FRIEDLINE MINE SITE
SUCCESSIVE ALKALINITY PRODUCING SYSTEM
OPERATION AND MAINTENANCE PLAN

PREPARED FOR

LOYALHANNA WATERSHED ASSOCIATION
POST OFFICE BOX 561
114 SOUTH MARKET STREET
LIGONIER, PENNSYLVANIA 15658

PREPARED BY

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INTRODUCTION

The Friedline Mine Successive Alkalinity Producing System (SAPS) was designed in 1995 and constructed in 1997. Problems were encountered with the system within the first two years after construction. Low permeability was observed in Cell T-1, and seepage areas began to form at the base of Cells T-2, T-3, and T-4. Remedial actions occurred in 2001. These remedial actions including the following: replacing limestone, compost, and the piping network in Cell T-1; installing an emergency spillway in Cell T-1; replacing the compost and a portion of the limestone in Cell T-5; installing an emergency spillway in Cell T-5; and installing a limestone-lined French drain to capture and treat seepage areas.

An aluminum capture and recycling system was also installed during the remedial work. This system included an aluminum capture tank, decant valve, aluminum sludge drying bed, and aluminum sludge release valve. This aluminum capture and concentration system is an integral part of the operation and maintenance plan.

Some of the operational problems resulted from undefined operation and maintenance activities and/or timeframes. Upon completion of the remedial activities, an operation and maintenance plan was developed. The operation and maintenance activities are conducted at four periods during the year. Normal operation and maintenance occur during the months of April, July, and October while winter shutdown occurs in November.

An operation and maintenance plan record sheet has been prepared and should be filled out during each maintenance activity. This record sheet will be used to assist in evaluation of system performance and will also serve as a method to record other observations related to system performance.

NORMAL OPERATION AND MAINTENANCE

This normal operation and maintenance is scheduled to occur in April, July, and October. The primary purpose of this maintenance activity is to flush aluminum precipitates from limestone pore spaces in Cells T-1 and T-5. There are typically three phases to the normal maintenance activity. However, in April the aluminum capture tank should be empty and Phase 1 will not be needed. These phases are described below.

PHASE 1

Remove small diameter lid (Photograph No. 1) from aluminum capture tank (Photograph No. 2). Open red aluminum capture tank decant valve (Photograph No. 3) by turning valve counterclockwise approximately ¼ to 1/2 turn. Water will flow from the aluminum capture tank to the final treatment Cell T-8 (Photograph No. 4). Monitor the water level in the aluminum capture tank. The water level will drop to approximately one foot from the bottom of the aluminum capture tank. After decanting water is complete, close the red aluminum capture tank decant valve by turning clockwise.

PHASE 2

Record Cell T-1 water elevation. This is done to ensure that proper freeboard is maintained and also serves as a troubleshooting mechanism. If the observed water rises steadily over a period of time, it is an indication that permeability may be getting low and a major maintenance may be forthcoming.

Remove small diameter lid (Photograph No. 1) from aluminum capture tank (Photograph No. 2). Open Cell T-1 flush valve contained in a plastic black box between Cell T-1 and the aluminum capture tank. This is accomplished by unscrewing the lid and turning the wheel valve (Photograph No. 5) counterclockwise to a fully opened position. Water will flow from T-1 to the aluminum capture tank (Photograph No. 2). Observe the water level in the aluminum capture tank. When the water level in the aluminum capture tank nears the top, close the wheel valve by turning clockwise. After flushing is complete, replace the aluminum capture tank small diameter lid (Photograph No. 1).

PHASE 3

Record Cell T-5 water elevation. This is done to ensure that proper freeboard is maintained and also serves as a troubleshooting mechanism. If the observed water rises steadily over a period of time, it is an indication that permeability may be getting low and a major maintenance may be forthcoming.

Remove cover from in-line control structure next to Cell T-5 (Photograph No. 6). Remove six weir boards from in-line structure using weir board tool (Photograph No. 7). This is accomplished by hooking the tool on each weir board and pulling out of the in-line structure. After all six board are removed (Photograph No. 8), wait for five minutes. Replace weir boards with hooks in upright position and amp into place (Photograph No. 9).

WINTER SHUTDOWN

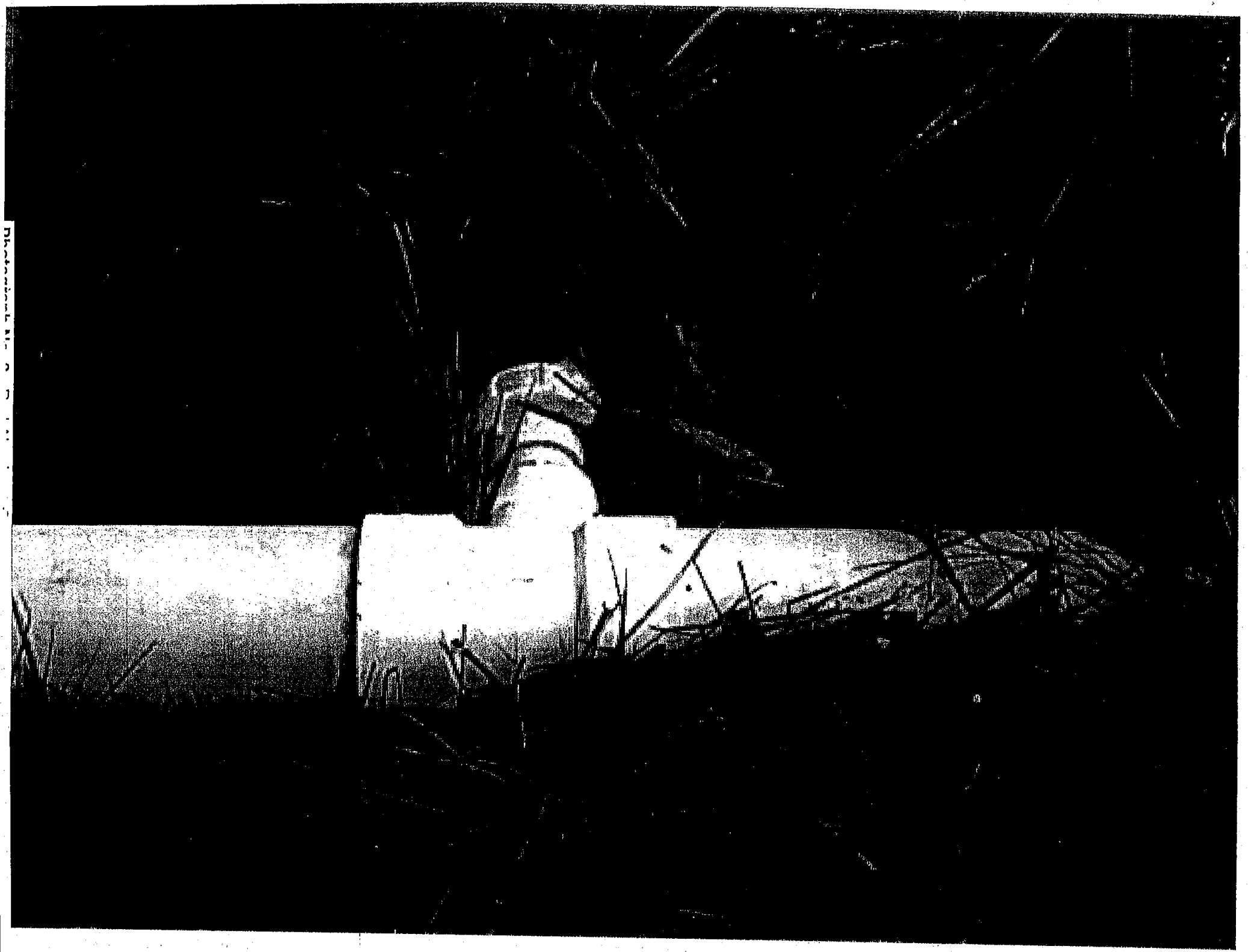
This annual maintenance is scheduled for November to prepare the system for winter weather. The primary purpose is to drain any pipes which are subject to freezing. In addition, this activity cleans the aluminum capture tank and directs the concentrated aluminum sludge to the drying bed. This activity is completed in two phases as described below.

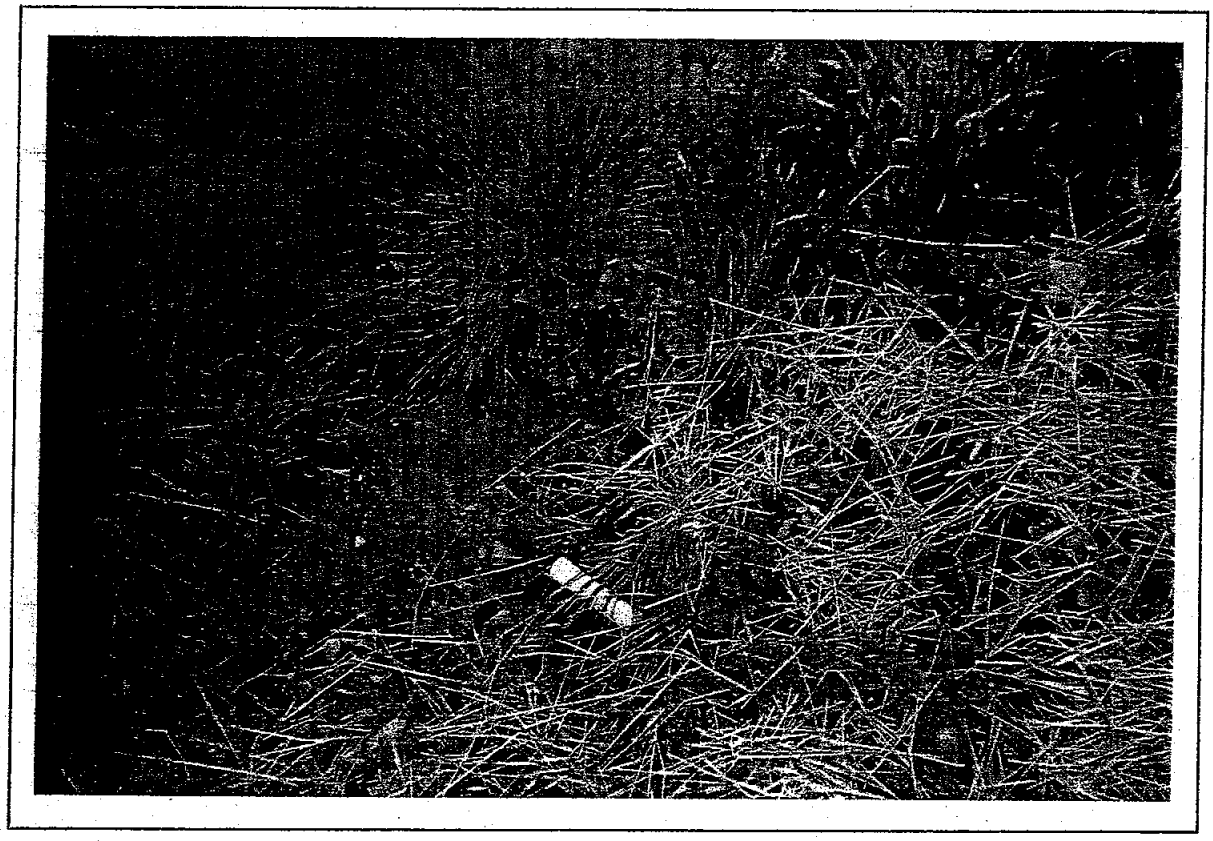
PHASE 1

Remove large diameter lid (Photograph No. 10) from aluminum capture tank (Photograph No. 2). Open red aluminum capture tank decant valve (Photograph No. 3) by turning valve counterclockwise approximately ¼ to ½ turn. Water will flow from the aluminum capture tank to the final treatment Cell T-8 (Photograph No. 4). Monitor the water level in the aluminum capture tank. The water level will drop to approximately one foot from the bottom of the aluminum capture tank. After decanting water is complete, close the red aluminum capture tank decant valve by turning clockwise.

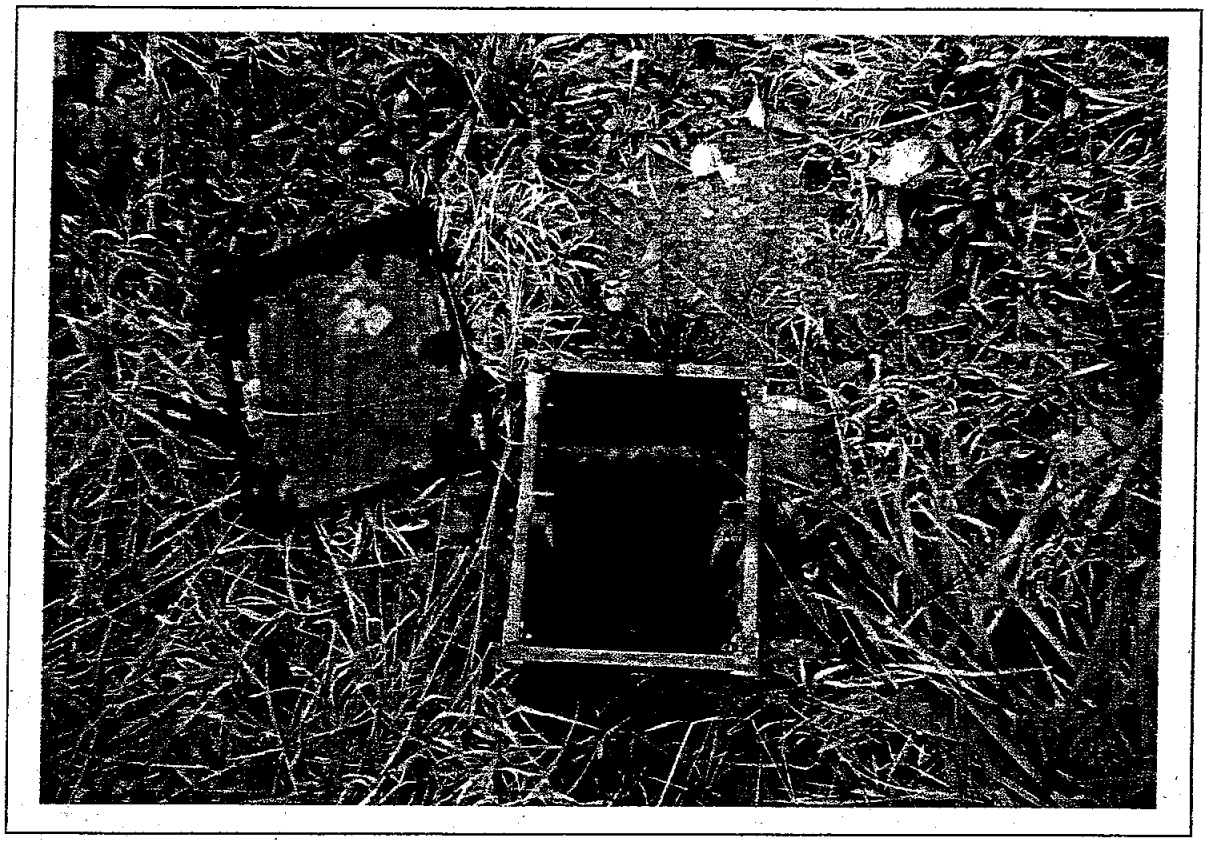
PHASE 2

Stir the concentrated aluminum sludge so that it is suspended in the liquid in the aluminum capture tank using a long handle. Open the metallic aluminum sludge drain valve (Photograph No. 11) by turning counterclockwise. Continue stirring the concentrated aluminum sludge/water mixture as the mixture flows from the aluminum capture tank to the aluminum sludge drying bed. After draining is complete, close the metallic aluminum sludge drain valve (Photograph No. 11) and replace the large diameter lid (Photograph No. 10) from aluminum capture tank (Photograph No. 2). Cover the aluminum sludge drying bed.

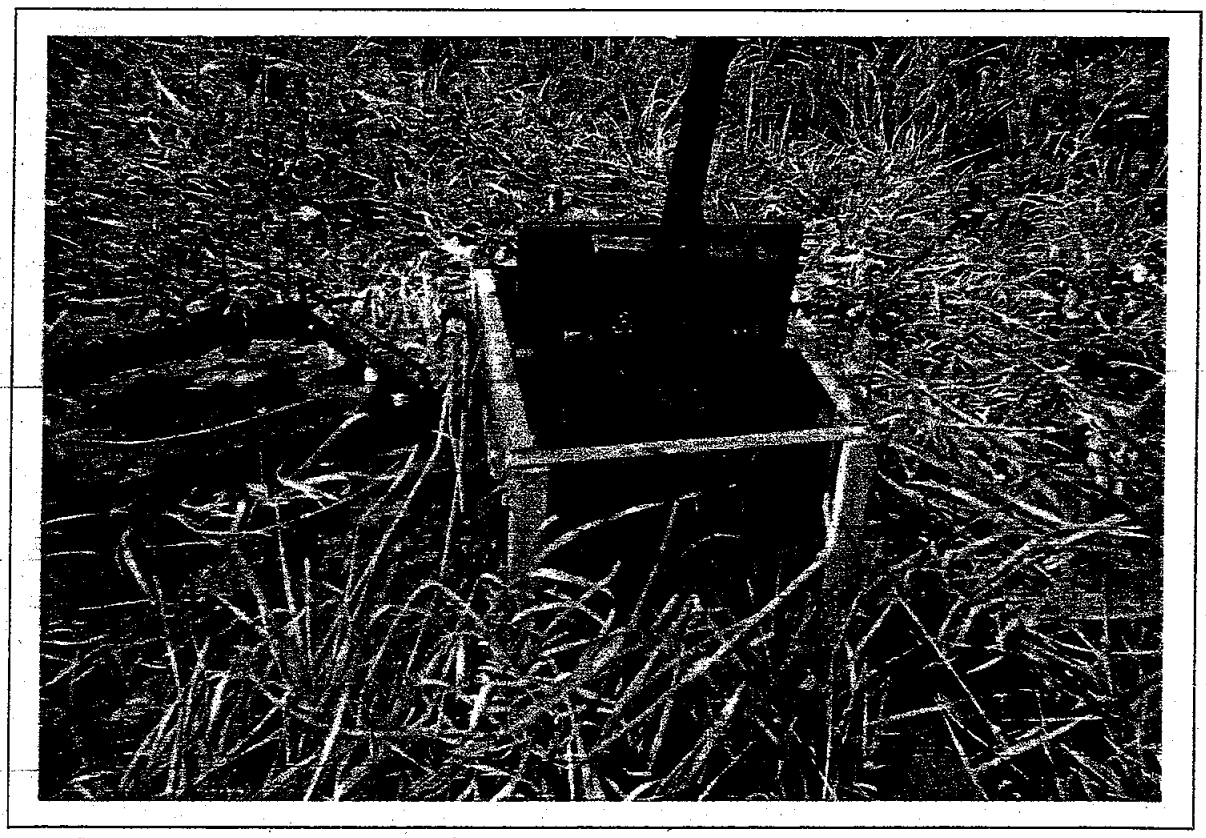




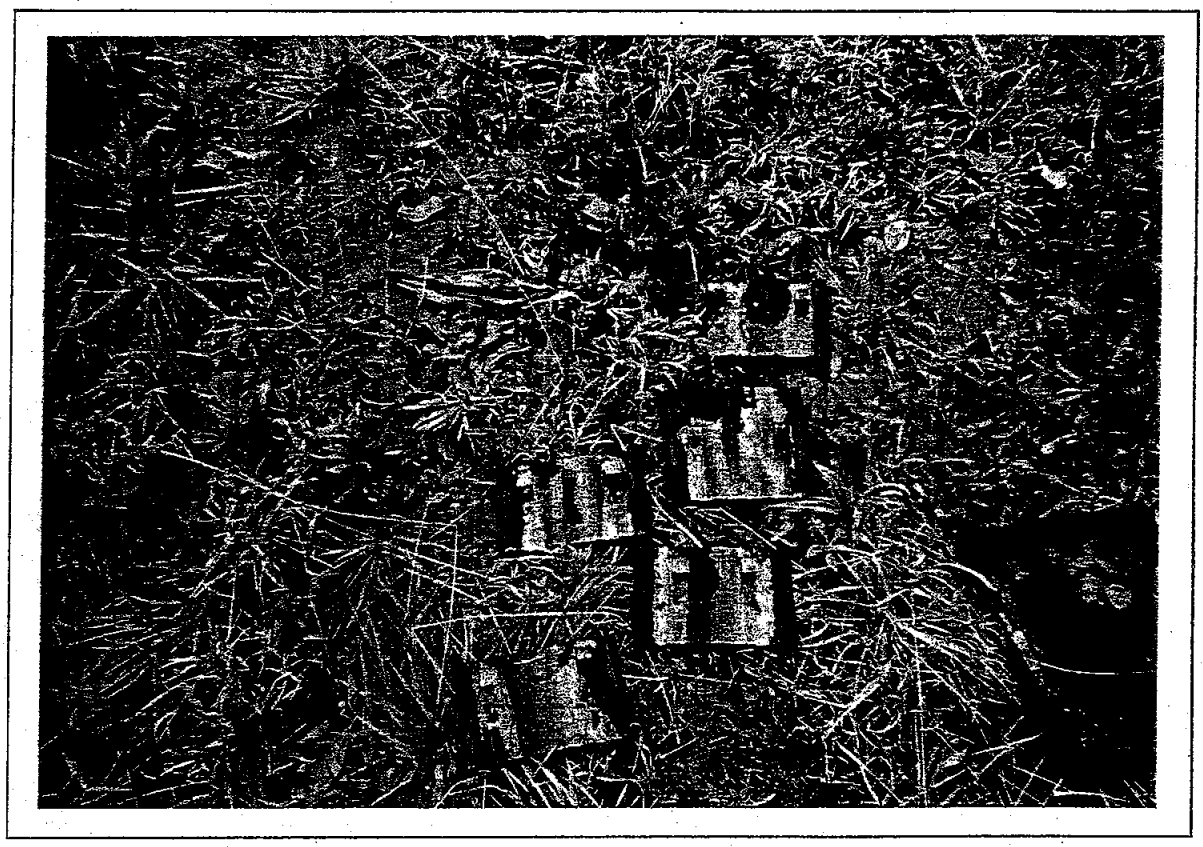
Photograph No. 4 - Decant Water Discharge Point to Cell T-8.



Photograph No. 6 - Cell T-5 In-Line Control Structure Cover



Photograph No. 7 - In-Line Structure Tool Hooked to Weir Board.



Photograph No. 8 - Six Weir Boards.

Photograph No. 9 - Weir Board Replacement and Tamping Position.

FRIEDLINE MINE SITE
OPERATION AND MAINTENANCE PLAN

NAME OF INDIVIDUAL PERFORMING MAINTENANCE	
DATE MAINTENANCE ACTIVITIES PERFORMED	
GENERAL COMMENTS	

NORMAL OPERATION AND MAINTENANCE SCHEDULE
(APRIL, JULY, OCTOBER)

PHASE 1

OPEN ALUMINUM CAPTURE TANK DECANT VALVE	
CLOSE DECANT VALVE WHEN FULLY DRAINED	
RECORD ALUMINUM CAPTURE TANK DECANT TIME	

PHASE 2

RECORD T1 WATER ELEVATION	
OPEN T1 FLUSH VALVE	
CLOSE T1 VALVE WHEN ALUMINUM CAPTURE TANK IS FULL	
RECORD T1 FLUSH TIME	

PHASE 3

RECORD T5 WATER ELEVATION	
PULL ALL T5 WEIR BOARD	
ALLOW T5 TO FLUSH FOR 15 MINUTES	
REPLACE T5 WEIR BOARDS	

ALUMINUM RECOVERY OPERATION AND MAINTENANCE

COLLECT DRIED SLUDGE FROM ALUMINUM DRYING BED	
SEND TO ALCOA FOR RECYCLING	

WINTER SHUTDOWN (NOVEMBER)

OPEN ALUMINUM CAPTURE TANK DECANT VALVE	
CLOSE DECANT VALVE WHEN FULLY DRAINED	
STIR CONCENTRATED ALUMINUM SLUDGE	
OPEN ALUMINUM SLUDGE RELEASE VALVE	
CLOSE RELEASE VALVE WHEN FULLY DRAINED	