section 6.0. After collection, sample containers will be immediately placed on ice in an insulated cooler for preservation. A chain-of-custody (COC) record will be initiated in the field and will accompany the samples during storage, transportation, and delivery to the analytical laboratory. The samples will either be in the possession of the field sampler, or securely stored at all times. Ground water samples will be delivered in custody-sealed coolers at the end of the sampling day to AWAL for analysis. Data collection and analysis will be evaluated by the project Data Quality Indicators discussed in the QAPP (Appendix B).

3.0 EQUIPMENT

Ground water sampling equipment is described below, including equipment set-up, operator duties, and field instruments. A sampling equipment checklist is provided in Attachment A-2.

3.1 Sampling Equipment

All sampling equipment that directly contacts the samples will either be dedicated, or disposable. The following equipment is required to perform ground water sampling at the landfill:

- 9-9.9 KW generator;
- Water level tape (located at the landfill weight station);
- Compressed air tank, or air compressor;
- Oakton pH and conductivity meter (calibrated prior to sampling);
- Grundfos Redi-Flo pump controller (wired for 220 volts prior to sampling);
- Bladder pump control box;
- Purge buckets; and
- Table.

A 9-9.9 KW generator, which has typically been rented prior to each sampling event, is required to run the dedicated pumps at the landfill. Wells MW-4, MW-5, and MW-6 have dedicated Grundfos pumps and well MW-3 has a dedicated bladder pump.

3.2 Equipment Set-Up

Wells MW-4, MW-5, and MW-6 have Grundfos Ready-Flo Pumps. To set-up, the dedicated pump power lead is attached to the pump control box, and the generator is placed to ensure that the generator exhaust is facing down wind and away from the well head. Next, the dedicated discharge tube is connected to the discharge outlet fitting on the well head. Finally, the pump controller is turned on with the controller dial used to establish the desired purge rate.

Well MW-3 contains a dedicated bladder pump. To set-up, the compressor tank (or compressed air cylinder) air hose is connected to the bladder pump control box inlet, and the control box recharge hose is connected to the pump recharge on the well head. Due to the depth of well MW-3, purge water may take up to ten minutes to travel to the surface and discharge from the

well. Once observable purge has started, the flow rate on pump control box is adjusted to desired rate.

3.3 Duties/Operational Staff

Upon arriving at the Payson City landfill, the sampler will check in at the weight station and pick up the well keys, bladder pump control box, and the water level measuring tape. The water level measuring tape is usually stored downstairs at the station.

Typically, the landfill operator provides a cylinder of compressed air to run the bladder pump, requiring prior coordination with the operator. Alternatively, there is an air compressor available at the site.

3.4 Field Instruments

Ground water quality parameters that will be measured during well purging include temperature, pH, conductivity, and turbidity. A Horiba series U-22 or equivalent meter will be used for measuring ground water parameters. All field instrumentation will be calibrated daily. Calibration will be documented on equipment calibration log forms. Water levels will be measured with an electronic well sounder that will be decontaminated before each use. Copies of field forms and checklists are provided in Attachments A-2 and A-3, respectively.

4.0 QUALITY CONTROL SAMPLES

To ensure overall data quality, the following quality assurance/quality control (QA/QC) samples will be collected during each sampling event:

QA/QC Samples	Requirement
Temperature Blank	One in each sample cooler
Trip Blank	One for each cooler containing samples for VOC analyses
Field Blank	One per sampling event
Blind Duplicate/Replicate	One per sampling event
Matrix Spike/Matrix Spike Duplicate	One per sampling event

The results of quality assurance samples will be reviewed by a qualified project chemist to assure that data are valid and usable in accordance with the Payson City Landfill QAPP. The Payson City Landfill QAPP is provided in Appendix B.

5.0 ANALYTICAL METHODS

Ground water samples will be analyzed for the constituents specified in Utah Solid and Hazardous Waste Permitting and Management Rule R315-308-4. The required analytical methods for ground water analyses are summarized in Table A-1. Ground water samples will be analyzed by American West Analytical Laboratories (AWAL), a Utah-certified laboratory. Data validation and verification methods are discussed in the QAPP, Appendix B.

6.0 SAMPLE HANDLING, LABELING, SHIPPING, DOCUMENTATION, PRESERVATION

This section presents the requirements for handling, labeling, shipping, and preserving environmental samples as well as field documentation practices necessary for reconstruction of the sampling event.

6.1 Sampling Handling

The possession and handling of all samples collected will be traceable from the time of collection, through analysis, until final disposition. Documentation of the sample history is referred to as chain-of-custody. Components of the chain-of-custody (sample seals, field records, and chain-of-custody records) and procedures for their use are described in the following sections.

A sample is considered to be in a person's custody if it is: 1) in a person's physical possession, 2) in view of the person after he or she has taken possession, 3) secured by the person so that no one can tamper with the sample, or 4) in a secure area. A person who has samples in custody must comply with the procedures described in the following sections.

6.2 Chain-Of-Custody Records

To establish the documentation necessary to trace sample possession from the time of collection, a chain-of-custody record must be filled out in triplicate and must accompany every sample or group of individually identified samples. Chain-of-custody records will contain the following information:

- Sample Identification Number;
- Date and Time of Sample Collection;
- Signature of Initials of Sample Collector;
- Matrix Type;
- Number of Containers;
- Signatures of People in the Chain-of-Custody;
- Date and Time of Each Change in Custody;
- Method of Shipment; and

- Condition of Samples when Received by Laboratory.

Each person who has custody must sign the form. Samples cannot be left unattended unless they are secured and sealed.

6.3 Sample Labeling

Sample labels are necessary to prevent misidentification of samples. Gummed paper labels or tags will be used and will include at least the following information:

- Sample number (referenced to a sampling location) including a sample code that distinguishes field samples, duplicates, spikes, or blanks. The laboratory should not be cognizant of the code;
- Date and time of sample collection; and
- Type of preservative used, or "None" as applicable.

Labels will be affixed to sample containers prior to or at the time of sampling. The labels will be filled out at the time of sample collection. The exact sample location and type of sample will be recorded on sampling forms and in a bound logbook.

6.4 Sample Seals

Sample seals are used to detect improper handling of samples following sample collection up to the time of analysis. Items such as gummed paper seals and custody tape will be used for this purpose. Signed and dated seals will be attached so that they must be broken to open either the individual sample containers or shipping containers. Seals will be affixed to containers before the samples leave the custody of sampling personnel.

6.5 Sample Shipping

Samples will be packaged and hand delivered by the sampler within 24 hours of sample collection to AWAL in Salt Lake City, Utah. Samples will be accompanied by the Chain-of-Custody record. Authorized laboratory personnel will acknowledge receipt of shipment by signing and dating the form and returning a copy to the URS Project Manager.

6.6 Field Documentation

Field personnel will record ground water sampling information on an appropriate sampling form, shown in Attachment A-1. All entries will be made in indelible ink and all corrections will follow the error correction protocol of one line through the error and initial and date of correction. At a minimum, entries on field documentation shall include the following:

- Location and description of the sampling point;
- Details of the sampling site (for example, the elevation of the casing, casing diameter and depth, integrity of the casing, etc.);
- Identification of sampling crew members;
- Number and volume of samples taken;
- Sampling methodology;
- Sample preservation;
- Date and time of collection;
- Collector's sample identification number(s);
- Sample distribution and transportation method;
- Field observations;
- Any field measurements made (e.g., pH, conductivity, water depth);
- Signature and date by the personnel responsible for observations; and
- Decontamination procedures.

Sampling situations vary widely. No general rules can specify the extent of information that must be entered in a log. However, records shall contain sufficient information so that someone can reconstruct the sampling activity without relying on the collector's memory.

6.7 Sample Preservation

All samples will be collected in appropriate sample containers and preserved as indicated in Table A-2.

7.0 REFERENCES

URS, 2002. *Quarterly Ground Water Monitoring Report Fourth Quarter: September 2002,* November 2002.

Utah Division of Solid and Hazardous Waste, Solid Waste Program, 2002. *Ground Water Sampling Guidance*, 49 p.

TABLES

TABLE A-1
2003 Quarterly Ground Water Sampling Schedule

ANNUAL SAMPLING	MW-3	MW-4	MW-5	MW-6	Blind Duplicate
First Quarter					
UAC R315-308-4 full list	X	X	X	X	X
40 CFR Part 258 Appendix II full list		X	X	X	X
Second Quarter					
UAC R315-308-4 full list		X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X
Third Quarter					
UAC R315-308-4 full list	X	X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X
Fourth Quarter					
UAC R315-308-4 full list		X	X	X	X
40 CFR Part 258 Appendix II; detects only		X	X	X	X

Note: MW-3 is scheduled for semi-annual detection monitoring only. All other wells are scheduled for assessment monitoring.

TABLE A-2
Analytical Methods for Ground Water Samples

Parameter	Analytical Method
Ammonia	EPA 350.1
Antimony	SW846 7041/6020
Arsenic	SW846 7060A/6020
Bicarbonate, Carbonate	EPA 310.1
Chloride	SM 4500 CL B
COD	HACH
Cyanide	EPA 335.2, 335.4
EDB & DBCP	EPA 504
Herbicides (App.II)	SW846 8151A
Lead	SW846 7421/6020
Mercury	SW846 7470A
Metals (Total)	SW 846 6010B/6020
Nitrate (as N)	EPA 353.2
Pesticides (App.II)	SW846 8081A
pH	EPA 150.1
Selenium	SW846 7740/6020
Semivolatiles (App.II)	SW846 8270C
Sulfate	EPA 375.4
Sulfide	EPA 376.1
TDS	EPA 160.1
Thallium	SW846 7841/6020
TOC	EPA 415.1
Volatiles (App.I & II)	SW846 8260B

Note: Total metals include: barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, tin, vanadium, and zinc.

TABLE A-3
Sample Containers, Preservation, and Holding Times for Ground Water Samples

Parameter	Container	Preservation	Holding Time (Days)
Ammonia	1 – 500 ml poly bottle	pH<2 with H_2SO_4	28 days
Bicarbonate, Carbonate	1 – 250 ml poly bottle	4° C	14 days
Chloride	1 – 250 ml poly bottle	4° C	28 days
COD	1 – 50 ml poly bottle	pH<2 with H_2SO_4, 4° C	28 days
Cyanide	1- 500 ml poly bottle	pH>12 with 50% NaOH, 4° C	14 days
EDB & DBCP	3 – 40 ml glass vials	None	28 days
Herbicides (App.II)	1 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
Metals[1]	1 - 1 L poly bottle	Nitric, 4° C	180 days[2]
Nitrate (as N)	1 – 250 ml poly bottle	pH<2 with H_2SO_4, 4° C	48 hours
Pesticides (App.II)	1 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
pH	1 – 250 ml poly bottle	4° C	Analyze as soon as possible following receipt at the laboratory
Semivolatiles (App.II)	2 - 1 L amber glass	4° C	7 days until extraction 40 days after extraction
Sulfate	1 – 250 ml poly bottle	4° C	28 days
Sulfide	1 – 500 ml poly bottle	PH/9 NaOH, Zn Acetate, 4° C	7 days
TDS	1 – 100 ml poly bottle	4° C	7 days
TOC	1 – 25 ml poly bottle	pH<2 with HCl/H_2SO_4, 4° C	28 days
VOCs	3 - 40 mL glass vials	HCl, 4° C	14
VOCs	3 - 40 mL glass vials	None	7

Notes:
1 Metals include antimony, arsenic, lead, mercury, selenium, thallium, and the total metals list from Table A-1.
2 Mercury must be analyzed within 28 days of collection.

ATTACHMENTS

ATTACHMENT A-1

Regulatory Requirements

APPENDIX II TO PART 258—LIST OF HAZARDOUS INORGANIC AND ORGANIC CONSTITUENTS [1]

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µ g/L) [6]
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100	200
			8270	10
Acenaphthylene	208-96-8	Acenaphthylene	8100	200
			8270	10
Acetone	67-64-1	2-Propenone	8260	100
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015	100
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270	10
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270	20
Acrolein	107-02-8	2-Propenal	8030	5
			8260	100
Acrylonitrile	107-13-1	2-Propenenitrile	8030	5
			8260	200
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5α,8α,8aβ)-	8080	0.05
			8270	10
Allyl chloride	107-05-1	1-Propene, 3-chloro-	8010	5
			8260	10
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine	8270	20
Anthracene	120-12-7	Anthracene	8100	200
			8270	10
Antimony	(Total)	Antimony	6010	300
			7040	2000
			7041	30
Arsenic	(Total)	Arsenic	6010	500
			7060	10
			7061	20
Barium	(Total)	Barium	6010	20
			7080	1000
Benzene	71-43-2	Benzene	8020	2
			8021	0.1
			8260	5
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8100	200
			8270	10
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8100	200
			8270	10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100	200
			8270	10
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100	200
			8270	10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100	200
			8270	10
Benzyl alcohol	100-51-6	Benzenemethanol	8270	20
Beryllium	(Total)	Beryllium	6010	3
			7090	50
			7091	2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-.	8080	0.05
			8270	10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4β,5α,6β)-.	8080	0.05
			8270	20
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-.	8080	0.1
			8270	20
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-.	8080	0.05
			8270	20
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-.	8110	5
			8270	10
Bis(2-chloroethyl) ether; Dichloroethyl ether.	111-44-4	Ethane, 1,1'-oxybis[2-chloro-	8110	3
			8270	10
Bis-(2-chloro-1-methylethyl) ether; 2,2'-Dichlorodiisopropyl ether; DCIP, See note 7	108-60-1	Propane, 2,2'-oxybis[1-chloro-	8110	10
			8270	10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.	8060	20
Bromochloromethane; Chlorobromomethane.	74-97-5	Methane, bromochloro-	8021	0.1
			8260	5
Bromodichloromethane; Dibromochloromethane.	75-27-4	Methane, bromodichloro-	8010	1
			8021	0.2
			8260	5

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
Bromoform; Tribromomethane	75–25–2	Methane, tribromo-	8010	2
			8021	15
			8260	5
4-Bromophenyl phenyl ether	101–55–3	Benzene, 1-bromo-4-phenoxy-	8110	25
			8270	10
Butyl benzyl phthalate; Benzyl butyl phthalate.	85–68–7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester.	8060	5
			8270	10
Cadmium	(Total)	Cadmium	6010	40
			7130	50
			7131	1
Carbon disulfide	75–15–0	Carbon disulfide	8260	100
Carbon tetrachloride	56–23–5	Methane, tetrachloro-	8010	1
			8021	0.1
			8260	10
Chlordane	See Note 8	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	8080	0.1
			8270	50
p-Chloroaniline	106–47–8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108–90–7	Benzene, chloro-	8010	2
			8020	2
			8021	0.1
			8260	5
Chlorobenzilate	510–15–6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	8270	10
p-Chloro-m-cresol; 4-Chloro-3-methylphenol.	59–50–7	Phenol, 4-chloro-3-methyl-	8040	5
			8270	20
Chloroethane; Ethyl chloride	75–00–3	Ethane, chloro-	8010	5
			8021	1
			8260	10
Chloroform; Trichloromethane	67–66–3	Methane, trichloro-	8010	0.5
			8021	0.2
			8260	5
2-Chloronaphthalene	91–58–7	Naphthalene, 2-chloro-	8120	10
			8270	10
2-Chlorophenol	95–57–8	Phenol, 2-chloro-	8040	5
			8270	10
4-Chlorophenyl phenyl ether	7005–72–3	Benzene, 1-chloro-4-phenoxy-	8110	40
			8270	10
Chloroprene	126–99–8	1,3-Butadiene, 2-chloro-	8010	50
			8260	20
Chromium	(Total)	Chromium	6010	70
			7190	500
			7191	10
Chrysene	218–01–9	Chrysene	8100	200
			8270	10
Cobalt	(Total)	Cobalt	6010	70
			7200	500
			7201	10
Copper	(Total)	Copper	6010	60
			7210	200
			7211	10
m-Cresol; 3-methylphenol	108–39–4	Phenol, 3-methyl-	8270	10
o-Cresol; 2-methylphenol	95–48–7	Phenol, 2-methyl-	8270	10
p-Cresol; 4-methylphenol	106–44–5	Phenol, 4-methyl-	8270	10
Cyanide	57–12–5	Cyanide	9010	200
2,4-D; 2,4-Dichlorophenoxyacetic acid	94–75–7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4'-DDD	72–54–8	Benzene 1,1'-(2,2-dichloroethylidene)bis[4-chloro-.	8080	0.1
			8270	10
4,4'-DDE	72–55–9	Benzene, 1,1'-(dichloroethylenylidene)bis[4-chloro-.	8080	0.05
			8270	10
4,4'-DDT	50–29–3	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-.	8080	0.1
			8270	10
Diallate	2303–16–4	Carbamothioic acid, bis(1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester.	8270	10
Dibenz[a,h]anthracene	53–70–3	Dibenz[a,h]anthracene	8100	200
			8270	10
Dibenzofuran	132–64–9	Dibenzofuran	8270	10
Dibromochloromethane; Chlorodibromomethane.	124–48–1	Methane, dibromochloro-	8010	1
			8021	0.3
			8260	5

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibrome-3-chloro-	8011	0.1
			8021	30
			8260	25
1,2-Dibromoethane; Ethylene dibromide; EDB.	106-93-4	Ethane, 1,2-dibromo-	8011	0.1
			8021	10
			8260	5
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester.	8060	5
			8270	10
o-Dichlorobenzene; 1,2-Dichlorobenzene.	95-50-1	Benzene, 1,2-dichloro-	8010	2
			8020	5
			8021	0.5
			8120	10
			8260	5
			8270	10
m-Dichlorobenzene; 1,3-Dichlorobenzene.	541-73-1	Benzene, 1,3-Dichloro-	8010	5
			8020	5
			8021	0.2
			8120	10
			8260	5
			8270	10
p-Dichlorobenzene; 1,4-Dichlorobenzene.	106-46-7	Benzene, 1,4-dichloro-	8010	2
			8020	5
			8021	0.1
			8120	15
			8260	5
			8270	10
3,3[1]-Dichlorobenzidine	91-94-1	[1,1[1]-Biphenyl]-4,4[1]-diamine, 3,3[1]-dichloro-.	8270	20
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8260	100
Dichlorodifluoromethane; CFC 12;	75-71-8	Methane, dichlorodifluoro-	8021	0.5
			8260	5
1,1-Dichloroethane; Ethylidene chloride.	75-34-3	Ethane, 1,1-dichloro-	8010	1
			8021	0.5
			8260	5
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,1-dichloro-	8010	0.5
			8021	0.3
			8260	5
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.	75-35-4	Ethene, 1,1-dichloro-	8010	1
			8021	0.5
			8260	5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene.	156-59-2	Ethene, 1,2-dichloro-, (Z)-	8021	0.2
			8260	5
trans-1,2-Dichloroethylene trans-1,2-Dichloroethene.	156-60-5	Ethene, 1,2-dichloro-, (E)-	8010	1
			8021	0.5
			8260	5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8040	5
			8270	10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane; Propylene dichloride.	78-87-5	Propane, 1,2-dichloro-	8010	0.5
			8021	0.05
			8260	5
1,3-Dichloropropane; Trimethylene dichloride.	142-28-9	Propane, 1,3-dichloro-	8021	0.3
			8260	5
2,2-Dichloropropane; Isopropylidene chloride.	594-20-7	Propane, 2,2-dichloro-	8021	0.5
			8260	15
1,1-Dichloropropene	563-58-6	1-Propene, 1,1-dichloro-	8021	0.2
			8260	5
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8010	20
			8260	10
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8010	5
			8260	10
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β,7aα)-.	8080	0.05
			8270	10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester.	8060	5
			8270	10
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin.	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester.	8141	5
			8270	20
Dimethoate	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S-[2-(methylamino)-2-oxoethyl] ester.	8141	3
			8270	20

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-.	8270	10
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270	10
3,3'-Dimethylbenzidine	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-.	8270	10
2,4-Dimethylphenol; m-Xylenol	105-67-9	Phenol, 2,4-dimethyl-	8040 8270	5 10
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester.	8060 8270	5 10
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-	8270	20
4,6-Dinitro-o-cresol 4,6-Dinitro-2-methylphenol.	534-52-1	Phenol, 2-methyl-4,6-dinitro	8040 8270	150 50
2,4-Dinitrophenol;	51-28-5	Phenol, 2,4-dinitro-	8040 8270	150 50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090 8270	0.2 10 ...
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090 8270	0.1 10 ...
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol.	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150 8270	1 20
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester.	8060 8270	30 10
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298-04-4	Phosphorodithioic acid, 0,0-diethyl S-[2-(ethylthio)ethyl] ester.	8140 8141 8270	2 0.5 10 ...
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,	8080 8270	0.1 20 ...
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aα,6β,9β,9aα)-.	8080 8270	0.05 20 ...
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-,3-3-dioxide.	8060 8270	0.5 10 ...
Endrin	72-20-8	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-, (1aα, 2β,2aβ,3α,6α,6aβ,7β,7aα)-.	8080 8270	0.1 20 ...
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4β,4aβ,5β,6aβ,6bβ,7R*)-.	8080 8270	0.2 10 ...
Ethylbenzene	100-41-4	Benzene, ethyl-	8020 8221 8260	2 0.05 5 .....
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester	8015 8260 8270	5 10 10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270	20
Famphur	52-85-7	Phosphorothioic acid, 0-[4-[(dimethylamino)sulfonyl]phenyl] 0,0-dimethyl ester.	8270	20
Fluoranthene	206-44-0	Fluoranthene	8100 8270	200 10
Fluorene	86-73-7	9H-Fluorene	8100 8270	200 10
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	8080 8270	0.05 10 ...
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1aα, 1bβ, 2α, 5α, 5aβ, 6β, 6aα).	8080 8270	1 10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120 8270	0.5 10 ...
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	8021 8120 8260 8270	0.5 5 ..... 10 ... 10 ...

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µg/L)[6]
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-.	8120	5
			8270	10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120	0.5
			8260	10
			8270	10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270	10
2-Hexanone; Methyl butyl ketone	591-78-6	2-Hexanone	8260	50
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno(1,2,3-cd)pyrene	8100	200
			8270	10
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-	8015	50
			8240	100
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a hexahydro-(1α,4α,4aβ,5β,8β,8aβ)-.	8270	20
			8260	10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-	8090	60
			8270	10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	8270	20
Lead	(Total)	Lead	6010	400
			7420	1000
			7421	10
Mercury	(Total)	Mercury	7470	2
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8015	5
			8260	100
Methapyrilene	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N1/2-thienylmethyl)-.	8270	100
Methoxychlor	72-43-5	Benzene,1,1'-(2,2,2,trichloroethylidene)bis[4-methoxy-.	8080	2
			8270	10
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-	8010	20
			8021	10
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8010	1
			8021	0.3
3-Methylcholanthrene	56-49-5	Benz[j]acenanthrylene, 1,2-dihydro-3-methyl-.	8270	10
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3	2-Butanone	8015	10
			8260	100
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-	8010	40
			8260	10
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester.	8015	2
			8260	30
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8270	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270	10
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, 0,0-dimethyl	8140	0.5
			8141	1
			8270	10
4-Methyl-2-pentanone; Methyl isobutyl ketone.	108-10-1	2-Pentanone, 4-methyl-	8015	5
			8260	100
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-	8010	15
			8021	20
			8260	10
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	8010	5
			8021	0.2
			8260	10
Naphthalene	91-20-3	Naphthalene	8021	0.5
			8100	200
			8260	5
			8270	10
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	6010	150
			7520	400
o-Nitroaniline; 2-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline; 3-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline; 4-Nitroaniline	100-01-6	Benzenamine, 4-nitro	8270	20
Nitrobenzene	98-95-3	Benzene, nitro-	8090	40
			8270	10

Common Name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µ g/L)[6]
o-Nitrophenol; 2-Nitrophenol	88-75-5	Phenol, 2-nitro-	8040	5
			8270	10
p-Nitrophenol; 4-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040	10
			8270	50
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	20
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8070	2
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8070	5
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-propyl-	8070	10
N-Nitrosomethylethalamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	20
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	40
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester.	8141	0.5
			8270	10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270	20
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040	5
			8270	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenl)	8270	20
Phenanthrene	85-01-8	Phenanthrene	8100	200
			8270	10
Phenol	108-95-2	Phenol	8040	1
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10
Phorate	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl] ester.	8140	2
			8141	0.5
			8270	10
Polychlorinated biphenyls; PCBs; Aroclors.	See Note 9	1,1'-Biphenyl, chloro derivatives	8080	50
			8270	200
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-.	8270	10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015	60
			8260	150
Pyrene	129-00-0	Pyrene	8100	200
			8270	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-	8270	10
Selenium	(Total)	Selenium	6010	750
			7740	20
			7741	20
Silver	(Total)	Silver	6010	70
			7760	100
			7761	10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-.	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020	1
			8021	0.1
			8260	10
Sulfide	18496-25-8	Sulfide	9030	4000
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid.	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-	8150	2
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010	5
			8021	0.05
			8260	5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8010	0.5
			8021	0.1
			8260	5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene.	127-18-4	Ethene, tetrachloro-	8010	0.5
			8021	0.5
			8260	5
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10
Thallium	(Total)	Thallium	6010	400
			7840	1000
			7841	10
Tin	(Total)	Tin	6010	40
Toluene	108-88-3	Benzene, methyl-	8020	2
			8021	0.1
			8260	5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	See Note 10	Toxaphene	8080	2

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µ g/L) [6]
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	8021	0.3
			8120	0.5
			8260	10
			8270	10
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8010	0.3
			8021	0.3
			8260	5
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8010	0.2
			8260	5
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	8010	1
			8021	0.2
			8260	5
Trichlorofluoromethane; CFC-11	75-69-4	Methane, trichlorofluoro-	8010	10
			8021	0.3
			8260	5
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	8270	10
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	8040	5
			8270	10
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8010	10
			8021	5
			8260	15
0,0,0-Triethyl phosphorothioate	126-68-1	*Phosphorothioic acid, 0,0,0-triethylester*	8270	10
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	8270	10
Vanadium	(Total)	Vanadium	6010	80
			7910	2000
			7911	40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8260	50
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-	8010	2
			8021	0.4
			8260	10
Xylene (total)	See Note 11	Benzene, dimethyl-	8020	5
			8021	0.2
			8260	5
Zinc	(Total)	Zinc	6010	20
			7950	50
			7951	0.5

Notes

[1] *The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for* informational purposes only. See also footnotes 5 and 6.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

[4] CAS Index are those used in the 9th Collective Index.

[5] Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste", third edition, November 1986, as revised, December 1987. Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW-846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.

[6] Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[7] This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2'-oxybis[2-chloro- (CAS RN 39638-32-9).

[8] Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and *constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for* technical chlordane. PQLs of specific isomers are about 20 µg/L by method 8270.

[9] Polychlorinated biphenyls (CAS RN 1336-36-3): this category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

[10] Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.

[11] Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

PART 259 [Reserved]

R315. Environmental Quality, Solid and Hazardous Waste.
R315-308. Ground Water Monitoring Requirements.
R315-308-1. Applicability.

(1) Each existing landfill, pile, or landtreatment disposal facility that is required to perform ground water monitoring shall comply with the ground water monitoring requirements according to the compliance schedule as established by the Executive Secretary during the permitting or the permit renewal process.

(2) Each new landfill, pile, or landtreatment disposal facility that is required to perform ground water monitoring shall have the ground water monitoring system complete and operational before waste may be accepted at the facility.

(3) Ground water monitoring requirements may be waived by the Executive Secretary if the owner or operator of a solid waste disposal facility can demonstrate that there is no potential for migration of hazardous constituents from the facility to the ground water during the active life of the facility and the post-closure care period. This demonstration must be certified by a qualified ground-water scientist and approved by the Executive Secretary, and must be based upon:

(a) site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport; and

(b) contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and the environment.

(4) Once a ground water monitoring system and program has been established at a disposal facility, ground water monitoring shall continue to be conducted throughout the active life, closure, and post-closure care periods as specified by the Executive Secretary.

R315-308-2. Ground Water Monitoring Requirements.

(1) The ground water monitoring system must consist of at least one background or upgradient well and two downgradient wells, installed at appropriate locations and depths to yield ground water samples from the uppermost aquifer and all hydraulically connected aquifers below the facility, cell, or unit. The downgradient wells shall be designated as the point of compliance and must be installed at the closest practicable distance hydraulically down gradient from the unit boundary not to exceed 150 meters (500 feet) and must also be on the property of the owner or operator:

(a) the upgradient well must represent the quality of background water that has not been affected by leakage from the active area; and

(b) the downgradient wells must represent the quality of ground water passing the point of compliance. Additional wells may be required by the Executive Secretary in complicated hydrogeological settings or to define the extent of contamination detected.

(2) All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must allow collection of representative ground water

samples. Wells must be constructed in such a manner as to prevent contamination of the samples, the sampled strata, and between aquifers and water bearing strata. All monitoring wells and all other devices and equipment used in the monitoring program must be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

(3) The ground water monitoring program must include at a minimum, procedures and techniques for:

(a) well construction and completion;

(b) decontamination of drilling and sampling equipment;

(c) sample collection;

(d) sample preservation and shipment;

(e) analytical procedures and quality assurance;

(f) chain of custody control or sample tracking, as approved by the Executive Secretary; and

(g) procedures to ensure employee health and safety during well installation and monitoring.

(4) Each facility shall utilize a laboratory, that is certified by the state for the test methods used, to complete tests, using methods with appropriate detection levels, on samples for the following:

(a) during the first year of facility operation after wells are installed or an alternative schedule as approved by the Executive Secretary, a minimum of eight independent samples from the upgradient and four independent samples from each downgradient well for all parameters listed in Section R315-308-4 to establish background concentrations;

(b) after background levels have been established, a minimum of one sample, semiannually, from each well, background and downgradient, for all parameters listed in Section R315-308-4 as a detection monitoring program;

(i) In the detection monitoring program, the owner or operator must determine ground water quality at each monitoring well on a semiannual basis during the life of an active area, including the closure period, and the post-closure care period.

(ii) The owner or operator must express the ground water quality at each monitoring well in a form appropriate for the determination of statistically significant changes;

(c) field measured pH, water temperature, and water conductivity must accompany each sample collected;

(d) analysis for the heavy metals and the organic constituents from Section R315-308-4 shall be completed on unfiltered samples; and

(e) the Executive Secretary may specify additional or fewer constituents depending upon the nature of the ground water or the waste on a site specific basis considering:

(i) the types, quantities, and concentrations of constituents in wastes managed at the landfill;

(ii) the mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the landfill;

(iii) the detectability of indicator parameters, waste constituents, and reaction products in the ground water; and

(iv) the background concentration or values and coefficients of variation of monitoring parameters or constituents in the ground water.

(f) The following information shall be placed in the facility's operating record and a copy submitted to the Executive Secretary as the ground water monitoring results to be included in the annual report required by Subsection R315-302-2(4)(e):

(i) a report on the procedures, including the quality control/quality assurance, followed during the collection of the ground water samples;

(ii) the results of the field measured parameters required by Subsections R315-308-2(4)(c) and R315-308-2(6);

(iii) a report of the chain of custody and quality control/quality assurance procedures of the laboratory;

(iv) the results of the laboratory analysis of the constituents specified in Section R315-308-4 or an alternative list of constituents approved by the Executive Secretary:

(A) the results of the laboratory analysis shall list the constituents by name and CAS number; and

(B) a list of the detection limits and the test methods used; and

(v) the statistical analysis of the results of the ground water monitoring as required by Subsection R315-308-2(7).

(vi) The results of the ground water monitoring may be submitted in electronic format.

(5) After background constituent levels have been established, a ground water quality protection standard shall be set by the Executive Secretary which shall become part of the ground water monitoring plan. The ground water quality protection standard will be set as follows.

(a) For constituents with background levels below the standards listed in Section R315-308-4 or as listed in Section R315-308-5, which presents the ground water protection standards that are available for the constituents listed as Appendix II in 40 CFR 258, the ground water quality standards of Sections R315-308-4 and R315-308-5 shall be the ground water quality protection standard.

(b) If a constituent is detected and a background level is established but the ground water quality standard for the constituent is not included in Section R315-308-4 or Section R315-308-5 or the constituent has a background level that is higher than the value listed in Section R315-308-4 or Section R315-308-5 for that constituent, the ground water quality protection standard for that constituent shall be set according to health risk standards.

(6) The ground water monitoring program must include a determination of the ground water surface elevation each time ground water is sampled.

(7) The owner or operator shall use a statistical method for determining whether a significant change has occurred as compared to background. The Executive Secretary will approve such a method as part of the ground water monitoring plan. Possible statistical methods include:

(a) a parametric analysis of variance (ANOVA) followed by

multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent;

(b) an analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent;

(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 compliance well is compared to the upper tolerance or prediction limit;

(d) a control chart approach that gives control limits for each constituent; or

(e) another statistical test method approved by the Executive Secretary.

(8) For both detection monitoring, as described in Subsection R315-308-2(4), and assessment monitoring, as described in Subsection R315-308-2(11), the Executive Secretary may specify additional or fewer sampling and analysis events, no less than annually, depending upon the nature of the ground water or the waste on a site specific basis considering:

(a) lithology of the aquifer and unsaturated zone;

(b) hydraulic conductivity of the aquifer and unsaturated zone;

(c) ground water flow rates;

(d) minimum distance between upgradient edge of the landfill unit and downgradient monitoring well screen (minimum distance of travel); and

(e) resource value of the aquifer.

(9) The owner or operator must determine and report the ground water flow rate and direction in the upper most aquifer each time the ground water is sampled.

(10) If the owner or operator determines that there is a statistically significant increase over background in any parameter or constituent at any monitoring well at the compliance point, the owner or operator must:

(a) within 14 days of the completion of the statistical analysis of the sample results and within 30 days of the receipt of the sample results, enter the information in the operating record and notify the Executive Secretary of this finding in writing. The notification must indicate what parameters or constituents have shown statistically significant changes; and

(b) immediately resample the ground water in all monitoring wells, both background and downgradient, or in a subset of wells specified by the Executive Secretary, and determine:

(i) the concentration of all constituents listed in Section R315-308-4, including additional constituents that may have been identified in the approved ground water monitoring plan;

(ii) if there is a statistically significant increase over

background of any parameter or constituent in any monitoring well at the compliance point; and

(iii) notify the Executive Secretary in writing within seven days of the completion of the statistical analysis of the sample results.

(c) The owner or operator may demonstrate that a source other than the solid waste disposal facility caused the contamination or that the statistically significant change resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground-water scientist and approved by the Executive Secretary and entered in the operating record. If a successful demonstration is made and documented, the owner or operator may continue monitoring as specified in Subsection R315-308-2(4)(b).

(11) If, after 90 days, a successful demonstration as stipulated in Subsection R315-308-2(10)(c) is not made, the owner or operator must initiate the assessment monitoring program required as follows:

(a) within 14 days of the determination that a successful demonstration is not made, take one sample from each downgradient well and analyze for all constituents listed as Appendix II in 40 CFR Part 258, 2001 ed., which is adopted and incorporated by reference.

(b) for any constituent detected from Appendix II, 40 CFR Part 258, in the downgradient wells a minimum of four independent samples from the upgradient and four independent samples from each downgradient well must be collected, analyzed, and statistically evaluated to establish background concentration levels for the constituents; and

(c) within 14 days of the completion of the statistical analysis of the sample results and within 30 days of the receipt of the sample results, place a notice in the operation record and notify the Executive Secretary in writing identifying the Appendix II, 40 CFR Part 258, constituents and their concentrations that have been detected as well as background levels. The Executive Secretary shall establish a ground water quality protection standard pursuant to Subsection R315-308-2(5) for any Appendix II, 40 CFR Part 258, constituent detected in the downgradient wells.

(d) The owner or operator shall thereafter resample:

(i) at a minimum, all downgradient wells on a quarterly basis for all constituents in Section R315-308-4, or the alternative list that may have been approved as part of the permit, and for those constituents detected from Appendix II, 40 CFR Part 258;

(ii) the downgradient wells on an annual basis for all constituents in Appendix II, 40 CFR Part 258; and

(iii) statistically analyze the results of all ground water monitoring samples.

(e) The Executive Secretary may specify additional or fewer constituents depending upon the nature of the ground water or the waste on a site specific basis considering:

(i) the types, quantities, and concentrations of constituents in wastes managed at the landfill;

(ii) the mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the landfill;

(iii) the detectability of indicator parameters, waste constituents, and reaction products in the ground water; and

(iv) the background concentration or values and coefficients of variation of monitoring parameters or constituents in the ground water.

(f) If after two consecutive sampling events, the concentrations of all constituents being analyzed in Subsection R315-308-2(11)(d)(i) are shown to be at or below established background values, the owner or operator must notify the Executive Secretary of this finding and may, upon the approval of the Executive Secretary, return to the monitoring schedule and constituents as specified in Subsection R315-308-2(4)(b).

(12) If one or more constituents from Section R315-308-4 or the approved alternative list, or from those detected from Appendix II, 40 CFR Part 258, are detected at statistically significant levels above the ground water quality protection standard as established pursuant to Subsection R315-308-2(5) in any sampling event, the owner or operator must:

(a) within 14 days of the receipt of this finding, place a notice in the operating record identifying the constituents and concentrations that have exceeded the ground water quality standard. Within the same time period, the owner or operator must also notify the Executive Secretary and all appropriate local governmental and local health officials that the ground water quality standard has been exceeded;

(b) characterize the nature and extent of the release by installing additional monitoring wells as necessary;

(c) install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well and analyze the sample for the constituents in Section R315-308-4 or the approved alternative list and the detected constituents from Appendix II, 40 CFR Part 258; and

(d) notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site as indicated by sampling of wells in accordance with Subsections R315-308-2(12)(b) and (12)(c).

(e) The owner or operator may demonstrate that a source other than the solid waste disposal facility caused the contamination or that the statistically significant change resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground water quality. A report documenting this demonstration must be certified by a qualified ground-water scientist and approved by the Executive Secretary and entered in the operating record. If a successful demonstration is made, documented and approved, the owner or operator may continue monitoring as specified in Subsection R315-308-2(11)(d) or Subsection R315-308-2(11)(e) when applicable.

R315-308-4. Constituents for Detection Monitoring.

The table lists the constituents for detection monitoring as

specified by Subsection R315-308-2(4), the CAS number for the constituents, and the ground water quality standard for the constituents for any facility that is required to monitor ground water under Rule R315-308.

TABLE

Constituents for Detection Monitoring

Inorganic Constituents	CAS	Ground Water Protection Standard (mg/l)
Ammonia (as N)	7664-41-7	
Carbonate/Bicarbonate		
Calcium		
Chemical Oxygen Demand (COD)		
Chloride		
Iron	7439-89-6	
Magnesium		
Manganese	7439-96-5	
Nitrate (as N		
pH		
Potassium		
Sodium		
Sulfate		
Total Dissolved Solids (TDS)		
Total Organic Carbon (TOC)		
Heavy Metals		
Antimony	7440-36-0	0.006
Arsenic	7440-38-2	0.05
Barium	7440-39-3	2
Beryllium	7440-41-7	0.004
Cadmium	7440-43-9	0.005
Chromium		0.1
Cobalt	7440-48-4	2
Copper	7440-50-8	1.3
Lead		0.015
Mercury	7439-97-6	0.002
Nickel	7440-02-0	0.1
Selenium	7782-49-2	0.05
Silver	7440-22-4	0.1
Thallium		0.002
Vanadium	7440-62-2	0.3
Zinc	7440-66-6	5
Organic Constituents		
Acetone	67-64-1	4
Acrylonitrile	107-13-1	0.1
Benzene	71-43-2	0.005
Bromochloromethane	74-97-5	0.01
Bromodichloromethane[1]	75-27-4	0.1
Bromoform[1]	75-25-2	0.1

Carbon disulfide	75-15-0	4
Carbon tetrachloride	56-23-5	0.005
Chlorobenzene	108-90-7	0.1
Chloroethane	75-00-3	15
Chloroform[1]	67-66-3	0.1
Dibromochloromethane[1]	124-48-1	0.1
1,2-Dibromo-3-chloropropane	96-12-8	0.0002
1,2-Dibromoethane	106-93-4	0.00005
1,2-Dichlorobenzene (ortho)	95-50-1	0.6
1,4-Dichlorobenzene (para)	106-46-7	0.075
trans-1,4-Dichloro-2-butene	110-57-6	
1,1-Dichloroethane	75-34-3	4
1,2-Dichloroethane	107-06-2	0.005
1,1-Dichloroethylene	75-35-4	0.007
cis-1,2-Dichloroethylene	156-59-2	0.07
trans-1,2-Dichloroethylene	156-60-5	0.1
1,2-Dichloropropane	78-87-5	0.005
cis-1,3-Dichloropropene	10061-01-5	0.002
trans-1,3-Dichloropropene	10061-02-6	0.002
Ethylbenzene	100-41-4	0.7
2-Hexanone	591-78-6	1.5
Methyl bromide	74-83-9	0.01
Methyl chloride	74-87-3	0.003
Methylene bromide	74-95-3	0.4
Methylene chloride	75-09-2	0.005
Methyl ethyl ketone	78-93-3	0.17
Methyl iodide	74-88-4	
4-Methyl-2-pentanone	108-10-1	3
Styrene	100-42-5	0.1
1,1,1,2-Tetrachloroethane	630-20-6	0.07
1,1,2,2-Tetrachloroethane	79-34-5	0.005
Tetrachloroethylene	127-18-4	0.005
Toluene	108-88-3	1
1,1,1-Trichloroethane	71-55-6	0.2
1,1,2-Trichloroethane	79-00-5	0.005
Trichloroethylene	79-01-6	0.005
Trichlorofluoromethane	75-69-4	10
1,2,3-Trichloropropane	96-18-4	0.04
Vinyl acetate	108-05-4	37
Vinyl Chloride	75-01-4	0.002
Xylenes	1330-20-7	10

[1] The ground water protection standard of 0.1 mg/l is for the total of Bromodichloromethane, Bromoform, Chloroform, and Dibromochloromethane.

R315-5. Solid Waste Ground Water Quality Protection Standards for 40 CFR 258 Appendix II Constituents.

The table lists the CAS number for each constituent and the ground water quality protection standards which are currently available for the 40 CFR 258 Appendix II constituents required for assessment monitoring of ground water at a solid waste facility as specified by Subsection R315-308-2(11).

TABLE

Appendix II Protection Standards

Appendix II Constituent	CAS	Ground Water Protection Standard (mg/l)
2,4-D	94-75-7	0.07
2,4,5-T	93-76-5	36.5
2,4,5-TP	93-72-1	0.05
Benzo[a]pyrene	50-32-8	0.0002
bis(2-Ethylhexy)phthalate	117-81-7	0.006
Chlordane	57-74-9	0.002
Cyanide	57-12-5	0.2
Dinoseb	88-85-7	0.007
Endrin	72-20-8	0.002
Heptachlor	76-44-8	0.0004
Heptachlor epoxide	1024-57-3	0.0002
Hexachlorobenzene	118-74-1	0.001
Hexachlorocyclopentadiene	77-47-4	0.05
Lindane	58-89-9	0.0002
Methoxychlor	72-43-5	0.04
Pentachlorophenol	87-86-5	0.001
Polychlorinated biphenyls(PCBs)	1336-36-3	0.0005
Tin	7440-31-5	21.9
Toxaphene	8001-35-2	0.003
1,2,4-Trichlorobenzene	120-82-1	0.07

KEY: solid waste management, waste disposal
June 15, 2002 **19-6-105**
Notice of Continuation April 20, 1998 **40 CFR 258**

ATTACHMENT A-2

Field Forms

Payson City Landfill
Monitoring Well Sampling Log

General Information

Well Identification: _____
Sampler: _____
Date Sampled: _____
Climate: _____
Ambient Temperature: _____

Well Evacuation

Purge Method: _____
Purge Rate: * _____
Time Start Purge: _____
Time End Purge: _____
Total Volume Purged: _____

Sampling Information

Sampling Rate: * _____
Time Start Sampling: _____
Time End Sampling: _____
QA/QC Sampling: _____

Well Condition / Remarks:

_____
_____
_____

Purge Measurements

Parameter	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6
Time						
Temperature (°C)						
Conductivity (mS/cm)						
Turbidity (NTU)						
pH						

Parameter	Reading 7	Reading 8	Reading 9	Reading 10	Reading 11	Reading 12
Time						
Temperature (°C)						
Conductivity (mS/cm)						
Turbidity (NTU)						
pH						

Stabilization

Turbidity: +/- 10% or < 5 NTU
pH: +/- 0.2
Temperature: +/- 1 °C
Conductivity: +/- 10 %

* Standard maximum purge and sampling rate = 0.3 liters per minute

Payson City Landfill
Static Water Level Log

Date: _____

Well ID	Time	Depth to Water	Total Depth	Comments
MW-1				
MW-2				
MW-3				
MW-4				
MW-5				
MW-6				

Payson City Landfill
Equipment Calibration Log

Event: _____
Date: _____
Time: _____
Personnel: _____
Weather: _____
Temperature: _____
Humidity: _____

Instrument (√):
DO Meter _____
OVM/OVA _____
Explosimeter _____
pH Meter _____
HNU _____
Hydrolab _____
Conductivity _____
Turbidity _____
Eh meter _____
Other _____

CALIBRATION AND CONTINUING CALIBRATION LOG

Date	Time	Calibration Standard	Calibration Standard Expiration Date	Calibration Standard Concentration	Meter Reading	Observations/Comments

ATTACHMENT A-3

Pre-Field Work and Equipment Checklists

Payson City Landfill
Pre-Field Work Procedures Checklist

LOGISTICS

___ Arrange for site access with Payson City Landfill
___ Locate the nearest Fedex drop off spot

LABORATORY ARRANGEMENTS

___ Make sure you have sufficient numbers, types, and volumes of sample containers – **get extras!** Remember QA/QC sample containers and trip blanks.
___ Discuss sample preservation, holding time, shipping requirements, and QA/QC expectations with the laboratory.
___ Inform the laboratory of the date and number of samples you will send.
___ Familiarize yourself with chain of custody or other sample tracking procedures.

SITE HISTORY

___ Review past water quality data or sampling and analysis plan (SAP) to determine the well sampling order.

EQUIPMENT AND FIELD PREPARATION

___ Review the ground water monitoring plan
___ Organize equipment (Equipment Checklist).
___ Check that equipment is in good working condition:
___ Test and recharge/replace batteries as necessary.
___ Test the equipment with tap water or calibration standards.
___ Inspect the equipment for defects, loose bolts, frayed wiring, etc.
___ Check the instruments' ability to calibrate and function properly.
___ Check that all equipment is properly decontaminated and stored for transport.
___ Prepare field forms for sampling

Payson City Landfill
Equipment Checklist

GENERAL AND LOGISTICS
___ Permission from the City of Payson
___ Site access
___ Contact names, addresses and phone numbers
___ Site map showing well locations, keys for well locks
___ Calculator and/or purge volume conversion tables

DOCUMENTATION AND REFERENCE MATERIAL S
___ A copy of this ground water sampling plan
___ Field forms
___ Well and boring logs
___ Field note book and waterproof pens
___ Clipboard with waterproof cover
___ Chain of custody forms or other sample tracking forms
___ Camera and film

PURGING AND SAMPLING EQUIPMENT
___ Purging pump or bailer and accessories (inert material)
___ Sampling pump or bailer and accessories (inert material)
___ Sample tubing
___ Generator
___ Calibrated buckets or similar device for purge water
___ Waterproof grease markers or pens (Sharpies™ are a potential source of VOCs)
___ Sample containers (provided by lab) - **bring extra,** and water proof labels/tags
___ QA/QC sample bottles (VOC trip blanks filled by lab)
___ Sample transfer containers and wide mouth funnel
___ Filtering apparatus and all accessories
___ Filter membranes (0.45 micron) and pre-filters, or
___ Disposable in-line filters

FIELD MEASUREMENTS AND EQUIPMENT
___ Water level measuring instrument (0.01 foot increments) and backup device
___ Thermometer or temperature instrument
___ Field parameter meter
___ pH buffer solutions (pH 4, 7 and 10) and beakers
___ All meters fully charged and operational; spare batteries
___ Closed flow through cell
___ Squirt bottles filled with reagent grade water

DECONTAMINATION EQUIPMENT
___ Non-phosphate cleaner and scrub brushes
___ Wash and rinse tubs or buckets and wastewater containers
___ Laboratory reagent grade water (two gallons/well usually sufficient)
___ Clean containers to transport equipment

SAMPLE PRESERVATION AND SHIPPING

___ Sample preservatives, transfer pipettes and pH paper
___ Coolers sufficiently large to hold all samples, including QA/QC samples
___ Crushed or cubed ice (frozen cold packs discouraged, need temp. blank)
___ Bubble wrap, Ziplock™ bags or equivalent to protect sample containers
___ Strapping tape, postage, Fedex or UPS shipping labels, COC forms, etc.,

TOOLS AND MISCELLANEOUS

___ Extra locks, keys for wells, flashlight, rain gear, etc.
___ Propane torch for frozen locks and bolt cutters for corroded locks
___ Adjustable wrench, screw drivers, hammer, scissors, knife, duct tape, etc.
___ Plastic garbage bags for contaminated waste
___ Bailer retrieval device (e.g., weighted hook)
___ Drum bung wrench and racket socket set (typ. 15/16" socket for 55 gallon drums)

PERSONAL PROTECTIVE EQUIPMENT

___ Respirators and cartridges (compatible for contaminants)
___ Safety glasses and/or splash shield
___ Inner and outer gloves (compatible for contaminants)
___ Hard hat and steel toed boots
___ First aid kit and eye wash kit

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

QUALITY ASSURANCE PROJECT PLAN

April 2003

Prepared by

URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107

TABLE OF CONTENTS

1.0 DATA COLLECTION OBJECTIVES 1

2.0 DATA QUALITY OBJECTIVES 2

3.0 DATA QUALITY INDICATORS 3
- 3.1 Precision 3
- 3.2 Accuracy 3
- 3.3 Representativeness 4
- 3.4 Completeness 4
- 3.5 Comparability 4
- 3.6 Sensitivity 4

4.0 PROJECT OVERSIGHT AND CORRECTIVE ACTION 5

5.0 DATA EVALUATION 6

6.0 PROJECT RECORDS AND REPORTS 7

LIST OF TABLES

Table B-1 – Data Quality Assurance Objectives in Terms of Data Quality Indicators
Table B-2 – Data Validation and Verification Methods

1.0 DATA COLLECTION OBJECTIVES

The ground water monitoring program at the Payson City Landfill will include sampling and analysis of ground water from monitoring wells, and measurement of static water levels in monitoring wells at the Landfill. The ground water elevations measured during each sampling round will be used to plot potentiometric surface maps of the area, which will be used to assess the ground water flow direction and hydraulic gradient in the vicinity of the Landfill. All analytical data will be validated, processed, analyzed, and included in quarterly reports to UDEQ.

2.0 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative statements that clarify project objectives, define the appropriate data to collect, determine the most appropriate conditions for data collection and specify tolerable levels of potential decision error. The DQOs for this program are to ensure that data collected will be of sufficient quality and quantity to monitor ground water conditions at the Landfill, in accordance with regulatory requirements.

Data quality will be assessed according to data quality indicators discussed in Section 3.0. Corrective actions may be taken if data quality objectives are not met. The nature of the action will depend upon circumstances unique to each situation and may include: reanalyzing the samples (if holding time criteria are not exceeded); resampling and reanalyzing particular samples; evaluating and amending sampling and analytical procedures; and accepting the data with an acknowledgement of the level of uncertainty.

3.0 DATA QUALITY INDICATORS

To adequately support the data quality objectives, specific measurement ranges or acceptance criteria are established for each of the following five data quality indicators (DQIs): precision, accuracy, representativeness, completeness and comparability. Sensitivity will also be measured as part of the QA/QC program. The following discussion describes the qualitative or quantitative application of each DQI and identifies the method by which each will be applied to the data collection, analysis and QA/QC program. Table B-1 includes a summary of the application of the DQIs to the QA/QC objectives of the SAP.

3.1 Precision

Precision is a measure of mutual agreement among replicate (or between duplicate) sample measurements of the same analyte. The closer the numerical values of the measurements are to each other, the more precise the measurement. Precision will be evaluated by calculating the relative percent difference (RPD) for each analytical parameter tested as follows:

$$\text{RPD} = \frac{\text{difference between the two measured values}}{\text{average of the two measured values}} * 100 .$$

The QC program for addressing precision includes obtaining a field duplicate sample during each sampling round and calculating RPDs. QA/QC goals are listed in Table B-1. Laboratory precision will be maintained through routine instrument checks to demonstrate that operating characteristics are within predetermined limits.

3.2 Accuracy

Accuracy is a measure of bias in a measurement system, as a percent. The closer the value of the measurement agrees with the true value, the more accurate the measurement. Quality assurance data from internal laboratory spikes and control samples will be examined to determine analytical accuracy. The number and frequency of the internal quality control sampling is outlined in the laboratory's QA/QC Plan; the quality assurance protocols of the selected laboratory are adopted as part of this plan. Accuracy will be expressed as the percent recovery of an analyte from a surrogate sample and from the analysis of a standard reference sample compared to actual analyte concentrations.

3.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. The design of and rationale for the sampling program ensure that environmental conditions have been adequately represented. Measures that will be used to establish representativeness include: implementation of standard operating procedures, adherence to sample holding times, specification of low detection limits that are at or below regulatory standards, and the analysis of method blanks to check for laboratory contamination.

3.4 Completeness

Completeness is an assessment of the number of valid measurements obtained in relation to the total number of measurements planned for the successful achievement of the investigative objectives. Completeness will be expressed as the percentage of valid measurements to planned measurements. The closer the numbers, the more complete the measurement process.

3.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set may be compared to another. Data sets will be compared only when precision and accuracy meet the specified acceptance criteria established in this section. Samples will be collected and analytical results will be reported according to standard procedures and methods in order to ensure comparability with other similar data and results. The comparability goal will be achieved through the use of SOPs applicable to collecting and analyzing representative samples, and by reporting analytical results in appropriate and consistent units.

3.6 Sensitivity

Sensitivity is used to evaluate the utility of the data for comparison to numeric standards. The method used must meet the reporting limits required in the Solid and Hazardous Waste Rule R315-308-4 and 40 CFR Part 258 Appendix II (Appendix A).

4.0 PROJECT OVERSIGHT AND CORRECTIVE ACTION

URS will provide project oversight and report directly to the Payson City Corporation Project Manager. Should field conditions arise that require changes to the plan, these changes will be discussed with the City and UDEQ prior to implementation, as time permits. All deviations from this plan will be documented in the quarterly sampling report.

5.0 DATA EVALUATION

The data collected will be reviewed and evaluated in order to determine whether they meet project DQOs. Laboratory analytical results will be reviewed by a URS project data quality specialist. Data validation and verification requirements and the methods for meeting those requirements are included in Table B-2.

One component of the data validation and verification requires that the data be assessed in terms of the DQIs. In order to fulfill this requirement, the DQIs will be calculated (where applicable) or evaluated and compared to the original DQOs set out in this document. The performance criteria against which the data will be measured in terms of the DQIs are listed in Table B-1. Documentation showing whether or not the DQOs were met or, if not, the limits set on the data because the DQOs were not achieved, will be included in the report prepared for each sampling round.

6.0 PROJECT RECORDS AND REPORTS

All field notes, records of conversation, and reports will be on file at URS. URS will prepare a report after each quarterly sampling. As required under Solid and Hazardous Waste Management Rule R315-308, a summary report will be prepared after each quarterly sampling round. The report will document sampling procedures, parameters measured in the field, chain-of-custody documentation, quality assurance/quality control procedures, analytical results, and the results of statistical evaluation of the analytical data. The report will also include a potentiometric surface map and calculations used to determine ground water flow rate. The reports will be delivered to UDEQ in fulfillment of the landfill monitoring requirements.

TABLES

TABLE B-1
Data Quality Assurance Objectives In Terms of Data Quality Indicators

Parameter	QC Program	Evaluation Criteria	Summary of QA/QC Goals
Precision	Field Duplicate Pairs Matrix Spike/Matrix Spike Duplicate Method Duplicate	Relative Percent Difference (RPD) Reproducibility	Method Duplicate, for waters: +/- 20% if >5x LRL, +/- LRL if < 5x LRL Field Duplicate, for waters: +/- 30% if >5x LRL, +/- 2x LRL if < 5x LRL
Accuracy	Surrogate Spike Laboratory Control Samples Matrix Spike/Matrix Spike Duplicate	Percent Recovery	Within laboratory historical control limits provided in the Appendix
Representativeness	Hold Times Method Blanks Field Duplicates	Representative of Environmental Conditions Qualitative Degree of Confidence Standard Operating Procedures(SOPs)	Holding times meet 100 percent No method blank contamination 90 percent of field duplicates meet RPD goals SOPs are followed
Comparability	Standard Units of Measure Standard Analytical Methods Field Duplicate Pairs	Qualitative Degree of Confidence	Laboratory Methods Followed SOPs Followed
Completeness	Complete Sampling	Percent Valid Data	90% valid data

LRL = Laboratory Reporting Limit
RPD = Relative Percent Difference
SOP = Standard Operating Procedure

TABLE B-2
Data Validation and Verification Methods

Data Validation and Verification Requirements	Data Validation and Verification Methods
• Samples were collected as per scheduled locations and frequency.	• Comparison with Site Monitoring Plan
• Sample collection and handling followed specified procedures (i.e., relevant SOPs and chain-of-custody procedures).	• Review of field notes, sampling logs and COCs. • Surveillance-level oversight of field procedures to maximize consistency in field.
• Appropriate analytical methods were used, and internal laboratory calibration checks were performed according to the method-specified protocol.	• Review of analytical methods and case narratives provided with laboratory reports. • Maintain documentation of communications with laboratory regarding problems/corrective actions.
• Required holding times and laboratory reporting limits were met.	• Comparison with specified holding times and DLs.
• Recovery acceptance limits for field and laboratory QC samples were met.	• Tabulating RPDs and percent recoveries, and direct comparison with laboratory acceptance limits. • Comparison with DQIs.
• Appropriate steps were taken to ensure the accuracy of data reduction, including reducing data transfer errors in the preparation of summary data tables and maps.	• Maintaining a permanent file of hard copies of laboratory data reports. • Minimizing retyping of data. • Double checking values entered into databases, tables and maps against laboratory data reports.

SOP = Standard Operating Procedures
RPD = Relative Percent Difference
DQI = Data Quality Indicator
DL = Detection Limit
COC = Chain of Custody

APPENDIX C

HEALTH AND SAFETY PLAN

PAYSON CITY LANDFILL GROUND WATER MONITORING PLAN

HEALTH AND SAFETY PLAN

April 2003

Prepared by

URS Corporation
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Approved:_____ _____March 28, 2003_____
Richard Moore , CIH Date
Regional Health & Safety Manager,

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 HAZARD ASSESSMENT 2

3.0 EMPLOYEE MEDICAL QUALIFICATIONS AND TRAINING REQUIREMENTS 3

4.0 PERSONAL PROTECTIVE EQUIPMENT 4

5.0 EMERGENCY CONTINGENCY PLAN 5

6.0 REFERENCES 7

LIST OF FIGURES

Figure C-1 – Hospital Location Map

LIST OF TABLES

Table C-1 – Typical Payson City Landfill VOC Detections and Concentrations
Table C-2 – Emergency Telephone Numbers

LIST OF ATTACHMENTS

Attachment C-1 – Material Safety Data Sheet for Alconox
Attachment C-2 – Activity Hazard Analysis
Attachment C-3 – Safety Management Standard Checklist and Safety Management Standards

1.0 INTRODUCTION

URS Corporation (URS) has been tasked with conducting a quarterly monitoring program at the Payson City landfill, near Payson, Utah.

This Site-Specific Health and Safety Plan (HASP) summarizes health and safety hazard information for URS ground water monitoring activities at the Payson City Landfill. The landfill is currently in operation. The HASP delineates procedures that will allow personnel to work safely and respond quickly and appropriately to site emergencies. All URS activities will be conducted in accordance with requirements of the URS Health and Safety Program and Management System that is available on the SOURSE (the URS Intranet) at www.oklink.com\safety. Work will also be conducted in accordance with Occupational Safety and Health Administration (OSHA) regulations in the Code of Federal Regulations (CFR), Title 29, Parts 1904 and 1910. In addition, all field activities will be conducted in accordance with Occupational Safety and Health Rules of the State of Utah.

The field activities will consist of sampling four existing monitoring wells for organic chemicals, such as tetrachloroethene, as well as metals and inorganic constituents using a dedicated sampling system and equipment (Grundfos submersible pump, bladder pump with compressed air tank operated and run by the City of Payson, 9.9 kilowatt generator kept in the bed of a field truck, and Teflon-lined polyethylene tubing). Table C-1 provides a list of the anticipated volatile organic compounds (VOCs) and their typical concentrations expected at to occur in the ground water. Based on the chemical concentrations, and the permissible exposure limits identified by the Occupational Safety and Health Administration (OSHA), it is unlikely that airborne VOC exposures will exceed occupational health criteria. To further minimize the potential for exposure, the field team will remove the top of the well head, and allow the well to off-gas to the atmosphere for approximately 10 minutes prior to collecting the sample. During this time, the field team will remain upwind of the open well pipe. If the field team detects any odors, they will discontinue activities and collect Draeger tube samples for the expected contaminants at the well head.

2.0 HAZARD ASSESSMENT

Chemical hazards present at the active landfill site include low levels of a variety of organic and inorganic chemicals. Exposure to contaminants is expected to be limited to vapors emitted from the monitoring well headspace when the wells are initially opened or dust as a result of landfill operations around active cells. The Site Safety Officer (SSO) will brief all personnel assigned to the work site of the contaminants potentially present at the site, ground water, soils, or other site media, as well as the chemicals and fuels brought onto the worksite. Material safety data sheets (MSDSs) for all hazardous materials, fuels and other chemicals used or brought on site will be reviewed by and made available to all field personnel throughout field activities (see Attachment C-1).

Physical hazards potentially present at the site include heat stress, cold stress, noise, slips, trips, falls, heavy equipment, landfill operations, electricity, debris, traffic, lifting (muscoskeletal injury), sharp objects, severe weather (wind, precipitation, electrical storms, etc.), fire, vehicles, and powered equipment and tools.

Biological hazards include small biting animals and poisonous plants and animals (e.g. dogs, poison ivy, rattlesnakes, spiders, scorpions, and ticks).

Specific controls for potential hazards are addressed throughout this plan and in the activity hazard analyses contained in Attachment C-2.

3.0 EMPLOYEE MEDICAL QUALIFICATIONS AND TRAINING REQUIREMENTS

OSHA regulations require that all personnel entering hazardous waste sites meet specific qualifications. The required certifications for all personnel must be on file in the URS Salt Lake City office.

Personnel who have a potential for exposure to hazardous substances at the site must have a current physician's statement to document medical status and absence of any conditions that would limit or increase potential health risks while completing assigned tasks. URS has secured the services of a board-certified occupational physician to review medical examination results. The URS Medical Surveillance Program is described in detail in the URS Health and Safety Program and Management System in Safety Management Standard (SMS) 24 "Medical Surveillance". A copy of project relevant URS SMSs are provided in Attachment C-3.

40-hour initial and current 8-hour annual OSHA hazardous waste site worker training in accordance with HAZWOPER regulations (29 CFR §1910.120) are required for personnel involved in hazardous waste operations or who have a potential for exposure to hazardous substances at a worksite. URS personnel assigned to and providing oversight of the quarterly monitoring program at the Payson Landfill site include:

- Project Manager: Jeff Porter
- Site Safety Officer (SSO): Quinn Brown
- Field Personnel: Lawrence Cannon, Quinn Brown
- URS Regional Health & Safety Manager (RHSM): Richard Moore, CIH

4.0 PERSONAL PROTECTIVE EQUIPMENT

Oversight and other non-intrusive activities at the active landfill site can be completed in standard work clothing. It is anticipated that all site activities can be completed in level D personal protective equipment (PPE) with a potential to upgrade to level C PPE. Level D is the basic work uniform and is intended to minimize worker personal cleanup at the end of a work shift.

Level D PPE to be worn at the worksite includes:

- Clothing (work clothes or regular Tyvek® or equivalent coverall as appropriate for completing activities with "dry" materials; poly-coated Tyvek® for completing activities with "wet" materials), long pants and long sleeves required;
- Gloves, inner (latex or nitrile surgical type) as appropriate for handling potentially contaminated materials;
- Boots, steel-toe with boot covers or rubber boots as appropriate to facilitate decontamination (chemical-resistant rubber boots are required if muddy conditions are present);
- Safety glasses with side shields;
- Hard hat (whenever overhead hazards, electrical hazards, or heavy equipment are present);
- Hearing protection consisting of ear plugs and/or ear muffs (when near noisy equipment); and
- Orange vest (ground personnel near heavy equipment and when working near traffic).

An upgrade to Level C PPE will consist of Level D PPE plus a half- or full-face air purifying respirator with combination organic vapor/P100 filter cartridges. Level C PPE will be available on-site during sampling activities in the event respiratory protection should be required in the judgement of the URS SSO.

5.0 EMERGENCY CONTINGENCY PLAN

In the event of an emergency at the site, first contact the appropriate emergency services, next secure the site, and then notify the URS Project Manager and RHSM. The list of emergency phone numbers (see below) will be clearly posted at the work site or field vehicle.

In the event of a site accident requiring ambulance, police, or fire rescue response to the site, personnel will instruct rescuers to meet site personnel at the address below. It will be the responsibility of the SSO to instruct rescuers of any site hazards present.

Payson City Landfill
6211 West 10400 South
Payson, UT 84651

Medical Emergencies

URS personnel may administer first aid on a voluntary basis. Remember to follow "universal precautions" if blood is present (e.g. avoid contact with blood and other bodily fluids). Contact the RHSM if you are exposed to another individual's blood. An American Red Cross Standard First Aid book will be available at the site for reference. For serious injuries or illnesses, transport the victim to the hospital via ambulance. All injuries, illness, and other incidents (property/vehicle damage, near miss accidents) must be reported and investigated in accordance with URS policy and procedures as specified in SMS 49. Work-related injury or illness must be reported immediately to the Jeanette Schrimsher, RN, the URS Occupational Health Specialist (see Table C-2) in accordance with URS policy as specified in SMS 65.

Emergency Medical Services

Nearest Hospital

Mountain View Hospital
1000 East 100 North
Payson, Utah 84651
(See Figure C-1, for the Hospital Route Map)

Emergency Equipment List

Each URS field vehicle at the site will be equipped with the following equipment:

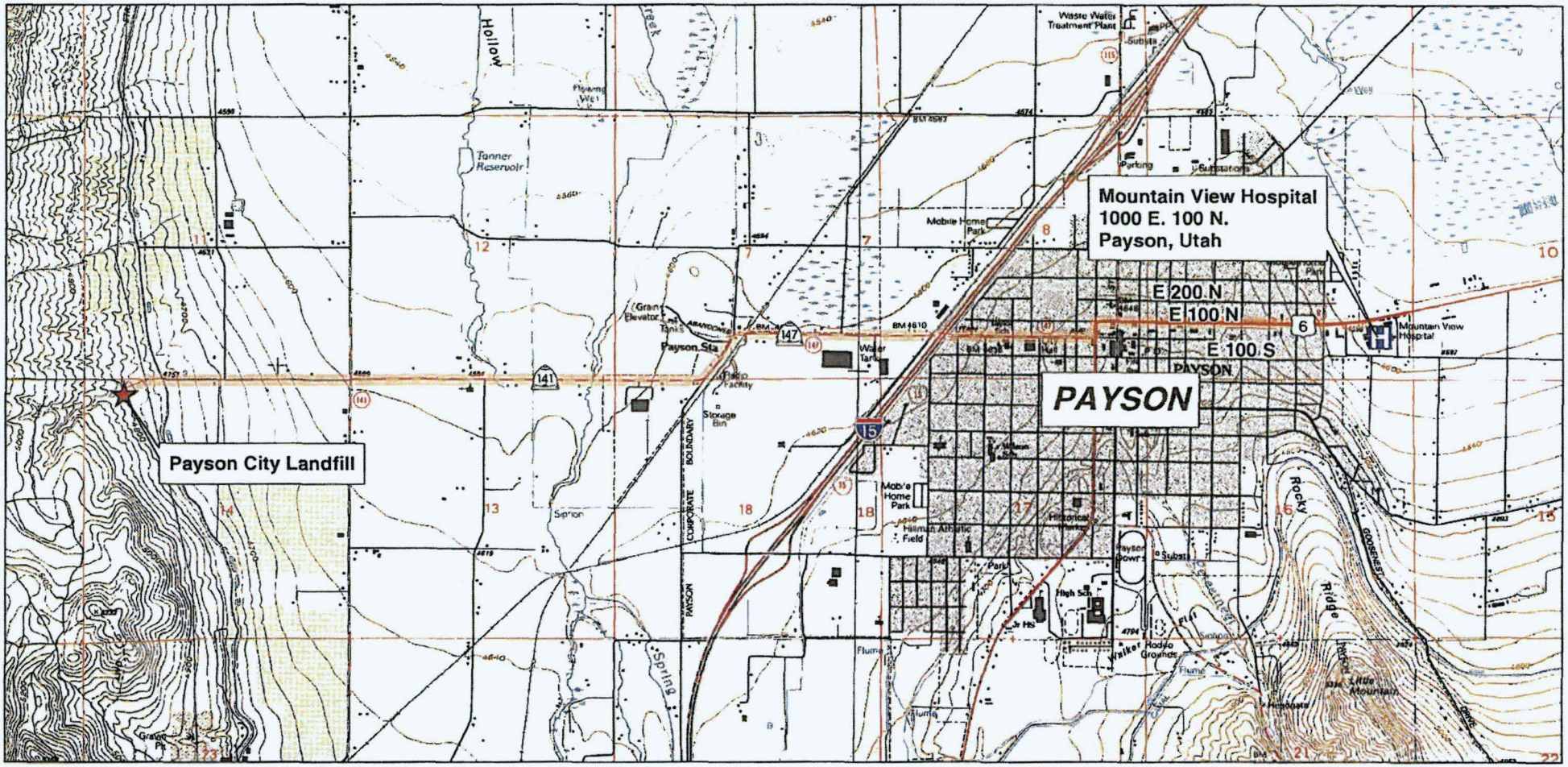
- Cellular phone or the location of the nearest phone,
- First aid kit,
- Eye wash,
- Fire extinguisher, and
- Bottled water.

6.0 REFERENCES

URS, 2002a. *Quarterly Ground Water Monitoring Report Third Quarter: June 2002,* July 2002.

URS, 2002b. *Quarterly Ground Water Monitoring Report Fourth Quarter: September 2002,* November 2002.

FIGURES



Source. USGS 7.5 min 1:24 000 Quadrangles, "West Mountain, UT", and "Spanish Fork, UT"

HOSPITAL LOCATION MAP

Payson City Landfill
Payson, Utah

URS

FIGURE C-1

TABLES

Table C-1

Typical Payson City Landfill VOC Detections and Concentrations

		Volatile Organic Compounds (ug/L)			
		1,1-Dichloroethane	cis 1,2-Dichloroethene	Methylene chloride	Tetrachloroethene
	Permissible Exposure Limit	100 ppm	Not available	25 ppm	100 ppm
Well	Date				
MW-3	6/13/2002	<2.0	<2.0	<2.0	<2.0
MW-4	9/6/2002	<2.0	3.7	<2.0	4.5
MW-5	9/6/2002	3.6	6.5	4.4	7.4
MW-6	9/6/2002	<2.0	<2.0	<2.0	3.1

Sources of well data: URS, 2002a (MW-3) and URS, 2002b (MW-4, MW-5, and MW-6).

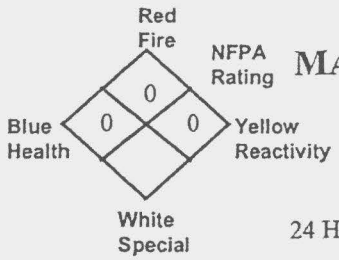
Table C-2
Emergency Telephone Numbers

Location	Telephone Number
Ambulance	911 or (801) 465-7000
Fire	911 or (801) 375-3601
Police	911 or (801) 375-3601
Mountain View Hospital, Payson UT	(801) 465-7000
Poison Control Center	(800) 332-3073
Payson Landfill Safety Manager (Kent Fowden)	(801) 465-5230
Payson Landfill Environmental Engineer (Glade Robbins)	(801) 465-5235 (801) 465-5214
Underground Utility Locates	(801) 532-5000
Richard Moore, CIH, RHM	(916) 803-6062 (cell)
URS Occupational Health Specialist (Jeanette Schrimsher, RN)	(512) 419-6440 or (866) 326-7321 (512) 419-5660 (Bonnie Wolf)
URS Project Manager (Jeff Porter)	(801) 904-4042

ATTACHMENT C-1

Material Safety Data Sheet for Alconox

Alconox ®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO_2, foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO_2 on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

ATTACHMENT C-2

Activity Hazard Analysis

ACTIVITY HAZARD ANALYSIS: Ground Water Sampling

Physical and Biological Hazards and Controls	
Potential Hazards	**Controls**
Heavy equipment	• Minimize the use of ground personnel • Notify operators if ground personnel are present • Verify that backup alarms are operating • Make eye contact with the operator before approaching equipment • Wear a bright orange vest, hard hat and safety glasses • Refer to SMS 19 *Heavy equipment*
Noise	• Wear hearing protecting when working near noisy equipment • If it is too loud for voice communication at normal volume you should be wearing protection • Refer to SMS 26 *Noise*
Hand tools and portable equipment	• Inspect tools prior to use • Use tools for their intended use • Don't use damaged tools • Push, don't pull wrenches • Refer to SMS 16 *Hand tools and portable equipment*
Lifting	• Get help and/or use proper equipment to lift heavy objects • Bend at the knees; do not use your back • Keep objects close to your body • Do not twist • Minimize movement of heavy objects • Refer to SMS 45 *Back injury prevention*
Driving and vehicle traffic	• Obey traffic rules • Do not operate vehicles in unsafe conditions (e.g. steep slopes, mud) • Do not use cell phones when operating vehicles • Secure all loads • Wear seat belts • Use caution and wear orange vests if working near equipment or roads • Leave enough time to get to your destination without hurrying! • Refer to SMS 57 *Vehicle Safety Program* • Refer to SMS 32 *Work Zone Traffic Control*

Physical and Biological Hazards and Controls	
Potential Hazards	**Controls**
Slips, trips, and falls	• Avoid steep and uneven terrain • Watch where you step • Be especially cautious around construction debris • Maintain good housekeeping • Refer to SMS 21 *Housekeeping*
Biting animals, poisonous plants	• Use caution when lifting objects that may provide shelter for spiders, snakes and rodents • Rattlesnakes, scorpions and black widow spiders may be present at the site
Vector borne disease	• Stay away from animals that may carry fleas • Hanta virus may be present in mouse droppings • Histoplasmosis may be present in bird droppings • Do not generate dust from areas impacted by animal droppings
Severe weather	• Listen to radio for warnings • Discontinue all site activities and seek shelter if severe weather is approaching
Cold Stress	• Stay dry • Dress in layers • Have a warm hat and socks available • Take breaks in heated areas
Heat stress	• Train workers regarding heat stress prevention and symptoms • Use vehicles for shelter and take breaks as needed • Drink plenty of fluids • Use cooling devices if necessary • Use acclimatized workers • Create shaded work areas if appropriate • If necessary schedule heavy work for cooler times of day • Refer to SMS 18 *Heat Stress* (attached)

ATTACHMENT C-3

Safety Management Standard Checklist and Safety Management Standards

URS Safe Work Plan
SMS Checklist

The following URS Safety Management Standards (SMS) generally apply to all field projects. Review the requirements of each SMS and determine appropriate steps to ensure project compliance with the requirements.

Determine the applicability of these SMS's to your project	Yes	See SMS #	Determine the applicability of these SMS's to your project	Yes	See SMS #
Emergency Action Plan	Yes	003	Sanitation	Yes	030
Housekeeping	Yes	021	Regulatory Inspections	Yes	001
Vehicle Safety	Yes	057	Health and Safety Training	Yes	055
New Employee Safety Orientation	Yes	025	Incident Reporting and Investigation	Yes	049
			Injury Management	Yes	065

The following URS SMS' only apply when specific activities are conducted by URS and URS subcontractor personnel. If you answer Yes to any of the questions below, review the SMS indicated and determine the appropriate steps necessary to ensure project compliance with the requirements.

Will project activities involve any of the following?	Yes	See SMS #	Will project activities involve any of the following?	Yes	See SMS #
Abrasive blasting or exposure to abrasive blasting media or waste?	☐	006	Excavations or exposure to excavation hazards?	☐	013
Potential exposure to ticks, snakes, poisonous plants, and other biological hazards	☒	047	Flammable or combustible materials used or stored which could constitute a fire hazard?	☐	014,015
Use of aerial lifts?	☐	007	Use of portable, gas powered, electric, and/or powder actuated hand tools?	☒	016
Potential exposure to air contaminants in hazardous concentrations?	☐	043,042 ,050	Hazardous materials shipping?	☐	048
Asbestos surveys or abatement oversight?	☐	008	Hazardous substances – physical, chemical or health hazards?	☐	002
Potential exposure to Bloodborne Pathogens (i.e. blood or other bodily fluids)?	☐	051	Hazardous waste activities (investigative or remedial)?	☐	017
Work over or near water?	☐	027,053	Heat Stress potential to employees working in: • Hot environments; or • *Impermeable Chemical Protective Clothing?*	☒	018
California job activities?	☐	005	Heavy equipment in use at this project site?	☒	019
Corrosive materials used or handled?	☐	009	Hot Work (welding, cutting, grinding)	☐	020
Confined space entries?	☐	010	Industrial site access of any kind?	☐	004

URS Safe Work Plan
SMS Checklist

Will project activities involve any of the following?	Yes	See SMS #	Will project activities involve any of the following?	Yes	See SMS #
Cranes or hoists?	☐	038,041	Lead exposures (lead paint removal, lead in dust, etc)?	☐	022
Demolition activities of any type of structures?	☐	011	Exposure to uncontrolled energy sources including electrical, fluid, pneumatic, fuel, steam, gravity, and hazardous material?	☐	023
Drilling activities?	☐	056	Use of Manbasket (Crane Suspended Personnel Platforms) for working at heights?	☐	037, 038, 041
Use of watercraft (i.e. boats, canoes, barges, vessels)	☐	053	Work on or near streets and/or roadways?	☐	032
Exposure to chemical/physical/biological agents and/or activities that require Medical Surveillance? Examples would include exposures to; Noise, Asbestos, Lead, Hazardous Waste, High Altitudes, Carcinogens, Respirator Use.	☐	024	Travel to remote locations and/or developing countries?	☐	036
Noise exposures?	☒	026	Potential exposure to subsurface and/or overhead utilities?	☐	034
Portable ladder use?	☐	028	Potential exposure to Unexploded Ordnance/Chemical Warfare agents?	☐	039
Exposure to eye, head, hand, foot, or other hazards that require the use of personal protective equipment?	☐	029	Underground Storage Tank investigation, removal, etc.	☐	033
Nuclear Density Gauge use?	☐	044	Work with live electrical systems	☐	012
Respiratory protection use – required and/or voluntary?	☐	042	Work at altitudes greater than 7,000 feet (~ 2,100 meters)	☐	035
Scaffolding?	☐	031	Working at heights of greater than 6 feet?	☐	040
Manual lifting and/or material handling?	☒	045	Use of computer workstations for data entry, CADD, word processing, etc.	☐	054
Work near railroad transportation systems?	☐	063	Exposure to recognized Hand hazards?	☐	064
Work at a client site requiring compliance with the OSHA Process Safety Management Standard?	☐	058	Potential personnel exposure to temperatures below 32°F	☒	059
Subcontractors to perform construction (including drilling and excavation) with their own personnel and/or equipment?	☐	046	Potential exposure to ionizing radiation?	☐	052

URS SAFETY MANAGEMENT STANDARD
Inspections by Regulatory Agencies

1. Applicability

This program applies to URS office and field operations.

2. Purpose and Scope

Representatives of regulatory agencies may have statutory authority to evaluate URS operations for compliance with health and safety regulations. URS personnel are to cooperate with all such inspections. This procedure provides guidelines for responding to the inspector and for documenting inspection activities.

3. Implementation

Office Locations	Implementation of this procedure is the responsibility of the Office Manager.
Field Activities	Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Obtaining Positive Identification

Request formal identification (photo identification card) from any regulatory agency representative. Call the agency if there is any question regarding the identity of the individual (independently obtain the agency's number; don't use a number provided by the representative). Obtain a business card from the inspector for URS records.

B. Warrants

Do not require an inspector to obtain a warrant prior to conducting an inspection.

C. Health and Safety Notification

Contact the local URS Health and Safety Representative or URS Health and Safety Manager immediately upon confirming the identification of the representative.

D. Opening Conference

1. Request an opening conference if one is not initiated by the inspector.

2. Use the opening conference to determine why the inspector is conducting the inspection.

3. Take good notes during the conference.

E. Inspection Activities

1. Escort the inspector at all times, taking him/her directly to the area of interest.

2. Answer all questions honestly, but do not volunteer information.

3. Do not argue with or attempt to mislead the inspector.

4. Resolve violative conditions immediately, while the representative is on site, if possible.

5. Make sure the inspector has appropriate qualifications to enter high hazard areas.

6. Take good notes during the inspection and take pictures where the inspector takes pictures.

7. Inspectors generally have the right to interview employees if they do not interrupt operations.

F. Closing Conference

1. Request a closing conference if one is not initiated by the inspector.

2. Use the closing conference to determine what regulatory violations the representative found, if any.

3. Do not try to negotiate during the closing conference.

4. Take good notes during the conference.

G. Post-Inspection Activities

1. Immediately contact URS Health and Safety Manager and communicate the results of the inspection. The URS Health and Safety Manager will provide additional instructions regarding the inspection.

2. Debrief any employees who were contacted by the representative; all discussions should be reduced to notes.

3. All follow-on activities associated with the inspection will be coordinated by the Group Health and Safety Manager and appropriate legal counsel. Local URS employees are not to conduct any follow-on activities without the express consent of the URS Health and Safety Representative.

5. Documentation Summary

Provide the following documents to the URS Health and Safety Manager:

A. Inspector's business card.

B. All materials provided by the inspector.

C. All notes relating to the inspection, opening conference, closing conference, and debriefings.

D. All photos from the inspection, with explanatory notes.

6. Resources

U.S. OSHA - Field Inspection Reference Manual

URS SAFETY MANAGEMENT STANDARD
Worker Right-to-Know (Hazard Communication)

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

The worker right-to-know program provides URS personnel with information and training about safety and health hazards associated with the chemicals they might encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel working in offices and at field site locations, and how information is to be provided to employees of other employers working at the location. The requirements include steps to acquire this information, maintain it, and train everyone to use it.

3. Implementation

Office Locations: Implementation of this program is the responsibility of the Office Manager.

Field Activities: Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Hazardous Material Inventory

1. Maintain a hazardous material inventory that lists all of the hazardous materials used at this workplace. Use chemical names consistent with the applicable MSDS's.

2. File a copy of the chemical inventory in the Safety Filing System.

B. Material Safety Data Sheets (MSDS's)

1. Obtain a MSDS for each chemical before it is used.

2. Review each MSDS when it is received to evaluate whether the information is complete and to determine if existing protective measures are adequate.

3. Maintain a collection of all MSDS's where they are accessible at all times.

4. Replace MSDS sheets when updated sheets are received. Communicate any significant changes to those who work with the chemical.

5. MSDS's are required for all hazardous materials used on site by project personnel.

C. Labels

Label all chemical containers with:

1. Identity of the hazardous chemical(s),

2. Appropriate hazard warnings, and

3. Name and address of the chemical manufacturer, importer, or other responsible party.

D. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, provide each employee with information about hazards to which they may be exposed during such an activity.

This information will include:

1. Specific chemical hazards.

2. Protective/safety measures which must be utilized.

3. Measures that have been taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

E. Informing Contractors/Subcontractors

Provide contractors/subcontractors the following information on chemicals used by or provided to URS personnel:

1. Names of hazardous chemicals to which they may be exposed while on the jobsite.

2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

3. Location of URS MSDS's and written chemical inventory.

F. Training

1. Conduct training of all employees potentially exposed to hazardous materials on the following schedule:

   a. Before new employees begin their jobs.

   b. Whenever new chemicals are introduced into the workplace, or

   c. Annually thereafter.

2. This training will include:

   a. Applicable regulatory requirements.

   b. Names of those responsible for implementing this program.

   c. Location of the program, inventory and MSDS 's.

   d. Chemicals used, and their hazards (chemical, physical and health).

   e. How to detect the presence or release of chemicals.

   f. Safe work practices.

   g. How to read an MSDS.

3. Document the training.

5. Documentation Summary

A. File these records in the Office Safety Filing System

1. Chemical Inventory.

2. Location of the MSDS inventory.

3. Training records.

4. Contractor/Subcontractor notifications.

B. File these records in the Project Safety File.

1. Chemical Inventory.
2. Location of the MSDS inventory.
3. Training records.
4. Contractor/Subcontractor notifications.

6. Resources

A. U.S. OSHA Technical Links - Hazard Communication (http://www.osha-slc.gov/SLTC/hazardcommunications/index.html)

B. U.K. - Control of Substance Hazardous to Health - Regulations

URS SAFETY MANAGEMENT STANDARD
Emergency Action Plans

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

This procedure establishes policy, assigns responsibilities, and provides guidance to URS offices/field projects regarding emergency action. It includes general information on actions to be taken by URS management and employees in the event of a fire or other emergency that may endanger life or property.

The objectives of this procedure are to:

A. Promote a fast, effective reaction in coping with emergencies.

B. Save lives and avoid injuries and panic.

C. Restore order and conditions back to normal levels with a minimum of confusion and as promptly as possible.

3. Implementation

Office Locations- Implementation of this program is the responsibility of the Office Manager.

Field Activities- Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Emergency Action Plan Development

1. Gather Information

Each URS office/project must develop an emergency Action Plan tailored to its specific situation. Office Managers will check with their building manager or landlord regarding evacuation procedures they may have in place and incorporate these procedures into the emergency Action Plan. Project EAPs must comply with client requirements and specifications. The Plan must contain the following:

a. Reporting Fires and Other Emergencies

Describe the procedures that personnel should follow to report emergencies. List emergency telephone numbers for fire, paramedics and police. Include local prefixes on emergency numbers, if required, such as 9-911.

b. Alarm System

Describe the emergency alarm system for the building/site as applicable. Include the description and location of fire alarm pull boxes, and visual and audible alarms. If a public address (PA) system is used to notify occupants of emergencies, include the procedures to activate the PA system, such as calling the receptionist or building manager's office, and a description of the announcements that will be made.

c. Evacuation Routes and Procedures

Develop a map or description of the evacuation routes and emergency exits to be use. A description of the building emergency lighting system and exit signs may also be included. Evacuation route maps may be posted in the offices. There should be a primary and alternate evacuation route and exit from each work area.

Describe procedures regarding the use of elevators, if applicable. In most cases elevator use is prohibited during an emergency. The building manager should be consulted for these procedures.

Include procedures to determine that no employees have been inadvertently left behind.

d. Critical Equipment/Operations Procedures

Designate personnel responsible for shutting down critical equipment and the procedures for doing so, if applicable.

e. Assisting Disabled Personnel

Describe the provisions that have been made for notifying and assisting personnel with disabilities during an emergency. Such provisions are to accommodate personnel in wheelchairs or those who are temporarily disabled, such as personnel on crutches.

f. Personnel Accounting Procedures

Designate a primary and alternate assembly area for personnel who are evacuating. Require sufficient distance so that personnel will not be exposed to fire or debris hazards, or traffic, nor interfere with emergency responders.

Designate an individual and an alternate with the assigned responsibility for taking a headcount in the assembly area and reporting missing personnel to emergency responders.

Define the procedures on how employees will be informed that it is safe to re-enter the building or to leave for home.

g. Rescue and Medical Duties

Include the statement that "URS does not expect or encourage its employees to engage in firefighting, medical treatment, rescue, or other emergency response. Such activities should only be performed by properly equipped and trained emergency responders. URS recognizes that some of its personnel may have received training in first aid and cardiopulmonary resuscitation (CPR) and may wish to perform these duties on injured personnel."

B. Posting

1. Post the Emergency Action Plan where it is available to all employees.

2. Post evacuation maps at all exits and points of egress.

C. Training

Train all employees regarding the requirements of the Emergency Action Plan.

5. Documentation Summary

A. Office

File these records in the Office Safety Filing System:

1. Emergency Action Plan

2. Evacuation Maps
3. Training records

B. Field

File these records in the Project Safety File.

1. Emergency Action Plan
2. Evacuation Maps
3. Training records

6. References

A. U.S. OSHA Standard - Emergency Action Plans - 29 CFR 1910.38

B. U.S. OSHA Fact Sheet - Responding to Workplace Emergencies

URS SAFETY MANAGEMENT STANDARD
Hand Tools and Portable Equipment

1. Applicability

This procedure applies to URS operations involving the use of hand tools and/or power equipment, including chain saws, brush cutters, powder-actuated tools, and similar high-hazard implements.

2. Purpose and Scope

The purpose of this standard is to provide guidelines for the safe use and handling of hand tools and power equipment.

3. Implementation

Office/Facility Locations - Implementation of this program is the responsibility of the Office Manager.

Field Locations - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. General

1. Keep hand and power tools in good repair and used only for the task for which they were designed.
2. Remove damaged or defective tools from service.
3. Keep surfaces and handles clean and free of excess oil to prevent slipping.
4. Do not carry sharp tools in pockets.
5. Clean tools and return to the toolbox or storage area upon completion of a job.
6. Wrenches must have a good bite before pressure is applied.
    a. Brace yourself by placing your body in the proper position so that in case the tool slips you will not fall.
    b. Make sure hands and fingers have sufficient clearance in the event the tool slips.

c. Always pull on a wrench, never push.

7. When working with tools overhead, place tools in a holding receptacle or secure when not in use.

8. Do not throw tools from place to place, from person to person, or drop from heights.

9. Use non-sparking tools in atmospheres with fire or explosive characteristics.

10. Inspect all tools prior to start-up or use to identify any defects.

11. Powered hand tools should not be capable of being locked in the on position.

12. Require that all power fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.

13. Do not allow loose clothing, long hair, loose jewelry, rings and chains to be worn while working with power tools.

14. Do not use cheater pipes.

15. Make provisions to prevent machines from automatically restarting upon restoration of power.

B. Grinding Tools

1. Inspect work rests and tongue guards for grinders.

   a. Work rest gaps should not exceed 1/8 inch (3 mm).

   b. Tongue guards gap should not exceed ¼ inch (6 mm).

2. Do not adjust work or tool rests while the grinding wheel is moving.

3. Inspect the grinding wheel for cracks, chips or defects. Remove from service if any defects are found.

4. Wear goggles when grinding. A clear full face shield may be worn with the goggles.

5. Do not use the side of a grinding wheel unless the wheel is designed for side grinding.

6. Always stand to the side of the blade, never directly behind it.

7. Use grinding wheels only at their rated speed.

8. Grinding aluminum is prohibited.

9. For U.K. operations:

    a. No grinding wheels exceeding 55mm are to be used.

    b. All wheels are to be marked with their safe maximum speed.

    c. Abrasive wheels will only be operated by personnel who have been specifically trained and specified competent by URS.

    d. Abrasive wheels will only be operated by persons specified as competent, under the 'Abrasive Wheels" Regulations.

    e. Abrasive wheels must only be operated if the manufacturer's guard is fitted and they are in good working order.

C. Power Saws

1. Require that circular saws are fitted with blade guards.

2. Remove damaged, bent or cracked saw blades from service immediately.

3. Require that table saws are fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.

4. Require guards that cover the blade to the depth of the teeth on hand held circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

D. Wood Working Machinery

1. Do not use compressed air to remove dust, chips and from wood working machinery.

2. Locate the on-off switch to prevent accidental start up. The operator must be able to shut off the machine without leaving the work station.

3. Guard planers and joiners to prevent contact with the blades.

4. Use a push stick when:

   a. The cutting operation requires the hands of the operator to come close to the blade.

   b. Small pieces are being machined.

5. Adjust saw blades so they only clear the top of the cut.

6. Automatic feed devices should be used whenever feasible.

E. Pneumatic Tools and Equipment

1. Require that pneumatic tools have:

   a. Tool retainers to prevent the tool from being ejected from the barrel during use.

   b. Safety clip or tie wire to secure connections between tool/hose/compressor if they are of the quick connection (Chicago fittings) type.

2. Do not lay hose in walkways, on ladder or in any manner that presents a tripping hazard.

3. Never use compressed air to blow dirt from hands, face or clothing.

4. Compressed air exhausted through a chip guarded nozzle shall be reduced to less than 30 psi. Proper respiratory, hand, eye and ear protection must be worn.

5. Never raise or lower a tool by the air hose.

F. Powder Actuated Fastener Tools

1. Use powder actuated tools that comply with the requirements of the American National Standards Institute (ANSI) standard A 10.3 - 1970.

2. Use only individuals that have been trained by a manufacturer's representative and possess the proper license to operate, repair, service and handle powder actuated tools.

3. Never use a powder actuated tool in a flammable or explosive atmosphere.

4. Require the use of goggles or a full face shield as well as safety glasses during operation of powder actuated tools.

5. Powder actuated tool must not be able to be fired unless the tool is pressed against the work surface.

6. The tool must not be able to fire if the tool is dropped when loaded.

7. Firing the tool should require two separate operations, with the firing movement being separate from the motion of bringing the tool to the firing position.

8. Never fire into soft substrate where there is potential for the fastener to penetrate and pass through, creating a flying projectile hazard.

9. Do not use powder actuated tools in reinforced concrete if there is the possibility of striking the re-bar.

10. Do not use on cast iron, glazed tile, surface hardened steel, glass block, live rock or face brick.

11. Never load and leave a powder actuated tool unattended. It should only be loaded prior to intended firing.

12. Test tools each day prior to loading by testing safety devices according to manufacturer's recommended procedure.

G. Chain Saws

1. Inspect the saw prior to each use and periodically during daily use.

2. Operate the chain saw with both hands at all times.

3. Never cut above chest height.

4. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.

5. Start cutting only after a clear escape path has been made.

6. Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.

7. Require applicable protective gear. This may include, but is not limited to:

    a. Loggers safety hat.

    b. Safety glasses.

    c. Steel-toed boots.

    d. Protective leggings.

    e. Hearing protection.

8. Inspect saws to require that they are fitted with an inertia break and hand guard.

9. *Never* operate a chain saw when fatigued.

10. Do not allow others in the area when chain saws are operated.

11. Make sure there are no nails, wire or other imbedded material that can cause flying particles.

12. Do not operate a chain saw that is damaged, improperly adjusted, or is not completely and securely assembled. Always keep the teeth sharp and the chain tight. Worn chains should immediately be replaced.

13. Keep all parts of your body away from the saw chain when engine is running.

14. For U.K. operations, only personnel specifically trained and certified as competent by URS can operate chain saws.

H. Hand Operated Pressure Equipment

1. Pressure equipment such as grease guns, paint and garden sprayers shall be directed away from the body and other personnel in the area. The person operating any equipment such as this, which has a potential for eye injury, must wear protective goggles.

2. The noise produced when using certain types of pressure equipment may require the use of hearing protection.

3. Never allow the nozzle of a pressurized tool to come in contact with any body parts while operating. There is potential for injection of a chemical directly into the user's body, resulting in severe injury or death.

I. Gasoline Powered Tools

1. Never pour gasoline on hot surfaces.

2. Never fuel around open flame or while smoking.

3. Shut down the engine before fueling.

4. Provide adequate ventilation when using in enclosed spaces.

5. Use only OSHA approved safety cans to transport flammable liquids.

J. Inspection

Inspect all hand tools on a regular basis. Defective tools shall be immediately removed from service, tagged or destroyed to prevent further use.

5. Documentation Summary

Place in the Project Safety File:

A. Site briefings regarding tool use.

B. Records of tools removed from service.

C. Copies of powder actuated tool licenses (as applicable).

D. Tool inspection documentation.

6. Resources

A. U.S. OSHA Standard - Hand and Portable Power Tools - 29 CFR 1910, Subpart P

B. U.S. OSHA Standard - Construction Tools - Hand and Power - 29 CFR 1926, Subpart I

C. ANSI A10.3 – 1970

D. National Association of Demolition Contractors (http://www.demolitionassociation.com/)

E. U.K. - 'Abrasive Wheel' Regulations

F. U.K. - 'Wood-Working Machine' Regulations

G. U.K. - 'Provision and Use of Work Equipment' Regulations

H. Australian Standards Collection 26 - Occupational Health & Safety - Powered Machining and Tools

URS SAFETY MANAGEMENT STANDARD
Heat Stress

1. Applicability

This procedure applies to URS field projects where ambient (not adjusted) temperatures exceed 70°F (21°C) for personnel wearing chemical protective clothing, including Tyvek coveralls, and 90°F (32°C) for personnel wearing normal work clothes.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the effects of heat related illnesses.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Monitor ambient temperatures and conduct Heat Stress Monitoring when threshold temperatures (see Section 1) are reached.

B. Conduct initial monitoring to determine first rest break.

1. Measure the air temperature with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual).

2. Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow. 100 percent sunshine - no cloud cover = 1.0; 50 percent sunshine - 50 percent cloud cover = 0.5; 0 percent sunshine - full cloud cover = 0.0.

3. Plug these variables into the following equation to determine the adjusted temperature:

   T (adjusted) = T (actual) + (13 x fraction sunshine)

C. Body Temperature Monitoring

1. Monitor oral body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature are convenient and the

preferred method of measurement. Determine work/rest regimen as follows:

a. Measure (oral adjusted) temperature at the end of the work period.

b. If temperature exceeds 99.6 °F (37.5°C)., shorten the following work period by 1/3 without changing the rest period.

c. If temperature still exceeds 99.6 °F (37.5°C), shorten the following work period by 1/3.

d. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6 °F (38.1°C).

2. Oral temperatures are to be obtained prior to the employee drinking water or other fluids.

D. Pulse Rate Monitoring

1. Take the radial (wrist) pulse as early as possible in the rest period.

a. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third.

b. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by an additional one-third.

E. Record monitoring results on Heat Stress Monitoring Form (Attachment 18-2).

F. Investigate the use of auxiliary cooling devices in extreme heat conditions.

G. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Review the information provided in Attachment 18-3.

H. Provide water and electrolyte replacement drinks fluids as described in Attachment 18-3.

I. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization (see Attachment 18-3).

J. Provide break areas as described in Attachment 18-3.

5. Documentation Summary

File these records in the Project Safety File.

A. Heat Stress Monitoring Forms.

B. Employee Safety Briefing Verification Forms.

6. Resources

A. NIOSH - "Working in Hot Environments"

B. AFL-CIO Building Trades Division - "Heat Stress in Construction"

The following documents are PDF Files that must be read with Adobe Reader.

C. Attachment 18-1 - Initial Work Monitoring Cycles

D. Attachment 18-2 - Heat Stress Monitoring Record

E. Attachment 18-3 -Informational Supplement

INITIAL WORK / MONITORING CYCLES

Adjusted Temperature	Normal Work Clothes	Protective Clothing
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F - 90°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°F – 87.5°F (28.1°C – 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°F – 82.5°F (25.3°C – 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°F – 77.5°F (22.5°C – 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

URS Corporation

URS Corporation Health & Safety Program

EMPLOYEE HEAT STRESS EXPOSURE MONITORING RECORD

DATE: _____ SAFETY REPRESENTATIVE: _____

WORKER'S NAME: _____ SUBCONTRACTOR: _____

WORK ACTIVITY: _____

Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments

DATE: _____ SAFETY REPRESENTATIVE: _____

WORKER'S NAME: _____ SUBCONTRACTOR: _____

WORK ACTIVITY: _____

Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments

DATE: _____ SAFETY REPRESENTATIVE: _____

WORKER'S NAME: _____ SUBCONTRACTOR: _____

WORK ACTIVITY: _____

Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments

HEAT RASH

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by unevaporated sweat. The papules may become infected unless treated.

> **First Aid for Heat Rash -** to prevent heat rash: shower after work, dry off thoroughly, and put on clean, dry underwear and clothes. Try to stay in a cool place after work. If, in spite of this, you develop heat rash, see your physician.

HEAT CRAMPS

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle spasms.
- Pain in the hands, feet and abdomen.

> **First Aid for Heat Cramps -** leave the work area, and rest in a cool, shaded place. Drink one or two glasses of electrolyte replacement drink, and try to gently massage the cramped muscle. Once the spasms disappear, you may return to work; taking adequate breaks and drinking electrolyte replacement drink should prevent the cramps from returning.

HEAT EXHAUSTION

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin.
- Heavy sweating.
- Dizziness.
- Nausea.
- Fainting.

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated. It is important to

recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion - leave the work area immediately, go through decon and remove all chemical protective clothing. Rest in a cool, shaded place and open your clothing to allow air circulation; lay flat except when taking fluids. Drink plenty of cooled electrolyte replacement drinks. Your work is over for the day; do not attempt to return. Medical assistance in severe cases may be warranted.

HEAT STROKE

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin.
- Lack of or reduced perspiration (lack of perspiration may be masked for those wearing chemical protective clothing since perspiration from earlier in the day will be present).
- Nausea.
- Dizziness and confusion.
- Strong, rapid pulse.
- Coma.

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY! Remove the victim from the work area, perform a gross decon, and remove all PPE. Have the victim lie down in a cool, shady area. Attempt to bring the victim's temperature down by increasing air movement (electric fan) or placing wetted sheets or towels on them. Place an ice bag on the victim's head. The victim must not be sent home or left unattended without a physician's specific order.

HEAT STRESS PREVENTION

The best approach to avoiding heat-related illnesses is through preventative heat stress management. The site manager and site safety officer are responsible for implementing this program.

Rest areas - a relatively cool, shaded area must be provided for breaks when ambient temperatures exceed 70° F and workers are wearing chemical protective clothing (including uncoated Tyvek), or if temperatures exceed 90° F and workers are wearing "Level D"

coveralls or work clothes. A car or van is an oven, not a rest area. For Hazardous Waste Sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decon area so workers can take breaks without going through full decon. If shade is not available, build some: use a plastic "dining canopy", which can be obtained at sporting goods stores. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.

Liquids - encourage employees to drink plenty of cool plain water and electrolyte replacement drinks. Supplementing water with cool electrolyte replacement drinks, such as Gatorade, Squench or Quik-kick (drink) is helpful to employees who tend to sweat a lot. Do not use "community cups"; use paper cups. Have workers drink 16 ounces of drink before beginning work, such as in the morning and after lunch. At each break, workers should take 8-16 ounces of drink. Don't wait until you are thirsty to drink.

Discourage the use of alcohol during non-working hours, and discourage the intake of coffee during work hours, as these make heat stress control more difficult.

Acclimatization - this is the process by which your body "gets used to" hot work environments. This is achieved by slowly increasing workloads. Start at 50 percent capacity on day one, and increase by 10 percent per day; on day six, you'll be at 100 percent. You don't lose acclimatization over a weekend, but it'll start to decrease after three to four days. If you don't do hot work for a week, it is gone. You don't have to do full shift hot work to achieve or retain acclimatization; a minimum of 100 minutes of continuous hot work exposure per day is adequate.

Auxiliary Cooling - auxiliary cooling is usually obtained by providing workers with a specially-designed vest, which is worn under the protective clothing, but over any underclothing. These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.

The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.

The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.

Auxiliary cooling should be considered when the following conditions exist:

- Ambient temperature over 80° F
- Workers wearing impermeable garments (PE Tyvek, Saranex, Chemrel, etc.)
- It is desirable to have long work shifts with minimum interruption

URS SAFETY MANAGEMENT STANDARD
Heavy Equipment Operations

1. Applicability

This procedure applies to URS field projects where heavy equipment is in operation.

2. Purpose and Scope

The purpose of this procedure is to require that heavy equipment is operated in a safe manner, that the equipment is properly maintained and that ground personnel are protected.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Authorized Operators

1. Evaluate operators through documentable experience (resume) and a practical evaluation of skills.
2. Allow only qualified operators to operate equipment.
3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
4. Maintain a list of operators for the project and the specific equipment that they are authorized to operate.
5. Require operators to use seat belts at all times in all equipment and trucks.
6. Operators shall maintain three points of contact whenever entering and exiting a piece of equipment.
7. Brief operators on the following rules of operation:
    a. Operators are in control of their work area.
    b. Equipment will be operated in a safe manner and within the constraints of the manufacturer's Operation Manual.

c. Operators will stop work whenever unauthorized ground personnel or equipment enter their work area and only resume work when the area has been cleared.

B. Ground Personnel

1. Require that ground personnel on the site have received training and comply with the following rules of engagement:

   a. All ground personnel must wear orange protective vests when in work areas with any operating equipment.

   b. Ground personnel will stay outside of the swing zone or work area of any operating equipment.

   c. Ground personnel may only enter the swing or work area of any operating equipment when:

      1. They have attracted the operator's attention and made eye contact.

      2. The operator has idled the equipment down and grounded all extensions.

      3. The operator gives the ground personnel permission to approach.

   d. Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment.

C. Equipment

1. Maintain operations manuals at the site for each piece of equipment that is present on the site and in use.

2. Require that operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual.

3. Require that all equipment is provided with roll-over protection systems (ROPS). Tracked excavators are exempt from ROPS requirements but must have a cab which provides protection from overhead hazards

4. Verify that seatbelts are present and functional in all equipment.

5. Prohibit the use of equipment which has cab glass which is cracked, broken or missing.

6. Require that backup alarms are functional on all trucks and equipment. Tracked excavators must have bidirectional alarms or the operator must be provided with a spotter whenever tracking in either direction.

7. Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use.

8. Require brakes to be set and wheels chocked (when applicable) when not in use.

D. Inspection and Maintenance

1. Require daily inspections of equipment by operators using Attachment 19-1.

2. Prohibit use of equipment deemed to be unsafe as a result of daily inspection until required repairs or maintenance occur.

3. Conduct maintenance as prescribed by the manufacturer in the Operations Manuals for each piece of equipment.

4. During maintenance/repair, require that:

a. Motors are turned off.

b. All extensions are grounded or securely blocked.

c. Controls are in a neutral position.

d. Brakes are set.

5. Documentation Summary

File the following documents in the Project Health and Safety File.

A. List of authorized operators.

B. Operator qualifications.

C. Daily Equipment Inspection Logs.

D. Site Briefing documentation for operator rules and ground personnel "rules of engagement".

6. Resources

A. U.S. OSHA Standard - Motorized Vehicles and Mechanized Equipment - 29 CFR 1926, Subpart O

B. National Association of Demolition Contractors – Safety Manual

C. Queensland Workplace Health and Safety - Competency Standard for Users & Operators of Industrial Equipment

D. Attachment 19-1 - Equipment Inspection Form

URS	Health and Safety Program **DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST**	Attachment 19-1 Revised: March 2002

Equipment Id No. _____ Inspector's Name _____

Equipment Name _____ Employee No. _____

Beg. Hours _____ End Hours _____ Date _____

INSTRUCTIONS: Each shift shall inspect all applicable items indicated. If an unsatisfactory condition is observed, suspend operation of the equipment and report the unsatisfactory condition to the site supervisor immediately.

ITEM INSPECTED	CHECK IF SATISFACTORY	COMMENTS
Falling Object Protective Structure (FOP)		
Roll-Over Protection Structure (ROP)		
Seat Belts		
Operator Seat Bar(s)		
Side Shields, Screens or Cab		
Lift Arm Device		
Grab Handles		
Back-up Alarm – Working		
Lights		
Guards		
Horn		
Windshield Wipers		
Glass, Mirrors		
Anti-Skid Tread Clear of Mud		
Safety Signs (i.e., counterbalance swing area)		
Fire Extinguisher		
General Condition		
Fuel Connection		
Oil (fuel and no leaks)		
Clear of Extra Materials		
Controls Function Properly		
Damaged Parts		
Hydraulic System (full and no leaks)		
Parking Brake		
Lift Arm and Bucket		
Tires/Tracks		
Steering		
Breathing Air System		
Blast Shields		
Gallons of Fuel Added		
Quarts of Oil Added		

Operator Signature _____

URS SAFETY MANAGEMENT STANDARD

Housekeeping

1. Applicability

This procedure applies to URS facilities and field operations.

2. Purpose and Scope

Proper housekeeping in office locations, on construction sites, and fixed work facilities is essential to prevent fires as well as injuries resulting from slips, trips and falls.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Maintain the cleanliness of the site.

1. Require tools and equipment to be stowed at the end of the day.
2. Store supplies in locations away from walkways and in a manner that will not trip workers.
3. Keep weeds and vegetation away from stockpiled materials and walkways.
4. Maintain flooring and walkways in a clean, dry, smooth condition.
5. Dispose of construction debris in a timely manner.

B. Regularly inspect the work area for slip and trip hazards.

1. Office locations - inspect work areas at least semi-annually. Utilize the check-sheet provided as Attachment 21-1.
2. Field sites - inspect sites at least monthly. Utilize the check- sheet provided as Attachment 21-1.

C. Thoroughly investigate all injuries resulting from slips, trips and falls on site. Correct conditions contributing to injuries.

5. Documentation Summary

A. Office/Laboratory

File Completed Housekeeping Inspection Sheets (Attachment 21-1), in the Office Safety Filing System.

B. Field

File Completed Housekeeping Inspection Sheets (Attachment 21-1), in the Project Safety File.

6. Resources

A. U.S. OSHA Standard - Sanitation - 29 CFR 1910.141

B. U.S. OSHA Standard - Aisles and Passageways - 29 CFR 1910.22.

C. U.K. - 'The Workplace' (Health & Safety and Welfare) Regulations

D. U.K. - 'The Construction' (Health and Welfare) Regulations

E. Attachment 21-1 - Housekeeping Inspection Sheet

URS	Health and Safety Program **HOUSEKEEPING INSPECTION SHEET**	Attachment 21-1

Building or Location: _____

Inspection Conducted by: _____ **Date:** _____

		Yes	No (must be completed)	N/A
	General Site Housekeeping			
1.	No blocking of exits or emergency equipment.			
2.	Equipment or materials are not left lying on the ground.			
3.	Storage areas are free from the accumulation of materials that constitute trip hazards.			
4.	Scrap materials and other debris is kept free from work area.			
5.	Combustible scrap and debris is removed by safe means at regular intervals.			
6.	Oily rags are stored in metal cans with tight fitting lids. Oily rags are removed at the end of the day.			
	Visibility			
7.	Halls, stairways and walkways are well lit.			
8.	Well designed light switches are present in areas where walkways are not always lighted.			
9.	Dust, smoke or steam does not create poor visibility.			
10.	Glare from floodlights or windows does not create poor visibility in work areas.			
	Stairs			
11.	Handrails are tight and at the proper level.			
12.	Handrails extend past the top and bottom step.			
13.	White or yellow strips are painted on the first and last step for better visibility. (Not an OSHA requirement – recommendation only).			
14.	Steps are not rough or defective.			
15.	Stair treads are wide enough and risers consistently spaced.			
16.	Stairs are free of obstructions.			
	Floor Conditions			
17.	Floors of every workroom are clean, and so far as possible, in a dry condition.			
18.	Floors are not oily or overly waxed or polished.			
19.	Where wet floors or processes are present, proper drainage is provided and false floors, mats, or other dry standing places are provided.			
20.	Floor surfaces are finished with non-slip coatings where spills are likely.			
21.	Floors and passageways are free from protruding nails, splinters, holes, or loose boards.			

URS	Health and Safety Program HOUSEKEEPING INSPECTION SHEET	Attachment 21-1

		Yes	No must be completed	N/A
22.	Floors are free of holes and depressions.			
23.	Aisles or pathways are wide enough for easy passage and for carrying objects (48 inches is recommended).			
24.	Ramps are covered with non-slip surfaces or matting.			
25.	Carpets or rugs do not have loose or frayed edges that may catch boots or shoes.			
26.	Walkways are free from extension cords, air hoses and cables.			
27.	Boxes, containers, machine parts or other tripping hazards do not lie in pathways.			
	Ground Conditions			
28.	Trip hazards are not present.			
29.	Fall hazards are not present.			
30.	Holes or changes in ground elevation are either filled or guarded.			
31.	Muddy walkways are filled with gravel to reduce slipping.			
32.	All employees who work in wet or greasy conditions wear slip resistant footwear.			
	Equipment			
33.	Vehicle steps are of adequate size, surface placement for safe dismounting.			
34.	Hand grips or ladders are adequate for getting in and out of equipment.			
35.	Ladders have been checked for damage and removed from service if found unsafe.			

I certify that the above inspection was performed to the best of my knowledge and ability, based on the conditions present on _____

_____

Signature

URS SAFETY MANAGEMENT STANDARD
Medical Screening & Surveillance

1. Applicability

This program applies to employees assigned to work environments where there is a potential for exposure to chemical, biological, and/or physical hazards. Individuals will be selected for medical screening based on regulatory standards, project health and safety plan assessments, the expected use of personal protective equipment, and client contract requirements.

2. Purpose and Scope

The overall goal of this program is to prevent occupational illness and injury by early identification of exposure-related health effects before they result in disease. Medical examinations will be performed in order to determine if employees are capable of safely performing assigned tasks, to verify protective equipment and controls are effectively providing protection, and to comply with governmental regulations. Included are provisions for emergency medical consultation and treatment.

3. Implementation

Office/laboratory locations – Implementation is the responsibility of the Office Manager.

Field activities – Implementation is the responsibility of the Project Manager.

Program Administration – The Occupational Health Specialist (OHS) is responsible for development and administration of this program in coordination with the URS Medical Service Provider (MSP). The OHS will maintain current injury and illness data and participate with Corporate Health & Safety Managers in evaluation of this program. The MSP will provide board certified occupational medicine oversight for the program and will approve medical surveillance protocols.

The United States and Canada locations will follow all requirements of this program.

International locations will follow sections B.1,2,3,5,6,7,8; G.3; and H.1 of this program.

4. Requirements

A. Selection of program participants.

1. The Medical Surveillance Evaluation (MSE) form provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and their supervisor at time of hire for any employee who may work outside an office environment and is to be reviewed for accuracy at each annual performance review. Other reviews are required whenever there is a change in job tasks.

2. Additional site/project specific biological monitoring or toxicological screening may be required in addition to this program's core exam schedule. These medical tests will be specified by the project-specific health and safety plan and will be authorized by the MSP on the exam appointment protocol. Note: See section D.2 if employee will have an initial assignment at a HAZWOPER site.

B. Types of medical screening and surveillance exams

1. A baseline or preassignment baseline exam will be conducted prior to the start of work assignments requiring medical surveillance.

2. Periodic exam schedules are established by the MSP using the following criteria:

   a. Employees performing the following types of work will receive annual exams: construction activities in the exclusion zone of HAZWOPER sites, field work activities in the exclusion zone of HAZWOPER sites for 30 or more days per year, projects involving exposure to OSHA-regulated materials at or above established action levels.

   b. Employees performing the following types of work will receive biennial exams: field work activities at HAZWOPER sites less than 30 days per year; waste disposal activities; non-HAZWOPER environmental sampling; chemistry laboratory, pilot plant projects, or bench scale operations for 30 or more days per year.

3. Employees currently participating in an examination program will receive exit exams when they leave their work assignment as identified in the Exit Exam Determination. In the event an employee declines the exit exam, the employee will be requested to sign a Waiver of Exit Medical Surveillance Exam.

4. Department of Transportation (DOT) exams will be conducted biennially when an employee is assigned to drive a vehicle with a gross weight rating of more than 10,000 pounds or when driving a placarded vehicle of any size used to transport hazardous chemicals. DOT exam certification can be added to a routine baseline or periodic exam protocol when scheduling with the MSP.

5. When noise levels in the employee's work environment equal or exceed an 8-hour time-weighted average of 85 decibels as measured on the A-scale (dBA), annual audiograms will be performed. For employees involved in construction activities or management of construction, enrollment in this program will be required if more than 50% of their time is spent in an active construction area.

6. Individual radiation dose monitoring will be conducted as required by the site-specific health and safety plan with approval by a Radiation Safety Officer. Personal dosimetry (film badges) are typically required, however, depending on the specific radiation hazard, additional excretory monitoring or thyroid scans may be required.

7. In order to determine an employee's ability to wear a respirator, a medical evaluation will be performed before an employee is fit tested or assigned to wear a respirator.

8. Employees assigned to work environments with airborne concentrations of asbestos fibers at or above the established action level will receive asbestos-specific baseline and annual exams. Exit exams will be performed if an exam has not been performed within the past 6 month period or if an employee has medical complaints related to asbestos exposure.

C. Exam protocols

1. The Medical Screening & Surveillance Exam Protocol identifies the medical exam components of this program.

D. Scheduling of exams

1. The Office or Project Manager, usually with assistance of the local H&S Representative, is responsible for contacting the MSP when baseline, exit, and project specific exams are required. The MSP maintains an employee scheduling database for tracking periodic

exams and will contact the employee for scheduling the month their exam is due. These steps are detailed in the Medical Surveillance Exam Process.

2. Construction Services Division employees hired with an initial assignment to work at a OSHA HAZWOPER site whose work duties require passing a physical exam or who have an essential job function of wearing a respirator, will receive a job offer contingent upon passing a preassignment baseline exam. See HAZWOPER & Respirator Preassignment Baseline Exam Process. In the event of an urgent business necessity a temporary clearance to begin work the day of the exam, issued by the local physician and good for 14 days until the MSP physician final clearance is received, may be requested at the time a baseline exam is scheduled through the MSP.

3. If an exam becomes due during an employee's pregnancy, it is advised to defer the exam until after delivery and the employee returns to work from family/medical leave status.

E. Exam Follow Up

1. Following each exam, the MSP will issue a physician's written opinion (Health Status Medical Report) to the site Health & Safety Representative which will include any medical restrictions and address the employee's ability to use personal protective equipment. See Exam Follow Up Procedures.

2. The MSP will mail the exam invoice to the site H&SR who will approve the charge and forward the invoice to the accounts payable department for payment.

3. The MSP will mail an exam results letter that is confidentially addressed to the employee at their home address within 30 days of the exam date.

F. Emergency Medical Care

1. Preplanning is essential to a prompt and proper response to a medical emergency. Site specific emergency procedures will be provided in the site Health & Safety Plan. See Field First Aid Kit Supply List for recommended supplies. The contents of the first aid kit shall be checked prior to being sent out to each site/project and periodically thereafter to ensure the expended items are replaced.

2. A MSP occupational physician can be reached 24 hours a day for phone consultation at WorkCare™ 1-800-455-6155.

3. A workers' compensation claim should be filed by the Human Resource Representative with AIG Claim Services (1-877-366-8423) for an injured employee who receives professional medical care or who is disabled from working beyond the initial date of injury.

4. In order to comply with OSHA reporting regulations, immediately notify the OHS or a Division Health & Safety Manager if there is a work-related hospitalization or death.

G. Medical Records

1. Medical records are maintained and preserved in confidential, locked files in the custody of the MSP for at least the duration of employment plus 30 years. Only information regarding the employee's ability to perform the job assignment will be provided to company representatives.

2. Upon request, each employee (or designated representative) will have access to the employee's medical record. Prior to the release of health information to the employee (or designated representative), a specific written consent must be signed by the employee.

3. International records (excluding the United States and Canada) will be maintained in country at the local clinic.

H. Program evaluation

1. The OHS and Division Health & Safety Managers will evaluate this program annually and as needed. Issues to review include program efficacy and efficiency, employee satisfaction, and cost effectiveness.

2. The MSP will prepare an Annual Medical Trending Report specifying the number and types of exams performed and anonymous statistical exam results in group data format.

3. Each employee is mailed a Post-Exam Evaluation by the MSP. Employee feedback regarding the clinic, medical staff, and exam

procedures are reviewed and corrective actions are identified and acted upon as needed.

5. Documentation Summary

The H&SR will file the Medical Surveillance Evaluation and the Health Status Medical Report in the site health & safety records.

6. Resources

A. U.S. OSHA Technical Links - Medical Screening/Surveillance

B. U.S. OSHA Publication 3162 (1999) Screening and Surveillance: A Guide to OSHA Standards

C. Attachment 24-1 WorkCare Medical History Questionnaire

D. Attachment 24-2 Medical Surveillance Evaluation

E. Attachment 24-3 Medical Screening & Surveillance Exam Protocol

F. Attachment 24-4 Medical Surveillance Exam Process

G. Attachment 24-5 HAZWOPER/Respirator Preassignment Baseline Exam Process

H. Attachment 24-6 Exit Exam Determination

I. Attachment 24-7 Waiver of Exit Medical Surveillance Exam

J. Attachment 24-8 Exam Follow Up Procedures

K. Attachment 24-9 Field First Aid Kit Supply List

L. SMS 8 Asbestos Survey and Oversight Operations

M. SMS 17 Hazardous Waste Operations

N. SMS 42 Respiratory Protection

Medical History Questionnaire

☐ Baseline ☐ Annual/Biennial
☐ Exit ☐ Other _____

Company Name:_____
Office:_____
Date:_____

URS

Medical History Questionnaire

The exam will be at: *Please see Appointment Protocol.*

- Please have your Supervisor or Health & Safety Professional complete the Job Profile on the inside flap of this page if you do not know the responses.

- See your Health & Safety Professional for directions to the clinic. Please bring the completed exam packet and your Authorization.

- Do not eat for 8 hours prior to exam.
  (Water and unsweetened juice or black decaffeinated coffee are allowed)
  (Dry toast if you have an afternoon appointment)

- Avoid all alcohol consumption for 24 hours prior to the exam.

- Avoid loud noise exposure for 14 to 16 hours before the exam.

- If you wear contact lenses, please do not insert them on the day of the exam. Bring a pair of glasses.

- If you use hearing aids, please bring them to the clinic.

- If you have questions, do not read or understand please contact (800) 455-6155.

- The cost of this exam will be borne by your employer. It is important to be on time for your appointment. If you cannot attend your appointment, call (800) 455-6155 to cancel, or your employer may be charged.

Please answer all the questions in this booklet.

Occupational Medicine • Environmental Health • Toxicology

1-(800) 455-6155

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I INSTRUCTIONS

Your supervisor must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisors must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the healthcare professional who will review it.

	Yes	No
Has your employer told you how to contact the healthcare professional who will review this questionnaire?	☐	☐

This questionaire is used to gather information about your health and physical condition, both now and in the past. This information will be used to determine if you can safely perform the duties of your job. This exam is not intended to substitute for care provided by a personal physician. Results of the exam will be sent to your home address. The results of the examination are kept confidential.

I. 1. Print the following information:

Last Name: _____ First Name: _____

Home mailing address: _____

_____

(city) (state) (zip)

Social Security Number: _____ Date of Birth: _____ Age: _____

Sex	Position	Site Location	Date Employed
[ ] Male [ ] Female			

Home Phone	Work Phone	Emergency Contact/Phone #
( )	( )	( )

What is the phone number at which you can be reached by the healthcare professional who reviews this questionnaire (include area code:) (_____) _____

What is the best time to reach you? From: _____ AM/PM To: _____ AM/PM

E-mail: _____

2. **Read and sign this Consent for Release of Medical Records:**
I hereby authorize WorkCare to release in confidence to _____(company) and/or its subsidiaries medical information, including but not limited to the results of medical evaluations, physical examinations or medical testing, as it specifically pertains to my medical qualification to perform the stated Job Duty consistent with the requirements of OSHA, MSHA.
I further authorize the examining physician and/or clinic to release to WorkCare™ any medical information related to my medical or physical condition. You have a right to receive a copy of this authorization.

Signature: _____ Date: _____

Job Profile

II THIS SECTION IS TO BE COMPLETED

If you have questions about the job, these need to be discussed with the employer.

JOB DUTY / TITLE What is the main job duty (present or proposed) for this individual?
(Example: Driller, Water Treatment, Ground Water Sampling, Engineer, Environmental Scientist, Lab Tech, Heavy Equipment Operator, Maintenance Worker, etc.)

_____

_____

WORK SCHEDULE _____ % Field _____ % Office _____ % Travel

PHYSICAL REQUIREMENTS

Yes ☐ No ☐

Are there any specific physical demands of the job that are important? (example: lifting, carrying)
If yes, please specify:

_____

PROTECTIVE EQUIPMENT

Yes ☐ No ☐

Is clearance for the use of respiratory protective equipment needed?

Escape only (no rescue) ☐ Emergency rescue only ☐

Yes ☐ No ☐

Is there specific safety equipment (beyond hard hat, gloves, boots, and appropriate clothing) that are used in the safe performance on the job? If yes please specify:

_____

1. **THIS EMPLOYEE USES THE FOLLOWING TYPES OF RESPIRATORY PROTECTIVE EQUIPMENT:**

✓		DURATION	FREQUENCY	TEMPERATURE EXTREMES	HUMIDITY
	HALF FACE PIECE AIR PURIFYING RESPIRATOR				
	FULL FACE PIECE AIR PUIRFYING RESPIRATOR				
	POWERED AIR PURIFYING REPIRATOR				
	SELF-CONTAINED BREATHING APPARATUS				
	AIR LINE RESPIRATOR				

Yes No

2. Is it possible that this individual will be required to wear Level A protection at any time? ☐ ☐
   [SCBA, fully encapsulated suit, chemical resistant gloves & boots.]

3. Is it possible that this individual will be required to wear Level B protection at any time? ☐ ☐
   [SCBA, chemical resistant clothing, chemical resistant gloves & boots.]

4. List potential chemical exposures

   _____

	Yes	No
5. Will you be working under hot conditions (temperatures exceeding 77°F)?	☐	☐
Will you be working under humid conditions?	☐	☐
Will you be working at high altitudes?	☐	☐

   Describe the work you'll be doing while you're using your respirator(s)._____

   _____

6. Describe any special or hazardous conditions you might encounter when you're using your respirator(s)
   (For example, confined spaces, life-threatening gases):_____

   _____

7. During the period you are using the respirator(s), is your work effort:
   a. Light (less than 200 kcal per hour) Yes ☐ No ☐ How long_____hrs per shift
   b. Moderate (200 to 359 kcal per hour) Yes ☐ No ☐ How long_____hrs per shift
   Examples: sitting while mailing or filing; driving a truck or trasferring a moderate load (about 35 lbs) at trunk level; walking on a level surface about 2 mph
   c. Heavy (above 350 kcal per hour) Yes ☐ No ☐ How long_____hrs per shift
   Examples: lifting a heavy load (about 50 lbs.) from the floor to your waist; working on a loading dock; shoveling; standing while bricklaying; climbing stairs with a heavy load (about 50 lbs.)

8. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of other (e.g. rescue, security):_____

   _____

9. Are there any substances which you can not work with? List:_____

III REVIEW OF SYSTEMS

ANSWER YES IF YOU CURRENTLY HAVE THE SYMPTOM OR HAVE HAD SIGNIFICANTLY IN THE PAST

		YES	NO	DATE
1.	A. Fever			
	B. Chills			
	C. Weight Loss			
	D. Loss of energy/fatigue			
2.	A. Poor Vision			
	B. Color Blindness			
	C. Double vision			
	D. Injury to eye			
	E. Cataract			
	F. Glaucoma			
	G. Do you wear glasses or contacts?			
3.	A. Ear Infection			
	B. Mastoid surgery			
	C. Loss of hearing			
	D. Sore throat			
	E. Frequent hoarseness			
	F. Dental problems			
4.	A. Allergies			
	B. Sinus trouble			
	C. Hay fever			
5.	A. Tuberculosis			
	B. Asthma & breathing difficulties			
	C. Lung collapse			
	D. Pneumonia			
	E. Shortness of breath			
	F. Persistent or severe colds			
	G. Persistent or severe coughs			
	H. Chest surgery			
	I. Wheezing			
	J. Emphysema			
	K. Bronchitis			
6.	A. High blood pressure			
	B. Heart murmur			
	C. Enlarged heart			
	D. Heart disease/failure			
	E. Rheumatic fever			
	F. Heart palpitations			
	G. Irregular heart beat			
	H. Heart attack			
	I. Chest pain			
7.	A. Varicose veins			
	B. Stroke			
	C. Leg ulcers			
	D. Swelling of ankles			
	E. Leg pain on walking			
8.	A. Anemia			
	B. Leukemia			
	C. Sickle Cell Disease			
	D. Other blood disease			
9.	A. Diabetes			
	B. Thyroid problems			
	C. Cancer or tumors			
	D. Heart related illness			
10.	A. Rash/dermatitis			
	B. Bruise easily			
	C. Psoriasis			
	D. Wart/mole change			
	E. Eczema/Acne			

		YES	NO	DATE
11.	A. Headaches			
	B. Head injury			
	C. Neck injury			
12.	A. Birth defect			
	B. Frequent backaches			
	C. Back surgery			
	D. Disc disease			
	E. Back injury or strain			
	F. Back x-rays			
	G. Chiropractic treatments			
	H. Arthritis/Rheumatism			
	I. Knee problems			
	J. Swollen joints			
	K. Amputation			
	L. Broken Bones			
	Type:			
	M. Dislocations			
	N. Carpal Tunnel Syndrome			
	O. Repetitive Strain Extremities			
13.	A. Ulcers			
	B. Colitis			
	C. Diarrhea (frequent)			
	D. Stomach problems			
	E. Vomiting			
	F. Bloody bowel movements			
	G. Hepatitis/Abnormal liver enzymes			
	H. Cirrhosis			
	I. Yellow Jaundice			
	J. Gallbladder trouble			
14.	A. Epilepsy/seizures			
	B. Fainting spells			
	C. Loss of consciousness			
	D. Dizziness or vertigo			
	E. Frequent exhaustion			
	F. Trouble with nerves			
	G. Frequent worry/depression			
15.	A. Kidney trouble/stones			
	B. Bladder trouble			
	C. Kidney/bladder surgery			
	D. Blood in urine			
	E. Difficulty urinating			
16.	A. Venereal disease			
	B. Infertility/difficulty conceiving			
	C. Children with birth defects			
17. Female	A. Irregular period/painful menstruation			
	B. Hysterectomy			
	C. Are you pregnant?			
	D. Have you difficulty becoming pregnant?			
	E. Date of last menstrual period			
	F. Date of past pelvic/pap smear			
	G. Date of last mammogram			
	H. Breast lumps			
	I. Breast discharge			
	J. Repeated miscarriages			
18. Male	A. Inability to have an erection			
	B. Discharge or bleeding from the penis			
	C. Abnormal testicular self examination			
	D. Prostate problems			

Describe fully any "Yes" responses by number: _____

_____

Are you currently unable to perform any type of activity? Yes ☐ No ☐ List: _____

_____

IV SOCIAL HISTORY

YES NO

1. Do you now or in the past month smoke cigarettes? ☐ ☐
2. Have you ever smoked cigarettes in the past? ☐ ☐
3. If you now smoke or smoked in the past, how many years total have you smoked? (Write in number)____
4. If you now smoke or have smoked in the past, how many packs per day do/did you smoke on the average? (Choose the closest number)

☐ Less than one-half(½) ☐ One (1) ☐ One and one-half(1½)
☐ Two (2) ☐ Two and one-half (2½) ☐ Three (3)
☐ More than three

5. Do you use any one of the following tobacco products? ☐ ☐

☐ Pipe Tobacco ☐ Cigars ☐ Snuff ☐ Smokeless Tobacco

6. Do you regularly drink alchoholic beverages? ☐ ☐

FOR QUESTIONS 7-9, CHOOSE THE ANSWER WHICH BEST FITS YOU.

7. If yes, how many drinks, beers or glasses of wine do you drink daily?
   ☐ Less than 1 ☐ 1-2 ☐ 3-4
   ☐ 5-6 ☐ 7-8 ☐ More than 8
8. Do you have strenuous exercise for at least 45 min.?
   ☐ Daily ☐ 3 times a week ☐ 1 time a week
   ☐ Rarely ☐ Never
9. Do you feel frustated, stressed or uptight?
   ☐ Daily ☐ 3 times a week ☐ 1 time a week
   ☐ Rarely ☐ Never
10. Do you eat greasy or fatty foods?
   ☐ Daily ☐ 3 times a week ☐ 1 time a week
   ☐ Rarely ☐ Never
11. Do you use street drugs? ☐ Yes ☐ No

V PAST MEDICAL HISTORY

For Annual or Exit Exam - Indicate Change Since Last Exam

1. Are you currently being treated for illness or injury? ☐ Yes ☐ No
2. Have you been treated for persistent illness or injury? ☐ Yes ☐ No
3. Describe fully any "Yes" responses. _____

4. Please list HOSPITAL ADMISSIONS: ☐ If none, check here

YEAR	REASON FOR HOSPITALIZATION
19____	_____
19____	_____
19____	_____

5. Please list allergies to any medication, food, clothing, bee stings or other substances:
   _____
   _____
   _____

YES NO

6. How many days of work did you miss in the last 12 months due to your health? _____
7. Have you ever pursued a compensation claim or received disability payment for occupational injury or disease? ☐ ☐

YES NO

8. Have you ever been turned down for life insurance? ☐ ☐
9. Have you had injuries from an auto accident? ☐ ☐

VI CURRENT MEDICINES

When was the last year you received a tetanus immunization booster? _____ (mo.) / _____ (day) / _____ (yr.)

Do you currently have presciptions for drugs or medications? ☐ Yes ☐ No Please specify:_____

Have you ever been addicted to or consistently used drugs? ☐ Yes ☐ No Please specify:_____

Do you take any of the following medications on a daily basis.

Heart Medicine	☐ Yes	☐ No	Aspirin	☐ Yes	☐ No
Thyroid medicine	☐ Yes	☐ No	Blood pressure medicine	☐ Yes	☐ No
Oral medicine for Diabetes	☐ Yes	☐ No	Diuretic (Water pill)	☐ Yes	☐ No
Insulin for diabetes	☐ Yes	☐ No	Medicine for seizures	☐ Yes	☐ No
Nerve or sleeping pills	☐ Yes	☐ No	Allergy/Asthma medications	☐ Yes	☐ No
Blood thinner	☐ Yes	☐ No	Other:_____		

VII FAMILY HISTORY

Father:	☐ Living	List Diseases _____	If dead, cause of death_____
Mother:	☐ Living	List Diseases _____	If dead, cause of death_____
Brothers:	☐ Living	List Diseases _____	If dead, cause of death_____
Sisters:	☐ Living	List Diseases _____	If dead, cause of death_____

Has any member of the family had any of the following:

Cancer	☐ Yes	☐ No	Diabetes	☐ Yes	☐ No	Nervousness	☐ Yes	☐ No
Insanity	☐ Yes	☐ No	Tuberculosis	☐ Yes	☐ No	Rheumatism	☐ Yes	☐ No
Kidney Disease	☐ Yes	☐ No	Heart Disease	☐ Yes	☐ No			

FOR INITIAL EXAMS ONLY

THIS PAGE IS TO BE COMPLETED ONLY AS INITIAL OR PRE-JOB EXAMS

VIII PAST JOB HISTORY

LIST ALL JOBS EVER HELD STARTING WITH YOUR FIRST - INCLUDE PART TIME AND VOLUNTEER WORK

NAME OF EMPLOYER	FROM MO/YR	TO MO/YR	# HRS WORKED PER WEEK/SHIFT	DESCRIPTION OF WORK	POTENTIAL HAZARDS (DUST, FUMES, CHEMICALS, HEAT, NOISE, PHYSICAL AGENTS, METALS, RADIATION)

IX TOXIC EXPOSURE HISTORY

At work or at home have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g. gases, fumes, dust) or have you come into skin contact with hazardous chemicals?

List _____

_____

Have you worked with any of the materials, or under any of the conditions, listed below:

	YES	NO
Asbestos	☐	☐
Silica (e.g. sandblasting)	☐	☐
Coal (e.g. mining)	☐	☐
Grinding	☐	☐
Welding	☐	☐
Aerosols	☐	☐
Asphalt, pitch or tar	☐	☐
Beryllium	☐	☐
Cadmium	☐	☐
Cotton Dust	☐	☐
Pesticides	☐	☐
Fuel Specify:	☐	☐
Oils	☐	☐
Lead	☐	☐
Nickel/Chrome	☐	☐
Paint	☐	☐
Microwave/Radio Frequency	☐	☐
Nuclear Radiation/X-Ray	☐	☐
Fiberglass	☐	☐
Plastics	☐	☐
Solvents	☐	☐
Compressed Gases	☐	☐
Aluminum	☐	☐
Iron	☐	☐
Tin	☐	☐
Dusty Environments	☐	☐

Have you ever worked around excessive **noise?** ☐ ☐
Where? _____

Have you ever worked in an excessively **hot or cold environment?** ☐ ☐
Where? _____

	YES	NO
Have you ever worked around **vibration** or with **vibrating tools?**	☐	☐
Have you ever worked in a doctor's office, clinic or hospital where you might have had exposure to **biohazardous materials?**	☐	☐
Have you ever performed a **site assesment** on any of the above industry groups or materials?	☐	☐

List: _____

_____

Any other hazardous exposures	☐	☐

If "yes," describe these exposures:

_____

_____

	YES	NO
Have you ever lived near large industrial plants or areas of air pollution?	☐	☐
Have you ever received hazardous duty or environmental pay?	☐	☐
Have you ever been in the military service?	☐	☐
If "yes" were you exposed to biological or chemical agents (either in training or combat?)	☐	☐
Have you ever worked on a HAZMAT team?	☐	☐

List any second jobs or side businesses you have:

_____

_____

List your current and previous hobbies:

_____

_____

RESPIRATOR USERS ONLY

THE FOLLOWING 2 PAGES ONLY NEED TO BE COMPLETED BY THOSE ASSIGNED TO USE REPIRATORS.
IF UNCERTAIN ABOUT RESPIRATOR USE, PLEASE COMPLETE

RESPIRATOR USE

	YES	NO
1. Have you ever worn a respirator in the past?	☐	☐

2. What type of respirator did you wear? (mark all that apply) If no go to question 4
   - ☐ Disposable particulate filter mask (non-cartridge dust mask)
   - ☐ Half face cartridge respirator
   - ☐ Full face cartridge respirator
   - ☐ Powered air purifying respirator
   - ☐ Supplied air (airline) respirator
   - ☐ Self contained breathing apparatus (SCBA)
   - ☐ Escape only respirator

3. If you've ever used a respirator, have you ever had any of the following problems?	YES	NO
Eye irritation	☐	☐
Skin allergies or rashes	☐	☐
Anxiety	☐	☐
General weakness or fatigue	☐	☐
Any other problem or difficulty that interfered with your use of a respirator	☐	☐

_____

_____

HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)

	YES	NO
4. Have you ever had an abnormal EKG (Electrocardiogram)	☐	☐

Explain:

_____

5. Have you ever had any of the following cardiovascular or heart problems?	YES	NO
Heart attack	☐	☐
Stroke	☐	☐
Angina (chest pain)	☐	☐
Heart failure	☐	☐
High blood pressure	☐	☐
Swelling in your legs or feet (not caused by standing or walking)	☐	☐
Heart arrhythmia	☐	☐
Any other heart problem that you have been told about	☐	☐

6. Have you ever had surgery of the arteries, coronary bypass or angioplasty (to correct blocked artery or aneurysm)?(mark only 1 answer)	YES	NO
Yes, within the past year	☐	☐
Yes, more than 1 year ago	☐	☐
No	☐	☐

6. Have you ever had any of the following pulmonary or lung problems?	YES	NO
Asbestosis	☐	☐

HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)

	YES	NO
Asthma	☐	☐
Chronic bronchitis	☐	☐
Emphysema	☐	☐
Pneumonia	☐	☐
Tuberculosis	☐	☐
Silicosis	☐	☐
Lung cancer	☐	☐
Broken ribs	☐	☐
Pneumothorax (collapsed lung)	☐	☐
Any chest injuries or surgeries	☐	☐

	YES	NO
8. Have you ever had seizures (fits)?	☐	☐
9. Have you ever been told you had diabetes (sugar disease)?	☐	☐
10. Have you ever had allergic reactions that interfere with your breathing?	☐	☐
11. Have you ever experienced claustrophobia (fear of closed-in places)?	☐	☐
12. Have you ever had trouble smelling odors?	☐	☐

13. Have you ever had any of the following pulmonary, cadiovascular, lung or heart symptoms?	YES	NO
Shortness of breath	☐	☐
Shortness of breath when walking fast on level ground or walking up a slight hill or incline	☐	☐
Shortness of breath when walking with other people at an ordinary pace on level ground	☐	☐
Have to stop for breath when walking at your own pace on level ground	☐	☐
Shortness of breath when washing or dressing yourself	☐	☐
Shortness of breath that interferes with your job	☐	☐

14. Do you currently take medication for any of the following problems?	YES	NO
Breathing	☐	☐
Heart trouble	☐	☐
Blood pressure	☐	☐
Seizure (fits)	☐	☐

15. Have you within the past had any of the the following symptoms of lung illness?	YES	NO
Coughing that produces phlegm (thick sputum)	☐	☐

HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)

	YES	NO
Coughing that occurs mostly when you are lying down	☐	☐
Coughing up blood in the last month	☐	☐
Wheezing	☐	☐
Wheezing that interferes with your job	☐	☐
Chest pain when you breath deeply	☐	☐
Coughing that wakes you early in the morning	☐	☐
Any other symtoms that you think may be related to lung problems	☐	☐

16. Have you ever had any of the following cardiovascular or heart symtoms?

Frequent pain or tightness in your chest	☐	☐
Pain or tightness in your chest during physical activity	☐	☐
Pain or tightness in your chest that interferes with your job	☐	☐
In the past two years, have you noticed your heart skipping or missing a beat?	☐	☐
Heartburn or indigestion that is not related to eating	☐	☐
Any other symtoms that you think might be related to heart or circulation problems	☐	☐

FULL FACE OR SCBA REPIRATOR USER ONLY

The following questions must be answered by every employee who has been selected to use either a full-face piece respirator or Air Supply Respirator (Self-Contained Breathing Apparatus [SCBA] or air line).

	YES	NO
17. Have you ever lost vision in either eye (temporarily or permanently)?	☐	☐
18. Do you currently have any of the following vision problems?		
Wear contact lenses	☐	☐
Wear glasses	☐	☐
Color blind	☐	☐
Any other eye or vision problem	☐	☐

FULL FACE OR SCBA REPIRATOR USER ONLY (CONT.)

	YES	NO
19. Have you ever had an injury to your ears, including a broken ear drum?	☐	☐
20. Do you currently have any of the following hearing problems?		
Diffculty hearing	☐	☐
Wear a hearing aid	☐	☐
Any other hearing or ear problem	☐	☐

Explain: _____

_____

_____

_____

21. Have you ever had a back injury?	☐	☐
22. Do you currently have any of the following muscle or skeletal problems?		
Weakness in any of your arms, hands, legs or feet	☐	☐
Back pain	☐	☐
Difficulty fully moving your arms and legs	☐	☐
Pain or stiffness when you lean forward or backward at the waist	☐	☐
Difficulty fully moving your head up and down	☐	☐
Difficulty fully moving your head side to side	☐	☐
Difficulty bending at your knees	☐	☐
Difficulty squatting to the ground	☐	☐
Difficulty climbing a flight of stairs or a ladder carrying more than 25 lbs.	☐	☐
Any other muscle or skeletal problems that might interfere with using a respirator	☐	☐

Explain: _____

_____

_____

_____

X FOR YEARLY / EXIT EXAMINATIONS ONLY

1. a. Approximately how many days of hazardous field work have you performed since your last examination? _____

   b. Approximately how many days in Level C (using an air-purifying respirator)? _____

   c. Approximately how many days in Level B (self-contained breathing apparatus or air line)? _____

2. Approximately how many different hazardous material sites have you worked on since your last examination? _____

3. What were the chemical or other hazards of concern to which you have potential exposure since your last examination? (e.g. gasoline, arsenic, trichlorethylene, radiation, asbestos)

Chemicals of Concern	Approximate # of Days	Exposure Frequency			Exposure Duration		
		Daily	Weekly	Monthly	< 1 Hr.	1-8 Hrs.	> 8 Hrs.

4. **Since your last exam,** have you had difficulty doing your job because of:

a.	Sensitivity to chemicals, dust, sunlight, etc.? (circle one)	**Yes**	**No**	**Don't Know**
b.	Inability to perform certain motions? (circle one)	**Yes**	**No**	**Don't Know**
c.	Inability to assume certain positions? (circle one)	**Yes**	**No**	**Don't Know**
d.	Heat Stress? (circle one)	**Yes**	**No**	**Don't Know**
e.	Other medical reasons? (circle one)	**Yes**	**No**	**Don't Know**

5. Have you experienced any health symptoms that may be related to exposures to hazardous materials since your last examination? If so, please describe:

_____

6. **Since your last examination,** have you had any type of illness that resulted in more than 3 consecutive days lost time from work? Yes No List: _____

7. Do you feel that you have and/or had exposure to ticks? [ ] No [ ] Yes When _____
   If "Yes", how would you quantify your potential exposure?
   [ ] Very significant [ ] Significant [ ] Insignificant [ ] None [ ] Unknown
   Have you ever had any symptoms or signs (e.g. rash) which you attribute to tick bites? [ ] No [ ] Yes
   If "Yes", please describe:

_____

8. a. How would you rate the effectiveness of the health and safety procedures used for work?
   Check One [ ] Poor [ ] Fair [ ] Good [ ]Excellent

   b. Comments: _____

	YES	NO		YES	NO
9. Have you ever had an illness, condition or symptom which:			10. Have you ever developed illness or symptoms which you think were related to your work?	☐	☐
Occurred only during work?	☐	☐	11. Have you ever worked with a substance which made your nose, chest, or sinuses congested?	☐	☐
Occurred only after work, in evening?	☐	☐	12. Have you ever worked with substances that irritated your skin or caused a rash?	☐	☐
Occurred when you begin work after a weekend or holiday?	☐	☐			
Disappeared during vacations or weekends?	☐	☐			

	YES	NO
13. Would you like to talk to the healthcare professional who will review this questionnaire about your answers to this questionnaire?	☐	☐

STOP!: PHYSICIANS COMPLETE THE REMAINING SECTIONS.

PHYSICAL EXAMINATION AND SUPPORTING STUDIES

(Please initial on Authorization Form when completed)

HEIGHT	WEIGHT	TEMP.	BLOOD PRESSURE
_____inches	_____lbs.	_____°F	_____/_____

PULSE (Resting) _____ /min.

For D.O.T. only:	Pulse immediately after 2/min. exercise:_____

VISION Visual acuity (if applicant wears glasses, test and record both with and without glasses.)

NEAR	Left	Right	Both
Corrected	20/_____	20/_____	20/_____
Uncorrected	20/_____	20/_____	20/_____
FAR	Left	Right	Both
Corrected	20/_____	20/_____	20/_____
Uncorrected	20/_____	20/_____	20/_____

COLOR VISION

- Normal ☐
- Abnormal ☐
- Can recognize Red & Green ☐

PERIPHERAL VISION

- Normal ☐
- Abnormal ☐

URINALYSIS

Specified Gravity _____ Albumin_____ Female: LMP _____

Sugar _____ Blood _____

AUDIOGRAM (If marked YES on Exam Checklist):

	500	1000	2000	3000	4000	6000	8000
Right	_____	_____	_____	_____	_____	_____	_____
Left	_____	_____	_____	_____	_____	_____	_____

Note: Testing documentation must be forwarded to WorkCare

SPIROMETRY (If marked YES on Exam Checklist):

FVC _____ Observed Vol. FEV_1 _____ Observed Vol. $\frac{FEV_1}{FVC}$ _____%

FVC _____ Predicted %_____ FEV_1 _____ Predicted %_____

Note: Testing documentation must be forwarded to WorkCare

EKG (If marked YES on Exam Checklist);

☐ Normal ☐ Abnormal

Note: All EKG strips must be forwarded to WorkCare

CHEST X-RAY (If marked YES on Exam Checklist):

☐ Normal ☐ Abnormal

Comments: _____

_____

SPECIMEN COLLECTION PER EXAM CHECKLIST

All laboratory specimens must be shipped by the day of the exam! If this is a Friday exam, mark Airbill for Saturday delivery. Exam data should be included for shipment in the box with the laboratory specimens.

MEDICAL EXAMINATION

CHECK LIST	NORMAL	ABNORMAL	DETAILED DESCRIPTION OF ABNORMAL FINDINGS
HANDS/SKIN			
HAIR	☐	☐	
SKIN COLOR/TEXTURE	☐	☐	
NAILS	☐	☐	
HEAD/EYES/EARS/NOSE/THROAT/MOUTH			
CONFIGURATION	☐	☐	
LIDS/CONJ/SCLERA	☐	☐	
PUPILS/FUNDI/EOM	☐	☐	
PINNA/CANALS/TM	☐	☐	
NASAL SEPTUM/MUCOSA	☐	☐	
TEETH/GUMS/TONGUE/PALATE	☐	☐	
NERVOUS SYSTEM			
CENTRAL	☐	☐	
MOTOR	☐	☐	
SENSORY	☐	☐	
CEREBELLAR	☐	☐	
REFLEXES	☐	☐	
NECK/NODES			
BRUIT	☐	☐	
ROM	☐	☐	
MUSCLE STRENGTH	☐	☐	
THYROID	☐	☐	
CERVICAL NODES	☐	☐	
INGUINAL/AXILLARY NODES	☐	☐	
CHEST/LUNGS			
SHAPES/SYMMETRY	☐	☐	
DIAPHRAGMATIC EXCURSION	☐	☐	
PERCUSSION	☐	☐	
AUSCULTATION	☐	☐	
CARDIOVASCULAR			
CAROTIDS	☐	☐	
NECK VEINS/PULSES	☐	☐	
HEART SOUNDS (MURMURS)	☐	☐	
HEART SIZE	☐	☐	
GASTRO/INTESTINAL			
LIVER	☐	☐	
SPLEEN	☐	☐	
MASSES	☐	☐	
TENDERNESS	☐	☐	
SCARS	☐	☐	
HERNIA	☐	☐	
MUSCULOSKELETAL/EXTREMITIES			
SPINAL ALIGNMENT	☐	☐	
EXTREMITIES	☐	☐	
(EDEMA, VARICOSITIES)	☐	☐	
JOINTS	☐	☐	
ROM	☐	☐	

COMMENTS:

EXAMINING PHYSICIAN (PRINT)	PHYSICIAN SIGNATURE	DATE

SUMMARY OF FINDINGS AND COMMENTS RELEVANT TO ABNORMAL CONDITIONS

_____

_____

_____

_____

_____

_____

_____

Signature of Licensed Examining Physician: _____

Printed Name: _____

Phone: (____) _____

INSTRUCTION FOR PHYSICIAN/CLINICIAN

1. The results of the required testing should be recorded on page 10.

2. Please be sure to note EKG and chest x-ray readings on NORMAL or ABNORMAL on page 10 if **required for this exam.**

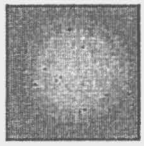
3. Please review any YES answers ONLY for questions on pages 4, 5, 7, 8 and 9 of this booklet.

You are not required to review the other history questions.

4. Your physical examination findings should be recorded on page 11.

5. The booklet and any specimens must be shipped to our laboratory **THE DAY OF THE EXAM.**

QUESTIONS? CALL *WorkCare* 1-800-455-6155



WORKCARE™

Transforming Occupational Health

1-(800) 455-6155

Rev. 1/2000

URS	Health and Safety Program **MEDICAL SURVEILLANCE EVALUATION**	Attachment 24-2 Revision: 09/01/01

This information will be used to determine routine medical screening exams for employees who work outside of an office setting. In addition, Site Health and Safety Plans may specify project related medical surveillance for regulated substances.

Please answer each question.

Date _____

Name _____

Phone _____ SSN _____ Employee # _____

Job Title _____

Location _____ Supervisor _____

Health & Safety Representative _____

Division _____ Region/ Business Unit _____

Choose One: ❑ New Employee ❑ Current employee w/ job change
❑ Transfer from _____office

The following questions assess federally mandated medical screenings and surveillance requirements:

	Yes	No	
Respirator	❑	❑	Does your job require you to wear a respirator or be certified for respirator use? If yes, how many days per year? ❑ 1-29 ❑ 30+
Hearing	❑	❑	Does your job require you to wear hearing protection because you: a) Work in an environment where noise levels equal or exceed an 8-hour time-weighted average of 85 decibels? b) Perform construction activities or construction management around heavy equipment on a construction project more than 50 percent of the time?
Asbestos	❑	❑	Do you perform intrusive work with asbestos? (i.e., sampling, demolition, etc.)
Lead	❑	❑	Are you currently performing construction work where you may be exposed to lead above the OSHA action level or are you currently in a job that required you to be in a medical surveillance

	Yes	No	
			program for lead> (i.e. removal of lead based paint or other demolition activities)
Radiation	❑	❑	Are you classified as a radiation worker?
DOT Driver	❑	❑	Do you drive a truck with a gross vehicle weight rating of 10,000 pounds or more during company trips?
Biohazard	❑	❑	Does you job require work with bloodborne pathogens?
Remediation	❑	❑	Do you perform heavy remediation construction activities, field CONSTRUCTION sampling or supervision activities at hazardous waste sites or HAZWASTE treatment, storage, or disposal (TSD) facilities which could expose you to hazardous substances above permissible exposure levels? (i.e. exclusion zone). If yes, how many days per year? ❑ 1-29 ❑ 30+
Field and Lab	❑	❑	Answer Yes if you do ANY of the following: a) Work at HAZWOPER sites 1 to 29 days per year b) Perform waste disposal activities c) Perform non-HAZWOPER environmental sampling d) Work in a chemistry laboratory 30 or more days per year e) Work on a pilot plant project 30 or more days per year f) Conduct bench scale operations 30 or more days per year
Other	❑	❑	Site/Project specific biological monitoring or toxicological screening as specified by the project-specific health and safety plan.

Distribution:

- ❑ Supervisor,
- ❑ Site Health and Safety Representative,
- ❑ Medical Service Provider, *WorkCare*

Employee Signature _____ Date _____

Supervisor Signature _____ Date _____

URS SAFETY MANAGEMENT STANDARD

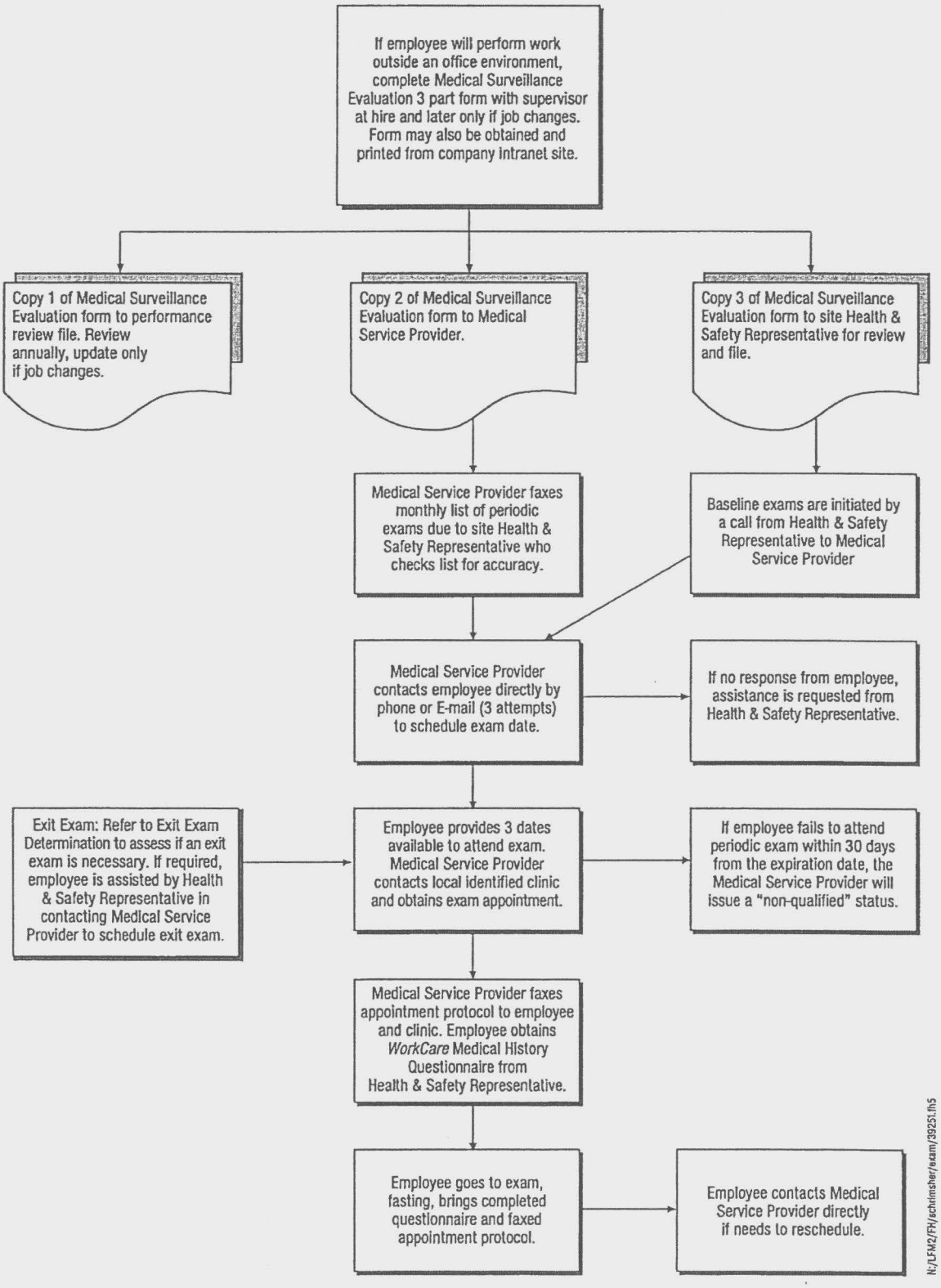
Medical Screening & Surveillance Exam Protocol

PROTOCOL	HAZWOPER Baseline or Preassignment Baseline	HAZWOPER Annual or Biennial	HAZWOPER Exit	DOT Driver Certification (Baseline and Biennial)	ASBESTOS (Baseline, Annual and Exit)	MINI-RESPIRATOR (Baseline and Biennial)
Medical History & Respiratory Questionnaire	X	X	X	X	X	X
OSHA Asbestos Questionnaire (Initial or Periodic)					X	
Medical Exam	X	X	X	X	X	If indicated by questionnaire
Physical Exam (height, weight, pulse, oral temperature, blood pressure)	X	X	X	X	X	
Non-resting pulse				X		
Vision	X	X	X	X	X	
Urinalysis	X	X	X	X		
Audiogram (hearing test)	X	X	X	X	(If indicated by project noise levels)	
Spirometry (pulmonary function test)	X	X	X		X	X
Electro-cardiogram (EKG)						
EKG Age < = 40	X	Every 3 years for annual, every 4 years for biennial				
EKG Age 41-55	X	Every 2 years				
EKG Age 56+	X	Every year for annual, every 2 years for biennial				
Chest x-ray (one view)						
Age < or = 40	X	Every 4 years	If symptomatic or due on periodic		Baseline and every 5 years per OSHA 1910.1001	
Age 41-50	X	Every 3 years for annual, every 4 years for biennial	If symptomatic or due on periodic		Baseline and every 2-5 years per OSHA 1910.1001	
Age 51-54	X	Every 2 years	If symptomatic or due on periodic		Baseline and every 2-5 years per OSHA 1910.1001	
Age 55+	X	Every year for annual, every 2 years for biennial	If symptomatic or due on periodic		Baseline and every 1-5 years per OSHA 1910.1001	
B-reader					X	
Complete Blood Count with White Cell Differential	X	X	X			
Blood Chemistry Panel	X	X	X			

*Note: Additional entry, periodic, and exit biological monitoring or toxicological screening may be indicated in the project-specific health & safety plan. Examples include: blood lead/ZPP, serum/RBC cholinesterase, urine heavy metals (arsenic, cadmium, mercury, chromium, or beryllium), urine radiation (thorium, uranium), biological vaccinations (hepatitis B, hepatitis A), blood benzene, blood beryllium LPT, etc.

Attachment 24-4

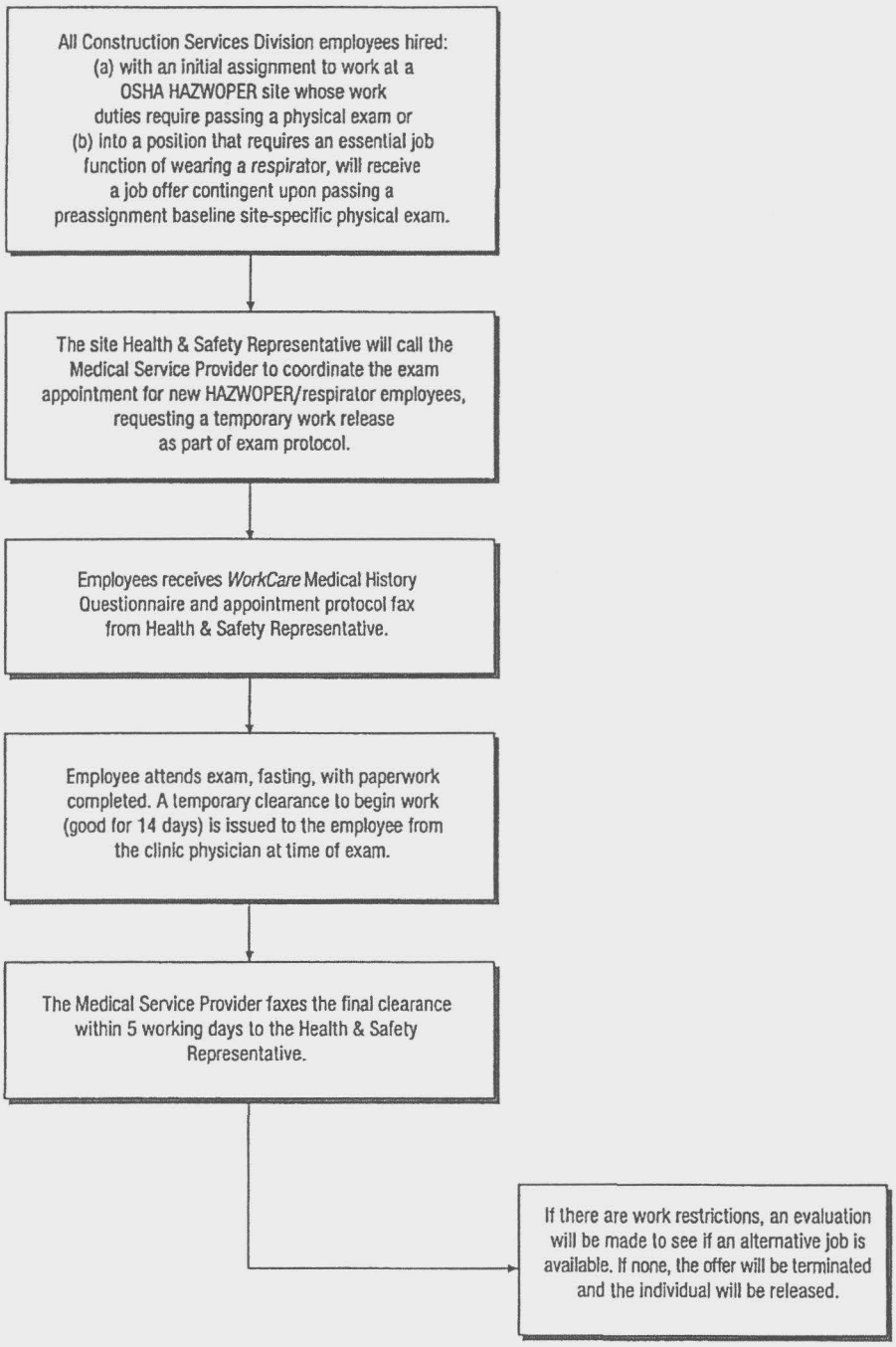
Medical Surveillance Exam Process



URS Corporation

Attachment 24-5

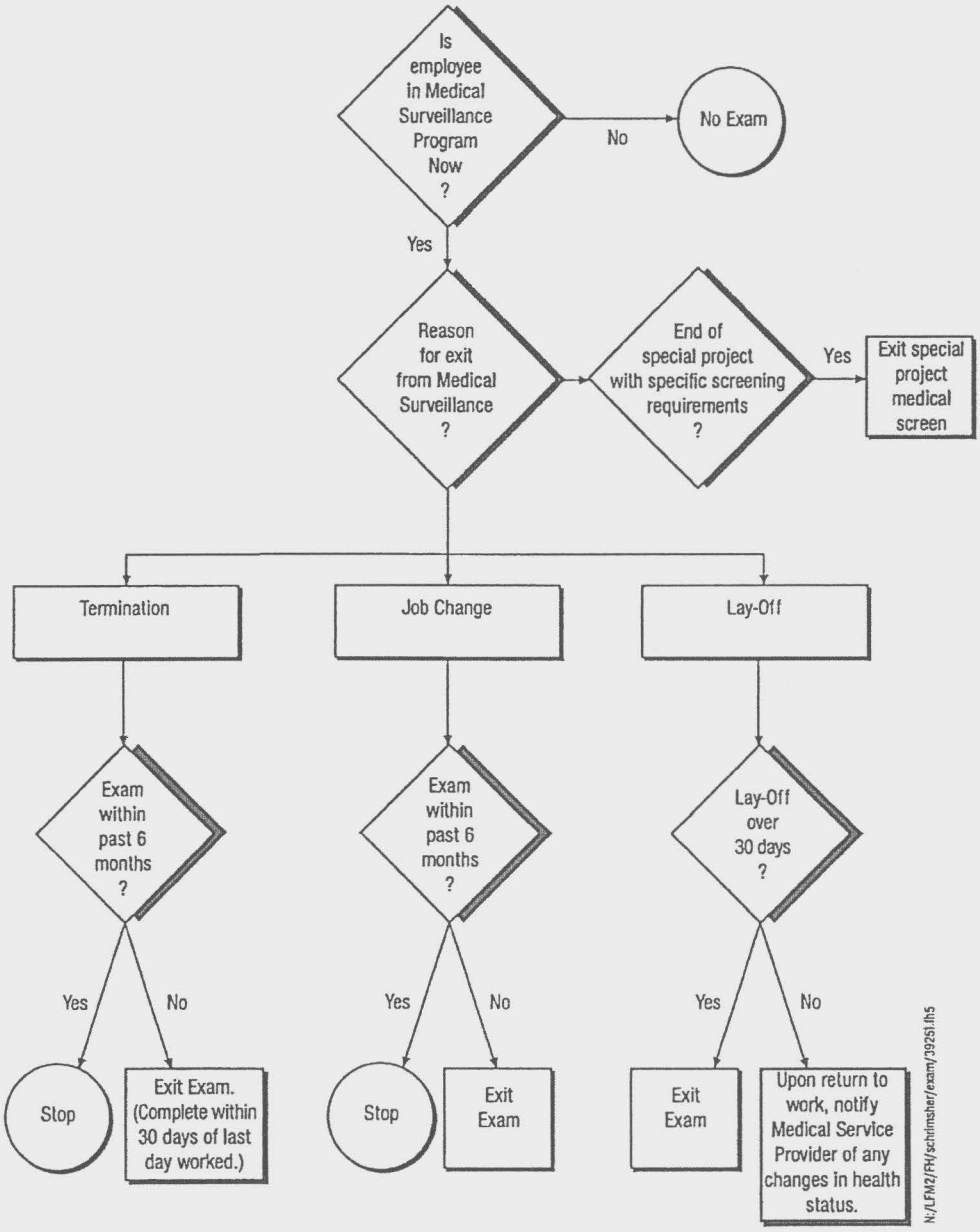
Construction Services Division
HAZWOPER & Respirator Preassignment Baseline Exam Process



N:/LFN2/FH/schulmsher/exam/39251.ch5

Attachment 24-6

Exit Exam Determination



Note:

Exit exams from Medical Service Provider or previous employer may be used for review as a URS Corporation baseline exam if completed within the past 3 months. A *WorkCare* Medical History Questionnaire is completed by the employee and submitted with a copy of the previous exam for physician review and approval.

URS	Health and Safety Program **WAIVER OF EXIT MEDICAL SURVEILLANCE EXAM**	Attachment 24-7

I have been a participant in URS' Medical Screening & Surveillance Program which entitles me to an exit medical screening exam upon reassignment to a position that does not require medical clearance or termination of my employment. I understand that URS encourages employees to schedule and complete an exit medical exam, however, I voluntarily relinquish the opportunity to have an exit medical exam.

Name _____

Employee Number _____

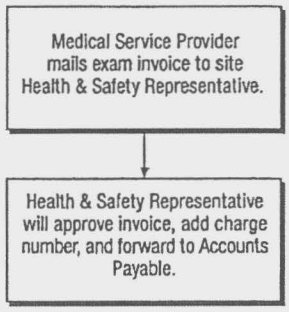
Date _____

Employee Signature:_____

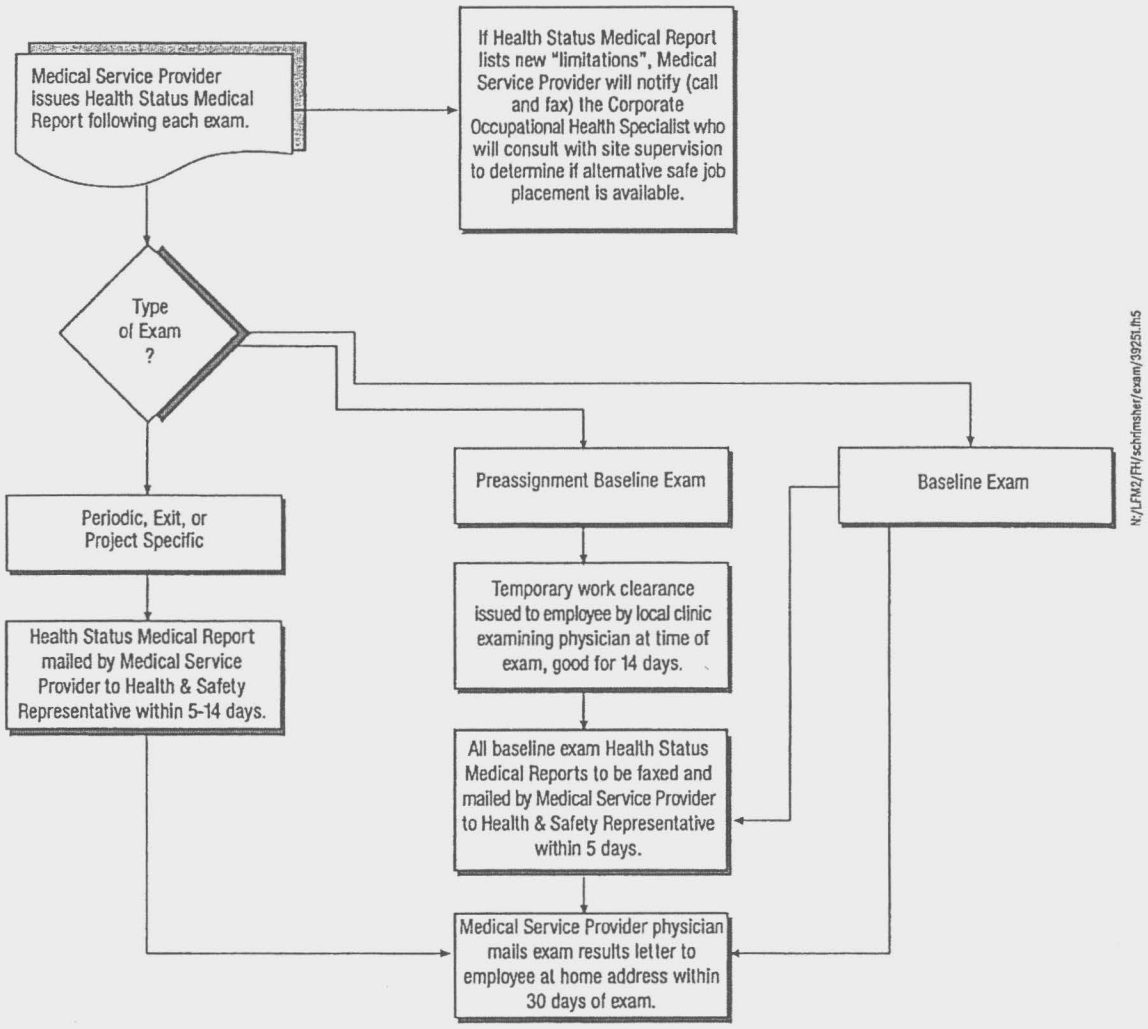
Attachment 24-8

Exam Follow Up Procedures

Billing



Medical Surveillance Exam Clearances



URS	Health and Safety Program **FIELD FIRST AID KIT SUPPLY LIST**	Attachment 24-9

- Portable, plastic or metal, water resistance first aid kit, with handle
- Bloodborne pathogens personal protective equipment kit (minimum requirements are latex gloves and CPR shield)
- First aid manual
- Ace bandage 3"
- Assorted band aids
- Sterile gauze pads 4" x 4"
- Sterile non-stick gauze pads 2" x 3"
- Paper tape (hypo-allergenic)
- Burn ointment (for minor burns, use after cold water soak)
- Antibiotic ointment (Neosporin or generic)
- Alcohol prep pads
- Iodine prep pads (if not allergic to iodine, use after soap and water wash for bloodborne exposure)
- Ice pack
- Gauze roll 2"
- Butterfly strips (wound closure)
- Tweezers (one use, disposable)
- Temperature strips
- Flashlight
- Triangular bandage
- Bandage scissors
- Sterile normal saline eye wash, 4 ounce bottle
- Ammonia inhalant ampoules
- Insect sting relief wipes or spray

URS Safety Management Standard

New Employee Health and Safety Orientation

1. Applicability

This procedure is applicable to newly hired URS Corporation personnel.

2. Purpose and Scope

The New Employee Health and Safety Orientation is designed to introduce new employees to the URS Corporation Health and Safety Management System. The orientation is intended to be a brief overview, and does not take the place of task or program specific health and safety training. In the course of the orientation, the manager will determine which additional training courses the new employee needs to complete prior to being assigned to specific job tasks.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

It is anticipated that this SMS will primarily be implemented in the office. However, for those new employees who have already completed appropriate training for field tasks, the orientation may be conducted by the Project Manager.

4. Requirements

A. Time for completion

Complete the New Employee Health and Safety Orientation within one week of the employee's start date.

B. Address the following General Orientation Topics (use Attachment 25-1):

1. Office/Project Emergency Action Plan.

    a. Evacuation routes and assembly areas.

    b. Fire extinguishers/alarms.

    c. Office layout.

2. Reporting unsafe or unhealthful working conditions.

a. General reporting to supervisor.

b. Anonymous reporting to Health and Safety Representatives.

3. Incident Reporting - SMS 49

a. Report all work-related injuries, illnesses, near misses, and property damage to your supervisor or Health and Safety Representative immediately.

b. An Incident Report form should be completed and distributed within 24 hours.

4. General office safety.

5. URS Corporation Health and Safety Management System overview.

a. Health and safety organization and representatives.

b. Philosophy and responsibilities.

6. Health and safety training program.

a. Describe program.

b. Review training background.

c. Obtain training certificates; send to Regional Health and Safety Manager.

d. Assign training courses per assignment.

7. Health and safety committees (where applicable).

a. Describe committee organization.

b. Introduce to committee chair.

C. Address the following Field Orientation Topics (use Attachment 25-1):

1. Obtaining Safe Work Plans.

a. Describe Hazard Analysis Process.

b. Review forms and Project Hazard Analysis Process.

2. Obtaining personal protective clothing and equipment.

   a. Review SMS for PPE

   b. Describe process for obtaining PPE.

3. Company's Medical Screening and Surveillance Program – SMS 24

   a. Describe program requirements.

   b. Determine if program participation is required. In order to determine if program participation is required, the Medical Surveillance Evaluation form is to be completed by the employee and their supervisor for any employee who may work outside an office environment.

5. Documentation Summary

File these records in the Safety Filing System:

A. Completed New Employee Safety Orientation Checklist.

B. Medical Surveillance Evaluation form.

6. Resources

A. Health and Safety Management System

B. Office Emergency Action Plan

C. Incident Reporting - SMS 49

D. Medical Screening and Surveillance Program - SMS 24

E. Attachment 25-1 – New Employee Safety Orientation Checklist

URS	New Employee Safety Orientation Checklist	Attachment 25-1

Employee: _____ Employee # _____

Business Unit: _____ Date: _____

GENERAL SAFETY	
Office Emergency Action Plan	
• Evacuation routes and assembly alarms	☐
• Locations of fire extinguishers and alarms	☐
• General Office layout	☐
• First aid kits	☐
Reporting unsafe or unhealthful working conditions	
• General reporting of unsafe conditions to Supervisor	☐
• Anonymous reporting to Health and Safety Representative	☐
Incident Reporting System	
• Incident report form	☐
• Workers compensation claim	☐
URS Health and Safety Management System Overview	
• Health and safety organization and representatives	☐
• Philosophy and responsibilities	☐
Health and Safety Training Program	
• Program description	☐
• Training background review	☐
• Provide copies of training certificates	☐
• Assign training courses appropriate for assignment	☐

FIELD SAFETY	
Obtaining Safe Work Plans (Health and Safety Plans)	
• Describe Health and Safety Plans	☐
• Review importance of compliance with plans	☐
Obtaining personal protective clothing and equipment	
• Review Safety Management Standard for PPE	☐
• Describe process for obtaining PPE	☐
URS Medical Surveillance Program	
• Describe program elements	☐
• Determine if program participation may be required	☐
• Schedule employee physical	☐
• Determine if drug testing program is required	☐

Conducted By _____ Employee Signature _____

URS SAFETY MANAGEMENT STANDARD
Noise and Hearing Conservation

1. Applicability

This procedure applies to URS Corporation facilities and field operations where URS Corporation personnel may encounter noise exposures that may exceed 85 dBA as an 8 hour Time Weighted Average.

2. Purpose and Scope

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

3. Implementation

Office/Lab locations:	High noise is unlikely to be encountered at URS offices, however, if applicable, the implementation of this program is the responsibility of the Office Manager.
Field Activities:	Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. General

The use of hearing protectors in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Use of hearing protectors may only be discontinued when noise levels are verified to be less than 85 dBA through a properly conducted noise survey. Whenever information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the project manager or location manager will be responsible to enforce the proper use of hearing protectors.

B. Hearing Protectors

1. Require that at least two (2) types of hearing protectors are available to employees free of charge, preferably a plug and a muff type.

2. Minimum Noise Reduction Ratings (NRR)

Hearing protectors issued must have the following minimum NRR:

Ear Plug	Muffs
29 dBA	27 dBA

3. Require that hearing protectors are used and thus effectively protect hearing.

C. Noise Surveys

1. Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Safety Program Representative.

2. Sound level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).

D. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered follow:

1. Addition or replacement of mufflers on motorized equipment.

2. Addition of mufflers to air exhausts on pneumatic equipment.

3. Following equipment maintenance procedures to lubricate dry bearings.

4. Isolation of loud equipment with newer and quieter models.

E. Audiometric Exams

1. Tests

Details on the medical surveillance program (including audiometric testing) are included in SMS 24.

Audiometric tests shall be performed by a person meeting OSHA's 1910.95 (g)(3)'s definition. Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram shall be established against which subsequent audiograms can be compared. Testing to establish a baseline audiogram shall be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that

baseline audiogram shall be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram shall be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if there is a standard threshold shift (STS). If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer will obtain a retest within 30 days and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee within 21 days of the determination.

2. Standard Threshold Shifts

   If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

F. Training

Verify that each employee who must work in a noisy environment is current on the required Hearing Conservation Training. Training must include the following topics:

1. The effects of noise on hearing.
2. The purpose of hearing protectors.
3. The advantages and disadvantages of various types of hearing protectors.
4. The attenuation of various types of hearing protection.
5. The selection, fitting, care, and use of hearing protectors.
6. The purpose of audiometric testing.

7. An explanation of the audiometric testing procedure.

5. Documentation Summary

A. File these records in the Office Safety Filing System:

1. Noise surveys, when applicable.
2. Training Records.

B. File noise surveys, when applicable, in the Project Safety File:

6. Resources

A. U.S. OSHA Standard – Occupational noise exposure – 29 CFR 1910.95

B. U.S. OSHA Construction Standard – Occupational noise exposure – 29 CFR 1926.52

C. U.S. OSHA Technical Links - Noise and Hearing Conservation

D. American Industrial Hygiene Association: The Occupational Environment – Its Evaluation and Control, Chapter 20. Fairfax, VA: 1997

E. National Hearing Conservation Association web site

F. URS SMS 24 Medical Screening and Surveillance

URS Safety Management Standard
Personal Protective Equipment

1. Applicability

This program applies to URS Corporation laboratory and field operations where the use of Personal Protective equipment (PPE) is warranted. Refer to SMS 42, "Respiratory Protection", for respiratory hazards. Hearing Protection issues are additionally addressed in SMS 26, "Noise and Hearing Conservation."

2. Purpose and Scope

This procedure provides information on recognizing those conditions that require personal protective equipment as will as selecting personal protective equipment for hazardous activities.

3. Implementation

Shop/Lab Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Perform hazard assessments for those work activities that are likely to require the use of PPE.

   1. Use Attachment 29-1 to perform the assessment.

   2. Reevaluate completed hazard assessments when the job changes.

B. Eliminate the hazards identified in Attachment 29-1, if possible, through engineering or administrative controls.

C. Select PPE that will protect employees if hazards cannot be eliminated.

   1. See Attachment 29-1 for recommended PPE.

   2. Review Material Safety Data Sheets for chemicals used for PPE recommendations.

   3. If needed, consult with the URS Health and Safety Representative for assistance in selecting PPE.

D. Provide required PPE to employees free of charge (excluding in some instances components of standard work attire such as steel-toed boots), assuring that it fits properly giving them a choice if more than one type is available.

E. Whenever a hazard is recognized, and PPE is required, the employees will be provided with the appropriate PPE. However, when a PPE is not required, and the employee selects to wear his or her own PPE, the project manager shall ensure that the employee is properly trained in the fitting, donning, doffing, cleaning, and maintenance of his or her employee owned equipment.

F. Conduct and document employee training.

1. Train all employees who are required to wear PPE.
2. Require that training includes:
   a. When PPE is necessary to be worn.
   b. What PPE is necessary.
   c. How to properly don, doff, adjust and wear PPE.
   d. Limitations of PPE
   e. Proper care, maintenance, useful life and disposal of PPE.
3. Training must be conducted before PPE is assigned.
4. Refresher training is needed when:
   a. New types of PPE are assigned to the worker.
   b. Worker cannot demonstrate competency in PPE use.
5. Keep written records of the employees trained and type of training provided, including the date of training.

G. Maintain Protective Equipment

1. Check personal protective equipment for damage, cracks, and wear prior to each use. Replace or repair equipment not found in good condition.

2. Wash off contaminated protective equipment with water and mild soap, if necessary, to prevent degradation of the equipment.

H. Periodically inspect worksites where employees are using personal protective equipment, using Attachment 29-2.

1. Field activities – inspect work sites at least monthly.

2. Office locations – inspect work sites semi-annually.

5.0 Documentation Summary

A. Records required in the Project Safety File:

1. Completed Hazard Assessment Certification Forms (Attachment 29-1)

2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)

3. Documentation of employee training.

B. Records required in the Laboratory Safety Filing System:

1. Completed Hazard Assessment Certification Forms (Attachment 29-1)

2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)

3. Documentation of employee training.

6.0 Resources

A. U.S. OSHA Standards - Personal Protective Equipment -29CFR 1910 Subpart I (http://www.osha-slc.gov/SLTC/lead/index.html)

B. U.S. OSHA Construction Standard - Personal Protective Equipment –29 CFR 1926 Subpart E (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_E.html)

C. U.S. OSHA Technical Links - Personal Protective Equipment (http://www.osha-slc.gov/SLTC/personalprotectiveequipment/index.html)

D. Australian Standards SAA HB9-1994 - Occupational Personal Protection

E. American National Standards Institute, ANSI Z89.1-1986, Protective Headwear (http://www.ansi.org/cat_top.html)

F. American National Standards Institute, ANSI Z87.1 - 1989, Eye and Face Protection (http://www.ansi.org/cat_top.html)

G. American National Standards Institute, ANSI Z41.1 - 1991, Foot Protection (http://www.ansi.org/cat_top.html)

H. SMS 40 - Fall Protection

I. Attachment 29-1 Hazard Assessment Form

J. Attachment 29-2 PPE Inspection Form

URS Corporation

URS Corporation Health & Safety Program
HAZARD ASSESSMENT CERTIFICATION FORM

Location:_____ Job No:_____

Date : _____ Assessment Conducted by: _____

Specific tasks performed at this location: _____

	Are any of the following present during the task?	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE
	Overhead Hazards			
1.	Suspended loads that could fall			Hard hat, ANSI Class A, B
2.	Overhead beams or load that could strike head			Hard hat, ANSI Class A, B
3.	Energized wires or equipment that could strike head			Hard hat, ANSI Class B
4.	Employees working above at an elevated site who could drop objects on others below			Hard hat, ANSI Class A, B
5.	Sharp objects or corners at head level			Hard hat, ANSI Class A, B or C
	Eye Hazards			
6.	Chemical splashes or irritating mists			Chemical protective goggles See Attachment 29-3
7.	Excessive dust			Safety glasses or impact goggles
8.	Smoke & fumes			Chemical protective goggles
9.	Welding operations			See Attachment 29-3 and 29 T-1
10.	Lasers/optical radiation			See Attachment 29-3 and Reference F
11.	Projectiles			See Attachment 29-3
12.	Sawing, cutting, chipping, grinding			See Attachment 29-3
	Face Hazards			
13.	Chemical splashes or irritating mists			Face shield if chemical is irritating to the skin or is corrosive. See Attachment 29-3
14.	Welding operations			See Attachment 29-3 and 29-T1
15.	Projectiles			See Attachment 29-3 and face shield
	Hand Hazards			
16.	Chemical exposure			Use resistant gloves as recommended by manufacturer - See Best Chemrest Guide
17.	Sharp edges, splinters, etc.			Leather gloves

Location :_____ Job No:_____

	Are any of the following present during the task?	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE
18.	Temperature extremes - heat			Leather gloves; hot mill gloves; Kevlar gloves, welders' gloves
19.	Temperature extremes - cold			Leather gloves; insulated gloves
20.	Blood, fungus			Nitrile gloves
21.	Exposure to live electrical current			Electrical gloves - See Reference H
22.	Sharp tools, machine parts, etc.			Leather gloves, kevlar gloves
23.	Material handling			Leather gloves
	Foot Hazards			
24.	Heavy materials (greater than 50 pounds) handled by employees			Safety shoes or boots
25.	Potential to crush whole foot			Safety shoes or boots with metatarsal guard
26.	Sharp edges or points - puncture risk			Safety shoes or boots
27.	Exposure to electrical wires			Safety shoes or boots with electrical protection
28.	Unusually slippery conditions			Rubber soled boots or grips
29.	Chemical contamination			Rubber, nitrile boots or boot covers
30.	Wet conditions			Rubber boots or boot covers
31.	Construction/demolition			Safety shoes or boots with metatarsal guard if who foot crushing hazard exists.
	Fall Hazards			
32.	Elevations above 6 feet without guardrails			Full body harness, ANSI A-10.14 - 1991 - See Reference G
33.	Suspended scaffolds, boatswain's chairs, float scaffolds, suspended staging.			ANSI Type II - full body harness - See Reference G
34.	Working in trees			ANSI Type I full body harness - See Reference G
35.	Working in vehicle mounted, elevating work platforms (bucket trucks, pin-on platforms, etc.)			ANSI Type II full body harness - see Reference G
	Water Hazards			
36.	Working on or above water where drowning hazards exist			U.S. Coast Guard approved personal flotation device, Type I, II, or III PFD
	Excessive Heat or Flame			
37.	Full body chemical protective clothing in temperatures greater than 80 degrees			Cooling vest
38.	Work around molten metal or flame			Nomex or kevlar clothing

Location :_____Job No:_____

	Are any of the following present during the task?	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE
39.	Welding activities			Welding leathers for those areas that are exposed to flame, spark or molten metal
	Respiratory Hazards			
40.	See SMS for RESPIRATORY PROTECTION for selection guidance			
	Excessive Noise			
41.	Exposure to noise			Ear plugs or muffs
	Body and Leg Protection			
42.	Chemical exposure			Have local DMG H&S representative assist you in proper selection
43.	Using chainsaw, cutting brush			Chainsaw chaps

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on _____.

_____
Signature

URS	Health and Safety Program PERSONAL PROTECTIVE EQUIPMENT INSPECTION SHEET	Attachment 29-2

Name of Inspector _____ Date Inspected _____

	True	False (= Hazard - Needs to be fixed)
Hard Hats		
1. The brim or shell does not show signs of exposure and excessive wear, loss of surface gloss, chalking or flaking.		
2. Suspension system in hard hat does not show signs of deterioration including cracking, tearing or fraying.		
3. The brim or shell is not cracked, perforated or deformed.		
4. Employees use hard hats in marked areas.		
5. Hard hat areas are marked.		
Safety Shoes		
6. Safety shoes used by employees do not show signs of excessive wear.		
7. Safety shoe required areas are marked.		
Work Gloves		
8. Gloves are worn when needed.		
9. Gloves do not show signs of excessive wear such as cracks, scrapes, or lacerations, thinning or discoloration or break through to the skin.		
Protective Clothing		
10. Protective clothing is worn by employees when required.		
Hearing Protection		
11. Noise hazardous areas are marked.		
12. Employees are using earplugs or muffs when using noise hazardous equipment or working in noise hazardous areas.		
Safety Glasses		
13. Eye hazardous areas are marked or posted.		
14. Employees use safety glasses when working in eye hazardous areas or working with eye hazardous equipment.		

REMARKS

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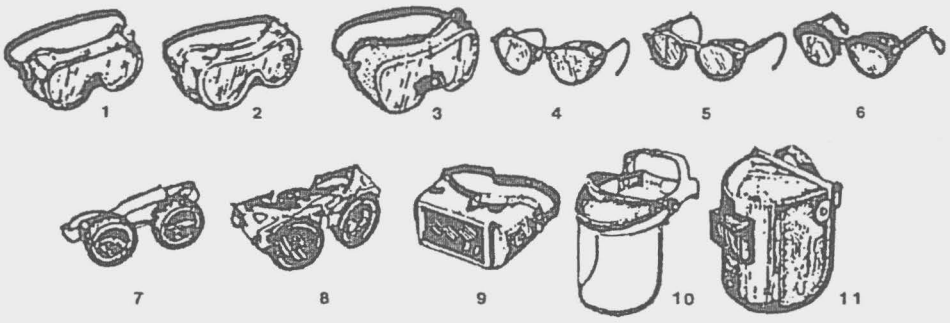
URS Corporation

URS Corporation Health & Safety Program

EYE AND FACE PROTECTOR SELECTION GUIDE



1. **GOGGLES,** Flexible Fitting, Regular Ventilation
2. **GOGGLES,** Flexible Fitting, Hooded Ventilation
3. **GOGGLES,** Cushioned Fitting, Rigid Body

*4. **SPECTACLES,** Metal Frame, with Sideshields
*5. **SPECTACLES,** Plastic Frame, with Sideshields
*6. **SPECTACLES ,** Metal-Plastic Frame, with Sideshields
*7. **WELDING GOGGLES,** Eyecup Type, Tinted Lenses (Illustrated)

7A. **CHIPPING GOGGLES,** Eyecup Type, Clear Safety Lenses (Not Illustrated)

*8. **WELDING GOGGLES,** Coverspec Type, Tinted Lenses (Illustrated)

8A. **CHIPPING GOGGLES,** Coverspec Type, Clear Safety Lenses (Not Illustrated)

*9. **WELDING GOGGLES,** Coverspec Type, Tinted plate Plate Lens

10. **FACE SHIELD,** (Available with Plastic or Mesh Window)
11. **WELDING HELMETS**

APPLICATIONS		
OPERATION	HAZARDS	RECOMMENDED PROTECTORS Bold Type Numbers Slightly Preferred Protection
ACETYLENE-BURNING ACETYLENE-CUTTING ACETYLENE-WELDING	SPARKS, HARMFUL RAYS MOLTEN METAL, FLYING PARTICLES	7,8,9
CHEMICAL HANDLING	SPLASH, ACID BURNS, FUMES	2,10 (For severe exposure add 10 over 2)
CHIPPING	FLYING PARTICLES	1,3,4,5,6,7A,8A
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	9,11 (11 in combination with 4,5,6 in tinted lenses, advisable)
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7,8,9 (For severe exposure add 10)
GRINDING-LIGHT	FLYING PARTICLES	1,3,4,5,6,10
GRINDING -HEAVY	FLYING PAPTICLES	1,3,7A,8A (For severe exposure add 10)
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 4,5,6)
MACHINING	FLYING PARTICLES	1,3,4,5,6,10
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7,8 (10 in combination with 4,5,6 in tinted lenses)
SPOT WELDING	FLYING PARTICLES, SPARKS	1,3,4,5,6,10

*Non-side shield spectacles are available for limited hazard use requiring only frontal protection.

URS SAFETY MANAGEMENT STANDARD
Sanitation

1. Applicability

This procedure applies to URS field operations.

2. Purpose and Scope

The purpose of this program is to provide employees on field assignments with appropriate personal hygiene facilities, including toilets, wash rooms and eating facilities, and to protect employees from unsanitary conditions.

3. Implementation

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Arrange for the installation of adequate toilet and wash facilities during the planning stage of field projects. Note: Mobile crews having transportation readily available to nearby toilet facilities need not be provided with facilities.

1. Provide job sites without sanitary sewer with one of the following:

   a. Privies (where their use will not contaminate ground or surface water).

   b. Chemical toilets.

   c. Combustion toilets.

2. Provide toilets for employees of each sex at field sites according to the following ratio:

Number of Employees	Minimum # of water closets (1)
1 - 15	1
16 - 25	2
36 - 55	3
56 - 80	4
81 - 110	5
111 - 150	6
Over 150	(2)

Footnote (1) where toilet facilities will not be used by women, urinals may be provided instead of the minimum specified.
Footnote (2) 1 additional fixture for each additional 40 employees.

B. Provide a means for washing hands next to toilet areas.

C. Arrange for fresh potable water to be available.

1. Fixed Facilities

   Require backflow prevention devices, testing and administrative controls to be used for all potable water supply branches.

2. Field Sites

   a. Require an adequate supply of potable water to be available.

   b. Water containers must be tightly closed and marked as to the contents. Containers must have a tap and be refilled daily.

D. Maintain existing toilet and wash facilities.

1. Maintain toilets and toilet area in good repair and in a clean and sanitary condition.

2. Provide paper towels and soap or other suitable sanitizing material for washing hands.

3. Locate hand-washing facilities next to or near toilets.

E. Maintain availability and cleanliness of drinking water.

1. Maintain backflow devices in a sanitary condition.

2. Water coolers and water dispensers are to be kept in a sanitary condition and filled only with potable water.

3. Provide fountain-type dispensers or one-use cups at each water dispenser.

F. Maintain lunchrooms in a clean condition.

1. Require microwave ovens to be used for food only.

2. Require refrigerators that are designated for food storage to be used for food only.

3. Do not allow workers to eat or store foods in areas where toxic materials are handled or stored.

4. Periodically clean lunchrooms.

G. Manage waste generated on site.

1. Release sanitary sewage into sanitary sewer lines or to other proper disposal channels.

2. Do not discharge hazardous waste into the sanitary sewer or storm sewer system.

3. Collect garbage and trash daily.

a. Garbage containers located outside buildings should have lids and remained closed. Transport garbage offsite at least weekly.

b. At remote field sites where bears and similar wild animals are a hazard, remove garbage from the site daily (do not let garbage remain on site overnight).

H. Prevent pests and vermin from multiplying on site. Eliminate unsanitary conditions that propagate insects or vermin.

I. Inspect work sites using checksheet provided as Attachment 30-1 for compliance at the beginning of the project and mid -project.

5. Documentation Summary

File completed inspection sheets in the Project Safety File.

6. Resources

A. U.S. OSHA Construction Standard - Sanitation - 29 CFR 1926.51 (http://www.osha-slc.gov/OshStd_data/1926_0051.html)

B. U.S. OSHA General Industry Standard - Sanitation - 29 CFR 1910.141 (http://www.osha-slc.gov/OshStd_data/1910_0141.html)

C. National Interim Primary Drinking Water Regulations 40 CFR 141 (http://www.access.gpo.gov/nara/cfr/waisidx_99/40cfr141_99.html)

D. Attachment 30-1 - Sanitation Inspection Checksheet

E. Queensland Workplace Health and Safety - Code of Practice for Construction Project Amenities

URS	Health and Safety Program **SANITATION INSPECTION SHEET**	Attachment 30-1

Location: _____ **Job No:** _____

Date Inspected: _____ **Name of Inspector:** _____

	Note: All "No" notations must be corrected	**Yes**	**No**
	Toilets		
1.	Are there an adequate number of toilets on site? 1 – 15 employees = 1 toilet 16 - 35 employees = 2 toilets 36 – 55 employees = 3 toilets 56 – 80 employees = 4 toilets 81 - 110 employees = 5 toilets		
2.	Toilets are in clean condition.		
3.	Toilet paper is provided.		
4.	Toilet areas are clean and sanitary.		
	Hand Washing Facilities		
5.	Hand washing facilities are provided near toilets.		
6.	Paper towels and soap are provided.		
	Drinking Water		
7.	Drinking water is provided on site.		
8.	Disposable cups are provided or fountain type dispenser is provided.		
9.	Drinking water containers are kept clean and tightly closed or covered.		
	Lunch Rooms		
10.	Lunch rooms or eating areas are kept clean.		
11.	Microwaves are used for food only.		
12.	Microwave ovens are kept clean.		
13.	Refrigerators are kept clean.		
14.	Refrigerators are used to store food only.		
	Vermin		
15.	Rats, mice and other vermin are not living within buildings.		
16.	Cockroaches and fleas are not thriving within buildings.		

REMARKS:

_____

_____

_____

_____

URS SAFETY MANAGEMENT STANDARD
Work Zone Traffic Control

1. Applicability

This procedure applies to URS field operations involving work performed on roads, highways, and similar areas where motor vehicles may be a hazard.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with work performed on or next to highways and roads.

3. Implementation

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Review the project in the planning phase to determine if any work will be performed on or adjacent to any road that will disrupt normal traffic flow.

B. Hire a qualified contractor or have an in house Competent Person devise a traffic control plan based on the work to be performed.

1. Competent persons are those who are knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed.

2. Traffic control plans will be designed to meet requirements as set in the Manual on Uniform Traffic Control Devices (MUTCD) (Resource A) as well as those rules set by state, county and cities in which work is performed.

3. Require that the plan is commensurate with the complexity of the project.

C. Submit the traffic control plan to the road authority for approval.

1. Submissions will be made to the state department of transportation or highways if state or federal highways are impacted as well.

2. Local county representatives.

3. Local city representatives, if within city limits.

4. For U.K. operations, submittal is to be made to County Council or local authority.

D. Decide whether to have qualified in house personnel or contract personnel implement the traffic control plan in the field.

1. Certified flaggers may set up work zones.

   Flaggers must attend an eight-hour work zone traffic control course as taught by an ATSSA certified instructor (or equivalent).

2. Obtain appropriate traffic control equipment as described in Resource A.

3. For U.K. operations, all operative must be trained in accordance with 'New Road and Street Works' Act.

E. Execute the traffic control plan developed for the job site. Require all personnel who work on/or adjacent to the roadway to wear bright orange, strong yellow-green or fluorescent versions of these colors of approved work zone clothing, including:

1. Vests, at a minimum.

2. Coveralls, if desired.

3. Rainwear or other apparel as needed.

B. Require a Competent Person who is certified as a Worksite Traffic Supervisor supervises flaggers at least once a day.

C. Develop a plan for the periodic inspection and maintenance of the Traffic Control Zone utilizing Attachment 32-1.

5. Documentation Summary

Records required in the Project Safety File:

A. Copies of traffic control plans used on site.

B. Training certificates for URS flaggers and Competent Persons.

C. Qualifications of contracted flaggers and Competent Persons.

D. Inspection records.

6. Resources

A. Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) (http://www.ohs.fhwa.dot.gov/)

B. American Traffic Safety Services Association (http://www.atssa.com/)

C. ATTSA Flagger Train the Trainer Program (http://www.flagger.com/)

D. U.K. - Section 7, Road Traffic Act

E. U.K. - 'New Road and Street Works' Act

F. Australian Standards SAA HB81.1-.5 - Field Guide for Traffic Controls at Work on Roads

G. Australian Standards AS1742 - Manual of Uniform Traffic Control Devices

H. Australian Standards SAA HB69.13-1995. Guide to Traffic Engineering Practice - Pedestrian

I. Attachment 32-1 - Traffic Control Inspection Checklist

J. Queensland Workplace Health and Safety - A Guide to Preparing Workplace Health and Safety Plans for Worker Safety Within Road Reserves (http://www.detir.qld.gov.au/hs/guide/gde26.pdf)

URS Corporation

URS Corporation Health & Safety Program
TRAFFIC CONTROL INSPECTION CHECKLIST

Project Name:_____ Project Number:_____

Item	Yes	No	How Many?
1. **Are any devices missing?**			
Do any devices need repair?			
Were all replaced or repaired?			
2. **Are any lights(flashers, etc.) not functioning?**			
Were they all replaced or repaired?			
3. **Are any devices improperly placed?**			
Were all positions corrected?			
4. **Do any devices need cleaning?**			
Were all devices cleaned?			
Additional comments:			

The above check was completed by:_____
(name/title)

on _____ at _____ ☐ a.m. ☐ p.m.
(date) (time)

URS SAFETY MANAGEMENT STANDARD
Back Injury Prevention

1. Applicability

This procedure applies to URS operations where personnel perform manual lifting.

2. Purpose and Scope

The purpose of this procedure is to prevent back injuries to URS personnel.

3. Implementation

Office Locations - Implementation of this procedure is the responsibility of the Office Manager.

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Safe Lifting Practices in the Office

1. Require that personnel receive the training described in (C) below.
2. Evaluate all assignments that involve lifting, such as moving boxes of files and paper, computer equipment, and the like to see that the task can be completed without risk of back injury to assigned personnel.
3. Provide material handling devices, such as carts and dollies, to assist in the safe moving of materials.
4. Obtain outside assistance, such as contract movers, if the job cannot be safely accomplished by URS personnel.
5. Require that heavier items are stored on lower shelving units.

B. Safe Lifting Practices in the Field

1. Recognize that field assignments tend to be lifting-intensive, and that URS has a duty to provide the means by which personnel can perform lifting duties without risk of injury.
2. Require that personnel receive the training described in (C) below.

3. Evaluate all field assignments that involve lifting to see that the tasks can be completed without risk of back injury to assigned personnel.

4. Provide material handling devices, such as carts, dollies, trucks with lift gates, to assist in the safe moving of materials. If required, assign additional personnel to the task.

5. Direct field personnel not to assist in lifting tasks that are normally undertaken by subcontractor personnel.

6. Contact a URS Health and Safety Program Representative when assistance is necessary to evaluate a lifting task that may pose a back injury risk to assigned personnel.

C. Training

1. Require that personnel who may have lifting as part of their duties receive training that includes the following topics:

   a. Showing personnel how to avoid unnecessary physical stress and strain.

   b. Teaching personnel to become aware of what they can comfortably handle without undue strain.

   c. Instructing personnel on the proper use of equipment.

   d. Teaching personnel to recognize potential hazards and how to prevent or correct them.

2. This training must be completed prior to an employee being assigned to a task that involves lifting.

D. Office Moves and Relocations

1. Utilize professional movers (who are appropriately insured) to move office furniture such as desks, file cabinets, and bookcases, even if such a move is only between offices or cubicles at a particular location (on-site move).

2. Utilize professional movers for intensive moving of file boxes and other heavy materials.

E. Material Packaging

1. Use only smaller size (<18") file ("Banker") boxes for file storage, as the larger (>18") boxes are awkward and readily overloaded.

2. Use only smaller coolers for field samples, as the larger coolers are awkward and readily overloaded.

5. Documentation Summary

File the following documents in the Office Health and Safety File

- Training rosters

File the following documents in the Project Health and Safety File

- Training rosters

6. Resources

A. Work Practices Guide for Manual Lifting, NIOSH

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

1. Applicability

This program applies to job activities performed primarily in outdoor environments.

2. Purpose and Scope

The primary goal of this program is to eliminate or reduce illnesses and injuries transmitted by plants, insects, and animals. Although there are many animals and insects that are potentially harmful to humans (i.e. bees, spiders, bears, and rodents), this safety management standard focuses on four common biological hazards: ticks, poison plants, mosquitoes, and snakes.

3. Implementation

The Project Manager, with support from the URS H&S Regional Managers and Occupational Health Specialist, will be responsible for implementation of this program.

4. Requirements

A. Ticks

1. Precautionary Measures

Background information: Ticks do not jump, crawl, or fall onto a person. They are picked up when clothing or hair brushes a leaf or other object the tick is on. Ticks are generally found within three feet of the ground. Once picked up, they will crawl until they find a likely site to feed. Often they will find a spot at the back of the knee, near the hairline, behind the ears, or at pressure points where clothing presses against the skin (underwear elastic, belts, neckline). The best way to prevent tick borne diseases is not to be bitten by a tick. Ticks can carry a number of diseases including:

- Lyme Disease is an infection caused by the corkscrew-shaped bacteria *Borrelia burgdorferi* that is transmitted by the bite of deer tick (ixodes) and western black-legged ticks. The disease occurs in the forested areas of North America, Europe, and Asia. Symptoms which occur 3-30 days following a tick bite include: a spreading 'bulls-eye" rash, fever, fatigue, headache, and joint and muscle aches. Prompt treatment with antibiotics is essential in order to prevent more serious complications that may occur if left untreated.

- Rocky Mountain Spotted Fever is an infection caused by the bacteria *Rickettsia rickettsii*. The disease occurs in North, Central, and South America. Other Rickettsia organisms cause disease worldwide (Mediterranean, Japan, Africa, North Asia). Symptoms which occur 2-6 days following a tick bite include: fever, nausea, vomiting, diarrhea, rash, muscle and joint pain. The disease is treated with antibiotics.

- Babesiosis is caused by hemoprotozoan parasites of the genus *Babesia*. It is transmitted by the ixodid tick. The geographic distribution is worldwide. Symptoms include fever, chills, fatigue, muscle aches, and an enlarged spleen and liver. The disease is treated with anti-protozoan drugs.

- Ehrlichiosis is caused by several bacteria of the genus *Ehrlichiae*. The geographic distribution is global, primarily in temperate regions. Symptoms which occur 5-10 days following a tick bite include fever, headache, fatigue, muscle aches, nausea, vomiting, diarrhea, confusion, and occasionally a rash. The disease is treated with antibiotics.

a. Avoidance of tick habitats

Whenever possible, persons should avoid entering areas that are likely to be infested with ticks, particularly in spring and summer when nymphal ticks feed. Ticks favor a moist, shaded environment, especially that provided by leaf litter and low-lying vegetation in wooded, brushy, or overgrown grassy habitat. Both deer and rodent hosts must be abundant to maintain the life cycle of the tick.

b. Personal Protective Equipment

1. Wear light colored clothing or white Tyvek® to allow you to see ticks that are crawling on your clothing.

2. Tuck your pant legs into your socks or boots, wear high rubber boots, or use tape to close the opening where they meet so that ticks cannot crawl up the inside of your pant legs.

3. Wear a hat, tie back long hair.

4. Apply repellents to discourage tick attachment. Repellents containing permethrin can be sprayed on boots and clothing and will last for several days. Repellents containing DEET (n,n-diethyl-

m-toluamide) can be applied to the skin, but will last only a few hours before reapplication is necessary. Apply according to Environmental Protection Agency guidelines to reduce the possibility of toxicity.

c. Tick Check

1. Change clothes when you return from an area where ticks may be located.

2. Shower to wash off any loose ticks.

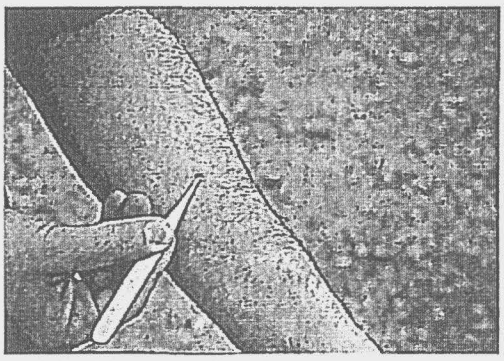
3. Check your entire body for ticks. Use a hand held or full-length mirror to view all parts of your body.

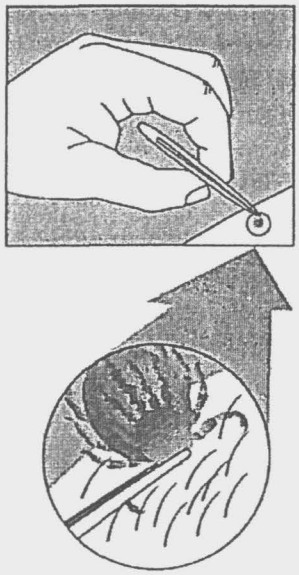
4. Place clothing worn in tick infested areas into the dryer for at least 30 minutes in order to kill any ticks.

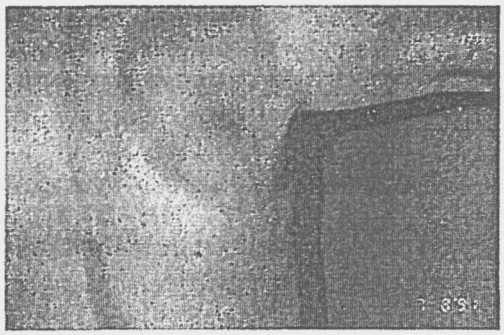
2. Tick Removal

Because it takes several hours of attachment before microorganisms are transmitted from the tick to the host, prompt removal of attached or crawling ticks is an important method of preventing disease. Remember, folklore remedies of tick removal to do not work! Methods such as the use of petroleum jelly or hot matches may actually make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting disease.

The best method to remove an attached tick is with a set of fine tipped tweezers.







a. Use fine-tipped tweezers. When possible, avoid removing ticks with bare hands.

b. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with the tweezers.

c. Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva and gut contents) may contain infectious organisms.

d. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

e. Disinfect the tweezers.

f. Save the tick for identification in case you become ill. This may help the doctor make an accurate diagnosis. Place the tick in a vial or plastic zip lock bag and put it in the freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.

3. Medical Follow-Up

In most circumstances, medical treatment of persons who only have a tick bite is not recommended. However, individuals who are bitten by a tick

should seek medical attention if any signs and symptoms of tick borne disease develop over the weeks following the tick bite.

B. Poisonous Plants

1. Background Information

Poison ivy and poison oak plants are the most common cause of allergic contact dermatitis in North America. These poisonous plants can be a hazard for many various outdoor activities at work, home, and play. Skin contact with the oleoresins (urushiol) from these plants can cause an itchy, red, oozing, blistered rash in sensitive individuals. Oil content in the plants is highest in the spring and summer, however the plants are even hazardous in the winter when they have dropped their leaves. There are three types of exposure:

- Direct contact: An initial skin exposure in necessary to "sensitize" the individual. Subsequent contact in a sensitized person will result in a rash appearing within 4 to 48 hours. Approximately 50-70 % of the population is sensitized. Poison plant dermatitis is usually characterized by areas of linear or streaked patches where branches of the plant brushed the skin.

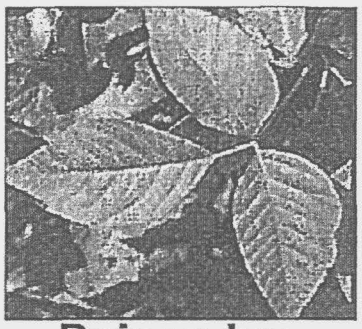
- Indirect contact: Skin exposure can happen indirectly. Clothing, shoes, tools, personal protective equipment and other items can be contaminated with the oils and maintain potency for months.

- Airborne smoke contact: Never burn poison plants. Droplets of oil can be carried by smoke and enter the respiratory system causing a severe internal outbreak.

Poison plant rash is not contagious. Skin contact with blister fluid from an affected individual will not cause dermatitis in another sensitized person. Scratching the rash can only spread it to other parts of your body if the oil is still on your skin. After the oil has been washed off or absorbed by the skin, scratching will not spread the rash.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each and are green in the summer and red in the fall. Both plants also have greenish-white flowers and berries that grow in clusters. All parts of these plants are toxic.

Poison Ivy grows as a small plant, vine, and as a shrub. Leaves always consist of three glossy leaflets.

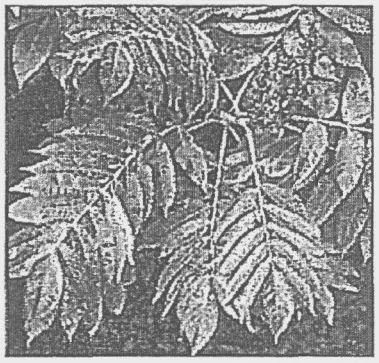


Poison Ivy

Poison Oak grows as a shrub or vine. It has three leaflets that resemble oak leaves.

Eastern Poison Oak

Poison Sumac grows as a woody shrub or small tree from 5 to 25 feet tall. It has 7 to 13 leaves that grow opposite each other with a leaflet at the tip.



Poison Sumac

1. Precautionary Measures

   - The best approach is to learn to identify the plants and avoid them.
   - Wear long pants and long sleeves, boots and gloves.
   - Barrier skin creams may offer some protection if applied before contact.

- Avoid indirect contact from tools, clothing or other objects that have come into contact with a crushed or broken plant. Don't forget to wash contaminated clothing and clean up contaminated equipment.

- If you can wash exposed skin areas within 3-5 minutes with cold running water, you may keep the urushiol from penetrating your skin. Proper washing may not be practical in remote areas, but a small wash-up kit with pre-packaged alcohol-based cleansing tissues can be effective.

2. Medical Follow-Up

   Home treatment: Calamine lotion and an oatmeal (one cup to a tub full of water) bath can help relieve itching. To prevent secondary skin infection, scratching is not helpful and the finger nails should be cut to avoid damage to the skin. Over-the-counter hydrocortisone cream can decrease inflammation and itching, however read the label and use according to directions.

   When to see the doctor: Severe cases may require further treatment. A physician should be seen if the rash appears infected, is on the face or other sensitive body areas, or is too extensive to be easily treated at home.

C. Mosquito Borne Diseases

1. Background Information

   a. Arboviral encephalitis is a viral illness causing inflammation of the brain and is transmitted to humans by the bite of infected mosquitoes. Globally there are several strains including: Eastern equine, Japanese, La Crosse, St. Louis, West Nile, and Western equine encephalitis. Some of the strains have a vaccine. Symptoms of infection are nonspecific and flu-like: fever, headache, and tiredness. Fortunately, only a small proportion of infected people progress to encephalitis. Treatment is supportive, antibiotics are not effective.

   b. Malaria is a serious but preventable disease spread by the bite of an infected anopheline mosquito. It is caused by four species of the parasite *Plasmodium (P. falciparum, P. vivax, P. ovale, and P malariae)*. Malaria-risk areas include primarily tropical areas of Central and South America, Africa, India, Southeast Asia, and the Middle East. Symptoms of malaria which occur 8 days to 1 year after infection

include fever, shaking chills, headache, muscle ache, tiredness, jaundice, nausea, vomiting, and diarrhea. Malaria can be cured with prescription drugs.

c. Dengue Fever is a potentially life-threatening viral illness transmitted by the bite of the Aedes mosquito, found primarily in urban areas. The disease is found in most of tropical Asia, the Pacific Islands, Central and South America, and Africa. There are four dengue virus serotypes. Symptoms include sudden onset, high fever, severe headache, joint and muscle pain, rash, nausea and vomiting. There is no specific treatment and no vaccine.

d. Yellow Fever is a viral disease transmitted between humans by mosquitoes. It occurs only in Africa and South America. There is a vaccine that confers immunity lasting 10 years or more. Symptoms begin 3-6 days after the mosquito bite and include fever, nausea, vomiting, headache, slow pulse, muscle aches, and restlessness. Treatment is symptomatic.

2. Precautionary Measures

- Insect Repellent – Use insect repellants that contain DEET. The effect should last about 4 hours. Always use according to label directions. Use only when outdoors and wash skin after coming indoors. Do not breathe in, swallow, or get into the eyes. Do not put on wounds or broken skin.

- Protective Clothing – wear long sleeved shirts and long pants, especially from dusk to dawn. Or avoid going outdoors during these hours.

- Mosquito netting – Travelers who will not be staying in well-screened or air conditioned rooms should use a pyrethroid containing flying insect spray in living and sleeping areas during evening and nighttime hours. Sleep under mosquito netting (bed nets) that have been sprayed with permethrin.

- Malaria prophylaxis medications may be prescribed, however they do not provide complete protection. The type of medication given depends on the area of travel.

D. Poisonous Snakes

1. Background Information

No single characteristic distinguishes a poisonous snake from a harmless one except the presence of poison fangs and glands. Only in dead specimens can you determine the presence of these fangs and glands without danger. Most poisonous snakes have both neurotoxic and hemotoxic venom, however, one type is dominant and the other is weak.

a. Hemotoxic venom. The folded-fang snakes (fangs can raise to an erect position) have venoms that affect the circulatory system, destroying blood cells, damaging skin tissues, and causing internal hemorrhaging.

b. Neurotoxic venom. The fixed-fang snakes (permanently erect fangs) have venoms that affect the nervous system, making the victim unable to breathe.

c. Poisonous snakes in the Americas: copperhead, coral snake, cottonmouth, and rattlesnake.

d. Poisonous snakes in Europe: adder, viper.

e. Poisonous snakes of Africa and Asia: viper, cobra, adder, green mamba.

f. Poisonous snakes in Australia: copperhead, adder, taipan, tiger snake.

2. Precautionary Measures

Bites occur when you don't hear or see the snake, when you step on them, or when you walk too close to them. Follow these simple rules to reduce the chance of accidental snakebite:

- Don't put your hands into dark places, such as rock crevices, heavy brush, or hollow logs, without first investigating.
- Don't step over a fallen tree. Step on the log and look to see if there is a snake resting on the other side.
- Don't walk through heavy brush or tall grass without looking down. Look where you are walking.

- Do not pick up any live snake. If you encounter a snake, walk around the snake, giving it plenty of room. A snake can strike half its length.
- Don't pick up freshly killed snakes without first severing the head. The nervous system may still be active and a dead snake can deliver a bite.

3. Medical Follow-up

   If you are bitten by a snake, the primary goal is to get to a hospital as soon as possible to receive professional medical evaluation and possible treatment with antivenom if warranted. Initial first aid should include: Wash the bite with soap and water. Immobilize the bitten area and keep it lower than the heart. Try to remain calm. If you are unable to reach a hospital within 30 minutes, a bandage, wrapped two to four inches above the bite, may help slow the venom. The bandage should not cut off blood flow from a vein or artery, make sure the band is loose enough that a finger can slip under it. A suction device from a commercial snakebite kit may be placed over the bite to help draw venom out of the wound.

   Research has shown the following to be potentially harmful, DO NOT: apply ice, use a tourniquet, or make incisions into the wound.

5. Documentation Summary

Complete and distribute a URS Incident Report form 49-1 for all work-related biological exposure incidents.

6. Resources

Centers for Disease Control
http://www.cdc.gov

U. S. Occupational Safety and Health Administration
http://www.osha.gov

U.S. Food and Drug Administration
Treating and Preventing Venomous Snake Bites

URS SAFETY MANAGEMENT STANDARD
Injury / Illness / Incident Reporting & Notifications

1. Applicability

This procedure applies to URS Corporation offices and field operations.

2. Purpose and Scope

The purpose of this procedure is to provide guidance for the timely reporting of work related injuries, illness, and incidents. This procedure also defines incident notification procedures for URS employees. Note – For incidents involving motor vehicles, the reporting and notification requirements of URS SMS 057 – Vehicle Safety Program may also apply.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the employee's Supervisor.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Reporting: All employees shall immediately notify their appropriate level of management (line, project, and/or office) of a reportable incident. A reportable incident includes the following:

1. An injury or illness to any URS employee or subcontractor, even if the injury does not require medical attention;
2. An injury to a member of the public, including clients, occurring on a URS controlled work site;
3. Illness resulting from suspected chemical exposure;
4. Chronic or re-occurring conditions such as back pain or cumulative trauma disorders (example: carpal tunnel syndrome);
5. Fire, explosion, or flash;
6. Any vehicle accidents occurring on site, while traveling to or from client locations, or with any company-owned, rented, or leased vehicle (including personal vehicles used for company business);
7. Property damage resulting from any URS or subcontractor activity;
8. Structural collapse or potential structural hazards;

9. Unexpected release or imminent release of a hazardous material;

10. Unexpected chemical exposures to workers or the public;

11. A safety related complaint from the public regarding URS activities.

12. Incidents that could result in adverse public media interest concerning URS or a URS project.

13. Any incident that could result in, or any actual investigation by, OSHA, DOT, EPA, or State, Federal, or local law enforcement agency.

14. Any other significant occurrence that could impact safety – including a near-miss.

Note: A near-miss is defined as an incident having the potential to cause significant injury or property damage as listed above – but did not. Examples of a near-miss include:

- A worker steps off a ledge and falls three feet (1 meter) to the floor – and is uninjured.
- A crane drops a 1,000-pound (454 kg) beam during a lift – and nobody is hurt, no equipment is damaged.
- A work crew is conducting a survey along the highway. A vehicle leaves the roadway (driver asleep) and the vehicle enters the survey area at 50 mph (80 kph). The vehicle misses an employee by 3-feet (1 meter), the driver recovers control of the vehicle and leaves the area.

B. Actions: The following actions will be taken following a reportable incident:

1. Employees:

a. If necessary, suspend operations and secure and/or evacuate the area;

b. Immediately notify your supervisor and/or project manager

c. Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved witnesses, description of event, and actions taken) and initiate either an Incident Report (49-1) or Near-Miss Report (49-2);

d. Assist with incident investigation as directed by management;

e. Implement corrective actions as directed by management;

f. *Do not* discuss the incident with members of the news media or legal representatives (except URS legal counsel or your personal legal advisor) unless directed to do so by URS management;

g. *Do not* make statements pertaining to guilt, fault, or liability.

2. Line/Project Management:

a. For instances involving serious accidents, injuries, or other significant consequences, verbally notify the URS H&S Management Team as soon as possible at the following numbers:

- In the U.S., Canada, and Mexico: (866) 326-7321
  Fax +1 (512) 419 6413
- In Europe: +44-1291-621768
  Fax +44 1291 621768
- In Asia/Pacific: +61 (2) 8925 5693
  Fax +61 (2) 8925 5555

Notification should in no case occur later than the end of the work shift. Follow-up notification by faxing an SMS 49-1 Incident Report Form within 24 hours to the URS Occupational Health Manager (OHM) at +1-512.419.6413. Also, assure copies of the report are distributed as outlined on the form.

URS Corporate H&S Management will make notification to Federal and State authorities as appropriate.

b. For minor incidents involving only first aid treatment, minor damage to vehicle of equipment, etc., make notifications to the above number as soon as reasonable during normal business hours and fax the SMS 49-1 Incident Report Form to the URS OHM within 24 hours at +1-512.419.6413. Also, assure copies of the report are distributed as outlined on the form.

c. For a near-miss incident, complete the Near-Miss Report Form (49-2) and give it to the Office or Project Health and Safety

Representative. Also, assure copies of the report are distributed as outlined on the form.

d. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions;

e. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.

3. Local Office or Project Health And Safety Representative

   a. Assist with incident evaluation;

   b. With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence;

   c. Review injury/incident report or the near-miss report for completeness and accuracy. Assure the reports are distributed properly.

   d. Assure notifications are made in a timely manner.

   e. Assure that the injured employee is properly counseled/advised as directed by SMS 65 - Injury Management. Communicate with the OHM at (866) 326-7321.

4. Occupational Health Manager

   a. Report work-related injuries and illness to workers' compensation carrier.

   b. Assure that the employee's injury is managed in accordance with SMS 065. Provide guidance for the affected Office or Project Health and Safety Representative.

   c. Periodically disseminate near-miss reporting summary information to the Regional and Corporate H&S Managers.

5. Corporate Health and Safety Management

   a. Notify URS management of any significant occurrence including lost-time injuries, deaths, or other serious result or circumstance.

b. The Occupational Health Manager (OHM) will review all reported incidents to determine OSHA reporting and recording requirements with input from the appropriate Corporate Health and Safety Manager. For a determination of recordability in those infrequent instances where there is not a clear answer, the Director of Health and Safety shall make the final determination. All decisions will be based strictly on current Federal OSHA guidelines. The Corporate H&S Manager will make notifications to Corporate Legal and Management as required.

c. Official records (including required reports and logs for all reported incidents) will be maintained at one central location by the OHM.

d. The OHM will send each office any required government report (i.e. OSHA 300 log) for their operation following receipt of an incident report.

e. Each January the OHM will prepare and distribute, to each URS establishment, the appropriate government injury/illness reports. These reports will summarize all required government information for incidents that occurred during the preceding calendar year.

5. **Documentation Summary**

A. File these records in the Office Safety File:

1. Attachment 49-1 - Incident Report Form
2. Attachment 49-2 – Near-Miss report
3. Maintain OSHA 300 Log.

B. File these records in the Project Health and Safety File

1. Attachment 49-1 - Incident Report Form
2. Attachment 49-2 – Near-Miss report
3. Maintain OSHA 300 Log if applicable for Project.

URS	Health and Safety Program **INCIDENT REPORT FORM**	Attachment 49-1 Revision 1: Feb 2003

ADMINISTRATIVE INFORMATION:

URS Division/Company: _____

Project or Office: _____

Project Number: _____

Date/Time of Incident: _____ _____

Location/Client Name: _____ _____

TYPE OF INCIDENT (Check all applicable items)			
☐ Illness	☐ Injury	☐ Fire, Explosion, Flash	☐ Unexpected Exposure
☐ Property Damage	☐ Vehicular Accident	☐ Other (describe):	

FOR INJURIES/ILLNESS ONLY	
Name of Injured Employee _____	Phone No. _____
Describe Injury _____	
Medical Treatment / First Aid _____	

EMPLOYEES' DESCRIPTION OF INCIDENT: (Describe the facts contributing to the incident. Identify individuals involved, witnesses, and their affiliations. Attach additional sheets, drawings, or photographs as needed.)

_____

_____

_____

_____

_____

_____

_____

_____

Employee Name _____

Employee Signature _____ Date _____

URS	Health and Safety Program **INCIDENT REPORT FORM**	Attachment 49-1 Revision 1: Feb 2003

SUPERVISORS' DESCRIPTION OF INCIDENT: (Provide any additional/different details than provided by employee. Attach additional sheets, drawings, or photographs as needed.) Use additional sheets if necessary.

_____

_____

_____

_____

_____

CORRECTIVE ACTIONS (*For Internal Use Only*):

_____

_____

_____

_____

_____

REVIEWED BY:

Supervisor or Project Manager _____ Date _____

Office Manager _____ Date _____

Health and Safety Representative _____ Date _____

Supervisor must deliver this report to the office or project health and safety representative within 24 hours of the reported incident.

DISTRIBUTION: The Office or Project Health and Safety Representative distributes to:

- Office Manager
- Project Manager
- Project / Office file
- Regional Health and Safety Manager
- URS Occupational Health Manager

  Fax: 512.419.6413

  Phone: 866.326.7321

(For URS Asia/Pacific and Europe Operations – distribute this form in accordance with the directions in SMS 49.)

Note: The Regional Health and Safety Manager will distribute this Incident Report to other appropriate URS line managers as appropriate.

URS	Health and Safety Program **NEAR-MISS REPORT**	Attachment 49-2 Issue Date: Feb. 2003

URS Division/Company: _____

Project /Location _____

Date/Time of Near-miss: _____

Name of Preparer: _____ Date: _____

The following is an account of what happened:

I believe this could have resulted in injury and/or damage to: (Check all that pertain)

☐ **Personnel** ☐ **Property** ☐ **Equipment**

If these circumstances occurred:

I recommend the following actions to prevent this from occurring in the future:

REVIEWED BY:

Project Manager _____ Date _____

Health and Safety Representative _____ Date _____

DISTRIBUTION:

- **Regional H&S Manager**
- **Project / Office file**
- **URS Occupational Health Manager**
  Fax: 512.419.6413
  Phone: 866.326.7321

URS SAFETY MANAGEMENT STANDARD

Health and Safety Training

1. Applicability

This SMS applies to all URS personnel. These are the minimum Environmental, Health and Safety (EHS) compliance training requirements and tracking procedures. Specific geographic entities, business units, and projects may require additional training. These requirements may be dictated by federal/national, state/provincial or local agencies or by the activities of a specific work group or project team. Each location or project manager is responsible for ensuring documentation and informing employees of these additional requirements.

2. Purpose and Scope

This SMS was developed to assist employees and managers in the identification of training requirements and to define the URS procedures for tracking/documenting this training. It covers environmental, hazardous materials, and health and safety training only. The goals of this program are to ensure regulatory compliance and to provide employees with the information/training they need to accomplish their work assignments safely, prevent injuries to themselves, coworkers, surrounding communities and clients, and to protect company property and the environment.

3. Implementation

Location — Location Manager is responsible for ensuring compliance with this program and any additional requirements necessary because of the physical location of the facility, and/or the business units in operation at that facility (e.g., laboratories).

Projects — Project Manager is responsible for ensuring project-related compliance (e.g., compliance of project staff members) with this program and any additional training necessary because of specific project activities.

Corporate HS Training Coordinator (CTC) — The CTC is responsible for maintaining the corporate training calendar, filing original records/tests, issuing certificates, maintaining and issuing corporate training materials, helping to develop materials that meet requirements, adding approved courses and course information to the corporate training database, updating the intranet site with course information.

4. Requirements

Employee training requirements are dictated by the work each employee performs (or are expected to perform) and the geographic area(s) where they perform these activities. In most cases there is a regulatory driver for specific training. Attachment 55-1 shows a decision tree designed to help employees and managers determine training requirements.

A. Health & Safety Orientation: All URS employees must be informed as to existence of and basic content of the URS Health and Safety Program. Locations will have the option of selecting the appropriate method of delivery but the content of this orientation must include at a minimum:

1. Review of the URS EHS policy statement
2. The Management System
3. The URS H&S Organization
4. Overview of the Safety Management Standards and Hazard Assessment Process
5. Incident Reporting (SMS 049)

Based on job assignment, additional training covered during this orientation:

6. Office Ergonomics (SMS 054)
7. Hazard Communication (US) or WHMIS (Canada)
8. Emergency Procedures (emergency action plans, evacuation plans, fire alarms, gathering points, emergency communications)

B. Table 1 contains a list of the most common courses that may be required, their frequency, and expected participants. This table will be updated as regulatory and company requirements change.

TABLE 1

Course Title	Regulatory Requirement	Frequency	Audience	Comments
Hazardous Waste Operations (40-Hrs - U.S.) (24-Hrs- non U.S.)	Y	Once	Anyone performing work or expected to perform at hazardous waste sites or treatment, storage, and disposal facilities	
Hazardous Waste Operations – Refresher (8 Hrs - U.S.) (4 Hrs - non-U.S.))	Y	Annually	(See above)	
Hazardous Waste Operations – Supervisor (8 Hrs)	Y	Once	Required for anyone serving as the site supervisor at a hazardous waste site.	
Field Safety (4 Hrs)	N	Biennially	Required for all URS non-craft employees performing field work that are not in hazardous waste training program.	Specific content will depend on the office and the employees' expected work.
Health & Safety Orientation	Y	Once	Required for all URS employees.	Specific content will depend on the office and the employees' expected work.
Respiratory Protection[1]	Y	Annually	Required for any employee who may be required to wear a respirator.	Initial training is approximately 1 hr. Annually refresher training and fit testing is approximately .5 hrs.

Course Title	Regulatory Requirement	Frequency	Audience	Comments
Hazardous Materials Shipping[1]	Y	Biennially	Required for anyone who packages, labels, transports, completes paperwork for, or offers for shipment, hazardous materials/dangerous goods	
Bloodborne Pathogens[1]	Y	Annually	Required for anyone designated as a first aid responder or others who have a potential bloodborne pathogen exposure.	
First Aid	N	Biennially	Required for Hazardous Waste Site Safety Officers and personnel at remote sites (e.g., no local emergency medical response).	
Hazard Communication[1]	Y	Initially and if hazards change	Required for anyone who is potentially exposed to/works with hazardous chemicals	Training must occur before any work with hazardous chemicals. Included (as needed) in H&S Orientation. After the initial training, required updates will typically be handled as part of project specific H&S training.

[1]This material is covered in the Hazardous Waste Operations initial and annually refresher courses, however individuals who are not Hazardous Waste Operations staff may be required to take one or more of these courses based on their work activities and as required by federal regulations.

C. Attachment 55-1 is a tool used to identify *additional* training requirements. These requirements may be necessary due to the individual's project or office activities, or the location of the facility. The responses to this simple questionnaire dictate what training an individual needs above and beyond the basic URS courses. Each employee, once these requirements have been identified, is expected to complete the required training as soon as possible and to track his/her progress.

D. Training requirements should be re-evaluated at least annually and more frequently if an employee's assigned duties change significantly.

E. To ensure consistency in content and duration and in meeting regulatory and company requirements, corporate training materials should be used as the base materials whenever they are available. Trainers may always elect to supplement the base corporate training materials for these courses with project/office/geographic unit specifics.

F. For training requiring certifications (regulatory or corporate) trainers must be regional or divisional H&S Managers or be approved by the Corporate Health and Safety Director. This training includes but is not limited to, Hazardous Waste Health and Safety courses and Field Safety Training.

G. Training is offered in a variety of formats including classroom instruction, computer-based training (CBT), and on-the-job (OTJ) training. To ensure consistency and that all requirements are being met, external courses (e.g., 40 Hour HAZOPWER) including classroom instruction and CBT should be evaluated and approved by the Corporate Health and Safety Director or a designee (e.g., Divisional or Regional H&S

Manager). Local, regional or divisional H&S staff will be able to assist in identifying qualified external vendors when the need arises.

H. Internal training course schedules will be posted on the Health and Safety intranet site at http://healthandsafety.com/ .

I. URS staff is expected to be familiar with applicable training requirements. In addition to the corporate training tracking. Staff members are expected to track their own progress toward meeting those requirements.

5. Documentation Summary

A. Those courses shown in Table 1 will be tracked in a corporate training database. These courses were selected for a variety of reasons including:

1. Audits/compliance checking
2. Written certification requirements
3. Easy access to qualified individuals for project/office staffing purposes

B. All training must be documented using Training Attendance form (Attachment 55-2) and Course Agenda. Minimum course agenda requirements include:

- Type of course
- Course date
- Course location
- Topics covered
- Length of time covered for each topic
- Course duration (start / end times)
- Instructor(s) name

C. For client/vendor provided training, training documentation must include:

- Copy of the attendee's course certificate
- Course agenda

D. Divisional H&S Managers will ensure the course agenda meet regulatory/company requirements. The Corporate H&S Training Coordinator will then enter attendance records in the corporate training database.

E. Original attendance sheets, agendas, and any completed tests will be sent to the Corporate H&S Training Coordinator. These should be filed by course then by date for easy access/auditing.

F. Locations/projects will maintain records on any project or location specific training requirements such as fire extinguisher training, project H&S plan training, and chemical hygiene program (laboratory safety) training. They may optionally elect to maintain copies of attendance records for courses also being tracked corporately.

G. For courses requiring certification, certificates will be issued by the Corporate Health and Safety Director, unless the certificate is issued by a vendor or client. Under those conditions a copy of the certificate must be provided to the Corporate H&S Training Coordinator (along with course content information and sign in sheets).

H. Managers (local, regional, project) can access the information for staffing and compliance purposes through the Divisional H&S Managers or Corporate H&S Training Coordinator. Divisional H&S Managers will have "read only" access to the corporate training database.

6. References

The following are sites that provide additional information to assist you in identifying training requirements.

A. OSHA website training section (U.S. Regulatory Requirements)
http://www.osha-slc.gov/Training/

B. National Occupational Health and Safety Commission (Australia)
http://www.nohsc.gov.au/work/education/index.htm

C. European Agency for Safety and Health at Work
http://europe.osha.eu.int/training/

D. Additional Training Requirements Evaluation - Attachment 55-1

E. Training Attendance Form - Attachment 55-2

URS	Health and Safety Program ADDITIONAL H&S TRAINING EVALUATION	Attachment 55-1

Name _____ Location _____ Date _____

Course Title	Regulatory	Frequency	Should You Attend?	Check if Required ✓	Comments
Asbestos Inspector	Y	Annual	You perform asbestos sampling tasks.		Not offered in-house
Asbestos Planner	Y	Annual	You serve as the project asbestos planner.		Not offered in-house
Confined Space Entry	Y	Once	You perform confined space entry/authorizer/attendant duties (including anyone performing non-entry rescue activities).		Tracked in corporate database.
Confined Space Refresher	N	As needed	Recommended if you perform entry activities.		
Confined Space Rescuer	Y	Once	You may have to enter a confined space to perform a rescue		Not offered in-house. Tracked in corporate database.
Construction Safety OSHA 500		Once	Recommended if you are a Supervisor and/or Safety Officers at Construction Sites		Tracked in corporate database.
Emergency Action Plan	Y	Once	You are assigned to and at least occasionally work at a fixed facility in the US. This should be covered in EHS Orientation.		For field/site personnel this will be covered in project/site safety training.
Excavations/Trenching Awareness	Y	Once	You work at sites where excavation/trenching tasks are performed.		Covered in HAZWOPER and Field Safety
Excavations/Trenching Competent Person	Y	Once	You are or may be designated as a competent person (educational background and experience may allow for grand-fathering)		Tracked in corporate database.
Fall Prevention/Protection	Y	Once	You supervise tasks or perform tasks at heights (on roofs, scaffolding, ladders, unfinished flooring).		Tracked in corporate database.
Fire Extinguisher	Y	Annual	You may be expected to use fire extinguishers (fixed facilities and project sites)		
Powered Industrial Trucks (Forklifts)	Y	Once	Your job assignments includes operating a powered industrial truck (forklift)		Required more frequently if required assessments indicate the need.
General Industry Safety	N	Once			See Field Safety

URS	Health and Safety Program ADDITIONAL H&S TRAINING EVALUATION	Attachment 55-1

Course Title	Regulatory	Frequency	Should You Attend?	Check if Required ✓	Comments
H&S Issue for Project Managers	N	Once	Required if you manage projects with field work.		Will be offered as part of PM Training
Hazard Communication	Y	Once	You work with or around hazardous materials in a US facility (includes URS facilities and client facilities)		Tracked in corporate database. Typically included in H&S Orientation.
HAZWOPER HazMat Team	Y	Once	Emergency Response Team Members (First Responders Operations Level, HazMat Technicians and Incident Commanders)		Tracked in the corporate training database.
Hearing Conservation	Y	Annual	Employees exposed to noise at or above 85 decibels averaged over an 8 hour day.		Covered in HAZWOPER Refresher and Field Safety
Injury/Illness Prevention	Y	Once	You are assigned to CA offices		Covered in CA office H&S Orientation.
Laboratory Safety	Y	Once	You work in a fixed or mobile wet chemistry lab.		
Lead Inspector	Y		You are a project lead inspector.		Not offered in house.
Lead Planner	Y		You are a project lead planner.		Not offered in house.
Lockout/Tagout	Y	Once	You work with and around equipment that may need to be locked out/tagged out. (You are not responsible for applying tags/locks)		General awareness covered in HAZWOPER and Field Safety
Nuclear Density Gauge Operator	Y	Once	You operate nuclear density gauges		
Radiation Safety Officer	Y	Once	You are designated as a Radiation Safety Officer		
SCBA/Cascade Systems	Y	Once	Required for any employee required to wear SCBAs or to operate a supplied air system.		Part of Project H&S training as needed.
Shipping Specialist	Y	Once	You are designated as a Shipping Specialist and/or are a Regional H&S Manager.		Updates are required as regulations change. Tracked in the corporate training database.
Substance Specific	Y	Once	Any employee potentially exposed to a substance covered by the 29 CFR substance specific regulations. SMS 050.		Includes lead, asbestos, benzene, etc.
Waste Awareness	Y	Annual	You generate, handle or manage hazardous waste at a fixed facility or		Updates/refreshers can be part of Project H&S

ADDITIONAL H&S TRAINING EVALUATION

Course Title	Regulatory	Frequency	Should You Attend?	Check If Required ✓	Comments
			field project.		training.
Waste Specialist	Y	Once with Annual Refresher	You are responsible for waste management at a small or large quantity generator facility.		
Welding/Brazing/ Cutting	Y		You job duties include these activities		
WHMIS	Y		You are assigned to a Canadian facility and work with or around hazardous materials.		Canadian "HazCom"

URS	Health and Safety Program EXAMPLE TRAINING ATTENDANCE FORM	Attachment 55-2

OCCUPATIONAL SAFETY AND HEALTH TRAINING

ATTENDANCE RECORD

DATE: _____ PAGE_____OF_____

LOCATION: _____

TYPE OF COURSE: _____

INSTRUCTOR SIGNATURE: _____

Name (print legibly)	Signature	Company/Location	Social Security Number
Sophia Miller	*Sophia Miller*	URS - Pittsburgh	[redacted]

(SSN - Social Security Number requested for training database use only. Information will be kept confidential.)

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

1. Applicability

This procedure applies to URS Corporation's U.S. operations. A violation of this policy is subject to disciplinary action up to and including termination.

2. Purpose and Scope

The purpose of this procedure is to help insure that people driving for the URS Corporation do so in a safe manner.

This Safety Management Standard (SMS) applies to employees operating motor vehicles that are owned, rented or leased by the Company, and the use of personal vehicles while on Company business.

This SMS does not apply to heavy equipment operations (see SMS 019).

3. Implementation

The overall responsibility for program implementation is with the URS Health and Safety Director. Other responsibilities include:

Administration - Fleet management, Vehicle Safety Program, vehicle acquisition, insurance claims reporting, controlling access to vehicles, maintenance of vehicles, participating on accident review.

Human Resources - Documentation of driver's license, discipline.

Health and Safety - Employee safety training, maintenance of the vehicle safety program, participation on the accident review committee.

Employee - Familiarization with URS Vehicle Safety Program, compliance with its requirements.

4. Requirements

A. Authorized Drivers

1. Authorized Drivers are those individuals permitted to drive URS owned, leased, or rented vehicles. Employees that only operate rental cars obtained on a daily basis through URS National Service Agreements are not required to be designated as Authorized Drivers.

2. Must be at least 18 (non-commercial license) or 21 (commercial license) years of age and have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency).

3. Human Resources and Office Administrators requires new employees and current employees (on an annual basis), designated as Authorized Drivers, to provide a copy of their driver's license. Authorized drivers who

lose their license through legal action must notify their Human Resources Representative immediately. The Human Resources Representative will notify the Fleet Manager.

4. The Company may suspend the privilege to operate vehicles on Company business due to non-compliance with the URS Vehicle Safety Program, involvement in a motor vehicle accident, or motor vehicle violations.

5. Authorized drivers must review the Vehicle Safety Program (SMS 057) and sign the Drivers Information form (Attachment 57-2).

6. Non-URS employees (e.g., subcontractors, alliance partners) may operate URS vehicles only when this activity is specifically agreed to in the applicable contract.

B. Training

1. Authorized Drivers shall be provided basic driver safety training, including a review of the URS Vehicle Safety Program (SMS 057) and video or on-line training, within 6 months of the effective date of this SMS or within 3 months of their hire date.

2. Additional training may be required for select employees based on accident involvement.

C. General Operating Policy and Procedure (Applies to Authorized and Non-Authorized Drivers Operating Motor Vehicles on Official Company Business)

1. Company owned/rented/leased motor vehicles may be operated only by properly licensed employees who are specifically authorized to drive Company vehicles.

2. Authorized drivers required to operate vehicles with special hazards (i.e. trucks carrying fuel cells, vehicles used to tow trailers, vehicles with limited visibility, etc.) shall be thoroughly briefed on the hazards and control measures necessary for safe operation of the vehicle. The local office shall maintain documentation of the briefing.

3. Drivers/operators shall know and obey all federal, state and local motor vehicle laws applicable to the operation of their vehicle.

4. A driver shall not permit unauthorized persons to operate a Company-owned/rented/leased vehicle.

5. URS policy regarding reimbursement and insurance coverage requirements for use of personal automobiles may be found in the Policy and Procedures Manual (Section 074.020).

6. All cargo extending 4 feet or more beyond the end of a truck, trailer or similar vehicle shall be clearly marked with a red warning flag or cloth measuring no less than 16 inches square. Red lights must be used at night.

7. Company owned/rented/leased vehicles are for official business use only and are not to be used for personal activities without the specific approval of a Division Manager, Senior Vice President, or above.
8. Seat belts and shoulder harnesses (occupant restraint systems) shall be worn or used whenever the vehicle is in operation. The vehicle may not move until all passengers have fastened their restraints.
9. When parking or leaving a vehicle, the following procedures must be followed: Shut off the engine, engage the transmission in park (automatic transmission) or first gear (standard transmission), set the parking brake, remove the ignition keys, and lock the vehicle.
10. The vehicle's engine is to be turned off during refueling. Smoking or cell phone use is not allowed while refueling.
11. Drivers/operators will not drive or operate vehicles while under the influence of alcohol or illegal drugs. Further details on the URS Substance Abuse Policy may be found in the Policy and Procedure Manual (section 034.030).
12. Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another healthcare provider, or the manufacturer (i.e. instructions on the label) that the activity is unsafe.
13. Vehicle operators are responsible for any fines levied by law enforcement agencies for the operation of their vehicles.
14. Articles, tools, equipment, etc. placed in vehicles shall be stored as not to interfere with vision or the proper operation of the vehicle in any way. This also includes preventing items from flying about or out of the vehicle during sudden stops, turning, etc.
15. Trucks or vehicles with obstructed rear-view mirrors must observe the following procedures when backing up: Position an employee to act as a spotter at the rear of the vehicles, in the driver's line of sight, to ensure that the are behind the truck is clear. If no other employee is present, then the driver must step out of the vehicle and check the area behind the vehicle before backing up. As an added precaution, avoid backing up whenever possible.
16. Driver/operators may not deactivate or muffle any backup warning device.

D. Field Site Vehicle Safety

1. Define specific vehicle travel routes and parking areas at field sites. Use fencing, cones or other markings to define roads and parking.
2. If parking on the shoulder of an active road, park as far off the road as possible.
3. If work is required alongside an active road (e.g., surveying) park the vehicle behind the area of work to provide a barrier against out-of-control vehicles.

4. URS will not transport DOT-placard quantities of hazardous materials. However, small quantities of hazardous materials (e.g., sample coolers) may be transported if properly packaged. Be careful to prevent chemical contamination of the vehicle. Further details on DOT shipping may be found in the DOT Shipping SMS 048.
5. Nuclear density meters (e.g.,Troxler units) may be transported only by employees who have been trained in the use of nuclear density meters (see SMS 044). Nuclear density meters must be secured from movement and locked during transport. NRC and state-specific regulations regarding transport documentation also apply.
6. When performing fieldwork requiring the blocking of traffic lanes (e.g., bridge inspection), follow URS SMS 032, the Manual on Uniform Traffic Control Devices for Streets and Highways (ANSI D6.1) and local police requirements for barriers, cones, and flaggers.
7. No employee may ride in the bed of a pickup truck unless seating and restraints are provided for this specific use.

E. Accident Response and Reporting

1. In case of injury, call or have someone else call, 911 immediately for emergency assistance. If you are involved in an accident and are not injured, do the following:
   a. Protect the accident scene.
   b. Do not admit liability or place any blame for the accident.
   c. Provide only your name, address, driver's license number, and vehicle insurance information.
   d. Obtain the following:
      i. name(s), addresses, and telephone number(s) of the owner
      ii. driver and occupants of other vehicle(s)
      iii. the owner's insurance company
      iv. driver's license number
      v. year, make, model and license number of the vehicle(s)
      vi. name(s) and addresses of any witnesses
   e. **DO NOT:**
      - Call the insurance company; the Fleet Manager's office will do this (unless the incident involves your personal vehicle).
      - Give a statement to the press.
      - Give a signed statement to the claims adjuster representing the other driver's insurance company.

NOTE: The Auto Claim Report (Attachment 57-1) for Company-leased or owned vehicles is located in the vehicle glove compartment. The driver must complete this form at the scene of the accident and submit it to management.

2. Notification

   All accidents with a Company-leased, rented, or owned vehicle must be reported to your Office/Branch Manager/Supervisor and Fleet Manager within 24-hours of the time it occurs. Use the Auto Claim Report (Attachment 57-1) for this purpose. The Fleet Administrator will report the accident to the insurance carrier (leased and owned vehicles only) promptly .

F. Accident Review

1. The Fleet Manager will review all accidents involving URS-owned, rented or leased vehicles. Accidents involving any of the following will result in immediate disciplinary action in coordination with Human Resources:
   a. Driving under the influence of alcohol or illegal drugs
   b. Reckless driving
   c. Driving without a license
   d. Hit-and-run driving
   e. Repeat accidents involving the same employee,
   f. Unauthorized use of Company vehicles.
2. Disciplinary action includes possible:
   a. Loss of URS driving privileges
   b. Additional driver safety training
   c. Suspension without pay
   d. Termination

G. Inspection

1. The driver is responsible for inspecting the vehicle prior to use and not driving a vehicle with obvious safety defects.
2. Basic safety checks must include:
   a. Tire condition/pressure
   b. Lights/turn signals
   c. A clean windshield and adequate window washer fluid
   d. Gauges/warning lights indicating a normal condition
   e. Mirrors properly adjusted
   f. Brakes with adequate pedal pressure for proper braking

3. Any defects must be reported to the local office Fleet Representative/Office Administrator.

H. Vehicle Maintenance

1. The Office Administrator (or designee) is to ensure that all URS-leased/owned vehicles are properly maintained.
2. Routine maintenance must be performed in accordance the schedule provided in the owner's manual stored in the vehicle.
3. Reported defects/problems with vehicles must be repaired promptly.

5. Documentation Summary

A. Auto Claim Report - (Attachment SMS 57-1)

B. Driver's Information - (Attachment SMS-57-2)

6. References

The following sites provide additional information to assist you:

A. National Safety Council; Information on Defensive Driving Courses
http://www.nsc.org/psg/ddc.htm

B. AAA Foundation for Traffic Safety
http://www.aaafts.org/

URS	Health and Safety Program **AUTO CLAIM REPORT**	Attachment 57-1 Page 1 of 2 Revised: March 2002

To be used for all vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Name of Employee Involved in Accident _____

Office Location _____

Contact Person _____

Phone Number _____

Fax Number _____

Company Vehicle ❑ On Company business at the time of accident? Yes ❑ No ❑
Personal Vehicle ❑ Vehicle Identification Number (company or personal):
Rental Vehicle ❑ _____

Year _____ Make _____ Model _____

Other Driver's Information

Name _____ Phone Number _____

Address _____

Insurance Co. _____ Policy # _____

License Plate # _____ Make _____ Model _____

Description of Accident

Date of Accident _____ Police Report # _____

Location of Accident _____ Police Department _____

Description (provide a clear, inclusive description of the accident):

_____

_____

_____

_____

_____

_____

_____

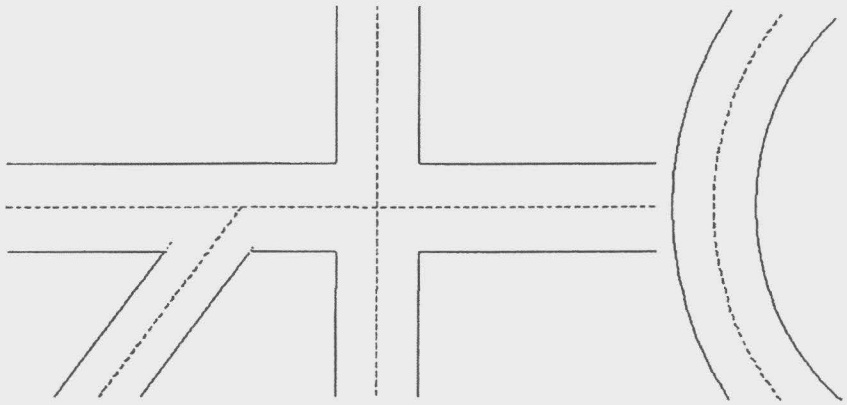
Accidents should be reported immediately to the Office Administrator who will then forward the information to:

ALL ACCIDENTS WILL BE REPORTED TO:
URS Corporation
Kay Tenuta in the Tampa, FL. Office.
813-636-2196, 813-636-2111 (Fax)

URS	Health and Safety Program **AUTO CLAIM REPORT**	Attachment 57-1 Page 2 of 2 Revised: March 2002

To be used for <u>all</u> vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Draw a diagram showing the position of vehicles before and after the accident. Correct the diagram to fit your situation.



Check all applicable conditions on each subject

WEATHER
- ❑ Clear
- ❑ Cloudy
- ❑ Fog
- ❑ Rain
- ❑ Snow
- ❑ Sleet
- ❑ Other

LIGHTING
- ❑ Daylight ❑ Dark
- ❑ Dusk ❑ Dawn
- ❑ Dark - no street lights on
- ❑ Dark - street lights on
- ❑ Headlights
- ❑ Headlights on dim
- ❑ Headlights on bright
- ❑ No lights on

ROAD SURFACE
- ❑ Dry
- ❑ Wet
- ❑ Muddy
- ❑ Snowy
- ❑ Snow-covered
- ❑ Ice in places
- ❑ Ice -covered
- ❑ Other

ROAD DESCRIPTION
- ❑ Straight ❑ Curve
- ❑ Level
- ❑ Hill ❑ Up ❑ Down
- ❑ Paved ❑ Black top
- ❑ One-way
- ❑ Two-way
- ❑ Divided road
- ❑ Intersection

ACTION OF DRIVER	You	Other
Exceeding safe speed		
On wrong side of street		
Did not have right-of-way		
Disobeyed traffic signal		
Passed illegally		
Improper turning		
Improper backing		
Following too closely		
Failure to signal		
Improper lane change		
Misjudged clearance		
Other		

What was speed limit?

_____ MPH

Witnesses?

❑ Yes ❑ No

Traffic control
- ❑ Signal lights
- ❑ Caution lights
- ❑ Stop sign
- ❑ Police officer
- ❑ None ❑ Other

Witness Name _____

Address _____

_____

Name _____

Address _____

URS	DRIVERS INFORMATION	Attachment 57-2 Revised: March 2002

Policy

All Company employees who operate a vehicle on company business must comply with the URS Vehicle Safety Program (SMS 57). Violation of this policy is subject to disciplinary action up to and including termination.

License

I currently have a valid driver license and authorize URS, its agents, or insurance carrier to verify my motor vehicle record.

I agree to notify URS Administration immediately if my driver's license is suspended or revoked.

Please Print Legibly

Name _____ _____ _____ Date of Birth _____
First Middle Last

License Number _____ State _____ Class _____

Employee Signature _____ Date _____

Repeated accidents, loss of driver's license, or violation of URS' Vehicle Safety Program will result in loss of permission to drive on Company business.

(Attach the applicant's driver's license to this space and photocopy this sheet. All information on the license must be legible after photocopying.)

URS SAFETY MANAGEMENT STANDARD
Cold Stress

1. Applicability

This procedure applies to URS projects where field crews are working outdoors in damp and cool (below 50° F or 10°C) conditions or anytime temperatures are below 32°F or 0°C.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the following conditions:

Hypothermia: Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia may be seen in Attachment 59-1.

Frostbite: Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

- **Frost Nip or Initial Frostbite:** (1st degree frostbite) Characterized by blanching or whitening of skin.
- **Superficial Frostbite:** (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.
- **Deep Frostbite:** (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager and the field supervisor.

4. Requirements

A. Carefully plan work anticipated to be performed in cool or cold conditions. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.

B. Monitor weather forecasts immediately prior to entering the field.

C. Observe and monitor weather conditions such as ambient temperature, wind speed, and precipitation while in the field. Use Attachment 59-2 to determine wind chill.

D. Wear at least 3 layers of clothing.

- An outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)
- A middle layer of down, wool, or similar materials to provide insulation
- An inner layer of cotton or synthetic weave to allow ventilation

In addition:

- Wear a hat. Up to 40% of body heat can be lost when the head is left exposed.
- Wear insulated boots or other insulated footwear.
- Keep a change of dry clothing available in case work clothes become wet.
- Do not wear tight clothing. Loose clothing allows better ventilation.

E. Use the following work practices:

- Use Attachment 59-3 to establish work/rest cycles in cold weather.
- Drink plenty of warm liquids. It is easy to become dehydrated in cold

weather.

- Avoiding caffeine and alcohol. Alcohol will accelerate loss of body heat.
- Eat high calorie snacks to help maintain body metabolism.
- If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold.
- Work in pairs to keep an eye on each other and watch for signs of cold stress.
- NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.
- Avoid exhaustion.

F. When possible, use the following engineering controls:

- Provide shelter to escape cold, wind and precipitation
- Provide a source of heat (such as warm packs or portable heaters)
- Use insulating materials on equipment handles when temperatures drop below 30°F or -1°C.

G. Watch for symptoms and signs of hypothermia (see Attachment 59-1).

H. Treat cold stress illness as follows:

- Hypothermia: Prompt treatment of hypothermia is essential. Once the body temperature drops below 95°F or 35°C, the loss of temperature control occurs, and the body can no longer rewarm itself. Initial treatment includes reducing heat loss by moving the individual out of the wind and cold, removal of wet clothing, applying external heat (such as a pre-warmed sleeping bag, electric blanket, or body-heat from other workers) and follow-up medical attention.
- Frost Bite: The initial treatment for frostbite includes bringing the individual to a warm location, removal of clothing in the affected area, and, **if help is delayed**, placing the affected parts in warm (100° to104° F or 38° to 40°C) water. Do not massage or rub the frostbite area. After

the initial treatment, wrap the affected area loosely in sterile gauze and seek medical attention.

For further discussion on Cold Stress treatment, please refer to Attachment 59-1

I. Hypothermia in Water:

Loss of body heat to the water is a major cause of deaths in boating accidents. Often the cause of death is listed as drowning; however the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around two to three degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE	EXHAUSTION	SURVIVAL TIME
32.5° F (0°C)	Under 15 min.	Under 15 to 45 min.
32.5 to 40°F (0 – 4°C)	15 to 30 min.	30 to 90 min.
40 to 50°F (4 – 10°C)	30 to 60 min.	1 to 3 hrs.
50 to 60°F (10 – 16°C)	1 to 2 hrs.	1 to 6 hrs.
60 to 70°F (16 – 21°C)	2 to 7 hrs.	2 to 40 hrs.
60 to 70°F (16 – 21°C)	3 to 12 hrs.	3 hrs. to indefinite
Over 80°F (27°C)	Indefinite	Indefinite

SOME POINTS TO REMEMBER:

- Wear your PFD. Review SMS 053 - Marine Safety and Boat Operations.
- If water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading) or if significant potential to fall in water.
- While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep your head out of the water. This will increase your survival time.

- Keep a positive attitude about your rescue. This will increase your chances of survival.
- If there is more than one person in the water, huddling is recommended.

J. Training

Workers at risk of developing hypothermia or cold-related injury will be trained in:

- recognition of the signs and symptoms of cold injury or impending hypothermia,
- proper re-warming procedures and appropriate first aid treatment,
- proper use of clothing,
- proper eating and drinking practices
- safe work practices appropriate to the work that is to be performed.

5. Documentation Summary

File these records in the Project Safety File.

A. Completed Project Hazard Analysis form (see Health and Safety Website – "Hazard Analysis")

B. Cold stress training records

6. Resources

A. OSHA Fact Sheets – "Protecting Workers in Cold Environments" http://www.osha-slc.gov/OshDoc/Fact_data/FSNO98-55.html

B. Attachment 59-1 "Signs of, and Treatment for, Cold Stress related Illnesses"

C. Attachment 59-2(a) "Wind Chill Index" (units in °F and miles/hour)

D. Attachment 59-2(b) "Wind Chill Index" (units in °C and Kilometers/hour)

E. Attachment 59-3 "TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift"

Attachment 59-1
Signs of and Treatment for Cold Stress Related Illnesses

Condition	Signs/Symptoms	Treatment
Hypothermia **Mild** (98° - 90° F) (36° - 32°C)	• shivering • lack of coordination • stumbling, fumbling hands • slurred speech • memory loss • pale, cold skin	• move to warm area • stay active • remove wet clothes and replace with dry clothes or blankets • cover the head • drink warm (not hot) sugary drink
Hypothermia **Moderate** (90° - 86° F) (32° - 30°C)	• shivering stops • unable to walk or stand • confused and irrational	• All of the above, plus • Call for an ambulance • Cover all extremities completely • Place very warm objects, such as hot packs or water bottles on the victim's head, neck, chest and groin
Hypothermia **Severe** (86° - 78° F) (30° - 26°C)	• severe muscle stiffness • very sleepy or unconscious • ice cold skin • death	• Call for an ambulance • Treat the victim very gently • Do not attempt to re-warm -- the victim should receive treatment in a hospital
Frostbite	• Cold, tingling, stinging or aching feeling in frostbitten area; numbness • Skin color turns red, then purple, then white or very pale skin, cold to the touch • Blisters in severe cases	• Seek medical attention • Do not rub the area • Wrap in soft cloth • If help is delayed, immerse in warm, not hot, water
Trench Foot	• Tingling, itching or burning sensation • Blisters	• Soak feet in warm water, then wrap with dry cloth bandages • Drink a warm, sugary drink

Source: Princeton University, Department of Environmental Health and Safety, posted 2/2/99.

Attachment 59-2(a)
Wind-Chill Index[1]
(miles per hour and °F.)

	ACTUAL THERMOMETER READING (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
Wind speed in mph	EQUIVALENT TEMPERATURE (°F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph (little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed flesh)			Great Danger		

[1] Source: Fundamentals of Industrial Hygiene, Third Edition. Plog, B.A., Benjamin, G.S., Kerwin, M.A., National Safety Council, 1988

Attachment 59-2(b)
Wind-chill Index[1]
(Kilometers per hour and °C.)

Estimated wind speed	Actual temperature reading (°C)												
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
(in km/h)	Equivalent chill temperature (°C)												
0 (Calm)	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
8	9	3	-2	-7	-12	-18	-23	-28	-33	-38	-44	-49	-54
16	4	-2	-7	-14	-20	-27	-33	-38	-45	-50	-57	-63	-69
24	2	-5	-11	-18	-25	-32	-38	-45	-52	-58	-65	-72	-78
32	0	-7	-14	-21	-28	-35	-42	-50	-56	-64	-71	-78	-84
40	-1	-8	-16	-24	-31	-38	-46	-53	-60	-67	-76	-82	-90
48	-2	-10	-17	-25	-33	-40	-48	-55	-63	-70	-78	-86	-94
56	-3	-11	-18	-26	-34	-42	-50	-58	-65	-73	-81	-89	-96
64	-3	-11	-19	-27	-35	-43	-51	-59	-66	-74	-82	-90	-98
(Wind speeds greater than 64 km/h have little additional effect.)	LOW HAZARD Risk of exposed, dry skin being affected in less than one hour. Awareness of hazard low.				INCREASING HAZARD Danger from freezing of exposed flesh within one minute.			HIGH HAZARD Flesh may freeze within 30seconds.					

The table was originally developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA, and is adapted from the 1995-1996 *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, published by the ACGIH. The ACGIH publication provides the equivalent table with temperature in degrees Fahrenheit and wind speed in mph.

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F).

Attachment-59-3

TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift*

The ACGIH has adopted the guidelines developed by the Saskatchewan Labour for working outdoors in cold weather conditions. These guidelines recommend protective clothing and limits on exposure time. The recommended exposure times are based on the wind chill factor, a scale based on air temperature and wind speed. The work-break schedule applies to any four-hour period with moderate or heavy activity. The warm-up break periods are of 10-minute duration in a warm location. The schedule assumes that "normal breaks" are taken once every two hours. At the end of a 4-hour period, an extended break (e.g. lunch break) in a warm location is recommended. More information is available in the ACGIH publications "2000 TLVs and BEIs" and "Documentation of TLVs and BEIs" and on the Saskatchewan Labour web page "Cold Conditions Guidelines for Outside Workers".

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. work Period	No. of Breaks**	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29°to -31°	-20°to -24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25°to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40°to -44°	30 min.	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

*2000 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati : American Conference of Governmental Industrial Hygienists (ACGIH), 2000 - page 176. Adopted from Saskatchewan Labour "Cold Conditions Guidelines for Outside Workers"

URS SAFETY MANAGEMENT STANDARD
INJURY MANAGEMENT

1. Applicability

This standard applies to all U.S. based URS field and office locations.

2. Purpose and Scope

This standard is designed to ensure that employees receive appropriate, immediate, and high-quality health care services that will minimize disability, promote rapid recovery and save lives.

3. Implementation

Office Locations – Implementation of this program is the responsibility of the Office Manager.

Field Activities – Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Pre-Injury Management

The following pro-active plans and procedures shall be in place before an injury or illness occurs.

1. Work Site Evaluation

   Project and office locations shall evaluate their location for first aid and medical requirements. The following factors should be considered:

   - Types of accidents that could reasonably occur
   - Location of local clinics and hospitals
   - Response time for external emergency services
   - If corrosive or hazardous materials are in use
   - Any industry specific requirements
   - Types of training for employees and first aid responders
   - What first aid supplies should be available

2. First Aid Services

   a. First Aid Responders

   At least one person, and preferably two or more, trained in first aid must be available at the worksite if either of these conditions exist:

   (1). If life threatening injuries can reasonably be expected, trained personnel must be available within 3 to 4 minutes. This generally means that community emergency medical services

cannot be relied on since their response time is usually greater than 3 minutes.

(2). If no life threatening injuries can reasonably be expected, the response time for trained personnel is extended to 15 minutes.

The trained first aid responders should be designated so that the other employees know who they are and how to contact them. The trained responder must have a current first aid certificate and be trained in Bloodborne Pathogens (See SMS 51).

b. First Aid Kits

Each site shall maintain a first aid kit in accordance with SMS 24-9.

c. Emergency Information

Each location shall post a current list of emergency telephone numbers and maps to access local medical emergency providers (SMS 003). Advance contact with ambulance services to ensure they are familiar with location, access routes, and hospital locations is advised in remote or new locations.

d. Eyewash Facilities

If corrosive materials are used, eyewash and body flush facilities must be provided. Where possible, these should provide large quantities of clean water. The water source must be pressure controlled and clearly identified. Portable eyewash stations must contain a minimum of 1 gallon of potable water.

e. Identification of Medical Facilities

Field and office location shall identify a suitable local clinic, preferably specializing in occupational medicine, to treat non-emergency injuries and illnesses. In addition, a local hospital emergency room shall be identified for treatment of life threatening or after hours injuries. The URS Occupational Health Specialist (OHS) or the workers' compensation insurance carrier pre-injury consultant should be contacted to provide a listing of recommended medical facilities.

The URS H&S Representative should visit the medical facility and meet with the medical provider in order to establish expectations. Clinics should be conveniently located, clean, professionally staffed, offer multiple services and be supportive of early return to work practices.

Field/construction projects shall make appropriate arrangements with local ambulance/emergency service providers prior to the start of work

activities to ensure appropriate transportation can be provided in the event of an emergency. These arrangements include establishment of an identifiable project address and emergency access point (i.e. location to meet emergency personnel).

B. Post-Injury Management

1. Transportation

   When employees require urgent medical attention as the result of a work-related injury/illness, transportation shall be provided to the doctor's office, clinic, or hospital. Employees should not be permitted to drive unless safe to do so.

2. Emergency Injury/Illness Treatment

   In all cases, critical injuries must be immediately referred for professional medical attention. The manner in which the referral is accomplished, and the person responsible for the referral, should be clearly defined in either a project safety plan and/or an office Emergency Action Plan (SMS 003). Critical injuries/illnesses include, but may not be limited to, the following:

   - Loss of consciousness
   - Unexplained chest pain
   - Breathing difficulty
   - Uncontrolled bleeding
   - Fractured bones
   - Suspected internal injuries
   - Suspected exposure to chemical/biological hazard
   - Second or third degree thermal or chemical burns (i.e. blistering)
   - Electrocution
   - Unexplained change in mental state following an injury (may indicate shock or other internal injuries)

3. Non-Emergency Injury/Illness Treatment

   When a work-related incident results in a non-critical injury/illness, the primary objective is to provide appropriate medical services to diagnose and treat the injury/illness. Options available to the employee and project/office management in these situations include the following:

   - First aid treatment and/or review by a qualified first aid responder

- First aid treatment and/or review by a qualified first aid responder followed by a referral to the Occupational Health Specialist (866-326-7321).

Additional support for the employee and managers in these situations can also be obtained from a URS H&S professional.

Attachment 065-1 provides a flow chart to assist employees and managers in determining the most appropriate option for obtaining medical services for non-emergency injuries/illnesses.

Note – Some states allow injured workers to choose their own initial medical provider. Employees are to be cautioned that not all medical providers accept workers' compensation insurance and coverage should be verified prior to treatment if an employee lives in a state that permits him/her to elect to see their personal doctor rather than the company recommended physician.

C. Workers' Compensation Case Management

1. Health and Safety

a. URS Occupational Health Specialist will:

(1). Evaluate and file workers' compensation claims for cases covered by the URS insurance program. Evaluate and provide consultation for injuries occurring in Monopolistic states (Ohio, Washington, West Virginia, North Dakota, and Wyoming).

(2). Provide date of injury support to employees and supervisors, including Monopolistic state claims.

(3). Coordinate regular follow-up of all cases, including Monopolistic state claims, to ensure effective case management.

(4). Offer pre-injury consultation for offices and project sites.

(5). Provide training and communication regarding the workers' compensation process.

b. The Regional and Corporate H&S Managers will assist with the early return to work program by interfacing with the supervisor and employee to evaluate if appropriate and safe temporary transitional work is available.

c. Local H&S Representatives will:

(1). Provide support to the local office or project to ensure that the requirements of this SMS are in place.

(2). Provide training on this SMS to the local office or project site staff.

(3). Ensure proper reporting of incidents in accordance with SMS 049.

(4). Ensure that requirements of this SMS are incorporated into all project H&S plans.

2. Human Resources

a. Local HR Representatives will:

(1). Provide on-site contact for injured employees by maintaining necessary forms and referring employee to OHS to file the workers' compensation claim.

(2). Act as the on-site point of contact for the workers' compensation insurance carrier adjuster.

(3). Forward any external communication (clinic bills, Monopolistic state forms, etc.) to the OHS upon receipt.

b. Regional HR Managers will coordinate any Short Term Disability benefits owed to employees disabled from working over one week because of a work-related injury/illness.

3. Supervisor

The Supervisor (or HR or H&S Representative) will:

a. Sign the Medical Treatment Referral form (65-2) prior to the employee leaving the site for medical treatment (this will not be necessary in an emergency). The employee will also be given the Medical Authorization Form (65-3) to be signed with copy provided to the employee, health care provider and OHS.

b. Provide transitional job assignments, with consultation and approval of the office manager, whenever possible to enable an injured worker to return to work (URS Return to Work Policy 65-4). Transitional employment is defined as temporary modified or light duty work that covers the time from the injury until the release to full duty from the doctor. The return to work hierarchy includes:

(1). Return to own job

(2). Return to own job with accommodations/modifications

(3). Return to another job at URS with or without accommodations/modifications

(4). Placement in alternate jobs through telecommuting or other job assignments determined on a case by case basis.

c. Provide, when requested by the treating physician or insurance carrier, the Description of Employee's Job Duties form (65-5).

d. Maintain regular contact with employees who are temporarily disabled (contact at least weekly by phone or email).

4. Employee

The employees will:

a. Report injuries as soon as possible to their supervisors. Employees are encouraged to contact their supervisor and/or the OHS prior to seeking any medical services for non-emergency injuries and illnesses.

b. Provide the Medical Treatment Referral form to the treating physician. If employees are unable to obtain the form prior to being treated (i.e. onset of symptoms during non-work hours, work in remote locations, etc.) they must notify their supervisor as soon as possible on the next scheduled workday.

c. Provide their supervisor with written return to work and follow up paperwork from the treating physician immediately following each doctor appointment.

5. **Documentation Summary**

A. The following documents shall be maintained by the H&S Representative:

- Posting of medical services providers and emergency phone numbers
- List of qualified first aid providers
- Documentation of coordination between URS and emergency service providers for field/construction projects.
- Completed Injury/Illness/Incident Report Form (SMS 49-1) (copy to OHS)
- Description of Employee's Job Duties form (copy to OHS) – 65-5
- Medical Treatment Referral form – 65-2
- Medical Authorization Letter – 65-3

B. The following documents shall be maintained by the HR Representative and copied to the OHS.

- Physician's First Report of Injury and follow up reports
- Medical Treatment Referral form
- Medical Authorization Letter

- Description of Employee's Job Duties form

6. **Resources**

- OSHA 1910.151 Medical Services and First Aid
- OSHA Instruction CPL 2-2.53 Guidelines for First Aid Programs
- OSHA Safety & Health Topics: Medical and First Aid
- Red Cross Health & Safety Services www.redcross.org/services/hss/
- SMS 003 Emergency Action Plans
- SMS 024 Medical Surveillance
- SMS 049 Incident Reporting
- SMS 051 Bloodborne Pathogens
- URS Medical Services Provider – WorkCare™ 1-800-455-6155
- URS workers' compensation insurance provider AIG – www.aigcs.net
- URS Occupational Health Specialist – Jeanette Schrimsher, RN COHN-S
- Phone 866-326-7321
- Confidential Fax 512-419-6413

Attachments

065-1 Injury Management Procedures (Flow Chart)

065-2 Medical Treatment Referral form

065-3 Medical Authorization Letter

065-4 URS Return to Work Policy

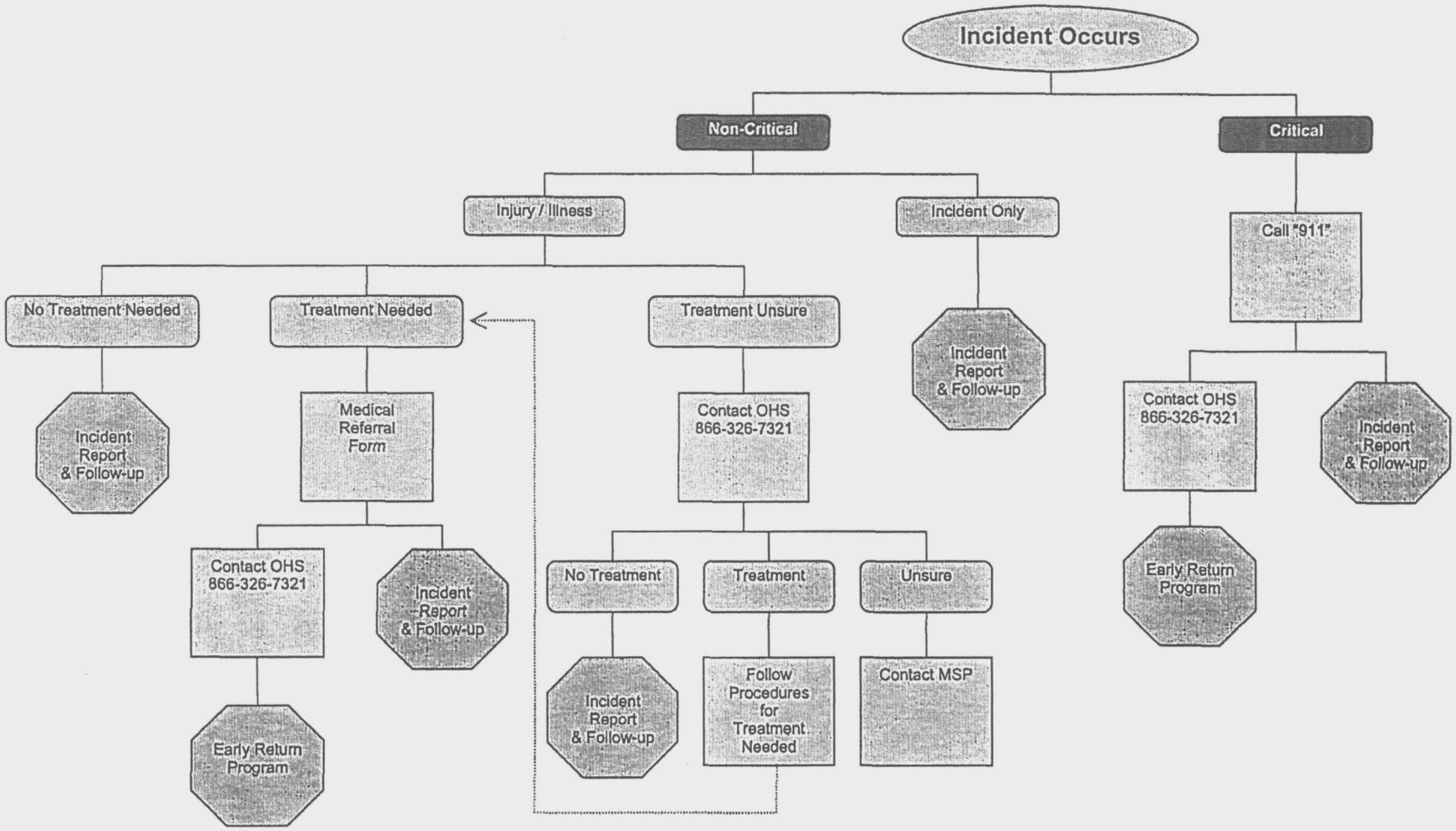
065-5 Description of Employee's Job Duties

URS

Health and Safety Program

INJURY MANAGEMENT PROCEDURES FLOW CHART

Attachment 65-1



URS	Health and Safety Program **MEDICAL TREATMENT REFERRAL**	Attachment 65-2

Date: _____ Site Phone Number: _____

URS Site Contact: _____

Employee Name _____ Social Security # _____

Employee Signature: _____

Brief Job Description _____

_____

Date of Injury _____ Body Part Injured _____

Place of Injury _____

Post-accident drug and/or alcohol test required? Yes ☐ No ☐

Medical Provider:

Name: _____ Phone: _____

Address: _____

_____

_____

Employee Transported to Medical Provider by:

_____

Workers' Compensation Insurance Carrier: **AIG Claim Services**
(except for: Washington, Ohio, West Virginia, North Dakota, Wyoming)

For questions, please contact: **Occupational Health Specialist, Jeanette Schrimsher, RN COHN-S 866-326-7321**

Early Return-to-Work and Transitional Employment Policy

To Medical Providers: URS Corporation values its employees and believes that it is helpful to an injured worker's recovery to return to work as soon as medically approved. Please contact us if you have any questions regarding releasing the employee to work either in a modified/light duty status or full duty clearance. Please send a work status report to the site contact listed above following the initial medical evaluation and each follow up appointment.

_____ _____

Supervisor Name Supervisor Signature

URS	Health and Safety Program MEDICAL AUTHORIZATION FORM	Attachment 65-3

WORKERS' COMPENSATION
EMPLOYEE AUTHORIZATION LETTER

To be signed with copies provided to employee, URS Occupational Health Specialist and medical provider(s).

To Whom It May Concern:

I, _____ hereby authorize any hospital,
Please Print Name

medical practitioner, clinic, other medical or medically related facility, pharmacy, insurance company to furnish to URS Corporation or its subsidiaries or representatives (orally or in writing), information with respect to any work-related injury or illness including, treatments, consultations, prescriptions, and copies of applicable records that may be requested. I also authorize my employer to disclose information needed to process my workers' compensation claim.

The information provided to URS Corporation, its subsidiaries or representatives is to be used solely for the administration of my workers' compensation claim.

A photo static copy of this authorization is to be considered as valid as the original and is effective for the duration of the claim.

Signature: _____ Date: _____

Note: A true copy of this authorization is available to the employee at any time.

RETURN TO WORK POLICY

Our primary goal in safety is the prevention of work related injuries. When an injury does occur, it is the policy of URS to provide our employees with the best possible recovery program. A major component of any successful recovery program is returning the injured employee to the workforce as soon as medically possible. This type of Early Return Strategy has been shown to dramatically reduce the overall recovery time of injured workers creating a benefit for the employee, his/her family, coworkers, and the firm.

As part of this policy, Operations, Human Resources, Health and Safety, and our workers' compensation insurance carrier will work together with our employees and their treating physician to establish a recovery program that minimizes both the number of cases and total days away from work experienced by our employees. URS operations will accommodate transitional work (i.e. light duty or modified work) requirements for employees recovering from work related injuries. The work limits, as defined by the treating physician, will be strictly adhered to. Modified job assignments will be structured to meet the capacities and therapy needs of the injured employee.

URS	Health and Safety Program **DESCRIPTION OF EMPLOYEE'S JOB DUTIES**	Attachment 65-5

Print Name:		
URS Location:	Phone:	
Job Title:	No. Hours Day:	No. Days Week:
General Job Description:		

1. Check the frequency & number of hours a day the activity is performed:

Activity	Frequency		Number of Hours Per Day									
	Continuous	Intermittent	0	1	2	3	4	5	6	7	8	9+
Sitting												
Walking												
Standing												
Bending												
Squatting												
Climbing												
Kneeling												
Twisting												

2. Hand manipulation required? (If yes, complete 2 a, b, c, d)			Yes ❑	No ❑
2a. Simple grasping?	Yes ❑	No ❑	Right ❑	Left ❑
2b. Power grasping?	Yes ❑	No ❑	Right ❑	Left ❑
2c. Pushing and pulling?	Yes ❑	No ❑	Right ❑	Left ❑
2d. Fine manipulation?	Yes ❑	No ❑	Right ❑	Left ❑
3. Does the job require reaching at or above shoulder level?			Yes ❑	No ❑
4. Does the job require use of the feet to operate foot controls?			Yes ❑	No ❑
5. Are there special visual requirements? (Describe)			Yes ❑	No ❑
6. Are there special hearing requirements? (Describe)			Yes ❑	No ❑

URS	Health and Safety Program **DESCRIPTION OF EMPLOYEE'S JOB DUTIES**	Attachment 65-5

7. Lifting and carrying (check weight lifted, frequency, and how far carried):

Weight	Frequency			Distance Carried
	Hourly	Daily	Weekly	
1-10 lbs.				
11-25 lbs.				
25-40 lbs.				
41-60 lbs.				
61-75 lbs.				

8. Environmental conditions (check yes or no):

8a.	Work near dust, gas, vapors, or fumes?	Yes ❑	No ❑
8b.	Work in noisy environment?	Yes ❑	No ❑
8c.	Work in extremely hot temperature?	Yes ❑	No ❑
8d.	Work in extremely cold temperature?	Yes ❑	No ❑
8e.	Work at heights?	Yes ❑	No ❑
8f.	Walk on uneven surfaces?	Yes ❑	No ❑

9. Equipment operated (check yes or no):

9a.	Computer and mouse? If yes, hours per day _____	Yes ❑	No ❑
9b.	Drive car, truck or van?	Yes ❑	No ❑
9c.	Operate forklift or heavy equipment?	Yes ❑	No ❑
9d.	Other (please describe):		

10. Comments:

Employee Signature: Date of Hire:

Date: