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ORIGINAL

**BEFORE THE ARIZONA CORPORATION COMMISSION**

**COMMISSIONERS**
BOB STUMP, CHAIRMAN
GARY PIERCE
BRENDA BURNS
SUSAN BITTER SMITH
BOB BURNS



IN THE MATTER OF THE APPLICATION OF LIVCO SEWER COMPANY FOR APPROVAL OF THE SALE OF ASSETS AND FOR CANCELLATION OF THE CERTIFICATE OF CONVENIENCE AND NECESSITY

Docket Nos. SW-02563A-14-0058

**RESPONSE TO INSUFFICIENCY LETTER**

Pursuant to Arizona Corporation rules and procedures, Livco Sewer Company (Company or Livco) submits this Response to Staff's Insufficiency Letter dated March 25, 2014.

**1.** Please review the map Staff has attached and provide the number of connections, if any, that are within the contiguous areas (outside Livco's Certificate of Convenience & Necessity) served by Livco Sewer Company. Also include any Livco Sewer Company facilities that are within the contiguous areas.

**Response:** During our telephonic conference on April 14, 2014, Staff clarified its concern related to the continued sewer service to all current customers. The Company affirms that all current customers will continue to be served consistent with standard utility practices after the plant is transferred to the district.

**2.** Please provide a detailed description of the wastewater treatment facility operation, as well as a schematic.

**Response:** *See* Attachment 1.

**3.** Please provide a current copy of the ADEQ Compliance Status Report for the LIVCO wastewater facility.

**Response:** During our telephonic conference on April 14, 2014, Staff confirmed receipt of the ADEQ compliance report, which documents that the Company is in compliance with ADEQ's rules.

DATED April 15, 2014.

**MOYES SELLERS & HENDRICKS LTD.**

Steve Wene

Original and 13 copies of the foregoing filed this 15th day of April, 2014, with:

Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

# Attachment 1

FACILITIES ASSESSMENT REPORT

for

# LIVCO SEWER COMPANY
CONCHO, ARIZONA

TETRA TECH

133-26591-13001



March 2013

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## *1.0 INTRODUCTION*

### 1.1 Purpose

The purpose of this report is to present the results of the facilities assessment that was performed by Tetra Tech, Inc. on behalf of the Livco Sewer Company. A site visit was made to observe the system and assess the facilities in operation that day. This report summarizes the observations that were made as well as provides information on suggested improvement requirements for the facilities.

### 1.2 Background

The Livco Sewer System is comprised of gravity mains, pressurized lines (force mains and lift stations), and a treatment facility. It appears that some of the system was constructed in the early 1980's or earlier, therefore some of the system is quite old. The system generally flows from south to north, and eventually makes its way to the treatment site on the northwest side of Concho. Most of the system is located in the area south of Concho Lake. The sewer is pumped from the Golf Course Lift Station along Highway 61 to the north. The effluent then travels on the west side of Concho where it then enters another lift station on the south side of the highway to Snowflake (County Road 5020). This lift station then pumps the sewer to the treatment site, which is also on the south side of the Snowflake Highway. A location map showing the approximate location of the lift stations and the treatment site is shown on Figure 1.

On January 31, 2013 Ed Pauling from Tetra Tech and Matt Davis from Livco Sewer Company inspected portions of the sewer system. On that day, six (6) lift stations, seven (7) manholes and the treatment site were inspected. Ed and Matt both went to each location.

The lift station lids were lifted and the wet wells, pumps, piping, and wiring inside the wet wells were examined. The exterior of the lift stations were inspected as well along with the electrical control box and wiring. Photographs were also taken of the lift stations.

All of the manholes that were inspected were located in the Concho Valley Unit 9 subdivision except one. The six (6) manholes that were inspected in Unit 9 had no sewer flow in them and were in good condition. The single manhole not located in Unit 9 is the manhole that the 8" diameter force main enters, which is upstream of the main lift station that pumps the effluent to the treatment facility site.

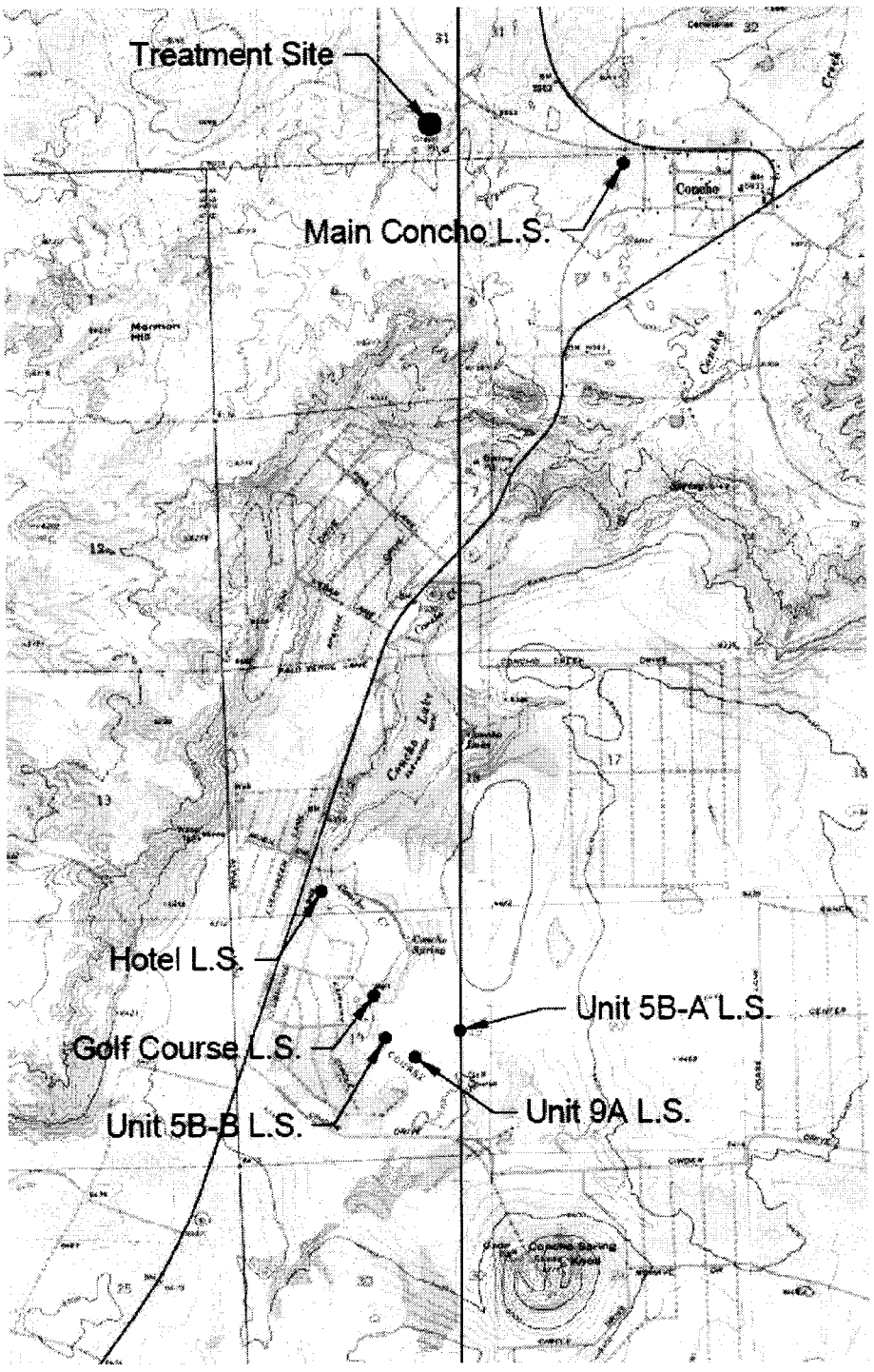


**Figure 1. Lift Station & Treatment Site Location Map**

## *2.0 LIFT STATIONS*

### 2.1 Lift Station 9A

The lift station designated as "9A" is located northwest of Concho Valley Unit 9A. It generally receives sewer flow from Units 9 and 9A. It is also the highest lift station in elevation in the sewer system. This lift station wet well is five feet (5') in diameter and has a concrete top with a metal lid and two (2) 2.5 horsepower pumps. The pumps force the effluent through a four inch (4") diameter force main. The force main empties into a manhole located on Lot 402 in Concho Valley Unit 5B. A photo of the exterior of the lift station along with the electrical control panel is shown in Figure 2.

**Figure 2. Exterior of Lift Station 9A**

The lift station was generally in satisfactory condition. The wet well appeared to be holding together and is not breaking down. The lid was also not rusting. As can be seen in Figure 3, there is some rusting inside the wet well on the rails and the piping, however they seem to be functioning fine. It was assumed that the rails are not too rusted to pull the pumps as it was indicated that the pumps have not been pulled in a long period of time. It appeared that the wet well has a PVC vent that runs from the wet well, over to the control panel, and up into the air above the control panel. This vent appears to be functioning properly as the wet well is in good condition.

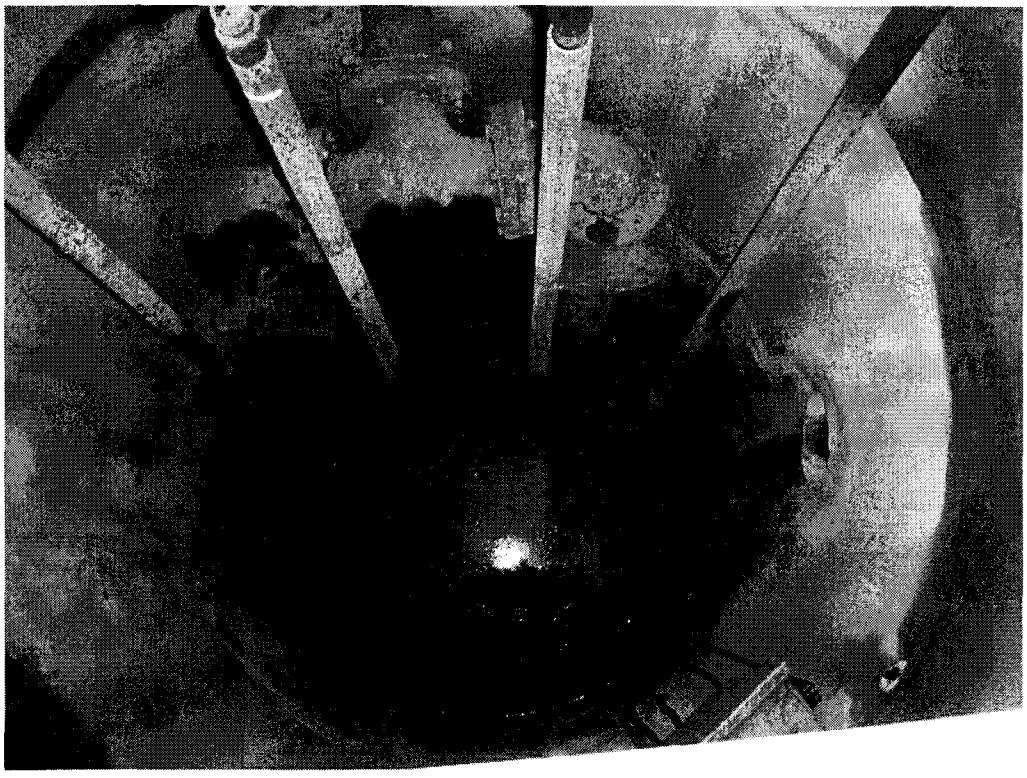

**Figure 3. Interior of Lift Station 9A**

Although there are duplex pumps in the wet well, it was indicated by Matt that there are no replacement pumps for this lift station on hand. An extra pump should be kept on hand for use when one or both of the pumps in the wet well need repaired or replaced. Also, as can be seen in Figure 3, there is an electrical junction box inside the wet well. This box should be relocated outside the wet well to prevent the box from being submerged in sewer as well as to keep the box away from the harmful and corrosive sewer gases (hydrogen sulfide) that exist in the wet well. When the lift station begins to receive more flows, this could become a problem.

Figure 4 shows that there are exposed wires between the electrical conduit and the control panel. It appears the control box was raised after the construction was completed. The control panel should be lowered so that there are no exposed wires. This will help protect the wires and will also prevent the wires from rubbing on the sharp edge of the control box when the wires move, which movement can be caused from the pumps turning on and off as well as running. After the control panel is lowered to the conduit, the hole in the control panel should be sealed. This will prevent moisture from entering the control box.

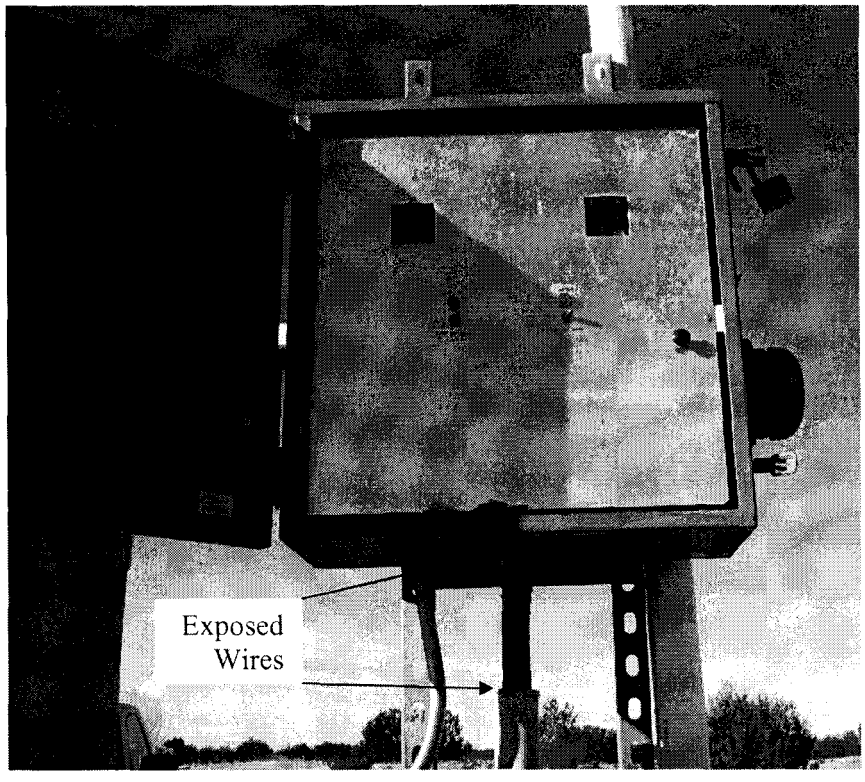


**Figure 4. Lift Station 9A Control Panel**

A fence should be added to the lift station site to prevent people from tampering with the lift station. A sign should also be attached in a conspicuous location indicating the phone number to call in case the emergency alarm is sounding or warning light is activated.

### 2.2 Lift Station 5B-1

Lift station 5B-1 is located on the south side of Concho Valley Unit 5B, in between Lots 380 and 381. This lift station is constructed to have redundant pumps, however only a single pump is functioning. The force main from the wet well is a four inch (4") diameter line that runs to a gravity manhole located on Lot 388 of Concho Valley Unit 5B. The wet well is five feet (5') in diameter and has a metal top and lid. The control panel is mounted directly onto the metal top. It appears the control panel started to corrode and break away from the lid so additional bracing was added to hold the control panel up. The corrosion of the control panel post was most likely from the hydrogen sulfide gas entering the post from the wet well. The lid has a small opening for access to the wet well and the pumps. Figure 5 shows a photo of the exterior of the lift station.

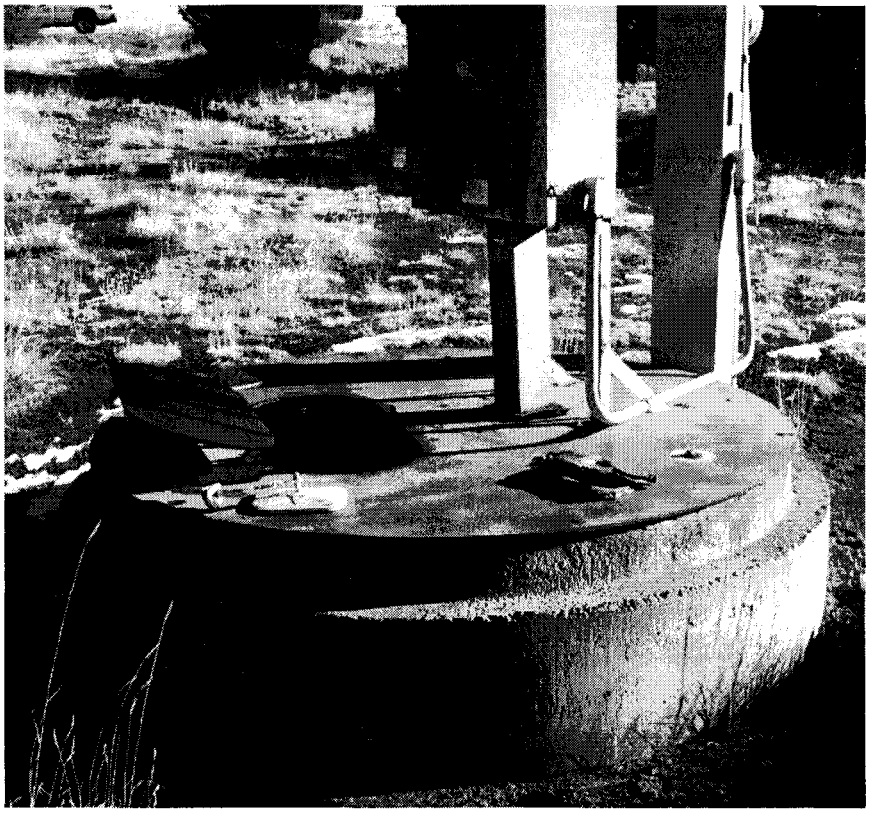

**Figure 5. Exterior of Lift Station 5B-1**

As was mentioned, the access lid to the lift station is too small and should be made larger. The existing lid is also showing a great deal of corrosion. There is not a vent on the wet well to allow the hydrogen sulfide gas to exit the wet well, and a vent should be added to the wet well.

It is also recommended that the control panel be moved from off of the wet well lid and placed near the lift station. Conduit should be ran from the side of the wet well to the control panel and all wiring should be protected and should be contained in the conduit. The entrance to the conduit at the wet well should also be sealed to prevent the sewer gasses from traveling through the conduit to the control panel.

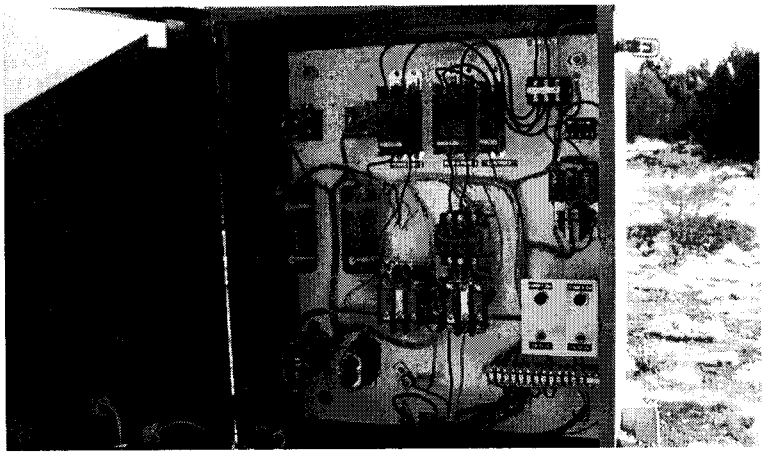

**Figure 6. Lift Station 5B-1 Control Panel**

As can be seen in Figure 6, the wiring in the control panel is in disrepair. It is recommended that an electrician be hired to check the wiring as there are many wires that are not connected. The emergency alarm on this lift station also does not operate and should be addressed.

**Figure 7. Interior of Lift Station 5B-1**

In Figure 7 it can be seen that the metal inside the wet well has a great amount of corrosion. Instead of a metal chain to pull the pump, a nylon strap has been installed. All of the metal in the wet well should be replaced with stainless steel metal, including a pull chain for the pumps.

It can also be seen in Figure 7 that the sewer in the wet well is very high and was approximately three feet (3') from over flowing the wet well. There is only a single working pump in the wet well and it is not known what size of pump it is. It was reported that the other pump would run, but the pipe may not be connected to the pump. It is not the original pump that was installed. Based on the depth of the sewer, it appears that there may be a problem with the floats or the electrical system. This high water problem should be investigated and corrected.

The wet well should have two (2) working pumps installed that have been sized for the flows entering the lift station. The required head and the size of the force main to achieve sufficient velocity to scour the force main should be analyzed. There should also be a backup pump in storage in case the lift station pumps require maintenance or replacement.

Also, there is no fence installed to prohibit tampering of the lift station. It is recommended that a fence be installed to prevent damage. A sign should also be attached in a conspicuous location indicating the phone number to call in case the emergency alarm is sounding or a light is activated.

### 2.3 Lift Station 5B-2

Lift station 5B-2 is located on the south side of Concho Valley Unit 5B, in the southwest corner of Lot 400. This lift station was in poor condition. The lift station also only has a single functioning pump. The force main from the wet well is a four inch (4") diameter line that runs to the same gravity manhole that Lift Station 9A flows to which is located on Lot 402 of Concho Valley Unit 5B. The wet well is five feet (5') in diameter and has a metal top and lid, similar to the lid on Lift Station 5B-1. Lift Station 5B-2 also has some of the same problems as Lift Station 5B-1.

The control panel was also mounted directly onto the metal top and has the same corrosion problems, although more severe than Lift Station 5B-1. Figure 5 shows a photo of the exterior of the lift station.

This lift station lid is also too small and should be made larger. The existing lid is also showing a great deal of corrosion, and therefore a vent should also be added to the wet well lid. It is also recommended that the control panel be moved from off of the wet well lid and placed near the lift station. Conduit should be ran from the side of the wet well to the control panel and all wiring should be protected and should be contained in the conduit. The entrance to the conduit at the wet well should also be sealed to prevent the sewer gasses from traveling through the conduit to the control panel. It appears some wiring for the float controls has been pulled through the hole in the lift station lid that allows the

wiring to enter the control panel. These float control wires should be in the wet well or in conduit for protection. They should not be opened to the elements.

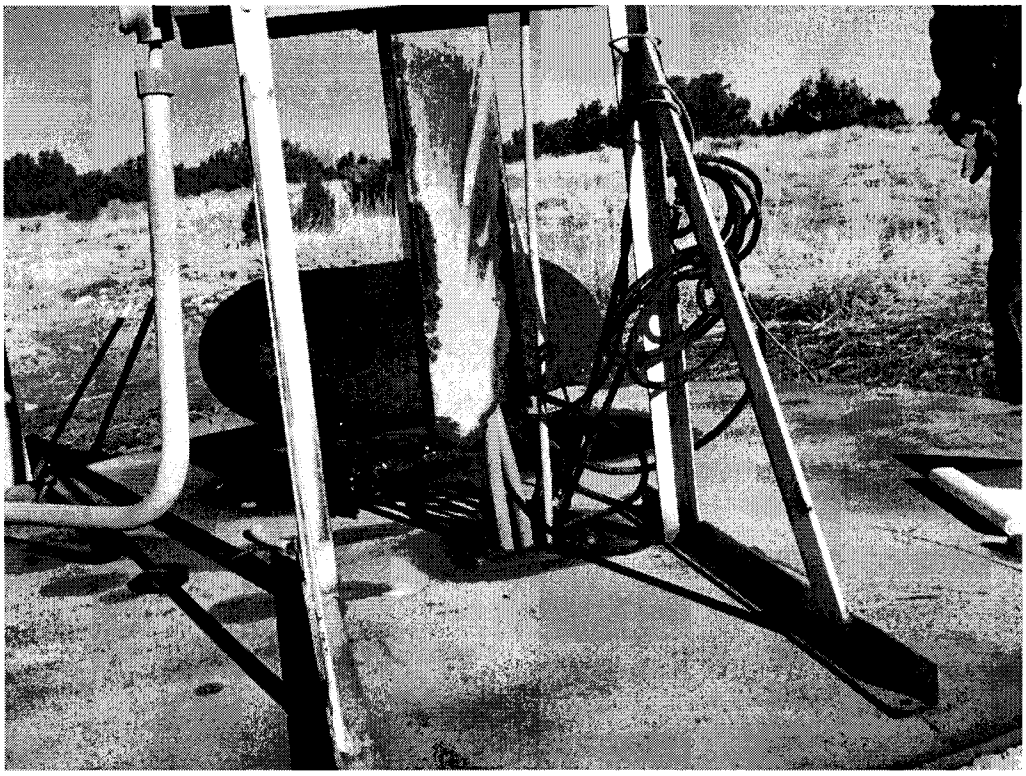

**Figure 8. Exterior of Lift Station 5B-2**

As can be seen in Figure 9, the wiring in the control panel is in fair condition, however it was reported that the warning alarm does not work at this lift station. It is recommended that an electrician be hired to address this problem. A sign should also be attached in a conspicuous location indicating the phone number to call in case the emergency alarm is sounding. A fence should also be installed to prohibit tampering and damage of the lift station.

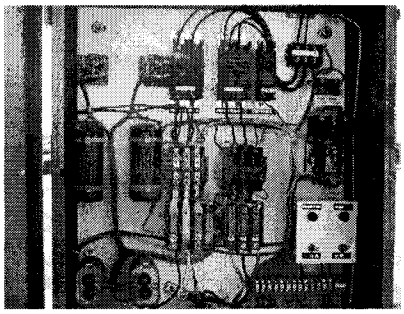

**Figure 9. Lift Station 5B-2 Control Panel**

In Figure 10 it can be seen that the metal inside the wet well has a great amount of corrosion and there is also a nylon strap to pull the pump. All of the metal in the wet well should be replaced with stainless steel metal, including a pull chain for the pumps.

The wet well should have two (2) working pumps installed that have been sized for the flows entering the lift station, the required head and the size of the force main to achieve sufficient velocity to scour the force main. There should also be a backup pump in storage in case the lift station pumps require maintenance or replacement. It would be beneficial if several of the lift stations use the same pump. Therefore a single pump could be kept on hand for backup of several lift stations instead of having a backup pump for each lift station.

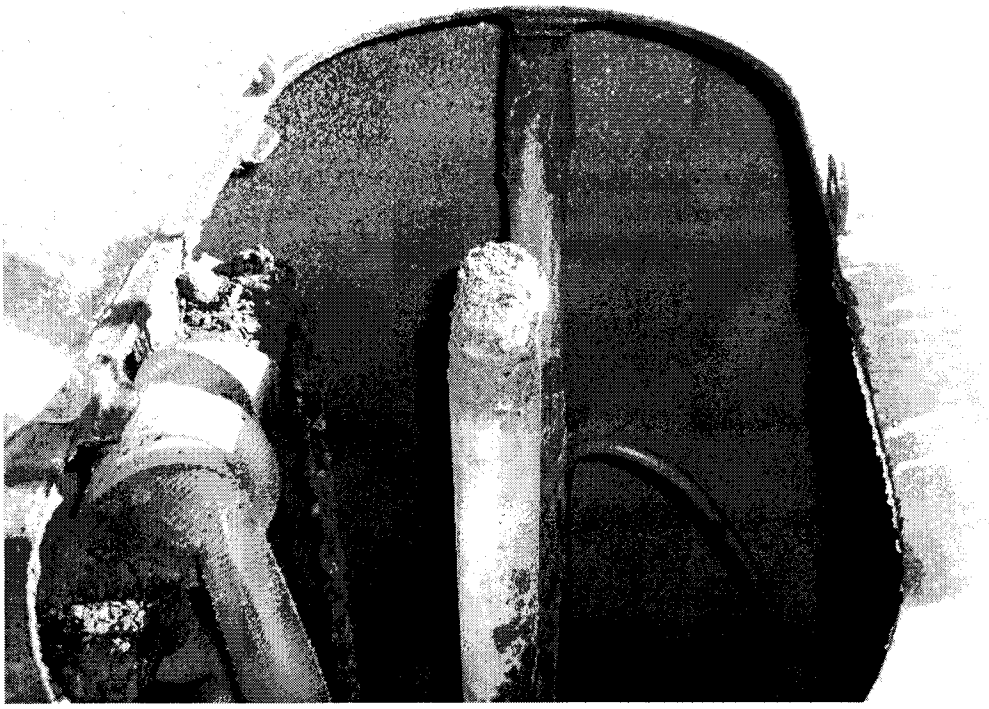

**Figure 10. Interior of Lift Station 5B-2**

### 2.4 Golf Course Lift Station

The Golf Course lift station is located west of Lot 123 of Concho Valley Unit 5A. This lift station accepts flows from lift stations 9A, 5B-1 and 5B-2. It has an eight foot (8') diameter wet well with two (2) 10 HP pumps. The Golf Course Lift Station has a six-inch (6") diameter force main and flows to the Motel Lift Station. Generally, the lift station is in fare to good condition. The lift station is configured with a wet well chamber as well as a

separate valve vault for the force main. Figure 11 shows a photo of the exterior of the lift station.

**Figure 11. Exterior of Golf Course Lift Station**

The wet well is in good condition. The metal in the wet well also appears to be in good condition. The control panel is located off of the wet well and it mounted on an adjacent panel. However, the openings in the control panel are quite a bit larger than the conduit. These openings should be closed to seal the control panel (see Figure 12).

**Figure 12. Control Panel Openings**

The control panel appears to be in good shape. It was reported that the alarms on the lift station do not work. It is recommended that the alarms be fixed to give a warning if the lift station does not operate correctly. A sign should also be added to the site indicating a phone number to call when the alarm is warning.

**Figure 13. Interior of Golf Course Lift Station**

In Figure 14 it can be seen that the wet well is in fairly good condition. The metal inside the well does not appear to be corroding and is still in good condition. Stainless steel pull chains should be installed to allow the pumps to be pulled for maintenance and replacement. It was reported that there is not a spare pump for this lift station. As was recommended for the other lift stations, a spare pump should be kept on hand for this lift station as well.

As was mentioned, this lift station has a separate valve vault for the force main as it exits the wet well. The piping in the valve vault has a large amount of corrosion. In Figure 15 it can be seen that water has entered the valve vault and the check valve on the line that allows the valve vault to drain to the wet well has not opened or the line itself is plug. Based on the high water marks in the vault it appears the water sat in the vault for a long period of time. This should be corrected by either repairing or replacing the check valve, or

clearing the line (which ever work is required to correct the problem) to allow the vault to drain.

Also, in the same valve vault, the concrete on the vault itself has deteriorated around the force main that extends out of the vault. This concrete should be patched to keep the vault from deteriorating completely and allowing infiltration.

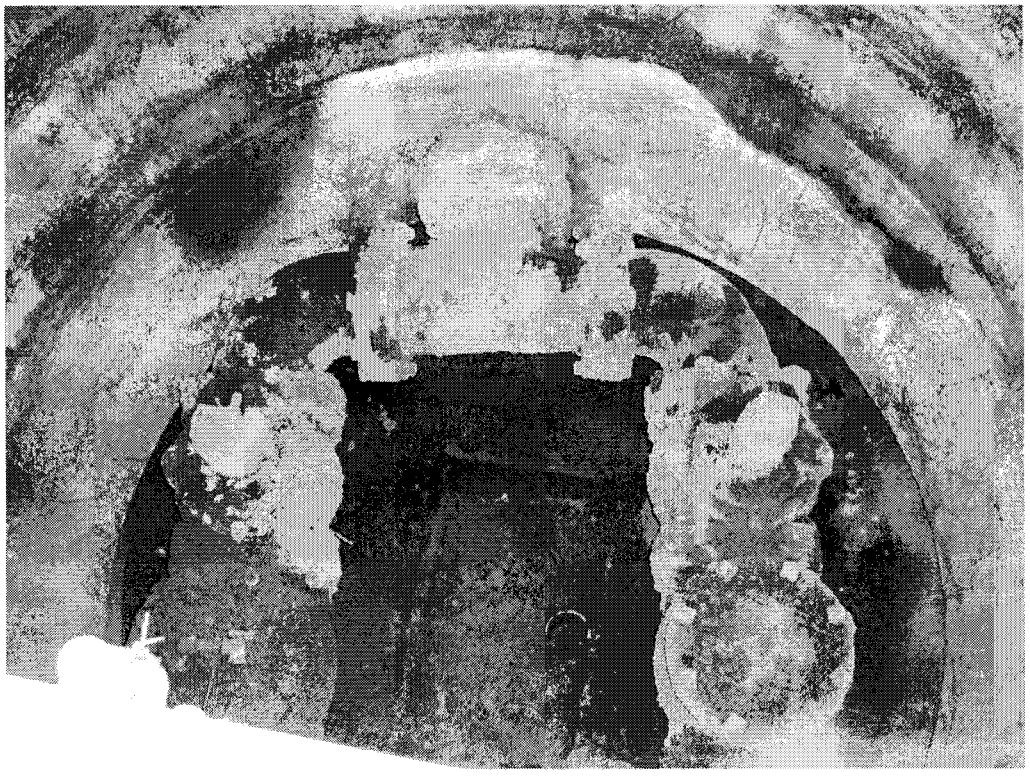

**Figure 14. Golf Course Lift Station Valve Vault**

The wet well should have two (2) working pumps installed that have been sized for the flows entering the lift station, the required head and the size of the force main to achieve sufficient velocity to scour the force main. There should also be a backup pump in storage in case the lift station pumps require maintenance or replacement.

### 2.5 Motel Lift Station

The Motel Lift Station is located southeast of the Concho Motel. The lift station handles sewer flows from Concho Valley Unit 1B and the Club House. The wet well is five feet (5') in diameter and was reported to only have a single functioning 2 HP pump. The force main from the wet well is a four inch (4") diameter line that runs to a gravity manhole located on the west side of Concho Valley Unit 5A. The wet well has a metal top and lid. The control panel is mounted directly onto the metal top; however it doesn't appear that

the mounting pole of the panel has corroded much. This lift station also has a hoist base that can be utilized to lift the pumps from the wet well. Figure 15 shows a photo of the exterior of the lift station.

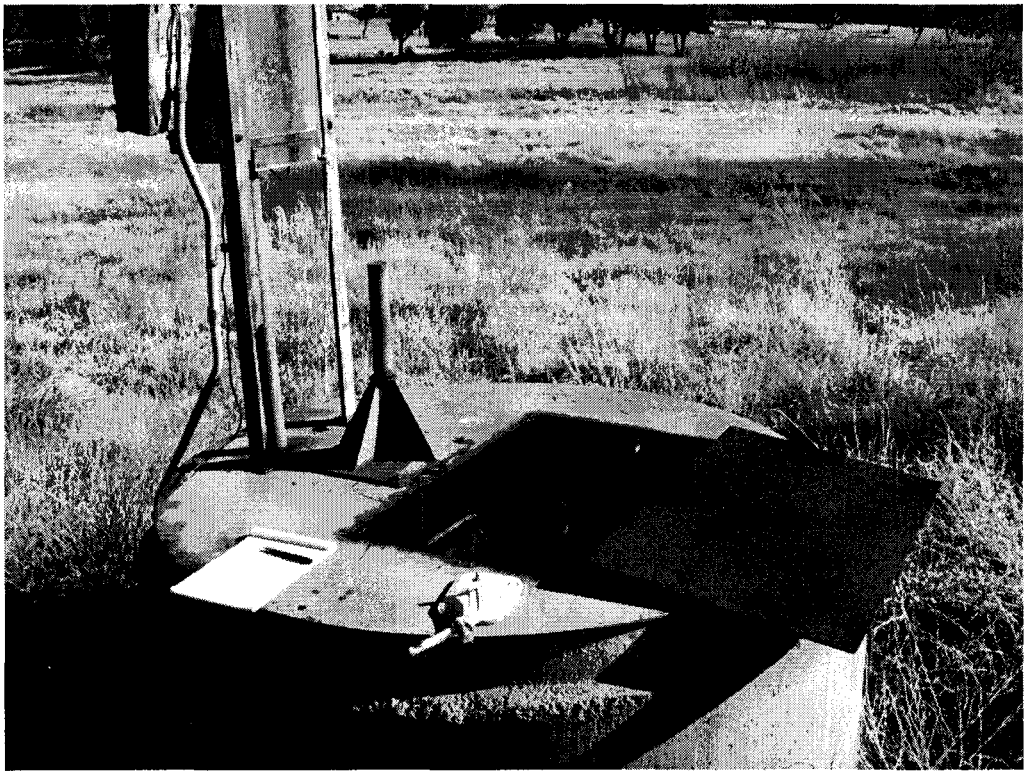

**Figure 15. Exterior of Motel Lift Station**

The existing lid is also showing a great deal of corrosion. There is also not a vent on this wet well to allow the hydrogen sulfide gasses to exit, but should be added to the wet well.

It is also recommended that the control panel be moved from off of the wet well lid and be placed near the lift station. Conduit should be ran from the side of the wet well to the control panel. Special care should be made to install all wiring in conduit to provide protection. As can be seen in Figure 15, there are wires that are exposed. The entrance to the conduit at the wet well should also be sealed to prevent the sewer gasses from traveling through the conduit to the control panel.

It was also reported that the emergency alarm on this lift station does not work. This problem should also be corrected. Also, there is no fence installed to prohibit tampering of the lift station. It is recommended that a fence be installed to prevent damage to the lift station. A sign should also be attached in a conspicuous location indicating the phone number to call in case the emergency alarm is sounding.

The wet well should have two (2) working pumps installed that have been sized for the flows entering the lift station, the required head and the size of the force main to achieve sufficient velocity to scour the force main. There should also be a backup pump in storage in case the lift station pumps require maintenance or replacement.

As previously mentioned, the Motel Lift Station pumps sewer through a four-inch (4") force main to an existing manhole located in Concho Valley Unit 5A. This sewer in this manhole then gravity flows to the south to the Golf Course Lift Station. The Golf Course Lift Station then pumps the sewer to the west to the right-of-way of Highway 61. The sewer continues north, parallel to Highway 61, and past the Concho Hotel and eventually to the Main Lift Station in Concho. To reduce pumping costs, a new four-inch (4") force main should be installed from the Motel Lift Station, northward to County Road 5100 and then west over to connect to the existing force main located in the right-of-way of Highway 61. This would decrease Golf Course Lift Station operating costs. This would require approximately 600 linear feet of four-inch (4") force main be installed. The approximate location of the proposed force main is shown in Figure 16. This line would need to be designed and constructed to prevent backflow into the Motel Lift Station.

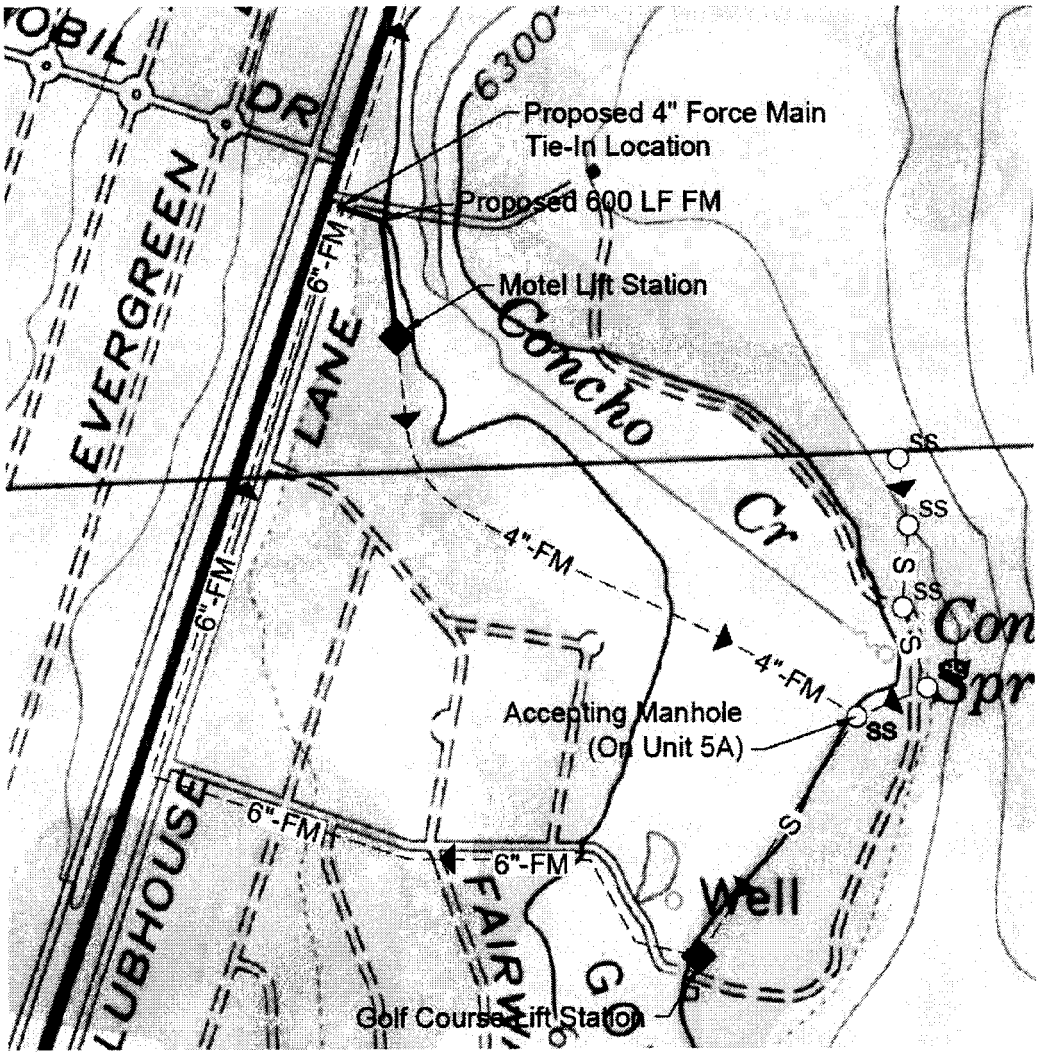


**Figure 16. Possible Force Main Location**

## 2.6 Main Lift Station

The Main Lift Station is located west of Concho itself and on the south side of County Road 5020 (Snowflake Highway). This lift station accepts flows from the Golf Course Lift Station, which is approximately 359 feet higher in elevation than the Main Lift Station. The sewer is delivered to the Main Lift Station via force main and gravity line. The Main Lift Station has an eight foot (8') diameter wet well with two (2) 20 HP pumps. The Main Lift Station has an eight-inch (8") diameter force main and sends flows to the treatment facility site. Generally, the lift station is in fair condition. The lift station is configured with a wet well chamber as well as a separate valve vault for the force main. Figure 17 shows a photo of the exterior of the lift station.

**Figure 17. Exterior of Main Lift Station**

As can be seen in Figure 18, the wet well needs some concrete patching around the pipes that penetrate the wet well wall. The metal in the wet well also appears to be in fair condition. The control panel is located off of the wet well and it mounted on good supports. However, the openings in the control panel are quite a bit larger than the conduit. These openings should be closed to seal the control panel (see Figure 19).

**Figure 18. Main Lift Statin Wet Well**

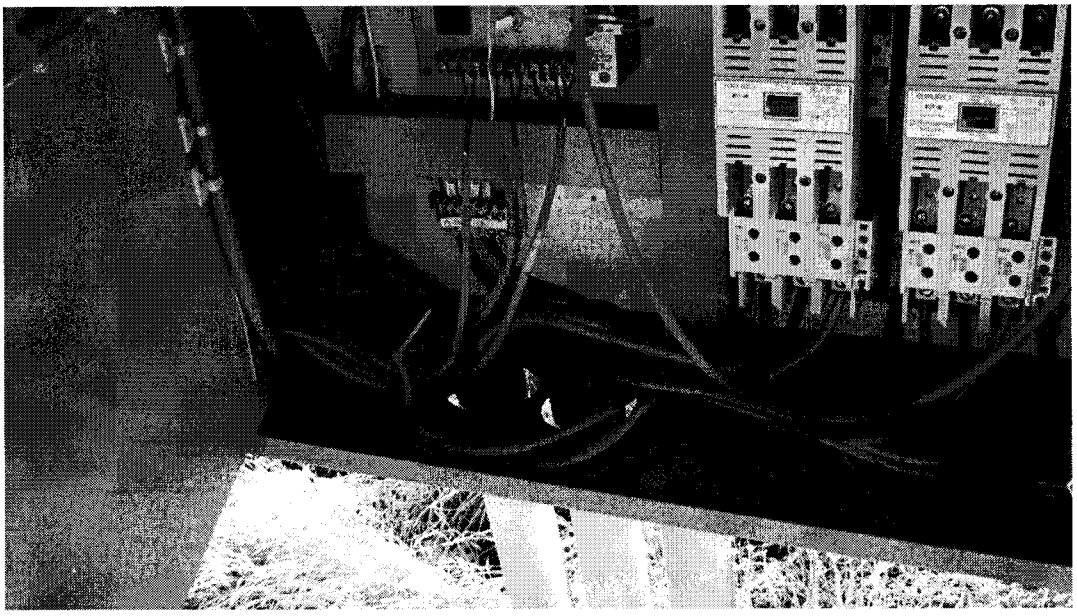

**Figure 19. Main Lift Station Control Panel**

The control panel appears to be in good shape. It was reported that the alarms on the lift station do not always work. It is recommended that the alarms be fixed to give a warning if the lift station does not operate correctly. A sign should also be added to the site indicating a phone number to call when the alarm is warning.

It was also reported that there is not a spare pump for this lift station. As was recommended for the other lift stations, a spare pump should be kept in reserve.

Only one lift station had a hoist base that could be used to lift the pumps from the lift station. It was reported that the sewer company does not have equipment to pull the pumps from the wet wells, therefore installing a hoist at each lift station will most likely be beneficial, however this was not included in the cost estimates. It is also recommended that all of the wet wells be epoxy coated for protection and a longer life. It was also reported that there are no backup generators for the system. It is recommended that at a minimum, a single portable backup generator be purchased and the control panel at each lift station be modified to enable the generator to operate the lift station. A single portable generator has been included in the cost estimates.

## *3.0 MANHOLES*

There were seven (7) manholes that were observed for inspection. Six (6) of the manholes were located in Concho Valley Unit 9. The other manhole that was inspected was the first manhole in the interceptor line that the Golf Course Lift Station force main empties in to.

### 3.1 Unit 9 Manholes

The six (6) manholes in Unit 9 were all in very good condition. None of the manholes had any flow in them. It didn't appear that any work is required for these manholes. Figure 20 is a photograph of the manhole located at Lot 138 in Unit 9. This shows the condition of the inside of the manhole.

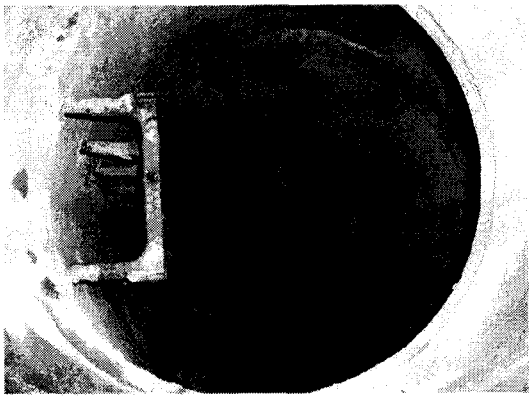

**Figure 20. Manhole on Lot 138, Unit 9**

### 3.2 Interceptor Manhole

As was mentioned, the interceptor manhole is the manhole that the Golf Course Lift Station empties in to and is the first manhole on the interceptor line. This manhole is located at station 126+00 in the ADOT right-of-way of Highway 61. The manhole is a four-foot (4') diameter manhole, with a depth of approximately six-feet (6'). The manhole was in poor condition as can be seen in Figure 21.

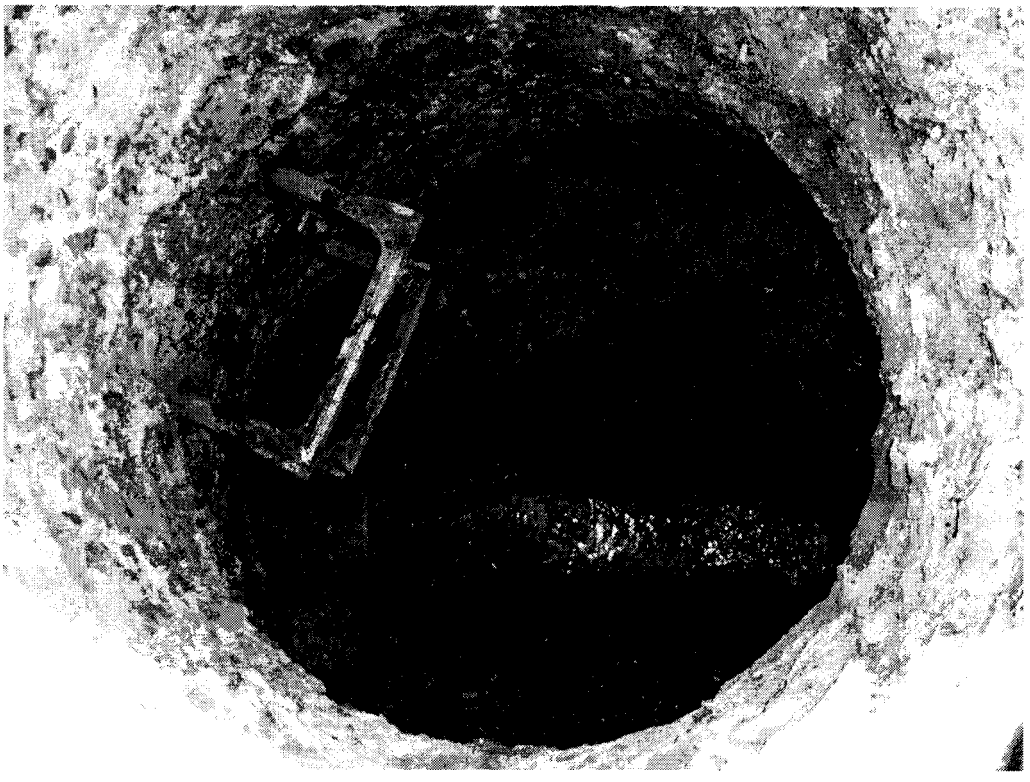

**Figure 21. Interceptor Manhole**

As can be seen in Figure 21, the concrete of the manhole has deteriorated. This is most likely because of the hydrogen sulfide introduced from the force main. Because there is a relatively small amount of flow into the system, it is likely that the sewer in the force goes septic before the sewer enters the manhole. With the septic sewage also comes the hydrogen sulfide which can cause Microbial Induced Corrosion (MIC) and will severely corrode the concrete in the manhole. This manhole should be replaced and then the manhole should be coated with an epoxy liner. The liner will bond to the concrete of the manhole to prevent the corrosion of the concrete. Although the next downstream manhole is approximately five-hundred feet (500') downstream of this manhole, it should be examined to determine if the hydrogen sulfide gasses have caused corrosion problems in it as well. It may need replaced and/or coated as well.

Other manholes in the system that receive flows from force mains should also be inspected to determine if they are in similar condition as the manhole that was inspected. It is likely that these manholes will be corroded and need replaced and/or coated as well.

### *4.0 AIR RELIEF VALVES*

Based on the construction plans, there appear to be many air relief valves (ARV) in the system. One ARV was observed. The valve was located in a concrete box, and the top of the valve was above the box. There was also a metal pole, indicating the location of the valve. A photo of the valve is shown in Figure 22.

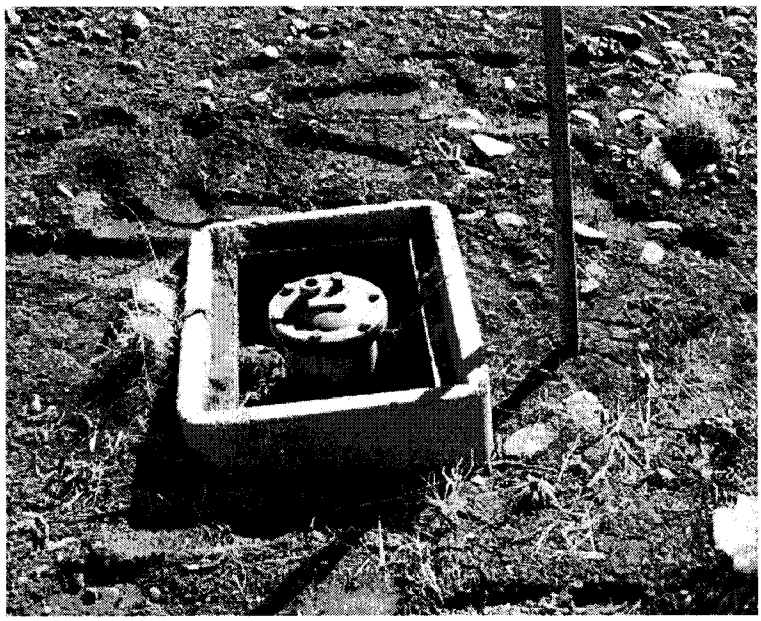

**Figure 22. Air Relief Valve**

It is suggested that the valve be protected. A higher box is required that can be installed above the valve so that the lid can be placed over the valve. It was not known if the valve was working. The valve should also be checked to make sure that it is allowing air out of the force main. All of the valves in the system should be examined to determine if the same corrective measures are necessary for them as well.

### *5.0 TREATMENT SITE*

The treatment site is located on the south side of the Snowflake Highway. It was designed to handle flows up to 20,000 gallons per day (gpd) and when the site reaches flows greater than this, there is additional area to extend the treatment site to handle flows up to 538,310 gpd.

Based on the Design Report which was completed by Shreeve & Associates, Inc. in 1991, the treatment site was designed with three (3) components. They consist of a settling pond or lagoon, wetland, and reuse area. The treatment plant was designed for the influent to be receive primary treatment by entering the settling pond and allowing the solids to settle to the bottom of the pond. Then the effluent will enter wetland cells for further treatment. There have been two (2) cells constructed for treatment of up to 20,000 gpd. From the wetlands, the effluent will enter the chlorine contact chamber for further treatment, and then be sent to the reuse area for disposal. It is apparent that the treatment site has not recently received enough flows to allow the settling pond to fill and flow over into the wetlands areas. Because of the small flows, the influent has entered into the settling pond and has been treated there instead of the wetlands. As can be seen in Figure 23, a great deal of vegetation has grown in the settling pond.

**Figure 23. Settling Pond - Lagoon**

The settling pond (lagoon) was designed to allow a detention time between five (5) to ten (10) days to provide time for the solids to settle out of the influent. Based on the Aquifer Protection Permit (APP) number P-102422, the settling pond was designed to have an 18" clay liner. The substantial vegetation root system could penetrate the liner and allow the effluent to flow below the liner and enter the groundwater, which could at some point, show up in the groundwater. Also, based on Part II.A.3 in the APP on page 2 of 27, the accumulated sludge in the pond shall be removed to obtain the required operating depth in

the pond, but at least every five (5) years. Because the flows to the pond are so small compared to the design flow, there most likely has not been a large amount of sludge build up in the pond, however ADEQ may have an issue with this in the future.

The side berms of the settling pond were also examined. A portion of the berm can be seen in Figure 24.

**Figure 24. Settling Pond Berm**

It appears the berms of the pond are slowly sloughing off in to the pond. Over time, the berm will break down and require maintenance. Based on the APP, the berm should have a free board height of three feet (3'). Although the flows are small now and therefore the required depth of the pond to achieve the free board is not much more than three feet, this could be a problem in the future. It is suggested that the berm be lined with riprap to prevent erosion of the berm.

The design report for the sewer treatment facility as well as the APP indicates the treatment site is designed to treat up to 20,000 gpd. It has been reported that there are 28 houses connected to the system. The design report also indicates that it was assumed that each residential lot will produce 250 gpd per lot. It was noted that this flow was based on restrictions that will require a 3 gallon per flush toilet and low flow shower head or other water restriction devices. It is not known if these restrictions are being practiced, however

because it appears the treatment facility is not receiving a large amount of flow, 250 gpd per lot was assumed. Based on 28 lots producing 250 gpd of sewer, the totals flows to the site are determined as follows:

28 lots X 250 gpd/lot = 7,000 gpd

Since the treatment facility was designed for 20,000 gpd, the treatment plant can handle an additional 13,000 gpd. This equates to approximately 52 additional lots that the treatment facility can handle.

## *6.0 TIMELINESS OF IMPROVEMENTS & COSTS*

The recommendations of improvements have been categorized based upon priority. The improvements were broken down into immediate needs and moderate needs. Because the entire system was not inspected, it was assumed that where problems were found, the same type of problems could exist throughout the system. These assumptions are reflected in the cost estimates. The majority of the work required is very specific to a certain aspect of the sewer system; therefore it was somewhat difficult to determine an accurate cost. The best way to determine costs is to have a contractor provide an actual cost estimate. The costs provided can be used for general budgeting purposes. It should be noted that a generator was not included in the costs because it was reported that a generator that is owned by the water company could be used if required.

### 6.1 Immediate Needs

The system's immediate needs should be completed in the next year. The immediate needs include replacing all of the existing manholes that accept flows from a force main. As mentioned, it was assumed that all of the manholes that receive flows from force mains will need replaced. Also it was assumed that the next two (2) manholes downstream of the receiving manhole be epoxy coated because of the harmful gasses, but should be examined to determine if this is necessary. The immediate needs also include having two (2) working pumps in each lift station. Because the Golf Course and Motel Lift Stations, as well as Lift Stations 5B-1 and 5B-2 each have only a single working pump, the immediate needs include an additional pump for each of these. Also, it is beyond the scope of this report to determine if any of the lift stations can utilized the same size pumps therefore it was assumed that none of the lift stations will have the same size pumps and therefore each lift station will be required to have its own backup pump.

**Table 1. Immediate Needs Cost Estimate**

| Item | Description | Total Cost | Unit Cost | Quantity | Unit |
|---|---|---|---|---|---|
| 1 | Install new manhole & epoxy coat | $ 22,400 | $ 5,600 | 4 | EA |
| 2 | Epoxy coat existing manholes | $ 14,000 | $ 1,750 | 8 | EA |
| 3 | Install new pumps (0 - 5HP) | $ 6,300 | $ 2,100 | 3 | EA |
| 4 | Install new pumps (6 - 10 HP) | $ 9,200 | $ 9,200 | 1 | EA |
| | **Total** | **$ 51,900** | | | |

## 6.2 Moderate Needs

The system's moderate needs should be completed in approximately the next five (5) years, but does depend on the growth (users) that the system receives. The moderate needs include all of the other suggested needs that were not included in the immediate needs. The needs include having an additional pump for each size pump in the system, moving the control panels from the top of the wet wells and adding vents to the wet wells, fixing bare wiring and correcting wiring in control panels and alarms. It also includes replacing metal inside wet wells and installing pull chains. It also includes providing some protection to the lift stations by installing a fence around them and adding a sign to each lift station indicating what number to call if the alarm is going off. Especially when the system receives more flows, the loss of electrical power could be problematic to the system functioning. It is also suggested that a portable backup generator be purchased to mobilize to a lift station in a case when the power is out. This most likely will also require the controls be modified to allow generator use at the lift station. The suggested improvements at the treatment site were included in the costs as well. A detailed list and cost estimates are shown in Table 2.

**Table 2. Moderate Needs - Lift Stations Cost Estimate**

| Item | Description | Total Cost | Unit Cost | Quantity | Unit |
|---|---|---|---|---|---|
| Lift Station 9A | | | | | |
| 1 | Lower control box, seal openings, move float wire juction box, controls for generator | $ 1,400 | $ 1,400 | 1 | LS |
| 2 | Install chain link fence and sign | $ 2,400 | $ 2,400 | 1 | LS |
| | **Sub-Total** | **$ 3,800** | | | |
| Lift Station 5B-1 | | | | | |
| 1 | Replace wet well lid, add vent, move control panel & fix wiring & alarm, re-route conduit, controls for generator | $ 5,900 | $ 5,900 | 1 | LS |
| 2 | Replace metal in wet well | $ 4,600 | $ 4,600 | 1 | LS |
| 3 | Install chain link fence and sign | $ 2,400 | $ 2,400 | 1 | LS |
| | **Sub-Total** | **$ 12,900** | | | |
| | **Total Sub-Total** | **$ 16,700** | | | |

**Table 2 Continued...**

| Item | Description | Total Cost | Unit Cost | Quantity | Unit |
|---|---|---|---|---|---|
| Lift Station 5B-2 | | | | | |
| 1 | Replace wet well lid, add vent, move control panel & fix wiring & alarm, re-route conduit, controls for generator | $ 5,900 | $ 5,900 | 1 | LS |
| 2 | Replace metal in wet well | $ 4,600 | $ 4,600 | 1 | LS |
| 3 | Install chain link fence and sign | $ 2,400 | $ 2,400 | 1 | LS |
| | **Sub-Total** | **$ 12,900** | | | |
| Golf Course Lift Station | | | | | |
| 1 | Seal control panel openings, fix alarm, add sign, add pull chains, controls for generator | $ 1,750 | $ 1,750 | 1 | LS |
| 2 | Replace check valve from valve vault, patch concrete in valve vault | $ 1,200 | $ 1,200 | 1 | LS |
| | **Sub-Total** | **$ 2,950** | | | |
| Motel Lift Station | | | | | |
| 1 | Add vent, move control panel & fix alarm, re-route conduit, control for generator | $ 1,750 | $ 1,750 | 1 | LS |
| 2 | Install new 4" force main | $ 16,800 | $ 28 | 600 | LF |
| 3 | Install chain link fence and sign | $ 2,400 | $ 2,400 | 1 | LS |
| | **Sub-Total** | **$ 20,950** | | | |
| Main Lift Station | | | | | |
| 1 | Seal control panel openings, patch concrete in wet well, add sign, control for generator | $ 850 | $ 850 | 1 | LS |
| 2 | Fix alarm | $ 1,750 | $ 1,750 | 1 | LS |
| | **Sub-Total** | **$ 2,600** | | | |
| Miscellaneous | | | | | |
| 1 | Epoxy coat each wet well | $ 27,000 | $ 4,500 | 6 | EA |
| 2 | Generator | $ 2,900 | $ 2,900 | 1 | EA |
| | **Sub-Total** | **$ 29,900** | | | |
| | **Total Sub-Total** | **$ 69,300** | | | |

**Table 3. Moderate Needs - Treatment Facility Site Cost Estimate**

| Item | Description | Total Cost | Unit Cost | Quantity | Unit |
|---|---|---|---|---|---|
| Treatment Site | | | | | |
| 1 | Clearing vegetation from settling pond and grading berms | $ 4,795 | $ 7 | 685 | SY |
| 2 | Riprap | $ 17,280 | $ 32 | 540 | SY |
| | **Sub-Total** | **$ 22,075** | | | |

**Table 4. Moderate Needs - Replacement Pumps On Hand**

| Item | Description | Total Cost | Unit Cost | Quantity | Unit |
|---|---|---|---|---|---|
| Replacement Pumps | | | | | |
| 1 | 0 - 5HP | $ 8,400 | $ 2,100 | 4 | EA |
| 2 | 6 - 10HP | $ 18,400 | $ 9,200 | 2 | EA |
| | **Sub-Total** | **$ 26,800** | | | |

Therefore the immediate needs total to $51,900, the moderate needs total $134,875. Based on adding the estimated costs for both the immediate needs and the moderate needs, the total suggested improvement costs are $186,775.

## *7.0 CONCLUSION*

A portion of the Livco Sewer System was inspected to determine the necessary changes to improve the system to ensure the system keeps operating and try to avoid having problems with the operation of the system. It was determined that work is needed for all of the lift stations, most likely all of the manholes that sewer from force mains enter, as well as the treatment plant itself. It was also determined that a new shorter force main can be installed to save on pumping costs.