JONES EDMUNDS

September 27, 2010

Mr. Steven G. Morgan
Solid Waste Section
Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

RE: Operation Permit Modification Application, Phases I-VI Capacity Expansion Area (Sections 7, 8, and 9) and Effluent Storage Tank of the Southeast County Landfill Hillsborough County, Florida, Response to FDEP Request for Additional Information
Operation Permit Modification – Permit No.: 35435-014-S0/01
Pending Permit Modification No.: 35435-018-S0/MM
FDEP ID No.: SWD/29/41193
Jones Edmunds Project No. 08449-030-04-1110

Dept. of Environmental Protection
SEP 30 2010
Southwest District

Dear Mr. Morgan:

This letter addresses comments received from the Florida Department of Environmental Protection, dated June 16, 2010. Each of the Department's comments is presented below in *italics*, followed by the response in **bold** type.

The following information is needed in support of the solid waste application [Chapter 62-701, Florida Administrative Code (F.A.C.)]:

Comment 1: ***Rule 62-701.600 (9), F.A.C.:***

a. *Please provide supporting information and/or calculations that demonstrate that "Due to the installation of the GCCS, partial closure of the side slopes and phases that reach final elevation will not be possible given the settlement and construction of the final GCCS system."*

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Response 1.a: As discussed during our meeting on August 25, the County no longer wished to modify the closure requirements at this time. Phases that reach final elevation will be closed as required by the current operating permit.

b. *The reason given for the request to extend temporary final cover through all interim lifts does not appear to meet the criteria of Rule 62-701.600(9) (a), F.A.C. Please verify and amend this permit modification application, as appropriate.*

Response 1.b: See Response 1.a.

c. *Supporting information that demonstrates that the conditions of temporary closure meet the requirements of Rule 62-701.900(9) (b), F.A.C. has not been provided with this permit modification application. Please verify and revise this permit application, as appropriate.*

Response 1.c: See Response 1.a.

d. *Design information and calculations provided in support of the Section 7 through 9 permitted design (e.g. HELP Model analyses, leachate generation calculations, slope stability analyses, stormwater management, etc.) appear to have been based on the assumption that side slopes and phases that reached final elevation would be closed and not on the assumption that these areas would be maintained with temporary final cover for extended time periods until final closure of Sections 7 through 9. Since Phase I-VI was also permitted to close slopes and phases that reached final elevation, this assumption may also have been part of the Phase I-VI design. Please verify all design information and calculations for the Phase I-VI and Sections 7-9 permitted designs that are based on the assumption of partial closure of slopes and areas that reach final elevation and provide revised design information and calculations, as appropriate, based on temporary closure of these areas until final closure of Phases I-VI and/or Section 7-9, as proposed.*

Response 1.d: See Response 1.a.

e. *Modifications in the design of Phases I-VI and Sections 7 through 9, as described in Comments #l.c & #l.d. above appear to be beyond the scope of a "'Minor Modification". As appropriate, please revise the Classification of Application on the application form for this application to a "Substantial Modification", revise the narrative in the appropriate sections of this application, and provide the appropriate additional application fee.*

Response 1.e: As we are no longer seeking changes to the closure, the request should remain within the scope of a "minor modification."

Comment 2: Please provide the supporting justification, including all appropriate information, calculations, and or assumptions, for the requested deletion of the 9700 gal/day application rate from Specific Condition #C.8. j.(5).

Response 2: Specific Condition C.8.j.(5) states that leachate/effluent evaporation via truck-mounted spraying is allowed at a "maximum average application rate of 9,700 gal/day in accordance with the procedures and restrictions in Section 8.4 of the LMP." Section 8.4 of the LMP states that "an average of 9,700 gallons per day" will be sprayed from a spray bar mounted on the rear of a tank truck onto active-fill areas of the landfill.

The amount of leachate sprayed onto active-fill areas may vary daily; one day more than 9,700 gallons of leachate are sprayed and the next day less than 9,700 gallons of leachate are sprayed, resulting in an average application rate of 9,700 gallons leachate for any given month. Therefore, we request that the application rate be changed to an average of 9,700 gallons per day and the word "maximum" be removed from the specific condition #C.8.j(5)

Comment 3: Please explain how the wording in Specific Condition C.8.k. differs from that in the leachate management plan and provide proposed alternate language for the specific condition.

Response 3: Specific Condition C.8.k. differs from that of the leachate management plan (LMP) in that the specific conditions state that the bottom liner for a particular *lift* to be filled will be evaluated 1 year before filling begins in that *lift*, whereas the LMP states that the bottom liner of a particular *phase* shall be evaluated 1 year before filling begins in that *phase*. The intent is to have the bottom liner of a phase evaluated before entering that phase for operation of subsequent lifts. Therefore, the proposed alternate language for the specific condition is as follows:

k. <u>Phase I-VI Bottom Liner Clay Evaluation</u>.

1) To measure and evaluate the consolidation and subsurface stability of the underlying clay bottom liner in Phases I-VI, at least 1 year before entering <u>a particular phase for</u> operation <u>of subsequent lifts</u>, as shown the Phase I-VI sample shall be collected from beneath the lift proposed to be filled.

2) Clay strength testing of the in-situ undisturbed clay sample and an evaluation of the slope stability for the next lift and final cover elevations shall be conducted in accordance with procedures in Section 9.2.4 of the LMP.

3) The results of the clay liner strength and stability evaluation shall be submitted to the Department for approval at least 6 months before filling begins in a particular phase.

ATTACHMENT A - UPDATED OPERATION PLAN (RULE 62-701.500, F.A.C.):

Comment 4: The current Operations Plan is referred to as Part L and the sections in the plan start with the letter L. In this permit modification application, the Operations Plan is referred to as Part K and the sections in the revised pages of the plan start with the letter K. Please provide a complete revised Operations Plan with a consistent section designation system.

Response 4: In the new application form, the operations plan is now Part K but our references have been changed to Part L and the operations plan has been changed back to sections beginning with the letter L. A complete revised Operations Plan, now referred to as Part L and including a consistent section designation system, is attached. The permit application page is also attached.

Comment 5: ***Table of Contents:*** *Please explain why Appendix F is being deleted rather than modified and why Appendix G is being deleted from the Operation Plan.*

Response 5: Appendix F should have been updated rather than deleted. An updated Appendix F is now included in the attached operations plan that reflects the information included in the latest capacity analysis report. Appendix G contained connection details between Sections 7 and 8 that were constructed 5 years ago and have been in operation since. Appendix G is no longer needed and has been deleted.

Comment 6: ***Section K.2.f.(1):*** *Please revise this section, as appropriate, based on your response to Comment #5.*

Response 6: References to Appendix F have been reinstated and Appendix F has been revised.

Comment 7: ***Section K.2.f.(3):***

a. Special Section 7 and 8 Connection: Please revise this section, as appropriate, based on your response to Comment #5.

Response 7.a: No change is necessary. Appendix G is deleted. Landfill Gas Monitoring Points has changed from Appendix H to Appendix G.

Comment 8: ***Sections K.7.h.(1) & (2):*** *Please revise these sections, as appropriate, based on your response to Comment #1.*

Response 8: Sections have been reinstated to read as the original (January 2007) operations plan when referring to plan closure. Please also see Response 1.A.

Comment 9: **Section K.9.:** *Specific operational procedures for the GCCS do not appear to be provided in the approved GCCS Design Plant as indicated in this section. Please provide operation procedures for the GCCS, including but not necessarily limited to, the following information:*

Response 9: In general, the design of the Landfill Gas (LFG) collection system and the subsequent operation is in accordance with the federal New Source Performance Standards (NSPS) for municipal solid waste landfills (Subpart WWW) and Subpart AAAA of the National Emission Standards for Hazardous Air Pollutants (NESHAP), which dictates the operational procedures for the GCCS.

The facility maintains all operational and manufacturer procedural documentation for the blower, flare, control devices, and LFG system components on site in the LFG Specialties User Manual for Utility Flare System Unit 2162 dated September 2009, which has not been included here due to the magnitude of the document.

a. Daily start-up and shutdown procedures for the entire system.

Response 9.a: The system is designed and permitted to run continuously, so there are no specific daily startup and shutdown procedures. As part of the daily inspection conducted on the landfill, the flare is checked visually for operations but no specific start-up or shut down procedures are performed daily. If the system shuts down, it is designed to attempt an automatic restart three times. If these three automated restarts are unsuccessful, then the system remains shut down and calls a designated landfill employee via the system's autodialer; this employee is then informed that the system is shut down. When the system shuts down or is shut down for maintenance, it is recorded in accordance with the facility's Startup, Shutdown, and Malfunctions (SSM) plan required by NESHAP. This plan discusses in detail what actions are taken to start up or shut down the system. The plan is included in Attachment 1 for reference.

b. Operating and maintenance procedures for the vertical wellhead and horizontal collectors.

Response 9.b: The vertical wellheads are operated in accordance with the federal New Source Performance Standards (NSPS) for municipal solid waste landfills (Subpart WWW) and Subpart AAAA of the National Emission Standards for Hazardous Air Pollutants (NESHAP).

As required by 40 CFR 60.756, each well or collector that is under vacuum and connected to the GCCS is monitored every month. At the time of the monitoring, the wellhead is checked for leaks at the fittings and hoses and visually inspected. Once monitored, the data collected are reviewed either at the time of collection or shortly thereafter (within 5 days maximum, per rule). Based on a review of the data, the wellhead may or may not be adjusted. If the readings collected meet the NSPS requirements for pressure, temperature, and oxygen, then no adjustment is required. If the requirements are not met and an exceedance occurs, then an adjustment/remedial action is required within 5 days. The matrix below is used to determine the adjustment/remedial action to be taken based on the exceedance observed.

Wellhead reading in question	Adjustment Required per Rule	Recommended Adjustment
Oxygen above 5%	Yes	Decrease vacuum at wellhead. Re-check all fittings and connects for possible leaks.
Pressure above 0.0 in w.c.	Yes	Reduce vacuum to well by closing valve slightly. Check available system vacuum to insure vacuum is available. If no vacuum is available, isolate area of vacuum loss.
Methane below 35%	No	Reduce vacuum at wellhead as long as pressure stays negative.
Methane above 58-59%	No	Increase vacuum to wellhead by opening wellhead valve.
Temperature above 131°F	Yes	Reduce vacuum to wellhead and make sure adequate cover exists around wellhead.

Following adjustments, a 15-day re-check is required by the NSPS rule. This reading can be taken the same day as the adjustment or up to 15 days following the day of initial exceedance. If the re-check now shows a compliant reading, monitoring is done for the month; if not, adjustments are continued according to the matrix above. All collection devices connected to the GCCS are operated in this manner. If maintenance is required on an individual well or wellhead, it will be discovered during the monthly monitoring and maintenance will be performed on the devices as needed. Monitoring is also performed at the blower and flare inlets and recorded monthly. Additional operation information as it pertains to the operation of the wellheads can be found in Section 5.3 of the GCCS Design plan submitted to the FDEP Air division on July 11, 2008.

c. *System readings taken at the wellhead and adjustments to the system made as a result of those readings.*

Response 9.c: See Response 9.b.

d. *Procedures for evaluation of the performance of the system.*

Response 9.d: See Response 9.b and 9.c for well and horizontal collector evaluations. The GCCS is designed to remove LFG from the landfill and combust the LFG to avoid LFG rising through the landfill and entering directly into the atmosphere or migrating off site through the ground. To ensure performance of the system, surface emissions monitoring (SEM) occurs on a quarterly basis per 40 CFR 60 Subpart WWW to ensure that the system is working and that no LFG is being vented directly to the atmosphere through the landfill's cap. Quarterly LFG perimeter probe monitoring also occurs to ensure that the no LFG is traveling out of the landfill. These required monitoring events, along with the monthly monitoring, ensure that the system is performing as required. All instances where any of these monitoring events leads to readings not in compliance with the regulations are reported in the NSPS semiannual reports submitted to the FDEP air division for the site in June and December of every year. The quarterly perimeter probe monitoring is submitted quarterly to the FDEP Solid Waste Division per the facility's operating permit. Meeting these regulatory requirements ensures that the system is performing as required.

e. *Procedures for isolation of parts of the system in the event of damage, repair, or maintenance of parts of the system.*

Response 9.e: The GCCS has been designed so that portions of the GCCS can be isolated from the remainder of the system with the use of isolation valves. This design allows for the majority of the system to remain operational while one section of the system is maintained or repaired. There are nine isolation valves located on the LFG header that can close off a vacuum to an area of the landfill for maintenance to be performed on the header, lateral, or wellhead. These valves have been positioned to allow for isolation of Phases I-VI from Sections 7 and 8 and for Phases I-VI to be isolated into four separate areas. Similarly, there are eight valves on the air supply line and seven valves on the condensate force main that allow for isolation of the system without having to shut down the flare or support systems.

As far as specific procedures for performing isolation of the system, it will be performed as maintenance or damage occurs or as required to assure the performance of the system is remaining in compliance with NSPS and NESHAP standards.

f. *Condensate management system monitoring and maintenance procedures.*

Response 9.f: The majority of the condensate management system drains into the leachate management system for the landfill and will be handled along with the current leachate management system. The remainder of the condensate management system between AR-8, AR-1 and AR-7 all drain to CS-1. The pneumatic pump in CS-1 is checked daily to assure operation during the landfill's daily inspection. There are no specific maintenance practices for sump CS-1 as the system performs automatically on a demand basis. Should the pump in CS-1 malfunction, the condensate would build up in the sump and ultimately affect the vacuum to the well field and result in an automatic shutdown due to low flow or methane concentration. The system would then be diagnosed and the location of the vacuum blockage identified and repaired. Should the pump be required to be removed for an extended period of time, the sump is equipped with a port that can be used to pump out the sump above grade with a portable pump, which would allow the system to continue to operate. Under normal operating conditions the pump in CS-1 will be serviced according to manufacturer's recommendations as described in the pump's manual in Attachment 2. The condensate from CS-1 is pumped into the leachate management system and is managed under the facility's current leachate management plan.

g. *Specific description of the safety protocols and considerations relating to subsurface landfill fires.*

Response 9.g: **The majority of subsurface fires occur in a landfill when excess oxygen is introduced into the waste mass. In consideration of this fact, the GCCS is monitored monthly and was designed to minimize this effect. The introduction of oxygen can occur around a landfill gas well if appropriate cover material is not placed and the vacuum pulls oxygen into the system though the ground surface. The LFG extraction wells have all been designed with 20 feet of solid pipe below grade to avoid pulling oxygen though the wells. The horizontal collectors are located near the surface of the waste mass and therefore must be operated under very small vacuum or no vacuum until adequate waste is in place on top of the collectors to avoid introducing oxygen into the landfill. The operational procedures for the horizontal collectors are further described in Section 5.3 of the GCCS Design plan submitted to the FDEP Air Division on July 11, 2008. The monthly monitoring is also designed to ensure that the potential for a subsurface fire is minimized as described in 40 CRF 60.755 (5):**

> **60.755(5) For the purpose of identifying whether excess air infiltration into the landfill is occurring, the owner or operator shall monitor each well monthly for temperature and nitrogen or oxygen as provided in §60.753(c). If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Administrator for approval.**

If the landfill personnel detect a temperature above 131°F in any of the LFG extraction wells, remedial action will be taken to lower the temperature in the well by decreasing or eliminating vacuum to the well, applying additional cover material in the area to eliminate the potential for oxygen intrusion, and monitoring the surrounding wells to ensure there is a not a rise in the overall temperature of the waste mass in the area. Subsequent LFG well re-checks and monthly monitoring events will determine if the actions taken were successful or additional remedial activities are required.

Comment 10: **Appendix F (formerly Appendix H):**

a. *Figure F-l: The location of landfill gas perimeter monitoring well LFG-l on this figure appears inconsistent with its location shown on Figure H-l in Appendix H of the current Operations Plan, referenced in Specific Condition #F.3. of Permit No. 35435-014-80/01. Please explain this apparent inconsistency and revise Figure F-l, as appropriate.*

Response 10.a: Figure F-1 has been revised to show the current location of landfill gas perimeter monitoring well LFG-1 and is included in the attached operations plan. The location of LFG-2 has also been adjusted.

PART N - GAS MANAGEMENT SYSTEM REQUIREMENTS (RULE 62-701.520, F.A.C.)

Comment 11: Please revise Part N, as appropriate, based on your response to Comment #9.

Response 11: No changes to Part N are required.

APPENDIX B - PHASES I-VI OPERATING SEQUENCE DRAWINGS (RULE 62-701.320(7)(f), F.A.C.)

Comment 12: Please revise these drawings, as appropriate based on your response to Comments #1 and #13. These drawings will be reviewed in their entirety at that time.

Response 12: The Drawings have been revised to show final cover, not intermediate cover.

Comment 13: Rule 62-701.320(7) (f), F.A.C.: Please also provide full sized copies of the drawings in Appendix B, signed and sealed by the professional engineer preparing the drawings in accordance with Rule 62-701.320(7l If), F.A.C.

Response 13: Signed and sealed drawings are attached.

APPENENDIX C - CAPACITY EXPANSION AREA (SECTION 7, 8, and 9) OPERATING SEQUENCE DRAWINGS (RULE 62-701.320(7) (f), F.A.C.)

Comment 14: Please revise these drawings, as appropriate based on your response to Comments #1 and #15. These drawings will be reviewed in their entirety at that time.

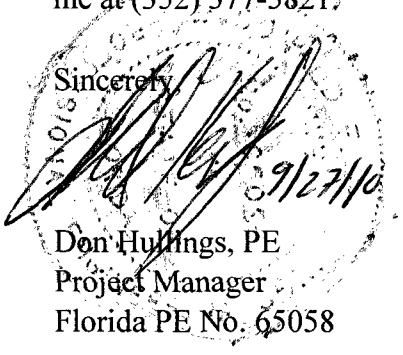
Response 14: The Drawings do not reflect final closure as currently permitted.

Comment 15: *Rule 62-701.320(7) (f), F.A.C.: Please also provide full sized copies of the drawings in Appendix B, signed and sealed by the professional engineer preparing the drawings, in accordance with Rule 62-701.320(7) (f), F.A.C.*

Response 15: Signed and sealed drawings are attached.

If you have any questions or need clarification regarding the enclosed information, please contact me at (352) 377-5821.

Sincerely,



Don Hullings, PE
Project Manager
Florida PE No. 65058

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ATTACHMENT 1

STARTUP, SHUTDOWN, AND MALFUNCTION (SSM) PLAN

MUNICIPAL SOLID WASTE LANDFILL
GAS COLLECTION AND CONTROL SYSTEM (GCCS)

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

SOUTHEAST COUNTY LANDFILL
Hillsborough County, Florida

Prepared by:

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Florida Board of Professional Engineers
Certificate No. 00004892

Original Date of Issuance: January 19, 2010

☐ This version of this plan has been superseded.

If the box above has been checked, complete the following information:

This copy of the plan may be discarded after _____
(enter the date that is 5 years after date on which this version was superseded by a newer version)

GAS COLLECTION AND CONTROL SYSTEM (GCCS)

STARTUP, SHUTDOWN, AND MALFUNCTION (SSM) PLAN

SOUTHEAST COUNTY LANDFILL
Hillsborough County, Florida

This Startup, Shutdown, and Malfunction (SSM) Plan was prepared by SCS Engineers in order to comply with the requirements of 40 CFR 63.6(e)(3), as this facility is subject to *40 CFR Part 63, Subpart AAAA, the National Emission Standard for Hazardous Air Pollutants (NESHAPs) for Municipal Solid Waste (MSW)Landfills.* The SSM Plan contains all of the required elements set forth within *40 CFR 63.6(e).*

This SSM Plan will be revised if the procedures described herein do not adequately address any malfunction or startup/shutdown events that occur at the facility. A copy of the original plan and all revisions/addenda will be kept on file at the facility for at least five (5) years. The Site/Facility Manager is responsible for assuring that the most recent copy of this SSM Plan is made available to all personnel involved with the landfill gas (LFG) collection and control system (GCCS) at Southeast County Landfill as well as to appropriate regulatory agency personnel for inspection.

Name of Plan Preparer: Daniel R. Cooper, P.E. (Name) 1/19/2010 (Date)

Approved:
Plant Manager: Larry Ruiz. (Name) 1/19/2010 (Date)

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APPENDICES

A Common Causes and Response Actions for GCCS Malfunctions
B SSM Plan Reporting Forms
C SSM Procedures
  C-1 Manual Startup Procedures for Utility Flare & Gas Mover System
  C-2 Manual Shutdown Procedure for Utility Flare
D Glossary

ADDENDA

I. Southeast County Landfill Gas Collection Control System Design Plan

REFERENCES

Hillsborough County Southeast County Landfill Mechanical Catalogues
Hillsborough County Southeast County Landfill Title V Operation Permit No. 0570854-006-AV
Hillsborough County Southeast County Landfill Solid Waste Permit O&M Plan

1 Revision History

Add the effective date of the most-recent revision to the list below. Do not overwrite or delete any dates. This is intended to be a complete record of all revisions made to this plan, and assists in making certain that all plan versions are retained for at least five (5) years as required by §63.6(e)(3)(v). Please note that this SSM Plan supersedes any previous version that may have been prepared.

Date of Initial Issuance
January 18, 2010
Revision Dates

2 INTRODUCTION

2.1 Purpose and Scope

The municipal solid waste (MSW) landfill owner or operator of an affected source must develop and implement a written Startup, Shutdown, and Malfunction (SSM) Plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction; a program of corrective action for malfunctioning processes; and air pollution control and monitoring equipment used to comply with the relevant standard. The purpose of the SSM Plan is to:

- Ensure that, at all times, the MSW landfill owner or operator operates and maintains the affected source, including associated air pollution control and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions to the levels required by the relevant standards;
- Ensure that MSW landfill owners or operators are prepared to correct malfunctions as soon as practicable after their occurrence in order to minimize excess emissions of hazardous air pollutants; and
- Reduce the reporting burden associated with periods of startup, shutdown, and malfunction (including corrective action taken to restore malfunctioning process and air pollution control equipment to its normal or usual manner of operation).

A glossary of terms used throughout or applicable to this SSM Plan is included in Appendix D.

2.2 Description of SSM Plan

This SSM Plan has been divided into three major sections comprising the major elements related to startup, shutdown, and/or malfunction of a landfill gas (LFG) collection and control system (GCCS) at a MSW landfill. Malfunction events are distinct events when the GCCS is not operating in accordance with NSPS requirements and which result, or have the potential to result, in an exceedance of one or more emission limitations or operational standards under the NSPS. Startup and shutdown events are generally planned events associated with system repair, maintenance, testing, and upgrade, and may or may not be related to or occur in association with a malfunction of the GCCS.

2.3 Site Background

The Southeast Central Landfill is an existing affected source under the Maximum Achievable Control Technology (MACT) rule for MSW landfills, which previously began operating its GCCS on an "exempt" Title V Air Permit basis. New construction commenced on March 11, 2009 and began operating its GCCS on December 16, 2009. As such, this SSM Plan is required

to be implemented for the Southeast County Landfill by January 19, 2009 for compliance with NSPS MACT regulations. This SSM Plan meets or exceeds this requirement

2.4 Management Approval

In accordance with the requirements of 40 CFR 63.6(e)(3)(i), this SSM Plan does not need to address any scenario that would not cause the source to exceed an applicable emission limitation in the relevant standard. The management of the Southeast County Landfill fully understands and acknowledges the SSM Plan requirements of the MACT rule. This SSM Plan has been developed to specifically address these requirements as summarized above.

2.5 Revisions

This SSM Plan will be revised if the procedures described herein do not adequately address any malfunction or startup/shutdown events that occur at the facility. A copy of the original plan and all revisions/addenda will be kept on file at the facility for at least five (5) years. The County is responsible for assuring that the most recent copy of this SSM Plan is made available to all personnel involved with the GCCS at the site as well as to appropriate regulatory agency personnel for inspection.

The table at the front of this document shall be completed upon any future revisions in order to document the most recent version of the Plan.

2.6 Recordkeeping and Reporting

The SSM Plan is included as part of the facility's Part 70 Title V operating permit. However, any revisions made to the SSM Plan do not constitute Title V permit revisions. If the SSM Plan is revised, previous versions must be available at the site for inspection or copying by the Florida Department of Environmental Protection (FDEP) for five years after the revisions are made.

In addition, Hillsborough County is required to submit semiannual SSM Plan reports detailing actions taken during startups, shutdowns, and malfunctions of the affected source that are consistent with the site's SSM Plan. Also, immediate SSM Plan reports are required any time an action is taken during a startup, shutdown, or malfunction that is not consistent with the site's SSM Plan on file. Later sections of this Plan provide further information on startup, shutdown, and malfunction reporting.

2.7 Site Equipment Subject To This SSM Plan

The following components of the GCCS are subject to this SSM Plan:

Table 2-1. GCCS Components Subject to SSM Plan

Collection wells and other collectors
Lateral and header extraction piping
LFG mover equipment
Flame monitoring and recording equipment
Flow monitoring and recording equipment
Flare automated controls
Flare

3 STARTUP PLAN

This section details procedures for the startup of the GCCS to ensure that, at all times, good safety and air pollution control practices are used for minimizing emissions to the levels required by the relevant standards.

Pursuant to the requirements of the NSPS for MSW landfills, a GCCS must be installed and operated when the landfill exceeds a threshold of 50 Mg/year NMOC and meets all the applicable criteria for a controlled landfill.

3.1 How to Identify a GCCS Startup Event

The regulatory definition of "startup" reads as follows:

> **"Startup** means the setting in operation of an affected source or portion of an affected source for any purpose." (§63.2)

GCCS startup operations generally include startup of gas mover equipment, LFG control devices, and any ancillary equipment that could affect the operation of the GCCS (e.g., power supply, air compressors, etc.). In accordance with the requirements of 40 CFR 63.6(e)(3)(i), this SSM Plan does not need to address any scenario that would not cause the source to exceed an applicable emission limitation in the relevant standard.

3.2 What to do When the GCCS is Started-Up

The following provides a summary of typical response actions for startup of the GCCS.

3.2.1 Gas Mover and Collection System

The following activities may have the potential to emit regulated air pollutants to the atmosphere during startup of the collection system portion of GCCS: (1) startup of gas mover equipment; (2) purging of gases trapped within piping system prior to normal operation; (3) repair of system leaks discovered during startup, (4) connection of the leachate collection risers (LCRS) to the GCCS; and (5) all other activities after construction of the system but prior to fulltime operation, which could release HAPs from the collection system. These activities would be subject to the SSM Plan portion of the SSM Plan.

During such activities, work shall progress such that air emissions are minimized to the greatest extent possible by:

- Temporarily capping pipes venting gas if such capping does not impact safety or the effective construction of the system.
- Minimizing surface area allowing gas to emit to the atmosphere to the extent that it does not impact safety or the effective construction of the system.
- Ensuring that other parts of the system, not impacted by the activity, are operating in accordance with the applicable requirements of NSPS.
- Limiting the purging of piping to as short duration as possible to ensure safe combustion of the gas in the control device.

GCCSs, once installed, are "closed" systems designed to prevent the uncontrolled release of LFG to the atmosphere. The network of piping installed at the site connects each extraction point with the control device(s) with no open vents located anywhere in the collection system.

Portions of active collection systems or individual extraction points may be isolated by valves installed in the system from time to time and subsequently opened. Opening these valves shall not be considered a startup of the active collection system, unless such an activity causes the venting of gas to the atmosphere. If the activity results in emissions to the atmosphere, the actions listed above shall be followed.

The operation of the collection system, once installed, shall be consistent with the provisions of the NSPS as well as the GCCS Design Plan, which has been developed and approved for the facility.

3.2.2 Gas Control System

Personnel shall follow the procedures as identified below when starting the respective control systems. Gas control systems operating at MSW landfills normally undergo planned startups. However, flare systems are designed for unattended automatic operation.

A startup checklist for manual and automatic startups is provided on the Startup Report Form included in Appendix B. However, it is recommended that startups be conducted in the automatic mode. System should not be left unattended in Manual mode since safety shutdowns are bypassed.

Additional startup information is included by reference in Appendix C-1 for LFG Specialties Utility Flare System Unit 2162.

3.3 What to Record for All Startup Events

In the event the control device does not restart automatically, the operator shall record the following information on the attached **Startup Report Form** (Appendix B):

- The date and time the startup occurred.
- The duration of the startup.
- The actions taken to affect the startup.
- Whether procedures in this SSM Plan were followed. If the procedures in the SSM Plan were not followed, a **SSM Plan Departure Report Form** (Appendix B) must also be completed.
- If an applicable emission limitation was exceeded, a description of the emission standard that was exceeded or had the potential to be exceeded.

3.4 Whom to Notify at the Facility in Case of a Startup Event

For all startup events the following persons must be notified:

- The Site/Facility Manager, Engineer, or other appropriate Facility Personnel should be notified immediately of the startup.
- The Site/Facility Manager, Engineer, or other appropriate Facility Personnel should be notified within a reasonable timeframe of progress of the diagnosis and resolution of the startup.
- The Site/Facility Manager or Engineer for the site should be notified when the alternative timeframe for startup has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.
- The **Startup Report Form** must be initially prepared upon startup, or discovery of an automatic startup, and implementation of the SSM Plan. The form must be finalized by the appropriate Facility Personnel on duty upon successful implementation of the SSM Plan and submitted to the Site/Facility Manager or Engineer. The original form should be retained in the Operation files for five (5) years.

3.5 What to Report for a Startup Event

- If the actions taken during the startup **were consistent** with this SSM Plan, file the necessary information in your semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

  1. Name and title of Site/Facility Manager or other appropriate Facility Personnel;

2. Certifying signature of the owner/operator or other responsible official (Note that "responsible official" has the same meaning as under the Title V permitting program);
3. Statement that the actions taken during the startup or shutdown were consistent with the SSM Plan; and
4. If the SSM Plan was revised during the reporting period, to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during the startup **were not consistent** with this SSM Plan, but the startup did not result in an exceedance of an applicable emission, the responsible official shall state this in the semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

1. Name and title of Site/Facility Manager;
2. Certifying signature of the owner/operator or other responsible official;
3. Statement that the actions taken during the startup were not consistent with the SSM Plan, but the source did not exceed any applicable emissions limit standards;
4. Number, duration, and description of startup events; and
5. If the SSM Plan was revised during the reporting period to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during a startup **were not consistent** with this SSM Plan, and the startup resulted in an exceedance of an applicable emission standard, the Site/Facility Manager or Other appropriate Facility Personnel must report the actions taken to the enforcing authority (FDEP Southwest District) by telephone or facsimile transmission within two (2) working days after the startup. A letter must then be sent to the enforcing authority within seven (7) working days after the startup. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

1. Name and title of Site/Facility or Other appropriate Facility Personnel;
2. Certifying signature of the owner/operator or other responsible official (Note that "responsible official" has the same meaning as under the Title V permitting program);
3. A copy of the **Startup Report Form**;
4. Detailed explanation of the circumstances of the startup;
5. The reasons the SSM Plan was not adequate; and whether any excess emissions and/or parameter monitoring exceedances is believed to have occurred during the event.
6. A copy of the **SSM Plan Departure Report Form.**
7. Revise the SSM plan within 45 days of the non-conforming event.

Hillsborough County must retain documentation of the conversation with FDEP or fax regarding the 2-day notification, the 7-day letter, and proof of receipt by FDEP of the 7-day letter in the site's files for a minimum of five years. If the actions taken during startup were not consistent with this SSM Plan, the SSM Plan must be revised. The revised SSM Plan shall include the new actions to be taken for startup of the GCCS during similar startup events. If the revisions to the SSM Plan alter the scope of the process activities at Hillsborough County Solid Waste Management Facility or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s). The revised SSM Plan shall be included in the next semiannual SSM Plan Report.

4 Shutdown Plan

This section details procedures for the shutdown of the GCCS to ensure that, at all times, good engineering, safety and air pollution control practices are used for minimizing emissions to the levels required by the relevant standards.

Pursuant to the requirements of the NSPS for MSW landfills, a GCCS cannot be removed unless the landfill meets all the applicable criteria for removal of collection and control system in *40 CFR 60, Subpart WWW.*

4.1 How to Identify a GCCS Shutdown Event

The regulatory definition of "shutdown" reads as follows:

> "**Shutdown** means the cessation of an affected source or portion of an affected source for any purpose." (§63.2)

GCCS shutdown events generally include shutdown of the gas collection system, the gas control system, and any ancillary equipment that could affect the operations or monitoring of the GCCS. There are two general types of shutdown events, those that are initiated manually by an operator (e.g. for purposes of system maintenance) and those that are initiated automatically by the control system in response to certain monitored conditions. Each of these types of shutdown events is discussed below. In accordance with the requirements of 40 CFR 63.6(e)(3)(i), this SSM Plan does not need to address any scenario that would not cause the source to exceed an applicable emission limitation in the relevant standard. Operational exceptions are identified in the Title V permit modification and GCCS Design Plan.

Table 4-1. Potential Events Necessitating Shutdown of the GCCS

Control Device Maintenance, Repair, or Cleaning
Addition of New GCCS Components
Extraction Well Raising
Movement of LFG Piping to Accommodate New Components or Filling Operations
Source Testing
Gas Mover Equipment Maintenance, Repair, or Cleaning
Gas Processing Treatment System Equipment Maintenance, Repair, or Cleaning
Ancillary Equipment (e.g., compressors, etc.) Maintenance, Repair, or Cleaning
New Equipment Testing and Debugging
Shutdown and Subsequent Startup to Address Malfunctions or Other Occurrences
Planned Electrical Outages

Table 4-1. (continued)

Power generation equipment maintenance, repair, and cleaning
Other Site-Specific Shutdown Events

4.1.1 Manual Shutdowns

Table 4-1 includes events that may necessitate a shutdown of the GCCS at a MSW Landfill. This list should not be considered exhaustive. In the event a manual shutdown is required, the procedures specified in Section 4.2 for manual shutdowns should be followed and documented.

4.1.2 Automatic Shutdowns

The GCCS may automatically shutdown one or more of its components in response to monitored conditions that fall outside of set-point ranges. In these instances, the shutdown is completely automatic, and there are no shutdown steps that need to be taken by facility personnel. Personnel will need to evaluate the cause of the shutdown and initiate corrective action as needed with a goal of restarting the system in a safe and timely manner.

Some events that may cause the GCCS to shutdown automatically are listed in Table 4-2 below. This list should not be considered exhaustive.

Table 4-2. Potential Causes of Automatic Shutdowns of the GCCS

Loss of gas flow to the flare
High inlet gas temperature
Flame sensor detects loss of flame
Elevated flame arrestor temperature
High liquid level in knockout pot
Loss of power from the grid
Treatment system component shutdowns
Power generation equipment shutdowns

4.2 Actions to Take When The GCCS Is Shutdown

4.2.1 Collection System

GCCSs, once installed, are "closed" systems designed to prevent the uncontrolled release of LFG to the atmosphere. The network of piping installed at the site connects each extraction point with the control device(s) with no open vents located anywhere in the collection system.

Portions of active collection systems or individual extraction points may be isolated by valves installed in the system from time to time. Periodic or occasional closing of individual valves on

the active collection system for valid operational reasons shall not be considered a shutdown of the overall GCCS for purposes of this Plan.

4.2.1.1 Gas Control System – Automatic Shutdown

Automatic shutdowns of the flare system (including the blower and other related equipment) do not involve any operator interaction. Therefore, there is no procedure to be followed for an automatic shutdown, and no need to document whether established procedures were or were not followed. A shutdown report shall be generated for each automatic shutdown. These reports should indicate that the event that occurred was an automatic shutdown. No procedures checklist need be completed.

4.2.1.2 Gas Control System – Manual Shutdown

Personnel shall follow the procedures identified in this section when shutting down the respective control devices. Control devices operating at MSW landfills normally undergo planned shutdown for the various events listed above.

Control device shutdown procedures for Manual Shutdown are located Appendix C-2 and included on the **Shutdown Report Form**, (Appendix B).

4.3 What To Record For All Shutdown Events

The operator should record the following information on the attached **Shutdown Report Form (Appendix B):**

- The date and time the shutdown occurred
- The duration of the shutdown
- The actions taken to effect the shutdown
- Whether procedures in this SSM Plan were followed. If the procedures in the plan were not followed, a **SSM Plan Departure Report Form** must also be completed
- If an applicable emission limitation was exceeded, a description of the emission standard that was exceeded or had the potential to be exceeded

4.4 Whom to Notify at the Facility in Case of a Shutdown Event

- The Site/Facility Manager, Engineer, or other designated personnel should be notified immediately of the shutdown.

- The Site/Facility Manager, Engineer, or other designated personnel should be notified within a reasonable timeframe of progress of the diagnosis and resolution of the shutdown.

- The Site/Facility Manager, Engineer, or other appropriate personnel should be notified when the alternative timeframe for shutdown has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.

- The **Shutdown Report Form** should be initially prepared upon shutdown, or discovery of an automatic shutdown, and implementation of the SSM Plan. The form should be finalized by the operator on duty upon successful implementation of the SSM Plan and submitted to the Site/Facility Manager or other appropriate Personnel. The original form should be retained in the landfill files for five (5) years.

4.5 What to Report for a Shutdown Event

- If the actions taken during the shutdown **were consistent** with this SSM Plan, file the necessary information in your semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

  1. Name and title of Site/Facility Manager.
  2. Certifying signature of the owner/operator or other responsible official (Note that "responsible official" has the same meaning as under the Title V permitting program.
  3. Statement that the actions taken during the shutdown were consistent with the SSM Plan; and
  4. If the SSM Plan was revised during the reporting period to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during the shutdown **were not consistent** with this SSM Plan, but the shutdown did not result in an exceedance of an applicable emission, the responsible official shall state this in the semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

  1. Name and title of Site/Facility Manager;
  2. Certifying signature of the owner/operator or other responsible official;
  3. Statement that the actions taken during the shutdown were not consistent with the SSM Plan, but the source did not exceed any applicable emissions limit standards;
  4. Number, duration, and description of shutdown events; and
  5. If the SSM Plan was revised during the reporting period to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during a startup **were not consistent** with this SSM Plan, and the shutdown resulted in an exceedance of an applicable emission standard, the

Site/Facility Manager or Other appropriate Hillsborough County Facility Personnel must report the actions taken to the enforcing authority by telephone or facsimile transmission within two (2) working days after commencing the actions that were inconsistent with the plan. A letter must then be sent to the enforcing authority within seven (7) working days after the startup or shutdown. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

1. Name and title of Site/Facility Manager;
2. Certifying signature of the owner/operator or other responsible official (Note that "responsible official" has the same meaning as under the Title V permitting program. See previous corporate guidance on this topic.);
3. A copy of the **Shutdown Report Form**;
4. Detailed explanation of the circumstances of the shutdown;
5. The reasons the SSM Plan was not adequate; and whether any excess emissions and/or parameter monitoring exceedances is believed to have occurred during the event.
6. A copy of the **SSM Plan Departure Report Form.**
7. Revise the SSM plan within 45 days of the non-conforming event.

Hillsborough County must retain documentation of the conversation with FDEP or fax regarding the 2-day notification, the 7-day letter, and proof of receipt by FDEP of the 7-day letter in the site's files for a minimum of five years. If the actions taken during startup were not consistent with this SSM Plan, the SSM Plan must be revised. The revised SSM Plan shall include the new actions to be taken during similar GCCS shutdown events in the future. If the revisions to the SSM Plan alter the scope of the process activities at Hillsborough County Solid Waste Management Facility or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s). The revised SSM Plan shall be included in the next semiannual SSM Plan Report.

5 Malfunction Plan

5.1 How to Identify a GCCS Malfunction

The regulatory definition of "malfunction" reads as follows:

> **"Malfunction** means any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions." (§63.2, revised 5/30/03)

The following list includes events that may constitute a malfunction of the GCCS at Southeast County Landfill. The cause of these events should be investigated immediately in order to determine the best course of action to correct the malfunction. Each of these malfunctions could have multiple causes that need to be evaluated and possibly considered. It is the intent of this SSM Plan to include all possible causes for the specific malfunction events. Common malfunction events for LFG collection and control systems are listed in Table 5-1.

Table 5-1. Potential Malfunction Events

Possible Malfunction	Potential Resulting Emission Limitation Exceedance [citation]
Gas Mover/Power Generation Equipment Malfunction with resulting loss of LFG flow	GCCS downtime of greater than 5 days [60.755(e)]
Loss of Electrical Power	GCCS downtime of greater than 5 days [60.755(e)]
Loss of Flame at the Flare	Control device downtime of greater than 1 hour with free venting of LFG [60.755(e)]
Malfunction of Flow Measuring/Recording Device	Failure to record flow [60.756(c)(2)(i)]
Collection Well and Pipe Failures	Failure to route collected gases to the control device. [60.753(e)]
Condensate Pump Failure (resulting in gas collection line blockage)	Failure to route collected gases to the control device. [60.753(e)]

Table 5-1. (continued)

Possible Malfunction	Potential Resulting Emission Limitation Exceedance [citation]
Loss of flame-sensing instrument at flare tip.	Failure to monitor presence of pilot light or flare flame [60.756(c)(1)]
Failure of flare continuous-flame-presence recorder	Failure to continuously record the presence of a flame or pilot light [60.758(c)(4)]
Loss of air compressor	GCCS downtime of greater than 5 days [60.755(e)]
Loss of electricity	Multiple, including possibly:
	• Failure to record flow [60.756(c)(2)(i)]
	• Failure to route collected gases to the control device. [60.753(e)]
	• Failure to continuously record the presence of a flame or pilot light [60.758(c)(4)]

If the occurrence does not result in an exceedance of an applicable emission limitation contained in the NSPS or MACT rules, **it is <u>not</u> required to be corrected in accordance with this SSM Plan**, although use of the plan may still be advisable.

Malfunctions should be considered actionable under this SSM Plan whether they are discovered by the MSW landfill owner or operator during normal operations or by a regulatory agency during compliance inspections.

The operator should follow all the corrective action, notification, record keeping, and reporting procedures described herein in case of malfunction of the GCCS. The various malfunction reference sections of this SSM Plan are provided in Table 5-2 below:

Table 5-2. Malfunction Procedure Reference

Possible Malfunction	Section
Loss of LFG Flow/Gas Mover Malfunction	5.3
Loss of Electrical Power	5.4
Low Temperature Conditions at Control Device	5.5
Loss of Flame at the Control Device	5.6
Malfunction of Flow Monitoring/Recording Device	5.7
Malfunction of Flame Monitoring/Recording Device	5.8
Collection Well and Pipe Failures	5.9
Possible Malfunction	**Section**
Other Control Device Malfunctions	5.10

Malfunctions of Field Monitoring Equipment	5.11
Malfunction of the Automatic Spark Ignition System	5.12

5.2 Actions To Take When The GCCS Malfunctions - All Malfunctions

- Determine whether the malfunction has caused an exceedance, or has the potential to cause an exceedance, of any applicable emission limitation contained in the NSPS/EG or MACT.

- Identify whether the malfunction is causing or has caused excess emissions to the atmosphere. If excess emissions are occurring, take necessary steps to reduce emissions to the maximum extent possible using good air pollution control practices and safety procedures.

- Contact the Site/Facility Manager for the site immediately and proceed with the malfunction diagnosis and correction procedures described in Appendix A ("Common Causes and Response Actions for GCCS Malfunctions") for each specific malfunction.

- Site-specific malfunction and/or troubleshooting procedures are contained in the documents or appendices referenced below. Personnel shall follow these procedures when addressing a malfunction of a collection system or control device.

- If the procedures in this SSM Plan do not address or adequately address the malfunction that has occurred, the operator should attempt to correct the malfunction with the best resources available. The Site/Facility Manager and Hillsborough County Landfill Operations Personnel should be notified of this situation immediately. Complete a **SSM Plan Departure Report Form** (Appendix B) as discussed in Section 5.14. The SSM Plan must be updated to better address this type of malfunction.

- Notify the Site/Facility Manager of the progress of the diagnosis and correction procedures and status of the malfunction as soon as practicable.

- **If the GCCS malfunction cannot be corrected within the time frame specified in the NSPS/EG, notify the Site/Facility Manager for the site and proceed to shutdown the control device and/or the process(es) venting to the flare control device, if this has not already occurred automatically**.

- If the GCCS malfunction cannot be corrected within the time frame allowed by the NSPS/EG rule for each specific malfunction, define the appropriate alternative timeframe for corrective action that is reasonable for the type of repair or maintenance that is required to correct the malfunction.

- If the GCCS malfunction cannot be corrected within alternative timeframe for corrective action specified above, notify the Site/Facility Manager for the site and conduct the appropriate record keeping and reporting required for deviations of the MACT rule and Title V permit.

- Once the malfunction is corrected, notify the Site/Facility Manager for the site as soon as the system is operational.

- Complete the **Malfunction Report Form** (Appendix B) after the malfunction diagnosis and correction procedures are completed.

- If the procedures in this SSM Plan do not address or adequately address the malfunction that has occurred, the operator should note the circumstances and the actual steps taken to correct the malfunction in the **Malfunction Report Form** (Appendix B). This SSM Plan will need to be revised based on this information, as described in Section 5.13 below.

- Follow procedures in Sections 5.13 through 5.15, as appropriate, to adequately document, notify, and report the malfunction and corrective action.

5.3 Loss of LFG Flow/Gas Mover Malfunction

- Follow the procedures in Section 5.2, above.

- Check to see if the control device has shutdown. If control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.

- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.

- If the malfunction cannot be corrected within 5 days, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.4 Loss of Electrical Power

- Follow the procedures in Section 5.2, above.

- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in **Appendix A**.

- If the malfunction cannot be corrected within the time frame allowed by the NSPS/EG rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if malfunction cannot be corrected within the established timeframe.

5.5 Low Temperature Conditions at the Control Device

- Follow the procedures in Section 5.2, above.
- Check to see if the control device has shutdown. If control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.
- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.
- If the malfunction causes the GCCS to go off-line and cannot be corrected within the time frame allowed by the NSPS/EG rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.6 Loss of Flame at the Control Device

- Follow the procedures in Section 5.2, above.
- Check to see if the control device has shutdown. If control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.
- If system will not restart, follow also the procedures in Section 5.3.
- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.
- If the malfunction cannot be corrected within the time frame allowed by the NSPS/EG rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.7 Malfunctions of Flow Monitoring/Recording Device

- Follow the procedures in Section 5.2, above.
- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.
- If the malfunction cannot be corrected in the time frame allowed by the NSPS/EG rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.8 Malfunctions of Flame Monitoring/Recording Device

- Follow the procedures in Section 5.2, above.
- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.
- If the malfunction cannot be corrected within 15 minutes, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.9 Collection Well and Pipe Failures

- Follow the procedures in Section 5.2, above.
- Follow also the procedures in Section 5.3, above.
- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.
- If the malfunction causes the entire GCCS to go off-line and cannot be corrected within 5 days, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.10 Other Control Device Malfunctions

- Follow the procedures in Section 5.2, above.

- Check to see if the control device has shutdown. If control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.

- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.

- If the malfunction causes the entire GCCS to go off-line and cannot be corrected within 5 days, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.11 Malfunctions of Field Monitoring Equipment

- Follow the procedures in Section 5.2, above.

- Verify that malfunction of monitoring equipment will cause a deviation of the NSPS/EG requirements for wellhead and/or surface emissions monitoring.

- Conduct diagnostic procedures to identify the cause of the malfunction.

- Repair the device or obtain replacement device to complete the monitoring as required by the NSPS/EG.

- Conduct proper calibration procures before use of the device for NSPS/EG compliance monitoring.

- If the malfunction cannot be corrected so that the monitoring equipment can be used for the purposes required by the NSPS/EG rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting.

5.12 Malfunction of the Automatic Spark Igniter System Size

- Follow the procedures in Section 5.2, above.

- Check to see if the sparking mechanism has shutdown, perform diagnostics and shut the valve if necessary to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.

- Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix A.

5.13 What to Record for a Malfunction

The operator must record the following information on the attached **Malfunction Report Form**:

- The date and time the malfunction occurred.
- The duration of the malfunction.
- A description of the affected equipment.
- The cause or reason for the malfunction (if known).
- The actions taken to correct the malfunction (checklist).
- Whether the procedures in this SSM Plan were followed. If the procedures in the plan were not followed, a **SSM Plan Departure Report Form** must also be completed.
- A description of the emission standard that was exceeded or had the potential to be exceeded.

5.14 Whom to Notify at the Facility in Case of a Malfunction

- The Site/Facility Manager shall be notified immediately of the malfunction.
- The Site/Facility Manager shall be notified within a reasonable timeframe of progress of the diagnosis and corrective action of the malfunction.
- The Site/Facility Manager and Hillsborough County Landfill Operations shall be notified when the alternative timeframe for corrective action has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.
- The Site/Facility Manager and Hillsborough County Landfill Operations shall be notified if the malfunction cannot be corrected within the timeframe allowed by the NSPS rule or the alternate timeframe established under this SSM Plan. Notification should also occur if the malfunction that occurred is not addressed by the current SSM Plan.
- The **Malfunction Report Form** shall be initially prepared upon discovery of the malfunction and implementation of the SSM Plan. The form shall be finalized by the operator on duty upon successful implementation of the SSM Plan and submitted to

the Site/Facility Manager. The original form must be retained in the landfill files for five (5) years.

5.15 What to Report for a Malfunction Event

- If the actions taken during the malfunction **were consistent** with this SSM Plan, file the necessary information in your semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

  1. Name and title of Site/Facility Manager or other appropriate personnel;
  2. Certifying signature of the owner/operator or other responsible official. (Note that "responsible official" has the same meaning as under the Title V permitting program. See previous corporate guidance on this topic.)
  3. Statement that the actions taken during the malfunction were consistent with the SSM Plan; and
  4. If the SSM Plan was revised during the reporting period to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during the malfunction **were not consistent** with this SSM Plan, but the malfunction did not result in an exceedance of an applicable emission, the responsible official shall state this in the semi-annual SSM report (*within 30 days following the end of each 6-month period*) with the following information included:

  1. Name and title of Site/Facility Manager or other Hillsborough County landfill operations personnel;
  2. Certifying signature of the owner/operator or other responsible official;
  3. Statement that the actions taken during the malfunction were not consistent with the SSM Plan, but the source did not exceed any applicable emissions limit standards;
  4. Number, duration, and description of malfunction events; and
  5. If the SSM Plan was revised during the reporting period, to reflect changes in equipment or procedures at the affected source, this must be reported in the semiannual report.

- If the actions taken during a malfunction **were not consistent** with this SSM Plan, and the malfunction resulted in an exceedance of an applicable emission standard, (see items listed under Step 1 above), the Site/Facility Manager or Other appropriate Facility Personnel must report the actions taken to the enforcing authority by telephone or facsimile (FAX) transmission within two (2) working days after commencing the actions that were inconsistent with the plan. A letter must then be sent to the enforcing authority within seven (7) working days after the malfunction. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

1. Name and title of Site/Facility Manager or other Hillsborough County landfill operations personnel;
2. Certifying signature of the owner/operator or other responsible official. (Note that "responsible official" has the same meaning as under the Title V permitting program. See previous corporate guidance on this topic.);
3. A copy of the **Malfunction Report Form**;
4. Detailed explanation of the circumstances of the malfunction;
5. The reasons the SSM Plan was not adequate; and whether any excess emissions and/or parameter monitoring exceedances is believed to have occurred during the event.
6. A copy of the **SSM Plan Departure Report Form.**
7. Revise the SSM Plan within 45 days of the non-conforming event.

Hillsborough County shall retain documentation of the conversation with FDEP or fax regarding the 2-day notification, the 7-day letter, and proof of receipt by FDEP of the 7-day letter in the site's files for a minimum of five years. If the actions taken during startup were not consistent with this SSM Plan, the SSM Plan must be revised. The revised SSM Plan shall include the new actions to be taken for startup of the GCCS during similar startup events. If the revisions to the SSM Plan alter the scope of the process activities at Hillsborough County Solid Waste Management Facility or otherwise modify the applicability of any emission standard, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s). The revised SSM Plan shall be included in the next semiannual SSM Plan Report.

APPENDIX A

Common Causes and Response Actions for GCCS Malfunctions

(Appendix A represents a summary of possible causes and response actions for GCCS malfunctions. The list is not considered to be exhaustive. The list of response actions is not intended to be a sequence of events that are to be implemented in order. Certain malfunction incidents may or may not be associated with the listed "common causes" nor will the "common response actions" be appropriate in all instances. Site-specific evaluation of the malfunctions and development of specific response actions is recommended in all cases.)

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment	Applies vacuum to wellfield to extract LFG and transport to control device	Loss of LFG Flow/Blower Malfunction	-Flame arrestor fouling/deterioration -Automatic valve problems -Blower failure (e.g., belt, motor, impeller, coupling, seizing, etc.) -Loss of power -Extraction piping failure -Condensate knock-out problems -Extraction piping blockages -Pneumatic pump failure -Air compressor failure -Condensate trapped in pipe headers.	-Repair breakages in extraction piping -Clean flame arrestor -Repair blockages in extraction piping -Verify automatic valve operation, compressed air/nitrogen supply -Notify power utility, if appropriate -Provide/utilize auxiliary power source, if necessary -Repair Settlement in Collection Piping - Repair Blower -Activate back-up blower, if available -Clean knock-up pot/demister -Drain knock-out pot -Repair pneumatic pump(s) -Repair air compressor -Repair air lines/condensate force main piping -Drain condensates
Extraction Wells and Collection Piping	Conduits for extractions and movement of LFG flow	Collection well and pipe failures	-Break/crack in header, lateral, or extraction well piping -Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc. -Collection piping blockages -Problems due to settlement (e.g. pipe separation, deformation, development of low points) -Pneumatic pump failure -Air compressor failure	-Repair leaks or breaks in lines or wellheads -Follow procedures for loss of LFG flow/blower malfunction -Repair blockages in collection piping -Repair settlement in collection piping -Re-install, repair, or replace piping Repair pneumatic pump -Repair air compressor -Repair air lines/condensate force main piping

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment And Control Device	Collection and control of LFG	Loss of electrical power	- Force majeure/Act of God (e.g., lightning, flood, earthquake, etc.) -Area-wide or local blackout or brown-out -Interruption in service (e.g. blown service fuse) -Electrical line failure -Breaker trip -Transformer failure -Motor starter failure/trip -Overdraw of power -Problems in electrical panel -Damage to electrical equipment from on-site operations	-Check/reset breaker -Check/repair electrical panel components -Check/repair transformer -Check/repair motor starter -Check/repair electrical line -Test amperage to various equipment -Contact electricity supplier -Contact/contract electrician -Provide auxiliary power (if necessary)
LFG Control Device	Combusts LFG	Low and high temperature conditions at control device	-Problems with temperature - monitoring equipment -Problems/failure of -thermocouple and/or thermocouple wiring -Change of LFG flow -Change of LFG quality -Problems with air louvers -Problems with air/fuel controls -Change in atmospheric conditions	-Check/repair temperature monitoring equipment -Check/repair thermocouple and/or wiring -Follow procedures for loss of flow/blower malfunction
LFG Control Device	Combusts LFG	Loss of Flame	-Problems/failure of thermocouple -Loss/change of LFG flow -Loss/change of LFG quality -Problems with air/fuel controls -Problems/failure of flame sensor -Problems with temperature monitoring equipment	-Check/repair temperature monitoring equipment -Check/repair thermocouple -Follow procedures for loss of flow/blower malfunction -Check/adjust air/fuel controls -Check/adjust/repair flame sensor -Check/adjust LFG collectors

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Flow Monitoring/ Recording Device	Measures and records gas flow from collection system to control	Malfunctions of Flow Monitoring/Recording Device	-Problems with orifice plate, pitot tube, or other in-line flow measuring device -Problems with device controls and/or wiring -Problems with chart recorder	-Check/adjust/repair flow measuring device and/or wiring -Check/repair chart recorder -Replace paper in chart recorder
Flame Presence/Heat Sensing Device	Indicates continuous presence of a flame at the control device	Malfunctions of Flame Presence/Heat Sensing Device	-Problems with thermocouple or ultraviolet beam sensor -Problems with device controls and/or wiring	-Check/adjust/repair thermocouple or ultraviolet beam sensor -Check/adjust/repair controller and/or wiring -Check/adjust/repair electrical panel components
Control Device	Combusts LFG	Other Control Device Malfunctions	-Control device smoking (i.e. visible emissions) -Problems with pilot light system -Problems with thermocouple -Problems with flame arrester -Alarmed malfunction conditions not covered above -Unalarmed conditions discovered during inspection not covered above	-Site-specific diagnosis procedures -Site-specific responses actions based on diagnosis -Clean pitot orifice -Clean/drain flame arrestor -Refill propane supply -Check/repair pilot sparking system
Condensate Management System	Manages condensate	Failure of condensate sumps	- Electrical failure - Mechanical failure of air compressor for pneumatic condensate sump pumps - Pump failure	- Check/adjust/repair electrical supply or connections - If pneumatic pumps, diagnose pump controls, etc., and air compressor per manufacturer's instructions and repair or replace as appropriate. Procure temporary air compression capacity if needed. - Check/adjust/repair pumps per manufacturer's instructions

APPENDIX B

SSM Plan Reporting Forms

Hillsborough County

Southeast County Landfill
Date of Issuance: January 19, 2010

HILLSBOROUGH COUNTY SOUTHEAST COUNTY LANDFILL - STARTUP REPORT FORM

This form is used to document actions taken during any startup **of any portion of the gas collection and control system**. If any of the steps taken are **not consistent with this procedure**, document the variations on a "SSM Plan Departure Form" and follow the reporting requirements in the SSM plan.

☐ Flare ☐ Collection System

1. Beginning of Startup Event Date: Time:

2. End of Startup Event Date: Time:

3. Duration of Startup Event (hours):

4. Description of Affected Equipment:

5. Cause/Reason for Startup:

6. Name of person completing this form (please print):

7. Date completed:

8. Type of Shutdown (check one): ☐ Manual ☐ Automatic

- If this is an automatic startup, skip sections 9 and 10 below and go to section 11.
- If this is a manual startup, the procedure listed in section 9 be should be followed. Check off the steps completed and continue on to section 10.

9. STARTUP PROCEDURE CHECKLIST	Check if procedure was followed

10. Did the actual steps taken vary from the procedure specified above? ☐ YES ☐ NO
If response is "Yes," proceed to section 11 below. If "No," stop.

11. Did this startup result in an exceedance of any applicable emission limitation? ☐ YES ☐ NO
If response is "Yes," proceed to section 12 below. If "No," stop.

12. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by fax within 2 working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow up in writing to the agency within working 7 days after the end of the event.

This form is intended to satisfy the recordkeeping requirements of 40 CFR 63.6(e)(3)(iii) and (iv) and 63.10(b)(2).

Hillsborough County

HILLSBOROUGH COUNTY SOUTHEAST COUNTY LANDFILL - SHUTDOWN REPORT FORM

This form is used to document actions taken during any shutdown **of any portion of the gas collection and control system**. If any of the steps taken are **not consistent with this procedure**, document the variations on a "SSM Plan Departure Form" and follow the reporting requirements in the SSM plan.

☐ Flare ☐ Collection System

1. Beginning of Shutdown Event	Date:	Time:
2. End of Shutdown Event	Date:	Time:
3. Duration of Shutdown Event (hours):		
4. Description of Affected Equipment:		
5. Cause/Reason for Shutdown:		
6. Name of person completing this form (print):		
7. Date completed:		
8. Type of Shutdown (check one):	☐ Manual	☐ Automatic

- If this is an automatic shutdown, skip sections 9 and 10 below and go to section 11.
- If this is a manual shutdown, the procedure listed in section 9 below should be followed. Check off the steps completed and continue on to section 10.

9. SHUTDOWN PROCEDURE CHECKLIST	Check if procedure was followed

10. Did the actual steps taken vary from the procedure specified above? ☐ YES ☐ NO
If response is "Yes," proceed to section 11 below. If "No," stop.

11. Did this shutdown result in an exceedance of any applicable emission limitation? ☐ YES ☐ NO
If response is "Yes," proceed to section 12 below. If "No," stop.

12. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by fax within 2 working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow up in writing to the agency within working 7 days after the end of the event.

This form is intended to satisfy the recordkeeping requirements of 40 CFR 63.6(e)(3)(iii) and (iv) and 63.10(b)(2).

Hillsborough County

Southeast County Landfill
Date of Issuance: January 19, 2010

HILLSBOROUGH COUNTY SOUTHEAST COUNTY LANDFILL - MALFUNCTION REPORT FORM

This form is used to document actions taken during a malfunction **of any portion of the gas collection and control system.** If any of the steps taken are **not consistent with this procedure,** document the variations on a "SSM Plan Departure Form" and follow the reporting requirements in the SSM plan.

☐ Flare ☐ Collection System

1. Beginning of Malfunction Event	Date:	Time:
2. End of Malfunction Event	Date:	Time:
3. Duration of Malfunction Event (hours):		
4. Description of Affected Equipment:		
5. Cause/Reason for Malfunction:		
6. Name of person completing this form (please print):		
7. Date completed:		

Follow the procedure listed below for each malfunction. This form is to be used to document the actions taken during each malfunction. Check off the steps completed.

8. MALFUNCTION PROCEDURE CHECKLIST	Check if procedure was followed

9. Did the actual steps taken vary from the procedure specified above? ☐YES ☐NO
If response is "Yes," proceed to box 10 below. If "No," stop.

10. Did this malfunction result in an exceedance of any applicable emission limitation? ☐YES ☐NO
If response is "Yes," proceed to box 11 below. If "No," stop.

11. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by fax within 2 working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow up in writing to the agency within working 7 days after the end of the event.

This form is intended to satisfy the recordkeeping requirements of 40 CFR 63.6(e)(3)(iii) and (iv) and 63.10(b)(2).

HILLSBOROUGH COUNTY SOUTHEAST COUNTY LANDFILL - SSM PLAN DEPARTURE REPORT FORM

1. Type of Event:	☐ Startup	☐ Shutdown	☐ Malfunction
2. Date:	Time:	Duration:	
3. Provide detailed explanation of the circumstances of the startup, shutdown, or malfunction:*			
4. Provide description of corrective actions taken:*			
5. Describe the reasons the SSM Plan was not followed:*			
6. Describe any proposed revisions to the SSM Plan:*			
7. Name (print):			
8. Title			

*Use additional sheets if necessary.

Note: If the event documented in this form was a malfunction and if the SSM plan needs to be revised to address the particular type of malfunction that occurred, the revision of the SSM plan must be made within 45 days of the event.

- This form is intended to assist in meeting the recordkeeping and reporting requirements of 40 CFR 63.6(e)(3)(iv).

APPENDIX C

SSM PROCEDURES

APPENDIX C-1

Manual Startup Procedures for Utility Flare and Gas Mover System

(See LFG Specialties User Manual for Utility Flare System Unit #2162)

APPENDIX C-2

Manual Shutdown Procedure for Utility Flare

Manual Shutdown Procedure for Utility Flare

In the event that the flare and associated blower(s) equipment must be shutdown manually the following procedure shall be followed:

- Manually depress the emergency stop plunger on the front of the flare control panel or deenergize the electrical service to the flare control panel. Turning the panel power selector switch to the off position or terminating electrical service to the panel can accomplish this task.
- Verify that the flare fail/safe valve is in the closed position. This valve must close to ensure there are no uncontrolled emissions from the flare stack.
- Verify that the continuous flare pilot is no longer operating.
- Verify that the pneumatic pumps at the nearest condensate pump station to the flare station are operable. If electrical service has been deenergized the air compressor, which services the pneumatic pumps, must remain in operation.
- Implement proper lock-out/tag-out procedures on electrical equipment, panel boxes and valves per Hillsborough County's standards.

APPENDIX D

Glossary

GLOSSARY OF COMMON TERMS AND ACRONYMS

Affected Source - A source of air pollution subject to the requirements of the MACT rule.

Control Device - A flare or other device used to burn the collected landfill gas and destroy or reduce the air pollutants present in the gas prior to being released into the environment.

Deviation - Variation from the set procedures outlined in this SSM Plan. If a deviation occurs, then a SSM Plan Deviation Report Form must be completed.

Gas Mover - A landfill gas blower or compressor used to apply vacuum to the landfill gas wells and extract gas from the wellfield and landfill. The gas mover is also used to send the collected gas to the control device such as a flare or burner.

GCCS - Gas Collection and Control System. The GCCS consists of all parts of the landfill gas system including wells, wellheads, gas collectors, piping, condensate sumps, valves, blowers, and the flare.

LFG - Landfill Gas. Gas created by the decomposition of municipal solid waste that consists primarily of methane and carbon dioxide.

MACT - Maximum Achievable Control Technology. A set of federally mandated rules written to control and reduce the emission of hazardous air pollutants (HAPs) from various industrial sources of air pollution, including certain landfill facilities.

Malfunction - Any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded.

NSPS - New Source Performance Standards for MSW landfills. A set of federally mandated rules that require certain landfills to control the emission of non-methane organic compounds (NMOC) found in landfill gas.

Shutdown - The cessation of the operation of the GCCS or portion of the GCCS for any purpose.

SSM Plan - Startup, Shutdown, and Malfunction Plan. A plan required for certain landfills under the MACT rule to ensure that the GCCS is operated and maintained properly during periods of startup, shutdown, and malfunction.

Startup - The setting in operation of the GCCS or portion of the GCCS for any purpose.

Utility Flare - A control device that combusts landfill gas in a vertical stack.

ATTACHMENT 2

AP 4 AUTOPUMP MANUAL

QED
Environmental Systems
Leaders in Environmental Compliance Products

OPERATIONS MANUAL

AP-4 AutoPump®

AutoPump Controllerless System
(for 4-inch wells or larger)

PO Box 3726
6095 Jackson Road
Ann Arbor, Michigan 48106-3726

(800) 624-2026 — North America Only
(734) 995-2547 — Tele
(734) 995-1170 — Fax
info@qedenv.com — E-mail
www.qedenv.com

[illegible] Street
Oakland, California 94607

(800) 537-1767 — North America Only
(510) 891-0880 — Tele
(510) 444-[illegible] — Fax

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Document No. 600006-12

The equipment in this manual is protected under U.S. and foreign patents issued and pending:

U.S. Patents:

Selective Oil Skimmer (SOS)	4,497,370
Specific Gravity Skimmer (SPG)	4,663,037
AutoPump (AP)	5,004,405
Specific Gravity Skimmer (SPG) Product Sensing	5,474,685
Vacuum/Pressure Hydrocarbon Recovery System	4,761,225
SPG PSR technology	5,474,685
AP-2	5,641,272
Genie System	5,704,772

Canada Patent:

Specific Gravity Skimmer (SPG)	1,239,868

"AP" is a Registered Trademark of "QED Environmental Systems"
"AutoPump" is a Registered Trademark of "QED Environmental Systems"
"SOS" is a Registered Trademark of "QED Environmental Systems"
"Genie" is a Registered Trademark of "QED Environmental Systems"
"SPG" is a Registered Trademark of "QED Environmental Systems"
The QED Environmental Systems logo is a Registered Trademark of "QED Environmental Systems"
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Table of Contents

Figures:

Introduction

Welcome to QED Environmental Systems' AutoPump® (AP-4) manual.

To ensure the best operator safety and system performance, it is strongly recommended that the operators read this entire manual before using the system.

This manual reflects our many years of experience and includes comments and suggestions from our sales and service personnel and most importantly from our customers. The chapters, their contents and sequence were designed with you, the user and installer, in mind. We wrote this manual so it can be easily understood by users who may not be familiar with systems of this type or are using a *QED* system for the first time.

Safety

Safety has been a cornerstone of our design which has been proven out in building and shipping systems throughout the world. Our high level of performance is achieved by using quality components, building in redundancies or backup systems, and not compromising our commitment to quality manufacturing. The net result is the highest quality and safest pneumatic pump recovery system on the market. We feel so strongly about safety, based on years of working with the hydrocarbon industry, that it is the first section in all of our manuals.

How to Contact *QED*

If for any reason you are unable to find what you need in this manual please feel free to contact the *QED* Service Department at any time. We encourage you to use following communication methods to reach us at any time:

Service Department
QED Environmental Systems
www.qedenv.com

Oakland Service Center
1133 Seventh Street
Oakland, California 94607

(800) 537-1767 – North America Only
(510) 891-0880 – Tele.
(510) 444-6789 – Fax

Ann Arbor Service Center
PO Box 3726
6095 Jackson Road
Ann Arbor, Michigan 48106-3726

(800) 624-2026 — North America Only
(734) 995-2547 — Tele.
(734) 995-1170 — Fax
info@qedenv.com — E-mail

***QED* can be reached 24 hours a day**

We welcome your comments and encourage your feedback regarding anything in this manual and the equipment you have on-site.

Thank you again for specifying *QED* remediation equipment.

Chapter 1: Safety

Safety has been a prime consideration when designing the AutoPump System. Safety guidelines are provided in this manual, and the AutoPump System safety features are listed below. Please do not attempt to circumvent the safety features of this system.

We have also listed some possible hazards involved when applying this system to site remediation. Nothing will protect you as much as understanding the system, the site at which it is being used, and the careful handling of all the equipment and fluids. If you have any questions, please contact the *QED* Service Department for guidance.

As you read through this manual, you will encounter three kinds of warnings. The following examples indicate how they appear and lists their respective purposes.

Note:	Highlights information of interest.
Caution:	Highlights ways to avoid damaging equipment.
WARNING:	Highlights personal safety issues.

A Partial List of Safety Procedures

WARNING:
The air compressor and any other electrical equipment used with this pneumatic system must be positioned outside of any area considered hazardous because of possible combustible materials.

These safety procedures should be followed at all times when operating QED equipment on or off site, and should be considered as warnings:

- Wear safety goggles when working with the AutoPump System to protect eyes from any splashing or pressure release.
- Wear chemically resistant rubber gloves, boots, and coveralls when handling the AutoPump and fluid discharge hose to avoid skin contact with the fluid being recovered.

- Point all hoses away from personnel and equipment when connecting or disconnecting.
- Always ensure that the fluid discharge hose is connected before the air hose to prevent accidental discharge.

The AutoPump System minimizes the potential for accidents with the following safeguards:

Fire and Explosion Protection

Almost all of QED underground fluid extraction systems are pneumatic. This offers many inherent fire and explosion protection features:

- Compressed air lines eliminates electrical wiring in hazardous areas.
- Aluminum or fiberglass enclosures prevent sparking.
- Standard systems use brass fittings to eliminate sparking hazard.

Personal Protection

On-site, service and maintenance personnel can safely use *QED* equipment. Safety-in-use is the primary design feature in all systems. Following are some samples:

- All standard high pressure air hoses have automatic shut off quick-connects on the supply side which prevents injury due to hose whip or air blown particles. Tubing does not usually have quick-connect fittings, but is pushed over barbs or pushed into compression fittings.
- Metal regulators and filter bowls are rated at 200 psi and plastic bowls are rated at 150 psi. The metal air filter bowl is made of zinc, providing greater pressure and chemical resistance than plastic bowls and it is less prone to damage if dropped. The customer can choose either material.

Spill Protection

On-site spills cannot always be prevented. *QED* equipment is designed to take into consideration such unpredictable occurrences that may happen despite strict adherence to standardized safety practices.

- The standard air and fluid hoses are rated at over 800 psi burst pressure to prevent accidental hose breakage.
- Down well quick-connects have locking features to prevent accidental disconnections.

Chapter 2: Overview

The AutoPump® fills and empties automatically, and is very easy to install, use, and maintain.

The AutoPump is a pneumatic fluid extraction pump that pumps in pulses. It handles any liquid which flows freely into the pump and is compatible with the component materials and with the connecting hoses. The AP-4 is intended for vertical operation in well casings with a 3.75-inch or greater internal diameter. It can pump particles up to 1/8-inch in diameter.

The AutoPump is very versatile and available in a wide range of lengths, valve arrangements, and materials of construction to meet particular site specifications.

Equipment will vary by application and site specifications. (See Chapter 3)

General Specifications

Pump Diameter	3.50 inch	88.9 mm
Pressure Range	5 - 120 psi	0.4 - 8.5 Kg/cm^2
High Pressure Option	5 - 200 psi	0.4 - 14.1 Kg/cm^2
Flow Ranges	0-16 gallons per minute	0-60 liters per minute

This is How it Works

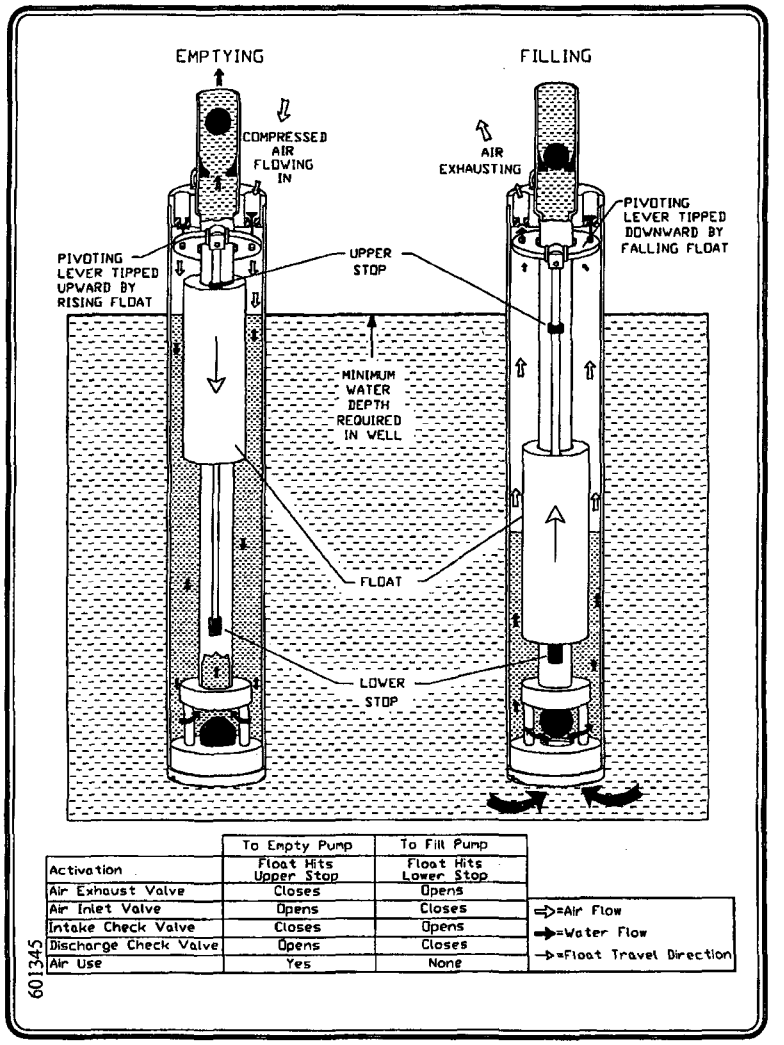
The AutoPump is a submersible compressed air-driven pump which fills and empties automatically. It also controls the fluid level in a well automatically. The pump fills (see Figure 1) when fluids enter either the top or bottom check valve. Air in the pump chamber exits through the exhaust valve as the fluid fills the pump. The float inside the pump is carried upwards by the fluids rising in the casing until it pushes against a stop on the control rod, forcing the valve mechanism to switch to the discharge mode.

The switching of the valve causes the exhaust valve to close and the air inlet valve to open. This causes the pump to empty (**see Figure 1**) by allowing compressed air to enter the pump. This pressure on the fluid closes the inlet check valve and forces the fluids up the discharge tube and out of the pump through the outlet check valve. As the fluid level falls in the pump, the float moves downwards until it pushes against the lower stop on the control rod, forcing the valve mechanism to switch to the fill mode. The outlet check valve closes and prevents discharged fluids from re-entering the pump. The filling and discharging of the pump continues automatically.

Note: The figures shown here are simplified schematics.

Major AutoPump Features

- The AutoPump System is small and lightweight and can be easily moved from site to site, allowing quick response to changing conditions.
- The hoses are color coded and all the fittings are different so only the proper connections can be made.
- Rugged construction ensures long system life, even under harsh conditions.
- The entire system is pneumatically powered with no electrical components, thus avoiding sparks in control power and sensing devices.
- Durable stainless steel air valves that can pass liquids as viscous as 90 weight gear oil without fouling. The air valves can handle reverse flow and submersion for long periods of time. Unlike pumps with bubblers or bleed hoses, there are no problems with start up, clogging, and failure under these difficult conditions when using the AP-4. This results in less downtime and lower training, maintenance, and repair costs.



Activation	To Empty Pump: Float Hits Upper Stop	To Fill Pump: Float Hits Lower Stop
Air Exhaust Valve	Closes	Opens
Air Inlet Valve	Opens	Closes
Intake Check Valve	Closes	Opens
Discharge Check Valve	Opens	Closes
Air Use	Yes	None

Figure 1 - How it Works

- The AP-4 only uses air while pumping. Unlike systems that rely on bleeding air sensors or timers which pressurize and depressurize the air hoses for each stroke, the air hose for the AP-4 remains pressurized to the pumps at all times. Air compressor power consumption, compressor filter maintenance, and thus operating costs are substantially reduced.

- The AP-4 can be configured to fill from the top or the bottom.

Figure 2 on the next page illustrates an overview of an AutoPump System.

The AP-4 System provides everything required for pumping fluid from a well. QED can also supply the air compressor, if desired.

The system is designed to perform for years and comes with a five year warranty.

Note:
An automatic drain on the compressor is highly recommended since it dramatically decreases air filter maintenance. *QED* can supply an automatic drain.

Caution:
Alteration of the System: Do not change or modify the equipment without the expressed written approval of *QED*.

Special Operating Conditions

Conditions may require adjustment or adaptations to the equipment. Below is a list of some of these conditions, their possible effects, and solutions.

Since every site is different, please contact your QED representative for detailed assistance if needed.

Cold Weather

Moisture in the pneumatic lines can freeze causing problems with the system. Such freezing could result in regulators not reducing the air pressure, valves sticking, and hoses clogging.

Actions To Take

- Use water traps and automatic compressor tank drains. These are available at industrial distributing companies (e.g., W.W. Graingers®).

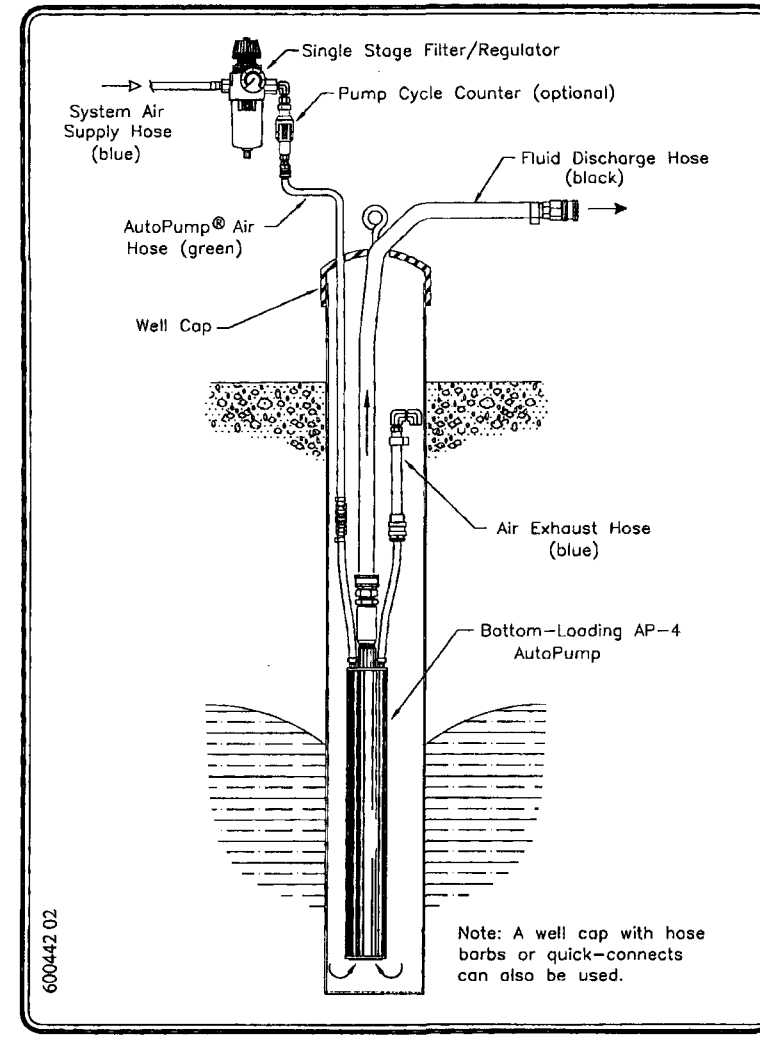


Figure 2 - Overview of the AutoPump System

- Reduce air line freezing by burying air hoses below the frost line, or insulating and heating with heat tape, or running hoses through a PVC pipe with warm air being blown through it.

- Remove all the moisture you can from the air by using drains on the compressor, filter, and low points in the air line. Use an air dryer to lower the dew point of the compressed air below the temperature of exposed lines.

- Protect the air regulator from freezing. During freezing conditions regulators may fail "open", allowing high pressure (e.g. 150 psi from the compressor) to enter components (e.g. gauges, hoses, fluid receptacles) that may be damaged, cause a safety problem, or release contaminating material.

- Locate the air intake to the compressor so the coolest (driest) air is drawn in. Usually it is better to draw air from outside a building than from the inside.

Flow induced freezing

Although it rarely occurs, air flow through an AutoPump may cause freezing at water temperatures well above 32°F, slowing down the system. Cold water, moisture in the compressed air, high air pressure, a high pumping rate, and back pressure on the pump are variables that alone, or in combination with each other, may induce freezing. Should it occur, there are system adaptations which can decrease or eliminate the freezing. Please contact *QED* for advice.

The well is under a vacuum

The pump will work in a well that is under a vacuum, but there are several conditions that must be considered.
(See Appendix D)

Abrasive particles in the well

Please contact QED service if you encounter problems with abrasives in the well.

Hard pipe air supply connection to the pump

These can cause debris and scale to travel down to the pump. It can also prevent the pump from cycling smoothly due to a solid connection (non-flexing) to the top of the pump. Blow out all of the hard pipe before connecting the pump. A short (6 feet) length of hose should be used between the hard pipe and the pump to allow the natural movement of the pump to occur without restraint. A small screen filter should be used at the lower end of the metal air pipe to prevent scale from reaching the air valve.

Other site conditions such as highly viscous fluids, extremes of pH, high salinity, deep (>400 feet) applications, high flow rates for LNAPL application, intermittent air supply, high dissolved solids, and high temperature can also be addressed. Please contact *QED* for guidance.

Options and Accessories

The following options and accessories are available from *QED*. Contact your *QED* Representative regarding the following:

- **AP Data Module** – This water-resistant enclosure protects and shields surface instrumentation from weather and/or harsh site conditions while providing easy visual access to key system instrumentation readings. The options available for inclusion inside the NEMA 3R enclosure are a filter/regulator, pump cycle counter, level sensor regulator and gauge with air flow meter. Also included are a fluid level indicator with an On/Off switch, an Air Inlet Supply Gauge, and a Vacuum/Pressure reference with Gauge.

- **Pump Cycle Counter (PCC)** – A PCC counts the number of times a pump cycles. The counter provides information for maintenance, service, and statistical purposes with minimal loss in air pressure or performance. A PCC is easily attached on the air inlet hose to the pump.

- **Component Materials** - Various materials specifically designed to withstand the harsh well environments (e.g. high temperature, abrasives, highly aggressive chemicals, high viscosity) of particular sites are available for all component pieces.

- **TFSO** – The Tank-Full Shut-Off (TFSO) System is a unique, self-contained pneumatic system that shuts down other pneumatic systems in the event of a liquid level rise or a pressure increase in a container. The TFSO provides dual safety by using two sensors. The system is expandable—the button sensor of the system can be teed to monitor many containers.

- **Inlet Conversions** – AutoPumps can be converted from Top- to Bottom-Loading and vice versa. See **Appendix C** for more information.

Chapter 3: Equipment

Unpacking

During the unpacking procedure, check for the following:
- All parts on the packing list have been included in the box
- All fitting openings are unobstructed
- The equipment has not been damaged in shipment

Equipment List

The equipment list will vary depending on site specifications, but the following list is a typical configuration:.

1. Top-Loading or Bottom-Loading AP-4 with support harness

2. Single stage filter/regulator with:
   - 5 micron filter with auto drain trap
   - Pressure regulator with gauge

3. Pump Cycle Counter (PCC)

4. Hoses:
   - Fluid discharge hose (black)
   - System air supply hose (blue)
   - AutoPump air hose (green)
   - Air exhaust hose (blue)

> **Note:**
> *Black nylon tubing can be used in place of hose.*

5. Pump support system:
   - Well cap
   - Polypropylene support rope with quick-link assembly or SS wire rope (Alternate materials as required)

Tools

The following tools are used to service the AP-4:
- Spanner wrench

Parts List

In aggressive sites over millions of cycles, the parts that one may anticipate replacing are:
- Discharge check valve ball

AP-4 AutoPumps

In both the Bottom-Loading and the Top-Loading models, the fluid is pushed out of the pump through a check valve located at the top of the pump. This check valve prevents the fluid from reentering the pump.

Bottom-Loading AP-4/BL

The Bottom-Loading AutoPump fills through a check valve at the bottom of the pump. There are three lengths of AP-4/BL: long, short, and low drawdown. The fluid level in the well can be drawn down to 36 inches from the bottom of the long BL, and 25 inches from the bottom of the short BL **(See Figure 3)** and as low as 11.5 inches with the low drawdown configuration **(See Figure 5)**

Top-Loading AP-4/TL

The Top-Loading AutoPump fills through a check valve at the top of the pump, therefore the fluid level in the well will never go below the level of this check valve. There are three lengths of AP-4/TL: long, short **(See Figure 4)** and low drawdown.

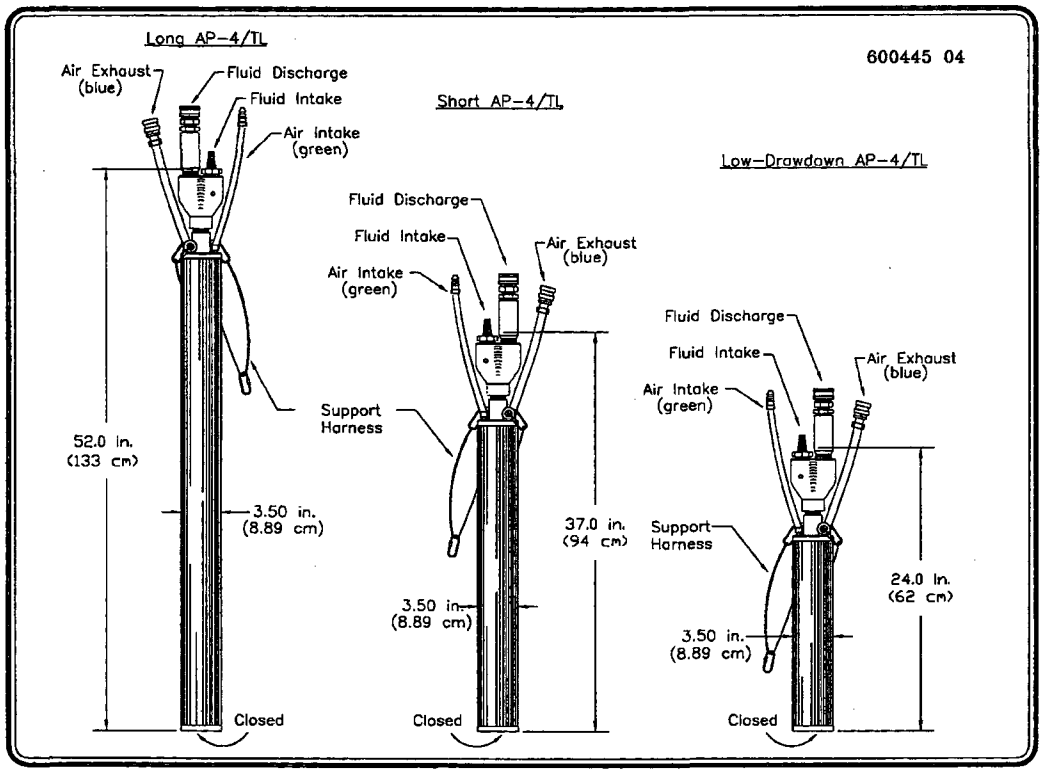


Figure 4 - Long, Short and Low-Drawdown Top-Loading (AP-4/TL)

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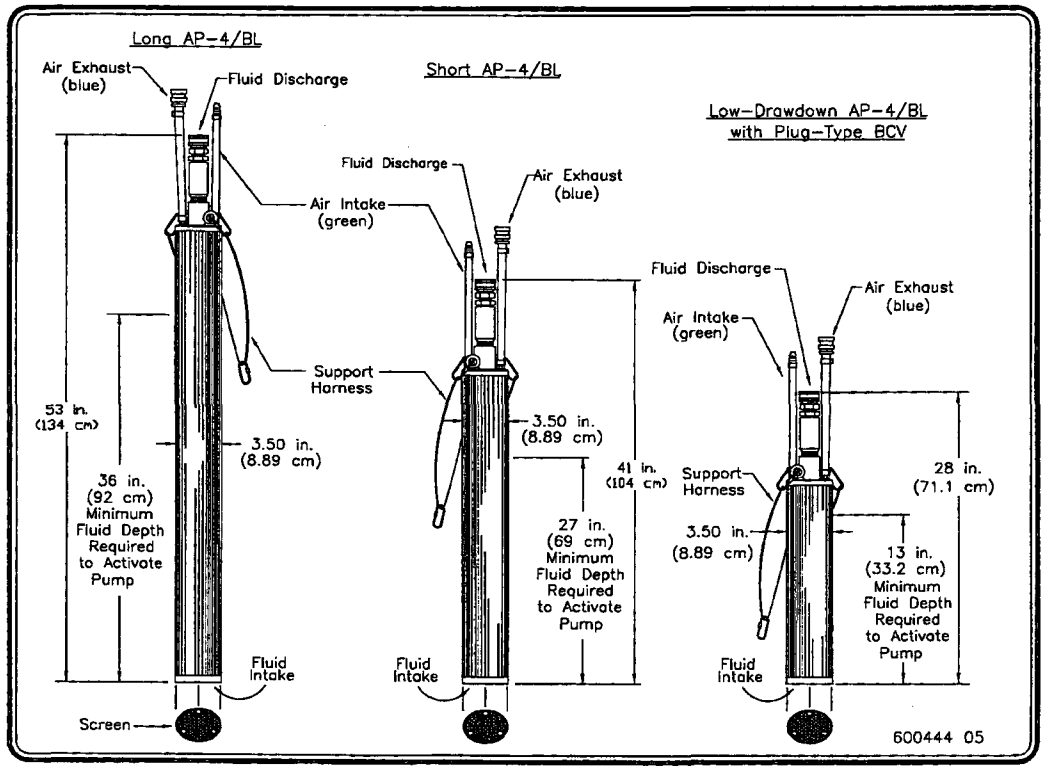


Figure 3 - Long, Short and Low-Drawdown Bottom-Loading (AP-4/BL)

Specifications

Pump	Length	Vol/Cycle Range	Weight	Outside Diameter
Long AP-4/BL	53-inches 134-cm	.58 gal - .78 gal 2.2 L - 3.0 L	16 lb 7.2 Kg	3.5-in 8.89-cm
Short AP-4/BL	41-inches 104-cm	.22 gal - .36 gal .83 L - 1.4 L	13 lb 5.9 Kg	3.5-in 8.89-cm
LD AP-4/BL	28-inches 71.1-cm	.11 gal - .16 gal .42 L - .61 L	10 lb 4.5 Kg	3.5-in 8.89-cm
Long AP-4/TL	52-inches 132-cm	.58 gal - .78 gal 2.2 L - 3.0 L	17 lb 7.7 Kg	3.5-in 8.89-cm
Short AP-4/TL	37-inches 94-cm	.22 gal - .36 gal .83 L - 1.4 L	14 lb 6.3 Kg	3.5-in 8.89-cm
LD AP-4/TL	24-inches 62-cm	.11 gal - .16 gal .42 L - .61 L	12 lb 5.4 Kg	3.5-in 8.89-cm

Component Materials

Typical component materials include stainless steel, acetal, Viton, fiberglass, PTFE (Teflon), PVDF (Kynar), UHMWPE, epoxy, and brass.

Performance and Air Use Curves -- See Appendices A and B.

Landfill Pump Configurations

All lengths (Long, Short, and Low Drawdown) and intake configurations (Bottom-Loading) are available in models for landfill leachate, condensate pumping and dewatering applications. **(See Figure 5)**

These models have material options to withstand temperatures up to 212° F (100° C) and pH levels from 1 to 12. Various inlet screen sizes also available.

Landfill Specifications

Pump	Length	Vol/Cycle Range	Weight	Outside Diameter
Long AP-4/BL	53-inches 134-cm	.58 gal - .78 gal 2.2 L - 3.0 L	16 lb 7.2 Kg	3.5-in 8.89-cm
Short AP-4/BL	41-inches 104-cm	.22 gal - .36 gal .83 L - 1.4 L	13 lb 5.9 Kg	3.5-in 8.89-cm
LD AP-4/BL w/Rad Screen	26-inches 66 cm	.11 gal - .16 gal .42 L - .61 L	10 lb 4.5 Kg	3.5-in 8.89-cm
LD AP-4/BL w/Ext Screen	30.5-inches 77.5-cm	.11 gal - .16 gal .42 L - .61 L	12 lb 4.5 Kg	3.5-in 8.89-cm

Component Materials

Typical component materials include stainless steel, acetal, Viton, nylon, fiberglass, Teflon (PTFE), PVDF (Kynar), UHMWPE, epoxy, and brass.

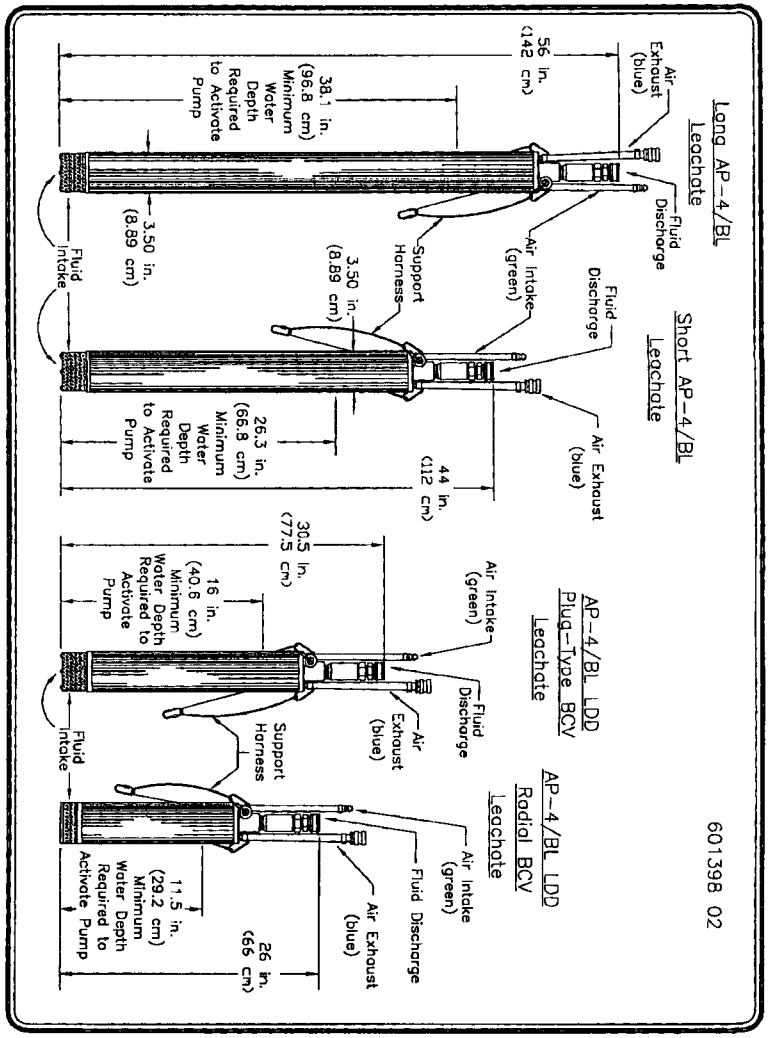


Figure 5 - Long, Short, and LDD Bottom-Loading Leachate (AP-4/BL)

Single Stage Filter/Regulator

A single stage 5 micron particulate air filter/regulator has an a manual or an optional automatic drain and is installed on the system air supply hose. The filter/regulator removes particles and some oil vapor, and water droplets from the air passing to the AP-4. The regulator should produce at least as much pressure as required to move the fluid from the depth at which the pump is installed. **(See Figure 6)**

Note:
Too much air pressure can result in low pump efficiency.

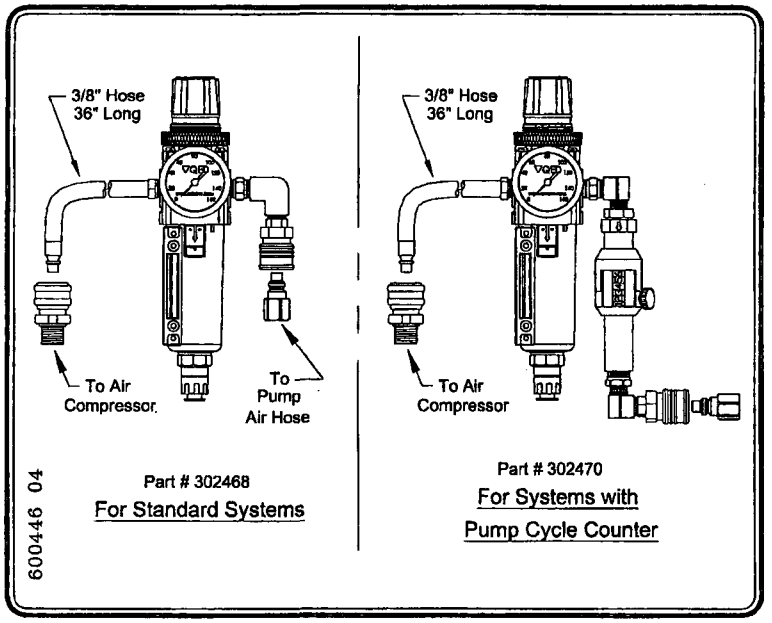


Figure 6 - Single Stage Filter/Regulator 60 with Quick-Connects

Hoses and Fittings

The table below shows the normal hose colors. These may change due to application or need.

Hose and Tubing Color Code Table

	System Air Supply Hose	Fluid Discharge Hose	AutoPump Air Hose	Air Exhaust Hose
Hose Color	Blue	Black	Green	Blue
Hose Material	Nitrile	Nitrile	Nitrile	Nitrile
Hose Size I.D.	3/8-inch to 3/4-inch	5/8-inch to 1-1/4-inch	3/8-inch to 1/2-inch	1/2-inch to 3/4-inch
Tubing Color*	Black	Black	Black	Black
Tubing Material*	Nylon	Nylon	Nylon	Nylon
Tubing Size O.D.*	3/8-inch to 1-inch	5/8-inch to 1-1/4-inch	3/8-inch to 5/8-inch	5/8-inch to 1-inch
Function	Transports air from air compressor to filter/regulator	Transports product from AutoPump to discharge point	Transports air from filter/regulator to AutoPump	Exhausts air from AutoPump
Fittings	Hose barb and clamp or one-way quick-connect fitting	Hose barb and clamp or straight through quick-connects	Hose barb and clamp or one-way quick-connect fitting	Hose barb and clamp or straight through quick-connects

* Nylon tubing is available in single tube or jacketed bundles. Contact QED for the sizes and bundle configurations.

If optional quick-connects are used, the flow of air and fluid in the hoses runs *into* the male plug and *out* of the female socket.

The quick-connect fittings on one type of hose will usually not interchange with those of another, so it is very difficult to connect a hose to an incorrect fitting.

Note:
The down well hose fittings normally have locking quick-connects. On sites with water depths over 50 feet, special consideration may be required to support the hoses. Consult with *QED* regarding such applications.

Volumes Pumped Per Cycle

- The volume of fluid pumped per cycle from an AutoPump varies depending upon the inlet air pressure, the fluid inlet head and the force against which the pump must move the fluid. This force is a sum of the static head and dynamic losses incurred during fluid movement, usually referred to as Total Head.
- The Total Head depends upon back pressure in the surface lines, hose size, fittings, vertical and horizontal pumping distance, the number of pumps feeding the hose system, air pressure to the pump, and the type of pump.
- The effects of some of these variables may cause the volume pumped per cycle to vary from pump to pump on a single site.

Pump	Volume per Cycle: Range	Volume per Cycle: Typical
Long AP4	0.58 - 0.78 gal (2.2 - 3.0 L)	0.65 gal (2.46 L)
Short AP4	0.22 - 0.36 gal (0.87 - 1.36 L)	0.25 gal (0.95 L)
Low Drawdown AP4	0.11- 0.16 gal (0.42 - 0.61 L)	0.13 gal (0.51 L)

All figures above are dependent on site specific conditions under which the pump is operating

Pump Support System

To safely support the AP-4, a pump support system is offered. Included in the system are a well cap, support rope, and quick-link assembly.
(See Figure 13 on page 36, and Figure 14 on page 37)

Well caps with various fitting combinations are available.
(See Figure 12 on page 34)

Caution:
Although it may be possible to support the pump using only tubing, it is not always wise to do so. If a pump becomes jammed in a well, a strong rope or wire rope separate from the tubing may be needed to withstand the force required to free it. Thus a separate support line is recommended.

Chapter 4: Assembly & Installation

WARNING:
PVC pipe is generally not recommended for compressed air service.

Cautions

The following suggestions are offered to reduce the complications involved in assembly and installation.

- Cover the hose ends with tape if they are being pulled through trenches. Be sure the ends of the hoses that connect to the air compressor and fluid discharge have the correct fitting leading out of the well. If you are unsure, look at the respective fittings on the pump.
- Blow out all water and particles from compressed air conduits (trunk lines, sensor hoses, air supply hoses etc.) and fluid lines for at least 10 seconds after the water and particles exit before connecting them to the system.
- When running hoses in conduit, include a rope to pull additional hoses in case they are needed at a later date
- If solid metal piping is used for compressed air conduit, it is advised that an air filter or a "Y" strainer with a fine mesh screen (60 mesh or finer) be placed at the downstream end of the piping. Metal flakes, rust, galvanizing material, dirt, etc. can be dislodged from such metal piping and travel to the pump.

Compressed Air Supply

The AP-4 System includes a compressor-to-pump air line quick disconnect fitting for the compressor.

There is a distinct air inlet on the AP-4; an "I" is stamped next to it on the head of the pump. The air inlet quick connect fitting on the pump has a female counterpart on the air inlet hose. The air inlet must be connected for the AP-4 System to function. Do not lubricate the compressed air coming out of the compressor. The AP-4 does not require lubrication and excess oil may foul the filter/regulator.

WARNING:
The compressor should not provide more pressure than the filter can accept. The filter and regulator with plastic bowl accepts a maximum of 150 psi air pressure. The metal bowl can accept 250 psi. Maximum output air pressure setting on the standard regulator is 120 psi. A higher pressure regulator and gauge are optional.

Component Assembly

Quick-Connects/Hose Barbs

Follow the instructions on **Figure 7** for properly securing the locking quick-connects. See **Figure 8 and Figure 9** for properly securing hose barbs.

AutoPump Assembly

STEP 1 - Attach Fluid Discharge Hose (black)

Note:
If a well cap with holes is used, insert the hoses through the cap before attaching hose.

a. Attach the fluid discharge hose or tubing to the AutoPump. **(See Figure 10 and Figure 11)**

b. Attach the other end of the discharge hose to the fluid discharge point.

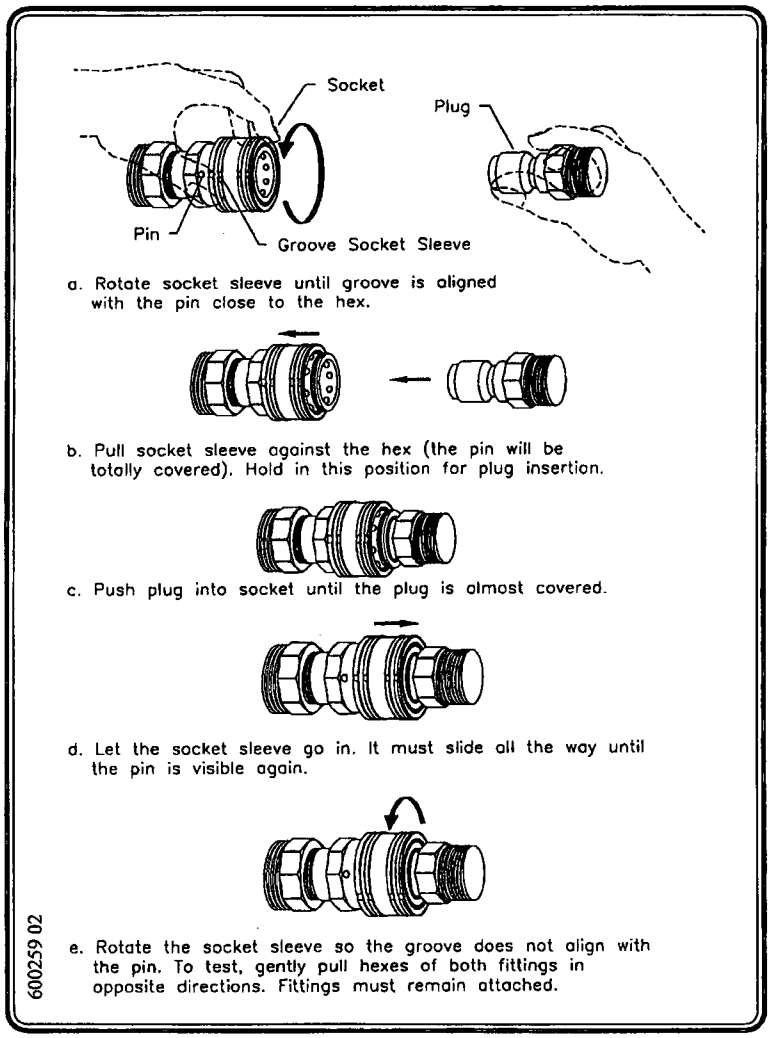


Figure 7 - Locking Quick-Connects

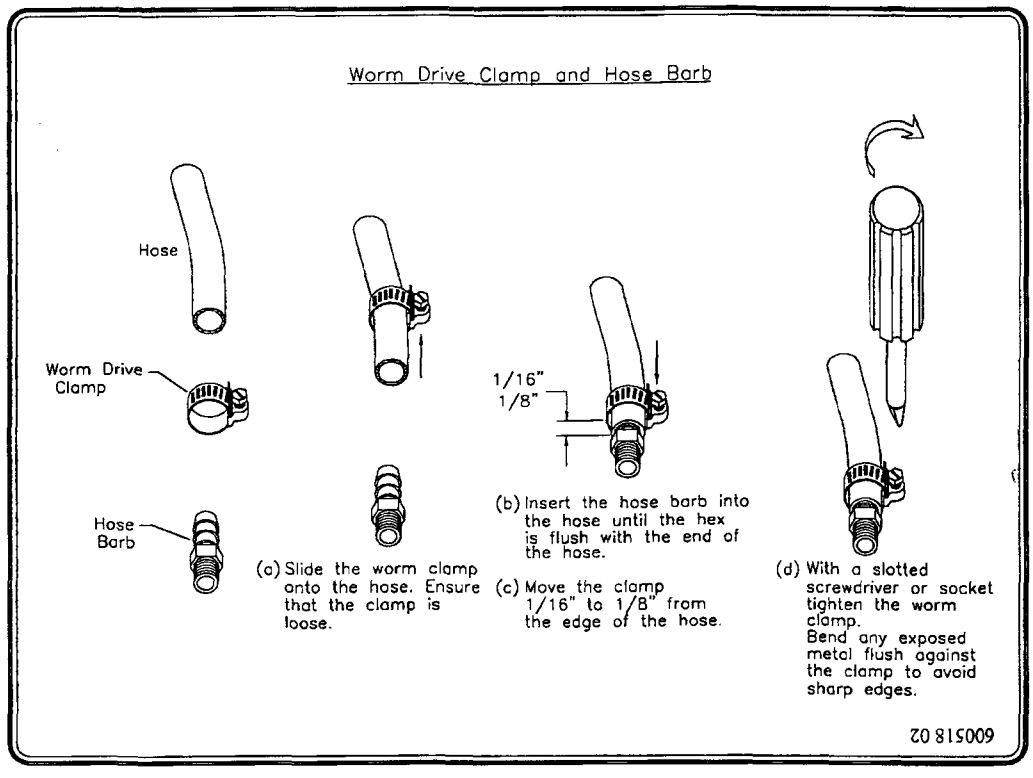


Figure 9 - Worm Drive Clamp and Hose Barb Assembly Instructions

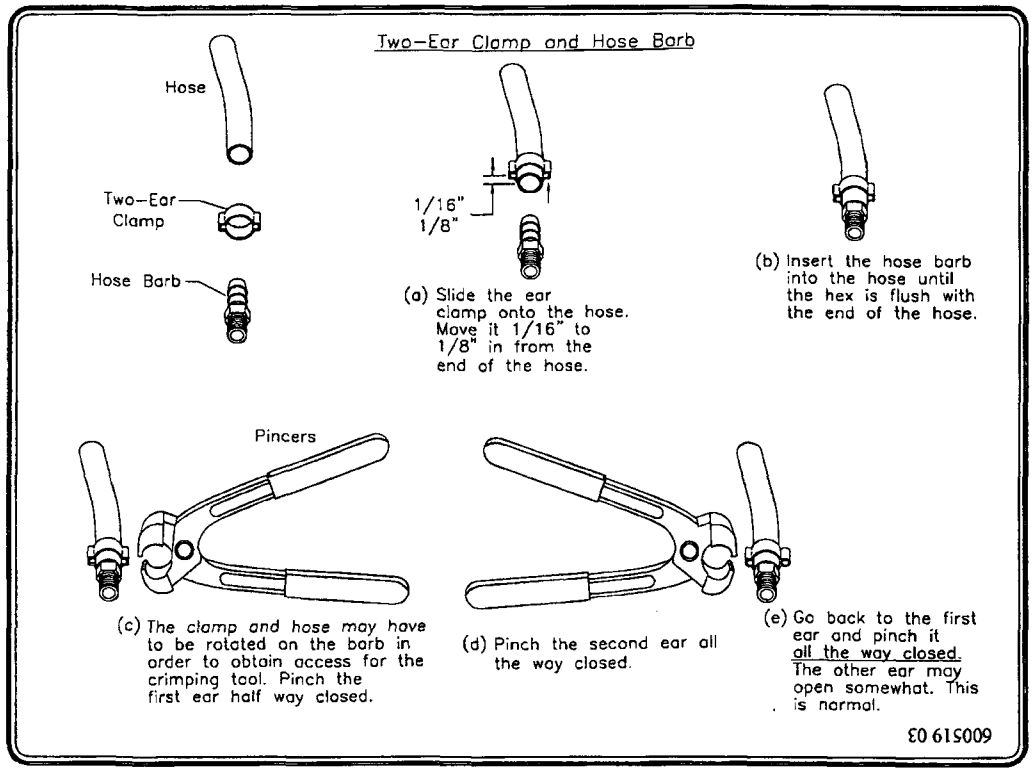


Figure 8 - Two-Ear Clamp and Hose Barb Assembly Instructions

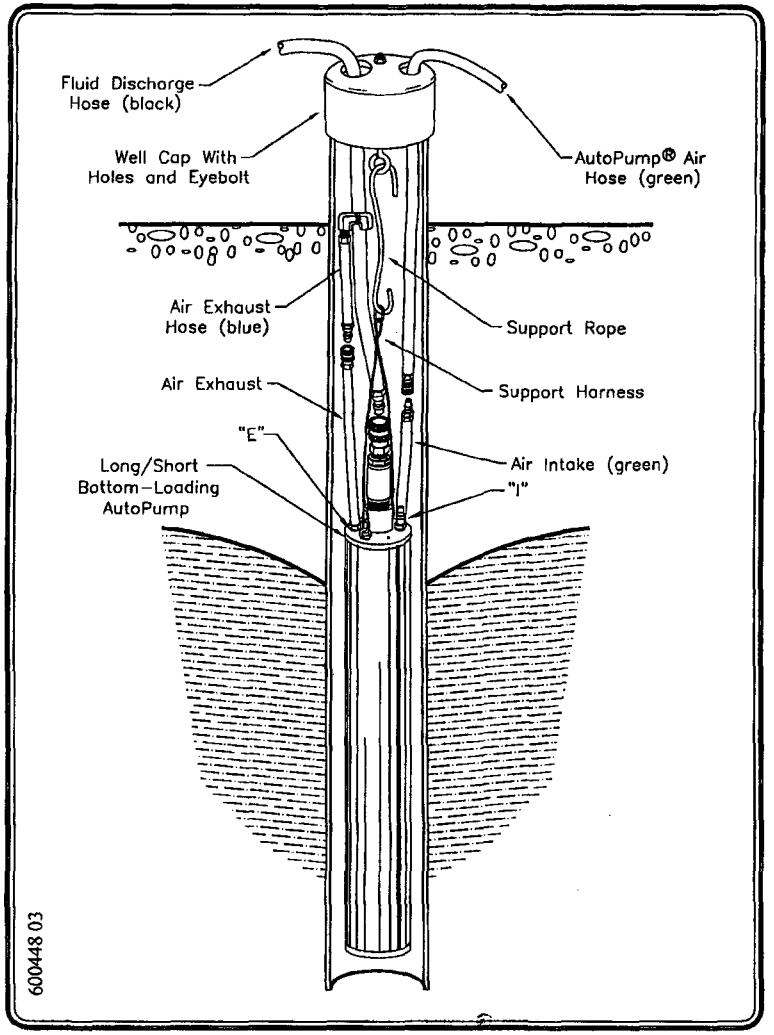


Figure 10 - AP-4 Assembly with Quick-Connects: Well Cap with Holes

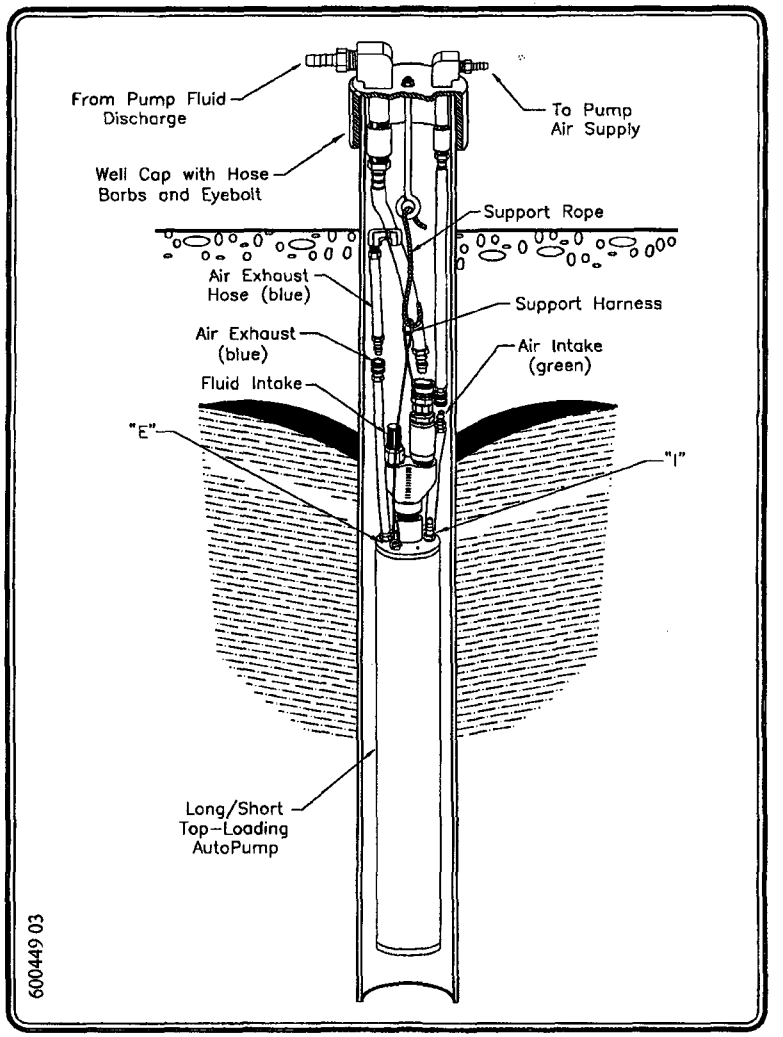


Figure 11 - AP-4 Assembly: Well Cap with Hose Barbs

STEP 2 - Attach AutoPump Air Hose (green)

a. If a Pump Cycle Counter (PCC) is used, install it downstream of the air filter regulator and as close to the pump as is reasonable.

b. Attach the AutoPump air hose to the single stage filter/regulator or *optional Pump Cycle Counter* **(See Figure 2 on page 11)**

c. Attach the other end of the AutoPump air hose to the AutoPump.

STEP 3 - Attach Air Exhaust Hose (blue)

a. Attach the air exhaust hose to the AutoPump. **(See Figure 10 and Figure 11)**

STEP 4 - Attach System Air Supply Hose (blue)

a. Thread the air hose socket with 1/4-inch MPT to the compressor. Use Teflon tape or sealant on the threads.

b. Attach the air hose plug end of the system air supply hose to the socket now attached to the compressor.

c. Attach the socket on the discharge end of the hose to the single stage filter/regulator. **(See Figure 2 on page 11)**

The pump will work in a well that is under vacuum, but there are several conditions that must be considered. **(See Appendix D)**

Dry Test

Before installing the AutoPump in the recovery well, it is important to test the system for proper operation. Before beginning this test, make sure that all hoses are properly connected as described in the previous section.

To test for float movement and air valve actuation follow these steps:

STEP 1 - Drain all fluid from the pump through the bottom inlet check valve (Bottom-loading) or air inlet fitting (Top-loading).

STEP 2 - *Hold the pump horizontally.*

STEP 3 - Tip the top of the pump downwards to about 45°. The float should slide to the top of the pump and open the air valve. Air should be heard going into the pump. It will exit the inlet fluid check valve (Bottom-loading) or the *outlet check valve (Top-loading).*

Caution:
If air is not acceptable in the fluid discharge hose, disconnect the hose before performing this test.

STEP 4 - Tip the head of the pump upwards past horizontal to 45° from the vertical. The float should slide to the bottom of the pump and close the air valve.

STEP 5 - Repeat this process 3 or 4 times to ensure the float moves freely and the air-valve opens and closes. If the pump must be tilted nearly vertical before the float slide or the air valve moves, open the pump and inspect for interference.

Pump Support System and Hose Bundling Assembly

A pump support system can be created to support the pump and hoses. The pump support system uses well caps with various fitting combinations. **(See Figure 12)**

Though it is possible in some instances to support a downwell pump with only the tubing, a separate support line is recommended.

Note:
The walls of some wells deform over time. They may trap a downwell pump. In some of those cases the AP-4 support harness and strong support line have proven useful when retrieving the pump.

In addition to supporting the down-well equipment with a support rope, it may be important to support down-well hoses (in most cases nylon tubing does not need to be supported by the support line). Since the down-well hoses can weigh more than the pump, particularly in wells over 50 feet deep with fluid inside the discharge hose, hose support can avoid problems such as kinking, jamming, and breaking.

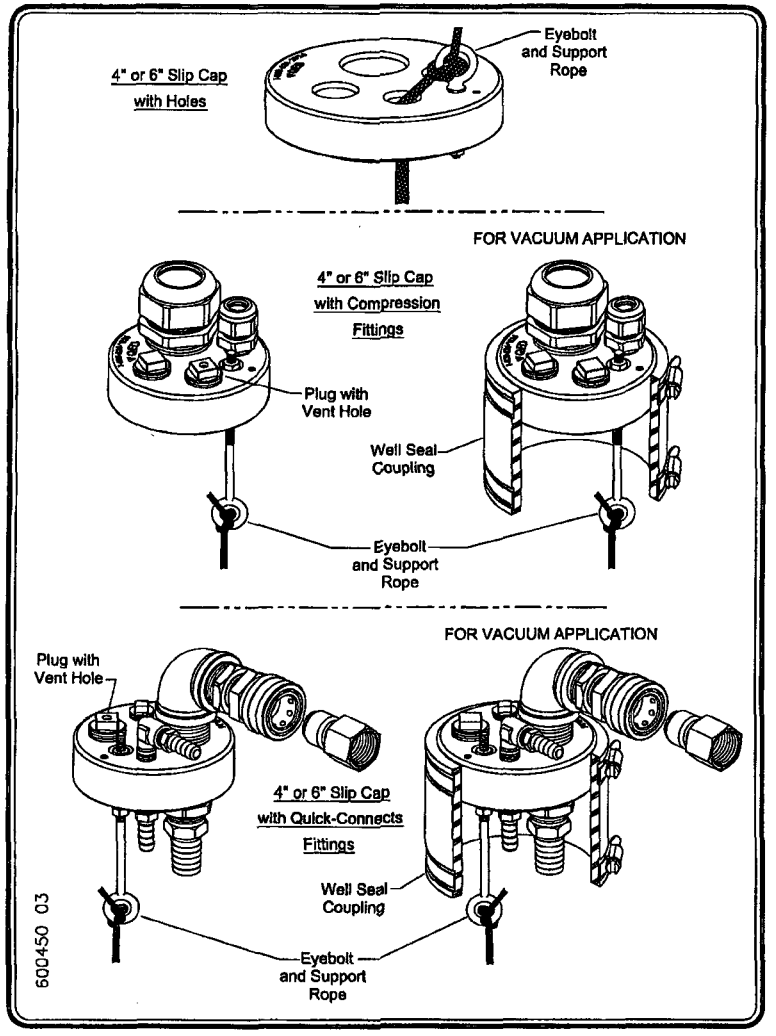


Figure 12 - Examples of Well Caps

Hose bundling or the use of jacketed tubing reduces equipment entanglement at the well surface, and aids the removal of the pump from the well. Bundling also assists in positioning the pump and down-well hose assembly against one side of the well casing. Maximum space is created for other items, such as probes, to be periodically placed inside the well.

Follow these instructions to create a hose bundle.

STEP 1 - Lay the equipment on the ground and make all of the necessary hose connections. **(See Component Assembly on page 26 and 32)**

STEP 2 - If a well cap is supplied, install it on the hoses. **(See Figure 10** for well cap with holes; **see Figure 11** for well cap with hose barbs)

STEP 3 - Connect the quick-link assembly on the support rope to the eyebolt on the AP-4 and lay the support rope out along with the hoses. Make sure that none of the hoses or support ropes are crossing over each other. **(See Figure 13)**

Note:
To make the next step easier, pull the support rope and the hoses taut.

STEP 4 - Starting at the AutoPump end of the hose, put a tie-wrap through the center of the braided support rope just above the uppermost quick-connect or barb on the AutoPump. **(See Figure 13 and Figure 14)**

STEP 5 - Pulling the rope taut, put the tie-wrap around the fluid discharge hose with the rough surface outwards. Cross the ends and complete the figure-8 pattern by securing the ends around the exhaust hose. When you connect the tie-wrap make sure it is straight and is not kinking the hoses. **(See Figure 13 and Figure 14)**

Note:
After completing this step, the fluid discharge hose will be attached to the support rope and the exhaust hose. At this point the air supply hose is still lying free.

STEP 6 - Place the next tie-wrap two feet towards the well cap from the first. Secure the air supply hose rather than the exhaust hose.

Note:
It is important to put the tie-wraps approximately two feet apart to keep a proper discharge hose/support rope bundle. Experience has shown that spreading the tie-wraps further apart than two feet increases the probability for hose kinking.

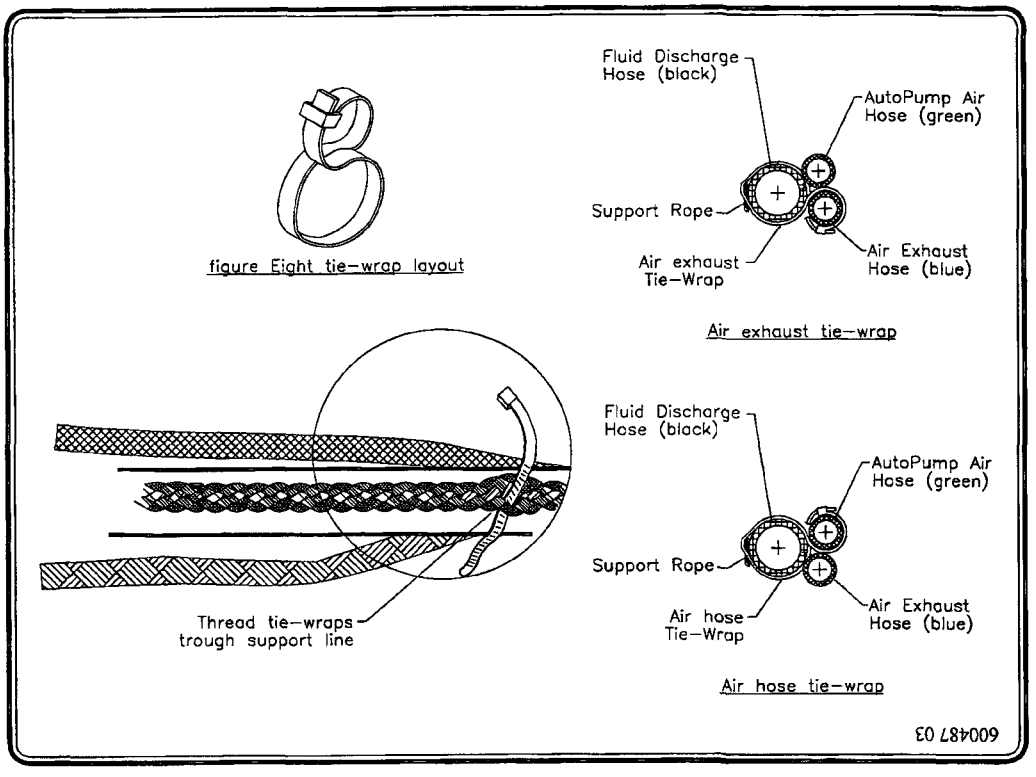


Figure 14 - Hose Bundling: Part 2 of 2

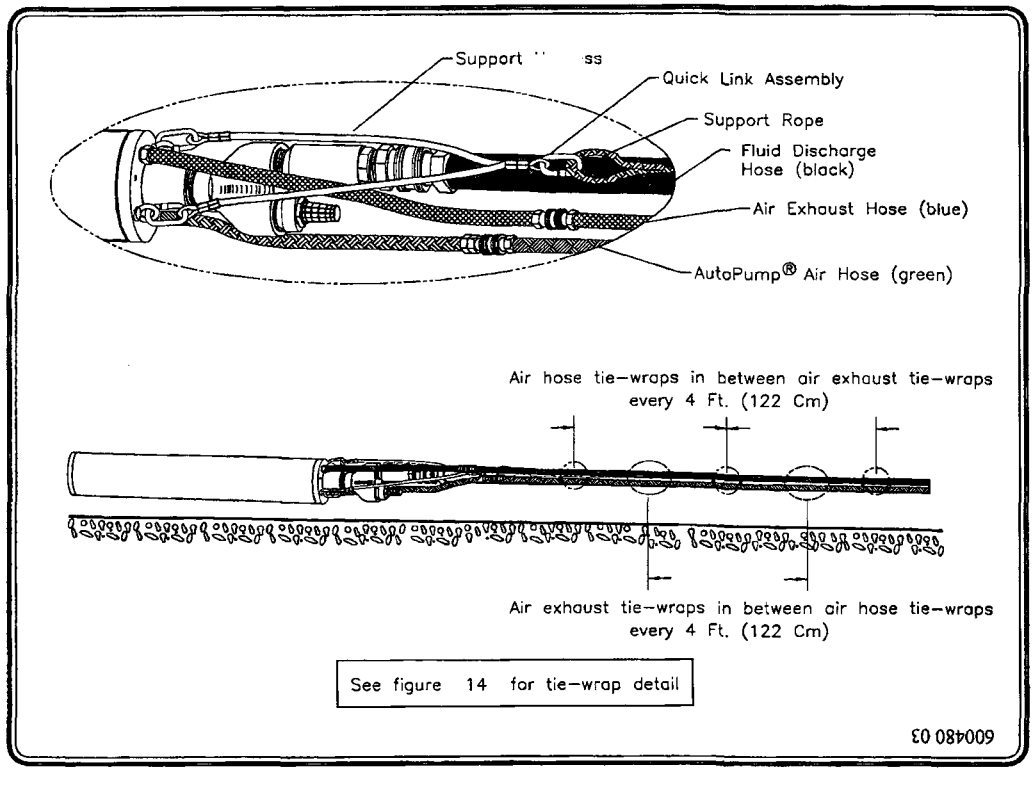


Figure 13 - Hose Bundling: Part 1 of 2

STEP 7- Continue to alternate the air exhaust and the air supply tie-wraps every two feet, stopping about five feet from the wellhead.

STEP 8- Being careful not to leave any sharp edges, cut the excess from the tie-wraps.

You now have a down-well bundled hose assembly that supports both the hoses and the down-well equipment.

AutoPump Installation

Once the installation of the pump support system is completed, you may install the AutoPump in the recovery well.

STEP 1 - Lower the pump until it is at the desired level.

STEP 2 - Secure the pump by tying off (securing) the support line or by placing the well cap on the well.

STEP 3 - Increase the air pressure to the pump until the pump is pushing the fluid out at the desired rate. With sufficient air pressure (at least 10 to 15 psi over the vertical static head), the AutoPump will gradually draw down the fluid level in the well to the level of the pump. The time required for this draw down varies with the yield of the well as compared to the flow rate of the pump. The maximum recommended continuous operating pressure is 120 psi (200 psi for high pressure version).

The pump rate can be increased slightly by increasing the air pressure to the pump. However, under conditions with high inlet pressures and little discharge resistance, some air may exit with the fluid. That would be due to a brief residual pressure in the pump which discharges fluid (and air) even after the exhaust valve is opened.

Under normal operating conditions, no air should exit the pump with the fluid.

If the pump is moving air out the fluid discharge and this is undesirable, a needle valve in the air line can be used. This reduces the air flow rate to the pump and thus the pressure buildup in the pump. Alternately, reduce the pressure going to the pump though the pressure regulator.

Note:
Submerging the pump before supplying it with air will result in fluids entering the exhaust hose. Those fluids will be discharged from the exhaust hose during the first few cycles of the pump. If such discharge will not be confined to the well, the operator may wish to install the pump with a low air pressure supplied to the pump. To obtain the value of that low pressure in psi, multiply the number of feet that the pump is to be submerged by one-half (0.5).

WARNING:
Be sure that the fluid discharge has a closed valve during such a process because the pump may have enough pressure to begin pumping fluid from the well.

Chapter 5: Start Up and Operation

Start Up Checklist

In normal operation, the AP-4 System requires little attention.

Before regulating the air pressure to the desired operating pressure, ensure that the following conditions exist:

1. Personal Protective Equipment (PPE) is being used by all personnel.
2. The pump is submerged below the fluid level.
3. All hoses are connected.
4. The exterior air filter is mounted vertically to allow the filter and its bowl drain to operate properly.
5. All out-of-well air and fluid valves are in their correct positions.
6. A method of rapid disconnect and exhaust (or at least a shut off) of compressed air to the pump is available in case of an unexpected occurrence.
7. When pumping is to begin, either gradually raise the air pressure to the pump or gradually open the air valve to the pump to allow the pump and hoses to slowly pressurize. Check for leaks as you do this.
8. As the air pressure overcomes the static and dynamic resistant forces, the pump will begin to cycle. Listen for the periodic exhaust of air from the pump to determine that the pump is working. The pump should push fluid out and then exhaust sharply to fill before pressurizing and pushing the fluid out again.
   Cycling can also be monitored by placing an air pressure gauge at the well head and by observing a pulse counter, if one is present.
9. If a pulse cycle counter is installed, it should be adjusted to accomodate the individual well conditions. Refer to the PCC manual, Document # 600473.

Observation of System Operation

Observe the system operation for at least 10 pump cycles to ensure everything is working. If the well influx is low so the pump seldom cycles, pour clean water into the well to check on the pump. If allowed, the pump discharge can be directed into the well so the pump will cycle within an acceptable period to allow for observance of operation. Check your local regulations to determine if these practices are permissible.

> **Note:**
> The Pump Cycle Counter may have to be readjusted if it is set when the water is recirculating to the well.

After the entire site is operating, return to each well to ensure that the pump and PCCs are functioning properly. The addition of other pumps and possible system back pressure can necessitate air pressure and counter readjustment.

Downwell Testing of the AutoPump

While the AutoPump is in the well, it can be tested by putting compressed air into the exhaust hose of the pump.

> **Note:**
> The air supply hose must be shut off or pressurized when this is done.

The compressed air will enter the pump through the exhaust valve and push any fluids in the pump up the discharge tube. If sufficient compressed air is continually supplied, it will also exit the discharge tube and cause the fluid in the discharge hose to be airlifted to the surface. This method can be used to lighten the pump and hoses before removing the pump from the well. This process can also show whether the fluid inlet check valve is sealing and if the pump is capable of discharging fluid.

AutoPump Shutdown while Submerged

The AutoPump can be submerged for long periods of time at most sites. If the well environment is such that deposition occurs on stainless steel parts, the operator may wish to raise the pump above the water level during a shutdown of the system.

AutoPump Removal Technique (optional)

By pressurizing the exhaust hose as noted above and airlifting the fluids out of the well, the fluid in an AutoPump and discharge hose can be reduced significantly. This can be used to lighten the system before removing it from the well.

Chapter 6: Maintenance

General Maintenance

The AP-4 should be relatively free of maintenance. The frequency of maintenance depends upon the nature of the fluids being pumped. Follow these general maintenance checks.

- Periodically inspect all hoses and connections for damage. Make sure that the hoses are not split or cracked, and listen for leaks in the system.
- Even if significant amounts of oil and water enters the air hose, the AP-4 System should perform reliably for years. Check the Air filters and filter bowl drains on the filters/ regulator for saturation and operation every few weeks.
- Periodically drain the air filters on the air hose to the pumps of collected particles, water and oil. Draining prevents the filter from clogging up or being otherwise damaged. Check the regulator to ensure the pressure setting has not drifted appreciably.
- An automatic drain on the compressor is highly recommended, since such an addition can dramatically increase air filter life and decrease maintenance. Automatic drains are available from QED.
- The pump can be opened up in the field if the area is clean and dry.

A maintenance video is available from QED.

Maintenance Table

A visual check and/or maintenance is recommended at least once every two weeks, but some site environments may demand more frequent service. The following table outlines the recommended minimum schedule for the AP-4 System.

Equipment	Biweekly	Monthly*	As Required
Air Quality Check • Single Stage Filter/Regulator	X		
AutoPump Service			X
Check Pump Cycle Counter	X		
Check Volume Pumped Per Cycle		X	

* Site conditions may require maintenance more often.

The following sections describe each maintenance activity in detail.

Air Quality Check

Single Stage Filter/Regulator Maintenance

Even using air which has some oil and water in it, the AutoPump System should operate trouble-free for years. The air filter is normally a 5 micron filter with a replaceable element.

To replace the element in the air filter on the single stage filter/regulator use the following procedure:

STEP 1 - Disconnect Air Source

- Valve off the air supply and drain the downstream air to the air filter. Or disconnect the blue system air supply hose from the single stage filter/regulator. The air filters will depressurize, allowing them to be safely serviced.

WARNING:
Do not remove a filter bowl that is pressurized.

STEP 2 - Remove Filter Bowl

- Different styles of air filters are available. The following instructions are *given for the most typical filter used, one with 1/4" pipe thread.*

- Remove the bowl of the air filter by sliding the button downward and twisting the bowl about 1/8 of a turn. The bowl should slide downward from the upper portion of the filter revealing the filter element. Unscrew the element as you would unscrew a light bulb. Hand tighten the element after replacing it.

  Make sure to replace the correct filter element.

  - Blue or black filter bowl:
    QED Filter element Part No. 205071

  - Silver filter bowl:
    QED Filter element Part No. 205800

STEP 3 - Bowl Drain

Optional Float Drain

- Wash out any deposits and oil buildup from the filter bowl with warm water and soap. To make sure the float drain is operating freely, shake it; the drain should rattle. Test the float drain by filling the bowl with water, assembling the bowl to the filter and reconnecting it to the air supply. The water should drain from the bowl. When under pressure, the drain should not leak.

Standard Manual Drain

- With water in the bowl, open the drain and ensure the liquid drains easily. When under pressure and closed, the drain should not leak.

AutoPump Service

AutoPump Shutdown and Removal from Well

To shut down and remove the AutoPump, follow these directions:

STEP 1 - Wait until the pump is in its discharge cycle and then raise it above the water level in the well. This will empty most of the fluid from the pump making it lighter to lift. There will also be less fluid to drain from the pump.

Note:
See Start Up and Operation for optional pump removal technique.

STEP 2 - Pull the pump and hoses to the surface.

STEP 3 - Shut off the air to the pump and disconnect the air hose from the pump.

STEP 4 - Ensure that there is a safe place to drain any fluid from the pump and discharge hose.

STEP 5 - Disconnect the fluid discharge hose from the pump.

For Bottom-loading pumps

Drain the fluid in the pump by lifting the bottom inlet check valve from its seat by using a thin wire or Allen wrench.

For Top-loading pumps

Drain the fluid by turning the pump upside-down and allowing fluid to flow from the air inlet fitting.

Caution:
Wear gloves and catch the draining fluid in a sump or bucket.

Removing Pump Casing

Follow these instructions for removing the pump casing:

Caution:
When assembling or disassembling the pump, do not rotate the casing. This action may cause the float and control rod to rotate with the casing. Instead of rotating the casing, spin the bottom check valve (or plug on a Top-Loading pump) and hold the casing stationary.

Caution:
After troubleshooting is completed and before assembling the pump, slowly move the float through its range to ensure that the lever will trip, even if the pump fills and empties slowly.

Unscrew the bottom check valve or plug from the discharge tube. **(See Figure 15)**

STEP 1 - Fit a spanner wrench in one of the holes in the circumference of the lower head. The lower head has right-handed threads, so the direction of rotation for disassembly is counterclockwise if looking at the bottom of the pump.

STEP 2 - Hold the top head of the pump by the support rings.

STEP 3 - Insert a large screw driver through one of the support rings and leverage it against the coupling for the discharge tube.

Caution:
Do not press against the air hoses or air hose fittings.

STEP 4 - Turn the plug or check valve.

Caution:
Do not leverage the large screwdriver against the air inlet or air exhaust fittings. This could damage the fittings.

Note:
The O-rings at the top and bottom of the pump may have swollen due to solvents in the fluid being pumped and therefore make turning the plug or check valve difficult.

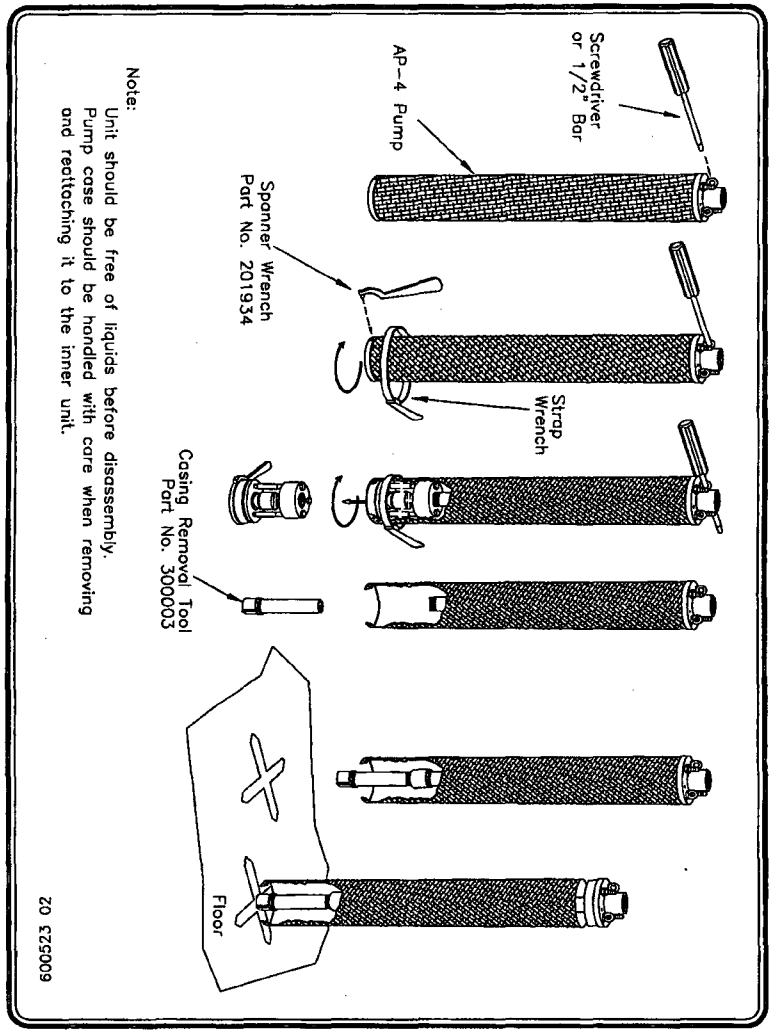


Figure 15 - Removing AP-4 Pump Casing

STEP 5 - If you suspect the pump of being clogged with mud or other particles, prevent the outer casing from turning while the lower plug or check valve is unscrewed.

STEP 6 - Have a second person hold a strap wrench around the pump casing. If there is only one person, hold the upper head in a vise while unscrewing the lower head. This allows a free hand to hold the strap wrench which prevents the pump casing from rotating.

STEP 7 - When the plug or check valve is removed, use a pump casing removal tool to remove the pump casing. The pump casing removal tool is a specially threaded coupling with a pipe extension.

STEP 8 - Thread the coupling onto the bottom of the discharge pipe (onto the same *threads from which the lower head was unscrewed).*

STEP 9 - Hold the pump vertically upright with the pump casing removal tool extending down out of the pump casing.

STEP 10 - Hold the pump casing and striking the pump casing removal tool on the ground. This will cause the pump casing to slide off the upper O-ring and will allow it to slide off the pump.

Cleaning Pump Interior

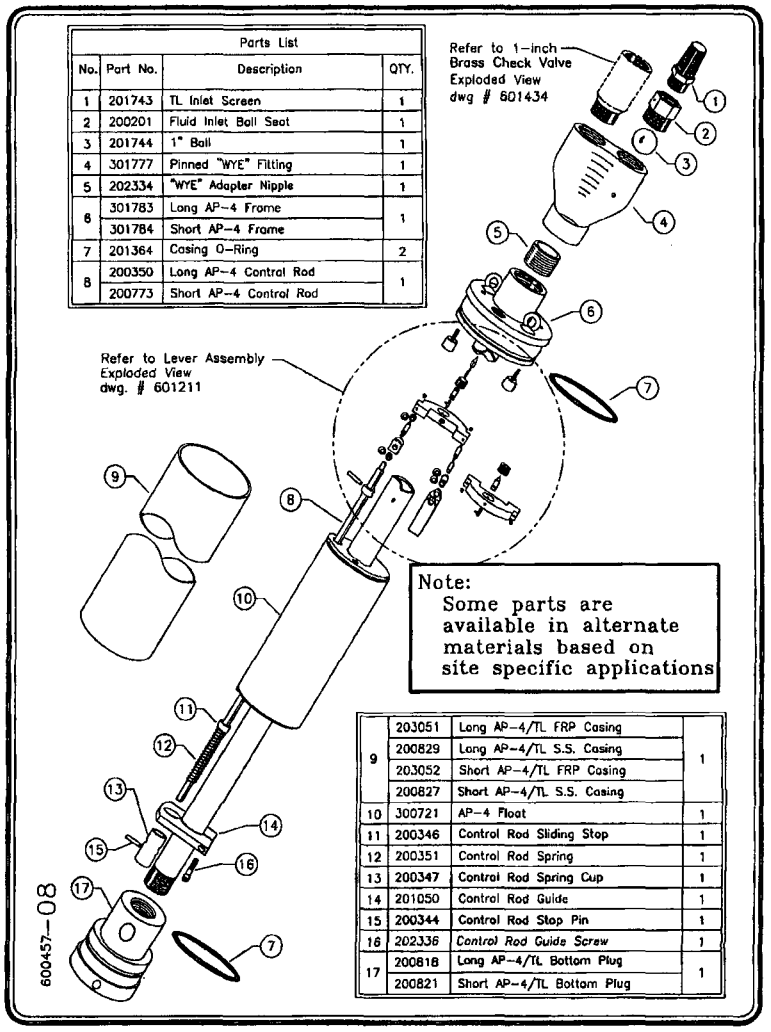
The inner workings of the pump should now be exposed for inspection and cleaning. **(See Figure 16, Figure 17, Figure 18, Figure 19, Figure 20, and Figure 21)**

Note:
A Scotch Brite® abrasive pad is useful for cleaning debris from the pump components.

STEP 1 - Gently brush off built-up solids from the float, the discharge tube, the pump casing and the control rod guide.

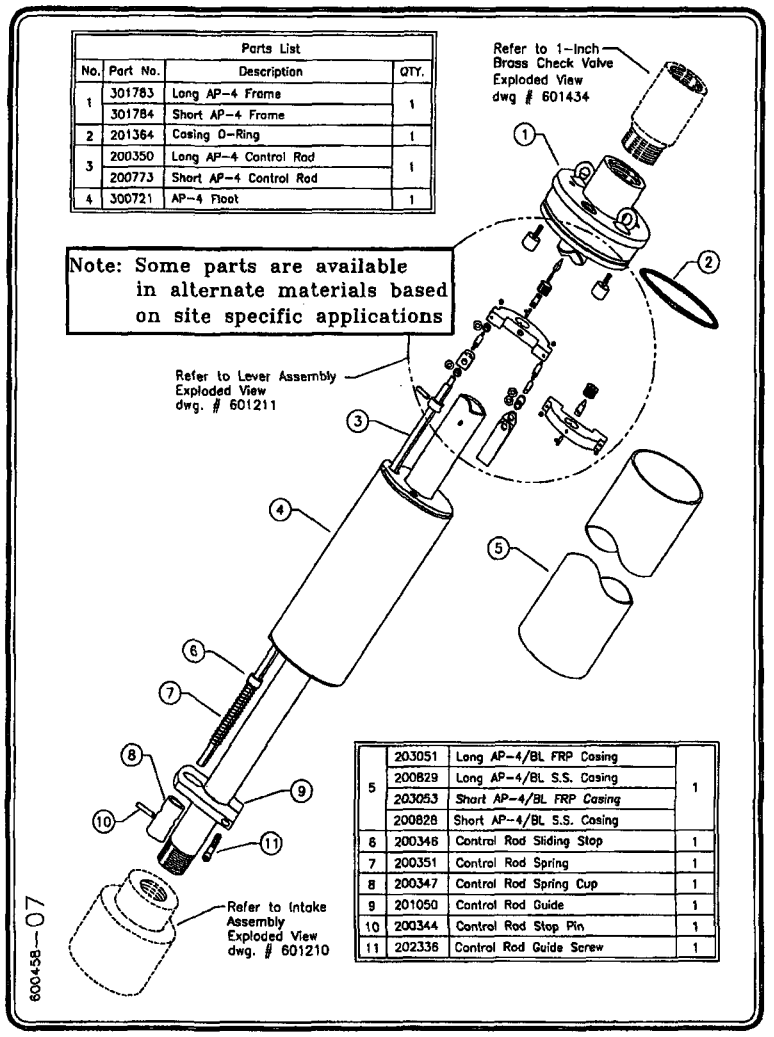
STEP 2 - The pump can be steam cleaned without damage.

STEP 3 - Remove thick deposits of hardened scale on the discharge tube by using a handbrush or by lightly tapping the discharge tube with a small hammer. Be careful not to strike any pins or other components, since they may be damaged.



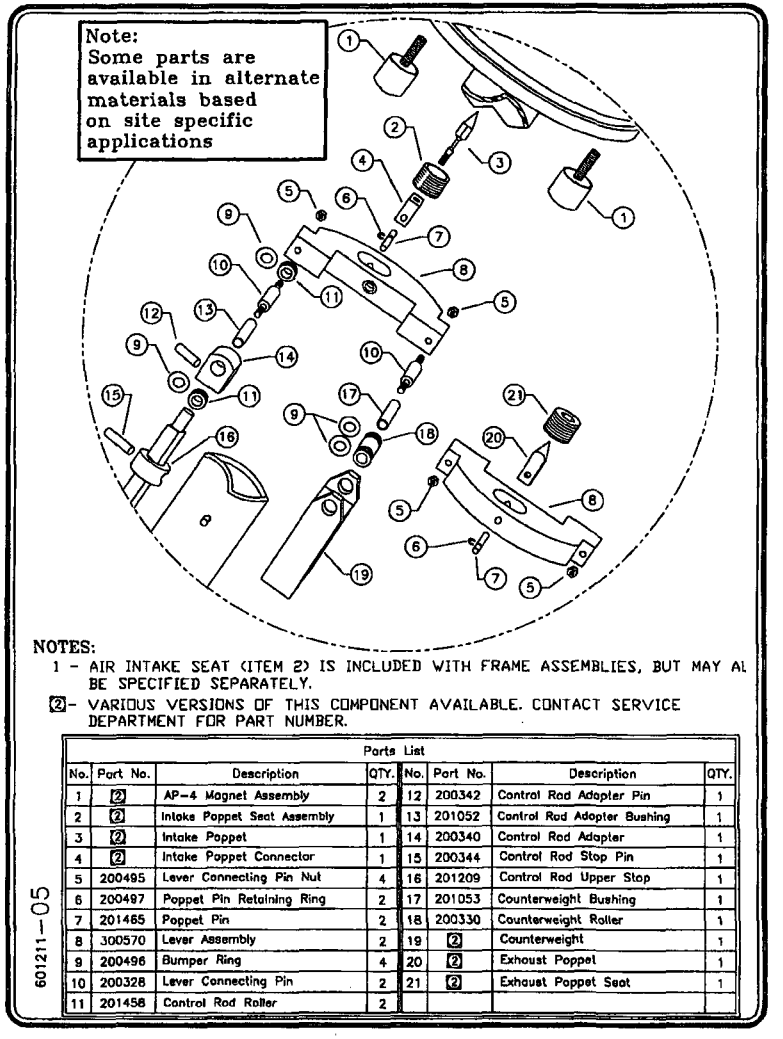
Parts List			
No.	Part No.	Description	QTY.
1	201743	TL Inlet Screen	1
2	200201	Fluid Inlet Ball Seat	1
3	201744	1" Ball	1
4	301777	Pinned "WYE" Fitting	1
5	202334	"WYE" Adapter Nipple	1
6	301783	Long AP-4 Frame	1
	301784	Short AP-4 Frame	
7	201364	Casing O-Ring	2
8	200350	Long AP-4 Control Rod	1
	200773	Short AP-4 Control Rod	
9	203051	Long AP-4/TL FRP Casing	1
	200829	Long AP-4/TL S.S. Casing	
	203052	Short AP-4/TL FRP Casing	
	200827	Short AP-4/TL S.S. Casing	
10	300721	AP-4 Float	1
11	200346	Control Rod Sliding Stop	1
12	200351	Control Rod Spring	1
13	200347	Control Rod Spring Cup	1
14	201050	Control Rod Guide	1
15	200344	Control Rod Stop Pin	1
16	202336	Control Rod Guide Screw	1
17	200818	Long AP-4/TL Bottom Plug	1
	200821	Short AP-4/TL Bottom Plug	

Figure 16 - Exploded View of a Top-Loading AutoPump AP-4 (Long & Short)



Parts List			
No.	Part No.	Description	QTY.
1	301783	Long AP-4 Frame	1
	301784	Short AP-4 Frame	
2	201364	Casing O-Ring	1
3	200350	Long AP-4 Control Rod	1
	200773	Short AP-4 Control Rod	
4	300721	AP-4 Float	1
5	203051	Long AP-4/BL FRP Casing	1
	200829	Long AP-4/BL S.S. Casing	
	203053	Short AP-4/BL FRP Casing	
	200828	Short AP-4/BL S.S. Casing	
6	200346	Control Rod Sliding Stop	1
7	200351	Control Rod Spring	1
8	200347	Control Rod Spring Cup	1
9	201050	Control Rod Guide	1
10	200344	Control Rod Stop Pin	1
11	202336	Control Rod Guide Screw	1

Figure 17 - Exploded View of a Bottom-Loading AutoPump AP-4 (Long & Short)



NOTES:
1 - AIR INTAKE SEAT (ITEM 2) IS INCLUDED WITH FRAME ASSEMBLIES, BUT MAY AL BE SPECIFIED SEPARATELY.
[2]- VARIOUS VERSIONS OF THIS COMPONENT AVAILABLE. CONTACT SERVICE DEPARTMENT FOR PART NUMBER.

Parts List							
No.	Part No.	Description	QTY.	No.	Part No.	Description	QTY.
1	[2]	AP-4 Magnet Assembly	2	12	200342	Control Rod Adapter Pin	1
2	[2]	Intake Poppet Seat Assembly	1	13	201052	Control Rod Adapter Bushing	1
3	[2]	Intake Poppet	1	14	200340	Control Rod Adapter	1
4	[2]	Intake Poppet Connector	1	15	200344	Control Rod Stop Pin	1
5	200495	Lever Connecting Pin Nut	4	16	201209	Control Rod Upper Stop	1
6	200497	Poppet Pin Retaining Ring	2	17	201053	Counterweight Bushing	1
7	201465	Poppet Pin	2	18	200330	Counterweight Roller	1
8	300570	Lever Assembly	2	19	[2]	Counterweight	1
9	200496	Bumper Ring	4	20	[2]	Exhaust Poppet	1
10	200328	Lever Connecting Pin	2	21	[2]	Exhaust Poppet Seat	1
11	201458	Control Rod Roller	2				

Figure 18 - Exploded View of AP-4 Lever Assembly

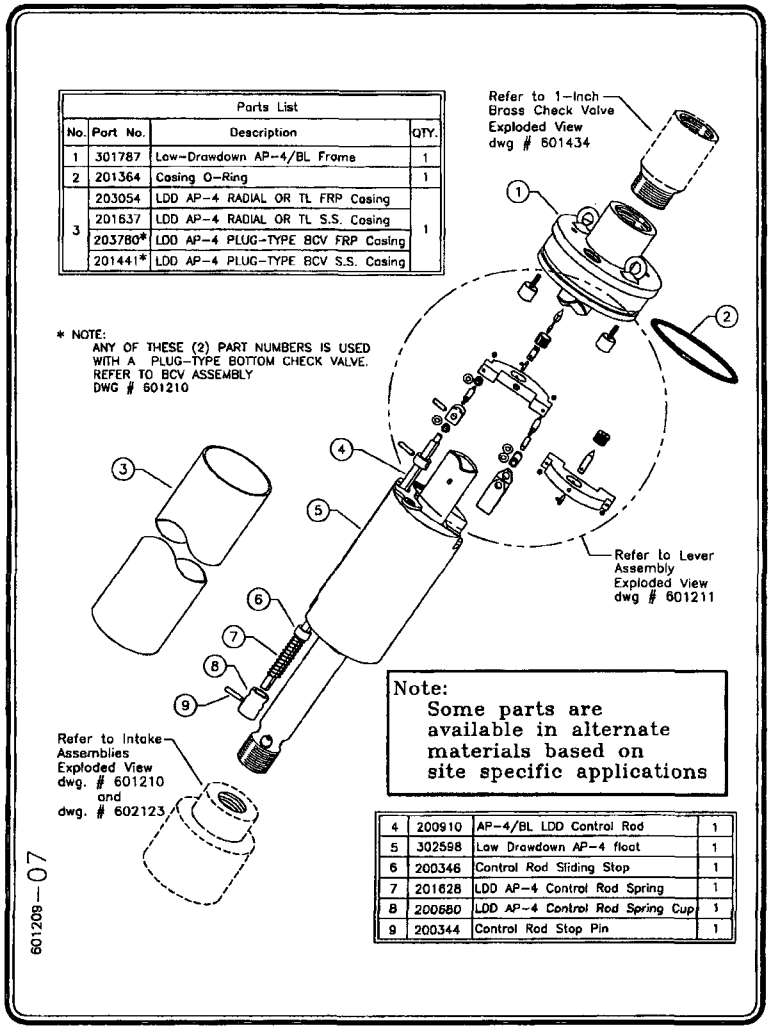


Figure 19 - Exploded View of LDD Bottom-Loading AutoPump AP-4

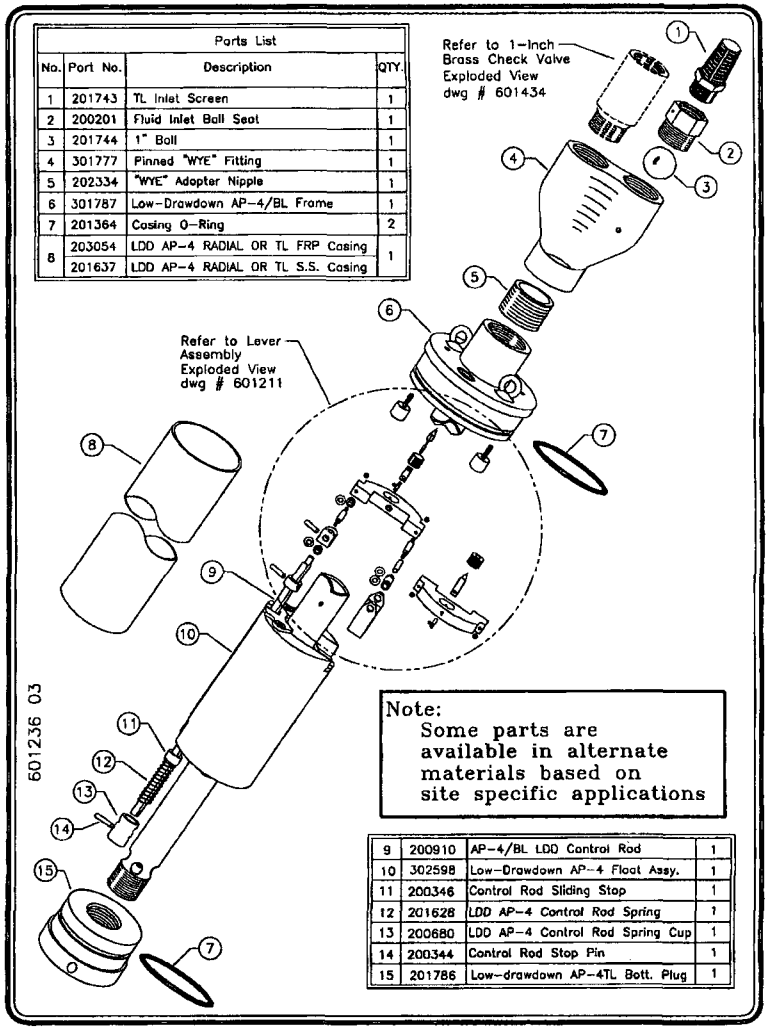
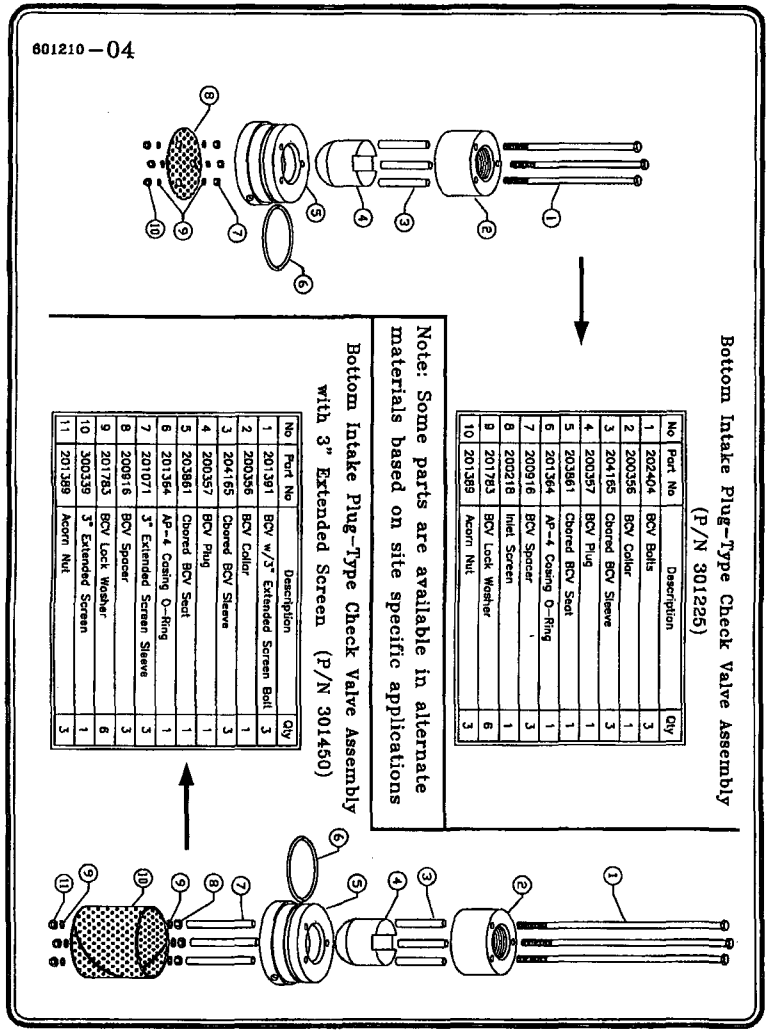


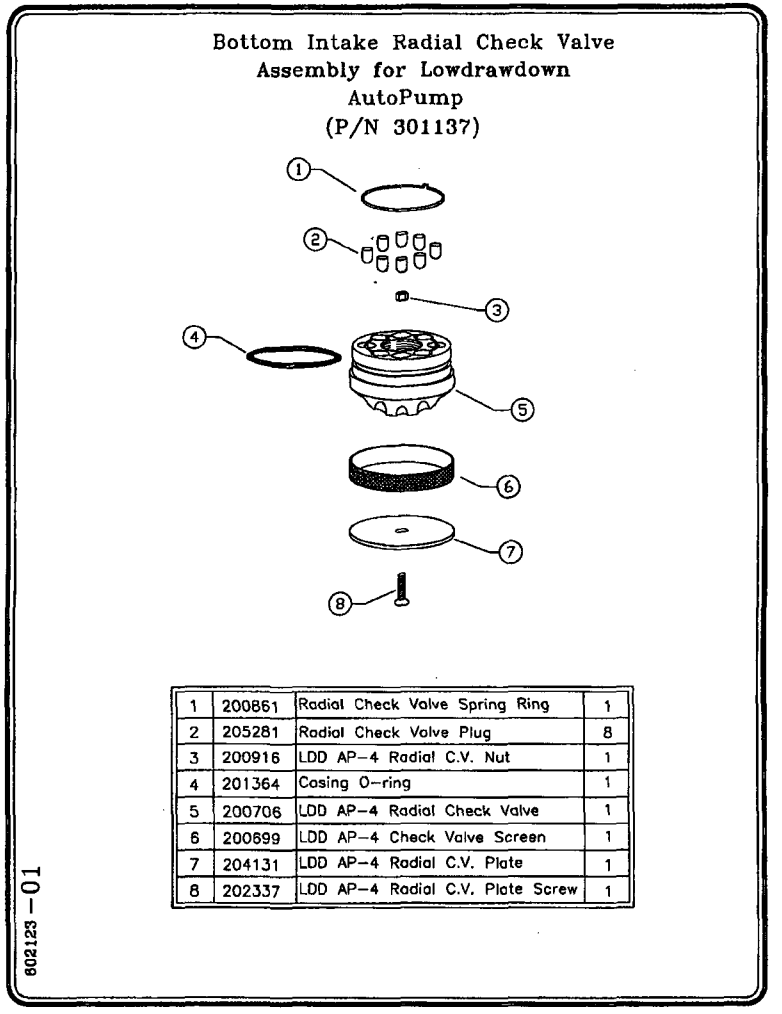
Figure 20 - Exploded View of LDD Top-Loading AutoPump AP-4



No	Part No	Description	Qty
1	202404	BCV Bolts	3
2	200356	BCV Collar	1
3	204165	Chored BCV Sleeve	3
4	200357	BCV Plug	1
5	203861	Chored BCV Seat	1
6	201364	AP-4 Casing O-Ring	1
7	200916	BCV Spacer	3
8	200218	Inlet Screen	1
9	201783	BCV Lock Washer	6
10	201389	Acorn Nut	3

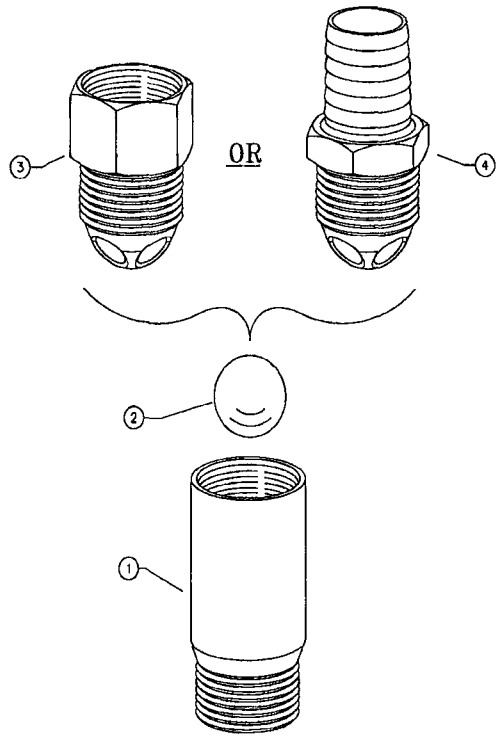
No	Part No	Description	Qty
1	201391	BCV w/3" Extended Screen Bolt	3
2	200356	BCV Collar	1
3	204165	Chored BCV Sleeve	3
4	200357	BCV Plug	1
5	203861	Chored BCV Seat	1
6	201364	AP-4 Casing O-Ring	1
7	201071	3" Extended Screen Sleeve	3
8	200916	BCV Spacer	3
9	201783	BCV Lock Washer	6
10	300339	3" Extended Screen	1
11	201389	Acorn Nut	3

Figure 21 - Bottom Intake Plug-Type Check Valve Assembly



1	200861	Radial Check Valve Spring Ring	1
2	205281	Radial Check Valve Plug	8
3	200916	LDD AP-4 Radial C.V. Nut	1
4	201364	Casing O-ring	1
5	200706	LDD AP-4 Radial Check Valve	1
6	200699	LDD AP-4 Check Valve Screen	1
7	204131	LDD AP-4 Radial C.V. Plate	1
8	202337	LDD AP-4 Radial C.V. Plate Screw	1

Figure 22 - Exploded View of Bottom Intake Radial Check Valve for Low-Drawdown Pump



No.	Part No.	Description	QTY.
1	205599	Check Valve Housing, Brass	1
2	201852	7/8" Ball	1
3	205597	Adapter 1" FPT X 1" MPT, Brass	1
4		*Specify= Hose or Tubing and Size*	1

601434 – 03

Figure 23 - Exploded View of 1-Inch Brass Check Valve

Iron Build-up Cleaning Procedure

After the casing has been removed from the AutoPump please follow the procedure below:

Note:
The procedure described below can be seen in the Maintenance Video Tape. This will aid the technicians understanding and ease of properly disassembling the AutoPump, effectively cleaning components and then re-assembling the AutoPump.

STEP 1 - The bottom intake check valve assembly should be removed from the casing. **(See page 49, and Figure 15 on page 50)**

STEP 2 - Visually inspect both the 1 inch stainless steel fluid discharge pipe for iron build-up or debris. Also, do the same with the float that rides up and down on the SS discharge pipe.

STEP 3 - Should there be iron deposits on either or both the discharge pipe or float, then remove the float from the SS fluid discharge pipe as follows:

- Remove the control rod guide. **(See Figure 16 and Figure 17)**
- Remove the small SS pin from the bottom spring cup "Stop". The Stop is the small white part located just below the Spring identified on **Figure 16 and Figure 17**. The pin and Stop removal will allow you to remove the spring and float from the SS discharge pipe.

STEP 4 - The 1 inch stainless steel fluid discharge pipe can now be cleaned using *either a Scotch Brite pad, a wire brush or finally a wire wheel on either* a drill or a grinding machine. After removing the iron debris, it is recommended the pipe be water rinsed.

STEP 5 - Usually the AP-4 float will be one of two types. Most floats have a metal plate on each end. The second type of float has round pins protruding into its center hole, and it does not have metal plates.

Both the internal and external surfaces of the float will generally require cleaning. The material choices include a Scotch Brite pad, and a light grade 150 sandpaper.

For floats with plates: If these plates are removed to ease cleaning, they should be replaced on the same float end from which they came. That is, the plates should maintain their original top and bottom positions.

For floats without plates: A knife may be used to aid in cleaning this float.

STEP 6 - The white plastic square Control Rod is the next component to be cleaned. The control rod is the item that fits through the smaller hole in the float and is adjacent to the SS discharge pipe in the assembled pump. Again, use the Scotch Brite pad or a razor or Exacto knife (not sandpaper).

STEP 7 - The final component to be cleaned is the outer AutoPump casing. Please note you may either have a stainless steel or FRP fiberglass pump casing. The fastest and most effective way to clean out the inside surface of the pump casing is to use a three-stone honing tool. The technique is to move the hone in-and-out a half dozen times or so through each end of the casing. The time for the casing cleaning should take no longer than 5 minutes.

The AutoPump is now ready for re-assembly by following the steps above in reverse order.

Installing Pump Casing

STEP 1 - Inspect the O-rings to ensure they are capable of sealing (no discernible cuts or abrasions).

STEP 2 - Lubricate both inside ends of the casing to a depth of 3/4" with a thin layer of food-grade grease. Ensure that the film reaches the edges of the casing.

STEP 3 - Place the bottom check valve (Bottom Loading Pump) or bottom plug (Top Loading Pump) upright on a clean level surface.

STEP 4 - Pull the casing down over the check valve or plug.

Warning:
The pump casing has beveled ends that allow it to slide over the O-rings easily. Keep fingers, hands and other body parts away from these edges as they approach the heads. These edges can pinch when the pump casing is slid over the lower and upper heads.

STEP 5 - Turn the pump upside down and spin the casing assembly on the discharge tube by hand until the edge of the casing contacts the O-ring on the pump head.

Caution:
Be careful to swing the counterweight inside the pump.

STEP 6 - Using a spanner wrench on the bottom fitting, or, a strap wrench on the bottom end of the casing (pump bottom), turn the parts together until the casing just contacts the pump head.

STEP 7 - Turn the bottom check valve or the plug in the reverse direction (counter clockwise) so it is looser by 1/4 turn.

Checking Volumes Pumped Per Cycle

See page 20 for information on the AutoPump volumes pumped per cycle. Ensure that volumes correspond with the previous experience on-site, and with the ranges indicated on page 23. If it doesn't correspond, then one of the following may exist:

1. The AutoPump is malfunctioning. **(See Chapter 7: Troubleshooting & Repair)**
2. The Pump Cycle Counter may not be counting correctly. Refer to the **Pump Cycle Counter Manual** for troubleshooting procedures.
3. Site conditions (e.g. air pressure, discharge head) may have changed substantially.

Chapter 7: Troubleshooting & Repairs

Problems may occur and usually can be easily resolved by following these instructions. If, after careful reading and service, you cannot resolve the problem, please contact the *QED Environmental Systems (QED)* Service Department at (800) 537-1767.

Caution:
Wear goggles, gloves, and coveralls when servicing this system.
After troubleshooting is completed and before assembling the pump, slowly move the float through its range to ensure that the lever will trip even if the pump fills and empties slowly.

Note:
See Chapter 6: Maintenance for disassembly and cleaning instructions.

Possible Causes	Symptoms		
Detailed Instructions Follow this Chart	Pump not cycling	Pump Cycles, but volume is reduced or there is no discharge	Air in fluid discharge
1. Air supply	X		X
2. Fluid level	X		
3. Air exhaust restricted	X		X
4. Fluid inlet clogged	X		
5. Debris, scale or very viscous fluid	X	X	X
6. Float pins	X		X
7. Lever pivot wear	X		X
8. Debris in air inlet valve	X		
9. Fluid check valve		X	
10. Valve timing	X		

Troubleshooting

1. Air Supply:

- If the air pressure is too low, or if the flow is severely restricted, the pump will not cycle. Check the flow by inserting the pump air fitting part way into the air line socket. A healthy discharge of air should result.
- If the air pressure exceeds the design limitations of the pump, the pump may fail to cycle, or the exhaust valve may have locked up and cause air to enter the fluid discharge.

2. Fluid Level:

- The fluid level must be above the fluid inlet on a Top-Loading pump. On a Bottom-Loading pump, the fluid must be no lower than 9 inches below the head of the pump.

3. Air Exhaust Restricted:

- The exhaust line must not be kinked, plugged, or too small in diameter.
- The air exhaust outlet must be above the fluid level.
- If the air exhausts in the well, the well must be vented to the atmosphere or a functioning vapor recovery line.
- If the air exhausts to the atmosphere (outside the well) and a vacuum is drawn on the well, the pump may fail to fill. In order for the pump to fill under these adverse conditions, the pump must be submerged to make up for the pressure difference between the atmosphere and the partial vacuum in the well.

  The pressure difference, expressed as feet of water column (FT. W. C.), is how far the fluid must be above the pump before it can fill.
- **See Appendix D** if there is a vacuum on the well.
- Ice may be forming on the exhaust valve seat due to the temperature drop that accompanies expansion of compressed air. Restrict the exhaust to lower the expansion rate of the exhaust. Restrict the air inlet hose or lower the pressure to reduce the rate of incoming compressed air. The previous three suggestions may reduce the flow rate from the pump. Submerge the head of the pump, if it is not already submerged. Protect the air lines from low temperatures and freezing by burial or insulation.

4. Fluid Inlet Clogged:

- If the fluid inlet screen is clogged with debris, or if a Bottom-Loading pump is on the bottom of the well, water cannot enter the pump.

5. Debris, Scale, or very Viscous Fluid:

- If debris, scale or a very viscous fluid has accumulated inside the pump, the float may not move freely up and down, or the control rod may not slide easily through the float.
- Clean the float, control rod, and the casing. See **Chapter 6** for cleaning instructions.

6. Float Pins:

- Determine if any part of the float material itself can contact the discharge pipe. Move each end of the float back and forth, sideways, to ensure that the pins prevent float contact. Call *QED* for repair options.

Note:
If viscous materials cause continual problems, contact QED for possible solutions.

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7. Lever Pivot Wear:

- Grasp the center of the lever with thumb and forefinger. Rotate the lever to horizontal.
- Push up and down, toward and away from the head. Confirm that there is less than 1/32 inch of movement.
- Replace the levers if the pivot hole is worn

8. Debris in Air Inlet Valve: (First check #7-Lever Pivot Wear)

- Open the pump. Connect the air supply. Pull the control rod down. Listen to determine if air leaks through. If so, clean the valve by blowing air or water through it from both ends.
- If air still leaks through the valve with the control rod down, the air-hose must be removed to access the valve inlet to check for debris in the valve or in the hose pigtail.
- Push the rod upwards. If little or no air passes through, remove the air-in hose to access the valve inlet. Blow air through the valve from the poppet side to clear debris from the ball and seat.

9. Fluid Check Valves:

- Open the pump. Hold the pump vertically and pour water into the discharge check valve. If water flows through, clean the valve.
- Remove the valve and use emery cloth or a very fine sand paper to polish the surface where the ball seats.
- If the pump is a Bottom-Loading design, inspect the seat of the bottom check valve for debris and wear. Clean or replace if necessary.
- If the pump is a Top-Loading design, remove the fluid inlet check valve and inspect the seating surface and the ball for debris and wear.

10. Air Inlet Valve Timing:

- (First check lever pivot wear per #7)
- Call the QED Service Department for correct air valve timing for your pump.

Returning Equipment for Service

If the equipment needs to be returned to *QED* for servicing, please follow these steps:

STEP 1 - Call the *QED* Service Department and obtain a Return Material Authorization **(RMA)** number. Please have available the customers contact person's name, company name and address, phone number, fax number, reason for the return, and the names of the chemicals to which the equipment has been exposed.

STEP 2 - Clean all equipment before shipping. See **Equipment Cleaning Requirements** at the end of this section.

If the equipment must be cleaned after it arrives at *QED*, the customer will be charged for the cleaning and disposal of material, if necessary. (Cost can be $200.00 per piece of equipment cleaned.) Drain and dry all equipment after cleaning.

STEP 3 - Package the equipment so that it will not be damaged in shipment. Use bubble pack rather than styrofoam flakes as packing material.

STEP 4 - Ship the equipment via a carrier and service level (i.e., one-day, two-day shipping) in consideration of probable service time and return shipment time.

STEP 5 - It is recommended that such shipments be insured so if the shipment is badly damaged or lost, the customer can replace the equipment at little or no cost.

STEP 6 - Include the contact's name, company, phone number and RMA number given by *QED* .

STEP 7 - Write the RMA number on the outside of the packaging so it will be directed immediately to the *QED* Service Department.

Equipment Cleaning Requirements

If the equipment is to be shipped to another site or to the factory for service, it needs to be thoroughly cleaned before leaving the site. Cleaning the equipment protects the user (sender), the shipper, and the receiver from dirt and/or contaminants. If the equipment is not cleaned prior to shipping for servicing, it may be severely delayed, refused or the shipper may be charged a cleaning fee. Before packing and shipping, ensure that the equipment is dry inside and out.

The following is a list of equipment and how it should be cleaned prior to shipment.

Hoses and Fittings

STEP 1 - Pump clean water or water with a gentle soap solution (e.g. Dove Dish Soap) through the pump to remove free product and particles.

STEP 2 - Rinse all soap off of the equipment.

STEP 3 - Soak and rinse the outside of the unit with water to remove loose debris and dirt.

STEP 4 - Steam clean inside and out to remove difficult dirt and contaminants.

Caution:
Use low pressure (less than 40 psi) when steam cleaning.

AutoPumps

STEP 1 - Pump clean water or water with a gentle soap (e.g. Dove Dish Soap) solution through the pump to remove free product and particles.

STEP 2 - Rinse all soap off of the equipment.

STEP 3 - Soak and rinse the outside of the unit with water to remove loose debris and dirt.

STEP 4 - Steam clean inside and out to remove difficult dirt and contaminants.

Caution:
Use low pressure (less than 40 psi) when steam cleaning.

Appendix A: Performance Curves

These curves were derived from in-house tests using a pump with average air flow capacity. Flow rates in the field may vary slightly due to temperature, air quality, flow restrictions and minor differences in pump adjustments. Flow rates can be affected due to the natural cooling effect of compressed air expansion. If this cooling effect is lowering the flow rate, decreasing the air pressure to the pump can actually increase the flow rate in some cases. Another way to reduce freezing of water vapor in compressed air is to use an air dryer on the compressed air line.

The following charts show the performance flow rate curves for Long, Short, and Low-Drawdown

Long Bottom and Top-Loading AP-4 AutoPumps (3.5-inch OD).
- For US units, see Figures 22, 23, 26, and 27.
- For Metric units, see Figures 24, 25, 28, and 29.

Short Bottom and Top-Loading AP-4 AutoPumps (3.5-inch OD).
- For US units, see Figures 30, 31, 34, and 35.
- For Metric units, see Figures 32, 33, 36, and 37.

Low-Drawdown Bottom and Top-Loading AP-4 AutoPumps (3.5-inch OD).
- For US and Metric units, see Figures 38, 39, 40, and 41.

The curves are categorized by pump type, hose size, depth of submergence and air supply pressure. To determine the flow rate a pump will produce, the following information must be known:

1. **Pump** – Long, Short or Low Dardown; Top- or Bottom-Loading.
2. **Discharge hose size** – 3/4-inch or 1-inch is standard. A larger inside diameter may yield a higher flow rate. This depends on site conditions.
3. **Fluid Inlet** Submergence – Select the submergence depth of the pump below the fluid under normal operating conditions.
4. **Air pressure.**

With the previous information, obtain the flow rate by using the following steps:
- On the horizontal scale, find the depth in the well at which the pump will be located.
- Trace that depth upwards to the line for the air inlet pressure you selected.
- Travel horizontally over to the vertical scale and read the flow rate.

Example: A long Bottom-Loading pump with a 1-inch discharge hose and 70 psi supply pressure positioned 100 feet below ground and submerged 6 inches below the fluid will produce about 4.5 gallons per minute (GPM).

The same pump submerged 10 feet below the fluid produces 6 GPM.

Note:
These flow rates are only applicable for the designated well head conditions. Any additional resistance from out-of-well equipment (e.g. surface hoses, valves, etc.) will affect the values shown on these curves.

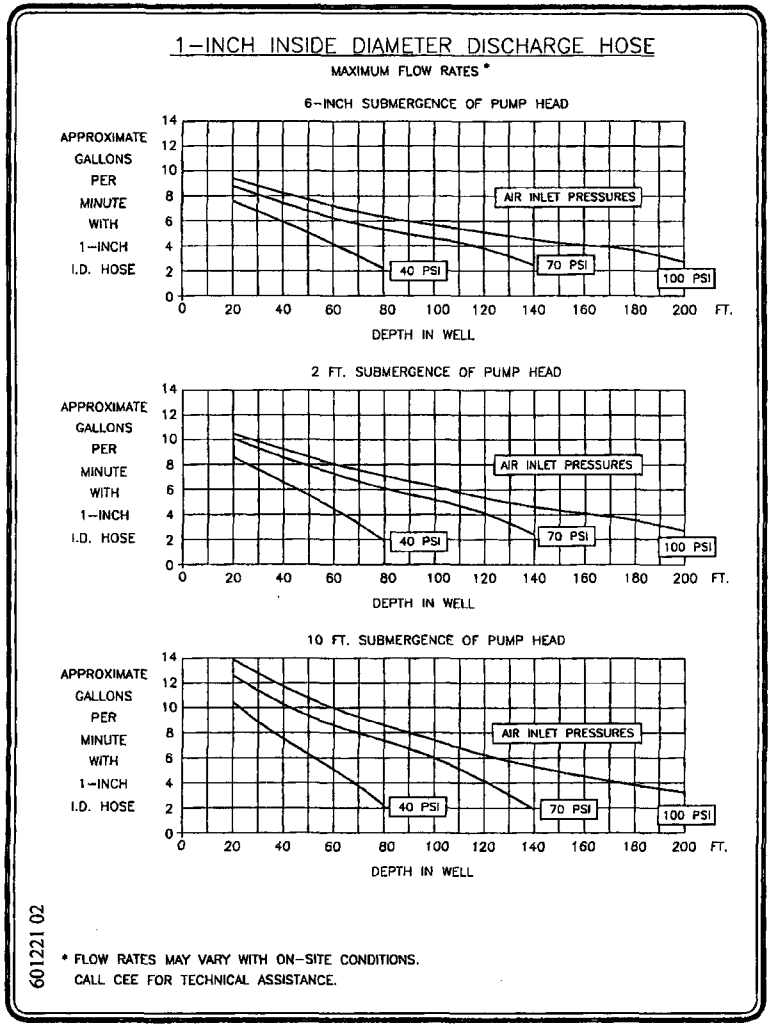


Figure 24 - Long AP-4/BL Performance Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

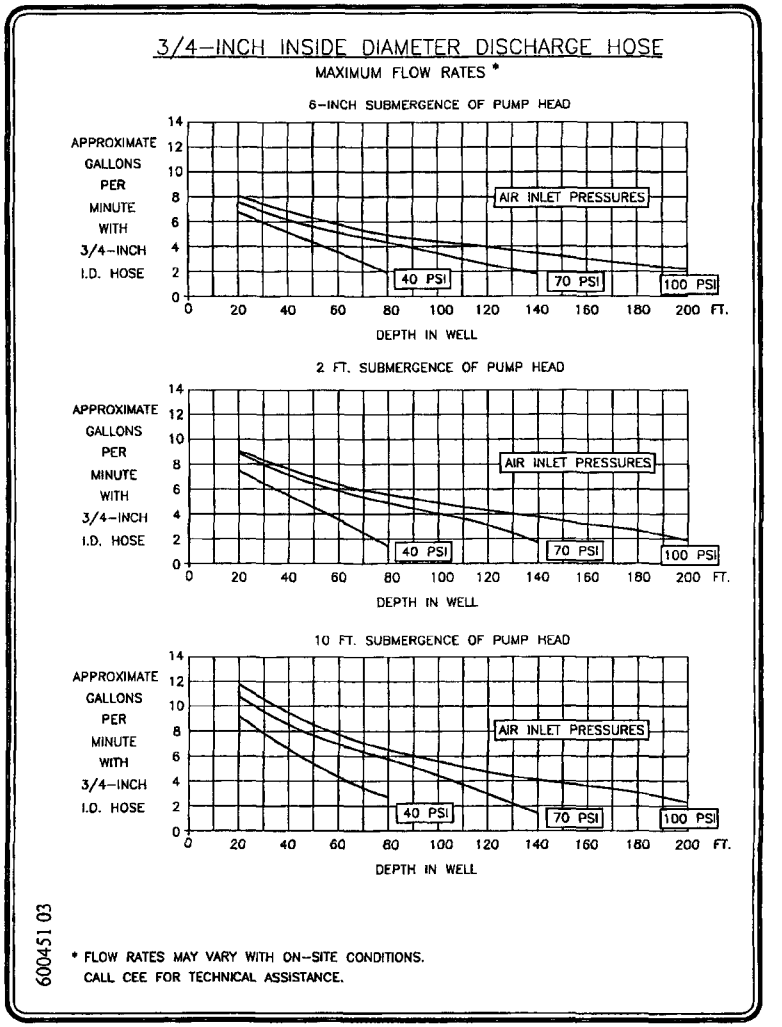


Figure 25 - Long AP-4/BL Performance Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

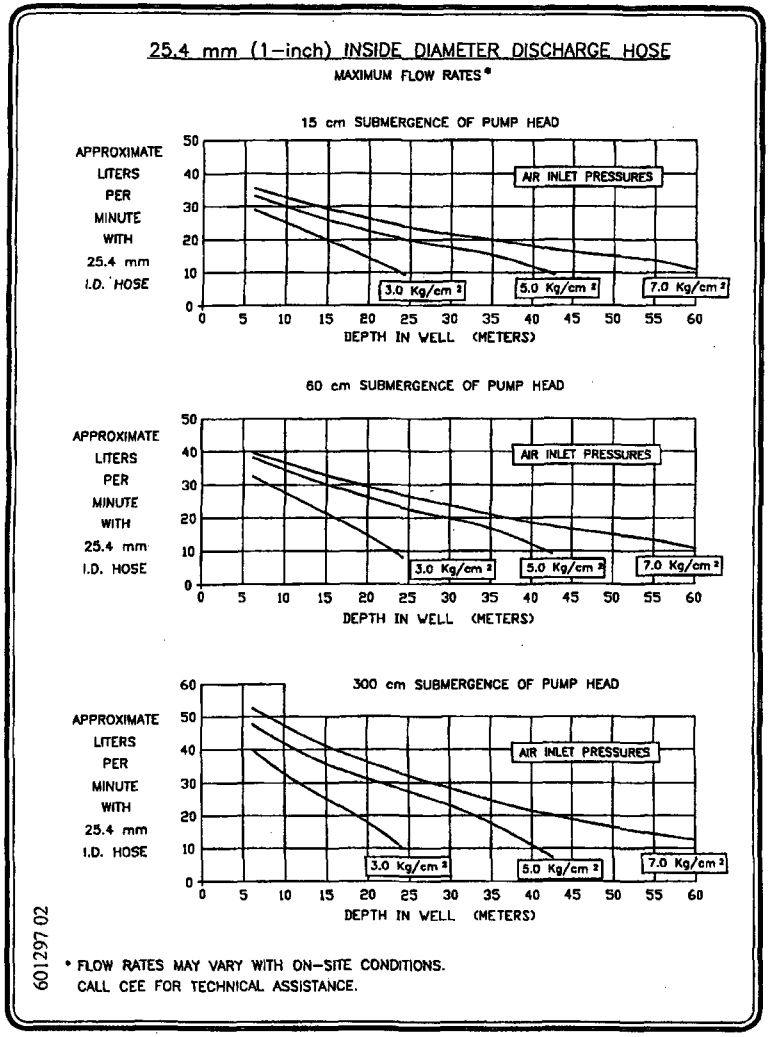


Figure 26 - Long AP-4/BL Performance Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

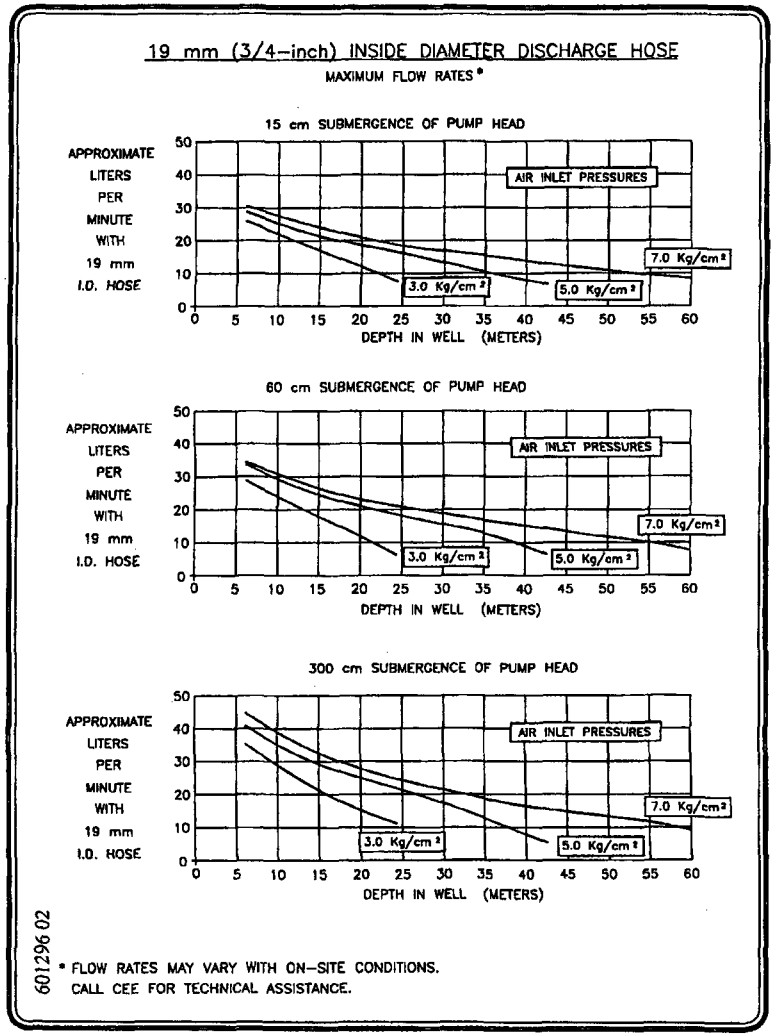


Figure 27 - Long AP-4/BL Performance Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

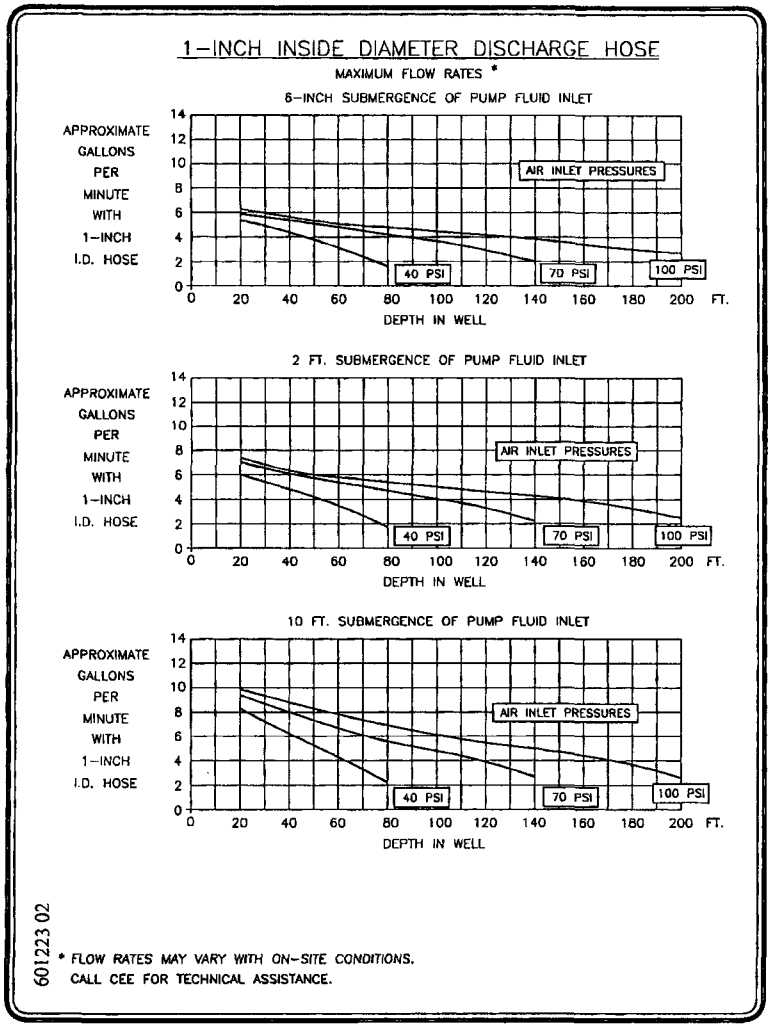


Figure 28 - Long AP-4/TL Performance Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

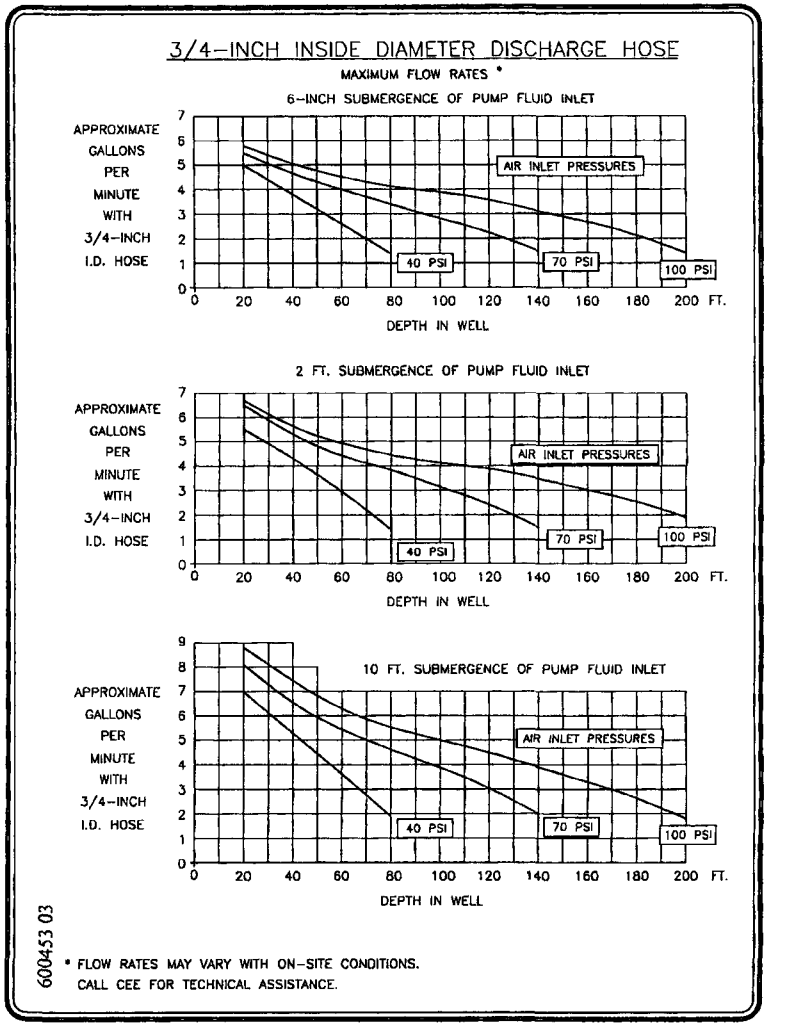


Figure 29 - Long AP-4/TL Performance Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

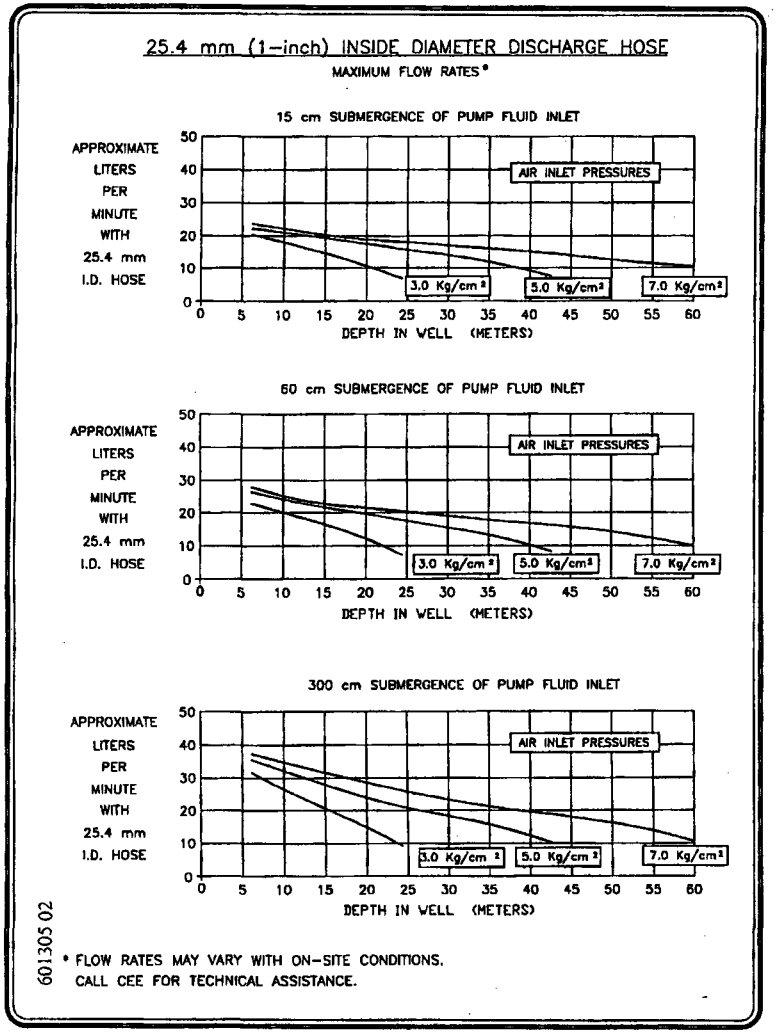


Figure 30 - Long AP-4/TL Performance Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

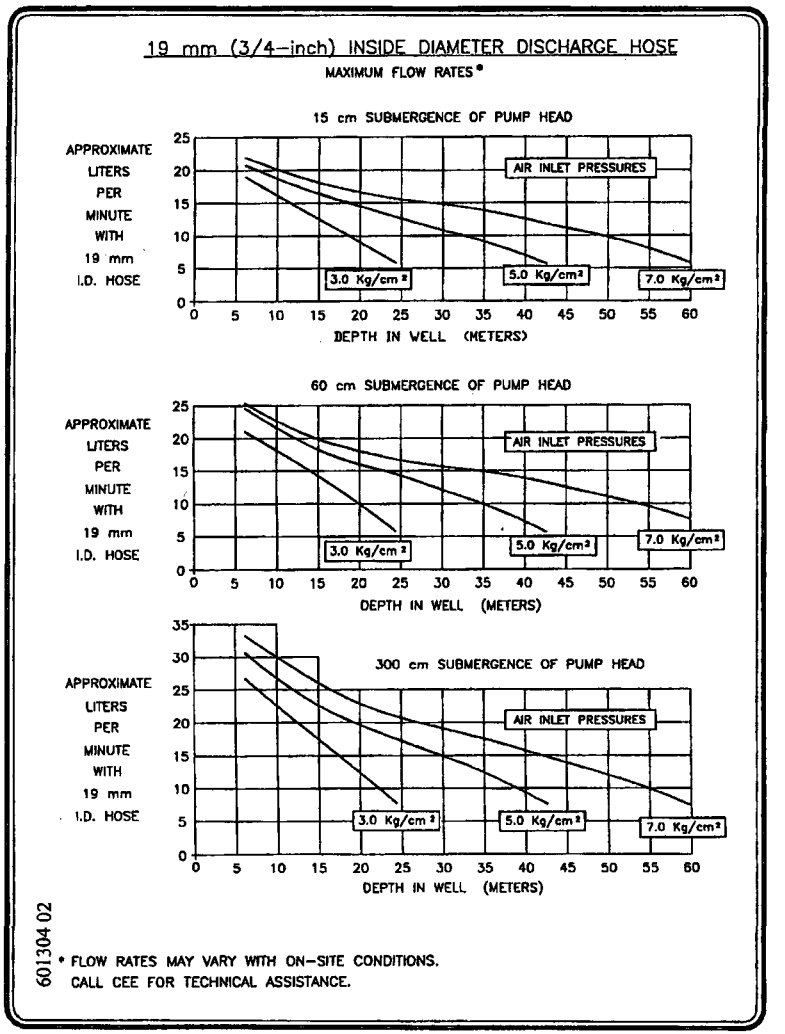


Figure 31 - Long AP-4/TL Performance Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

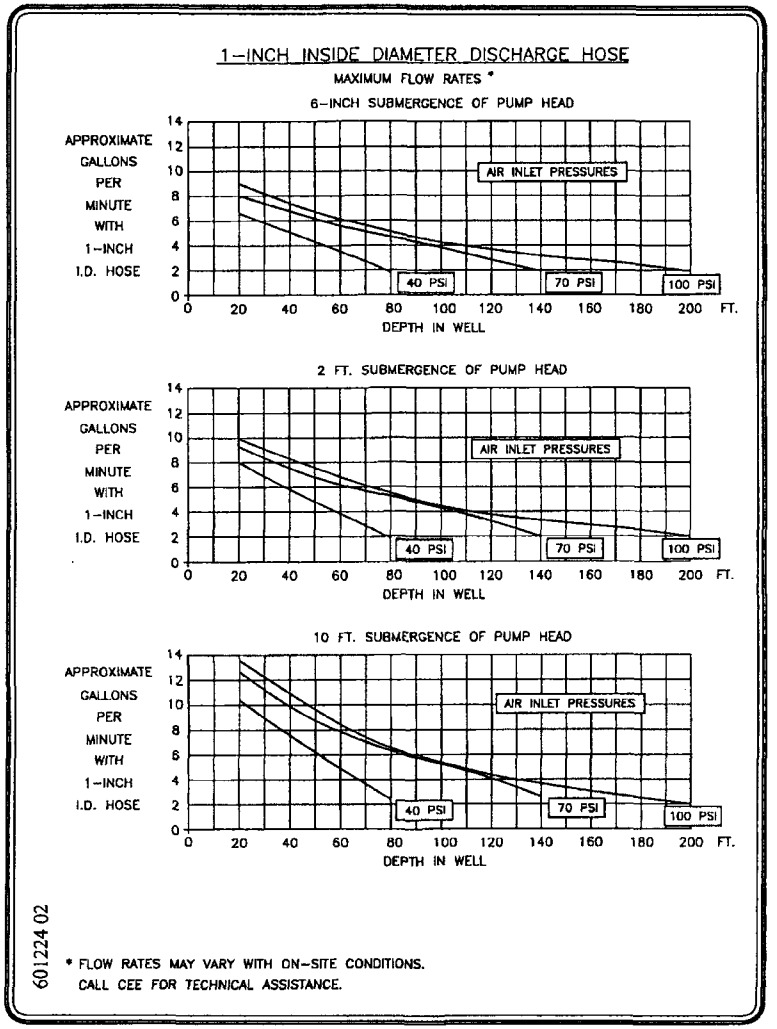


Figure 32 - Short AP-4/BL Performance Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

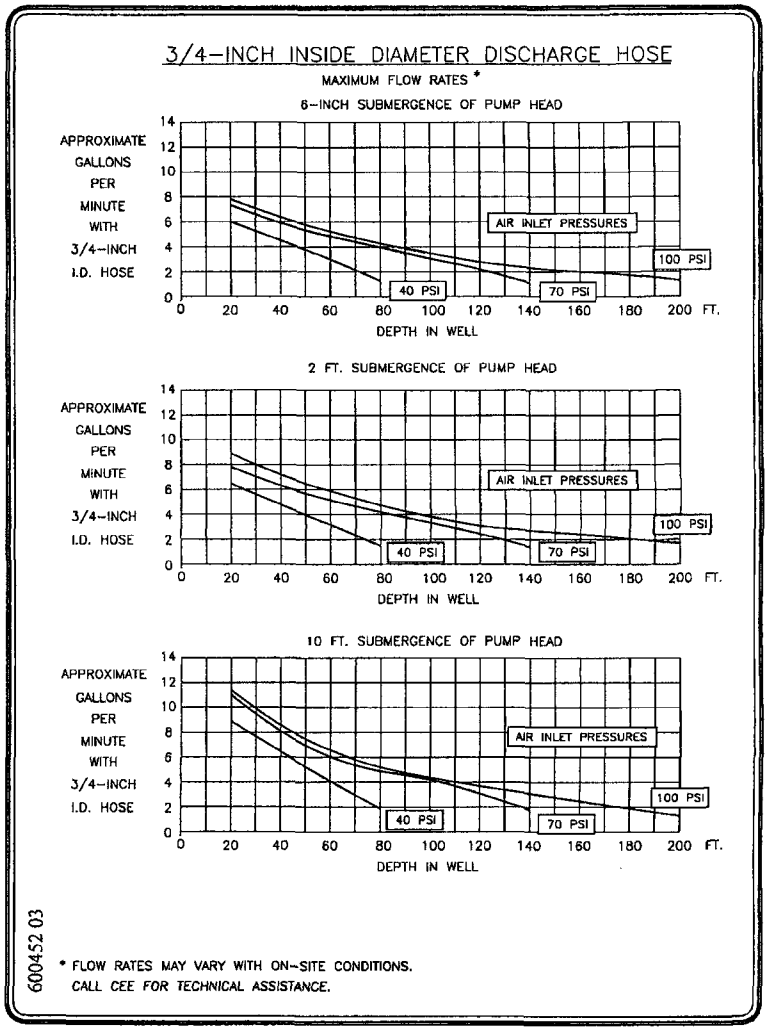


Figure 33 - Short AP-4/BL Performance Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

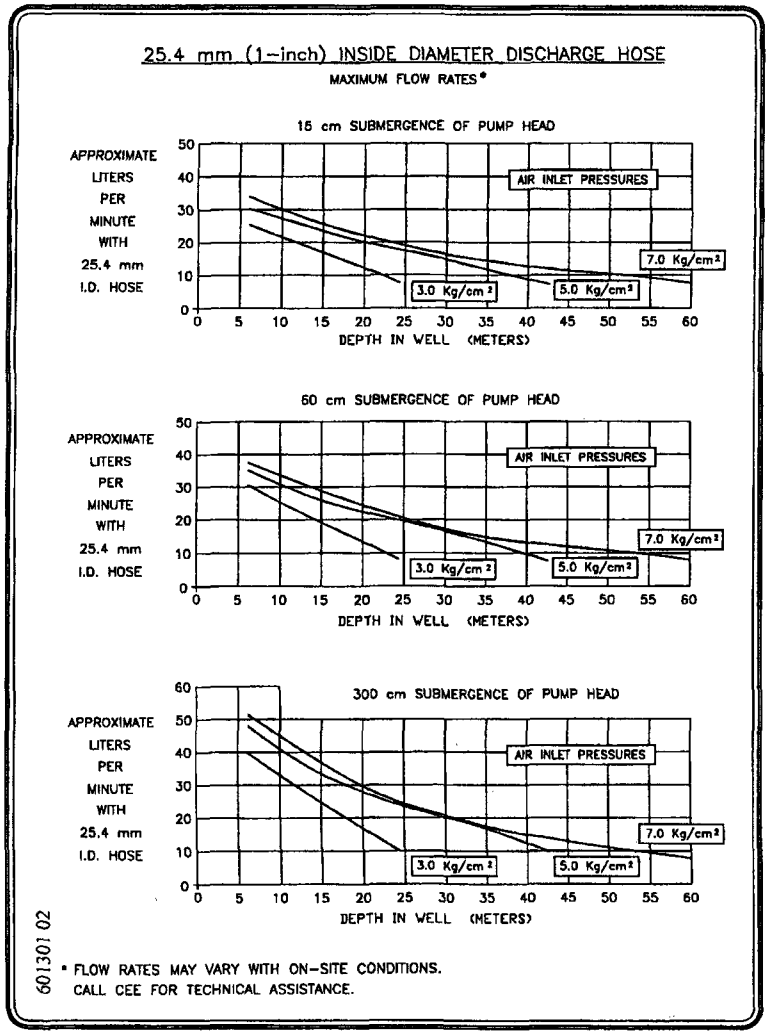


Figure 34 - Short AP-4/BL Performance Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

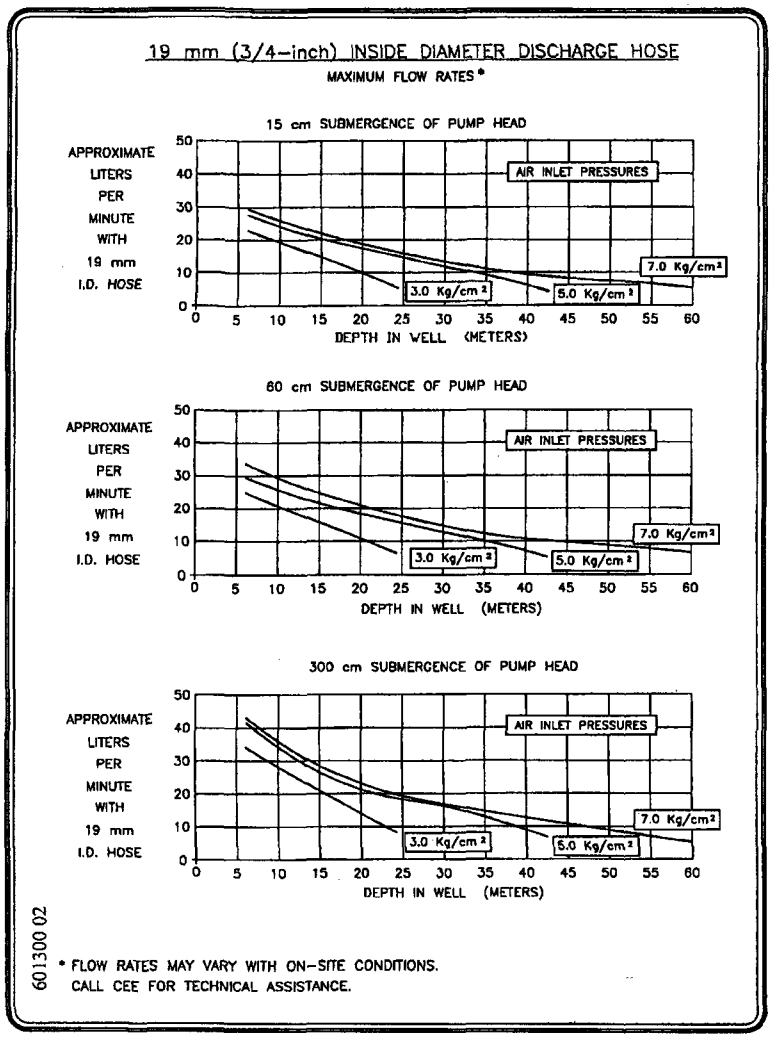


Figure 35 - Short AP-4/BL Performance Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

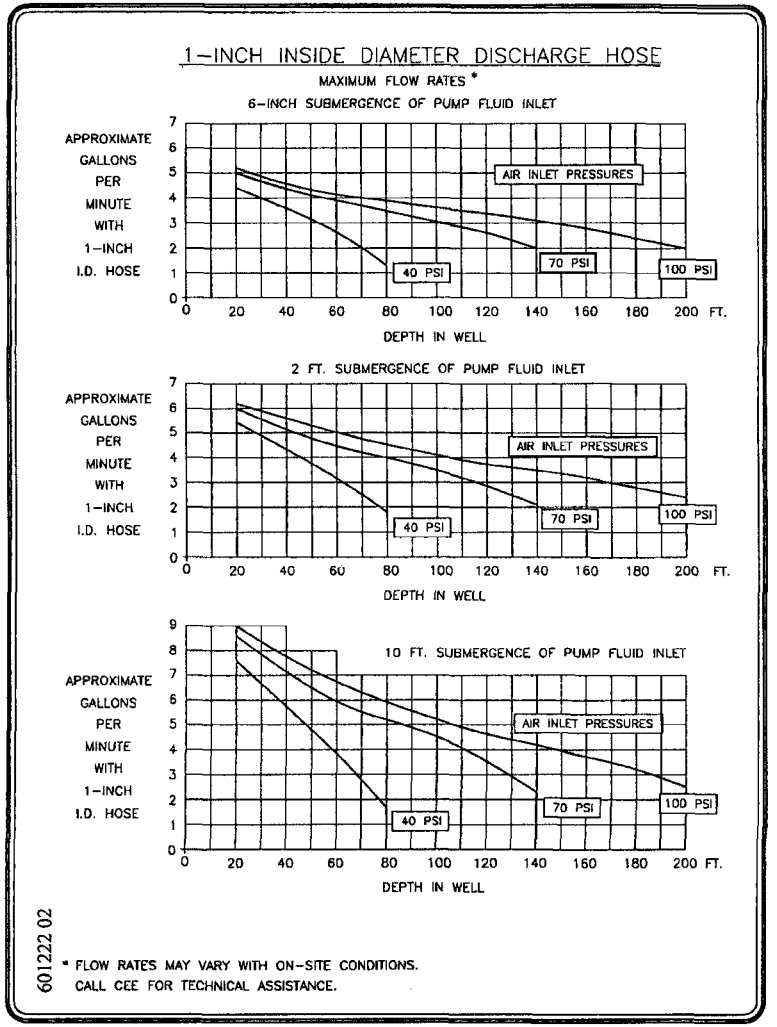


Figure 36 - Short AP-4/TL Performance Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

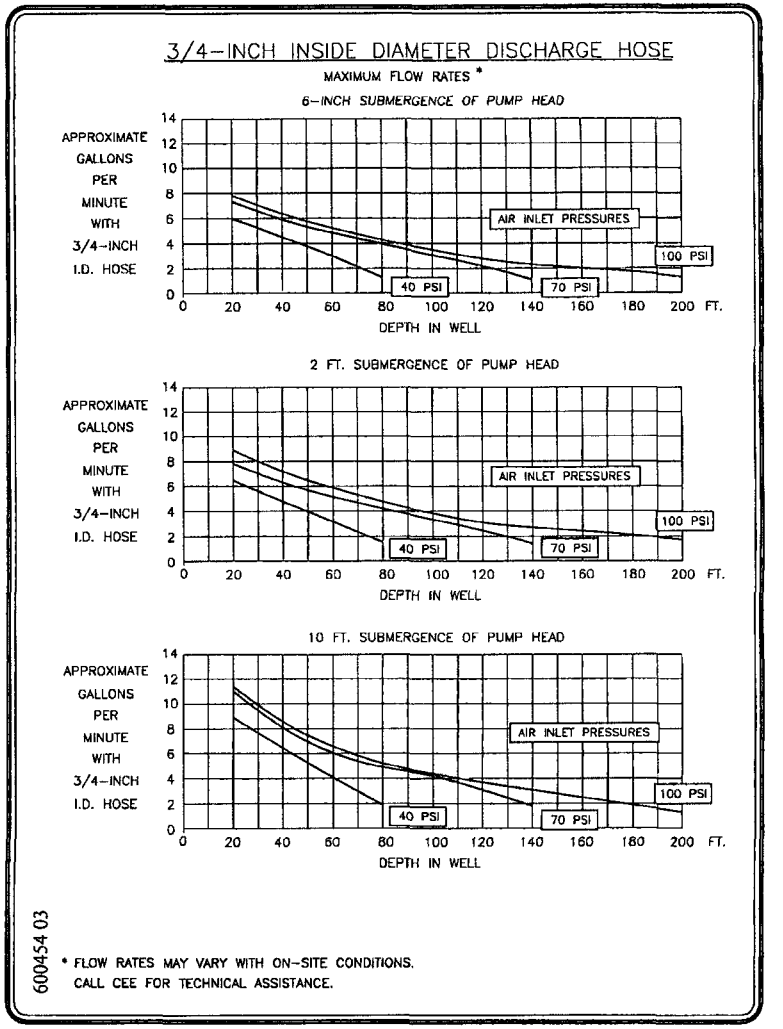


Figure 37 - Short AP-4/TL Performance Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

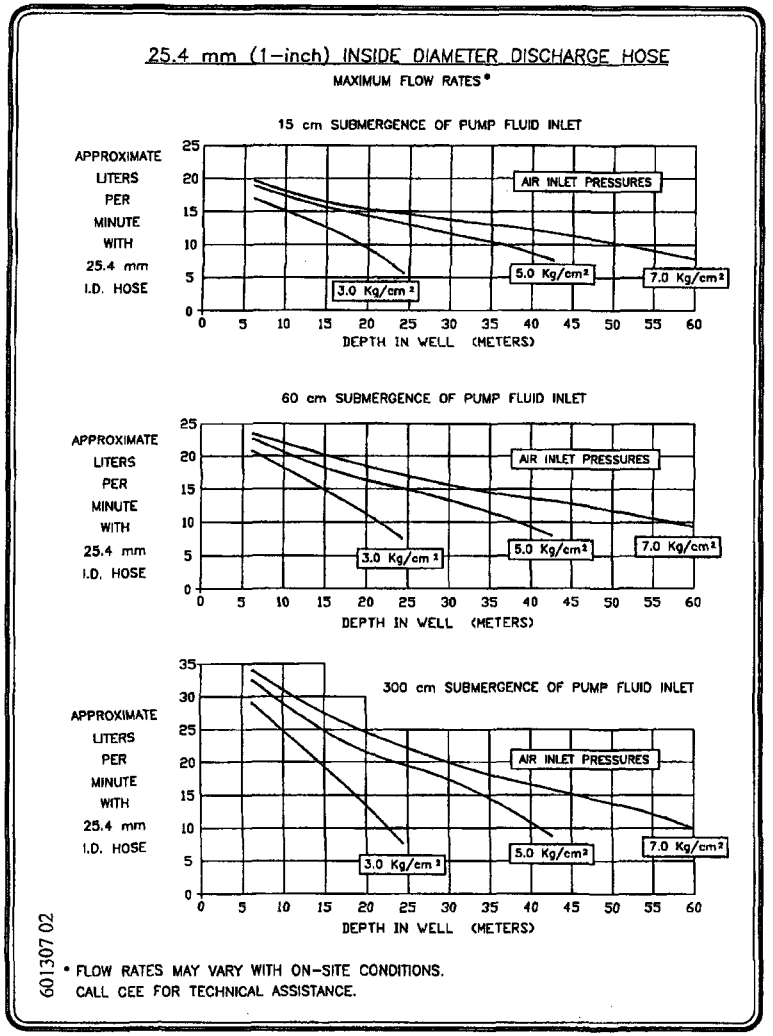


Figure 38 - Short AP-4/TL Performance Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

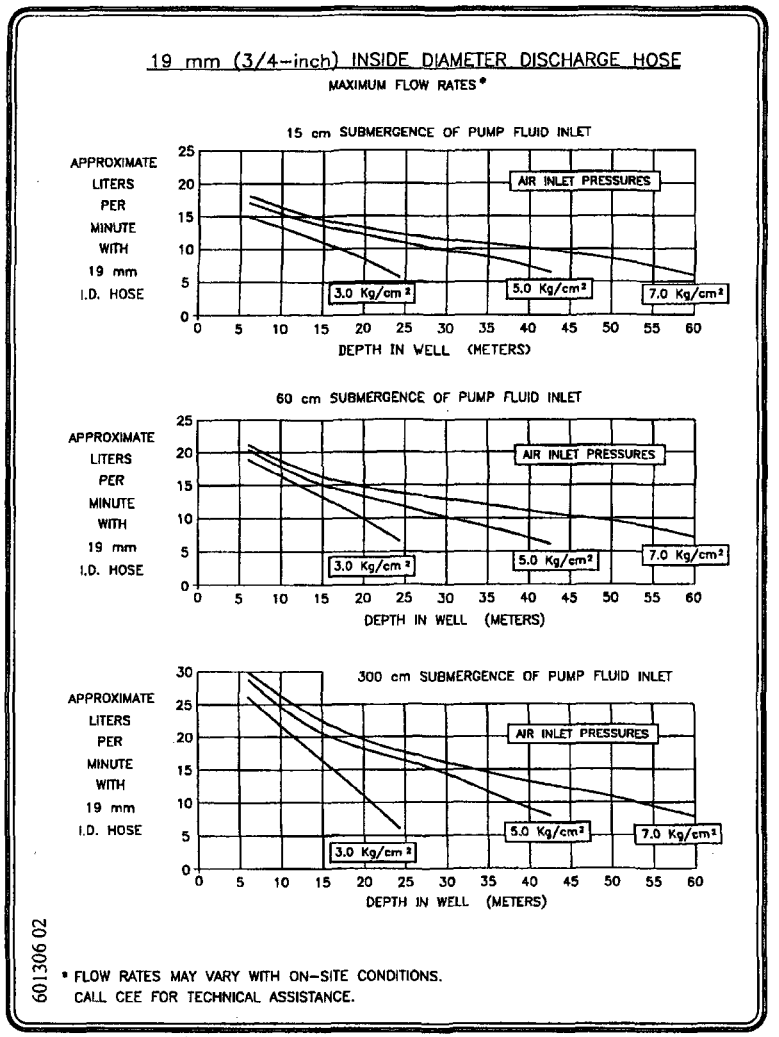


Figure 39 - Short AP-4/TL Performance Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

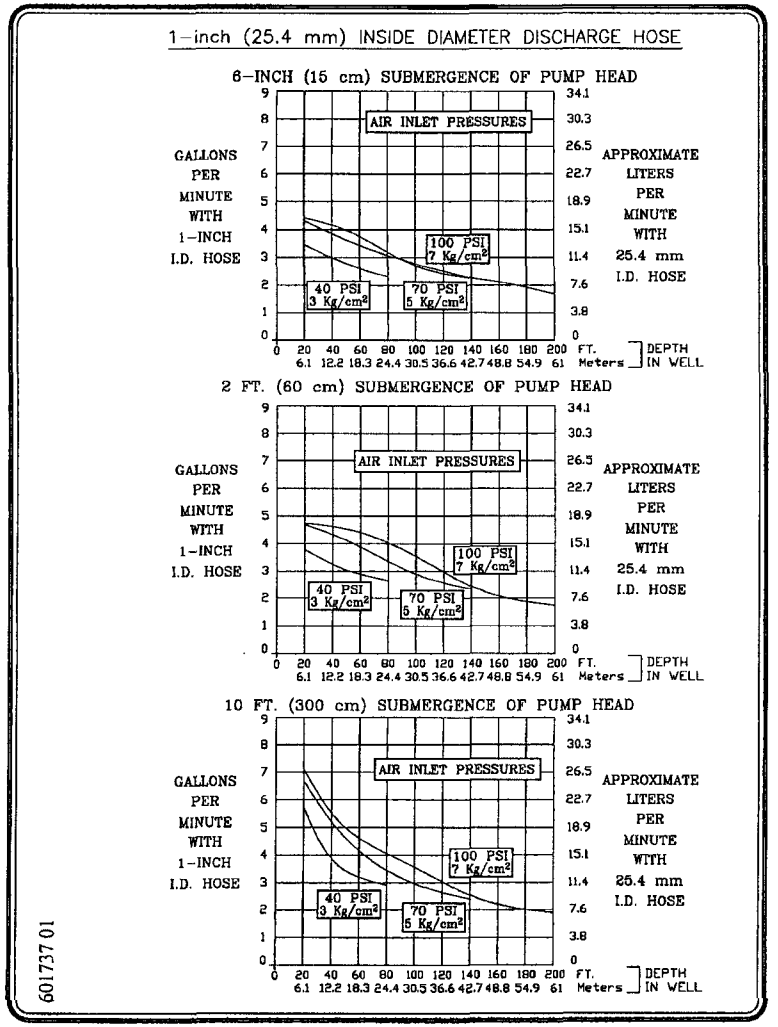


Figure 40 - Low Drawdown AP-4/BL Performance Curves: 1-inch (25.4 mm) I.D. Discharge US and METRIC UNITS

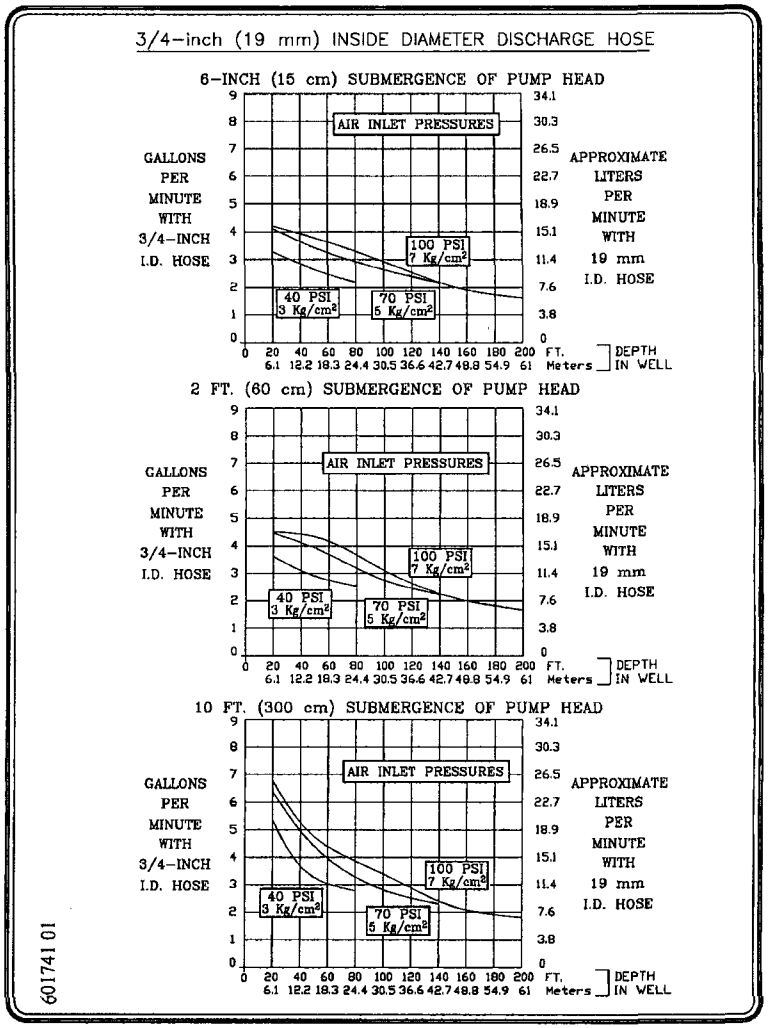


Figure 41 - Low Drawdown AP-4/BL Performance Curves: 3/4-inch (19 mm) I.D. Discharge US and METRIC UNITS

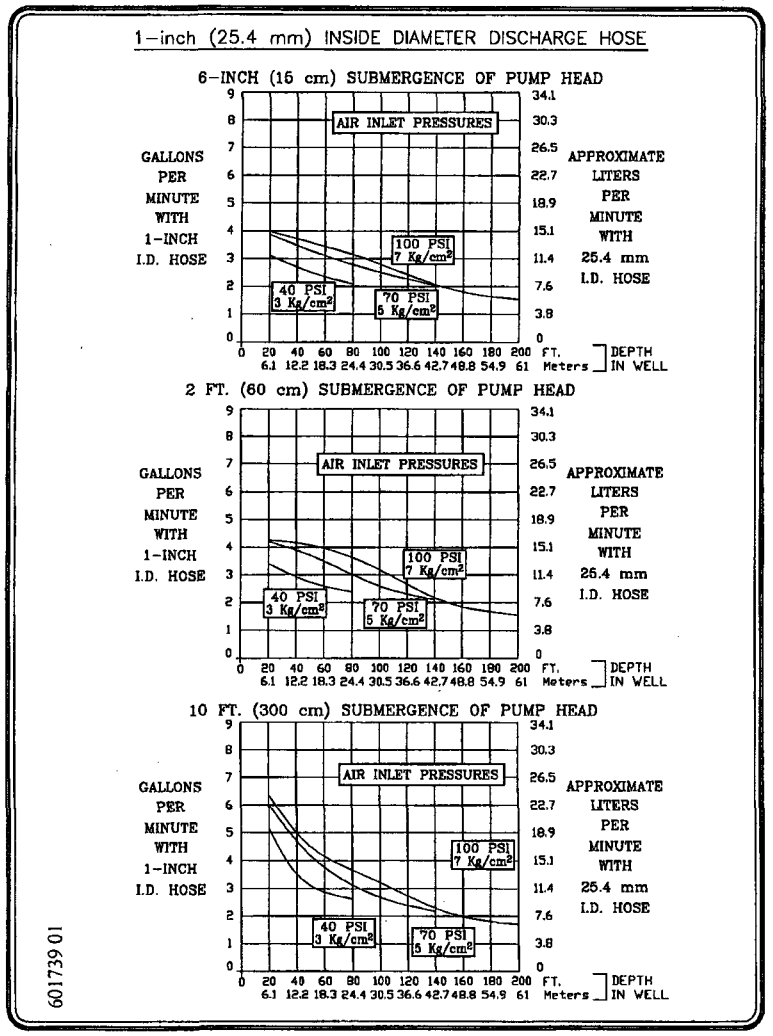


Figure 42 - Low Drawdown AP-4/TL Performance Curves: 1-inch (25.4 mm) I.D. Discharge US and METRIC UNITS

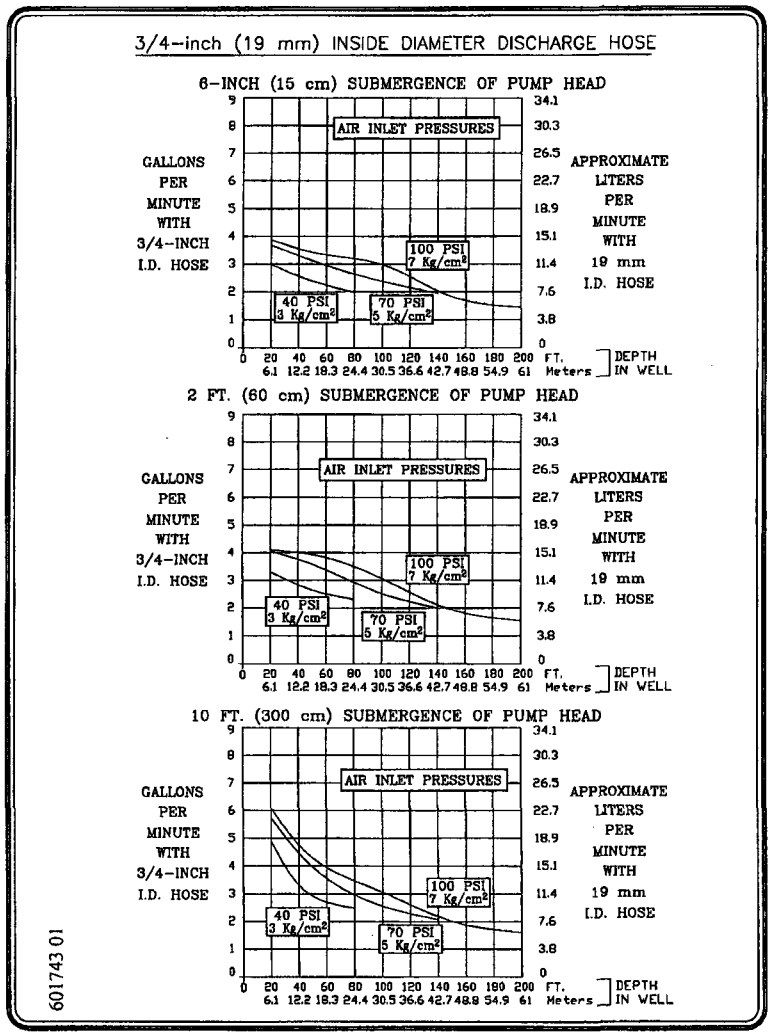


Figure 43 - Low Drawdown AP-4/TL Performance Curves: 3/4-inch (19 mm) I.D. Discharge US and METRIC UNITS

Appendix B: Air Consumption Curves

The following charts show the air consumption curves for the Long, Short, and Low-Drawdown length 3.5-inch OD AutoPumps. These curves can be used to estimate air use and compressor sizing. A compressor with reserve capacity is recommended.
(For U.S. UNITS, See Figures 42, 43, 46, 47, 50, 51, 52 and 53)
(For METRIC unit measurements, See Figures 44, 45, 48, 49, 50, 51, 52 and 53)

The curves are categorized by pump length, hose size, depth of submergence and air supply pressure. To determine the amount of air used for each gallon of fluid pumped, the following information must be known:

1. **Pump** – Long, Short, or Low Drawdown.
2. **Discharge hose size** – 3/4-inch or 1-inch is standard. A larger diameter may yield slightly lower use rates depending upon site conditions.
3. **Air pressure**.

With the above information, obtain the probable flow rate by using the following steps:

- On the horizontal scale, find the depth in the well at which the pump will be located.
- Trace that depth upwards to the line for the air inlet pressure you selected.
- Travel horizontally over to the vertical scale and read the air use factor.

Example: A long Bottom-Loading pump with a 1-inch discharge hose and 70 psi supply pressure positioned 100 feet below ground will use about .73 SCF of air for each gallon of fluid pumped.

The flow rate for the pump, taken from the flow rate curves, when there is 10 feet of fluid over the pump, is about 12.6 GPM.

Multiply the 12.6 GPM flow rate times the .73 SCF air use factor to generate a 9.2 SCFM (Standard Cubic Feet per Minute) air use result.

If the yield of the well is less than the maximum pump rate predicted by the appropriate flow rate graph, multiply the actual fluid recovery rate times the air use factor. This air use can be diminished if the regulator pressure is reduced. The maximum pump rate for the lower air pressure can be predicted using the performance curves.

Note:
These air use factors are only applicable for the designated well head conditions. Any additional resistance from out-of-well equipment (e.g. surface hoses, valves, etc.) will affect the factors shown on these curves.

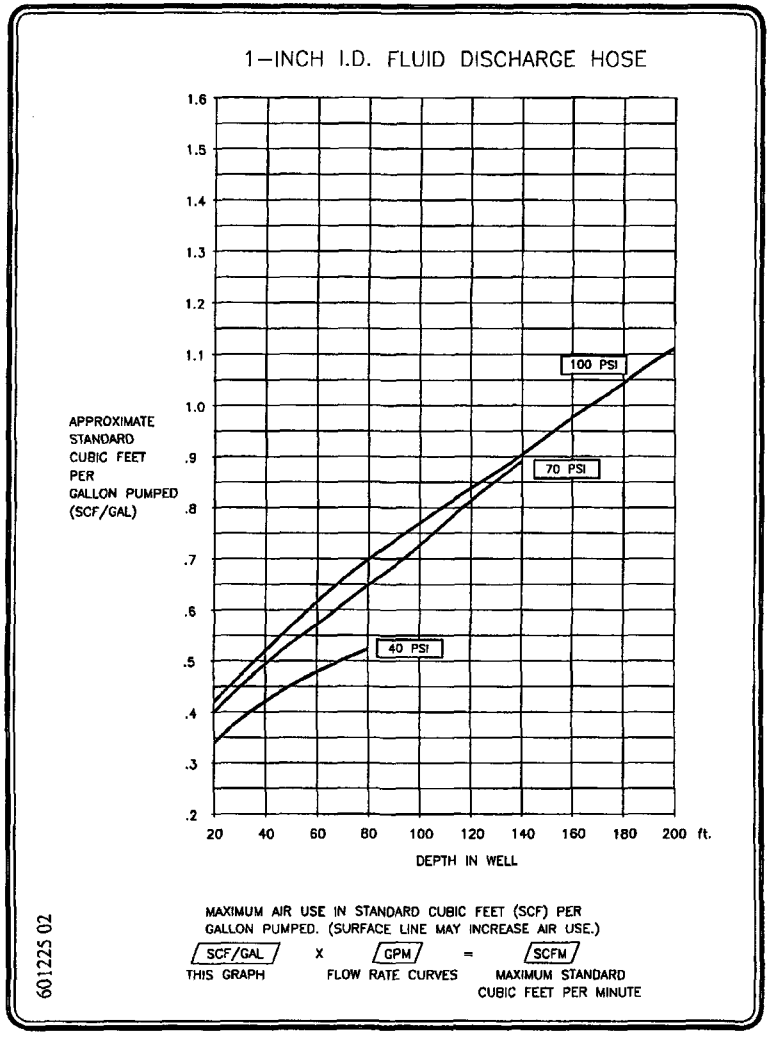


Figure 44 - Long AP-4 Air Consumption Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

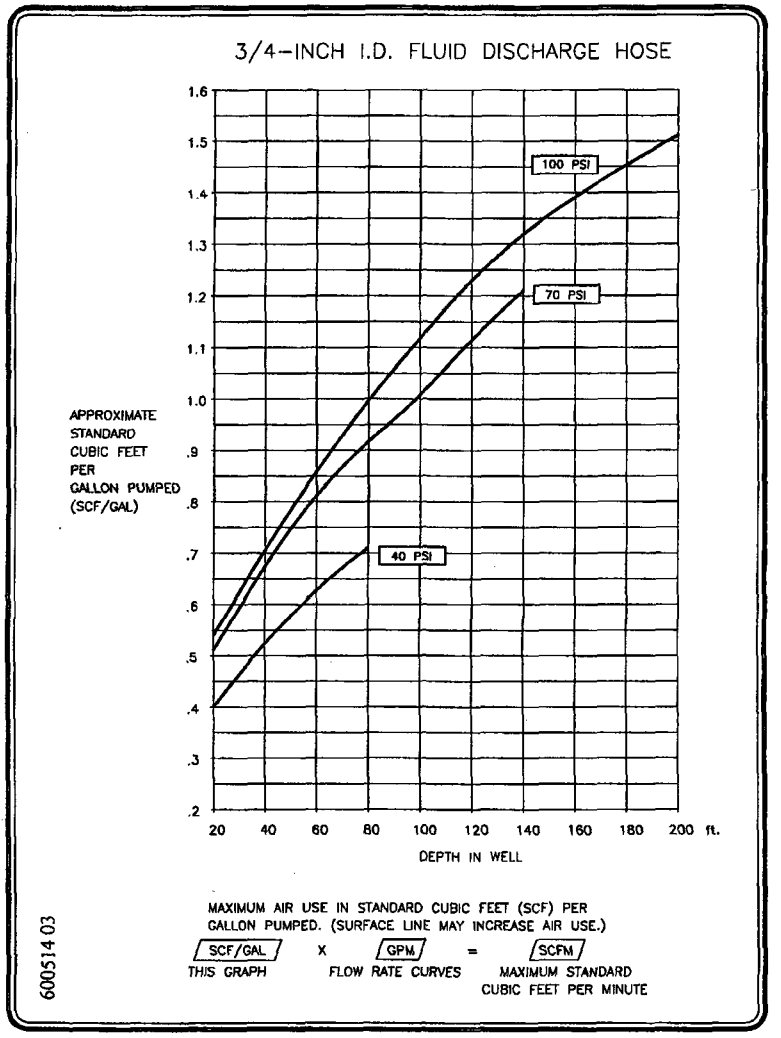


Figure 45 - Long AP-4 Air Consumption Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

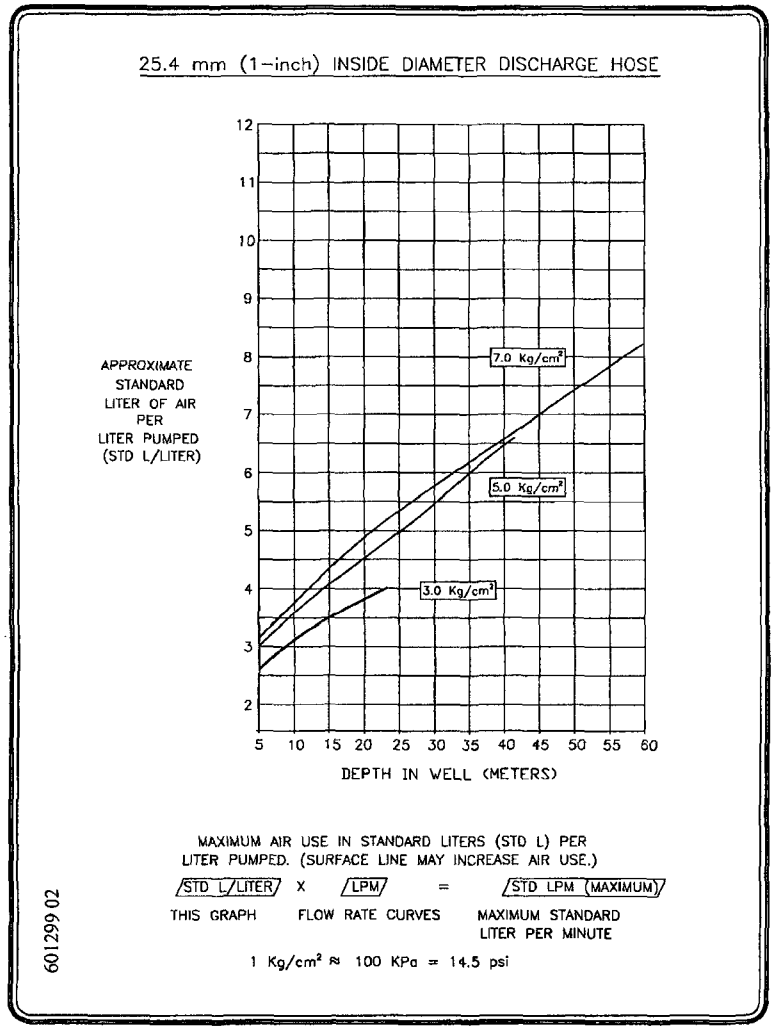


Figure 46 - Long AP-4 Air Consumption Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

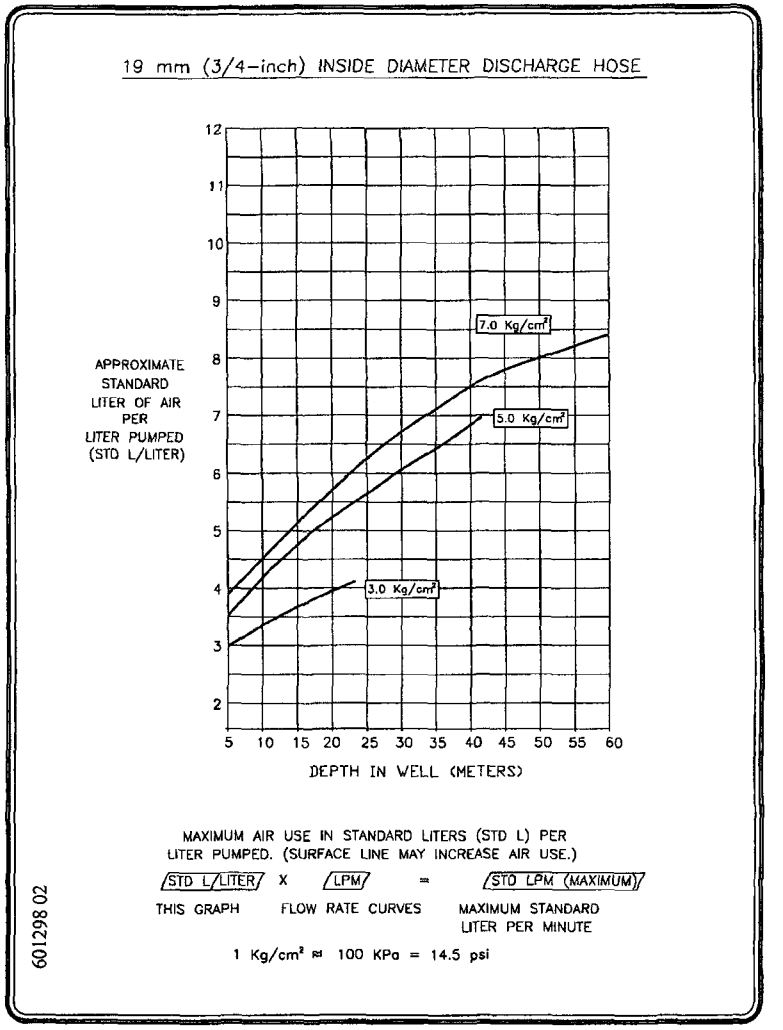


Figure 47 - Long AP-4 Air Consumption Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

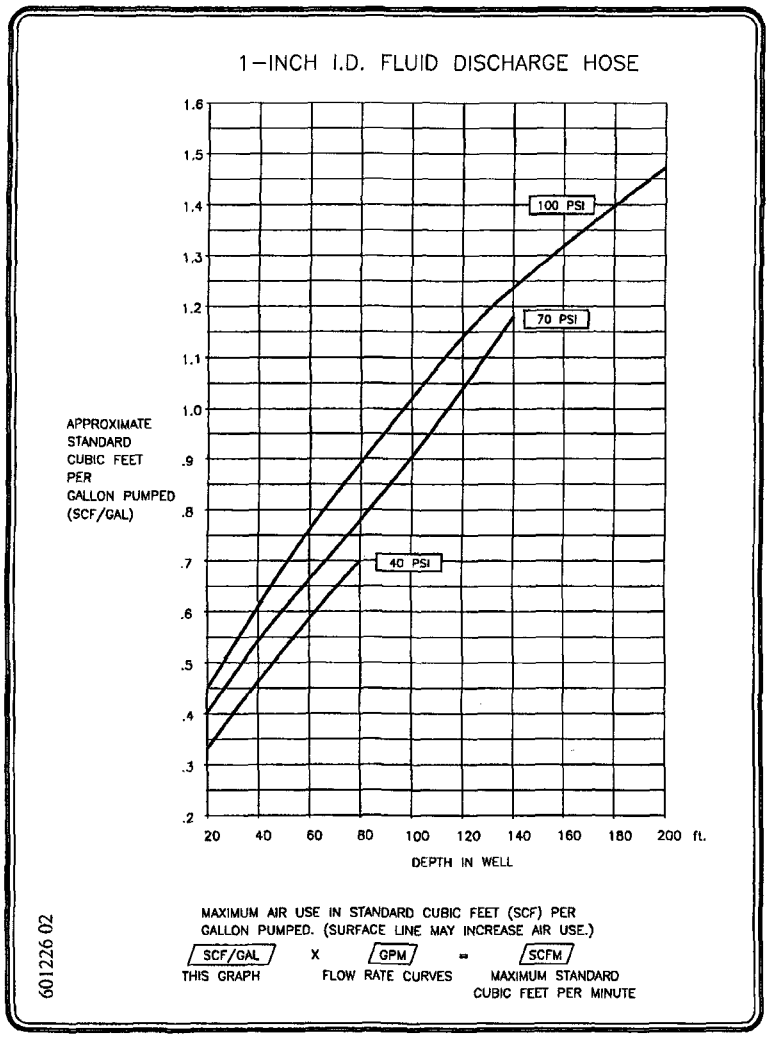


Figure 48 - Short AP-4 Air Consumption Curves: 1-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

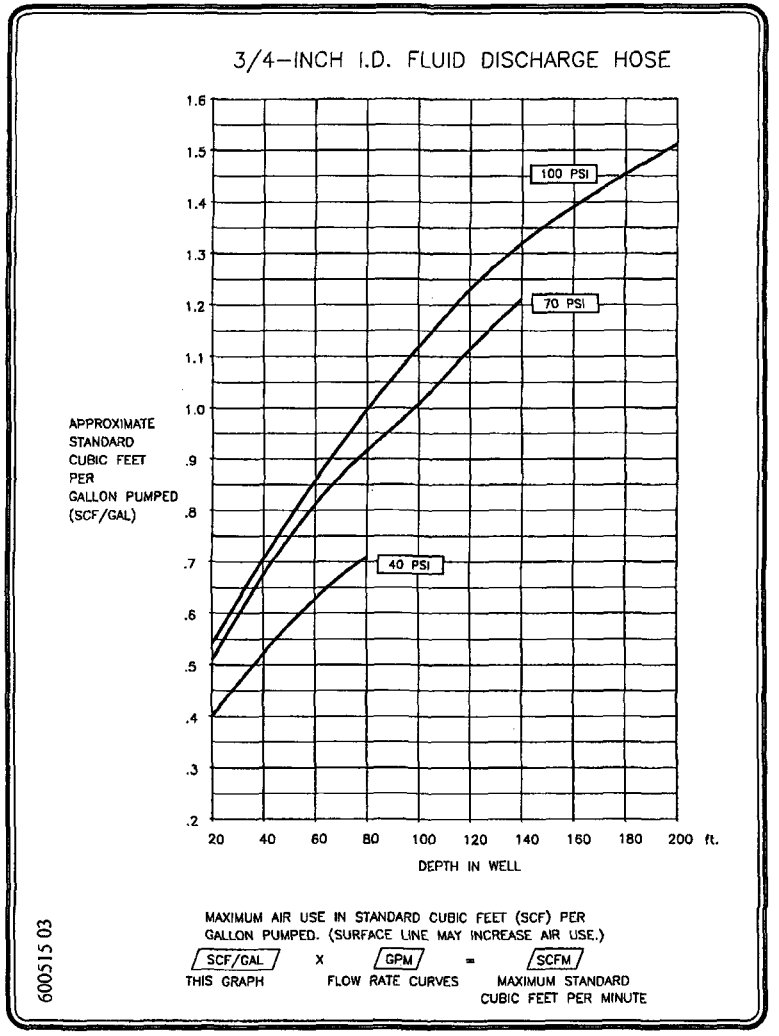


Figure 49 - Short AP-4 Air Consumption Curves: 3/4-inch I.D. Discharge U.S. UNITS (Includes Leachate Models)

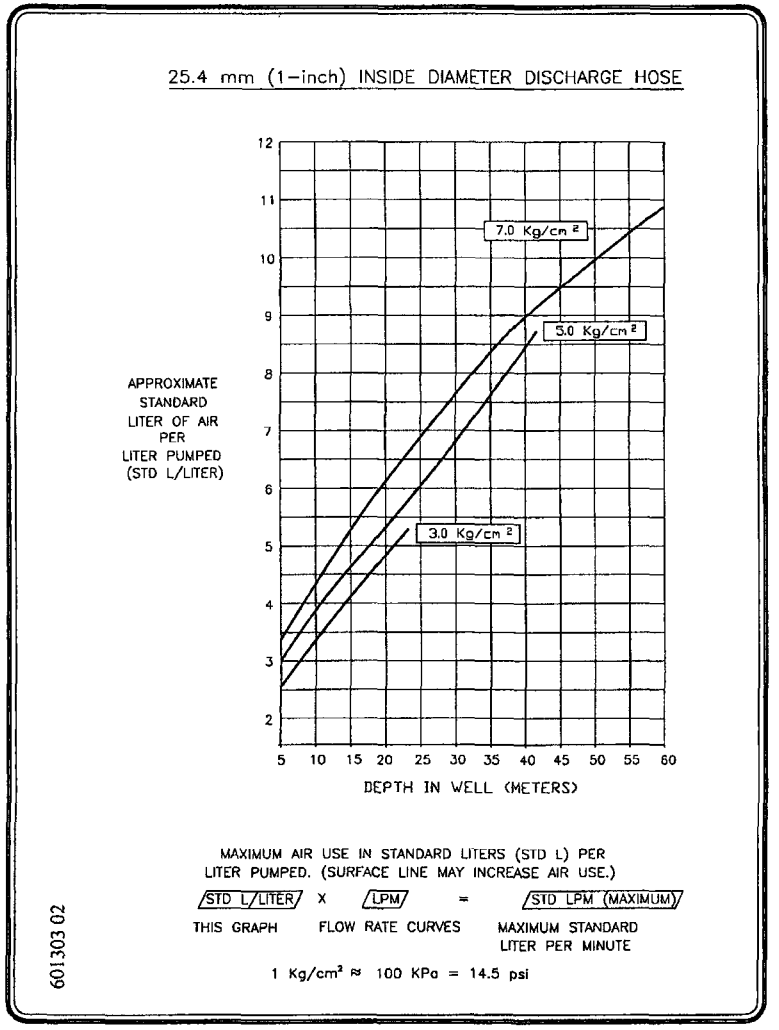


Figure 50 - Short AP-4 Air Consumption Curves: 25.4 mm (1-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

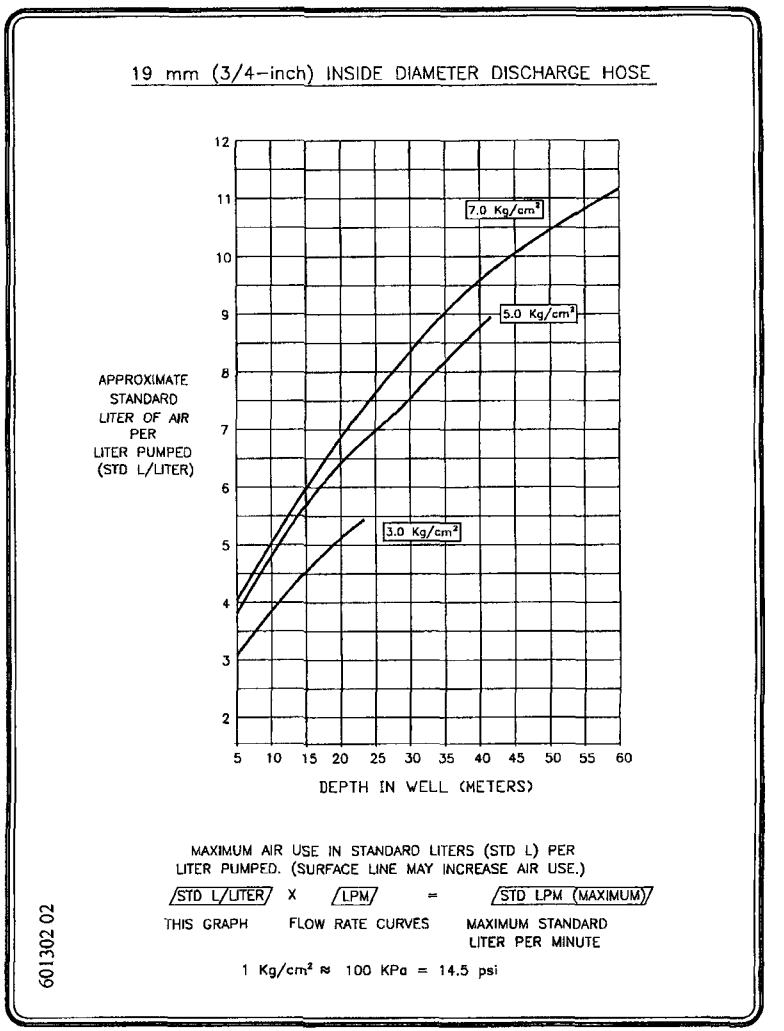


Figure 51 - Short AP-4 Air Consumption Curves: 19 mm (3/4-inch) I.D. Discharge METRIC UNITS (Includes Leachate Models)

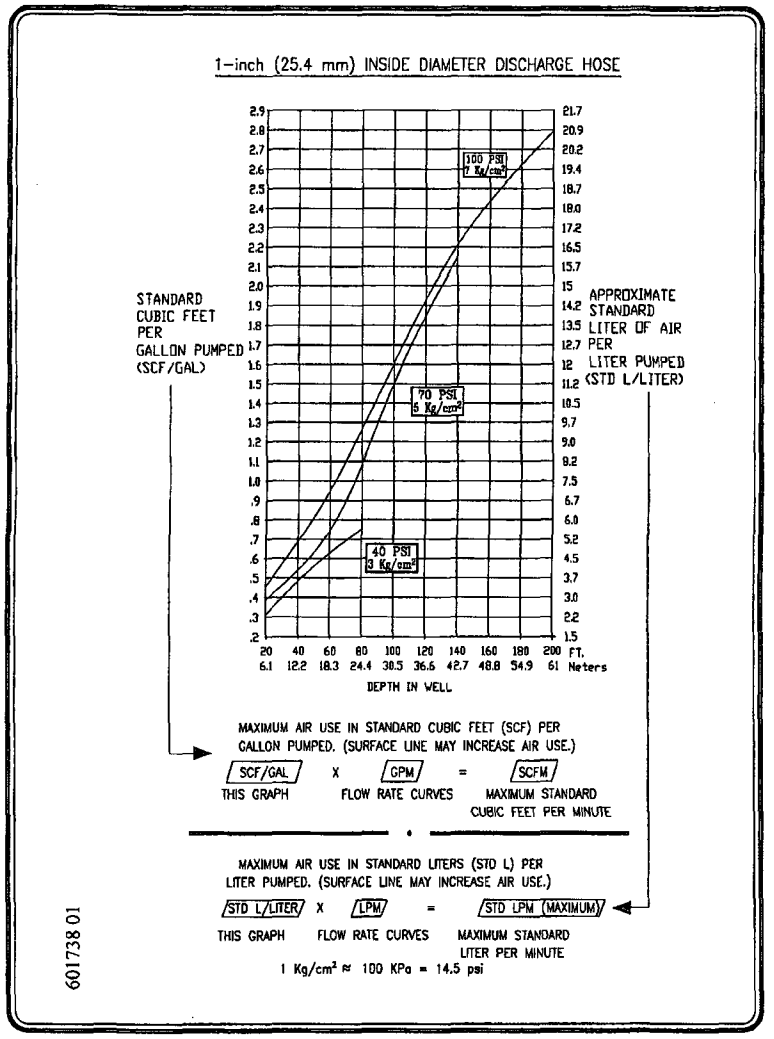


Figure 52 - Low Drawdown AP-4/BL Air Consumption Curves: 1-inch (25.4 mm) I.D. Discharge US and METRIC UNITS

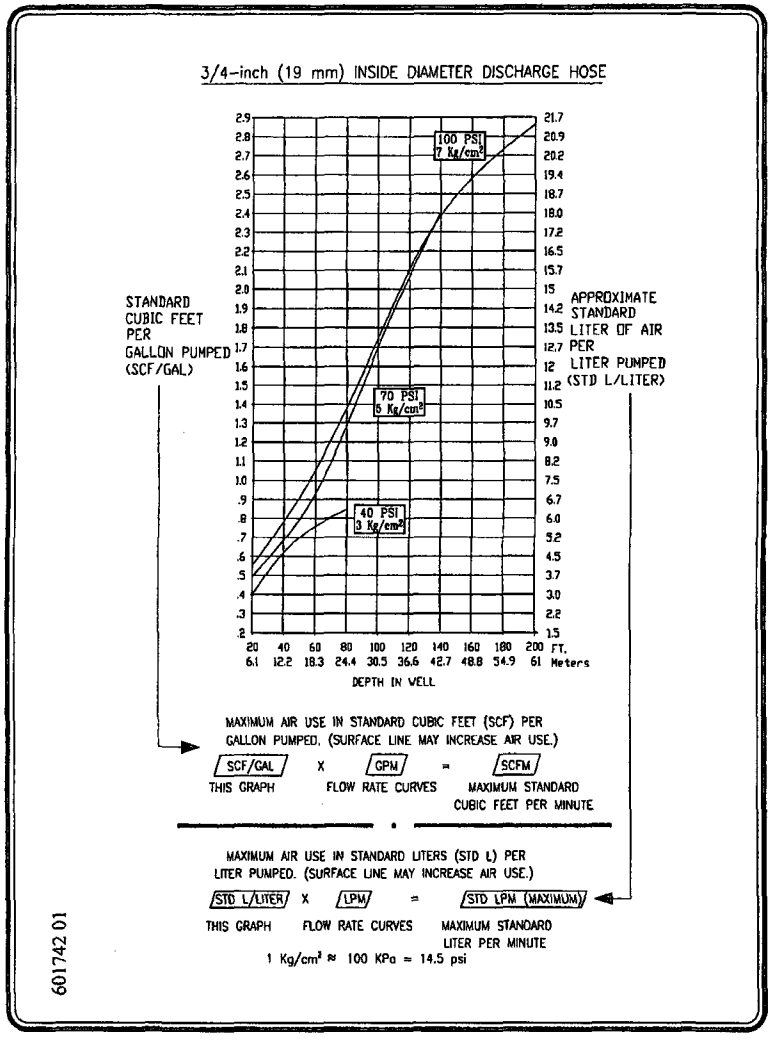


Figure 53 - Low Drawdown AP-4/BL Air Consumption Curves: 3/4-inch (19 mm) I.D. Discharge US and METRIC UNITS

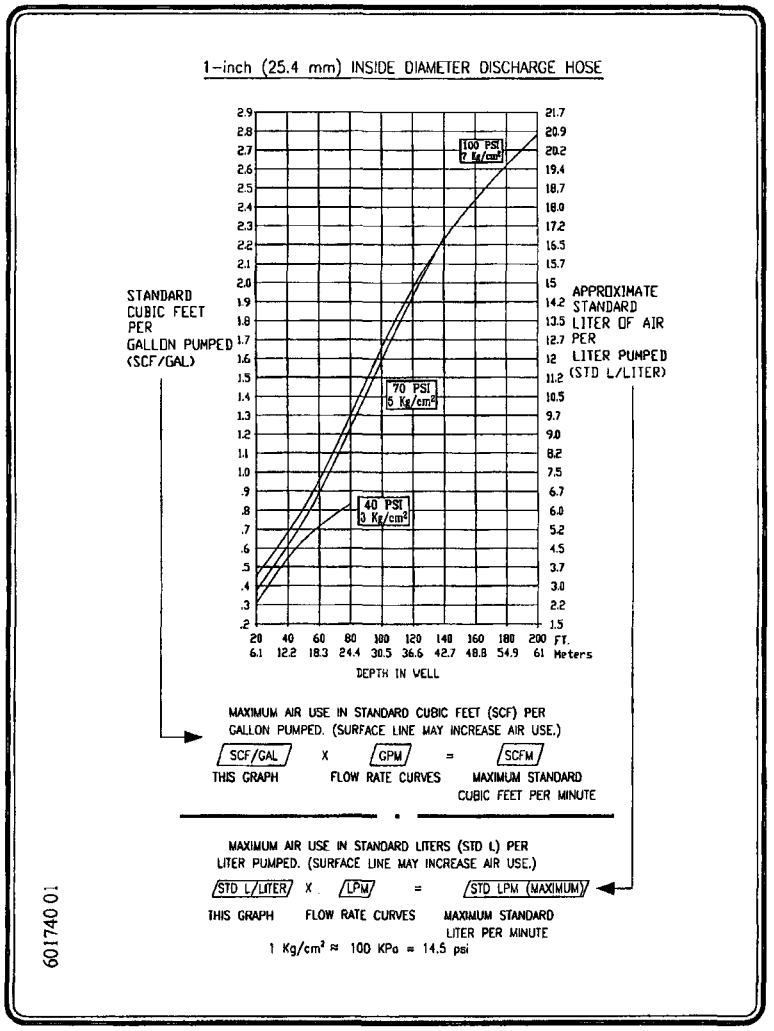


Figure 54 - Low Drawdown AP-4/TL Air Consumption Curves: 1-inch (25.4 mm) I.D. Discharge US and METRIC UNITS

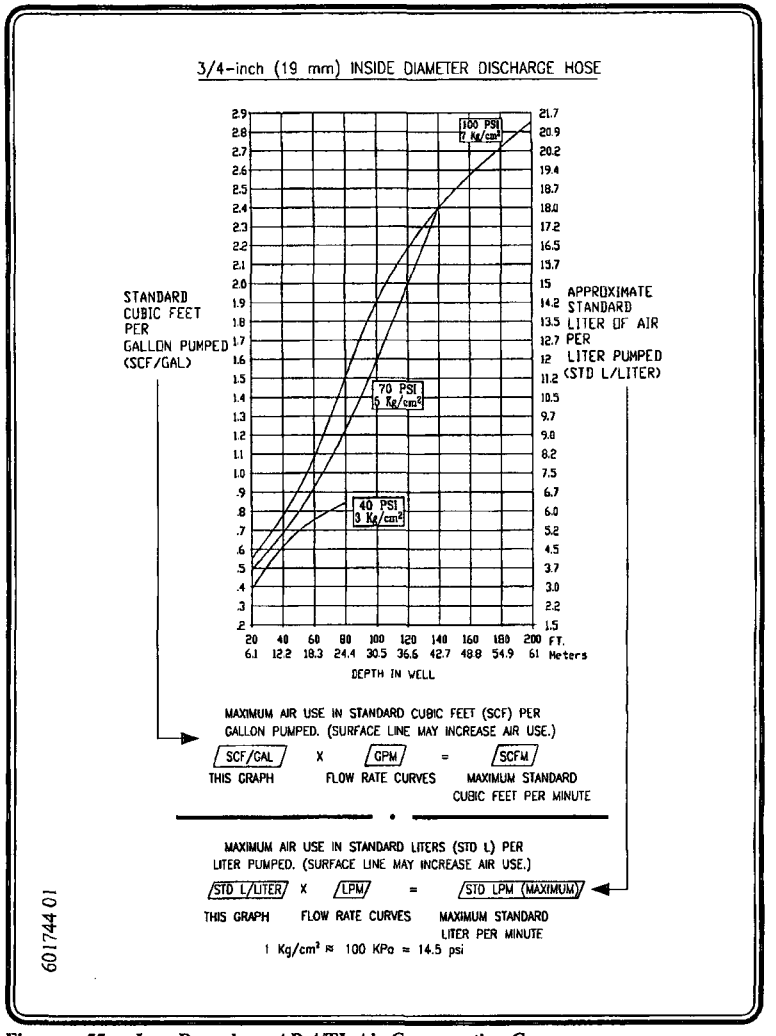


Figure 55 - Low Drawdown AP-4/TL Air Consumption Curves: 3/4-inch (19 mm) I.D. Discharge US and METRIC UNITS

Appendix C: AP-4 Conversions

The AP-4 can be converted the from Top- to Bottom-loading or Bottom- to Top-loading by rearranging the check valves.

Pumps produced prior to 1992
Top-loading to Bottom-loading conversions:

STEP 1 - Remove the inlet "Y" fitting at the top and move the inlet check valve and its inlet screen to the bottom of the pump.

STEP 2 - The outlet check valve is attached directly to the top of the export tube of the pump via a 1" coupling.

Convert a Bottom-loading pump to a Top-loading pump in the opposite manner.

Pumps produced in 1992 and after
Top-loading to a Bottom-loading conversion:

STEP 1 - Remove the inlet "Y" fitting at the top and install the outlet check valve in a coupling to the top of the export tube at the top of the pump. The inlet check valve must be obtained from *QED*.

STEP 2 - This inlet check valve replaces the blanked fitting at the bottom of a Top-loading pump.

Convert a Bottom-loading pump to a Top-loading pump in the opposite manner.
(See Figure 54 and 55)

Note:
When changing short pumps, change the outer casing as well. The casing for the short Top-loading pump is about 3 inches shorter than the case for long Top-loading pump.

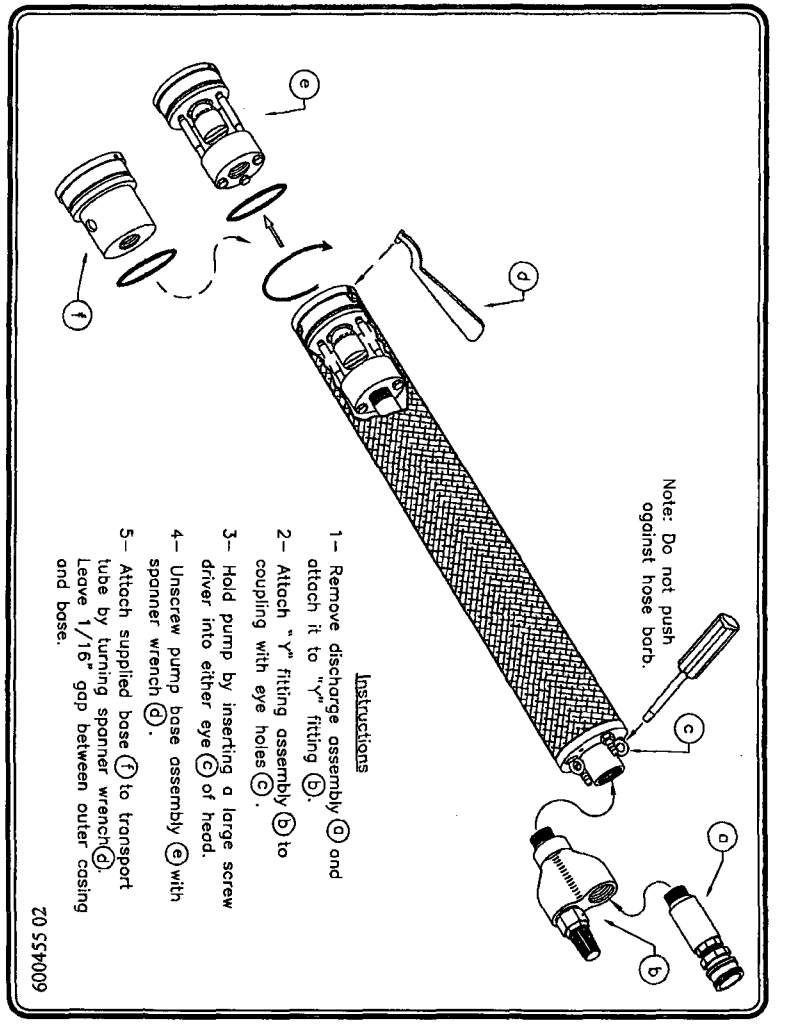


Figure 56 - Conversion From Bottom-Loading to Top-Loading AutoPump for pumps made after 1991

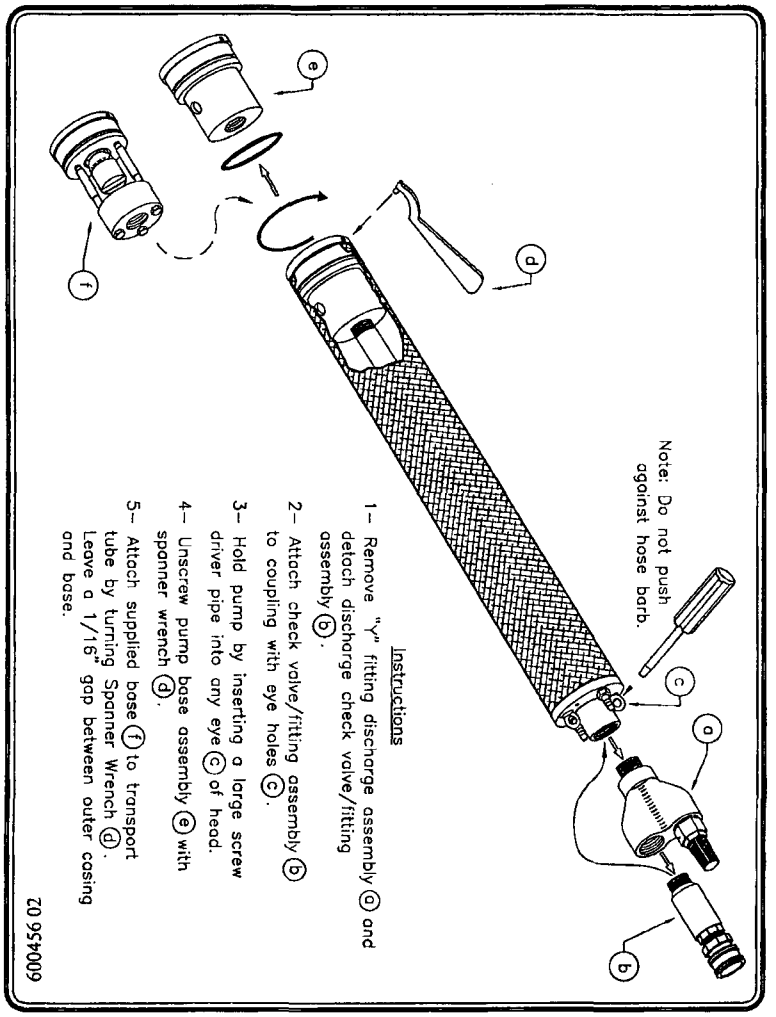
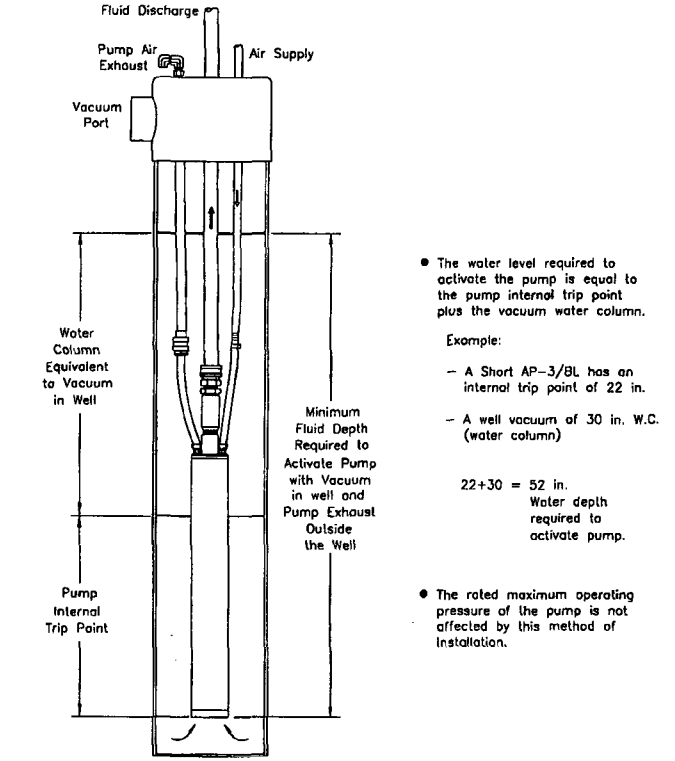


Figure 57 - Conversion From Top-Loading to Bottom-Loading AutoPump for pumps made after 1991

Appendix D: Vacuum on Well

The AP-4 will work in a well that is under vacuum, but there are several conditions that must be considered. These conditions are described in **Figure 57, Figure 58, Figure 59, and Figure 60** on the following pages.



- The water level required to activate the pump is equal to the pump internal trip point plus the vacuum water column.

  Example:

  – A Short AP–3/BL has an internal trip point of 22 in.

  – A well vacuum of 30 in. W.C. (water column)

  22+30 = 52 in. Water depth required to activate pump.

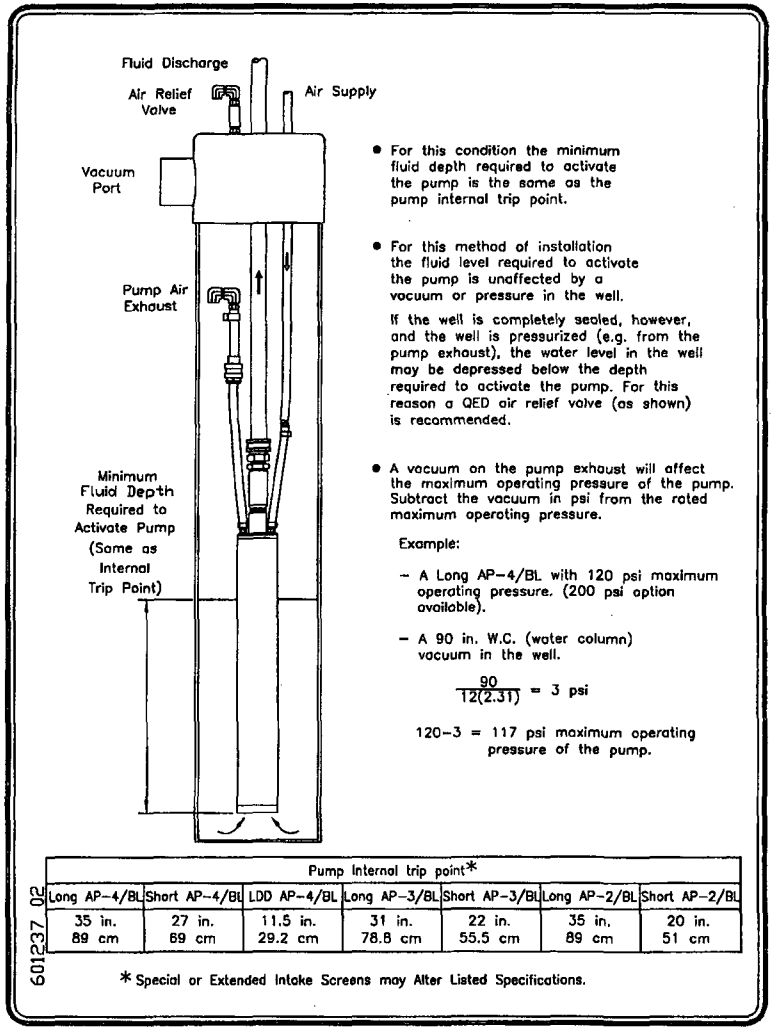
- The rated maximum operating pressure of the pump is not affected by this method of installation.

601238 01

Pump Internal trip point*						
Long AP–4/BL	Short AP–4/BL	LDD AP–4/BL	Long AP–3/BL	Short AP–3/BL	Long AP–2/BL	Short AP–2/BL
35 in. 89 cm	27 in. 69 cm	11.5 in. 29.2 cm	31 in. 78.8 cm	22 in. 55.5 cm	35 in. 89 cm	20 in. 50.8 cm

* Special or Extended Intake Screens may Alter Listed Specifications.

Figure 58 - AP-4/BL with Vacuum In the Well and Pump Exhaust Outside the Well



- For this condition the minimum fluid depth required to activate the pump is the same as the pump internal trip point.

- For this method of installation the fluid level required to activate the pump is unaffected by a vacuum or pressure in the well.

  If the well is completely sealed, however, and the well is pressurized (e.g. from the pump exhaust), the water level in the well may be depressed below the depth required to activate the pump. For this reason a QED air relief valve (as shown) is recommended.

- A vacuum on the pump exhaust will affect the maximum operating pressure of the pump. Subtract the vacuum in psi from the rated maximum operating pressure.

  Example:

  – A Long AP–4/BL with 120 psi maximum operating pressure. (200 psi option available).

  – A 90 in. W.C. (water column) vacuum in the well.

  $$\frac{90}{12(2.31)} = 3 \text{ psi}$$

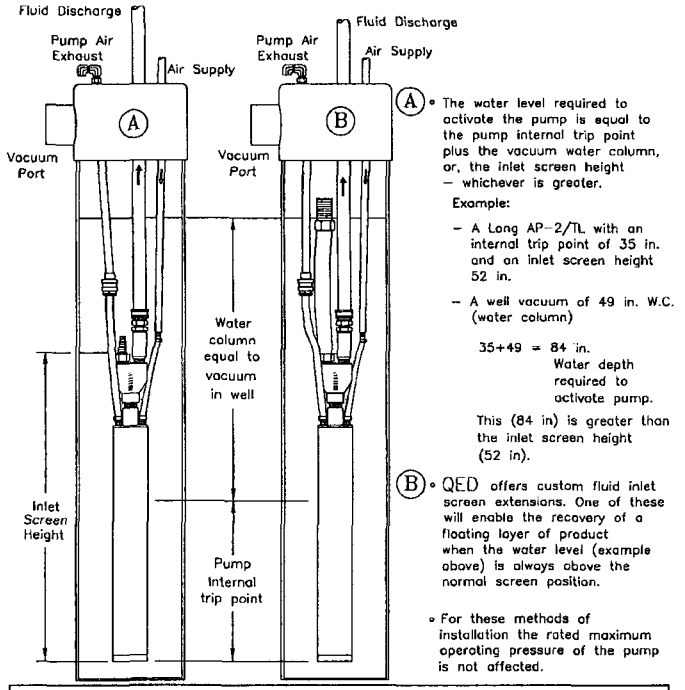
  120–3 = 117 psi maximum operating pressure of the pump.

601237 02

Pump Internal trip point*						
Long AP–4/BL	Short AP–4/BL	LDD AP–4/BL	Long AP–3/BL	Short AP–3/BL	Long AP–2/BL	Short AP–2/BL
35 in. 89 cm	27 in. 69 cm	11.5 in. 29.2 cm	31 in. 78.8 cm	22 in. 55.5 cm	35 in. 89 cm	20 in. 51 cm

* Special or Extended Intake Screens may Alter Listed Specifications.

Figure 59 - AP-4/BL with Vacuum In the Well and Pump Exhaust In the Well



Ⓐ ∘ The water level required to activate the pump is equal to the pump internal trip point plus the vacuum water column, or, the inlet screen height – whichever is greater.

Example:

– A Long AP–2/TL with an internal trip point of 35 in. and an inlet screen height 52 in.

– A well vacuum of 49 in. W.C. (water column)

35+49 = 84 in. Water depth required to activate pump.

This (84 in) is greater than the inlet screen height (52 in).

Ⓑ ∘ QED offers custom fluid inlet screen extensions. One of these will enable the recovery of a floating layer of product when the water level (example above) is always above the normal screen position.

∘ For these methods of installation the rated maximum operating pressure of the pump is not affected.

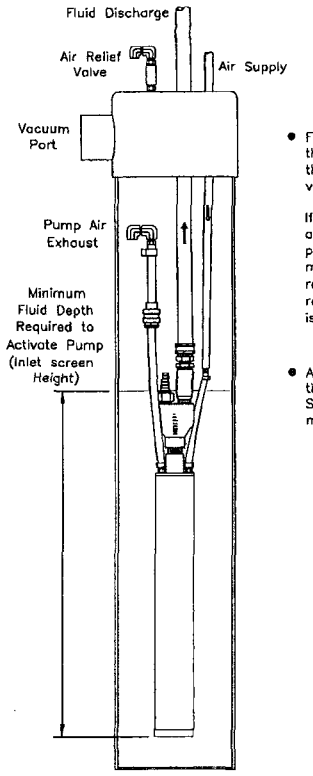
Internal trip point						
Long AP–4/TL	Short AP–4/TL	LDD AP–4/TL	Long AP–3/TL	Short AP–3/TL	Long AP–2/TL	Short AP–2/TL
35 in. 89 cm	27 in. 69 cm	10.6 in. 27 cm	31 in. 78.8 cm	22 in. 55.5 cm	35 in. 89 cm	20 in. 51 cm

Inlet screen height *						
Long AP–4/TL	Short AP–4/TL	LDD AP–4/TL	Long AP–3/TL	Short AP–3/TL	Long AP–2/TL	Short AP–2/TL
52 in. 132 cm	37 in. 94 cm	24 in. 61 cm	53 in. 134.7 cm	42 in. 106.6 cm	52 in. 132 cm	35 in. 89 cm

601241 02

* Special or Extended Intake Screens may Alter Listed Specifications.

Figure 60 - AP-4/TL with Vacuum In the Well and Pump Exhaust Outside the Well



- For this method of installation the fluid level required to activate the pump is unaffected by a vacuum or pressure in the well.

  If the well is completely sealed, however, and the well is pressurized (e.g. from the pump exhaust), the water level in the well may be depressed below the depth required to activate the pump. For this reason a QED air relief valve (as shown) is recommended.

- A vacuum on the pump exhaust will affect the maximum operating pressure of the pump. Subtract the vacuum in psi from the rated maximum operating pressure.

  Example:

  – A Long AP–4/BL with 120 psi maximum operating pressure. (200 psi option available).

  – A 90 in. W.C. (water column) vacuum in the well.

  $\frac{90}{12(2.31)} = 3$ psi

  120–3 = 117 psi maximum operating pressure of the pump.

Inlet screen height *						
Long AP–4/TL	Short AP–4/TL	LDD AP–4/TL	Long AP–3/TL	Short AP–3/TL	Long AP–2/TL	Short AP–2/TL
52 in. 132 cm	37 in. 94 cm	24 in. 61 cm	53 in. 134.7 cm	42 in. 106.6 cm	52 in. 132 cm	35 in. 89 cm

601240 02

* Special or Extended Intake Screens may Alter Listed Specifications.

Figure 61 - AP-4/TL with Vacuum In the Well and Pump Exhaust In the Well

Terms, Conditions, and Warranty

Five Year Warranty
This limited warranty is in lieu of and excludes all other representations made by advertisements, distributors, agents, or manufacturers sales representatives, and all other warranties, both express and implied. There are no implied warranties of merchantability or of fitness for a particular purpose for goods covered hereunder.

QED Environmental Systems warrants to the purchaser of its products that, subject to the limitations and conditions provided within the Terms & Conditions of Sale, products, materials and/or workmanship shall reasonably conform to descriptions of the products and shall be free of defects in material and workmanship.

All warranty durations are calculated from the original date of purchase—determined as beginning the date of shipment from QED facilities and the date QED is notified of a warranty claim. This warranty shall be limited to the duration and conditions set forth below.

1. **AP-4 AutoPumps** — warranted for five (5) years: 100% material and 100% workmanship for the first three (3) years; 50% material and 50% workmanship for the fourth (4th) and fifth (5th) years. This limited warranty coverage only applies to AP-4 AutoPumps purchased with this warranty. There will be no warranty for application or material compatibility. The materials used in pumps vary depending upon application and the customer is responsible for knowing the environment in which the pump will be operating and working with QED to determine what materials of construction will be best for the application.

   The warranty is valid when the following conditions exist: when the site has a pH between 4 and 9, has a salinity of 3500 ppm or less, is between 40 and 120 degrees Fahrenheit, is non-corrosive to the construction materials of the pump; and is not abrasive. Typical commercial fuels are acceptable materials in free or dissolved phase. The pumps and accessories must be operated within the specifications and limits given in the manual for the particular piece of equipment.

2. **Pumps, hose, tubing, fittings, heater, condensers and air filtration housings** — warranted for one (1) year: 100% material and 100% workmanship. This does not include AP-4 AutoPumps. There will be no warranty for application or material compatibility. The materials used vary depending upon application and the customer is responsible for knowing the environment in which the equipment will be operating and working with QED to determine what materials of construction will be best for the application.

3. **Pneumatic Data Modules / Logic Control Panels** — warranted for one (1) year: 100% material and 100% workmanship.

4. **Parts and Repairs** — warranted for ninety (90) days: 100% material and 100% workmanship; when repairs are performed by QED or its appointed agent; from date of repair or for the full term of the original warranty, whichever is longer. Separately sold parts are warranted for ninety (90) days: 100% materials and 100% workmanship.

This warranty will be void in the event of unauthorized disassembly of component assemblies. Defects in any equipment that result from abuse, operation in any manner outside the recommended procedures, use and applications other than for intended use or exposure to chemical or physical environments beyond the designated limits of materials and construction, will also void the warranty.

Chemical attack by liquids and/or abrasive substances contacting equipment and accessories shall not be covered by this warranty. A range of materials of construction is available from QED and it is the Buyer's responsibility to select materials of construction to fit the Buyer's application. QED will only warrant that the supplied site liquid contacting materials will conform to published QED specifications and generally accepted standards for that particular material.

QED Environmental Systems shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than QED service personnel (unless such repair by others is made with the written consent of QED); resold to other parties; and/or moved to or used on a remediation site other than originally specified.

It is understood and agreed that QED Environmental Systems shall in no event be liable for incidental or consequential damages resulting from its breach of any of the terms of this agreement, nor for special damages, nor for improper selection of any product described or referred to for a particular application. Liability under this warranty is limited to repair or replacement F.O.B. QED's factory, or its appointed agent's shop, of any parts which prove to be defective within the duration and conditions set forth herein, or repayment of the purchase price at the option of QED, provided the products have been returned in accordance with the duration and conditions set forth herein.

Subassemblies and Other Equipment Manufactured by Others
The foregoing warranty does not apply to major subassemblies and other equipment, accessories, and other parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties, if any, supplied by their respective manufacturers. QED makes no warranty concerning products or accessories not manufactured by QED. In the event of failure of any such product or accessory, QED will give reasonable assistance to Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty.

Illustrations and Drawings
Reasonable Effort has been made to have all illustrations and drawings accurately represent the product(s) as it actually was at the time of doing the illustrations and drawings.

However, products may change to meet user requirements and therefore may not be reflected in the literature. In addition, literature may be updated to reflect the most recent equipment revision(s). Changes to either or both equipment and/or literature can be made without notice.

Buyer's Remedies
The buyer's exclusive and sole remedy on account of or in respect to the furnishing of defective material or workmanship shall be to secure replacement thereof as aforesaid. QED shall not in any event be liable for the cost of any labor expended on any such product or material or for any special, direct, indirect or consequential damages to any one by reason of the fact that it shall have been deemed defective or a breach of said warranty.

Changes without Notice
Prices and Specifications are subject to change without notice.

Shipping Dates
Shipping dates are approximate and are subject to delays beyond our control.

F.O.B. Point and Title
All material is sold F.O.B. factory. Title to all merchandise sold shall pass to Buyer upon delivery by Seller to carrier at factory. All freight insurance is the responsibility of the Buyer and shall be charged to the Buyer on the invoice unless directed in writing. All Freight claims are the Buyer's responsibility.

Terms
Payment terms are Net 30 days; 1.5% per month past due.

State and Local Taxes
Any taxes, duties or fees which the seller may be required to pay or collect upon or with respect to the sale, purchase, delivery, use or consumption of any of the material covered hereby shall be for the account of the Buyer and shall be added to the purchase price.

Acceptance
All orders shall be subject to the terms and conditions contained or referred to in the Seller's quotation, acknowledgments, and to those listed here and to no others whatsoever. No waiver, alteration or modification of these terms and conditions shall be binding unless in writing and signed by an executive officer of the Seller. All orders subject to written acceptance by QED Environmental Systems, Ann Arbor, MI, U.S.A.

Warranty Claims Procedure (Responsibility of purchaser)
The original purchaser's sole responsibility in the instance of a warranty claim shall be to notify QED or its appointed agent, of the defect, malfunction, or other manner in which the terms of this warranty are believed to be violated. The purchaser may secure performance of obligations hereunder by contacting the Customer Service Department of QED or its appointed agent, and:

1. Identifying the product involved by model or serial number, or other sufficient description, that will allow QED, or its appointed agent, to determine which product is defective.

2. Specifying where, when, and from whom the product was purchased.

3. Describing the nature of the defect or malfunction covered by this warranty.

4. After obtaining authorization from QED, sending the malfunctioning component via a RMA# (Return Material Authorization number) to the address below or to its appointed agent:

   QED Environmental Systems
   1133 Seventh Street
   Oakland, CA 94607
   USA

   (800) 537-1767 Toll-Free in North America
   (510) 891-0880
   (510) 444-6789 FAX

5. Equipment must be cleaned before shipment or it will be cleaned by QED before any work is performed. The customer will be charged for such cleaning.

If any product covered hereby is actually defective within the terms of this warranty, purchaser must contact QED, or its appointed agent, for determination of warranty coverage. If the return of a component is determined to be necessary, QED, or its appointed agent, will authorize the return of the component at Purchasers expense. If the product proves not to be defective within the terms of this warranty, then all costs and expenses in connection with the processing of the Purchaser's claim and all costs for repair, parts, labor, and shipping and handling, as authorized by owner hereunder, shall be borne by the Purchaser. In no event shall such allegedly defective products be returned to QED, or its appointed agent, without its consent, and QED's, or its appointed agent's, obligations of repair, replacement or refund are conditional upon the buyer's return of the defective product to QED, or its appointed agent. All equipment returned to QED will be appropriately cleaned of contamination before shipping.

ATTACHMENT 3

REVISED OPERATIONS PLAN

OPERATIONS PLAN
PHASES I-VI AND THE
CAPACITY EXPANSION AREA
(SECTIONS 7, 8, AND 9)
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

Prepared for:

HILLSBOROUGH COUNTY SOLID WASTE MANAGEMENT DEPARTMENT
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Prepared by:

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Certificate of Authorization #1841

~~January 2007~~
~~Revised August 2008~~
~~Revised April~~February ~~May~~September 2010

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APPENDICES

PART ~~K~~L INTRODUCTION

The Southeast County Facility (Facility) includes the Southeast County Landfill (SCLF), which is permitted by the Florida Department of Environmental Protection (FDEP) as a Class I landfill for Phases I-VI and the Capacity Expansion Area. This Operations Plan includes Phases I-VI and Sections 7, 8, and 9 of the Capacity Expansion Area.

The Facility is the final depository for municipal solid waste (MSW) ash residues, non-processables, and bypass wastes from the Solid Waste Management System of Unincorporated Hillsborough County. The Facility also receives solid waste from the cities of Temple Terrace and Tampa, as well as MSW ash residues and bypass wastes from the Waste-to-Energy Incinerator Facility of the City of Tampa. Hazardous waste will not be accepted at the Facility.

This operations plan was prepared in conjunction with an operation permit application; as such, the format follows the requirements of Part L of the Permit Application Form.

L.1 TRAINING

In accordance with Rule 62-701.500(1), Florida Administrative Code (FAC), key supervisory staff at the Facility have received Landfill Operator Certification training. Operator training includes a 24-hour initial course and 16 hours of continuing education every 3 years. Spotter training includes an 8-hour initial course and 4 hours of continuing education every three years. Operator and Spotter training courses will be offered by the University of Florida Center for Training, Research and Education for Environmental Occupations (TREEO) and through other FDEP-approved sources. Appendix A lists the currently available TREEO training courses and schedule. The listing is also available at www.treeo.ufl.edu. Documentation demonstrating that the facility operators and spotters have received the required continuing education is presented in Attachment E.15 of the Phases I-VI and Capacity Expansion Area (Sections 7, 8, and 9) Permit Renewal Application dated January 2007.

As required by Rule 62-701.500(1), FAC, a certified Landfill Operator will be on site when waste is received for disposal at the landfill, and a trained spotter will be on site during all times when waste is deposited at the landfill working face to detect any unauthorized wastes. In addition, the equipment operators have sufficient training and knowledge to move waste and soil and to develop the site in accordance with the design and operational standards described in the operation permit application.

L.2 LANDFILL OPERATION PLAN

L.2.a. SWMD Organization and Responsibilities

Hillsborough County (County) owns the Facility and is the applicant for the operation permit. A Landfill Contractor (Waste Management, Inc. of Florida) will operate and maintain the Facility in accordance with the permit conditions under the contract that exists between the County and the Contractor.

The following Hillsborough County Solid Waste Management Department (SWMD) and Contractor personnel are currently responsible for the operations at this Facility:

- Larry E. Ruiz, Landfill General Manager (SWMD)
- Ernest Ely, District Landfill Manager (Contractor)

In addition, the following positions are maintained at the Facility: scale-house clerks (SWMD), waste monitors (SWMD), equipment operators (Contractor), spotters (Contractor), laborers (Contractor), security personnel (Contractor), and mechanic (Contractor). At least one trained operator familiar with the landfill operations will be on site at all times while the Facility is open in accordance with Rules 62-701.320(15) and 62-701.500(1), FAC.

L.2.b. Contingency Plan

The contingency plan for the Facility is based upon addressing two potential emergencies:

- Equipment failure.
- Large influx of material resulting from a natural disaster such as a hurricane, fire, or from a breakdown at local resource-recovery facilities.

Sufficient backup equipment will be provided on site for equipment breakdowns and downtime for normal routine equipment maintenance. If primary and backup major equipment (i.e., landfill compactor or bulldozer) fail, one or both of the following contingency measures will be implemented:

- Use existing contracts with contractors and rental equipment dealers to furnish rental equipment on short notice (Appendix B).
- Establish arrangements with other County agencies to furnish equipment.

The Contractor will be responsible for providing equipment and a working force of adequate size and skill to maintain the landfill operation in compliance with all applicable federal, state, and local regulations. If sufficient local personnel are not available, the Contractor will relocate from other facilities sufficient personnel with the proper skills to maintain operations.

Hillsborough County's existing Comprehensive Emergency Management Plan (CEMP) provides policies and procedures necessary to prepare and respond to natural disasters (Appendix C). Under an unforeseen condition of a large influx of waste, the procedures discussed above would also apply. However, in a natural disaster other heavy equipment may not be available. Given that a large volume of wastes requiring disposal from a natural disaster is non-putrescible, it can be stored on site temporarily (adjacent to the working face) and landfilled after the state of emergency has ended.

In the case of a large fire, bomb threat, or other unforeseen situation requiring specialized emergency response personnel, 911 will be called for the local Fire Department or Sheriff's Department. Waste handling will be suspended and the affected area will be evacuated, if necessary. The landfill will be temporarily closed until the responding Department determines that the landfill is safe for re-entry. If the Facility will remain closed for more than 48 hours, the incoming waste will be diverted to an alternate facility in an adjacent county.

In case of an accidental spill of oil, fuel, leachate, or chemicals, the spill will be minimized by controlling the source immediately (e.g., by closing the valve, turning-off switch, or taking any other necessary action). The affected area will be protected by diverting vehicular traffic. Building a berm, plugging a drain or ditch, or adding absorbent material will control runoff from the affected area. The affected area will be cleaned, and the effectiveness of the cleanup confirmed by sampling, as needed, depending on the nature of the spilled material. For spill countermeasures of secondary containment at the Leachate Treatment and Reclamation Facility (LTRF) and the proposed effluent/leachate storage tank, refer to Section 7.1 of the Leachate Management Plan (LMP).

L.2.c. Waste Type Control

The automated accounting system, clerks at the scalehouse, and the site security fence help discourage unauthorized entry and uncontrolled disposal of unauthorized waste. A sign at the entrance states the general regulations including the types of prohibited solid waste.

A minimum of three random load inspections of solid waste per week will be conducted at the active landfill (See Part L.6 and Appendix D). As an additional control, the SWMD has one waste monitor and the Contractor has at least one trained spotter at the working face to visually inspect each load of waste as it is unloaded and deposited. If any unauthorized special waste (i.e., lead-acid batteries, used oil, yard trash, white goods, and whole tires) is found at the working face during the random inspection or as part of routine operations, the waste will be segregated and removed from the site for recycling or other processing in accordance with FDEP regulations. Items that may contain liquids or gases will be stored upright, undamaged, and in a container as appropriate. The maximum on-site storage will be as follows:

- 50 batteries in a secondary containment covered tray.
- 20 gallons of used oil placed upright in an undamaged container.
- 40 cubic yards (cy) yard trash in one 40-cy roll-off container.

- 75 white goods and lawnmowers placed upright (on the ground) until all liquids, CFCs, and freon are removed. After the metal recycling contractor removes all liquids, CFCs, and freon, the white goods are marked with spray paint to indicate that they are ready to be placed in the scrap metal containers.
- Scrap metal in two 40-cy roll-off containers (including processed white goods).

These special wastes will be stored next to the working face and removed from the site within 30 days.

Whole tires will be shredded on site and may be used as initial cover. Lead-acid batteries will be collected by the SWMD's contracted battery recycler. Scrap metal, including white goods and lawnmowers, will be collected and processed by the SWMD's metals recycling contractor. Propane tanks will be collected by the recycling contractor. Used oil and yard trash will be rejected, required to be reloaded, and directed to be taken to the household chemical collection center at the South County Transfer Station.

If unauthorized waste (i.e., hazardous, PCBs, untreated biomedical, or free liquid) is found at the working face, the waste will be isolated and the Landfill Manager will be immediately notified. The Landfill Manager is trained in the proper procedure to follow including notifying the FDEP. Similarly, if suspect waste is found, the waste will be isolated and the Landfill Manager notified. The Landfill Manager will prepare a suspect waste report and ensure that the waste is properly managed (Appendix D). If hazardous wastes are found, the FDEP will be notified immediately and the waste will be isolated and restricted from access until it is removed from the landfill by a qualified hazardous waste contractor. Hazardous wastes will be removed from the Facility within 24 hours.

L.2.c.(1) Special Waste

The SWMD has established policies, procedures, and guidelines for managing special waste to comply with federal, state, and local regulations for minimizing risks to the environment, public health, and employees posed by non-hazardous and unregulated waste. Appendix E presents the SWMD Special Waste Program, which includes guidelines and procedures for accepting and evaluating special waste. Appendix E presents the current policies and management procedures for asbestos, empty containers, ash, soil, polychlorinated biphenols (PCBs), tires, industrial waste, yard waste, chemical waste, used motor oil, construction and demolition debris, white goods, waste tires, household batteries, other batteries, paint, bio-hazardous, and household hazardous waste. The following are the objectives of the special waste program:

- Preclude the entry and disposal of hazardous waste into the Facility.
- Preclude leachate developing hazardous waste characteristics.
- Protect the landfill liner.
- Prevent objectionable odors from becoming a problem.
- Ensure that delivered materials can be handled safely.

L.2.c.(2) Motor Vehicles

Motor vehicles will not be accepted at the facility; however, mobile homes will be accepted for disposal in the landfill at the active working face if they cannot be recycled. Appliances (white goods) and waste tires from mobile homes must be removed before being accepted at the facility and processed as stated in Section L.2.c.

L.2.c.(3) Shredded Waste

The Facility will accept shredded tires from the on-site tire-shredding facility. The SWMD uses shredded tires for initial cover since shredded tires are an effective initial cover for controlling disease, vectors, odors, litter, and scavenging. This practice benefits the County by conserving valuable landfill space and recycling materials.

L.2.c.(4) Asbestos Waste

Asbestos waste will be accepted at the Facility. The entire footprint of Phases I-VI and the Capacity Expansion Area will be designated as an asbestos disposal area. Before landfilling, the material must be wetted and placed in a leak-tight wrapping. The bags will be placed in a prepared trench at the working face. Materials such as transite paneling and pipe insulation must be wrapped sufficiently to maintain their integrity during disposal. After placement, the bags will be immediately covered with 6 inches of asbestos-free material (i.e., soil or select waste without large or sharp objects that may damage the asbestos packaging). Copies of the asbestos waste shipment records complying with 40 CFR 61-Subpart M will be maintained on site.

L.2.d. Weighing Incoming Waste

All incoming waste will be weighed before disposal in the landfill. The existing scales are fully automated and computerized, with the capability for data storage and retrieval for daily record keeping and reporting. All customers are issued receipts upon exiting the Facility.

L.2.e. Traffic Control

The working face area is the most equipment-intensive area of operation for the Facility. In this area, solid waste transportation vehicles arrive, turn around, back up to the working face, and unload the solid waste. Landfill operation equipment will continually spread and compact the solid waste as it is received. During normal operating conditions, only one working face will be active at any given time, with the solid waste at all other areas within the landfill secured by a minimum of 6 inches of initial cover. The working face may alternate from month to month from Phases I-VI to the active cells at the Capacity Expansion Area and back. It is intended that only one working face will be active at a time at either Phases I-VI or the CEA. However, during the initial placement of selected waste in Section 8 Lift 1 Cell A or in Section 9, a temporary working face will be maintained at Phases I-VI for the placement of large rigid objects and construction demolition debris.

The approach to the working face will be maintained in an accessible condition so that two or more vehicles may safely unload simultaneously side by side. When unloading is complete, the vehicles will immediately leave the working face area. Entrance and exit haul roads will be provided (both temporary and permanent) and maintained to facilitate future unloading operations. Contractor personnel will direct traffic as necessary to expedite safe movement of vehicles and to ensure that all waste transport vehicles dump within the designated area.

L.2.f. Method and Sequence of Filling Waste

L.2.f.(1) Phases I-VI

Each phase will be landfilled as shown in the Operating Sequence Plans provided separately with the Phases I-VI and Capacity Expansion Area (Sections 7, 8, and 9) Permit Renewal Application. The lifts in each of the several phases are shown on one sheet to minimize the number of sheets, but each lift is independent of the others.

One working face will be maintained for the anticipated traffic maneuvering during waste fill operations. Typical lifts consist of two lifts 8 to 10 feet high, to reach the maximum elevation shown on the operating sequence drawings including daily and intermediate cover. Because of the phosphatic clay liner stability in Phases I-VI, at no time shall a lift exceed the maximum height shown on the operating sequence drawings. The cells will be placed as shown on the operating sequence drawings and will be filled moving from west to east across Phase I to the line dividing Phase I from Phase II. Phase II will be filled beginning on the east side of Phase II and proceeding from east to west across Phase II to the line dividing Phase II from Phase III. The filling of cells in Phase III will begin on the east side of Phase III and proceed from east to west across Phase III to the line dividing Phase III from Phases I, IV, V, and VI.

The cells in Phase IV will be filled from the center of the site (east side of Phase IV) against Phases I and III, proceeding from east to west across Phase IV to the western perimeter of the landfill. The filling of cells in Phases V and VI will proceed counterclockwise from the northeast corner against Phase III around across Phases V and VI to the southwest corner of the landfill against Phase I-VI. The Contractor will prepare filling plans in accordance with the sequence drawings 45 days before the development of a new lift. Subsequently, grades for the new lift will be set on grade stakes by a registered engineer, land-surveyor, or by an authorized agent.

Refer to Table 1 Southeast Landfill Filling Sequence for Phase I-VI and Project Disposal Rate Diversion to the Capacity Expansion Area provided in Appendix F.

L.2.f.(2) Section 7 of the Capacity Expansion Area

The temporary filling in Section 7 was complete as of June 2005. The outer sideslopes have not reached their final design 3H:1V slope. The temporary sideslopes of Section 7 will be filled to reach their maximum design slope of 3H:1V upon construction of Section 9.

L.2.f.(3) Section 8 of the Capacity Expansion Area

The temporary filling in Section 8 was completed as of May 2007. The outer sideslopes have not reached their final design slope of 3H:1V. The temporary sideslopes of Section 8 will be filled to reach their design slope upon construction of Section 9.

Initial Waste Placement

In general, the initial waste placement will begin in the southwest corner and proceed northeast until it reaches the temporary stormwater separation berm. Refer to Part L.7.b for requirements for the first layer of waste. Waste placement will continue up to a crest elevation of 150.8 feet NGVD with exterior sideslopes no steeper than 4 feet horizontal to 1 foot vertical (4H:1V). The working face will be adequate for the anticipated traffic maneuvering during waste-filling operations. Cover soil will be brought from the existing borrow area north of the Section 8 area. Daily lifts of the waste will be no thicker than 8 to 12 feet including cover soils.

Two temporary stormwater separation berms were used to separate leachate from stormwater in the interior of the Section 8. The middle and eastern leachate collection pipes in Section 8 were plugged with a removable air ball plug. Stormwater which does not come in contact with waste material will be pumped into the perimeter stormwater ditch on the eastside of Section 8. The stormwater in the ditch will then drain to Basin C.

A rain tarp was used to cover the sideslopes of the Section 8 area to minimize erosion and washout of the slopes. Before placement of waste, all rain tarps were removed from the sideslopes.

Before placement of waste in the middle and eastern portions of Section 8, the air ball plug was removed from the leachate collection pipe.

Filling of Lift 1

Access to the Section 8 area will continue from the southwest corner for Lift 1. Filling in this area has begun in the southwest corner and will continue in a back-and-forth pattern in Lift 1A. The waste in Lift 1A will be placed against the previously placed waste in Section 7, moving northeast until it reaches the temporary perimeter ditch located on the north and west side of Section 8. Filling will continue in a similar pattern for Lifts 1B and 1C beginning at the southwest corner of each cell, overlapping the slopes of Section 7, and progressing northeast until it reaches the temporary perimeter ditch. The entire Section 8 will be filled and raised so stormwater can sheet flow to the perimeter ditch. Lift 1 will eventually be raised to a crest elevation of 156 feet NGVD.

Stormwater runoff west of the crest will sheet flow into the perimeter ditch located north of the Capacity Expansion Area to Basin C. As filling progresses to the east, stormwater collected east of the temporary stormwater separation berms will be considered stormwater and pumped to the

perimeter ditch east of Section 7. The temporary stormwater separation berms will be used to separate leachate from stormwater. Once waste material has been placed east of the temporary stormwater separation berms or if stormwater comes in contact with waste material, the stormwater in this area will be considered leachate.

When filling of the entire base of Section 8 is complete, stormwater runoff from the west and north slopes of the fill area will sheet flow into the perimeter ditch located north of the cell to Basin C.

SPECIAL SECTION 7 AND 8 CELL CONNECTION

Before filling across the leachate collection lines in Cell A of the initial lift and Cell B of Lift 1, the east-west separation berm between Sections 7 and 8 was removed (only in the immediate area of the leachate collection pipe) to provide additional redundancy should the leachate pipe become clogged or collapse. The removal of the berm allows leachate to flow freely from Section 8 into Section 7.

Filling of Lift 2

Filling in Lift 2 will proceed beginning in Lift 2D at the southwest corner. Lift 2D will be placed against the previously placed waste in Section 7. Lifts 2D, 2E, and 2F filling will proceed from the southwest to the northeast, reaching a crest elevation of approximately 175 feet NGVD with 4H:1V exterior sideslopes and a 20H:1V top slope. Vehicle traffic will continue to access the landfill by the temporary haul road previously constructed. As an alternative access route to the Section 8 area, a second temporary access road will be constructed on the south side of Section 7. Traveling across the top of Section 7 will provide access to Section 8.

Stormwater for Lift 2 will drain from the crest to the temporary sideslope stormwater swale installed at approximately elevation 165 feet NGVD. Stormwater for the Lift 2 area will be conveyed to the northeast corner where a temporary stormwater downchute will be constructed. Stormwater conveyed in the temporary stormwater downchute will discharge into the perimeter ditch that leads to Basin C.

Filling of Lift 3

Waste filling will continue in Lift 3 beginning in the southwest corner with Lift 3G. Lift 3G filling will continue from the crest elevation of 165 feet NGVD moving north until it reaches grade elevation 190 feet NGVD. Lift 3G filling will progress toward the northeast reaching an approximate crest elevation of 190 feet NGVD. Lifts 3G will consist of waste filling overlapping the top area of Section 7 and will be graded to 4H:1V sideslopes. Filling will continue on the upper portion of Sections 7 and 8 with a final 20H:1V top slope. Sections 7 and 8 will be filled to a final elevation of 196 feet NGVD.

Stormwater for Lift 3 will drain from the crest to the temporary sideslope stormwater swale installed at approximately elevation 190 feet NGVD. Stormwater for this lift area will be conveyed to the northeast corner where the temporary downchute from Lift 2 will be extended to Lift 3. Stormwater conveyed in the temporary stormwater downchute will discharge into the perimeter ditch that leads to Basin C.

L.2.f.(4) Section 9 of the Capacity Expansion Area

The proposed filling sequence for Section 9 is presented in the drawings provided with the May 2007 RAI Response document for the facility operations permit renewal. The Section 9 area has been divided into three cells by separation berms to manage the amount of leachate generated and stormwater. Filling of the Section 9 area will begin on the southern end of the cell. Waste placement will continue in the southern cell until 20 feet of waste has been placed in the cell. Waste placement will begin with an initial 4-foot lift of select waste. The other two cells will have rain tarps so stormwater can be pumped from these cells. After 20 feet of waste is placed in the southern cell, the filling operation will proceed to the center cell. Again, 20 feet of waste will be placed in the cell with the first 4 feet being select waste, and the filling operation will proceed to the last cell. Once 20 feet of waste has been placed across all of Section 9, the filling operation will resume on the north side and proceed south across the area.

The filling will also be placed against the west sideslopes of Sections 7 and 8. The filling in Section 9 will proceed south to north and against the sideslopes of both Sections 7 and 8. As the Operations Fill Sequence Drawings show, filling will occur to bring the sideslopes of Sections 7, 8, and 9 to their design slope of 3(h) to 1(v) slopes. The filling of Section 7, 8, and 9 areas will bring the combined areas to an approximate elevation of 285 feet.

L.2.g. Waste Compaction and Application of Cover

Waste will be placed at the top or bottom of the working face and spread toward the bottom or top, respectively. Waste will be spread in approximately 2-foot-thick layers and compacted with a minimum of three to five passes of the landfill compactor. The spreading and compacting is intended to be a continuous operation. A minimum in-place waste density of 1,000 pounds/cubic yard (lb/cy) will be achieved.

A minimum of 6 inches of compacted initial cover will be placed over the waste at the end of each operation day. Before the working face between landfills is moved, the area that will remain inactive will be covered with compacted initial cover, soil, or a mixture of 50 percent unscreened wood mulch and 50 percent soil (no ash), with sufficient thickness (minimum 6 inches) to prevent erosion and the mixing of leachate with stormwater. A minimum of 1 foot of intermediate cover, in addition to the 6-inch initial cover, will be applied and maintained within 7 days of cell completion if additional solid waste will not be deposited within 180 days of cell completion.

When landfilling operations begin again in areas with intermediate cover, the intermediate cover (free of waste) will be stripped from the surface (upper 12 inches) and reused over other areas

needing intermediate cover. The stripped intermediate cover will be pushed ahead and used as perimeter berms around the active working face area. The intermediate areas are graded to promote drainage (minimum 2 percent slope) and seeded to prevent erosion.

L.2.h. Operation of Leachate, Gas and Stormwater Controls

See Sections L.8, L.9, and L.10 for leachate, gas, and stormwater controls, respectively.

L.2.i. Water Quality Monitoring

L.2.i.(1) Phases I-VI

Groundwater and surface monitoring is included in Section 2 of the Monitoring Plan Evaluation Phases I-VI and the Capacity Expansion Area (Sections 7, 8 and 9). Leachate monitoring is included in Section 9.0, the effluent monitoring is included in Section 9.1.2, and the biosolids monitoring is included in Section 9.1.3 of the Leachate Management Plan.

L.2.i.(2) Capacity Expansion Area

Water quality monitoring for Sections 7, 8, and 9 is included in Section M of the Permit Application. The proposed monitoring plan is designed to be consistent with the conceptual sequencing plan for build-out of the Capacity Expansion Area.

L.2.j. Leachate Collection and Removal System Maintenance

Refer to the current LMP Report.

L.3 OPERATING RECORD

The operating record will be maintained on site in the Administration Building or at the SWMD office. The operating record will be accessible to the Facility operation personnel and will be available for inspection by FDEP. The records include the following:

- Waste reports
- Operation permits
- Construction and closure permits including any modifications
- Monitoring results, such as water quality testing
- Notifications to FDEP
- Engineering drawings
- Training certifications as required by Chapter 62-701.320(15), FAC

L.4 WASTE RECORDS

The amount of solid waste received at the landfill will be weighed and recorded in tons per day in accordance with Rule 62-701.500(4), FAC. Waste reports will be compiled monthly and kept on site with the operating record. Waste will be listed by the following types and the amount of tons received will be recorded:

- Processable, to include
  - Household waste
  - Treated biomedical waste

- Non-processable, to include
  - Industrial waste
  - Industrial sludge
  - Air/water treatment sludge
  - Commercial waste
  - Incinerator by-pass waste
  - Agricultural waste
  - Ash
  - Waste tires
  - Construction and demolition debris
  - Asbestos
  - Yard trash

All records will be retained at the SWMD administration office. Report types include daily, month-to-date, and year-to-date totals of waste received from the various haulers. The records will be available to the FDEP for review.

L.5 ACCESS CONTROLS

The perimeter fence and berms around the Facility prevent the entry of livestock, protect the public from exposure to potential health and safety hazards, and discourage unauthorized entry or uncontrolled disposal of unauthorized materials. 'No trespassing' signs are also posted along the perimeter fence. The SWMD and Contractor personnel will inspect the premises daily. The gate at the Facility entrance and all other gates will be kept locked at all times the landfill is closed, and the Contractor will provide security personnel to guard the Facility during non-operating hours.

L.6 LOAD-CHECKING PROGRAM

The SWMD has established a random-load-checking program as referenced in Part L.2.c to detect and prevent disposal of unauthorized wastes into the landfill. In addition, site access control discourages the disposal of unauthorized and hazardous wastes. A sign at the entrance of the Facility explains the types of waste prohibited at the landfill.

In accordance with Rule 62-701.500(6)(a), FAC, a minimum of three random loads will be checked at the active working face(s) each week. The selected drivers will be directed to discharge their loads at a designated location next to the working face. If any unauthorized special waste (i.e., lead-acid batteries, used oil, yard trash, white goods, and whole tires) is found during the random inspection or as part of routine operations, the waste will be segregated and removed from the site for recycling as described in Part L.2.c. These special wastes will be stored next to the working face and removed from the site within 30 days.

If an unauthorized waste (i.e., hazardous, PCBs, untreated biomedical, or free liquid) is found, the generator of the waste, if known by the driver, will be contacted to determine the waste source. Either the hauling company or the generator of the waste will be directed to remove the unauthorized waste. The random load inspections will be documented on a report form which includes the date and time, name of the hauling company and the driver of the vehicle, the vehicle license number, the source of the waste or generator, and any observations or notes made by the inspector (Appendix D). The inspector will identify and note all unauthorized waste found during the random load inspection, estimated quantity, and the action taken. The inspector will sign the inspection form that will be retained at the Facility.

If the waste owner cannot be identified, the waste will be evaluated by Contractor personnel in charge. The waste will be isolated and contained and will not be moved until the waste is determined to be acceptable. If it is determined that the waste is not suitable for disposal, the SWMD will be notified for additional assessment and testing of the waste. Subsequently, a record of the decision will be placed into the daily operations file for the Facility.

If any regulated hazardous waste is discovered in a random load check or is identified by an operator or spotter, the Landfill Manager and the FDEP will be notified immediately as well as the generator or hauler, if known. The Landfill Manager is trained in the proper procedure to follow including notifications. If the generator or hauler is not known, the SWMD will be responsible for disposing of the hazardous waste at a properly permitted Facility. The hazardous waste will be isolated and restricted from access until it is removed from the landfill by a qualified hazardous waste contractor. Hazardous wastes will be removed from the site within 24 hours.

As required in Rule 62-701.320(15), FAC and discussed in Park L.1, inspectors, scale-house attendants, equipment operators, and landfill spotters will be trained to identify unacceptable wastes and hazardous wastes.

L.7 SPREADING AND COMPACTING WASTE

All loads coming into the Facility, including small-volume unloading containers, will be delivered to the working face daily. To preserve the prepared base area and to protect the leachate collection system, traffic will be prohibited to operate directly on the chipped tires overlying the drainage layer. Traffic will only be allowed to maneuver on top of the compacted and covered waste. Therefore, the initial lift of all new disposal areas will be accessed by

vehicles from the top of the working face. The waste will be spread and compacted from the top, keeping all heavy equipment off the prepared base.

For all subsequent lifts, the waste placement will vary depending on field conditions. Some lifts will be built from the bottom of the active working face. At the discretion of the operator, waste will also be placed from the top of the active working face and spread toward the bottom. Waste will be placed against the covered working face of the previous day's waste. The first cell will act as a means of access and as a berm to guide the placement of waste for the remaining cells. See Part L.2.g for additional information on waste compaction.

The following guidelines will provide an efficient and environmentally sound method of operation for the Facility:

- Portable litter fencing will be placed at the working face where needed to reduce windblown litter.

- Cracks or eroded sections in the surface of any filled and covered area will be repaired and a regular maintenance program will be followed to eliminate pockets or depressions that may develop as waste settles.

- If 12 inches of intermediate cover (free of waste) has been placed over a partially filled area, it will be removed, reused, and stockpiled for later use before the placement of a new lift.

- Tire chips, ash residue from incinerated MSW, tarps, soil, or a mixture of soil/mulch may be used for initial cover. Stormwater runoff will not be allowed from waste-filled areas covered with tire chips, ash, or tarp. Runoff from outside the bermed working face area will be considered stormwater only if the flow passes over areas that have no exposed waste and have been adequately covered with at least 6 inches of compacted soil (or a mixture of soil/mulch) which is free of waste and has been stabilized to control erosion.

- Sufficient cover material will be stockpiled near the working face to provide an adequate supply for initial cover operations. In some areas, daily stockpiling may not be necessary because of the proximity of the borrow area.

L.7.a. Waste Layer Thickness and Compaction Frequencies

Landfill personnel will direct all incoming waste to be unloaded at the toe or top of the working face. Waste will be spread in approximately 2-foot-thick layers and compacted with a minimum of three to five passes of the landfill compactors. The spreading and compacting is intended to be a continuous operation, and waste will not be placed in a layer until the previous layer is compacted.

L.7.b. First Layer Thickness

For Phases I-VI, the initial waste layer has been placed. To protect the integrity of the leachate collection system of the landfill, traffic and heavy equipment were not allowed directly on the sand drainage layer.

The procedure for filling and compacting the first layer of waste for the permitted sections at the Capacity Expansion Area will protect the integrity of the liner and leachate collection system. Traffic directly on the chipped tires will be prohibited, and the first lift will be accessed by vehicles from the top of the working face. An initial 4-feet-thick lift of selected waste will be placed over the protective layer (i.e., chipped tires). The selected waste will be MSW and ash not containing large rigid objects and will be spread and compacted from the top of the working face.

L.7.c. Slopes and Lift Depth

The working face slope will be maintained at a slope no steeper than 3H:1V. Each cell will be constructed in a horizontal lift to an approximate height of 8 to 12 feet, with the maximum height as shown on the Drawings provided separately with the Phases I-VI and the Capacity Expansion Area (Sections 7, 8, and 9) Operations Permit Renewal Application.

L.7.d. Working Face

Cells will be constructed with slopes no steeper than 3H:1V, and a working face will be maintained to provide unhindered vehicle access to the working face while minimizing exposed areas and unnecessary use of cover material. The working face may move from month to month from Phases I-VI to the active cells at the Capacity Expansion Area. The working face will be bermed with soil or a mixture of 50 percent unscreened wood mulch and 50 percent soil (no ash) to prevent the mixing of leachate with stormwater.

L.7.e. Initial Cover Controls

At the end of each working day, the waste will be covered with a 6-inch lift of compacted cover material such as soil, a mixture of 50 percent unscreened wood mulch and 50 percent soil (or ash), ash, chipped tires, or tarps. These cover materials will provide vector control, mitigate windblown litter, reduce the potential for fire, and reduce odors and moisture infiltration into the

waste. The initial cover material will be spread over the exposed waste and, with the exception of tarps, compacted by the equipment used to spread the cover (i.e., bulldozer or scraper). The initial cover material will not be removed before placement of successive lifts of waste, with the exception of tarps, which will be removed before placement of successive lifts. Any remaining litter and cleanings from equipment will be placed at the bottom of the completed cell and covered.

Before the working face between landfills is moved, the area that will remain inactive will be covered with compacted cover (free of waste), soil, or a mixture of 50 percent unscreened wood mulch and 50 percent soil (no ash), with sufficient thickness (minimum 6 inches) to prevent erosion and the mixing of leachate with stormwater.

L.7.f. Initial Cover Frequency

At the end of each day's operation, the active landfill working face will be thoroughly compacted, and cover material will be spread and compacted to a depth of 6 inches over the day's entire working face and sideslopes. Initial cover material is discussed in Part L.7.e. If needed, the portable barriers that define the working face will be moved to the positions required to define the next day's operation.

The Facility is equipped to excavate and haul cover materials from on-site borrow areas to the working face. Normally, an elevating scraper is used to excavate and haul cover material from the borrow area to the working face where it can be spread by a scraper or bulldozer.

When using a mixture of soil and mulch the following process will be used:

1. The area to be excavated will be identified in advance. The area used for mulch mixing will not be larger than 15 acres.

2. A 4-foot layer of mulch will be placed over the designated excavation area.

3. The mulch placed in a given area will not be allowed to remain in place longer than 2 years.

4. As the area is excavated, the excavator will take bucket loads of the mulch layer plus 4 feet of soil, mixing the load as it is placed in the dump trucks.

5. The trucks will deliver the load to the working face. As the loads are deposited, additional mixing will occur.

6. The soil/mulch mixture will be spread over the working face using a bull dozer, causing additional mixing.

L.7.g. Intermediate Cover

Intermediate cover will be placed and maintained over cells which will not receive additional solid waste or final cover within 180 days as required in Rule 62-701.500(7)(f), FAC. The working face will be bermed to reduce stormwater impacts. Sideslopes will be well maintained to minimize erosion. Intermediate cover material will be placed over the landfill surface within 7 days of cell completion if additional waste will not be placed within 180 days. Intermediate cover will be placed to a minimum compacted thickness of 12 inches on top of the 6 inches of compacted initial cover. On-site material free from organic matter, roots, and branches will be used for intermediate cover. Specifically, phosphatic waste clays available on site will be mixed with sand and used for intermediate cover.

To conserve the soil/clay mix, a portion of the intermediate cover will be removed immediately before placement of additional solid waste on top of the lift or before placement of additional waste. The soil/clay mix (free of waste) will be stripped and reused as intermediate cover material. The stripped intermediate cover will be pushed ahead as needed for the perimeter interceptor berms constructed around the active working face area. The intermediate cover areas will be graded to promote drainage (minimum 2-percent slope) and seeded to prevent erosion.

L.7.h. Final Cover

L.7.h.(1) Temporary Final Cover

A temporary final cover consisting of a soil layer will be installed over cells in Phases I-VI or the CEA which will not receive additional solid waste. The temporary final cover will consist of 12 inches of 10^{-5} cm/sec soil. Vegetative cover will be placed on areas which have reached interim final grade in Phases I-VI ~~and the CEA~~. These areas will not receive additional waste until the end of the consolidation period before waste can be filled on top of the area.

L.7.h.(2) Final Cover

When portions of the Facility are brought to design grades, final cover will be placed over the areas that have ~~when Phases I-VI or the CEA has~~ attained final elevation within 180 days in accordance with Rule 62-701.500(7)(g), FAC. Vegetative cover will be established. The final cover system and sequence for final cover placement will be submitted with the application for closure at least 90 days before the partial closure of the sideslopes.

L.7.i. Scavenging and Salvaging

Except for such operations that are conducted as part of a recycling program, scavenging and salvaging are not permitted at the Facility.

L.7.j. Litter Policing

If necessary, portable litter fences will be placed downwind of the immediate working area to confine most of the windblown material. Litter around the site and the entrance roadways will be collected regularly and picked up within 24 hours, in accordance with Rule 62-701.500(7)(i), FAC. In addition, the Contractor maintains a litter crew to provide litter control on State Road (SR) 39 from the Lithia-Pinecrest intersection to CR 672 and on CR 672 to Balm-Boyette Road.

L.2.k. Erosion-Control Procedures

The Facility fill sequence and the drainage facilities have been designed to minimize erosion of landfill sideslopes and washout of adjacent areas. The landfill surface will be inspected daily for cracks, eroded areas, and depressions in the landfill surface. Corrective action will be implemented within 7 days of detection. In areas where standing water develops, the area will be filled, compacted, and graded to provide positive drainage. Where the standing water problem cannot be corrected by proper grading, temporary drainage ditches will be constructed to drain off the standing water. Intermediately covered areas or other areas that discharge to the stormwater management system and which exhibit significant erosion will be repaired as follows:

- If greater than 50 percent of the soil cover material has eroded, the area will be repaired within 7 days.
- If waste or liner is exposed, the area will be repaired by the end of the next working day.

L.8 LEACHATE MANAGEMENT

Please see the current LMP.

L.9 GAS MONITORING AND MANAGEMENT PROGRAM

SWMD personnel shall monitor and record landfill gas (LFG) reading quarterly at the perimeter LFG monitoring wells and in the Administration, LTRF, and Maintenance buildings. The locations of the existing LFG monitoring points are included in Appendix ~~H~~FG. The ambient air and areas with slab penetration (areas with plumbing for water and drains) will be monitored inside these structures. The monitoring will be conducted for the Lower Explosive Limit (LEL) of methane using a GEM-500 Infrared Landfill Gas Analyzer (or equivalent). The probes will not be purged. Once the GEM is connected to the sampling port, the valve will be opened and the GEM pump will be started. The GEM reading will be observed and the value will be recorded.

When personnel must enter confined spaces or areas where dangerous gases may be present, the SWMD will follow the requirements in the "Code of Federal Regulations Title 29, Part 1910.146 OSHA" and the safety guidelines outlined in "A Compilation of Landfill Gas and Field Practices and Procedures" prepared by the SWANA Landfill Gas Division Health and Safety Task Force.

If methane is detected in concentrations greater than the regulatory limit (100 percent of the lower explosive limit at the property boundary or 25 percent of the lower explosive limit within structures), the SWMD will evaluate potential measures to correct the exceedances. If an unacceptable concentration of methane is detected in a monitoring location (i.e., a well or an on-site structure), the SWMD will immediately take appropriate actions to protect human health. The SWMD will notify FDEP and will re-monitor the location during each of the next 3 days. During this time the SWMD will evaluate potential causes of the exceedance and will implement procedures to remedy the situation if exceedances persist after the third day. Within 7 days of the initial exceedance, the SWMD will submit a remediation plan to FDEP in accordance with Rule 62-701.530(3)(a).

As described in Part L.7, the SWMD has a program for the placement of cover, which is effective for controlling disease, vectors, objectionable odors, and litter. No objectionable odors have been detected or reported by adjacent property owners. At least quarterly, or more frequently if necessary, qualified personnel from the SWMD will assess the presence of ambient objectionable odors at the perimeter monitoring points shown in Appendix ~~H~~FG. If objectionable odors are detected at the property line, the SWMD will implement an odor-monitoring program as required by Rule 62-701.530(3)(b) FAC.

For information on the gas management program and gas collection and control system, please refer to the approved GCCS Design Plan submitted to FDEP by SCS Engineers dated July 11, 2008.

L.10 STORMWATER-MANAGEMENT SYSTEM

L.10.a Leachate Reduction

L.10.a.(1) Stormwater Diversion

L.10.a.(1).1 Site Stormwater System

The stormwater system was designed to transport the maximum expected flows from a 24-hour, 25-year rainfall event and minimize the collection of standing water within the disposal areas. To efficiently collect and transport the stormwater runoff away from the disposal areas, the stormwater system will be maintained in good condition, with the proper slopes and free from obstructions. Erosion control measures and corrective action are described in Part L.7.k of the Operations Plan. In addition, the design maintains conformance with the site's Southwest Florida Water Management District (SWFWMD) Stormwater Permit (a copy was submitted in Volume 3 of the Construction Permit

Application for the Capacity Expansion Area, Section 7, September 2002). The major stormwater component designs and operations are as follows:

- Interior Stormwater Separation berms are generally designed to be 3 feet high and 3 feet wide across the top with sideslopes of 3H:1V. The separation berms divide the contributing runoff areas to facilitate the collection and handling of stormwater as well as providing separation from leachate.

- Sideslope swales were designed to convey stormwater flow from the sideslopes to the downchutes as shown on the drawings. Sideslope swales will be constructed where needed and as shown on the sequence drawings provided separately with the Phases I-VI and Capacity Expansion Area (Sections 7, 8, and 9).

- Downchutes constructed on the side slopes of the landfill will transport stormwater flow to the perimeter stormwater ditches.

- The perimeter stormwater ditches collect surface water runoff around the site, prevent offsite drainage from entering the landfill area, and drain runoff to the appropriate stormwater basins located around the site.

L.10.a.(1).2 Phases I-VI

The Phases I-VI stormwater collection system directs stormwater runoff from the landfill and surrounding sub-shed areas and into stormwater detention basins. The basins are designated as Basins A, B, C, D, and E, and an evaporation area. As the Phase I-VI areas are filled with waste, daily and intermediate cover (clean fill) is applied over the waste which promotes drainage away from the waste material. This minimizes the amount of water that is allowed to infiltrate into the waste. Stormwater that comes in contact with the waste in the active working area is considered leachate and will not be allowed to run off into the stormwater management system. The size of the working area will be kept to a minimum to minimize leachate and berms around the working area will separate stormwater from leachate. The runoff will be directed toward downchutes that will be conveyed to one of the basins.

L.10.a.(1).3 Capacity Expansion Area

The Capacity Expansion Area stormwater collection system directs stormwater runoff from the landfill and surrounding sub-shed areas and into the existing stormwater detention basins. The receiving basins are designated as Basins C and D. As the Capacity Expansion Area, currently Sections 7 and 8 (Section 9 to be constructed), is filled with waste, it will then be covered with daily and intermediate cover (clean fill) to allow drainage away from the waste. This minimizes the amount of water that is allowed to infiltrate into the waste. Stormwater that comes in contact with the waste (now

considered leachate) in the active working area will not be allowed to run off into the stormwater management system. The size of the working area will be kept to a minimum to minimize leachate. Berms around the working area will separate stormwater from leachate. The runoff will be directed toward downchutes and transported via stormwater ditches to Basin C. The undeveloped areas of the Capacity Expansion Area will collect and drain stormwater runoff to Basin D.

L.10.a.(1).4 Other Site Stormwater Basins

Several other basins located around the site collect stormwater runoff; however, they do not collect runoff from disposal areas. The other basins are mentioned in this plan for informational purposes. Basin E and Retention Ponds F and G collect runoff from the scalehouse. Retention Pond H collects runoff from the LTRF.

L.10.a.(2) Rain Tarps

Rain tarps will be used to cover open areas (areas that have not received waste material yet but are connected to the leachate collection system) to keep stormwater out of the leachate collection system. Water that has collected on top of the rain tarp is considered stormwater and can be pumped to the appropriate stormwater basin that was designed for that area. Before placement of waste, all rain tarps will be removed.

L.10.a.(3) Stabilized Slopes

As filling progresses, the top and side slopes that will not receive additional solid waste for 2 or more months will be stabilized. First, compacted fill will be placed over the waste material to keep stormwater from infiltrating into the waste and to promote runoff. The slopes can then be stabilized with vegetative cover, seed, and mulch, or rain tarp covers. Exterior side slopes that are constructed to design grade and interior side slopes that will not receive waste for longer than 180 days will be covered with intermediate cover and either vegetative cover or hydroseed.

L.10.a.(4) Closure

As disposal areas reach final elevations as discussed in Part L.7.h, areas may have a final or temporary cover placed over the waste material that will provide a low permeability cover over the waste and thus minimize long-term infiltration of stormwater into the waste materials as described in Section L.7.h.(1). As stormwater infiltration is cut off, water within the waste will drain out and into the leachate collection system. Since no further infiltration of stormwater will occur, the amount of leachate from stormwater infiltration will reduce with time.

The methods described above represent the current plan; however, as operations continue, they may be modified if alternate methods prove more efficient or allow a higher percentage of stormwater runoff, thus resulting in greater leachate minimization.

L.11 EQUIPMENT AND OPERATION

Landfill operation was discussed in Part L.2.

L.11.a. Operating Equipment

The landfill is currently operated with the following on-site equipment:

- Two steel-wheeled compactors.
- Two bulldozers.
- One self-propelled scraper.
- One water tank truck.
- One motor grader.
- One excavator.
- Several pickup trucks.
- Other miscellaneous construction and maintenance equipment.

Where appropriate, equipment is fitted with safety cabs and fire extinguishers. The Contractor is required to have back-up equipment available within 24 hours.

L.11.b. Reserve Equipment

Sufficient backup equipment will be provided on site for equipment breakdowns and downtime for normal routine equipment maintenance. Pre-arrangements with contractors and rental equipment dealers will be made to furnish equipment on short notice in the case of a major equipment failure. The Reserve Equipment Agreement is presented in Appendix B.

L.11.c. Communications Equipment and Personnel Facilities

Telephones are located at the Administrative and Maintenance Buildings for use in emergencies. Cellular telephones and two-way radios are also used. The Administration Building is equipped with water supply, toilet facilities, emergency first-aid supplies, and electricity. The building also provides shelter for employees in case of inclement weather. The Maintenance Building is equipped with spare parts, tools, equipment, and electrical services for operations and repair.

L.11.d. Dust Control

L.11.d.(1) Phases I-VI

Dust control outside of the landfill will be provided by applying water sprayed from a water tank truck and will be applied to the unpaved access roads as required to control dust generation. Dust control inside of the landfill will be provided by applying small quantities of leachate as described in Section 8.4 of the LMP.

L.11.d.(2) Capacity Expansion Area

Dust control outside of the landfill will be provided by applying water sprayed from a water tank truck and will be applied to the unpaved access roads as required to control dust.

Dust control inside the active waste disposal areas will be provided by applying small quantities of leachate from a spray bar mounted on the rear of a tank truck. Leachate will be sprayed onto the active fill areas of the Capacity Expansion Area, including the working face, which includes a berm to prevent runoff, and areas with the required 6 inches of initial cover as required to control dust.

Leachate used as dust control reduces the amount of fresh pond water that would otherwise be sprayed from tanker trucks to control dust on the active fill areas and provides for leachate evaporation. Leachate quantities used for dust control will continue to be reported in the leachate balance report submitted to the FDEP.

The SWMD will monitor the rate of application, soil moisture conditions, and the specific landfill areas used so that this leachate disposal method does not generate runoff. Spray bar leachate spraying will be applied under the following conditions:

- Leachate will only be sprayed on active-fill areas, including the working face that includes a berm to prevent runoff and areas with the required 6 inches of compacted initial cover.

- Leachate will not be sprayed on areas with intermediate or final cover, seeded or unseeded, or on areas that do not have a berm to prevent runoff.

- The maximum grade leachate will be sprayed on is 10H:1V slope. Areas within 150 feet of a 4H:1V or steeper sideslope will not be sprayed. Areas receiving leachate will be controlled at all times to prevent leachate runoff from entering the stormwater system.

- Leachate will not be sprayed during a rainfall event.

- The tank truck spray bar method maximizes evaporation. The application rate of leachate will be such that leachate does not accumulate on the landfill surface nor infiltrate quickly into the covered refuse. The main goal of this leachate disposal method is evaporation rather than recirculation of leachate.

- Leachate will not be sprayed at the end of the day on the initial cover of the working face or other areas. Spraying should be done early in the morning after any dew evaporates and continue until early afternoon or until all available areas have been used.

L.11.e. Fire Protection and Chemical Fires

A charged fire extinguisher is kept at the scalehouse, Administration Building, Maintenance Building, and with all landfill equipment all times. Excavated soil will be used for fire control at the working face.

If a load of waste delivered to the site is smoking or on fire, landfill personnel direct the load to the "hot spot" area (an area within the landfill footprint with at least 12 inches of soil cover) where appropriate fire fighting procedures are followed.

Water for fire protection will be supplied from the fire hydrant and intake structure located east of Phase II. A second fire hydrant and intake structure is located south of the LTRF. If there is a small fire at the working face, waste handling will continue on an alternate working face until the fire is suppressed. If a fire cannot be controlled using materials and personnel already on site, the Fire Department will be immediately contacted and the emergency response plan described in Part L.2.b will be followed. See Part L.2.b for spills and containment of contaminated water such as from fire fighting.

No chemicals will be accepted at the landfill. All waste coming through the scale house will be observed to eliminate unwanted chemicals capable of starting a fire. If a chemical accident does occur, the following steps will be taken:

- Call the local Fire Department (911).
- Contain the fire in a small area until Fire Department arrives. To eliminate inhalation of potentially toxic fumes, fight fire from the upwind side.
- Stay with fire until out and cover with sand.

L.11.f. Litter Control Devices

See Part L.7.j of this Operations Plan.

L.11.g. Signs

A sign indicating the hours of operation is located at the Facility entrance. Signs indicating the name of the operating authority, charges for disposal, and identifying the asbestos disposal site are located near the scalehouse area. Traffic flow and speed limit signs are located at various points along the landfill access road.

L.12 ALL-WEATHER ACCESS ROAD

The access roadway enters the site from CR 672. An asphalt paved road travels north through citrus groves and turns east into the Facility. The access road location was selected to minimize impacts to residential and agricultural areas along CR 672. There is a gate on the access roadway at CR 672 and fencing to prevent unauthorized access.

The main access road is a 40-foot-wide roadway with a 24-foot-wide asphalt paved section and 8-foot-wide shoulders constructed within the 100-foot-wide right-of-way. The main access road is paved and extends into the Facility through the property entrance, runs along the south side of the site, and turns north along the east side of the Facility area.

Other on-site roadways will be required on a temporary and permanent basis to serve the borrow area and for maintenance and services of on-site facilities. A stockpile of materials to construct and maintain all-weather roads to the active working face is available on site.

L.13 ADDITIONAL RECORDKEEPING

Operation records, such as permits, plans, inspections and others, are maintained at the Facility and at the SWMD office. The active area of Phases I-VI will be surveyed monthly and the active area of the Capacity Expansion Area will be surveyed twice each year to calculate the volume used and to estimate the in-place density.

L.13.a. Permit Application Development

The SWMD keeps all information including site investigations, construction records, operation records, inspections, and permits.

L.13.b. Monitoring Information and Background Water Quality

The SWMD also keeps all monitoring records on groundwater, surface water, weather, and landfill gas. Copies are regularly submitted to the FDEP and the Environmental Protection Commission of Hillsborough County.

L.13.c. Remaining Site Life Estimates

An estimate of the remaining site life for the permitted area will be prepared annually for submission to the FDEP.

L.13.d. Archiving and Retrieving Records

Records of the landfill that are more than 3 years old will be available at the County's offices, 601 E. Kennedy Blvd., 24th Floor, in Tampa.

APPENDIX A

TRAINING COURSES

APPENDIX B

RESERVE EQUIPMENT AGREEMENT

APPENDIX C

COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

APPENDIX D

RANDOM INSPECTION AND VIOLATION REPORT

APPENDIX E

SPECIAL WASTE PROGRAM

APPENDIX F

TABLE 1 ~~FILLING SEQUENCE AND~~ PROJECTED DISPOSAL AND DIVERSION RATES

APPENDIX F - TABLE 1
PROJECTED DISPOSAL AND DIVERSION RATES TO PHASES I-VI AND EXPANSION AREA (SECTIONS 7, 8 AND 9)
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

Year	Projected Disposal Rate (1) (TONS PER YEAR)	Diversion to To PH I-VI (2) (%)	Diversion to Sec 7/8/9 (2) (%)	Waste To PH I-VI (TON)	Waste To PH I-VI (3) (CY)	Waste To Sec 7/8/9 (TON)	Waste To Sec 7/8/9 (3) (CY)	Remaining Capacity for PH I-VI (2,4,5) (CY)	Remaining Capacity for Sec 7/8/9 (2,4,5) (CY)
2010	272691							6,594,045	1,898,550
2011	272,691	70%	30%	190,884	200,930	81,807	86,113	6,393,115	1,812,437
2012	272,691	70%	30%	190,884	200,930	81,807	86,113	6,192,185	1,726,324
2013	272,691	70%	30%	190,884	200,930	81,807	86,113	5,991,254	1,640,211
2014	272,691	70%	30%	190,884	200,930	81,807	86,113	5,790,324	1,554,098
2015	272,691	70%	30%	190,884	200,930	81,807	86,113	5,589,394	1,467,985
2016	272,691	70%	30%	190,884	200,930	81,807	86,113	5,388,464	1,381,872
2017	272,691	70%	30%	190,884	200,930	81,807	86,113	5,187,534	1,295,759
2018	272,691	70%	30%	190,884	200,930	81,807	86,113	4,986,603	1,209,646
2019	272,691	70%	30%	190,884	200,930	81,807	86,113	4,785,673	1,123,533
2020	272,691	70%	30%	190,884	200,930	81,807	86,113	4,584,743	1,037,421
2021	272,691	70%	30%	190,884	200,930	81,807	86,113	4,383,813	951,308
2022	272,691	70%	30%	190,884	200,930	81,807	86,113	4,182,882	865,195
2023	272,691	70%	30%	190,884	200,930	81,807	86,113	3,981,952	779,082
2024	272,691	70%	30%	190,884	200,930	81,807	86,113	3,781,022	692,969
2025	272,691	70%	30%	190,884	200,930	81,807	86,113	3,580,092	606,856
2026	272,691	70%	30%	190,884	200,930	81,807	86,113	3,379,162	520,743
2027	272,691	70%	30%	190,884	200,930	81,807	86,113	3,178,231	434,630
2028	272,691	70%	30%	190,884	200,930	81,807	86,113	2,977,301	348,517
2029	272,691	70%	30%	190,884	200,930	81,807	86,113	2,776,371	262,404
2030	272,691	70%	30%	190,884	200,930	81,807	86,113	2,575,441	176,291
2031	272,691	70%	30%	190,884	200,930	81,807	86,113	2,374,511	90,178
2032	272,691	68%	32%	185,430	195,189	87,261	91,854	2,179,321	-1,676
2033	272,691	100%	0%	272,691	287,043	0	0	1,892,278	0
2034	272,691	100%	0%	272,691	287,043	0	0	1,605,235	0
2035	272,691	100%	0%	272,691	287,043	0	0	1,318,192	0
2036	272,691	100%	0%	272,691	287,043	0	0	1,031,149	0
2037	272,691	100%	0%	272,691	287,043	0	0	744,105	0
2038	272,691	100%	0%	272,691	287,043	0	0	457,062	0
2039	272,691	100%	0%	272,691	287,043	0	0	170,019	0
2040	272,691	100%	0%	272,691	287,043	0	0	-117,024	0

Notes:

1 The 272,691-ton for 2010 is based on actual waste tonnage disposed at SCLF from July 1, 2009 to June 30, 2010. This value is used for future waste tonnage projections. It is assumed that waste tonnage remains constant with no escalations to reflect current and near future economy. This table will be revised periodically during permit modifications or renewal when necessary.

2 Diversion rates to Phases I-VI and CEA (Sections 7, 8 and 9) were based on extending the remaining site life of both disposal areas as evenly as feasible. Once the CEA area is filled to final permitted grades (~ year 2032 based on the projected waste tonnages and diversion rates), all incoming waste will be disposed in Phases I-VI.

3 Volume (Cubic yards) conversion from tons was based on a 1,900 lb/cy (PCY) Apparent Waste Density (AWD). AWD = actual waste tonnage disposed / airspace consumed by both waste and daily cover. The relatively high AWD is due to the higher content of ash (~ 75% of total waste stream) from the Hillsborough County Waste-to-Energy facility in the current and projected incoming waste stream.

4 Remaining air space calculations were based on the July 7, 2010 site aerial topographic survey (prepared by Pickett Surveying & Photogrammetry) and permitted final build out contours. Final cover volumes were deducted from gross airspace. Daily cover volumes were included in the remaining airspace (after final cover reduction) calculations by using the Apparent Waste Density of 1,900 PCY.

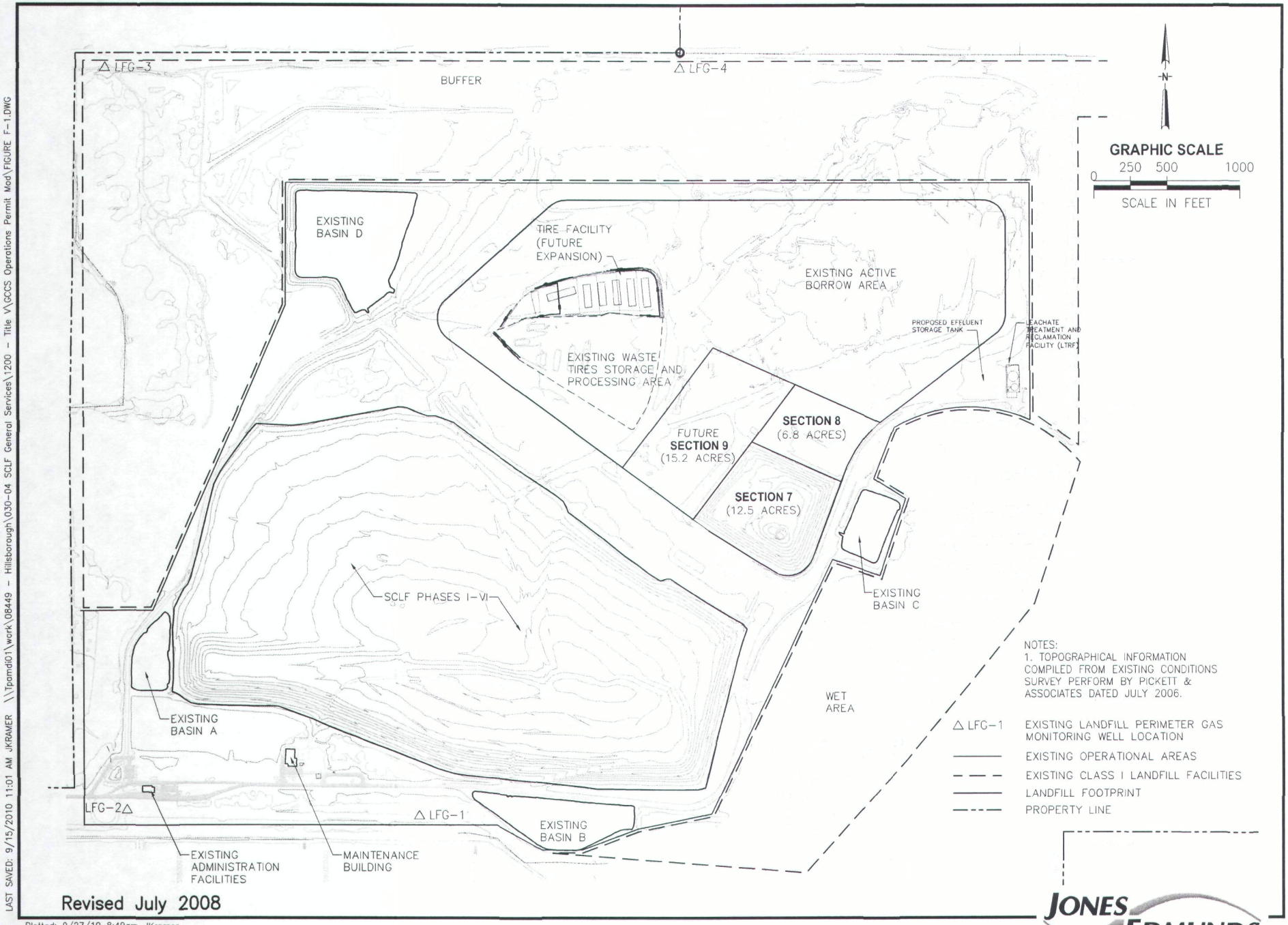
5 Remaining capacities in 2010 were from 2010 Remaining Capacity Report submitted to DEP in Sept 2010. CEA (Sec 7/8/9) reaches capacity ~year 2032, and Phases I-VI ~ year 2040.

~~APPENDIX G~~

~~SECTION 7 7 AND 8 CONNECTION DETAILS~~

APPENDIX ~~H~~FG

LANDFILL GAS MONITORING POINTS



LAST SAVED: 9/15/2010 11:01 AM JKRAMER \\Tpamdi01\work\08449 - Hillsborough\030-04 SCLF General Services\1200 - Title V\GCCS Operations Permit Mod\FIGURE F-1.DWG

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Figure F-1. Landfill Gas Perimeter Monitoring Wells

ATTACHMENT 4

REVISED PERMIT APPLICATION FORM

PART K. LANDFILL OPERATION REQUIREMENTS (62-701.500,FAC)

S	LOCATION	N/A	N/C		
☐	_____	☐	☒	1.	Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1),FAC)
				2.	Provide a landfill operation plan including procedures for: (62-701.500(2), FAC)
☐	_____	☐	☒		a. Designating responsible operating and maintenance personnel;
☐	_____	☐	☒		b. Emergency preparedness and response, as required in subsection 62-701.320(16), FAC;
☐	_____	☐	☒		c. Controlling types of waste received at the landfill;
☐	_____	☐	☒		d. Weighing incoming waste;
☐	_____	☐	☒		e. Vehicle traffic control and unloading;
☐	_____	☐	☒		f. Method and sequence of filling waste;
☐	_____	☐	☒		g. Waste compaction and application of cover;
☒	Part L.2.h	☐	☐		h. Operations of gas, leachate, and stormwater controls;
☐	_____	☐	☒		i. Water quality monitoring.
☒	Part L.2.j	☐	☐		j. Maintaining and cleaning the leachate collection system;
☐	_____	☐	☒	3.	Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3),FAC)
☐	_____	☐	☒	4.	Describe the waste records that will be compiled monthly and provided to the Department annually; (62-701.500(4),FAC)
☐	_____	☐	☒	5.	Describe methods of access control; (62-701.500(5),FAC)
☐	_____	☐	☒	6.	Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6),FAC)
				7.	Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7),FAC)
☐	_____	☐	☒		a. Waste layer thickness and compaction frequencies;

S	LOCATION	N/A	N/C	PART K CONTINUED
☐	_____	☐	☒	b. Special considerations for first layer of waste placed above liner and leachate collection system;
☐	_____	☐	☒	c. Slopes of cell working face and side grades above land surface, planned lift depths during operation;
☐	_____	☐	☒	d. Maximum width of working face;
				e. Description of type of initial cover to be used at the facility that controls:
☐	_____	☐	☒	(1) Vector breeding/animal attraction
☐	_____	☐	☒	(2) Fires
☐	_____	☐	☒	(3) Odors
☐	_____	☐	☒	(4) Blowing litter
☐	_____	☐	☒	(5) Moisture infiltration
☐	_____	☐	☒	f. Procedures for applying initial cover including minimum cover frequencies;
☐	_____	☐	☒	g. Procedures for applying intermediate cover;
☐	_____	☐	☒	h. Time frames for applying final cover;
☐	_____	☐	☒	i. Procedures for controlling scavenging and salvaging.
☐	_____	☐	☒	j. Description of litter policing methods;
☐	_____	☐	☒	k. Erosion control procedures.
				8. Describe operational procedures for leachate management including; (62-701.500(8),FAC)
☐	_____	☐	☒	a. Leachate level monitoring, sampling, analysis and data results submitted to the Department;
☐	_____	☐	☒	b. Operation and maintenance of leachate collection and removal system, and treatment as required;
☐	_____	☐	☒	c. Procedures for managing leachate if it becomes regulated as a hazardous waste;
☐	_____	☐	☒	d. Identification of treatment or disposal facilities that may be used for off-site discharge and treatment of leachate;
☐	_____	☐	☒	e. Contingency plan for managing leachate during emergencies or equipment problems;

S	LOCATION	N/A	N/C		PART K CONTINUED
☐	_____	☐	☒		f. Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;
☐	_____	☐	☒		g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;
☐	_____	☐	☒		h. Procedures for water pressure cleaning or video inspecting leachate collection systems.
☒	Part L.9	☐	☐	9.	Describe how the landfill receiving degradable wastes shall implement a gas management system meeting the requirements of Rule 62-701.530, FAC; (62-701.500(9),FAC)
☐	_____	☐	☒	10.	Describe procedures for operating and maintaining the landfill stormwater management system to comply with the requirements of Rule 62-701.400(9); (62-701.500(10),FAC)
				11.	Equipment and operation feature requirements; (62-701.500(11),FAC)
☐	_____	☐	☒		a. Sufficient equipment for excavating, spreading, compacting and covering waste;
☐	_____	☐	☒		b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
☐	_____	☐	☒		c. Communications equipment;
☐	_____	☐	☒		d. Dust control methods;
☐	_____	☐	☒		e. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
☐	_____	☐	☒		f. Litter control devices;
☐	_____	☐	☒		g. Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
☐	_____	☐	☒	12.	Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill; (62-701.500(12),FAC)
				13.	Additional record keeping and reporting requirements; (62-701.500(13),FAC)
☐	_____	☐	☒		a. Records used for developing permit applications and supplemental information maintained for the design period of the landfill;

S	LOCATION	N/A	N/C	PART K CONTINUED
☐	_____	☐	☒	b. Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
☐	_____	☐	☒	c. Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department;
☐	_____	☐	☒	d. Procedures for archiving and retrieving records which are more than five year old.

PART L. WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (62-701.510, FAC)

S	LOCATION	N/A	N/C	
☐	_____	☒	☐	1. Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements;
☐	_____	☒	☐	a. Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a),FAC)
☐	_____	☒	☐	b. All sampling and analysis preformed in accordance with Chapter 62-160, FAC; (62-701.510(2)(b),FAC)
				c. Ground water monitoring requirements; (62-701.510(3),FAC)
☐	_____	☒	☐	(1) Detection wells located downgradient from and within 50 feet of disposal units;
☐	_____	☒	☐	(2) Downgradient compliance wells as required;
☐	_____	☒	☐	(3) Background wells screened in all aquifers below the landfill that may be affected by the landfill;
☐	_____	☒	☐	(4) Location information for each monitoring well;
☐	_____	☒	☐	(5) Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site specific conditions justify alternate well spacings;
☐	_____	☒	☐	(6) Well screen locations properly selected;
☐	_____	☒	☐	(7) Monitoring wells constructed to provide representative ground water samples;
☐	_____	☒	☐	(8) Procedures for properly abandoning monitoring wells;