WRITTEN MATERIAL SUBMISSION FOR
DECEMBER 12, 2007 AGENDA ITEM NO. 16
COMPLAINT NO. R9-2007-0099
(TENTATIVE ORDER NO. R9-2007-0215)
FOR ADMINISTRATIVE CIVIL LIABILITY AGAINST THE CITIES OF VISTA AND CARLSBAD FOR VIOLATION OF NO. R9-2006-0003-DWQ, STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS
(Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

November 28, 2007

DISCHARGERS: CITY OF VISTA
600 Eucalyptus Avenue
Vista, California 92084
Attn: Rita Geldert, City Manager

CITY OF CARLSBAD
1635 Faraday Avenue
Carlsbad, California 92008
Attn: Glenn Pruim, Public Works Director

Linda S. Adams
Secretary for
Environmental Protection

California Regional Water Quality Control Board

San Diego Region

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Arnold Schwarzenegger
Governor

April 6, 2007

In reply refer to:
NCRU:01-0743.02 & 01-0764.02:ebecker

Rita Geldert
City Manager
City of Vista
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Vista, CA 92084-6240

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Mark Stone
General Manager
Carlsbad Municipal Water District
5950 El Camino Real
Carlsbad, CA 92008

CERTIFIED MAIL
Registration Number
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Dear Ms. Geldert and Mr. Stone:

INVESTIGATIVE ORDER NO. R9-2007-0060, DISCHARGE OF UNTREATED SEWAGE INTO BUENA VISTA LAGOON, WITHIN THE CITY OF CARLSBAD, SAN DIEGO COUNTY

Enclosed is Investigative Order No. R9-2007-0060 (Order) of the California Regional Water Quality Control Board, San Diego Region (Regional Board) concerning the discharge of over 5 million gallons of untreated sewage into Buena Vista Lagoon from a force sewer main jointly owned and operated by the City of Vista and the Carlsbad Municipal Water District. The Order is issued pursuant to California Water Code (CWC) sections 13267 and directs you to submit a technical report **by April 23, 2007** that provides information on the sanitary sewage overflow.

Please note the requirements contained within the Order. Specifically, all technical reports submitted to the Regional Board shall be accompanied by the certification, under penalty of law, that the information is true, accurate, and complete.

Failure to meet the requirements may subject you to further enforcement action by the Regional Board, including administrative civil liability pursuant to CWC sections 13268 and 13385.

The heading portion of this letter includes a Regional Board code number noted after "In reply refer to:" In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports to the Regional Board pertaining to this matter.

Respectfully,

for JOHN H. ROBERTUS
Executive Officer

JHR:dtb:tla

Enclosure

cc:

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

INVESTIGATIVE ORDER NO. R9-2007-0060
FOR
CITY OF VISTA
CARLSBAD MUNICIPAL WATER DISTRICT
VIOLATION OF WASTE DISCHARGE REQUIREMENTS NO. R9-2007-0005
FOR THE
DISCHARGE OF UNTREATED SEWAGE INTO THE BUENA VISTA LAGOON
WITHIN THE CITY OF CARLSBAD
SAN DIEGO COUNTY

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board) finds that:

1. The City of Vista and Carlsbad Municipal Water District, hereinafter Dischargers, jointly own and operate a 24-inch force sewer main located south of Buena Vista Lagoon near Jefferson Street in the City of Carlsbad. The Dischargers' sanitary sewer systems, including this sewer main are regulated by WDRs Order No. R9-2007-0005, *Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region*.

2. On or before April 1, 2007 through April 3, 2007, the Dischargers spilled over 5 million gallons of untreated sewage from the sewer main and an adjacent pump station into Buena Vista Lagoon in violation of Prohibition B.1 of Order No. R9-2007-0005. Prohibition B.1 of Order No. R9-2007-0005 prohibits the discharge of sewage from the sanitary sewer system at any point upstream of a sewage treatment plant.

3. Pursuant California Water Code Sections 13267, the Regional Board, in reviewing Waste Discharge Requirements (WDRs), may investigate the quality of waters of the state by requiring dischargers to submit technical or monitoring reports. The burden, including costs, of these reports shall bear a reasonable relationship to the need. The Regional Board must also provide an explanation for the need for the report and evidence supporting requiring the report from the discharger.

4. Due to the Dischargers' violation of Order No. R9-2007-0005, the Regional Board requires additional information to evaluate the actions taken to prevent the sewage discharge, to repair the failed pipeline, and to investigate the impacts to water quality from the sewage discharges.

5. The costs associated with providing the information are minimal and reasonable compared to the volume of the sewage spill and the impacts to water quality and beneficial uses of the Buena Vista Lagoon.

IT IS HEREBY ORDERED, that pursuant to section 13267 of the California Water Code, the City of Vista and Carlsbad Municipal Water District, shall conduct a technical investigation, and prepare and submit a technical report to the Regional Board **no later than April 23, 2007**. The technical report shall contain, but is not limited to, the following information:

1. A complete, detailed explanation of how and when the overflow from the sewer main was discovered, including the tabular and graphical summaries of the daily total influent flows to the Encina Water Pollution Control Facility (EWPCF) and flow data from the Buena Vista Pump Station from March 6, 2007 through April 6, 2007.

2. A detailed report of the cause and/or causes of the overflow, including any testing or technical evaluation of the condition of the sewer main. The report should also include the rational for the original selection of the iron pipe and an evaluation of the appropriateness of installing this type of pipe in the lagoon.

3. A detailed chronological description of all actions taken by the Dischargers to terminate the overflow, repair the failed pipeline, and mitigate its impacts. Also include an evaluation of the results of these actions.

4. A detailed report of the total overflow volume including how the Dischargers calculated the volume.

5. The volume of water pumped back into the sanitary sewer system from the Buena Vista Lagoon.

6. Since 1994, the date and extent of preventive maintenance and/or inspection (e.g., line cleaning, closed-circuit television inspection) that was performed on the sewer line and other structures involved in the sewer overflow. Also report on any other problems experienced with the relevant force main in the past and what actions, if any, that have been taken to correct such problems.

7. Copies of any photographs and/or video taken during or after the sanitary sewer overflow. Photographs and/or video shall include appropriate identifying information, such as date taken, name of photographer/videographer, and textual summary of information being presented, as well as its relevance.

8. A copy of the Dischargers' current sanitary sewer overflow response plan.

9. Measures the Dischargers have taken, or will take, to prevent and mitigate the impacts of future overflows from force mains or other sewer lines, particularly in ecologically sensitive areas. This could include such tasks as monitoring of force

main flows, increased monitoring frequency of sewer lines in sensitive areas, use of additional equipment to recover sewage overflows, etc.

10. All water quality data collected as part of monitoring of the Buena Vista Lagoon after the overflow. Identify sampling locations, methods and circumstances. If historical data is available, provide this data as well.

11. An assessment of the impacts on fish, other species, and the overall ecosystem in the Buena Vista Lagoon resulting from this overflow. Identify all species that have been affected and describe all biological monitoring conducted.

12. A report on all other short and long term effects resulting from the overflow including, but not limited to, impacts on public health and the environment. Explain how these conclusions were reached and what steps the Dischargers have taken, or will take, to mitigate these impacts.

13. Any other pertinent information that will assist my staff in evaluating the discharges.

All information provided to the Regional Board shall include the following signed certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

JOHN H. ROBERTUS
Executive Officer

Date

JHR:rwm:esb

DISCHARGER RESPONSE TO INVESTIGATIVE ORDER NO. R9-2007-0060, DISCHARGE OF UNTREATED SEWAGE INTO THE BUENA VISTA LAGOON WITHIN THE CITY OF CARLSBAD, SAN DIEGO COUNTY

(Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

April 23, 2007

DISCHARGERS: CITY OF VISTA
600 Eucalyptus Avenue
Vista, California 92084
Attn: Rita Geldert, City Manager

CITY OF CARLSBAD
1635 Faraday Avenue
Carlsbad, California 92008
Attn: Glenn Pruim, Public Works Director

I certify under penalty of law that this document and all attachments were prepared under my *direction or supervision in accordance with* a *system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on* my *inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of* my *knowledge and belief, true, accurate, and complete. I* am *aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

Rita Geldert, City Manager
City of Vista

Glenn Pruim, Public Works Director
City of Carlsbad

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INVESTIGATIVE ORDER NO. R9-2007-0060,
DISCHARGE OF UNTREATED SEWAGE INTO BUENA VISTA LAGOON
WITHIN THE CITY OF CARLSBAD, SAN DIEGO COUNTY
(Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

April 23, 2007

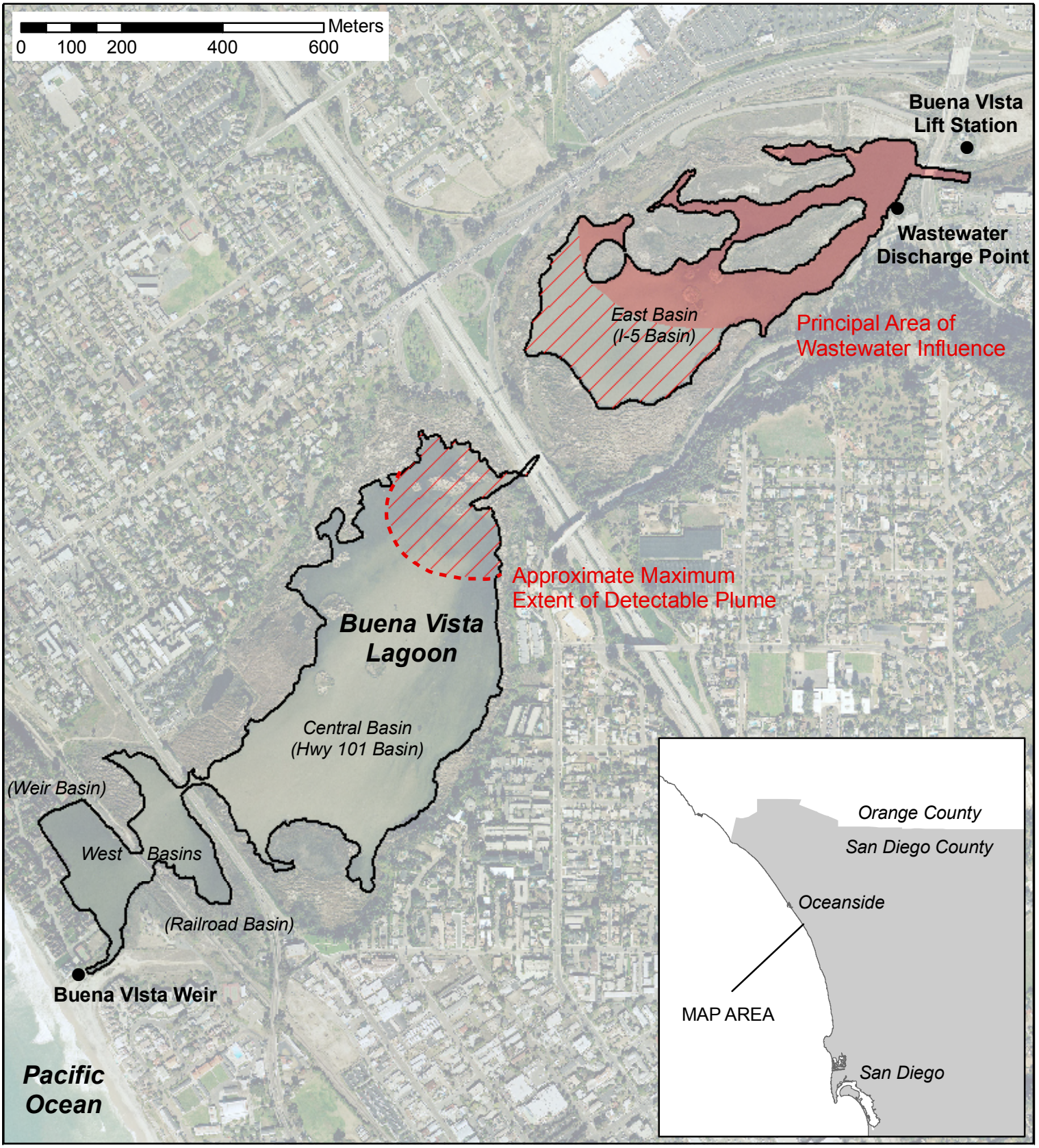
1.0 BACKGROUND

The City of Vista and the City of Carlsbad, hereinafter known as "Dischargers", jointly own and operate a 24-inch force sewer main located south of Buena Vista Lagoon near Jefferson Street in the City of Carlsbad. The City of Vista owns 89.6% of the line; while the City of Carlsbad owns 10.4%. This force main connects the Buena Vista Sewage Lift Station with the Encina Wastewater Authority's treatment plant located on Avenida Encina in Carlsbad. The Dischargers' sanitary sewer systems, including this sewer main, are regulated by Waste Discharge Requirements (WDRs) Order No. R9-2007-0005, Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region.

From March 31, 2007 through April 3, 2007, the Dischargers spilled an estimated 7.329 million gallons of untreated sewage from a rupture of the sewer main and as a result of repair period overflow from the containment berm at the adjacent Buena Vista Sewer Lift Station into Buena Vista Lagoon (Figure 1). As a result of the spill into Buena Vista Lagoon, the Regional Board requested information to evaluate the actions taken to prevent the sewage discharge, to repair the failed pipeline, and to investigate the impacts to water quality (WQ) from the sewage discharges. This request was tendered to the Dischargers on April 6, 2007 in the form of Investigative Order (IO) No. R9-2007-0060. The IO requires technical investigations and submittal of a technical report to the Regional Board no later than April 23, 2007. This document, and attachments hereto, constitutes the Dischargers' response to Investigative Order No. R9-2007-0060.

As the spill is a very recent event and environmental response and forensic analyses are still underway, this report should be viewed as preliminary and is based on the best information available to the Dischargers at the time of the report preparation. As updated information becomes available and investigations are completed, the dischargers will provide supplemental information to the Regional Board in order to further its consideration of the event.

M&A #02-059-60



Incident Area Map
Buena Vista Sewer Force Main Discharge
April 2007

Figure 1

Merkel & Associates, Inc.

2.0 IDENTIFICATION OF DISCHARGERS

As a matter of administrative clarification, the parties under the discharge order should be identified as the City of Vista and the City of Carlsbad, collectively referred to in this document as “Dischargers”. Please note the Investigative Order erroneously identifies the Carlsbad Municipal Water District as one of the dischargers instead of the City of Carlsbad. This correction should be made in the Board’s files.

3.0 DATA COLLECTION AND VERIFICATION

Data gathered for the preparation of this report has been derived from many sources including the Dischargers, cooperative agencies responding to the spill, consultants and contractors to the Dischargers, as well as resource and regulatory agency staff and regulatory agency files. In most instances, data have been fully evaluated and verified by collection of field logs and site records, completion and review of calculations by multiple parties, and compilation of synoptic accounts to confirm response actions. Water quality data has been collected using regularly calibrated equipment, and Encina Wastewater Authority (E.L.A.P. Certification No. 1441) has processed bacterial samples from the monitoring program.

In some instances, however, data collection and analyses are ongoing and data are preliminary in nature. Where data are considered to be preliminary, this has been noted. Most specifically, preliminary data exist for the lagoon environmental monitoring program and for forensic analysis of the causative agents to pipeline failure. For both of these investigations, data collection and analyses are ongoing, and thus it is not possible to provide final results at this time.

Documentation supporting the information provided in this report is provided as appendices to this document. The appendices are organized in accordance with the numbered information requested in the Board’s IO. The supporting documentation includes reference data and calculations, laboratory analysis and reports, photographs and logs, and similar information.

4.0 SPECIFIC DATA REQUESTS

This section comprises the bulk of the technical response to IO No. R9-2007-0060. The section is organized to follow the format of information requested in the IO. For completeness, the request made by the Board is repeated herein followed by the Discharger’s response. Where applicable, reference is made to the requisite supporting documentation related to the response. This information is found in the appendices to this report.

4.1 EXPLANATION OF OVERFLOW DISCOVERY

A complete, detailed explanation of how and when the overflow from the sewer main was discovered, including the tabular and graphical summaries of the daily total influent flows to the Encina Water Pollution Control Facility (EWPCF) and flow data from the Buena Vista Pump Station from March 6, 2007 through April 6, 2007. ***(RWQCB #1)***

The spill discovery was made by a private citizen who observed possible sewage overflow entering Buena Vista Lagoon at a regularly used formal wildlife observation area located at the east end of Buena Vista Lagoon off of Jefferson Street. The citizen contacted Carlsbad PD Dispatch at 6:52:54 PM on Sunday 4/1/07 (see Carlsbad PD dispatch logs regarding sewer discharge response, Appendix 1a). Dispatch called the City of Carlsbad duty person, Pedro Rodriguez. Mr. Rodriguez responded to the site at 6:55 PM on Sunday 4/1/07.

Mr. Rodriguez positively identified overflow entering Buena Vista Lagoon and called Mr. Jesse Castaneda, City of Carlsbad Public Works Supervisor at home to advise him. Mr. Castaneda responded to the location at 7:10 PM and met with Mr. Rodriguez. Mr. Castaneda confirmed it was the Buena Vista force main that had broken causing the sewage release. Following the City of Carlsbad Sanitary Sewer Overflow Response Plan, Mr. Castaneda contacted Mr. Don Wasko, City of Carlsbad Acting Public Works Superintendent. Mr. Wasko responded to the site at 7:40 PM. Mr. Wasko and Mr. Castaneda worked together to notify senior management and began to prepare for repairs and immediate response actions to mitigate the overflow. Additional staff members were also called in for assistance.

Within 3 minutes of the initial notification, the Dischargers had responded to the site. A detailed account as to the subsequent actions taken to terminate and mitigate the waste discharge is provided elsewhere in this document.

Appendix 1b provides a summary of influent flow to the Encina Wastewater Pollution Control Facility from March 6, 2007-April 6, 2007. Appendix 1c provides a summary of the total discharge flows from the Buena Vista Pump Station from March 6, 2007-April 6, 2007. Spill volume calculations are provided elsewhere in this document.

4.2 CAUSE OF THE DISCHARGE

A detailed report of the cause and/or causes of the overflow, including any testing or technical evaluation of the condition of the sewer main. The report should also include the rationale for the original selection of the iron pipe and an evaluation of the appropriateness of installing this type of pipe in the lagoon. ***(RWQCB #2)***

It would not be accurate to consider the present discharge to be an overflow of the sewer main. An overflow suggests a discharge from a location of intentional access

such as at a manhole, valve, inspection port, or vent. In the case of the force main, the present event is a rupture of the side of a heavy-walled pipe section intended to meet the pressure requirements of a force main.

A detailed analysis into the cause of the pipeline failure was initiated early in the spill response, and this effort continues at the present time with ongoing forensic analysis being conducted on segments of the pipeline failure area and soil taken from around the rupture site. The pipeline is only 25 years old and should have a useful life of more than double its current age. As a result, the Dischargers have been exploring the failure event in an effort to better understand what may have triggered such an unanticipated failure in a pipe that would not normally be scheduled for replacement for many years.

This response has been prepared as a compilation of information collected from an investigation into the history of the pipeline alignment and construction and the preliminary results of an investigation by the corrosion consultants, Schiff Associates, Inc., which was initiated on April 3rd during pipeline repairs. The consultant's preliminary findings are presented under a separate report titled "City of Carlsbad 24-Inch Force Main Failure, Buena Vista Lagoon, Carlsbad, California" (Appendix 2a). Additional testing of the polyethylene liner surrounding the pipe was performed to evaluate compliance with specifications. Preliminary results of this testing are also provided (Appendix 2b).

Upper Buena Vista Lagoon illustrating the original alignment of Jefferson Street on lagoon shoreline.

Buena Vista Lagoon with current Jefferson Street Alignment

Background on the Force Main

The alignment of the force main is shown on the exhibit titled "Buena Vista Force Main Alignment (Figure 2). The force main, originally constructed in 1963, conveys wastewater from the Buena Vista Lift Station to a gravity interceptor sewer located west of Interstate 5. The original pipe was a 16-inch diameter asbestos cement pipe (ACP) and was located entirely within Jefferson Street. At the time of construction of the original pipeline construction, Jefferson Street was aligned along the lagoon edge, and the utilities, including the force main, were constructed within the roadway below pavement and subgrade. The new 24-inch ductile iron pipeline replaced the older pipeline. Jefferson Street was realigned away from the lagoon edge, making room for the present wildlife viewing area, while the underground utilities have remained in their current alignment.

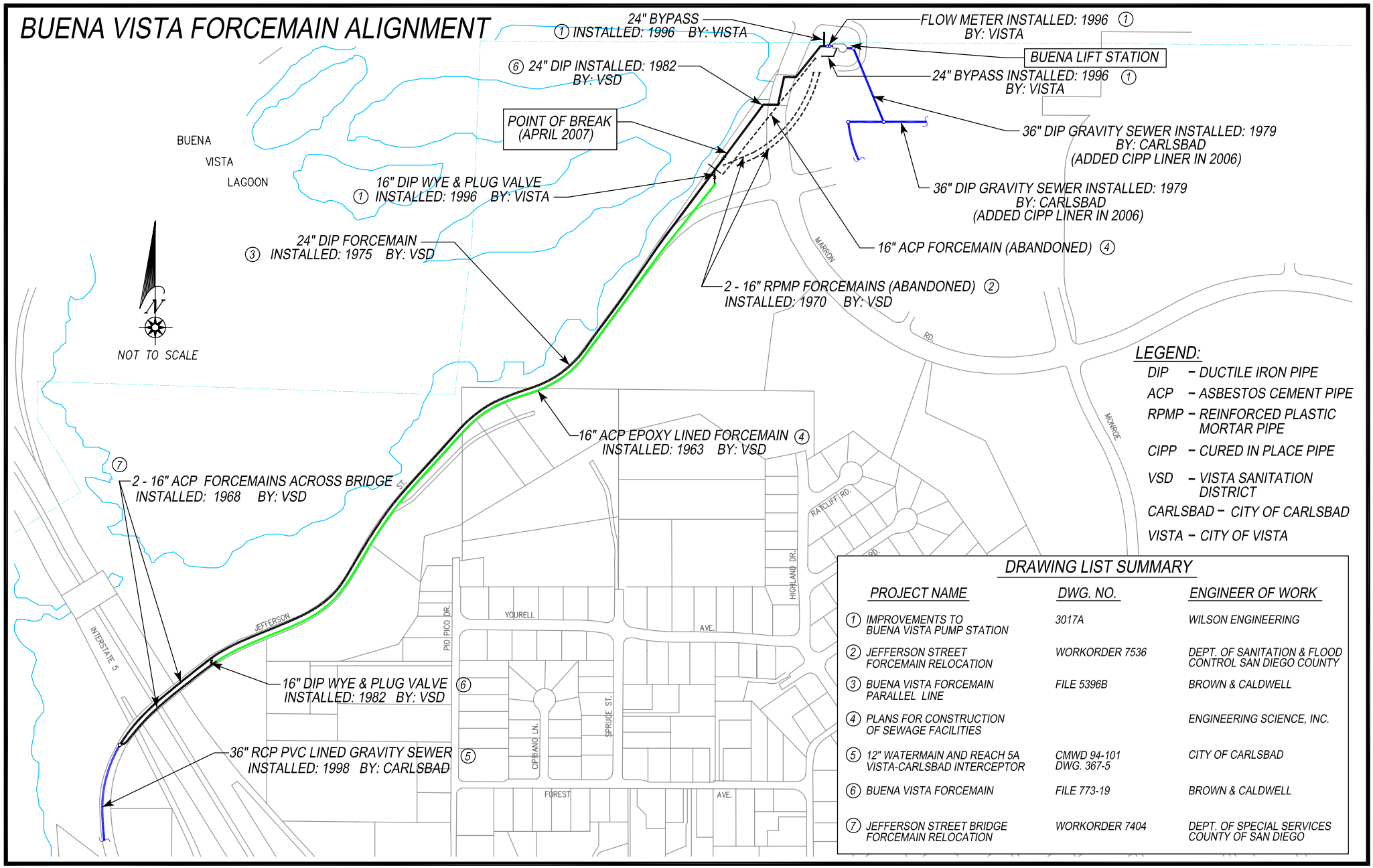
When Interstate 5 was constructed in about 1968, a new bridge overpass was built for Jefferson Street, and a two-barrel pipeline, consisting of 16-inch diameter ACP, was constructed in the bridge. The original force main was connected to one pipe barrel in the bridge. In approximately 1970, two 16-inch diameter reinforced plastic mortar pipes (RPMP) were constructed to replace the easterly most portion of the original ACP force main because of a realignment of Jefferson Street. One of the RPMP pipes was connected to the original 16-inch diameter ACP force main. In 1975, a 24-inch diameter ductile iron pipe (DIP) was constructed in Jefferson Street, parallel to the original force main. On one end, the 24-inch DIP connected to the second16-inch RPMP pipe, and at the other end, it connected to the remaining 16-inch pipe barrel located in the bridge crossing Interstate 5. At that point in time, the force main consisted of two pipelines.

While considered state-of-the-art in the 1970s and expected to have 50-year plus life spans, RPMP pipes began to show high failure rates, with breaks from fatigue occurring fairly often. Although the two 16-inch force mains in Jefferson Street had not suffered any failures, these pipes were retired in 1982 after only 12 years of service and replaced with a superior 24-inch DIP that extended from the Buena Vista Lift Station west to the existing 24-inch DIP that had been installed in 1975 (Figure 2). The 1982 24-inch DIP is the specific pipeline that failed in this event. The other pipelines installed previously have never had a similar failure on them. One of the four spills that occurred previously on the present system was the result of a contractor drilling through a 16-inch segment of the force main pipe inside of the Buena Vista Lift Station facility.

Force Main Design Specifications

The 1982 24-inch DIP force main was designed by the firm of Brown and Caldwell Consulting Engineers through an agreement with Vista Sanitation District (Appendix 2c). The location of the pipe was not constructed in the lagoon, but followed and was within the Jefferson Street alignment where it replaced a 16-inch diameter force main.

BUENA VISTA FORCEMAIN ALIGNMENT



LEGEND:

- DIP – DUCTILE IRON PIPE
- ACP – ASBESTOS CEMENT PIPE
- RPMP – REINFORCED PLASTIC MORTAR PIPE
- CIPP – CURED IN PLACE PIPE
- VSD – VISTA SANITATION DISTRICT
- CARLSBAD – CITY OF CARLSBAD
- VISTA – CITY OF VISTA

DRAWING LIST SUMMARY

	PROJECT NAME	DWG. NO.	ENGINEER OF WORK
①	IMPROVEMENTS TO BUENA VISTA PUMP STATION	3017A	WILSON ENGINEERING
②	JEFFERSON STREET FORCEMAIN RELOCATION	WORKORDER 7536	DEPT. OF SANITATION & FLOOD CONTROL SAN DIEGO COUNTY
③	BUENA VISTA FORCEMAIN PARALLEL LINE	FILE 5396B	BROWN & CALDWELL
④	PLANS FOR CONSTRUCTION OF SEWAGE FACILITIES		ENGINEERING SCIENCE, INC.
⑤	12" WATERMAIN AND REACH 5A VISTA-CARLSBAD INTERCEPTOR	CMWD 94-101 DWG. 367-5	CITY OF CARLSBAD
⑥	BUENA VISTA FORCEMAIN	FILE 773-19	BROWN & CALDWELL
⑦	JEFFERSON STREET BRIDGE FORCEMAIN RELOCATION	WORKORDER 7404	DEPT. OF SPECIAL SERVICES COUNTY OF SAN DIEGO

In 1982, the material specified for the pipe where the break occurred was 24-inch diameter ductile iron pipe, cement mortar lined, thickness Class 51, with a polyethylene encasement. Thickness Class 51 DIP has a wall thickness of 0.41-inches and an outside diameter of 25.80-inches. This pipe can handle an internal working pressure of up to 300 psi. The discharge pressure from the pumping station varies but is a maximum of approximately 40 psi; and therefore, internal pressure requirements are not a concern. Each joint of the DIP has a rubber gasket and incorporates a restrained joint mechanism for thrust resistance.

The pipe bedding, according to the plans, consisted of Class I bedding under the pipe, minimum 6" thick, Class II bedding from pipe invert (flowline of pipe) to springline (halfway up the pipe), and native backfill above the springline. This bedding is suitable for the location of the pipe. Using this pipe bedding, the depth of cover could be as high as 32-feet without risk of loading failures. Actual cover depth at point of break was less than 15-feet; therefore, earth load conditions were not a concern in construction and are not believed to be a factor in the pipeline failure. No evidence of such load stresses were observed in the pipe section removed at the damage point.

Pipe Corrosion Analysis

As indicated above, Schiff Associates, Inc. is in the process of completing corrosion analysis and forensic assessments of the pipe failure to better understand and describe the causes of the failure and to assess potential for other failures on this line. Preliminary results have been provided. These results, combined with other field observations made during the repairs, underpin the present corrosion analysis discussions.

Internal Corrosion

Internal corrosion of sewer lines is almost always associated with hydrogen sulfide generation and corrosion in a gaseous environment. Because force mains are generally fluid filled when in operation, hydrogen sulfide gas from the wastewater cannot generally accumulate in the top of the pipe where internal corrosion would normally occur. In the case of the present event, the rupture point is a low point in the force main profile, and the pipe would remain full of wastewater even when the pumps were not in operation. Further, the break area was centered below the springline of the pipe in an area where it is very uncommon to find failures due to internal corrosion.

Inspection of the pipe at the rupture site showed the internal surfaces were in excellent condition, with no observable internal corrosion. The section removed was inspected in greater detail and also showed no internal corrosion of the mortar lining. In fact, the pipe appeared to be in excellent condition internally as would be expected for this sewage force main. Based on these reviews, it is not believed that internal corrosion played any role in the failure of this line.

External Corrosion

It does preliminarily appear that the cause of the failure was external corrosion. The early testing of soils from the site by Schiff Associates, Inc. indicates a highly corrosive

nature. This is consistent with the placement of polyethylene encasement around the pipe that would be normal for use in corrosive soil environments. By appearances, the polyethylene encasement around the pipe was installed in accordance with American Water Works Association (AWWA) Standard C105 and was used for exterior corrosion protection of the DIP. The encasement requirements provided in pipeline construction documents were in accordance with design standards (Appendix 2c - 1982 Construction Documents). Using polyethylene encasement for corrosion protection is also included in Section 207-9.2.6 in the Standard Specifications for Public Works Construction (Greenbook).

Polyethylene encasement, at the time of design, was used to protect DIP from an aggressive soil environment. A common procedure used to determine if the soil is aggressive to iron pipe is the 10-point soil evaluation procedure outlined in Appendix A of the ANSI/AWWA C105/A21.5 Standard "Polyethylene Encasement for Ductile-Iron Pipe Systems." If the soil tests corrosive to DIP, then corrosion protection is warranted. An aggressive soil environment includes resistivity, pH, Oxidation-Reduction (redox) potential, sulfides, and moisture in its determination. Polyethylene encasement also protects against stray electrical currents generated by cathodic protection systems.

Polyethylene encasement is the corrosion protection method normally recommended by the Ductile Iron Pipe Research Association and the manufacturers of ductile iron pipe. If the soil is determined corrosive when tested in accordance with Appendix A of ANSI/AWWA C105/A21.5 and the pipe is encased with polyethylene in accordance with the standard, ductile iron pipe could have a life expectancy of 100 years according to the standards. The Dischargers had applied a 50-year life expectancy to this force main. Following the pipe rupture incident, Carlsbad's corrosion consultant sent a sample of the polyethylene encasement from the 24-inch pipe to the Ductile Iron Pipe Research Association in Birmingham Alabama for testing to determine its compliance with governing standards and requirements applicable at the time of installation. This allows evaluation of the material to determine if it was in accordance with specifications. Preliminary testing results on the polyethylene liner found material to be in compliance with the requirements of the applicable ANSI/AWWA C105/A21.5 Standard for Polyethylene Encasement for Ductile Iron Pipe Systems (Appendix 2b).

In order to perform properly and obtain maximum protection, the polyethylene encasement must be installed correctly. This requires correct wrapping and sealing of encasement sections. It also requires care be given to prevent rips or tears during installation. By examination of available design documentation for the pipeline construction and testing that has been performed on the *in situ* pipe and polyethylene liner materials, there is nothing to suggest that corrosion damage is more widespread than that found on the specific segment of the pipe where the failure occurred. In fact, the pipeline extending in both directions from the 3'9" segment that was removed and replaced is in excellent condition and shows no corrosion (see photo).

Corroded segment of pipe being removed.

During the excavation of the line, a deep PVC irrigation line transitioning from 2.5-inch diameter to a 3-inch diameter was unearthed directly over the location of the line break. The line had compression couplers at either end of a replacement segment of pipe, suggesting a prior repair was made to this line. The line is presently inactive, and no data could be located regarding the prior repairs. While this may in fact be coincidental, the pipe is inordinately deep for an irrigation line with a separation from the deep sewer force main of approximately 4 feet. It is possible that a failure event from this irrigation line may have eroded a large void over the force main. If so, a subsequent repair to this irrigation line would have required replacement and recompaction of fills in the void. It is possible that damage to the polyethylene encasement liner may have occurred at the time of the irrigation line repairs and not during pipeline placement.

The site observations of the irrigation line and the absence of indications of inappropriate installation standards of care leave great uncertainty with respect to if and how corrosive conditions may have entered the liner and reached the pipe. It is, however, preliminarily believed by Schiff Associates, that the liner was locally damaged. While the repairs were being made, visual inspection of the external condition of the pipe to either side of the failure point, and even above the failure point, suggested localized corrosion within the viewable portions of the pipe. This would lend credence to the belief that the polyethylene encasement had been breached. It is not anticipated

that the forensic analysis will allow a determination as to if there was installation period or later damage to the liner, however further analysis may assist in understanding more about this issue.

Conclusions

Properly designed and installed ductile iron pipe systems could have a life expectancy of more than 100 years. The Dischargers had conservatively applied a 50-year life expectancy to the pipe. The pipe in which the failure occurred is only 25-years old. Unlike other pipe materials, the physical properties of DIP do not change with age. As long as Ductile Iron pipe is not subjected to loadings and pressures in excess of its original capabilities, the only factor that will generally shorten pipe life expectancy is corrosion. Based on the information known at the time of pipe installation, the use of DIP with polyethylene encasement was suitable for this location, and design and installation practices appear to have been appropriate. The identified corrosion preliminarily appears to be the result of localized polyethylene liner breach; however at present, the cause of the breach and the corrosive agents are not known.

4.3 CHRONOLOGY OF SPILL RESPONSE EVENTS

> *A detailed chronological description of all actions taken by the Dischargers to terminate the overflow, repair the failed pipeline, and mitigate its impacts. Also include an evaluation of the results of these actions.* ***(RWQCB #3)***

Appendix 3 includes a detailed chronology of the discharge response activities and subsequent actions taken to mitigate damage associated with the spill. The chronology has been put together from a compendium of information recorded in incident logs, field notebooks, call logs and records, and photographic records. The exact chronology of events has been assembled as best as possible recognizing that records of timetables and details vary with recorders.

The spill was responded to under a regimented Incident Command System (ICS) that allowed for rapid response with parallel action tracks and redundancy in the response preparation. As a result of parallel work tracks and multiple operations occurring simultaneously, the raw chronology can, at times, be somewhat confusing unless time is taken to track parallel courses of action. This section provides a more focused summary of milestone actions and describes the principal events that occurred regarding the response.

Response Day 1

The spill was reported to Carlsbad Police Department Dispatch at 6:52:54 PM on Sunday 4/1/07. At that time, dispatch called the City of Carlsbad duty person who responded to the site three minutes later. Upon verification of the spill, response protocols went into play with contacts to the Carlsbad Public Works Supervisor and subsequently to Don Wasko, City of Carlsbad Acting Public Works Superintendent, who arrived at the site 47 minutes after the initial spill report had been received by the PD. By this time, response analyses were underway to confirm the source of the leak was

the force main and identify response options. After confirming the source to be the force main, Don Wasko contacted the Oceanside emergency number and requested that Oceanside divert all sewage coming into the system possible. This would enable the diversion of approximately 800-1,000 GPM from the Vista/Carlsbad line. After confirming that there was a diversion possibility, actions were undertaken to identify further diversion options that ultimately led to additional pumping diversions to Oceanside at 1,500 GPM beginning at 5 AM Monday morning. These actions would ultimately result in removal of over 2 million gallons of wastewater from the spill volume.

By 9 PM on Sunday, most of the senior Public Works staff of Carlsbad, Vista, and Encina Wastewater Authority was on site for the response, and an ICS was in place. A backhoe had been delivered to the site, and vegetation clearing over the leak commenced through Carlsbad staff, while Vista Engineering staff coordinated emergency mark-out for utilities and Public Works staff secured site preparation equipment such as scene lighting. Following mark-out, Carlsbad commenced digging with a Case 580 backhoe in hopes of uncovering the pipeline, but not knowing the depth of the line, excavation progressed slowly to avoid hitting the pipe and expanding the rupture. After excavating down 10 to 12 feet without reaching the pipe, it was determined that continuing with small equipment was not a safe and practical solution, and a larger contractor would need to be brought in to affect repairs and buttress slopes of the excavation against failure. After concluding that the repairs required larger equipment and a specialty contractor, crews went to work preparing the site for move in of larger equipment.

Response Day 2

Having already assumed a major pipeline contactor would be required, parallel efforts were underway to locate a contractor capable of responding immediately with appropriate equipment and expertise to excavate and repair the pipe, while a pumping company was called to explore additional diversion to Oceanside's system. At approximately 1:30 AM, Engineers and Public Works Supervisors pursued plans for the sewer to assist in guiding repairs. These were not readily located at that time, and the depth of the sewer could not be verified. Alan Manges, Encina Wastewater Shift Supervisor, contacted the California Department of Fish and Game (CDFG). Cari Dale, City of Carlsbad Public Works Manager, and Don Wasko contacted the Office of Emergency Services (OES) at 2 AM and were assigned a tracking number (OES #07-2061).

Two local contractors were contacted about the repairs but were not equipped to accomplish the work required in a timely fashion. Other contractors were also contacted; and at dawn, the specialty contracting company, Vadnais, came to the site and confirmed that they could make the repairs. They were retained to accomplish the repairs, and they contacted McMahon Construction to provide sheetpiling to shore-up trench walls for the deep excavation.

While coordination of the repair work commenced, Atlas Pumping trucks was contacted to deliver four 5,500 gallon capacity trucks to the site in order to recover some of the

sewage and begin shipping sewage to the Carlsbad collection system downstream of the break. In addition, D.L. Hubbard Contracting was requested to initiate logistical work preparing an alternative to the Vadnais excavation and pipeline repair. The alternative was to construct a temporary highline that would run from the Buena Vista Pump Station all the way to Interstate 5.

At 7:45 AM on 4/2, with pumper trucks present, the Buena Vista Lift Station was shut off to facilitate inspections, and wastewater began to back up into the 1 million gallon capacity containment berm around the lift station. Trucks began pumping and transporting wastewater from the containment area around the Buena Vista Lift Station to a manhole on the downstream gravity line located to the west of the force main. Trucks ran continuously from this point until repairs were made and the sewer line was put back into operation. The use of pumper trucks and vactor trucks to collect and transport sewage that had left the sanitary sewer system and was within the containment berm ultimately resulted in the recapture of 669,000 gallons of sewage.

By 8:00 AM, calculations were completed regarding the highline requirements, and it was determined that a hot tap of approximately 12-14 inches would be required. It was also determined that any combination of lines that would provide half the cross-sectional area of the 24-inch line may provide the required capacity. A concern existed, however, regarding the capacity of the Buena Vista Lift Station to bear the additional backpressure of reduced line diameters. Encina was contacted regarding the issues.

Field efforts commenced to post waters as contaminated, sample waters for bacteria, and respond to wastewater release impacts to the lagoon waters. Encina was charged with first response for signage posting and sampling. Shortly after initiation, City of Carlsbad Environmental Programs was contacted to provide assistance to Encina and commence efforts to assess environmental monitoring and response needs.

At 8:20 AM, Cari Dale requested that Steve Plyler, City of Carlsbad Public Works Superintendent, follow up with Dave Cammel who works at the CalTip Hotline of the CDFG. Steve entered Dave Cammel's voice mail where he obtained another number. When he called that number, he spoke to an operator who said it's not their area and they would transfer to the SD office; so he asked for that number before being transferred. Steve was successfully transferred and talked to Candice with CDFG in San Diego. She took brief info and asked if we have an OES number. Steve said he wasn't sure but he would find out and call her back. She said don't worry, if it had been previously reported that it would be forwarded to her by OES.

At 8:25 AM, Clay Clifton, Environmental Health Specialist with San Diego County Department of Health Services, was contacted. Clay requested information regarding the spill location, volume, status, mitigation, and posting. At that time, Mike Hogan, Encina General Manager, had already commenced posting of the lagoon and adjacent beach areas using Encina Wastewater staff. The bacterial monitoring program had already been initiated at this time, and the first samples were drawn at 8:37 AM.

At 9:00 AM, the Regional Water Quality Control Board (RWQCB) was contacted, and a message was left for Bob Morris. When Bob called back, he directed the call to Brian Kelly, and a message was left for Brian. At 9:45 AM, contact was made with Brian Kelly who asked questions regarding the event time, postings, cause of the failure, and repair mitigation underway.

Per direction of San Diego County Department of Environmental Health, contaminated waters signs were posted along the beach 600 feet south and 1,200 feet north of the Buena Vista Lagoon outlet as a precautionary measure. It would later be determined that contamination did not reach sampling stations at Highway 101 or downstream areas at the beach. EWA staff expanded sampling to the coastal waters north and south of the lagoon outlet.

At 11 AM, Eric Becker, RWQCB Water Resources Control Engineer, visited the site. At 11:20 AM, CDFG Game Warden, Noel Richards, arrived at the site. He indicated he wanted a call when the leak had been stopped. At approximately 12:14 PM, Hubbs Sea World was contacted regarding potential recommendations for minimizing damage to the lagoon and dealing with any wildlife casualties.

At 12:30 PM, with work underway for sheetpile shoring and planning of the repair operations for the point of rupture repairs, Carlsbad crews were also moving forward with the temporary highline alternative. They had already removed concrete thrust restraints from the force main lines on the bridge to expose it for a highline connection. With the engineering assistance of Carlos Mendoza, City of Vista Senior Engineer, the intent was to tap in two 10-inch tees for the highline to provide a high-pressure highline bypass. While it appeared workable, the construction timelines for each alternative suggested that the highline could not be completed prior to the point repairs. Based on this analysis, the highline option was put on hold. Vactor trucks were used during this period to remove spilled sewage.

Exploration of aeration commenced on the afternoon of 4/2, with calls being made to the area agencies to amass equipment that could be used for aeration. By approximately 7 PM, pumps had been obtained from Oceanside. Additional pumps were rounded up to dewater the repair excavation site. The Buena Vista force main was operated intermittently to draw down wastewater to the treatment plant.

At 7:04 PM, Elaine Lukey, City of Carlsbad Storm Water Manager, was designated as the lead for environmental coordination and testing issues. Environmental response monitoring commenced following guidance provided by the EWA Sanitary Sewer Overflow Response Plan (SSORP) and monitoring and immediate response plans implemented in 1994 and 1997. Dissolved oxygen (DO) monitoring began in the lagoon at 8 PM. Following response plans, the first aeration pump was installed on the northern shore of the east basin at 9 PM.

Response Day 3

With the trench shoring driven in the early hours of the morning, Vadnais began removing material. Pumps were used to dewater the excavation, and gravel was placed as a working surface. Work progressed through the early morning. By 5 AM on 4/3, access to the leak had been achieved, and handwork was underway to expose a large enough area to affect repairs. The outside diameter of the pipe was confirmed, and insert materials were sent to the site.

Hubbard was put on stand-by for the highline work in the event the repairs could not be affected as contemplated. At 7:05 AM, cutting out of the broken section of pipe was initiated. Because of the size of the main and wall thickness, a second saw was put to work. The pipe was removed in two sections. By 7:30 AM, it was confirmed that a highline would not be required.

At 8 AM, Elaine Lukey and Paul Hartman, City of Carlsbad Senior Environmental Specialist, met with CDFG representatives in the field to discuss the sampling program and obtain further guidance. It was determined at this meeting that fish collection should be initiated on a twice-daily basis, and the Department wanted two specimens of each species collected and transferred to the Department. Monitoring for DO would continue twice daily, and efforts would be initiated to search for sick or dead birds. The DO monitoring along lagoon shorelines followed the Buena Vista Response Plan of EWA and the monitoring program applied during the 1997 lagoon discharge.

The top section of the pipe was removed from the trench by 8:13 AM. The bottom section came out of the trench at 8:39 AM. A replacement section of 24-inch ductile iron pipe was cut to insert into the prepared gap.

Urban Corps crews were brought to the site to begin trash removal and clean-up of spill and response trash. Vactor trucks from Vista, Vallecitos, Oceanside, and Encinitas responded to initiate overflow cleanups through an informal mutual aid agreement.

At 9:08 AM, Carlos Mendoza contacted Don Wasko from the site of a second, unrelated line break near the Raceway in the Agua Hedionda Basin to request diversion of the unused 10-inch highline to the Raceway spill site. This was delivered to the Raceway site at about 10:30 AM.

At 9:16 AM, corrosion consultant, Schiff Associates, Inc., was contacted to come inspect the pipe, the trench, and the removed segments to provide insights into the cause of the failure. Graham Bell of Schiff Associates, Inc. arrived at approximately 11:15 AM to inspect the pipe in the trench. This forensic assessment has been ongoing off-site since the initial site inspections performed by Schiff Associates, Inc. Preliminary data are reported elsewhere in this document.

At 9:21 AM, Kim McKee, CDFG Reserve Manager, arrived on the site and advised that trench spoils should not be replaced and they needed to be hauled away. Additional

crews and trucks were brought in to begin hauling soils away for disposal. Clean suitable backfill was located on a project site being developed in Carlsbad.

Keith Merkel, Principal Ecologist with Merkel & Associates, was retained to assist in response oversight and resource recovery and to help identify any additional agency contacts that should be made, as well as to assist in formulating a response program to further the reduction of environmental harm and resource recovery where impacts had already occurred. At that time, the Army Corps Of Engineers (ACOE) and CDFG streambed alteration program staff, Jeannette Baker and Tamara Spear, were made aware of the spill and advised of the potential need for emergency permitting.

Additional aerators were established at the Jefferson Street Bridge at 9:55 AM and at the "Duck Pond" at 12:45 PM, and efforts continued to locate more aeration resources. At 11 AM, Weston Solutions, Inc. was brought in to conduct on-water monitoring for dissolved oxygen in accordance with the 1997 spill response program.

Onsite, repair couplings were installed to connect the replacement pipe segment to the existing cut ends of the exposed pipe. By 12:27 PM, valves to the repaired force main were opened, and one Buena Vista Lift Station pump was turned on. At 12:53 PM, the berm overflow at the lift station stopped as wastewater was drawn down at the station and pumped down the repaired force main. By 1:39 PM, the lift station was operating at 12,500 GPM and maximum operational pressures, without leakage being observed at the repair.

A helicopter survey of the lagoon by Elaine Lukey; Bill Paznokas, CDFG Staff Environmental Specialist; Joe Garuba, City of Carlsbad Senior Management Analyst; and the Carlsbad Fire Department photographer documented that the majority of the discharge appeared to be limited to the East basin, with a small incursion into the central basin of the lagoon. Bill Paznokas requested additional dissolved oxygen monitoring stations under and West of the I-5 Bridge.

At 2 PM, an agency coordination and response action meeting was held at the City of Vista to discuss measures going forward to further minimize harm to the lagoon. Elaine Lukey went through the environmental response and testing actions that were underway. These measures included aeration, monitoring in accordance with guidance provided by prior 1994 and 1997 spill response plans, supplemental monitoring that has been added in response to the current spill, dead fish collection and documentation per prior spill responses and requests of CDFG, and an intent to initiate pump-back to the sewage lift station now that repairs had been completed. Bill Paznokas discussed the system response to the prior spills. Keith Merkel recommended that more aeration be added to increase consumption of BOD and that pump-back from the east end of the lagoon be increased to benefit recovery by helping to remove sewage and pulling plume waters back towards the east end of the lagoon. Keith also recommended that Oceanside rebuild the barrier beach berm at the mouth of the lagoon since the lagoon had started spilling and bacterial testing data were not yet in. It was also recommended that benthic infaunal samples be collected to provide a pre-spill baseline before any

dead animals have had a chance to decompose. Mr. Merkel contacted wildlife care center to advise of potential for sick birds and to confirm capacity to receive birds. Mr. Merkel confirmed that he would follow up with the ACOE, CDFG, and California Coastal Commission (CCC) regarding the incident.

Environmental work at the site continued, with field reviews by CDFG and Merkel & Associates and supplemental monitoring being initiated by Carlsbad Environmental Program staff. A pump-back pump was put into operation at 5 PM to begin to draw water back to the sanitary sewer from the lagoon. At 7 PM, a fourth aeration pump was put into operation near the Jefferson Street Bridge. A second pump-back pump was put into operation at 8 PM.

A 24-hour staffing program was put into place to tend aeration pumps and pump-back facilities until changes in the program were dictated by recovery monitoring data. Staffing was accomplished by City of Carlsbad and City of Vista crews.

Response Day 4 through Day 23

Daily monitoring and testing for lagoon and beach bacteria levels continued to be performed by Encina Wastewater Authority. The dissolved oxygen sampling, as well as fish and bird collection, were conducted by environmental program staff of the Cities of Carlsbad and Vista and Weston Solutions, Inc., with data review and analysis being performed by Merkel & Associates to coordinate recovery program changes and assessment of environmental affects. Two additional aerators were put into service in the afternoon of April 7th. Monitoring responsibilities transferred over to Merkel & Associates on April 7th for shoreline DO monitoring and April 12th for other monitoring in association with overall data analysis, remediation coordination, and reporting obligations. Over the course of the subsequent weeks, pump-back operations and aeration have been phased out in response to monitoring results and lagoon recovery conditions. These program changes have been coordinated with resource and regulatory agencies through coordination meetings and briefings.

Analysis of the break incident, discharge volumes, and environmental damage resulting from the spill were initiated during the spill response and continued after the spill. On April 6, an Investigative Order (IO No. R9-2007-0060) was sent by the Regional Board requesting documentation be prepared and submitted in response to the spill event no later than April 23rd. The initial investigations by the Dischargers and EWA to understand the failure, along with subsequent work to respond to the Board's request, have been ongoing throughout the time since the spill.

4.4 CALCULATION OF WASTEWATER DISCHARGE VOLUME

A detailed report of the total overflow volume including how the Dischargers calculated the volume. ***(RWQCB #4)***

The total discharge volume resulting from the spill incident has been calculated to be 7.329 million gallons discharged between Saturday, March 31, and Tuesday, April 3,

2007. Calculations of releases were performed under the direction of Mr. Michael Hogan, Encina Wastewater Authority General Manager (Appendix 4). The spill volume was calculated using flow variance from average flows from the 4 prior weeks for the same days of the week during which the spill occurred. Measurements are based on monitoring of incoming flows to the EWA treatment plant from the influent system, including the ruptured Buena Vista force main. This method was selected over using 30-day averages or 90-day averages due to the substantial variability of flows from week days to weekends and the disproportionate weighting of the present spill with weekend days (50% weekend days versus 28.6% weekend days that occur in a full week). Alternative means of calculating the discharge using running averages were examined as a means to verify the reasonableness of the calculations. The basis for analyses is provided in Appendix 4.

4.5 VOLUME OF WATER PUMPED FROM LAGOON TO SEWER

The volume of water pumped back into the sanitary sewer system from the Buena Vista Lagoon. ***(RWQCB #5)***

Following the completion of pipe repairs, withdraw of effluent was initiated from the Eastern end of the lagoon. This was accomplished following the protocols established first in response to the 1994 spill and as documented in the Encina Wastewater Authority SSORP. The pump back effluent was conveyed from the lagoon through two 6-inch diesel powered pumps to the Buena Vista Pump Station, where the discharge was conveyed into the waste stream destined for the EWA treatment plant. Pumps were placed into operation at approximately 5 PM and 8 PM on 4/3. The pumps, rated at 2,200 gpm, operated at a calculated flow of approximately 1,500 gpm after losses due to intake and discharge hose friction and lift to the pump station.

Dissolved oxygen measurements and visual observations of the plume distribution that were made by Elaine Lukey, City of Carlsbad, and Bill Paznokas, CDFG, from helicopter surveys suggested that the plume was principally restricted to the eastern lagoon basin and just marginally had entered into the central lagoon basin. This situation, combined with the relatively low inflow to the lagoon from Buena Vista Creek and persistent Westerly winds, suggested that a substantial sustained withdraw at the east end of the lagoon could reverse the flow gradients in the system and pull the plume back towards the east. This would limit the footprint of adverse affect within the lagoon both from an ecological perspective as well as a human health risk. The reversal of flow gradient towards the east end of the lagoon prevented sewage from reaching much beyond the Interstate 5 Bridge between the eastern and central lagoon basins. As a result, dissolved oxygen levels and bacterial levels measured from Highway 101/Carlsbad Boulevard down to the weir and beach verified that these waters never received sewage inflows.

During the pump-back operation, 42.3 million gallons of combined wastewater and lagoon water was withdrawn from the lagoon (Appendix 5a). The two pumps operated concurrently from 4/3 through 11 am on 4/10. On 4/9, at a resource agency field

briefing, Keith Merkel recommended that the program be modified with a reduction of pump back to just balance inflows from Buena Vista Creek. The purpose of this recommendation was that dissolved oxygen levels had generally hit a point of substantial recovery throughout the east basin by 4/8 and DO levels were not low enough to result in further organism mortality, however the pump-back was beginning to lower lagoon water levels. A reduction to static inflow rates would generally maintain stasis in the plume distribution allowing bacterial levels to continue to drop without allowing spread to unaffected waters. Resource agencies and the Dischargers accepted this recommendation, with an effective date being 4/10/07.

Based on the recommendation, Jayne Strommer, City of Vista Program Manager, contracted Landis & Associates to measure the Buena Vista Creek flow rates to determine what a balance in rates would require. Landis & Associates gaged the stream flows near the El Camino Avenue Bridge at approximately 2.6 cfs (Appendix 5b). This rate required the elimination of one of the two pumps.

The second pump continued to operate until 4/16. On this date, at a resource agency briefing, Keith Merkel advised that the benefits of pump-back had been fully achieved with recovered DO and that bacterial levels were within health standards except at the easternmost end of the east basin. A recommendation to terminate all pump-back was made and accepted by resource agencies. The last pump was turned off at approximately 4 pm on 4/16.

4.6 MAINTENANCE AND INCIDENT HISTORY OF FORCE MAIN

> *Since 1994, the date and extent of preventive maintenance and/or inspection (e.g., line cleaning, closed-circuit television inspection) that was performed on the sewer line and other structures involved in the sewer overflow. Also report on any other problems experienced with the relevant force main in the past and what actions, if any, that have been taken to correct such problems.* ***(RWQCB #6)***

Past Maintenance and Inspection

The system facilities involved in the spill include the specific 24-inch force main that failed, connecting segments of force main, and the Buena Vista Lift Station. The force main system is designed to be a self-scouring, fully flooded conveyance with high pressure capacities requiring little maintenance. The large size and design of the force main both dictate a lack of requirement for internal inspection and cleaning as well as a lack of capability to perform such inspections. In the case of the Buena Vista force main, deposition of solids in the pipe does not occur because the flow velocities on a daily basis achieve velocities of at least 4.25 feet per second during peak flow conditions in the 24-inch diameter force main. This flow velocity is more than sufficient to suspend any solids that might deposit in the pipe during low flow conditions or when the pumps are not operating. Engineering standards for force mains require a minimum flow velocity of approximately 2 feet per second under peak flow conditions to maintain self-cleaning properties.

For smaller force mains where internal blockage is possible, a common method for cleaning is by the use of a polyurethane swab (poly pig) inserted into a pipeline and pressurized to launch the pig down the line scraping the sides of the pipe. Due to the pipe size and the considerable bends in the Buena Vista force main line, as well as a lack of launching or retrieval port, maintenance by pigging could not be performed. Internal video inspection cannot be done in a flooded force main and is not generally required in a fully flooded force main that is self-scouring and not subject to high rates of internal corrosion. As was discussed in section 4.2, internal corrosion is a common problem in gravity sewers where hydrogen sulfide gas corrodes pipe in a gaseous environment. It is very uncommon for internal corrosion to occur in force mains, and according to Schiff Associates, internal corrosion was not a factor in this failure.

The Buena Vista Lift Station has been regularly maintained with staff present at the lift station on a daily basis. Regular servicing of pumps and valves, as well as alarm systems and electronic monitoring equipment, is performed at the station, and records of the service are available through EWA. While this facility was not responsible for the present pipeline rupture, two of the system spills occurring in the last 13 years occurred as a result of pump station problems. Both of the pump station events occurred in 1997.

Standard maintenance for a force main of the Buena Vista force main type would be maintenance and exercising of valves, and inspection and maintenance of force main air release valves. Inspection and maintenance of valves at the Buena Vista Lift Station and the single force main air release valve on the pipe have been performed regularly by EWA. The lift station maintenance is on going, and the air release valve has been inspected or maintained a total of 34 times since 2000.

In conducting the analysis of system maintenance, the Dischargers discovered that the three control valves outside of the lift station have not been maintained. While these valves were not involved in the system failure and proved operable and useful in system repairs, they have not been exercised and serviced to ensure reliability in the event of future need. Modifications to the maintenance program to address this lack of past service will be made.

Incident History on Facilities

There have been four prior incidents of discharge of wastewater related to the Buena Vista force main system, including the lift station or in the immediate area of the system. None of these prior incidents are similar in nature or related to the present discharge. In fact, none of the prior releases were corrosion related in any way. The releases that have occurred on the force main system are listed below:

- 8/22/94: In violation of mark-out requirements, a contractor drilling a dewatering well at the Buena Vista Lift Station accidentally drilled into a 16-inch diameter force main, causing 4.75 million gallons of sewage to spill into the Buena Vista Lagoon. Greater controls on contractor mark-outs and

inspections within the pump station have been incorporated in subsequent construction contracts.

- 1/11/95: An interceptor sewer on Jefferson Street spilled 1,000 gallons of sewage into the Buena Vista Lagoon. The cause of the spill was a collapsed manhole downstream of the force main. This is not related to the force main system, but due to proximity, it is included in this discussion. The City of Carlsbad replaced the interceptor sewer and manholes in 1999 and installed T-Lock PVC Liners onto the pipe and manholes to prevent further corrosion downstream of the force main.

- 1/15/97: The Buena Vista Lift Station potentially surged and pumped sufficient flows to lift a manhole cover on the gravity flow pipeline in Jefferson Street downstream of the force main. This resulted in a spill volume of approximately 35 gallons. A letter was sent to the Pump Station operator at the Encina Wastewater Authority, directing them not to run pumps over 80% speed in order to prevent surcharge in the Vista/Carlsbad Interceptor Sewer gravity pipeline. This problem was addressed and will not occur in the future because the interceptor sewer was replaced with a larger 36-inch diameter pipe in 1999 that will handle all projected peak wet weather flow conditions under full pumping capacity at the lift station.

- 2/25/97: The Buena Vista Lift Station had a failure resulting from a flange failure within the lift station that failed during a flow test event to verify correct operation of pumps, valves, and switches under maximum load. Following shutdown of the pumps, an alarm went off indicating that the dry well within the lift station was flooding. With the station flooding, access to necessary valves to alter flows was cut off by rising sewage in the station. Several failed attempts to close the valves occurred during the day with the final closure of the isolation valve to the dry well being accomplished by a diver. The spill event resulted in an estimated 1.75 million gallons of raw sewage spilling into the lagoon between 11:45 am and 5:00 pm on 2/25/97. Pump-back from the lagoon removed 4.7 million gallons of wastewater and lagoon water following protocols established in 1994. Subsequent to the spill, modifications to the pump station were made to improve alarm systems, incorporate additional failsafe measures for valves.

4.7 PHOTOGRAPHIC AND VIDEOGRAPHIC DOCUMENTATION

Copies of any photographs and/or video taken during or after the sanitary sewer overflow. Photographs and/or video shall include appropriate identifying information, such as date taken, name of photographer/videographer, and textual summary of information being presented, as well as its relevance. ***(RWQCB #7)***

Attached, as Appendices 7a and 7c are photos taken during and subsequent to the event. Because of the inordinate number of photos and the numerous photographers that collected photos of the incident, the Dischargers have amassed well over 1,000 photographs, as well as a video of the event (Appendix 7b). Based on the Board's request, an effort commenced to identify, label, and summarize the information in these photographs. Recognizing that the effort would be unwieldy and that many photographs taken were irrelevant to the incident, Keith Merkel contacted Bob Morris, RWQCB Senior Waste Resource Control Engineer, on April 13th regarding possible omission of irrelevant photos from the record. Mr. Morris discussed the issue with Mark Alpert RWQCB Senior Engineering Geologist, and it was agreed between Mssrs. Morris, Alpert, and Merkel that all photos would be collected and provided, but that irrelevant photos would be batch labeled and submitted in bulk. The submitted photos are only those that are immediately available to the Dischargers. It is acknowledged that the public, news crews, resource and regulatory agency staff, and a number of others collected photos that were not acquired by the Dischargers. Photos taken by Schiff Associates, Inc. are not included in this section, as they have been incorporated into the preliminary forensic analysis of the pipe failure (Appendix 2a).

4.8 SANITARY SEWER OVERFLOW RESPONSE PLAN

> *A copy of the Dischargers' current sanitary sewer overflow response plan.* ***(RWQCB #8)***

Copies of the Sanitary Sewer Overflow Response Plans (SSORP) for Carlsbad and Vista are provided as Appendix 8a and Appendix 8b, respectively. Because the Encina Wastewater Authority SSORP specifically addresses actions within Buena Vista Lagoon as a response program to spills from the Buena Vista Lift Station, this plan has been included in this response as well (Appendix 8c). The Dischargers made use of specific guidance provided under this plan both because of the similarity in location of the pipeline break and the pump station and because collateral spills associated with shutting down the pumps at the pump station to make repairs, resulted in releases from the pump station containment area.

4.9 MEASURES TO MITIGATE IMPACTS

> *Measures the Dischargers have taken, or will take, to prevent and mitigate the impacts of future overflows from force mains or other sewer lines, particularly in ecologically sensitive areas. This could include such tasks as monitoring of force main flows, increased monitoring frequency of sewer lines in sensitive areas, use of additional equipment to recover sewage overflows, etc.* ***(RWQCB #9)***

The Dischargers have a good record of maintenance of facilities and extremely good spill response. This can be attributed to a variety of factors including 1) regular sewer master plan updates that are used to evaluate system monitoring, upgrade, and replacement needs; 2) strong inspection and cleaning programs for sewers within the

service area, and 3) a cooperative interagency preparedness program that involves annual spill drills and mutual assistance by North County agencies. This section elaborates on these established practices and provides a retrospective on means by which further improvements may be possible.

Sewer Master Plans

Both the City of Vista and the City of Carlsbad have recent sewer master plans that include evaluations of pipeline capacities and pipeline conditions of their interceptor and trunk sewers. For both Vista and Carlsbad, 2003 Sewer Master Plans are the most current plans. These sewer master plans are regularly updated. The City of Carlsbad has prepared many sewer master plans over the years since it was incorporated in 1952. Four of the most recent Sewer Master Plans were prepared in 1987, 1992, 1997, and the present plan in 2003. The City of Vista has completed Sewer Master Plan updates in 1982, 1993, and 2001, with minor updates in 2003. Vista has a comprehensive Master Plan update in progress now that is scheduled for completion in the summer of 2007.

The latest update incorporates a GIS-integrated parcel loaded updateable sewer model that, along with a flow-monitoring program, will incorporate an extensive infiltration and inflow analysis to help prioritize projects. The sewer master plan and model update is paired with a comprehensive storm drain GIS mapping, modeling, and CIP update project that allows integrated management of all the City's gravity infrastructure. From 2004-2007, the City developed a GIS program to maintain data. The data are available at: http://www.cityofvista.com/departments/engineering/GISSewerAtlas.cfm

The importance of these master plans to discharge control is they assist the cities in analyzing capacity requirements, infrastructure condition, maintenance and inspection needs, and trouble areas. These regular reviews provide for prioritization of actions including inspection, maintenance, system enhancements, and replacement of aging or problem infrastructure. Both of the cities maintain a rolling list of capital improvement projects (CIPs) based on the master plans. Inspection, maintenance, and facility replacements and expansions are funded based on the master plan needs identification and CIPs.

The outcome of these analyses is a recommended long-term Capital Improvement Program (CIP) for improvement of existing wastewater collection and treatment facilities. With this information, an updated sewer connection fee is calculated for future expansions to finance the recommended facilities. The cities also contribute to a replacement fund annually to be able to replace facilities when they reach their useful life. The cities consider all sewer pipelines to have a useful life of 50 years.

For both cities, there has been a great amount of effort placed on regular cleaning of sewer pipelines and making repairs or replacements where required. Recent examples in ecologically sensitive areas or where preventative and reactive replacements or maintenance have occurred include the following:

- **Carlsbad -** The Batiquitos Lagoon Interceptor Sewer from El Camino Real to the Batiquitos Lift Station included a CCTV and condition evaluation report performed in 2006. Previous to that work, but downstream of the Batiquitios Lift Station, Carlsbad has replaced the forcemain and the manholes. The new manholes are PVC lined concrete. In addition, an air jumper was installed in 2004 to convey sewer gases across an inverted siphon along Avendia Encinas, which effectively conveys the sewer gases downstream with the sewer flows.

- **Carlsbad -** On the Agua Hedionda Lagoon Interceptor sewer, Carlsbad completed 2005 installation of a new lift station and parallel interceptor sewer on the south side of the lagoon to reduce flows in the existing north side interceptor sewer. Other improvements included rehabilitation of manholes on the north side interceptor from Cove Drive to El Camino Real and complete upgrading and pump replacement of the downstream lift station on the North Agua Hedionda Lagoon interceptor sewer. One reach of the North Agua Hedionda Lagoon Interceptor sewer has been a challenge to replace due to environmental constraints; however, severely deteriorated sections of the pipeline between Cove Drive and Hoover Street are now to be addressed by microtunneling a replacement sewer alignment rather than using an open trench method.

- **Carlsbad -** Carlsbad is also in design to replace the remaining portion of the Vista/ Carlsbad Interceptor sewer from Agua Hedionda Lagoon to the Encina Water Pollution Control Facility. Issues with the California Coastal Commission and the North County Transit District are a significant restraint; however, and obtaining the needed Coastal Development permit and license agreement is anticipated to take some time to complete.

- **Carlsbad -** One project in the CIP that was identified in Carlsbad's 2003 Sewer Master Plan, is to install a parallel 24-inch diameter force main from the Buena Vista Lift Station to the bridge crossing Interstate 5. The purpose of this parallel pipeline is to provide additional conveyance capacity upon installation of the final pump at the Buena Vista Lift Station. In an era of ever evolving technology, it is anticipated that pipe material for the parallel force main will likely be high-density polyethylene (HDPE) to remove any concern from external corrosion. HDPE can be specified with sufficient wall thickness to handle the internal pressures and the external earth and live loads along this alignment.

- **Vista -** CIP 7035 – VC1-3 Rehabilitation – Earth Tech prepared an assessment report, dated February 2001, for the City of Vista for the DIP Gravity lines comprising reaches VC1, VC2, and VC3 of the Vista Carlsbad Interceptor. Based on the recommendations from this report, a rehabilitation project was designed, and construction was completed in June 2006. The project rehabilitated all 37 manholes on the reach with mortar patching and epoxy coating, installed 4,196 feet of 36-inch diameter structural Cured-in-Place Polyurethane resin (CIPP) liner, and 4,524 feet of 42-inch diameter structural CIPP liner.

- **Vista -** CIP 8049 – Mass/Citrus Sewer Replacement – Approximately 8000 linear feet of clay pipe, manholes, and appurtenances were replaced with PVC in widened easements. This project was completed on or about April of 2005. The project addressed a hard to access cracked and root intruded 1960's era sewer line that was prone to spills.

- **Vista -** CIP 8086 – NCTD Sewer Relocations – This project replaced and relocated sewers conflicting with the NCTD Sprinter Construction Project. It improved access to sewers in numerous locations adjacent to the NCTD Rail easements.

- **Vista -** CIP 8076 – Raceway Sewer Pump Station Replacement – Replaces a 1986 sewer pump station that was prone to failures. This project is currently scheduled for completion on or about May of 2007.

- **Vista -** CIP 8079 Buena Outfall Force Main Phase II – This project replaces approximately 6,200 linear feet of DIP force main with new PVC force main within the new Faraday Road alignment and out of an inaccessible tributary to the Agua Hedionda watershed. The new force main is in operation and Notice of Completion is expected on or about June 2007.

- **Vista -** CIP 8050 / 328 Buena Outfall Force main Phase I – This project replaced approximately 2,200 linear feet of DIP with PVC pipeline within an easement road adjacent to a tributary to the Agua Hedionda watershed. The project was completed in 2004.

- **Vista -** CIP 8046 – York Drive Sewer Replacement Project – This project installed approximately 5,000 feet of PVC pipeline, 1,500 feet of CIPP liner, 23 manholes, 60 service reconnections, and 7,000 feet of environmentally friendly access roads. The project replaced 1963-1965 era sewer lines in a 5-10 foot easement centered on fenced property lines in a floodplain that had become root infested due to the development of large trees and growth on this inaccessible alignment. After a November 7, 2002 sewage spill, the District escalated the priority of this difficult easement sewer replacement and access improvement project. A design was nearly completed in conformance with the environmental report on or about 2002. Based on extensive Community input, the District redesigned the project and acquired ROW in 2005-2006. A Notice of Completion was filed on December 12, 2006.

- **Vista -** CIP 8027 – South Santa Fe Avenue Phase III – This project replaced approximately 2,900 feet of existing clay sewer lines along the realigned South Santa Fe Avenue within the City of San Marcos from Bosstick to Rancho Santa Fe. The project was recently completed and Notice of Completion is anticipated by June 2007.

- **Vista -** CIP 8070 – Mimosa, Juniper, Grand, and Green Oak Sewer Replacement – Sewer Replacement and Rehabilitation – The design for this project is anticipated to be awarded in May 2007. The project will replace, relocate, and upsize approximately 3,100 feet of 12-inch diameter trunk sewers adjacent to sensitive tributaries of the Agua Hedionda Watershed. This project is anticipated to be completed within the next two years.

It is important to note that based on analysis criteria, the 1982 24-inch ductile iron Buena Vista force main has not been prioritized for maintenance or replacement under the Sewer Master Plan. This is because the pipe failure occurred after only 25 years on a pipe with a predicted 100-year lifespan and a 50-year service life under the master plan. Further, the pipe has had no other failures of any kind, and in fact, replaced poor piping materials when it went into service. For these reasons, the present failure could not have been predicted based on standards of assessment used to establish maintenance or replacement actions.

Inspections and Maintenance Programs

Both of the Discharger cities have aggressive inspection and maintenance programs. To describe these programs, the cities are discussed separately because they have somewhat differing programs that achieve the same goals.

Since 1996, efforts in Vista have been focused on meeting requirements of Board Order 96-04 and the new Order No. R9-2007-0005 incorporating prohibitions on any discharge of sewage from the sanitary sewer system upstream of a sewage treatment plant. To accomplish this, the wastewater division was reformatted to focus priorities on maintenance and inspection on a regular circuit during which problem areas are documented and capital project actions are assessed and initiated.

Daily maintenance efforts have been reformatted to include the following:

Cleaning of all accessible sewer line segments, filming of lines that have resulted in spills or blockages, and the support work necessary to provide reasonable access for all sewer maintenance equipment. This includes, but is not limited to, the following established crews.

- **1996-04 Compliance Cleaning Crew -** The City has been divided into three subareas that have been assigned one Vactor and two crewmen per subarea. The crews have a target goal of cycling through cleaning of all accessible line segments at least once every 6-8 months. Also assigned to this crew are one immediate supervisor/ Crew Chief to oversee work and respond to emergencies.

- **Video Inspection Crew and Easements -** In support of 96-04 and R9-2007-0005, a video inspection truck is used to perform assessment and diagnostic work to provide important information by conducting internal inspections looking into pipes to evaluate problem lines. This crew has also been charged with work from the Engineering Department requiring an extensive video inspection

program to film all new lines whether private development, CIP, or other forms of development.

- **Service and Repair Crew-** This three-man crew installs easement gates, maintains easement roads, repairs lines as needed during emergency breaks up to 10" pipe, and maintains and operates the old raceway pump station. The crew also installs raised manholes and clean outs, repairs trench failures, and other ancillary support work needed by the 96-04 crews.

During and after heavy rains, crews patrol all main trunk lines to be sure no areas have been compromised. Crews also respond as needed to assist sister JPA members and other North County agencies for mutual aid type support as needed. All of the wastewater crews receive regular training to maintain current expertise with work, regulations, safety, and spill response. To track progress and performance, the City employs several software programs. Daily sewer cleaning efforts are tracked using Accella and Sussex based software programs. Training programs are tracked in Excel formats.

In Carlsbad, similar city crew inspections and maintenance are performed on a regular basis. In addition, Carlsbad has also used contract services to perform considerable video inspection. In a contract between Carlsbad and National Plant Services, a CCTV inspection and cleaning was conducted of reaches VC1, VC2, VC3, VC13, VC14, and VC15 of the Vista/ Carlsbad Interceptor Sewer (gravity flow pipeline sections). These reaches extend from the City limits with Vista to the Buena Pumping Station and from Agua Hedionda lagoon to the Encina Water Pollution Control Facility. The remaining reaches of the gravity flow pipelines were being replaced at the time with a new larger pipeline; and therefore, were not included in the contract. The force main from the Buena Lift Station to its point of discharge was not cleaned and was not inspected internally under this contract for reasons explained in prior responses.

Spill Preparedness and Response

The Encina Wastewater Authority, the City of Carlsbad, and the City of Vista conduct overflow and emergency drills on an annual basis. Other JPA agencies and non-member agencies are also participants at times when the spill scenario may affect facilities or resources at which direct involvement may occur. Scenarios and/or after action reports are attached for several of the past years drills (Appendix 9). Of note is the parallelism between the present response chronology and the Incident Command Structure (ICS) consistently employed in the spill drills. The familiarity with the process of all of the respondents to the present spill can be credited with the rapid and affected multifaceted response program. For several reasons, it is beneficial to examine the 2004 Spill Drill After Action Report within the appendix. This particular drill was a spill at the Buena Vista Lift Station, and the response drill identified several solutions to problems that were encountered in the present pipeline rupture such as flow diversion, communications, and traffic control needs. The benefits of this drill were invaluable at guiding the response process and needs for the current spill.

Another factor that has been critical to the development and maintenance of response capabilities for major emergencies has been the development of mutual assistance programs between agencies. The facilities and resources of any single entity within San Diego North County are highly limited. However, through mutual assistance programs, emergency needs can be met by amassing resources from neighboring agencies. In the present spill, respondents to the spill not only included Carlsbad and Vista, but also Encina Wastewater Authority, Oceanside, Encinitas, Leucadia, and Vallecitos. Supplemental resources, field response, and technical assistance were derived from multiple cooperating contractors, consultants, and resource and regulatory agencies. Through the cooperative efforts of multiple parties working on numerous different, but coordinated response needs, a potentially much greater spill and environmental damage was averted.

Future Action Opportunities

Ongoing investigations into the pipe failure and response program continue to yield possible areas of improvement and issues to explore for future actions. These can be categorized as follows: 1) discharge avoidance; 2) leak detection; 3) response time and resources; and 4) impact minimization and recovery. In some instances, it remains uncertain if improvements may be made; however, retrospective evaluation suggests that these are areas that bear further exploration. Many of these possibilities fit squarely within the development of Sewer System Management Plans (SSMPs) required of the cities in accordance with established milestone dates in WDR Order 2006-003-DWQ.

Discharge Avoidance

This category focuses on means of improving detection of system weakness and responding to maintenance or operational needs prior to infrastructure failures. The present failure poses an interesting dilemma for the Dischargers in that there presently exists no means by which the failure could have been predicted using existing data or inspection capabilities. In fact, because the pipe is wrapped and the failure point appears to be a very localized point of substantial corrosion (the corroded area removed was fully captured in a segment of pipe only 3’9” in length), even high intensity pothole inspection would be unlikely to identify additional points of corrosion if they exist. This is especially true since the present failure point was in about the 4:30 position on the pipe and thus it would not have been detected without full exposure of all portions of the pipeline surface within relatively deep excavations requiring shoring and large equipment to accomplish the excavation. Further, because the inspection would require opening the polyethylene liner, the inspection itself may result in greater potential for future breaches.

For this reason, the Cities are considering contracting with a specialized infrastructure firm to conduct a risk assessment of force mains and siphons in the City. The risk assessment might be an element of the design and performance provision of the WDR Order 2006-003-DWQ and could consider pipeline age, pipeline material, operation conditions, and soil, as well as other factors as parameters that would extend or reduce the probable service life of infrastructure or play a major role in shaping inspection and

replacement decisions. The environmental, human health, and economic consequences and likelihood of pipeline failure may be further factors that could also influence further investigations such as a condition assessment of select pipelines.

Means to conduct further analysis of the risk of additional failures on the existing 24-inch force main pipe continue to be an issue the Cities are grappling with at this time. Unfortunately, technologies available today for conducting thorough condition assessments are emerging technologies and not yet commercially available to public utilities. These include borrowed technologies from the oil and gas industries such as eddy current techniques where a soft seascape or hydroscope is propelled or pulled through the pipeline. Limitations to these technologies exist and require that the line be shutdown and that an access port be available for launching and retrieval of the instrument. Additionally, this technology is only available for pipelines up to 12 inches in diameter and can only operate effectively in pipelines with minimal bends. Still other technologies have been developed for steel pipe, but the ability to apply it to mortar-lined iron pipe remains unknown. These present limitations may preclude applications in many of the region's sewer mains as the technology is furthered.

The City of Carlsbad is also studying the feasibility of using emerging technology to conduct a condition assessment of force mains. Those contacted include Tuboscope Pipeline Service, General Electric Power Systems, and Sahara Leak Location System. Tuboscope and General Electric conduct ultrasonic metal loss detection studies for oil and gas force mains, and Sahara conducts leak detection studies in water pipelines. Jason Consultants, an engineering firm working with WERF to develop Inspection Guidelines for Ferrous Force Mains, has also been contacted.

Consistent with the adopted WDR Order 2006-003-DWQ, the Cities will determine the feasibility of completing system modifications to the 24-inch ductile iron force main at Buena Vista lagoon such as relocating the line to Jefferson Street or relining the existing pipe with a polyethylene encasement. Moving the force main to match the street alignment would result in a minor separation of the pipe from an ecologically sensitive area and allow for ongoing maintenance activities and/or repairs to occur outside of the lagoon embankment. In a similar failure however, it would do little to prevent the spill from discharging to the lagoon. Consistent with the milestone dates in the adopted WDR Order 2006-003-DWQ, the Cities will perform regular video pipeline monitoring of gravity sewer lines. Although there are presently no guidelines for inspection of force mains, the Cities are considering televising the Buena Vista force main. This option is presently not considered feasible given that the line must be emptied, drained, flushed, and bypassed. This option will be revisited, however, due to the changed conditions of the current failure and following completion of the forensic corrosion analysis where it is hoped that some internal manifestation of a pending external corrosion failure may be identified.

Leak Detection

This category of potential actions addresses potential means to enhance detection of discharges. At present, wastewater flows are monitored by ADS, Inc. flow meters and

flow measurement devices at 16 metered locations within the Encina Wastewater Authority service area. These meters are employed in the billing of member agencies of the JPA. Data from the meters do not, however, provide member agencies real time updates, nor do they provide a means to evaluate variation as a means of assessing system losses. In light of the present availability of system upgrades that would provide real time access to flow information, the Cities of Carlsbad and Vista will pursue the implementation of such upgrades through EWA and will encourage all member agencies to upgrade their systems as well.

Preliminary indications are that there may be additional means to enhance the ADS system or install alternative systems that would improve leak detection through use of system pressure and flow variance and point-to-point differential. While these tools are widely available for potable and raw water pipelines, it is not clear if comparable systems are readily available for wastewater systems. The Dischargers are committed to investigating means to install automated alarm systems for potential leaks in this and other force main systems within their individual and collective operations areas. It should be noted, however, that real-time alarms still rely on flow or pressure differential ranges. As such, small leaks, or early ruptures may still go undetected, while larger ruptures should be detected earlier. The full detection capacity of such equipment and its application to the Cities systems remains uncertain.

In 1998, the City of Carlsbad, through a contract with MGD Technologies, Inc., collected sewer flow data at 4 locations to verify depth, velocity and quantity information as well as minimum, average daily, and peak flows to be conducted during the rainy season. Other agreements have been subsequently approved with MGD Technologies, Inc. to monitor flows in the gravity flow sections of all major interceptor and trunk sewers in Carlsbad. This process of monitoring will be reviewed as to whether it offers a practical solution to more permanent monitoring of gravity sewers for potential capacity exceedence overflow events. In addition, the Encina Wastewater Authority has flow-monitoring stations on the major interceptor sewers that they primarily use to invoice treatment capacities to its member agencies. These flow-monitoring stations continually chart the flows tributary to the treatment facility. Potential opportunities to install level alarms on gravity lines will be investigated by the Dischargers.

Response Time and Resources

The response time and effectiveness of the actions taken after leak detection were immediate and comprehensive. There are, however, a few points where improvement may occur. These include accessibility and retrieval of sewer improvement plan data and accessibility of equipment resources distributed among cooperating mutual assistance agencies. The early response record indicates difficulty among the agencies in locating pertinent design data that would have assisted in early determination that a force main rupture was too deep to access using a backhoe. This may have led to an earlier identification of larger equipment needs. Rapid system improvement plan access may also have assisted, or may assist in the future, with the identification of waste rerouting options. To address these issues, the following measures are to be undertaken:

- The Cities will evaluate plan archival systems and will consider the possibility of a central repository or indexing process that would allow more rapid access to data on trunk and main sewers, bypass interconnects, lift stations, and other critical infrastructure.

- Asset inventories across mutual assistance agencies do not exist for emergency response coordination and the requisition process to collect needed equipment can be hampered by fruitless calls to agencies or departments that lack needed resources. While it may be impractical to maintain a full list of resources, the Cities will upgrade call lists and create a general inventory of assets that may be called upon in the case of emergencies.

- To further resource readiness, the City of Carlsbad Public Works staff has requested the following items for inclusion in the budget during the 07/08 fiscal year: 2 new vactors; 1 new bypass trailer; 1 new CCTV van; replacement of 2 ½ ton pickups for use with the vactors; 1 new compact pickup truck; replacement of 1 1Ton pickup for working on the lift stations; and adding 1 Public Works Supervisor, 4 Maintenance workers, and 1 Office Specialist for the collections system. Some or all of the proposed positions may be staffed by outside contracts. Vactors and pickup trucks will be used for line cleaning and maintenance on the lift stations, the CCTV van will be used to video inspect the sewer pipelines, and the bypass trailer will be used to bypass sewer lines under construction, repair, or when inoperable due to blockages.

- The City of Vista Public Works Department is well staffed for sewer maintenance but has similarly requested equipment replacements and new equipment in upcoming years to stay current with resource reliability and upgrades. In FY07-08, the Department has included the following equipment replacements in its budget request: 1 vactor, 1 dump truck, and a flatbed crane truck. New equipment requested is an easement crawler hose cart machine. In FY 08-09, the Department has requested 1 new vactor be added to inventory.

Impact Minimization and Recovery

While each spill scenario encountered may have somewhat differing needs, almost any sizable spill into an inland lake, pond, or coastal lagoon will benefit from immediate and effective aeration. For this reason, it is the Cities' intent to identify equipment needs and options for immediate availability for future events. This will allow environmental response to be initiated immediately and independent of repair response crew activities.

Staff of the Dischargers will be reviewing the incident response actions for the present spill and will further critique the response. This process will lead to the preparation of an updated Sanitary Sewer Overflow Response Plan during FY 07/08. In this plan, consideration will be given to adding an element addressing incident response and damage minimization guidelines for various ecologically sensitive areas potentially affected by spills from the existing systems.

4.10 WATER QUALITY DATA

All water quality data collected as part of monitoring of the Buena Vista Lagoon after the overflow. Identify sampling locations, methods and circumstances. If historical data is available, provide this data as well. ***(RWQCB #10)***

Water quality monitoring in association with the April 2007 spill event has included bacteriological monitoring, as well as dissolved oxygen monitoring. The monitoring program has been guided by sampling programs and station locations established during the 1994 and 1997 spill events and formalized in the Encina Wastewater Authority's SSORP. In addition to the established WQ monitoring program, responsive monitoring has been adapted to meet the needs of the specific spill circumstances. Modifications of the sampling programs have been made at the requests of the County of San Diego Department of Environmental Health, CDFG, and Merkel & Associates for water column bacteria. Dissolved oxygen (DO) monitoring stations were also added at the request of CDFG, based on aerial review of the plume distribution patterns. As event monitoring proceeded, DO monitoring was reduced through coordination with resource and regulatory agencies. The first reduction was the omission of afternoon DO monitoring. After the consumption of spill-related biochemical oxygen demand (BOD), afternoon DO levels fluctuated at high levels with super saturation occurring on a regular basis. As a result, these measurements were not helpful in understanding system status and oxygen depletion. Subsequent monitoring has incorporated deployment of continuously recording meters that will be operated for one month with weekly retrieval of DO data. Data from this deployed logger effort has not been incorporated into the present report as the first full download event has not yet occurred.

Figure 3 illustrates all WQ sampling stations employed during the post spill monitoring. Shoreline WQ monitoring commenced on April 2nd, at 8:30 AM, with bacteriological sampling conducted by EWA. Dissolved oxygen monitoring also commenced on April 2nd through the actions of Carlsbad Environmental Programs staff. This monitoring program was supplemented on April 3rd by Weston Solutions, Inc. performing on-water monitoring in accordance with the EWA SSORP and 1997 spill monitoring method. On April 7th,Merkel & Associates took over field monitoring for shoreline DO, and on April 12th, Merkel & Associates took over field monitoring on the water. Summary data tables for bacteriological and dissolved oxygen data are incorporated in Appendix 10a. Bacteriological laboratory reports from the Encina Wastewater Laboratory are provided as Appendix 10b. Appendix 10c includes field data sheets for dissolved oxygen monitoring. Early spill period dissolved oxygen monitoring results were recorded in field notebooks and are not included in this appendix. However, all monitoring results are provided on the data summary sheets (Appendix 10a).

Historic background water quality and sediment quality data for the lagoon has been collected from the Buena Vista Lagoon Restoration Feasibility Analysis (Everest International Consultants 2004) and the water quality sections of the Buena Vista Lagoon Land Management Plan Elements (Coastal Environments 2000). Pertinent

sections of these documents are provided as Appendices 10d and 10e, respectively. Prior spill monitoring occurred in 1997 (MEC Analytical Systems, March 25, 1997) and 1994 (MEC Analytical Systems, September 30, 1994). These documents are incorporated as Appendices 10f and 10g, respectively.

The environmental effects of water quality impairment have been analyzed by Merkel & Associates as discussed under the following section of this report.

Water Quality Monitoring Stations
Buena Vista Sewer Force Main Discharge
April 2007

Figure 3

4.11 ASSESSMENT OF ECOLOGICAL IMPACTS

An assessment of the impacts on fish, other species, and the overall ecosystem in the Buena Vista Lagoon resulting from this overflow. Identify all species that have been affected and describe all biological monitoring conducted. ***(RWQCB #11)***

A preliminary account of the ecological impacts of the spill to the lagoon has been prepared by Merkel & Associates (Appendix 11a). The Merkel & Associates report summarizes the monitoring programs that were put into place during the spill and all supplemental monitoring that was done during or after the spill events. Summary water quality monitoring data has been provided in Appendices 10a and 10b. Biological data included collecting and inventorying dead fish and birds as well as collection of benthic samples that have not yet been processed. These benthic samples were collected early in the spill prior to any anticipated organism deterioration in order to establish a baseline condition for the benthic environment at some point in the future.

The best monitoring data available for evaluation of potential biological harm associated with wastewater spills into an aquatic environment is water column dissolved oxygen (DO) concentrations. During the spill event and for several days after the spill, DO remained significantly depressed within the eastern basin of the lagoon and most specifically, the eastern half of the eastern basin of the lagoon. The Merkel & Associates report investigates DO levels over the course of the monitoring period and has determined that oxygen levels within the eastern portion of the east basin remained depressed as a result of BOD from the spill through April 7th.

Fish Losses

On April 3rd, collection of dead organisms was initiated and twice-daily surveys were made of the lagoon to collect any fish, birds, or other dead organisms detected. These surveys were conducted by crews from the Cities of Carlsbad, Oceanside, and Vista, as well as Weston Solutions, Inc. Weston processed, identified, and counted organisms and recorded lengths for fish collected. Surveys and collections continued as long as organisms were being found.

The locations and amounts of fish mortality can be compared with the pattern of DO concentration in the lagoon. The majority if not all fish mortality likely occurred immediately after significant amounts of wastewater were spilled. At that time, fish would not have been able to seek refuges of high DO and a majority of the eastern end of the east basin was extremely low in DO. An adequate number of sampling locations were first implemented on the morning of April 4th, allowing a level of detail to produce a map of DO concentrations that likely approximated reality. Although DO measurements were taken on April 3rd, the low number and spread of sample stations created large distances of extrapolation between points and probably inaccurate reflection of DO across the lagoon. Therefore we assume that the initial spread of low DO in the lagoon likely covered a greater area than was seen on the morning of April 4th but was more localized than is reflected in the map of DO created from data taken on April 3rd.

On the morning of April 4th, 72% or 27.5 acres (111,334 m^2) of a total area of 38.4 acres (155,612 m^2) of open water in the east basin showed DO values less than 3.0 mg/l. This area amounts to 22.4% of the 122.6 acres (496,438-m^2) of open water in the lagoon.

DO values below 3.0 mg/l may result in fish kills although most of the species of warm water fish found in Buena Vista Lagoon have tolerances below this level (Table 1). Fish mortality appears to have occurred primarily in the eastern portions of the east basin as indicated in a map of the fish collection concentrations prepared by Weston (Figure 4). No dead fish were recovered on the south shoreline of the east basin but rather were recorded primarily on the northern shoreline and around the island in the center of the basin. Fish likely expired around the center of the spill location and were moved northward by the wind. Only two dead fish were found on the northern shoreline of the central basin. This would suggest that low DO might have encroached into the central basin enough to have a minor impact on fish there. However, given the location of these fish and the fact that they were both of reasonably large size, it is possible that these two fish losses are the result of injuries sustained from fishing, or other causes of mortality. The remainder of the 1,694 fish lost (99.9%) were recovered in the east basin.

Fish mortality was significantly lower during the present spill than the previous spill in 1994, despite the total volume released during the 1994 spill being less than the current event (Table 1). In 1994, 4.75 million gallons were released in comparison to 7.33 million gallons released in the current event. The decreased fish mortality is likely attributed to several factors including time of year in which the spill occurred, greater refuge from spill effects, and early aeration. Pump-back of the contaminated water as well as aeration may have decreased the severity of spill impacts through limiting the scope of the spill and accelerating BOD consumption.

Table 1. Faunal Mortality, 2007 and 1994 Spill Events, and Associated Dissolved Oxygen Tolerance

Species	Known Dissolved Oxygen Tolerance*	Mortality (no.)	
		1994	2007
Largemouth Bass	>1.5-2.0 mg/l	835	187
Bluegill	<1 mg/l	1671	648
Black Crappie		279	5
Channel Catfish	1-2 mg/l	70 lbs.	0
Bullhead	1-2 mg/l	348	604
Carp	0.5-3 mg/l	278	36
Mosquitofish	near 0 mg/l	3,000+	1+
Green Sunfish	<3 mg/l	0	210
Carp – Goldfish	O_2 deficient water	0	3
Birds		0	4
Bullfrog		0	1
Freshwater Shrimp		320,000	0
Crayfish		9,600	3

*McGinnis 1984 and Moyle 1976

Avian Losses
A total of four dead birds were found during surveys for impacts to avian species. These included one California gull, two American coots, and one gadwall. The distribution of these birds is illustrated in Figure 4. No sick birds were detected.

Amphibian Losses
One bullfrog was found dead in the east basin (Figure 4).

Figure 4. Distribution of fish and bird collections during April 2007 spill.

Invertebrate Losses

A total of three dead crayfish were collected from the lagoon. Two were collected from the east basin near the Jefferson Street bridge. The third was collected at the weir in a 75% decomposed condition and likely was unrelated to the spill. Notably, no freshwater shrimp were found during the present spill even though these crustaceans constituted the majority of the mortality following the 1994 spill.

Benthic infaunal sampling was conducted by Weston on April 4th and April 5th in the East, Central, and West Basins of Buena Vista Lagoon. Open water benthic invertebrate samples were collected from three locations within each of the three basins using a standard .025-m^2 Eckman grab sampling device. At each site location, the Eckman sampler was deployed and pushed into the sediment via a sampling pole for maximum penetration. The sediment was sieved on a 0.5-mm screen using site water. Material and organisms retained on the sieve were transferred to sample jars, labeled with the site information, and preserved in a 1:10 mixture of formalin and site water. At the end of each day, the preserved samples were transported in labeled coolers to Weston Solutions in Carlsbad, CA for storage. Samples were later transferred to a 70 percent ethanol solution.

Sampling took place within five days of the beginning of wastewater entry into the lagoon. If infauna were impacted by the spill, many would have been dead by the time of sampling although there would not have been time for significant decay of the organisms' tissues. Therefore, animals that may have been dead will be analyzed and counted as live. These post-spill samples represent baseline data to which post-impact samples will be compared. Post-impact samples have not yet been collected. Collections will be made after sufficient time has passed to allow decay of tissues in animals killed by conditions resulting from the spil,l so that a spill impact may be detected. Collections should not, however, occur after recovery of the system has begun. An appropriate period for collection will occur in May. None of the benthic samples have been worked up at the present time. Benthic infauna within the lagoon is known to be relatively depauperate. The April sampling will be compared both to post-impact sampling results as well as to prior investigations conducted as an element of the San Diego County Municipal CoPermittees Urban Runoff Monitoring Annual Reports for the Ambient Bay and Lagoon Monitoring Program 2002-2003 and 2004-2005 (MEC Analytical Systems 2004, 2006; Appendix 11b) and sampling performed to support preparation of the Buena Vista Lagoon Land Management Plan (Coastal Environments 2000, Appendix 11c).

4.12 SHORT AND LONG-TERM EFFECTS OF THE DISCHARGE

A report on all other short and long term effects resulting from the overflow including, but not limited to, impacts on public health and the environment. Explain how these conclusions were reached and what steps the Dischargers have taken, or will take, to mitigate these impacts. ***(RWQCB #12)***

Buena Vista Lagoon is identified in the Basin Plan as supporting the following beneficial uses: industrial service supply (IND), contact water recreation (REC-1), non-contact water recreation (REC-2), preservation of biological habitats of special significance (BIOL), warm freshwater habitat (WARM), wildlife habitat (WILD), rare, threatened, or endangered species (RARE), and marine habitat (MAR). In addition, it is identified as having the potential to support estuarine habitat (EST) as a beneficial use. To address this request, we have evaluated the discharge consequence in the context of these identified and potential beneficial uses.

Industrial Service Supply (IND)
The lagoon does not presently offer industrial service supply uses, and the discharge to the lagoon is not believed to have had adverse short or long-term affects on this use.

Contact water recreation (REC-1)
While designated for REC-1 uses, Buena Vista Lagoon is closed to on-water activities, wading, and swimming through use restrictions within the Buena Vista Lagoon Ecological Reserve and the San Diego Basin Plan. Fishing in the lagoon does occur and is designated as a REC-1 beneficial use. REC-1 designations do apply to coastal beaches that were also affected by the spill response actions, although the spill itself did not reach the coastal beaches.

On April 2nd, Encina Wastewater and the City of Carlsbad, in coordination with San Diego County Department of Environmental Health (DEH), posted Contaminated Waters signs along the beach 600 feet south and 1,200 feet north of the Buena Vista Lagoon outlet as a precautionary measure. Signs were also posted along the perimeter of the lagoon.

Beach postings remained in place for one week, and signs were removed on April 9th, when they were removed by order of County DEH. No discharge to ocean beaches occurred, however, the effects on REC-1 along the 1,800-foot long closure reach remain the same. Signage within the lagoon remained in effect through April 19th, when signage was fully removed from all areas of the lagoon. The posting and removal of signage at the lagoon had no affect on the regulatory closure of the lagoon to contact recreation as a function of the Ecological Reserve designation.

While considerable recreational fishing continued throughout the lower lagoon basins during the spill response, physical closures and access control for spill response at the eastern end of the lagoon prohibited access to this area by fishermen during and following the spill event. As a result, this REC-1 activity was impaired by both the mortality of fish in the eastern basin, as well as loss of access to this basin during the response.

The loss of approximately 1,694 fish, including 1,050 game fish (bluegill, green sunfish, largemouth bass, and black crappie), occurred principally within the upper end of the lagoon. These losses resulted in a reduction of the overall population of catchable fish in the lagoon. Replacement of these game fish through natural recruitment and growth

to maturity may require as much as 2-5 years based on species and size classes affected. No other long-term adverse affects to REC-1 are anticipated as a result of the incident.

Non-contact water recreation (REC-2)

Non-contact water recreation that was adversely affected at the lagoon principally includes wildlife viewing. The discharge occurred within a popular viewing area that was taken over by spill response activities on April 1st. This area remained closed through the spill response period. Bird watching is a principal REC-2 use at the lagoon, and the spill is preliminarily considered to have been responsible for the loss of four birds (a California gull, two American coots, and one gadwall).

No long-term adverse affects to REC-2 uses are anticipated.

Preservation of Biological Habitats of Special Significance (BIOL)

The wastewater discharge occurred into the Buena Vista Lagoon Ecological Reserve, an area designated as a State Ecological Reserve by the Fish & Game Commission under California Code of Regulations, Title 14, Section 630. The spill adversely affected freshwater and avian resources, as well as minor amounts of vegetated habitat within this reserve. The specific affects to resources are discussed under the beneficial use categories most specifically applicable including (WARM, WILD, and RARE).

The discharge did not result in any permanent losses of biological habitats of special significance. However, upland habitat damage at the spill site was in a habitat restoration area implemented by CDFG. The revegetation of this site may require up to 3 years to achieve an equivalent level of development as that existing prior to the spill.

Warm Freshwater Habitat (WARM)

A detailed account of the early effects of the spill is provided previously and in Appendix 11a. The spill resulted in mortality of a documented 1,694 non-native freshwater fish from affected portions of the lagoon. The cause of fish mortality is presumed to have been acute hypoxia brought about by biochemical oxygen demand (BOD) loading within the upper end of the lagoon and significant oxygen consumption during the spill and for as much as four days following the spill through April 7th. Following this date, dissolved oxygen levels had recovered throughout the impact area to levels that would not result in further loss of fish.

Based on prior benthic sampling in the lagoon (Appendix 11b and 11c), the lagoon supports a relatively depauperate benthic faunal assemblage. Low taxonomic diversity was specifically noted during the 2004-2005 Ambient Bay and Lagoon Monitoring Program where 91.4% of the 165 invertebrates collected were comprised of two species of organism (MEC Analytical Systems 2006). In 2003-2004, only three organisms were documented in the sampling (MEC Analytical Systems 2004). While the species comprising the lagoon's benthic invertebrate fauna are generally ephemeral short-lived species that are tolerant of intermittently low DO concentrations, natural variability in DO levels consists of broad fluctuations that result in low diurnal oxygen levels for a matter

of hours, prior to returning to higher levels. Several organisms have evolved to withstand these predictable conditions. The prolonged depressed DO levels associated with the spill event, however, would be expected to result in losses of benthic infauna within the upper end of the east basin of the lagoon. On April 4th, benthic samples were collected to document organisms within the lagoon sediments of the east and central basins. These samples would be expected to represent the community present in the sampled areas prior to the spill. Subsequent sampling has not been done as yet and the baseline samples have not been processed. For this reason, the short-term degree of impact to benthic communities is not yet known.

Long-term effects of the discharge on WARM beneficial uses are not yet known. While DO levels generally returned to levels that are protective of ecological resources within days of the spill termination, there remains a potential for future long-term affects of nutrient loading to the lagoon. With the sewage discharge, additional nitrogen and phosphorus were released to the system. The bacterial monitoring evidence suggests that limited spread of effluent occurred within the lagoon, and none of the sewage was exported from the system. Absent relatively immediate consumption by algae, these nutrients may be temporarily sequestered in the lagoon sediments until released as the lagoon warms and algal and vascular vegetation growth is accelerated. At the present time, plant growth is just commencing for the 2007 spring and summer growing seasons. Considerable sediment nutrients may result in spring algal blooms and thus hugely cyclic diurnal DO levels. Such theoretical effects may be readily speculated, but there does not appear to be any references to such affects occurring in specific association with the 1994 and 1997 spill events.

The lagoon is recognized in the San Diego Basin Plan as impaired for aquatic life, contact recreation, and non-contact recreation (RWQCB 1996 and 1998). Pollutants determined to be critical in the 303(d) listing as impaired waters were nutrients, sediment, and bacteria. As such, any additional nutrient load or bacterial load would be a concern. In both the 1996 and 2002 303(d) lists, nutrients and bacteria were listed as low priority in the list of priority pollutants.

To predict the role the spill may have on nutrient loading within the lagoon and future spring-summer algal blooms, a mass loading calculation was completed. The loading analysis estimated the approximate percentage of the total annual load of nitrogen, in the form of total nitrogen, and total phosphorus contributed to the lagoon by the spill. Annual lagoon loading estimates of nitrogen and phosphorus were derived from watershed analyses completed in the Buena Vista Lagoon Restoration Feasibility Analysis Report – Final Report, June 2004 (Everest International Consultants 2004, sections found in Appendix 10d). From this report, total nitrogen inputs from the watershed were estimated to be 71.6 tons/year, while total phosphorus was estimated at 6.7 tons/year.

Based on typical nitrogen and phosphorus concentrations in raw urban wastewater, it is expected that concentrations of nitrogen are in the 10s of mg/L, while phosphorus loading ranges less than 10 mg/L. In one study of the treatment plant influent for the

town of Ashland, Wisconsin, nitrogen concentrations totaled 40 mg/L, while phosphorus totaled 5.6 mg/L (Wisconsin Department of Natural Resources 1994). For the influent to the Encina Wastewater Authority's treatment plant, phosphorus loading is comparable to the Wisconsin concentrations ranging from approximately 1mg/L to 4mg/L while the loads for nitrogen are about 20mg/L mostly in the form of ammonia (pers. comm. Doug Campbell, Laboratory Supervisor, Encina Wastewater Authority. For the current spill, these concentrations of nitrogen and phosphorus when accumulated over the entire spill volume would translate into mass loading rates of approximately 0.61 tons of nitrogen and 0.03-0.12 tons of phosphorus assuming no benefits of atmospheric loss of ammonia and no reduction of sewage from the pump-back operation, both highly conservative assumptions.

Even without discounting the loading by an unknown but substantial percentage of effluent recapture and atmospheric ammonia loss, the annual percentage of nitrogen loading contributed to the lagoon would be approximately 0.85% of the total annual load. For phosphorus, the load would be approximately 0.4%-1.8%. While these values can be considered important in the context of a system that is already considered impaired by nutrient loading, the proportionality of the load percentages would not suggest that the spill would drive substantial seasonal algal blooms, but rather may be contributory to blooms that occur under baseline conditions. Low run-off during this last winter likely benefited the lagoon through lower than average loading from watershed input sources. Baseline data collection for the preparation of the Buena Vista Lagoon Land Management Plan Elements (Coastal Environments 2000, Appendix 11c) examined the seasonal algal blooms within the lagoon and documented a substantial coverage of the eastern end of the east basin to support blooms, but much of the western end of the basin does not typically support blooms. In the discussion of fish communities and eutrophic conditions, Coastal Environments noted that the lagoon is dominated by mobile species that can readily move to areas of higher oxygen during periods when DO concentrations are low. It was also noted, however, that the eutrophic conditions that sporadically occur in the lagoon have in the past resulted in some fish kills

Given the relatively minor contribution to nutrient loading of the spill and the low rainfall winter, it is not expected that the lagoon will experience particularly high algal blooms during the Spring and Summer 2007 seasons. For this reason, subsequent fish or invertebrate losses are not expected.

Wildlife Habitat (WILD)

Wildlife habitat impacts from the spill are limited to effects of the spill response. Non-wetland upland habitat was removed from the wildlife viewing area and at an entry point where a fence was taken down to access the north side of the lagoon from South Vista Way. Wetland habitat impacts are predominantly temporary in nature and have resulted from establishing pumping and aeration sites at existing clearings. These impacts have been due to water access by response crew labor at these existing clearings.

Impacts resulting from the emergency response are as follows:

HABITAT	AREA (SQ. FT.)
Disturbed Atriplex/Isocoma Scrub	9,292
Disturbed Exotic Vegetation	378
Non-tidal Alkali Marsh	350
Freshwater Marsh	152
TOTAL	**10,172**

The principal impacts occurred within the actual repair area in a location that has been a restoration site. As a result, it is contemplated that the restoration of this damaged area will be coordinated with CDFG with the intent of rapid recovery to a state comparable to the conditions prior to the spill event. Wetlands that have been damaged have generally been damaged by driving pumps into place at clearings made by fishing activities and damaging minor fringes of wetlands at these areas. Additional damage has occurred in an area where CDFG has previously cleared cattail marsh at the wildlife viewing area. Young cattails have been damaged by access taken in this clearing as a result of biological monitoring activities to access boats. In all cases where the wetland damage has occurred, it is expected that viable rootstock will allow for rapid recovery of the trampled vegetation.

Restoration of the damaged native upland habitat may require up to 3 years to achieve the maturity of prior vegetation in this area. Wetlands are expected to recover by the end of the 2007 summer season through natural plant regeneration of remaining live rootstock.

Rare, Threatened, or Endangered Species (RARE)

At the present time, there is no evidence that rare, threatened, or endangered species have been harmed as a result of the spill. There are two resident species of principal concern. The first is the state-listed Belding's Savannah sparrow, a species that nests in pickleweed marsh and which forages on insects within low-lying marshlands. This species is most abundant on the tops of the islands found in the eastern portion of the east basin. It is also found along the north side of the lagoon in better-developed pickleweed marsh vegetation. No adverse effects are anticipated to have occurred to this species.

The second species of concern is the federal and state-listed endangered light-footed clapper rail. This species is found within freshwater cattail marsh habitat throughout the lagoon. In 2006 and 2007, Dick Zembal, Orange County Water District Light-footed Clapper Rail Recovery Team Member, located an estimated 8 pairs of rails during each year throughout the lagoon. The most current survey was performed on March 28, 2007. Based on field survey maps provided by the Fish & Wildlife Service (FWS), it appears that rails were detected approximately 800-1,000 feet west of the repair site and on the southern and northern islands at the east end of the east basin. An additional single bird was detected at the northwestern portion of the east basin. The remaining birds were detected in the more western basins. Based on the survey maps, it does not appear that the work conducted in association with the pipeline repairs

occurred in or near marshes where clapper rails were detected. No vegetation impacts occurred within marsh areas in which birds were detected.

Following the 1.75 million gallon lift station spill on February 25th, a similar on-water response of aeration and pump-back operations was implemented. During the 1997 year, the highest rail count in the lagoon was recorded (7 pairs) (Everest International Consultants 2004, Coastal Environments 2000). Based on this prior event experience and the separation between the present operations and the identified rails in the 2007 surveys, it is not believed that direct impacts to rails are likely to have occurred.

Clapper rails are omnivorous and opportunistic foragers principally consuming epibenthic macroinvertebrates and insects. In freshwater systems, crayfish, insects and insect larvae, tadpoles, snails, small fish, and even small mammals are consumed by rails. Differing from the 1994 spill, there were very few dead crayfish (3 total) collected and no freshwater shrimp. Further, only one dead mosquito fish was collected. These collections would suggest a very low proportion of rail prey items were lost as a result of the spill. It is not believed that the losses of fish, principally larger individuals, resulted in an adverse effect on rails. As a result, no long-term adverse effects to rail populations are anticipated in association with the wastewater release.

Marine Habitat (MAR)
Marine Habitat beneficial uses were not adversely affected by the spill, and no long-term affects to these resources are anticipated.

Estuarine Habitat (EST)
The potential beneficial use of Estuary Habitat was not adversely affected by the spill.

4.13 ADDITIONAL PERTINENT INFORMATION

> *Any other pertinent information that will assist my staff in evaluating the discharges.* ***(RWQCB #13)***

The information presented in this document has been accumulated through a number of sources, and as a result, some variation in timeframes or action accounts may be expected. The best efforts possible within the reporting timeframe have been made to address disparities and present a true and accurate account of the event. As indicated in various sections of this document, forensic analysis of the pipe rupture is still under way, and environmental response and monitoring continues as of this date. For this reason, reporting on these efforts is limited to the information available at the time this report was prepared. Additional information may be developed that adds further to the Dischargers' and the Board's understanding of the incident.

Throughout the spill event and to this date, the Cities and our consultants have been open and cooperative with the Board staff and other agencies and have benefited from insights, discussions, and recommendations regarding the response actions taken to address the spill. This is evidenced by the considerable field coordination with agencies

as shown in the incident chronology log (Appendix 3). It is also illustrated by the considerable efforts that have gone into the preparation of a full and complete response to the Board's Investigative Order request and agency updates and coordination. A glimpse into these efforts can be seen by the numerous focused multi-agency meetings that have occurred on 4/3, 4/7, 4/9, 4/9, 4/13, 4/16, and 4/19 with the specific purpose of responding to and/or communicating with resource and regulatory agency staff (Appendix 13a). In addition, on two separate occasions during the early event history, formal presentations were made to the Board and other resource and regulatory agencies with respect to the state of the events (Appendices 13b and 13c). The Board should anticipate that as further data and analyses become available regarding the event, these data will similarly be shared with the Board in the same manner as has occurred to this date. The Dischargers would ask that the Board recognize and accept any new information into the process and consider these submittals as if they were attached to this document at this time.

The present spill event has been the largest faced by either of the Dischargers. Despite the considerable resource support of all of the mutual assistance parties that have engaged in the response, the equipment, contracting, and city staff commitments that have gone into the immediate response and on-going environmental follow-up have been substantial. At the present, the Cities have not tallied the full costs of the spill and subsequent response; however, these response and remediation costs are likely to be in excess of $1 million.

5.0 CONCLUSIONS

The present external corrosion associated rupture of the Buena Vista force main has been a unique event, completely unrelated to any past failures of the Cities' sewage system and unpredictable based on evaluation of discharge histories within the Cities. The life expectancy of the pipe is estimated to be approximately 100 years, while its useful life has been considered to be 50 years by the Cities. The rupture of the pipe after only 25 years was unexpected. The failure of the pipe was likely undetectable through commercially available technology.

The Dischargers' response to the sewage release was immediate and consistent throughout the spill event and follow-up remedial actions. The first responder was on-site within three minutes of the call made to the Carlsbad PD dispatch center. Within a matter of two hours, a full fledged incident response was well underway, with most of the senior Public Works staff being present on-site and dividing courses of action in accordance with an established Incident Command Structure and following processes that had been tested, evaluated, and refined on an annual basis through spill scenario drills involving multiple agencies. While the facility on which the rupture occurred was owned by the Cities of Vista and Carlsbad, numerous cooperative agencies responded with staff and equipment assets that were folded into the response in an effective manner. This resulted in reducing the time of the spill and volume of wastewater

discharged, as well as increasing the capacity to aerate the lagoon and pump wastewater back to the sanitary sewer once repairs were made.

The rapid response of repair crews and environmental staff resulted in less fish losses than occurred during the 1994 spill, despite the present spill being 35% larger than the 1994 spill. In large measure, this can be attributed to the response program and response planning benefits drawn from the prior spill events.

While it is certainly appropriate to acknowledge the effectiveness of the response, it would be inappropriate to dismiss the other factors illuminated through retrospective review. The Dischargers have undertaken a considerable effort to best identify where strengths and weakness exist in present systems and capabilities. While at the present time there does not appear to be available technology to identify likely failure points of the type that occurred here, continued consideration of inspection methods or potential preemptive improvements is in order and will be pursued. An obvious conclusion to an inability to predict a failure of a pipeline that, by all present investigative conclusions, was designed correctly, constructed of appropriate materials, and had considerable remaining programmatic lifespan, would be to consider possible options for enhanced failure detection. While this would not serve to further reduce failure risk, it may result in more rapid leak detection and less volume discharge if another spill were to occur. The Cities are pursuing this line of investigation with Encina Wastewater Authority as well as examining alternative flow monitoring and alarm capabilities. As with any incident and the spill drills that are regularly conducted by multiple jurisdictions in the Encina Wastewater Authority JPA, this event will be further examined and will play a key role in updating and enhancing further response measures in the future.

6.0 REFERENCES

Appendix A of the ANSI/AWWA C105/A21.5 Standard "Polyethylene Encasement for Ductile-Iron Pipe Systems."

Coastal Environments. 2000. Buena Vista Lagoon Land Management Plan Elements. Lagoon Bathymetry, Water Quality, Biological Analysis, and Soils Analysis. Prepared for Buena Vista Lagoon Foundation.

Everest International Consultants. 2004. Buena Vista Lagoon Restoration Feasibility Study – Final Report June 2004. Prepared for Buena Vista Lagoon Foundation, California Coastal Conservancy, U.S. Fish & Wildlife Service

MEC Analytical Systems. 2004. Regional Monitoring Workgroup - 2002/2003 Urban Runoff Monitoring Final Report (January, 2004).

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RWQCB. 1996. Draft 303(d) List. California Regional Water Quality Control Board, San Diego Region.

RWQCB. 1998. Fact Sheets in Support of Draft Section 303(d) List of Impaired Waters. California Regional Water Quality Control Board, San Diego Region.

RWQCB. 2007. Investigative Order No. R0-2007-0060, Discharge of Untreated Sewage Into Buena Vista Lagoon, Within the City of Carlsbad, San Diego County. NCRU:01-0743.02 & 01-0764.02:ebecker. (April 6, 2007)

Standard Specifications for Public Works Construction (Greenbook) 1982 edition.

Wisconsin Department of Natural Resources 1994. Wastewater Characterization for Evaluation of Biological Phosphorus Removal. http://www.dnr.state.wi.us/org/water/ wm/ww/biophos/3fract.htm

Linda S. Adams
Secretary for
Environmental Protection

California Regional Water Quality Control Board

San Diego Region

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

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Arnold Schwarzenegger
Governor

April 6, 2007

In reply refer to:
NCRU:01-0743.02 & 01-0764.02:ebecker

Rita Geldert
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CERTIFIED MAIL
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7006 3450 0003 7392 6858

Mark Stone
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Carlsbad, CA 92008

CERTIFIED MAIL
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7006 3450 0003 7392 6865

Dear Ms. Geldert and Mr. Stone:

INVESTIGATIVE ORDER NO. R9-2007-0060, DISCHARGE OF UNTREATED SEWAGE INTO BUENA VISTA LAGOON, WITHIN THE CITY OF CARLSBAD, SAN DIEGO COUNTY

Enclosed is Investigative Order No. R9-2007-0060 (Order) of the California Regional Water Quality Control Board, San Diego Region (Regional Board) concerning the discharge of over 5 million gallons of untreated sewage into Buena Vista Lagoon from a force sewer main jointly owned and operated by the City of Vista and the Carlsbad Municipal Water District. The Order is issued pursuant to California Water Code (CWC) sections 13267 and directs you to submit a technical report **by April 23, 2007** that provides information on the sanitary sewage overflow.

Please note the requirements contained within the Order. Specifically, all technical reports submitted to the Regional Board shall be accompanied by the certification, under penalty of law, that the information is true, accurate, and complete.

Failure to meet the requirements may subject you to further enforcement action by the Regional Board, including administrative civil liability pursuant to CWC sections 13268 and 13385.

The heading portion of this letter includes a Regional Board code number noted after "In reply refer to:" In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports to the Regional Board pertaining to this matter.

Respectfully,

for JOHN H. ROBERTUS
Executive Officer

JHR:dtb:tla

Enclosure

cc:

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Office of Chief Counsel (OCC)
State Water Resources Control Board
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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

INVESTIGATIVE ORDER NO. R9-2007-0060
FOR
CITY OF VISTA
CARLSBAD MUNICIPAL WATER DISTRICT
VIOLATION OF WASTE DISCHARGE REQUIREMENTS NO. R9-2007-0005
FOR THE
DISCHARGE OF UNTREATED SEWAGE INTO THE BUENA VISTA LAGOON
WITHIN THE CITY OF CARLSBAD
SAN DIEGO COUNTY

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board) finds that:

1. The City of Vista and Carlsbad Municipal Water District, hereinafter Dischargers, jointly own and operate a 24-inch force sewer main located south of Buena Vista Lagoon near Jefferson Street in the City of Carlsbad. The Dischargers' sanitary sewer systems, including this sewer main are regulated by WDRs Order No. R9-2007-0005, *Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region*.

2. On or before April 1, 2007 through April 3, 2007, the Dischargers spilled over 5 million gallons of untreated sewage from the sewer main and an adjacent pump station into Buena Vista Lagoon in violation of Prohibition B.1 of Order No. R9-2007-0005. Prohibition B.1 of Order No. R9-2007-0005 prohibits the discharge of sewage from the sanitary sewer system at any point upstream of a sewage treatment plant.

3. Pursuant California Water Code Sections 13267, the Regional Board, in reviewing Waste Discharge Requirements (WDRs), may investigate the quality of waters of the state by requiring dischargers to submit technical or monitoring reports. The burden, including costs, of these reports shall bear a reasonable relationship to the need. The Regional Board must also provide an explanation for the need for the report and evidence supporting requiring the report from the discharger.

4. Due to the Dischargers' violation of Order No. R9-2007-0005, the Regional Board requires additional information to evaluate the actions taken to prevent the sewage discharge, to repair the failed pipeline, and to investigate the impacts to water quality from the sewage discharges.

5. The costs associated with providing the information are minimal and reasonable compared to the volume of the sewage spill and the impacts to water quality and beneficial uses of the Buena Vista Lagoon.

IT IS HEREBY ORDERED, that pursuant to section 13267 of the California Water Code, the City of Vista and Carlsbad Municipal Water District, shall conduct a technical investigation, and prepare and submit a technical report to the Regional Board **no later than April 23, 2007**. The technical report shall contain, but is not limited to, the following information:

1. A complete, detailed explanation of how and when the overflow from the sewer main was discovered, including the tabular and graphical summaries of the daily total influent flows to the Encina Water Pollution Control Facility (EWPCF) and flow data from the Buena Vista Pump Station from March 6, 2007 through April 6, 2007.

2. A detailed report of the cause and/or causes of the overflow, including any testing or technical evaluation of the condition of the sewer main. The report should also include the rational for the original selection of the iron pipe and an evaluation of the appropriateness of installing this type of pipe in the lagoon.

3. A detailed chronological description of all actions taken by the Dischargers to terminate the overflow, repair the failed pipeline, and mitigate its impacts. Also include an evaluation of the results of these actions.

4. A detailed report of the total overflow volume including how the Dischargers calculated the volume.

5. The volume of water pumped back into the sanitary sewer system from the Buena Vista Lagoon.

6. Since 1994, the date and extent of preventive maintenance and/or inspection (e.g., line cleaning, closed-circuit television inspection) that was performed on the sewer line and other structures involved in the sewer overflow. Also report on any other problems experienced with the relevant force main in the past and what actions, if any, that have been taken to correct such problems.

7. Copies of any photographs and/or video taken during or after the sanitary sewer overflow. Photographs and/or video shall include appropriate identifying information, such as date taken, name of photographer/videographer, and textual summary of information being presented, as well as its relevance.

8. A copy of the Dischargers' current sanitary sewer overflow response plan.

9. Measures the Dischargers have taken, or will take, to prevent and mitigate the impacts of future overflows from force mains or other sewer lines, particularly in ecologically sensitive areas. This could include such tasks as monitoring of force

main flows, increased monitoring frequency of sewer lines in sensitive areas, use of additional equipment to recover sewage overflows, etc.

10. All water quality data collected as part of monitoring of the Buena Vista Lagoon after the overflow. Identify sampling locations, methods and circumstances. If historical data is available, provide this data as well.

11. An assessment of the impacts on fish, other species, and the overall ecosystem in the Buena Vista Lagoon resulting from this overflow. Identify all species that have been affected and describe all biological monitoring conducted.

12. A report on all other short and long term effects resulting from the overflow including, but not limited to, impacts on public health and the environment. Explain how these conclusions were reached and what steps the Dischargers have taken, or will take, to mitigate these impacts.

13. Any other pertinent information that will assist my staff in evaluating the discharges.

All information provided to the Regional Board shall include the following signed certification:

> *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

JOHN H. ROBERTUS
Executive Officer

Date

JHR:rwm:esb

Carlsbad Police Department
2560 Orion way
Carlsbad, Ca. 92008

Communications Division
(760) 931-2197
Fax (760) 931-8041

Date 4-10-07 Time 1411

Attention DON WASKO

Department

Sent By D. GRATH

Message CAD INCIDENTS FOR BUENA VISTA LAGOON. IF YOU NEED ANYTHING ELSE LET ME KNOW.

431-1601

Detailed History for Police Inc# #070023721 As of 4/10/2007 13:28:52

Priority:4 Type:WATER - WATER CALL OUT
Location:BUENA VISTA LAGOON, 2301 JEFFERSON,CB at 2301 JEFFERSON ST,CB
LocCross:btwn I-5 LAS FLORES SB OF RA and LAS FLORES DR

Created:	04/01/2007 18:52:54	DSP4	CB5156
Entered:	04/01/2007 18:57:32	DSP4	CB5156
Dispatch:	04/01/2007 19:45:52	DSP4	CB5156
Enroute:	04/01/2007 19:46:02	DSP4	CB5156
Onscene:	04/01/2007 19:46:02	DSP4	CB5156
Closed:	04/01/2007 18:57:32	DSP4	CB5156

PrimeUnit:21S Dispo:IO Type:WATER - WATER CALL OUT
RPname:FRANCISCO BRECIABO Phone:760/707-7530 RPaddr:CPH
Agency:CBPD Group:PD01 Beat:1 RD:4 ☐ Detail

18:52:54 CREATE Location:BUENA VISTA LAGOON, 2301 JEFFERSON,CB Type:WATER RPname:FRANCISCO BRECIABO RPaddr:CPH Phone:760/707-7530 Dispo:IO Group:PD01 RD:4 TypeDesc:WATER CALL OUT LocDesc:at 2301 JEFFERSON ST,CB LocCross:btwn I-5 LAS FLORES SB OF RA and LAS FLORES DR Priority:4 Agency:CBPD Map:1106E4A2 LocType:C

18:57:32 ADVSED Dispo:IO Comment:SEWER PIPE HAS BROKEN AND IS PUMPING SEWAGE INTO THE LAGOON; RP COULD NOT SAY EXACTLY WHERE PIPE IS - ONLY THAT IT'S NEAR THE 78 BRIDGE; RP WILLS STBY HIS GOLD '89 GEO METRO; WATER DUTY ADV'D AND WILL HANDLE

18:57:33 -PREMIS Comment:PPR

18:57:34 NOMORE

19:45:42 RO Comment:21S RESPONDING

19:45:44 SELECT

19:45:52 DISP 21S EmpID:CB5289 OperNames:LOWE, MATTHEW

19:45:52 -PRIU 21S

19:46:02 ONSCN 21S

19:47:35 MISC 21S Comment:BREAK IS ON SO SIDE OF LAGOON BETWEEN JEFF AND MAROON - ACROSS FROM FINNIGANS AND OVER THE FENCE

19:56:36 *CLEAR 21S Dispo:IO Comment:MADE CONTACT WITH WASTE WATER DEPT SUPERVISORS. THERE IS A LEAK AND THEY ARE WORKING ON A REPAIR. NO ASSISTANCE NEEDED FROM PD. I ADVISED CAPT. SHIPPLEY.

19:56:36 -CLEAR

19:56:36 *CLOSE

Detailed History for Police Inc# #070023942 As of 4/10/2007 13:35:26

Priority:2 Type:AA - AGENCY ASSIST
Location:JEFFERSON ST / MARRON RD,CB < 2200/ 1801>

Created:	04/02/2007 16:32:35	DSP2	CB5329
Entered:	04/02/2007 16:35:52	DSP2	CB5329
Dispatch:	04/02/2007 16:36:35	DSP4	CB5327
Enroute:	04/02/2007 16:43:02	DSP4	CB5327
Onscene:	04/02/2007 16:56:38	A073	CB5236
Control:	04/03/2007 00:10:28	DSP5	CB5156
Closed:	04/03/2007 09:43:20	DSP4	CB5334

PrimeUnit:13P Dispo: Type:AA - AGENCY ASSIST
RPname:FD CHIEF CRAWFORD Phone:760/484-4401 RPaddr:
Agency:CBPD Group:PD01 Beat:3 RD:5 ☐ Detail

16:32:35 CREATE Location:JEFFERSON ST / MARRON RD,CB Type:AA RPname:FD CHIEF CRAWFORD Phone:760/484-4401 Group:PD01 RD:5 TypeDesc:AGENCY ASSIST LocDesc: < 2200/ 1801> Priority:2 Response:2PAT Agency:CBPD LocType:L
16:35:52 ENTRY Comment:RP REQ ROAD CLOSURE ON JEFFERSON FROM MARRON TO TOP OF HILL DUE TO HEAVY AMOUNT OF WORK ON STREET INVOLVING MAJOR SEWAGE SPILL..ALSO REQ PD OFFICER BE AVAILABLE AT APPX 1730 REF SCHEDULED MEETING ON-SITE WITH CITY MANAGER..NEEDED FOR POTENTIAL CROWD AND MEDIA CONTROL
16:35:52 -PREMIS Comment:PPR
16:35:57 NOMORE
16:36:03 -SELECT
16:36:08 HOLD
16:36:09 SELECT
16:36:35 DISP 23P EmpID:CB5236 OperNames:ELLSWORTH, GERRY
16:36:35 -PRIU 23P
16:43:02 ENRTE 23P
16:44:05 UNAV 23P
16:56:38 *ONSCN 23P
16:57:41 MISC 23P Comment:27P ADVISED
17:01:24 MISC 23P Comment:LAS FLORS/JEFF....STREETS FOR SIGNS...JEFF FROM MARRON TO LAS FLORES...SEWAGE SPILL...
17:01:32 BACKUP 24P UnitID:23P EmpID:CB5255 OperNames:RILEY, PAT
17:02:47 BACKUP 21P UnitID:23P EmpID:CB5201 OperNames:JONES, AUGUSTINE
17:03:29 MISC 23P Comment:2L ADVISED
17:03:59 MISC 23P Comment:STREETS ENR WITH SIGNS
17:04:40 UNAV 23P 21P 24P
17:04:44 ENRTE 21P 24P
17:09:41 *ONSCN 21P
17:11:06 CLOS 24P Location:JEFFERSON ST / LAS FLORES DR,CB
17:14:25 MISC 24P Comment:JEFF/LAS FLORES HAS CLOSED SIGNS UP NOW
17:25:49 MISC 24P Comment:VEHS STILL TRYING TO GO THRU BARRACADES
17:31:53 CONTCT 23P 21P 24P

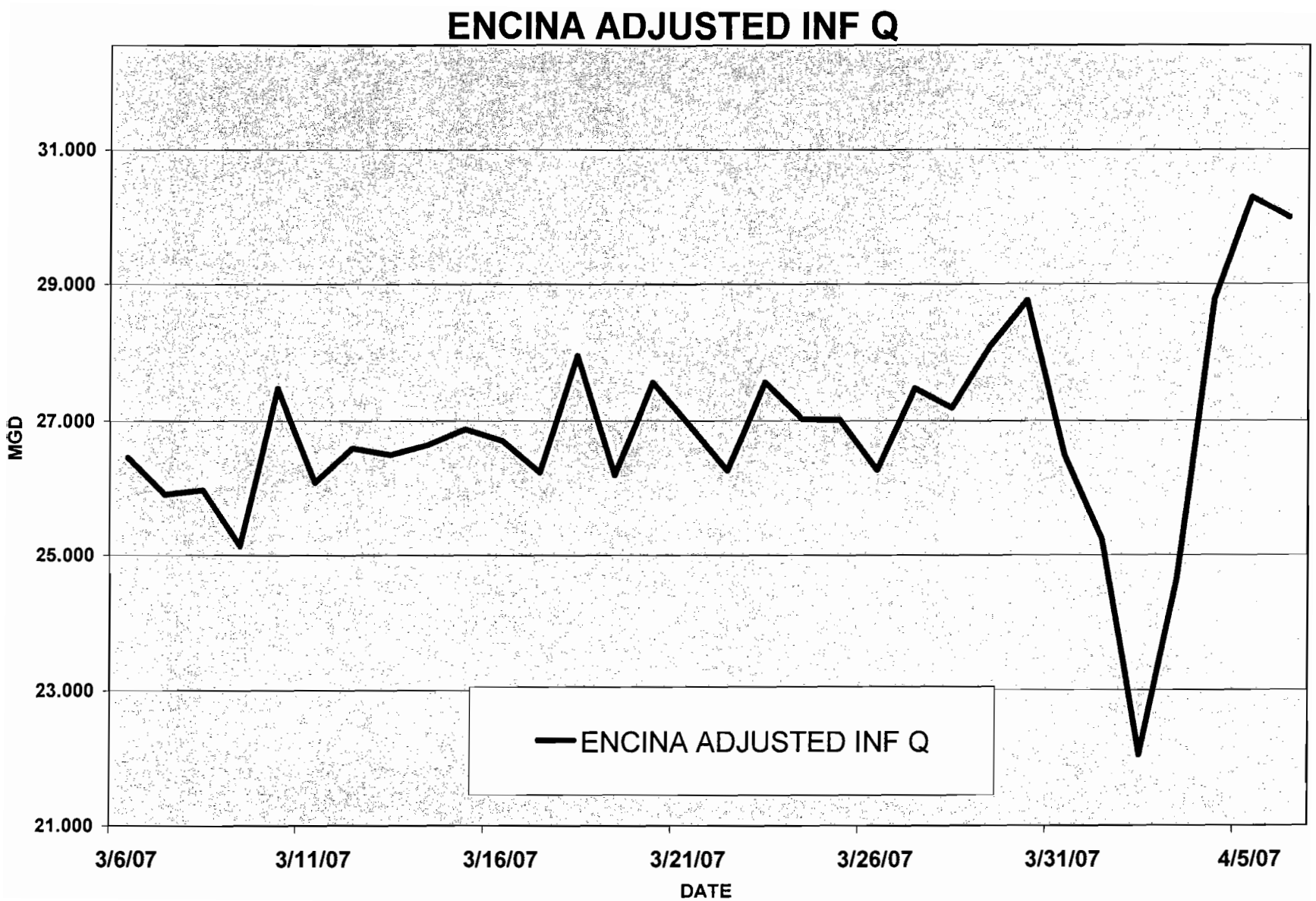
17:55:42 CONTCT 23P 21P 24P
18:08:41 CONTCT 23P 21P 24P UC:120
18:21:35 *CLEAR 21P
19:47:30 BACKOS 5R UnitID:24P Location:JEFFERSON ST / LAS FLORES DR,CB EmpID:CB7082
OperNames:STEPHENSON, GARY
19:47:43 UNAV 23P 5R 24P
19:52:44 PRMPT 24P Comment:Preempted and dispatched to call #070023942
20:10:53 CONTCT 23P 5R UC:360
21:13:31 MISC 5R Plate:4JJF562 Comment:4JJF562
21:13:52 LOGM 5R Message:990704030413000592 Received:04/02/2007 21:13:36 Comment:LOGM
21:14:13 LOGM 5R Message:990704030414000593 Received:04/02/2007 21:13:36 Comment:REF CN #2928
21:37:12 BACKOS 24P UnitID:23P EmpID:CB5255 OperNames:RILEY, PAT
21:38:58 CLEAR 23P
22:17:05 *CLEAR 5R
[04/03/2007]
00:10:18 UNAV 24P
00:10:28 CODE 4 24P
00:18:03 BACKUP 23P UnitID:24P EmpID:CB5236 OperNames:ELLSWORTH, GERRY
00:18:07 UNAV 23P
00:18:10 *ENRTE 23P
00:18:33 *ONSCN 23P
00:27:40 CODE 4 23P
00:41:51 CONTCT 24P UC:120
00:53:15 CLEAR 24P
00:58:23 CONTCT 23P UC:120
03:08:17 BACKUP 26P UnitID:23P EmpID:CB5270 OperNames:JANNUSCH, RACHEL
03:08:22 *ENRTE 26P
03:18:06 CONTCT 23P UC:120
03:19:41 *ONSCN 26P
03:34:17 CODE 4 26P
03:34:19 UNAV 26P
03:34:33 *CLEAR 23P
04:38:04 BACKUP 16P EmpID:CB5303 OperNames:BAILEY, LORAN
04:38:29 *ACK 16P
04:45:41 *ENRTE 16P
04:47:21 *ACK 16P
05:02:25 *ONSCN 16P
05:05:40 *CLEAR 26P
06:56:42 BACKUP 13P UnitID:16P EmpID:CB5282 OperNames:LAMBERT, TRAVIS
06:56:44 ONSCN 13P
06:56:50 CLEAR 16P
08:34:11 BACKUP 12P UnitID:13P EmpID:CB5332 OperNames:HOPPE, ERIC
08:34:14 ONSCN 12P
08:40:08 PRMPT 13P Comment:Preempted and dispatched to call #070024101
08:40:33 BACKUP 13P UnitID:12P EmpID:CB5282 OperNames:LAMBERT, TRAVIS
08:40:37 ONSCN 13P
09:19:27 *CLEAR 12P

09:43:20 PRMPT 13P Comment:Preempted and dispatched to call #070024119
09:43:20 -CLOSE
09:47:07 RO
09:47:09 SELECT
09:47:13 DISP 13P EmpID:CB5282 OperNames:LAMBERT, TRAVIS
09:47:13 -PRIU 13P
09:47:23 ONSCN 13P Comment:OFFICER ACCIDENTALLY CLEARED FROM CALL
09:54:08 BACKUP 14P UnitID:13P EmpID:CB5356 OperNames:LUC, DZUNG
09:54:21 *ACK 14P
09:54:22 *ENRTE 14P
10:05:54 *ONSCN 14P
10:11:58 *CLEAR 13P
10:48:35 BACKUP 2Z UnitID:14P EmpID:CB5335 OperNames:HICKEY, DEBRA
10:53:10 *ENRTE 2Z
11:13:31 *ONSCN 2Z
11:14:54 CLEAR 14P
12:02:34 *CLEAR 2Z
12:02:34 -CLEAR
12:02:34 *CLOSE

ENCINA WATER POLLUTION CONTROL FACILITY
ADJUSTED INFLUENT FLOWS

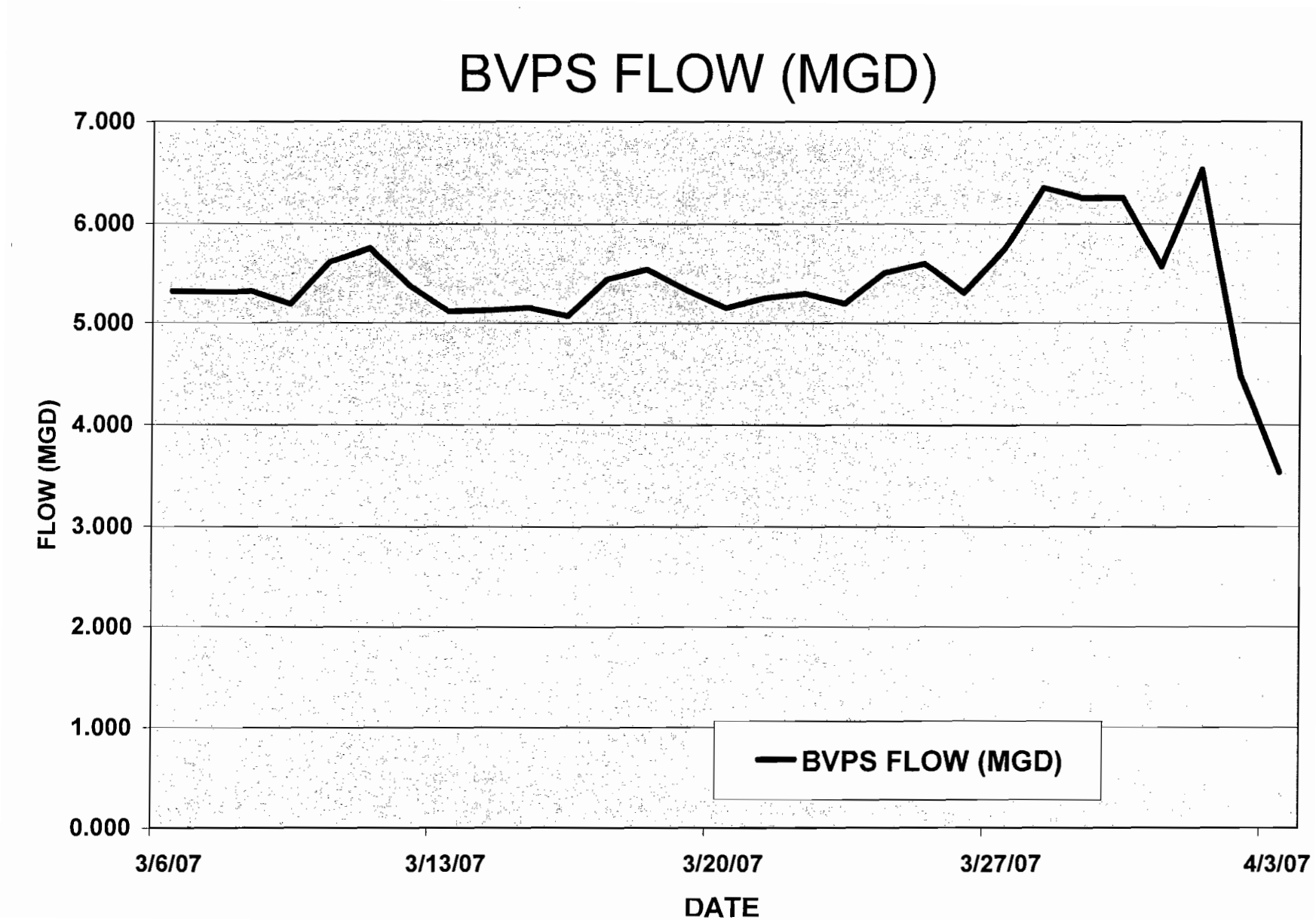
ALL FLOWS IN MGD

DATE	ENCINA ADJUSTED INF Q
6-Mar	26.453
7-Mar	25.906
8-Mar	25.969
9-Mar	25.130
10-Mar	27.462
11-Mar	26.076
12-Mar	26.586
13-Mar	26.495
14-Mar	26.636
15-Mar	26.872
16-Mar	26.703
17-Mar	26.230
18-Mar	27.940
19-Mar	26.195
20-Mar	27.553
21-Mar	26.918
22-Mar	26.261
23-Mar	27.551
24-Mar	27.018
25-Mar	27.012
26-Mar	26.264
27-Mar	27.466
28-Mar	27.181
29-Mar	28.069
30-Mar	28.755
31-Mar	26.488
1-Apr	25.233
2-Apr	22.048
3-Apr	24.628
4-Apr	28.767
5-Apr	30.288
6-Apr	29.984


ENCINA ADJUSTED INF Q
31.000
29.000
27.000
25.000
23.000
21.000
MGD
3/6/07
3/11/07
3/16/07
3/21/07
3/26/07
3/31/07
4/5/07
DATE
ENCINA ADJUSTED INF Q

BVPS FLOW DATA

DAY	DATE	BVPS FLOW (MGD)	(GPM)	
tues	3/6/2007	5.314	3690.53	
wed	3/7/2007	5.295	3676.94	
thurs	3/8/2007	5.319	3693.57	
fri	3/9/2007	5.191	3604.69	
sat	3/10/2007	5.616	3900.04	
sun	3/11/2007	5.752	3994.28	
mon	3/12/2007	5.372	3730.47	
tues	3/13/2007	5.116	3552.91	
wed	3/14/2007	5.129	3561.68	
thurs	3/15/2007	5.154	3579.14	
fri	3/16/2007	5.067	3518.69	
sat	3/17/2007	5.442	3779.06	
sun	3/18/2007	5.541	3847.79	
mon	3/19/2007	5.332	3702.89	
tues	3/20/2007	5.151	3577.29	
wed	3/21/2007	5.253	3648.24	
thurs	3/22/2007	5.295	3677.04	
fri	3/23/2007	5.194	3607.24	
sat	3/24/2007	5.503	3821.42	
sun	3/25/2007	5.599	3888.19	
mon	3/26/2007	5.303	3682.76	
tues	3/27/2007	5.733	3981.42	
wed	3/28/2007	6.355	4413.17	
thurs	3/29/2007	6.256	4344.39	
fri	3/30/2007	6.259	4346.26	
sat	3/31/2007	5.568	3866.74	
sun	4/1/2007	6.533	4536.69	
mon	4/2/2007	4.477	3109.00	
tues	4/3/2007	3.535	2455.01	only until 3:00 p.m. (pump back begins - flow signal distorted)
wed	4/4/2007			Too much agitation from the pump back operation!
thurs	4/5/2007			
fri	4/6/2007			


BVPS FLOW (MGD)
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
FLOW (MGD)
3/6/07
3/13/07
3/20/07
3/27/07
4/3/07
DATE
BVPS FLOW (MGD)

CITY OF CARLSBAD
24-INCH FORCE MAIN FAILURE
BUENA VISTA LAGOON
Carlsbad, California
NCRU: 01-0743.02 & 01-764.02:ebecker

Prepared for

THE CITY OF CARLSBAD
1635 Faraday Avenue
Carlsbad, California 92008

Attention: Mr. Bill Plummer, PE

by

SCHIFF ASSOCIATES
Consulting Corrosion Engineers
431 W Baseline Road
Claremont, CA 91711

SA #07-0477ENG

April 17, 2007

EXECUTIVE SUMMARY

A sewer force main jointly owned and operated by the City of Carlsbad and the City of Vista was reported to be discharging sewage into the Buena Vista Lagoon on April 1, 2007. Schiff Associates was contacted by the City of Carlsbad on the morning of April 3, 2007. Dr. Graham Bell, PE visited the site, inspected the pipe and excavation, obtained soil samples and visually inspected the exposed pipe that same morning and early afternoon began the investigation as to the cause of the discharge.

The ductile iron portion of the force main alignment begins at the Buena Vista Lift Station located on Marron Road, north of Jefferson Street. The raw sewage force main runs generally southwest from the Buena Vista Lift Station crossing near the lagoon in the Marron Road bridge deck and runs in Jefferson Street to transition to asbestos cement pipe force main that was installed by Caltrans to cross Interstate 5 (I-5). The discharge occurred about 700 feet downstream (west) of the Buena Vista Lift Station. This portion of the force main alignment contains a parallel asbestos-cement pipe (ACP), 16-inch diameter. The ACP parallel begins at a wye in the DIP just past the point of the break. Flow can be directed in the ACP or DIP by operating a plug valve. East of I-5 there is another wye and plug valve. Crossing under I-5 are parallel ACP barrels, and the DIP connects to one barrel with the parallel ACP connecting to the other barrel under I-5.

The force main where the discharge occurred is 24-inch diameter ductile iron pipe (DIP), and was installed in about 1982. Corrosion control for the exterior consisted of 8 mil thick clear, most likely linear low density, polyethylene encasement (PE) per American Water Works Association (AWWA) C105-82. The interior was lined with cement-mortar per AWWA C151. The pipe in the vicinity of the leak operates at a pressure at or below 40 psi. The restrained pipe joint excavated was not intentionally bonded for electrical continuity by means of an external bonding strap. In the area of the excavation, gravel had been used to back fill the pipe in the pipe zone, probably due to groundwater encountered during installation.

The sewage discharge was due to a rectangular hole (~3 inches x 12 inches) in the pipe just below spring line (reported as 4:30 clock position when facing downstream) on the lagoon (west) side of the pipe approximately 15 inches from the restrained joint. The hole exhibited characteristics consistent with external corrosion (concave edges on the exterior). The inside surface of the pipe was uniformly in good condition and internal corrosion was most likely not the source of the corrosion hole.

An approximately 40 inch long section of the leaking pipe was remove in two pieces including the restrained joint to the north. The rectangular hole was preserved in one half and the other side of the pipe was preserved in the other piece. Two in-line steel pipe couplings and a short section of ductile iron pipe were installed in order to place the line back in service. The sections of pipe were preserved and transported to Encina Wastewater Treatment Plant.

Soil samples collected from the excavation were tested for electrical and chemical properties to determine corrosivity towards DIP. Resistivity and soil chemistry characteristics (high chloride

concentration) along with the presence of sulfides and negative redox potentials (indicating anaerobic condition consistent with microbiological corrosion activity) result in extremely corrosive soils for DIP. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided. Exterior corrosion protection recommended by AWWA C105-82 was polyethylene encasement as was done for the subject force main.

In addition to the chemical testing, linear polarization resistance (LPR) tests using steel surrogate electrodes were performed in order to estimate the corrosion rate on exposed iron. Results of the LPR tests indicate general corrosion rates on the order of 8 to 10 mils per year (0.008 to 0.010 inches per year) and a tendency toward pitting which could accelerate time to perforation.

Based on our observations from the site and these preliminary laboratory results, it is most likely that the cause of the corrosion was due to damage to the PE from gravel backfill and intrusion of the severely corrosive environment under the PE and resulting external corrosion.

In order to complete our investigations and issue our final report, the following testing will be performed in the next 45 days:

1. Conduct a detailed physical examination and documentation of corrosion damage of the failure and apparently pristine half sections of pipe from the discharge site. This examination will include use of low pressure sand blasting to remove surface debris and graphitization to reveal the extent and depth of accumulated corrosion damage. Specifically calibrated ultrasonic metal thickness measurements will be use to map the damage. In order to perform these tests, the pipe samples will be transported to our facility in Claremont later this week

2. Receive results of conformance testing on sample of polyethylene encasement from excavation at discharge site.

3. Conduct metallurgical testing to confirm microstructure and mechanical characteristics of the pipe material are consistent with project specifications.

4. With the assistance of the City of Carlsbad, conduct excavations and testing to determine the feasibility or benefit of applying cathodic protection to prevent further corrosion and sewage discharge. This will require excavation of the pipe at a minimum of three locations for subsequent physical inspection and installation of test facilities.

This pipe can be continued to be operated as it presently is, periodic internal inspection with video and reactive strategies with respect to external corrosion. The failed pipe section did not show degradation of the cement-mortar lining, indicating there aren't air pockets where sulfuric acid can form and rapidly degrade the lining resulting in corrosion of the crown of the interior of the pipeline.

The pipe could be replaced. As another alternative, an High Density Polyethylene (HDPE) or Cured In Place Plastic (CIPP) liner are also options for repair and replacement but valving and other operational and construction issues must be considered.

Cathodic protection can be installed to control corrosion of the exterior of the pipe. For this option, more investigation and testing should be conducted to established electrical characteristics of the piping system and classify the corrosivity of the alignment.

TABLE OF CONTENTS

SCHIFF ASSOCIATES

INTRODUCTION AND BACKGROUND

A sewer force main jointly owned and operated by the City of Carlsbad and the City of Vista was reported to be discharging sewage into the Buena Vista Lagoon on April 1, 2007. Schiff Associates was contacted by the City of Carlsbad on the morning of April 3, 2007. This report summarizes our preliminary findings.

The ductile iron potion of the force main alignment begins at the Buena Vista Lift Station located on Marron Road, north of Jefferson Street. The raw sewage force main runs generally southwest from the Buena Vista Lift Station crossing near the lagoon in the Marron Road bridge deck and runs in Jefferson Street to transition to asbestos cement pipe force main that was installed by Caltrans to cross Interstate 5 (I-5). This portion of the force main alignment contains a parallel asbestos-cement pipe (ACP), 16-inch diameter. The ACP parallel begins at a wye with a plug valve installed in the DIP reach just past the point of the break. Flow can be directed in the ACP or DIP by operating a plug valve. East of I-5 there is another wye and plug valve. Crossing under I-5 are parallel ACP barrels, and the DIP connects to one barrel with the parallel ACP connecting to the other barrel under I-5. An aerial view of the alignment is included with the appendices. The leak occurred about 700 feet downstream (west) of the Buena Vista Lift Station.

The force main is 24-inch diameter ductile iron pipe (DIP), and was installed in about 1982. Corrosion control for the exterior consisted of 8 mil thick clear, most likely linear low density, polyethylene encasement (PE) per American Water Works Association (AWWA) C105-82. A sample of the PE has been sent to Ductile Iron Pipe Research Association (DIPRA) for testing and determination of conformance with requirements of AWWA C105-82. The interior was lined with cement-mortar per AWWA C151. The pipe had an approximate wall thickness of 0.41-inch wall thickness (Thickness Class 51) with restrained joints. The pipe in the vicinity of the leak operates at a pressure at or below 40 psi. The restrained pipe joint excavated was not intentionally bonded for electrical continuity by means of an external bonding strap. In the area of the excavation, gravel had been used to back fill the pipe in the pipe zone, probably due to groundwater encountered during installation.

Dr. Graham Bell, PE visited the site that same morning and early afternoon to begin the investigation as to the cause of the discharge. Our work to date has consisted of a site visit on April 3, 2007 to:

- Collect soil and gravel samples from the repair excavation at the discharge site
- Collected a sample of the polyethylene encasement from the west end of the excavation.
- Observe the repairs to the pipe.
- Examined and documented the as-excavated condition and external corrosion on the section of pipe removed.

In addition, Dr. Bell met with representatives from the City of Carlsbad and the City of Vista on April 12, 2007 at the Encina Wastewater Treatment Plant to receive documentation and discuss the investigation.

The purpose of this preliminary report is to document our efforts, present the laboratory soil corrosivity, review construction documents, and to respond to Investigative Order No. R9-2007-0060 issued by the California Regional Water Quality Control Board, San Diego Region (Regional Board). Statewide Waste Discharge Requirements (WDRs) prohibit Sanitary Sewer Overflows (SSOs), or leaks that result with discharge of sewage into natural waters of the state and also prohibit discharge of raw sewage from the system upstream of a sewage treatment plant, which in this case would be the Encina Wastewater Treatment Plant. The Regional Board is calling for information that shows the actions by the municipalities to prevent sewage discharge, repair the failed pipe, and investigate water quality impacts from the sewage discharges.

TEST PROCEDURES

Laboratory Tests on Soil Samples

Two soil samples were collected; one from the pipe trench and one from the wall of the excavation adjacent to the failure. A sample of gravel from next to the pipe was collected, and a sample of the polyethylene encasement was obtained. The polyethylene will be transmitted to the Ductile Iron Pipe Research Association (DIPRA) to be analyzed for material conformance with American Water Works Standard C 105.

Laboratory testing of soil can provide insight to some of the corrosion mechanisms. The electrical resistivity of the soil samples were measured in a soil box per ASTM G57 in their as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated samples was measured. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil. Test results are shown in 1 in the Appendix A.

DISCUSSION OF SOIL CORROSIVITY

Electrical and Chemical Results

The soil's electrical resistivity, a measurement of the soil's resistance to conduct electricity or corrosion current, is an important factor in determining the soil's corrosiveness toward buried metallic structures, particularly ferrous metals. Corrosion of buried metals is an electrochemical process in which the amount of metal loss is directly proportional to the flow of electrical current (DC) into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Low electrical resistivity soil is associated with high chemical and moisture content, and usually indicates a corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:

Soil Resistivity in ohm-centimeters			Corrosivity Category
over		10,000	mildly corrosive
2,000	to	10,000	moderately corrosive
1,000	to	2,000	corrosive
below		1,000	severely corrosive

Other soil characteristics that may influence corrosivity toward metals are pH, chemical content, soil types, aeration, anaerobic conditions, and site drainage. The electrical resistivities of both soil samples and the gravel were in the severely corrosive category with as-received moisture and after saturation. The gravel and soil pH values ranged from 7.4 to 8.3. This range is mildly alkaline to strongly alkaline. The chemical content of the samples was very high with chloride, particularly corrosive to ferrous metals, and sulfate as the predominant constituents.

The positive reactions for sulfide and the negative redox potentials indicate reducing conditions in which anaerobic bacteria are active.

This soil is classified as severely corrosive to ferrous metals. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided.

Linear Polarization Resistance and Electrochemical Imbalance Testing

Linear polarization resistance (LPR) testing was conducted to determine, by bench testing in the laboratory, the corrosion rate of ductile iron in these soils. LPR probes were made using steel electrodes as a surrogate for DIP. Electrodes were placed in the saturated soil samples taken from the excavations. The reported corrosion rates for the samples represent general corrosion rates for the electrode surface (5 sq. cm.). The measurement is derived from the average of the corrosion current shifts resulting from a 10 mV anodic polarization and a 10 mV cathodic polarization of the two electrodes. These DC measurements are compensated for solution resistance by an AC measurement (approximately 1 KHz).

Measurements of electrochemical imbalance between the two electrodes were also measured. The Imbalance values are shown in Imbalance Units. The scale factor is 0.5 microamperes per square centimeter of electrode surface which equates to 2.5 microamperes per imbalance unit (IU). This scale factor was determined from empirical data and selected so that when the corrosion rate in mils per year could be compared with the Imbalance reading in IU. This comparison is used as the basis for a qualitative interpretation with regard to the dominant corrosion mechanism. If corrosion rate > imbalance; this is an indication of general corrosion taking place. If corrosion rate < imbalance; this is an indication of localized corrosion activity (pitting). Since the imbalance reading is a “snapshot” of the ZRA measured current between the

electrodes rather than continuous current, little can be said for the character of the localized corrosion. Also, since it is displayed as an absolute value, it is impossible to determine if localized corrosion is occurring on one or both electrodes.

The measurements taken from both of the soil samples, shown in Figure 1, indicate that both general corrosion and localized corrosion are taking place.

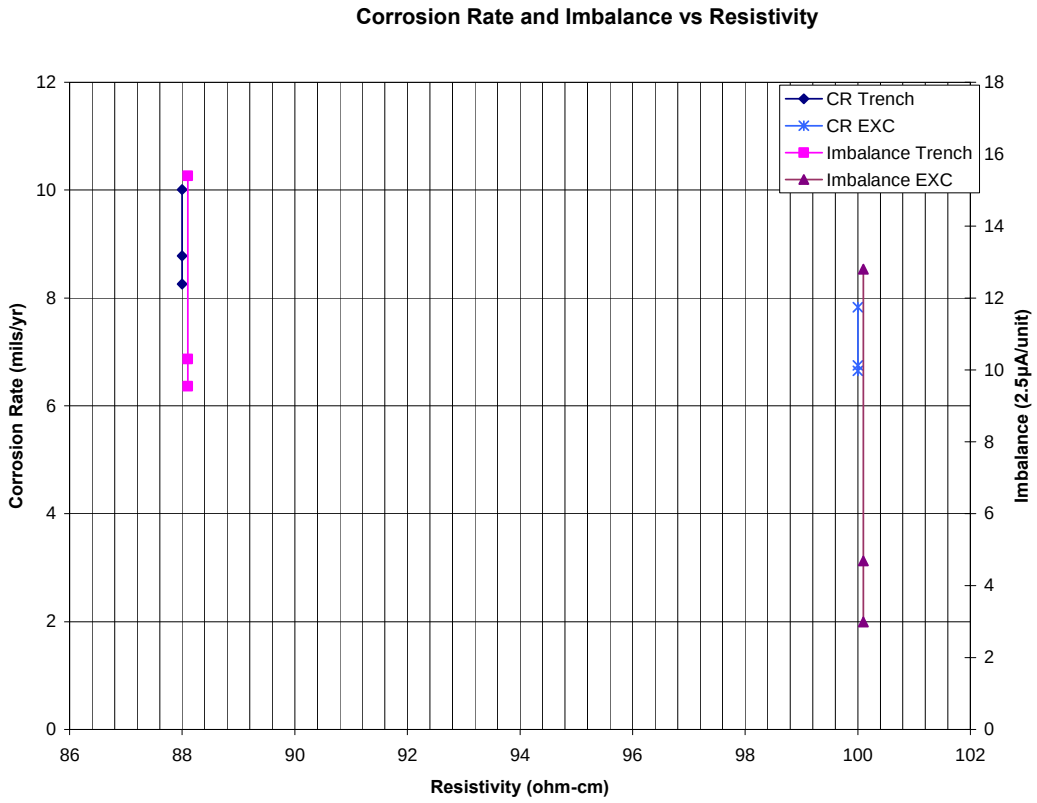


Figure 1: Linear Polarization Tests and Electrochemical Imbalance for Soil Samples from Excavation

PHYSICAL EXAMINATION OF PIPE SPECIMEN AND EXCAVATION SITE

An approximately 40 inch long section of the leaking pipe was removed in two pieces including the restrained joint to the north.

The sewage discharge was due to a rectangular hole (~3 inches x 12 inches) in the pipe just below spring line (reported as 4:30 clock position when facing downstream) on the lagoon (west) side of the pipe approximately 15 inches from the restrained joint. The hole exhibited characteristics consistent with external corrosion (concave edges on the exterior). The inside surface of the pipe was uniformly in good condition and internal corrosion was most likely not the source of the corrosion hole.

The rectangular hole was preserved in one half and the other side of the pipe was preserved in the other piece. Two in-line pipe couplings and a short section of pipe were installed in order to

place the line back in service. The sections of pipe were preserved and transported to Encina Wastewater Treatment Plant, 6200 Avenida Encinas, Carlsbad, CA.

Copies of all our photographs from the site inspection and specimen examination are contained in Appendix B.

Figure 2: Overall View of Pipe Specimen from Discharge Site Excavation from Exterior. Arrow indicates hole in pipe.

Figure 3: Close up of Hole from Exterior

Figure 4: Overall View of Failed Half of Pipe from Interior. Arrow indicates hole. Note, there was no sign of internal corrosion damage.

Figure 5: External Surface of Unfailed Half Section of DIP Removed from Discharge Excavation

Figure 6: Internal Surface of Unfailed Half Section of DIP Removed from Discharge Excavation. No sign of internal corrosion damage.

Figure 7: Replacement Section with Couplings in Excavation

CORROSION CONTROL FOR DIP CIRCA 1982: AWWA C105-82

The American Water Works Association (AWWA) Standard C-105, Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids, 1982 version, was sent to us by Ms. Jennie Nevens of AWWA. The Standard was preceded by The Cast Iron Pipe Research Association (CIPRA) work that demonstrated loose polyethylene encasement provides protection against soil corrosion and against stray current.

Polyethylene encasement was the state of the art for ductile iron pipe installations in 1982. DIPRA typically did not recommend joint bonding in ductile iron piping systems, which would prevent long line currents from having negative effects on the pipe. DIPRA relied on the polyethylene encasement to protect the pipe sections individually. This methodology was standard in the industry in the 1970s and 1980s. As infrastructure becomes more developed, the cost to excavate an existing pipeline has increased, and the access to conduct dig-ups has decreased. An American Water Works Research Foundation study on External Corrosion of Distribution Systems in 2002 found that the greatest future cost to infrastructure is and would be the extent of electrically discontinuous piping underground. Cathodic protection can be used to extend the life of a metallic pipeline, yet it requires pipe joints to be electrically continuous.

The Foreword of the 1982 AWWA C105 Standard states that the polyethylene encasement had maintained its integrity after 20-years of testing its exposure in severely corrosive soil. Since 1958, polyethylene encasement has been used extensively in the waterworks industry to protect cast and ductile iron pipe in corrosive environments and it is still in use today as a method of corrosion protection for DIP. The 1982 Standard calls for physical and dielectric requirements for the polyethylene, details installation methods, and has a system for rating soil corrosivity to determine if the encasement is necessary in Appendix A. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided. Exterior corrosion protection recommended by AWWA C105-82 is polyethylene encasement as was done for the subject force main.

A copy of AWWA C105-82 is contained in Appendix C.

CONCLUSIONS AND CONTINUED INVESTIGATION

Based on our observations from the site and these preliminary laboratory results, it is most likely that the cause of the corrosion was due to damage to the PE from gravel backfill and intrusion of the severely corrosive environment under the PE and resulting external corrosion.

In order to complete our investigations and issue our final report, the following testing will be performed in the next 45 days:

1. Conduct a detailed physical examination and documentation of corrosion damage of the failure and apparently pristine half sections of pipe from the discharge site. This examination will include use of low pressure sand blasting to remove surface debris and graphitization to reveal the extent and depth of accumulated corrosion damage.

Specifically calibrated ultrasonic metal thickness measurements will be use to map the damage. In order to perform these tests, the pipe samples will be transported to our facility in Claremont later this week

2. Receive results of conformance testing on sample of polyethylene encasement from excavation at discharge site.

3. Conduct metallurgical testing to confirm microstructure and mechanical characteristics of the pipe material are consistent with project specifications.

4. With the assistance of the City of Carlsbad, conduct excavations and testing to determine the benefits and the feasibility of applying cathodic protection to prevent further corrosion and sewage discharge. This will require excavation of the pipe at a minimum of three locations for subsequent physical inspection and installation of test facilities.

REGIONAL WATER QUALITY CONTROL BOARD REQUIREMENTS

Investigative Order No. R9-2007-0060 Item 4 calls for information about actions to prevent sewage discharge. Past actions as far as material selection were consistent with industry standards. The pipe material and polyethylene encasement appear to be state of the art for the construction period. It would not be uncommon for pipes of the same construction to have 50 to 100-year useful lives. In light of the untimely failure for this type and age of pipe, additional investigation to evaluate possible external corrosion elsewhere should be part of the City's SSO response plan. However, external corrosion at tears in the polyethylene encasement can not be easily detected. An electromagnetic conductivity (emag) survey of the soil along the alignment of the force main would give a plot of the soil conductivity over stationing or length. This procedure is typically done by sampling at 10-foot intervals so that virtually all of the alignment is evaluated. The emag survey uses radio frequency to evaluate soil conductivity (inverse of resistivity) and is non-intrusive. Cathodic protection can be installed to halt any further corrosion, but would not prevent failure of pipe that already had significant loss of metal. External or dig-up inspection of the entire alignment is not feasible. Conducting some excavation inspections and pipe condition assessments based on an emag survey would be prudent.

The Regional Board calls for a technical report that addresses the cause of the failure and the appropriateness of the material selection. The cause of the ductile iron pipe failure preliminarily appears to be contact with severely corrosive soil moisture at holidays or tears and rips in the polyethylene encasement. The current version of AWWA C105, Appendix A suggests additional corrosion control beyond polyethylene encasement including application of cathodic protection in soils with high soil corrosivity test evaluation scores. The state of the art for the era the pipe was installed called for two choices polyethylene encasement or bare. Other pipe material systems, asbestos cement and reinforced plastic mortar, were used by the municipalities in the past and were abandoned. The ductile iron met the structural requirements of the force main.

Future measures to prevent or mitigate future overflows would include replacement, lining, or cathodic protection and monitoring the cathodic protection in conjunction with periodic internal inspection.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, expressed or implied, is included or intended.

SCHIFF ASSOCIATES

Robert Pannell
Sr. Corrosion Technologist
NACE International #5299

Graham E.C. Bell, Ph.D., P.E.
Cathodic Protection and Corrosion Specialist
NACE International #5350

APPENDIX A: RESULTS OF LABORATORY TESTS FOR SOIL CORROSIVITY

Table 1 - Laboratory Tests on Soil Samples

City of Carlsbad
24-inch DIP FM Failure, Carlsbad, CA
SA# 07-0477ENG
4-Apr-07

Sample ID			Gravel next to pipe	Soil from trench	Soil depth from exc. @ pipe
Resistivity		**Units**			
as-received		ohm-cm	560	116	128
saturated		ohm-cm	440	88	100
pH			7.4	8.3	8.1
Electrical					
Conductivity		mS/cm	1.35	5.75	3.36
Chemical Analyses					
Cations					
calcium	Ca^{2+}	mg/kg	279	270	134
magnesium	Mg^{2+}	mg/kg	131	384	118
sodium	Na^{1+}	mg/kg	836	6,100	3,737
potassium	K^{1+}	mg/kg	60	165	69
Anions					
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	552	488	433
flouride	F^{1-}	mg/kg	3.6	3.7	7.2
chloride	Cl^{1-}	mg/kg	928	7,980	5,150
sulfate	SO_4^{2-}	mg/kg	817	3,070	1,050
phosphate	PO_4^{3-}	mg/kg	3.4	ND	ND
Other Tests					
ammonium	NH_4^{1+}	mg/kg	42.2	ND	ND
nitrate	NO_3^{1-}	mg/kg	5.1	36.0	20.0
sulfide	S^{2-}	qual	Pos	Pos	Pos
Redox		mV	-503	-11	99

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

APPENDIX B: SCHIFF ASSOCIATES PHOTOGRAPHS FROM SITE VISIT AND INSPECTION APRIL 3, 2007


2007 4 3


2007 4 3


2007 4 3


2007 4 3


KOMATSU
2007 4 3


260
2007 4 3

CAUTION
2007 4 3

CAUTION
2007 4 3


4 3
2007


4 3
2007


2007 4 3


2007 4 3


PIZZA
2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3

April 20, 2007

To: Graham E. C. Bell, Ph.D., P.E.
Schiff Associates/M.J. Schiff & Associates, Inc.
431 W Baseline Road
Claremont, CA 91711

RE: Test Results of Polyethylene Film Sample – 24" DIP, Carlsbad, CA

Dear Graham;

This letter is to relay the results of the physical tests conducted on the sample of polyethylene encasement material which you had sent to the DIPRA laboratory. It was reported that the polyethylene sample was from the encasement of a 24-inch ductile iron pipe sewer force main in Carlsbad, California installed in 1982. The pipeline had recently experienced a failure in April of this year. The sample was tested for thickness, tensile strength and elongation (ASTM D882 – Method B).

The sample's test results were found to be in compliance with the requirements of the applicable ANSI/AWWA C105/A21.5 Standard for Polyethylene Encasement for Ductile Iron Pipe Systems. Results follow:

Requirement	Transverse	Longitudinal	Standard
Thickness (inches)	0.0074	0.0082	0.0072 (min.)
Tensile (psi)	1741	2167	1200 (min.)
Elongation (percent)	431	570	300 (min.)

Should you have any questions or we can be of any other assistance please contact us.

Sincerely,

Daniel Crabtree
Research Coordinator

SPECIFICATIONS FOR CONSTRUCTION OF

24-INCH FORCE MAIN EXTENSION

AUGUST 1982

BROWN AND CALDWELL
CONSULTING ENGINEERS
PASADENA, CALIFORNIA

STATE OF CALIFORNIA
COUNTY OF SAN DIEGO
PUBLIC WORKS AGENCY

CONTRACT DOCUMENTS FOR THE CONSTRUCTION OF 24-INCH FORCE MAIN EXTENSION VISTA SANITATION DISTRICT CITY OF CARLSBAD

BID OPENING DATE:

October 19, 1982

Any questions relative to this project should be directed to:
Fraser, Wilson and Associates - Telephone: (714) 434-1794
2345 Harding, Suite 211
Carlsbad, California 92008

Approved: Vista Sanitation District — Date: 9-28-82

Approved: City of Carlsbad — Date: 9-14-82

BROWN AND CALDWELL
Consulting Engineers

SECTION C2 - EARTHWORK

C2.01 Scope

Earthwork includes all labor, equipment, appliances and materials as required or necessary to excavate, trench, fill, backfill, grade, and restoration of paved surface for the construction of the pipeline, as shown and specified.

C2.02 Fill Material

(1) Type A

Type A fill material shall be clean crushed rock or gravel meeting all of the requirements of California Division of Highways Specification 26-1.02A for Class 1, 3/4-inch maximum, aggregate base material.

(2) Type B

Type B material shall be granular material free from organic matter and of such size and gradation that the desired compaction can be readily attained. The material shall be select excavated material, or imported material, having a sand equivalent of not less than 50 as determined by Cal. Spec 217F. The maximum size of stone shall not exceed 3 inches.

No Type B material shall be used unless it has been accepted by the Engineer. Samples of the material shall be submitted by the Contractor a sufficient time in advance of intended use to enable its inspection and testing.

(3) Type C

Type C material shall be unclassified material obtained from excavation or from any other sources. The material shall be substantially free from wood, roots, bark, peat or other extraneous material. The maximum size of stone shall not exceed 3 inches.

C2.03 Construction

(1) General Requirements

(a) Contractor's Operations. The Contractor shall perform his work in such a manner as not to harm the undisturbed condition of the underlying or adjacent soils or damage or prevent the proper placement of fill. Should any natural soils or fill be damaged or disturbed by the operations of the Contractor, which in the opinion of the Engineer precludes the site utilization as now planned, the Contractor shall correct such damage or disturbance in a way which will provide satisfactory future behavior of the planned pipelines and structures. Corrections will be as directed by the Engineer and may include, but not be limited to, the removing of natural and fill foundation soils both laterally and vertically and replacing with

concrete to the required grades, or the constructing of alternate methods of support, or by being liable for the additional cost of constructing alternate methods of support. The cost of any such repair, rehabilitation or modification will be charged to the Contractor.

(b) Control of Water. All excavation and placement of backfill and fill shall be carried out in the dry. The Contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. He shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage and shall have available at all times competent workmen for the operation of the pumping equipment.

During excavating, construction of structures, installing of pipelines and sewers, placing of structure and trench backfill and the placing and setting of concrete, excavations shall be kept free of water. The Contractor shall control surface runoff so as to prevent entry or collection of water in excavations. The static water level shall be drawn down a minimum of one foot below the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

Before dewatering is started, the Contractor shall obtain acceptance by the Engineer for the method, installation and details of the dewatering systems he proposes to use. Open sumps shall not be used for excavations deeper than 3 feet below the static water table.

At each individual excavation, the Contractor shall provide a sufficient number of temporary observation wells to check continuously the static water level.

The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill and prevent flotation or movement of structures, pipelines and sewers.

(c) Removal of Obstructions. Unless otherwise noted, the Contractor shall remove all brush, trees, logs, stumps, roots, heavy sods, heavy growth of grass, all decayed vegetable matter, fences, irrigation lines and all structures where the proper construction and completion of the work require their removal. The Contractor shall also remove all rock, stones in excess of 4 inches, broken or old concrete and pavement, debris and all obstructions of whatsoever kind or character, whether natural or artificial, encountered in the work.

Material that is removed as hereinbefore specified, and is not to be incorporated in the work, shall be disposed of in a manner acceptable to the Engineer.

(d) Excess Excavated Material. Unless otherwise shown or specified, excess excavated material shall be disposed of by the Contractor at locations and in a manner acceptable to the Engineer and the City of Carlsbad.

(e) Shoring, Sheeting and Bracing. Where sheet piling, shoring, sheeting, bracing or other supports are necessary, they shall be furnished, placed, maintained and, except as indicated or specified otherwise, removed by the Contractor.

The design, planning, installation and removal of all lagging, sheeting, shoring, sheet piling and bracing shall be accomplished in such a manner as to maintain the required trench or excavated section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

The use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench bracing will not be permitted. The use of a traveling shield shall require the prior written acceptance of the Engineer.

Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe. Trench sheeting below the top of the pipe shall be left in place.

When the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the Contractor shall secure written acceptance of the Engineer prior to the installation of such bracing.

The rules of the Division of Industrial Safety of the State Department of Industrial Relations with respect to excavation and construction shall at all times be strictly observed.

(f) Degree of Compaction. Degree of compaction as set forth herein is the ratio expressed as a percentage of the dry density of the fill material in the field to the maximum dry density of the same material determined by ASTM D1557.

(2) Pipeline Excavation

a. General. Unless otherwise specified or indicated, excavation for pipelines shall be dry open cut. Trenching machines may be used except where their use will result in damage to existing facilities. Unless otherwise specified or indicated, the Contractor may use any method of excavation which will not damage or endanger adjacent structures or property or disturb the natural or fill soils at, below and adjacent to the excavation.

Where, in the opinion of the Engineer, the undisturbed condition of the natural soils is inadequate for the support of the planned pipeline, the Engineer shall direct the Contractor to overexcavate to adequate supporting soils and refill the excavated space to the proper elevation in accordance with the procedure specified for backfill. The excavation, furnishing and placement of such material in excess of the quantities shown on the drawings will be paid for as extra work.

Should the excavation be carried below the lines and grades indicated on the drawings because of the Contractor's operations, the Contractor shall, at his expense, refill such excavated space to the proper elevation as directed. Should the natural or fill foundation soils be disturbed or loosened because of the Contractor's operations, they shall be recompacted or removed and the space refilled as directed.

b. Trench Width. The maximum allowable width of trench measured at the top of pipe shall be as shown. Such maximum width shall be inclusive of all sheeting, lagging and bracing. If the maximum allowable trench width is exceeded for any reason, the Contractor shall, at his expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer, if in the opinion of the Engineer such action is required to adequately support the pipe.

(3) Backfilling

(a) Classes of Backfill. Backfill shall be of material placed as shown and specified in accordance with one of the following classifications:

1. Class I. Material for Class I backfill shall be Type A. The backfill material shall be placed in horizontal layers not exceeding 12 inches in loose depth and compacted by power-operated tampers or vibratory equipment.

2. Class II. Material for Class II backfill shall be Type B. The backfill material shall be placed in horizontal layers not exceeding 8 inches in loose depth and compacted by power-operated tampers, rollers or vibratory equipment to a dry density not less than 85 percent of the maximum dry density. Each layer shall be compacted to the specified density prior to placing subsequent layers. The thickness of the loose layer may be increased when in-place density tests performed by the Engineer show that the specified density can be obtained.

3. Class III. Material for Class III backfill shall be Type B or C. The backfill material shall be placed in horizontal layers not exceeding 8 inches in loose depth and compacted by power-operated tampers, rollers or vibratory equipment to a dry density not less than 80 percent of the maximum dry density. Each layer shall be compacted to the specified density prior to placing subsequent layers. The thickness of the loose layer may be increased when in-place density tests performed by the Engineer show that the specified density can be obtained.

(b) Pipelines. Unless otherwise shown or specified, bedding and backfilling shall conform to the cases described below.

1. Bedding. All pipe shall have a minimum of 6 inches bedding material below the barrel of the pipe. Unless otherwise indicated, bedding shall conform to requirements for Class I backfill. After compaction, the trench bottom shall be graded to provide uniform grade and bearing under the full length of the pipe.

2. Initial Backfill. Initial backfill shall not be deposited in the trench in any manner which will damage or disturb the pipe or the bedding. Unless otherwise indicated, initial backfill shall conform to the requirements for Class II backfill and shall be placed to the top of the pipe.

3. Subsequent Backfill. Unless otherwise indicated, subsequent backfill shall be Class III.

4. Sand. Sand used for backfill shall be natural bank sand, graded uniformly from fine to coarse and free from lumps, clay, cinders, rubbish or other objectionable material. It shall not contain more than 10 percent by weight of loam and clay and all material must be capable of passing through a 3/4-inch sieve. Not more than 5 percent shall remain on a No. 4 sieve.

C2.04 Finish

All area covered by the work, including excavated and filled sections, borrow areas, and transition areas, shall be graded uniformly to the elevations shown on the drawings. The finished surface shall be reasonably compacted and finished to drain readily. The degree of finish shall be that ordinarily obtainable from a blade-grader. The finished surface shall be not more than 0.2 foot above or below the finished grade. The surface of areas to be paved, or on which a base course is to be placed, shall not vary more than 0.05 foot from finished grade and approved cross-section. Improved areas and all roadways affected by any excavation shall be restored to the condition which existed at the time the Contractor entered upon the work. Ditches shall be graded, fences shall be restored, and all other work necessary for restoration shall be done.

SECTION C3 - CONCRETE WORK

C3.01 Scope

Concrete work includes the construction of thrust blocks and other concrete items complete with steel reinforcement as shown and specified.

C3.02 Materials

(1) Concrete

(a) Cement. Cement shall conform to ASTM C150 and shall be Type V.

Cement delivered to the site of the work shall at all times be suitably stored or protected from exposure to the atmosphere. In the event the cement shows signs of deterioration, it shall be removed from the work unless additional tests show that it conforms to the requirements stated above.

(b) Aggregate.

1. General. Fine and coarse aggregate for concrete shall conform to ASTM C33. In reinforced concrete, maximum size of aggregate shall not exceed one half the distance between reinforcing bars or 1½ inch.

(c) Water. Water shall be any potable water, clean and free from injurious amounts of oil, acid, alkali and organic materials.

(d) Quality. Concrete shall be composed of cement and crushed aggregate and water proportioned and mixed as hereinafter specified.

1. Concrete Type. Concrete shall be Type B composed of cement, fine aggregate, coarse aggregate and water. Minimum cement content shall be 3.5 sacks per cubic yard. Type B concrete shall be used for pipe thrust blocking and anchors.

2. Consistency and Strength. The exact proportions of cement and aggregate shall be such as to produce a workable, strong, dense, impermeable concrete having the following approximate consistency and strength:

a. Consistency. The quantity of water required for the proper consistency of the concrete shall be determined by the slump test in accordance with ASTM C143. Slump allowance shall be as follows:

Type B concrete:	Maximum slump, 5 inches plus or minus one inch tolerance

b. Strength. Compressive strength shall be determined at the end of 28 days on standard 6-inch by 12-inch test cylinders in accordance with ASTM C39. The compressive strength of Type B concrete shall not be less than 2000 pounds per square inch.

(e) Batching. Concrete batching equipment shall be provided to determine and to control accurately the relative amounts of cement, water, sand and each individual size of coarse aggregate entering into the concrete. Cement, sand and coarse aggregate shall be measured by direct weighing. Water shall be determined by direct weighing or by volumetric measurement. Equipment and its operation shall be subject at all times to the acceptance of the Engineer.

(f) Mixing. Unless otherwise authorized by the Engineer, concrete shall be mixed in a batch mixer of accepted type which will insure a uniform distribution of the materials throughout the mass so that the mixture is uniform in color and is homogeneous. All concrete shall be placed within one hour after water is first added to the batch. The mixer shall be equipped with a suitable charging hopper and a water storage and measuring device controlled from a case which can be kept locked. The mixer shall be so constructed that the water can be discharged only while the mixer is being charged. The entire contents of the mixing drum shall be discharged before recharging. The mixer shall be cleaned at frequent intervals while in use. The volume of mixed materials per batch shall not exceed the rated capacity of the mixer.

(g) Transit Mixed Concrete. At the Contractor's option, transit mixed concrete may be used provided it complies with applicable portions of these specifications and ASTM C94. Water shall be introduced only at time of charging the mixer. If transit mixed concrete is used, the Contractor shall assume full responsibility for the production of concrete of the specified characteristics. He shall arrange with the accepted testing laboratory for inspection as required to insure compliance with these specifications with regard to materials, proportioning, batching and mixing when concrete is being prepared for the work. The manufacturer shall furnish with each truckload of concrete delivered to the site a certificate indicating the composition and quality of the concrete.

(2) Grout

Grout shall be a mixture of one part cement to two parts sand with a water cement ratio of 0.55. Cement shall be as specified in sub-article C3.02 (1) (a). Sand shall conform to ASTM C33 and shall be graded so that 100 percent by weight will pass a standard No. 8 mesh sieve and at least 45 percent by weight will pass a standard No. 40 mesh sieve.

(3) Reinforcing Steel

Reinforcing steel shall consist of deformed bars of the size called for on the drawings. Steel shall conform to ASTM A615 and shall be grade 40.

Reinforcement shall be carefully formed as indicated on the drawings. All bars shall be bent cold in accordance with ACI 318.

C3.03 Construction

(1) Depositing

Concrete shall not be placed until the excavation and reinforcement (if any) have been accepted by the Engineer. Concrete shall be conveyed from the mixer to

the place of final deposit as rapidly as possible by methods which will prevent the separation or loss of ingredients. It shall be deposited in the forms as nearly as practicable in its final position so as to maintain a plastic surface approximately horizontal. Concrete shall not be dropped more than 6 feet unless a suitable chute or tube is used. Under no circumstances shall concrete that has partially hardened be deposited in the work. Temporary joints shall not remain exposed for more than 45 minutes before adjacent concrete is placed. Concrete utilized for thrust blocks or pipe anchors shall be placed against undisturbed soil as indicated on the plans.

(2) Placing Reinforcing Steel

Reinforcing steel, before being positioned, shall be cleaned thoroughly of mill rust scale or other coatings that will destroy or reduce the bond. Reinforcement reduced in section shall be rejected. Where there is delay in depositing the concrete, reinforcement shall be reinspected and, when necessary, cleaned by sandblasting.

Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the drawings shall not be used. Heating or welding of bars will not be permitted.

(3) Curing

Unformed concrete surfaces shall be covered with wet burlap mats as soon as the concrete has sufficiently set, and thereafter shall be kept wet under wet burlap or other approved means until backfilled or for 10 days after the concrete is placed.

SECTION C4 - PIPELINE WORK

C4.01 Scope

Pipeline work includes the furnishing, installing and testing of pipe, anchors, fittings, valves, specials, and all necessary appurtenances as shown and specified and as required to make the work complete and operable.

Pipeline work shall be accomplished using ductile iron pipe. All piping, fittings, and valves shall be wrapped with polyethylene in accordance with these specifications.

C4.02 Materials

(1) Design

All pipe, valves, fittings and appurtenances shall be suitable for a working pressure of 100 psi at the depth of cover indicated on the drawings.

The Contractor shall furnish the Engineer with design calculations from the pipe manufacturer verifying material performance at the design conditions.

(2) Ductile Iron Pipe

Ductile iron pipe shall be new, suitable for the loads indicated in Article C4.02(1), and manufactured in accordance with ANSI-A21.51 (AWWA-C151). Thickness design of ductile iron pipe shall be class 50 under the bridge, and Class 51 elsewhere in compliance with ANSI-A21.50 (AWWA-C150). Pipe lengths shall meet or exceed the manufacturers recommended minimum length.

Mechanical joints with retainer glands indicated in Article C4.02(4) shall be utilized. Gaskets shall conform to ANSI-A21.11 (AWWA-C111). Ductile iron pipe shall be cement-mortar lined and seal coated in accordance with ANSI-A21.4. The cement mortar lining shall be double thickness as specified in Section 4-10.2, ANSI-A21.4. The outside coating shall be bituminous coating of either coal tar or asphalt base at least 1 mil thick.

Each length of pipe must be physically tested for ductility in a manner satisfactory to the Engineer.

The Contractor shall furnish to the Engineer a certification from the pipe manufacturer that the pipe used in this work has been inspected and all specified tests have been made and the results thereof comply with the requirements herein and the requirements of ANSI-A21.51.

(3) Fittings

Ends shall be mechanical joints to suit the conditions specified. Gray cast iron fittings may be substituted for ductile iron fittings provided they conform to the specified requirements.

(4) Restrained Joints

Restrained joint piping and fittings as shown on the drawings must be capable of with standing the loads developed under the conditions specified in Article C4.02(1). The Contractor shall submit to the Engineer details of the restrained joint proposed by the pipe manufacturer including calculations setting forth the allowable restrained load in pounds and the stresses developed thereby. Ductile iron retainer glands will be permitted for use with standard mechanical joints.

(5) Air Release and Vacuum Valve

The sewage air and vacuum valve shall permit unrestricted passage of air during filling of the force main and unrestricted entry of air into the force main under vacuum condition. Shall have two (2) stainless steel floats having a common stainless steel float guide to maintain an air gap between the bottom float and top shut-off float to retard the waste solids from clogging the shut-off float. The internal baffle will protect the shut-off float from direct air flow and shall retain the Buna-N seat in place without distortion. Both floats shall withstand 1,000 psi or more. Shall include quick disconnect hose and blow off valves to permit flushing without dismantling. The valve shall be APCO 404 WA or approved equal.

(6) Eccentric Plug Valve

Eccentric plug valve shall be synthetic faced suitable for continuous duty for wastewater-related services such as scum, digested sludge, circulating sludge, primary sludge, etc., shall be suitable for exposure to fluids containing organic solids, waste debris, grit, petroleum products, industrial solvents and animal fats and greases.

(a) Materials.

Component	Material
Valve bodies	ASTM A126, Class B
Valve plugs	Cast iron or Ni-Resist
Plug facing	Neoprene or Buna-N
Shaft bearings	Stainless steel, bronze or monel
Valve body seats (valves 3 inch and larger)	Faced with 90 percent nickel alloy
Valve packing	Buna V-flex or TFE

(b) Manufacturer

The synthetic rubber-faced eccentric plug valves shall be De Zurik 118 or equivalent. Valves shall be straight flow, nonlubricated, resilient plug type suitable for driptight, bi-directional shutoff at a rated valve design pressure of 175 psig. Port areas for the valve shall be at least 70 percent of the adjacent full pipe area. The bonnet shall be of bolted construction. The end connection shall be either flanged or otherwise restrained compatible with the restrained joint piping.

All exposed nuts, bolts, springs and washers shall be field-coated, zinc-plated. Shaft bearings shall be permanently lubricated, replaceable type.

Valves shall be provided with wrench nuts and shall extend to within 6 inches of the valve box cover. All wrench nuts shall comply with Section 20 of AWWA C500. Not less than 10 percent with a minimum of two operating keys shall be provided for operation of the wrench nut operated valves.

(c) Execution

The Engineer shall be provided with submittals for review and approval and shall include certified copies of a report from an independent testing laboratory certifying successful completion of proof-of-design testing conducted in accordance with AWWA C504, paragraph 12.3, except that where the word "disc" appears in the standard, it is understood to mean "plug".

(7) Valve Box and Cover

Cast iron valve boxes extending to the finished or established ground or paved surfaces shall be provided for all buried valves. They shall have suitable base castings to fit properly over the bonnets of their respective valves and heavy top sections with stay-put and lockable covers. Covers shall bear the name of the controlled fluid. Boxes shall be of the screw or sliding type having 5-1/4-inch shaft diameter or greater. All parts shall be coated by dipping in a hot bituminous varnish.

C4.03 Construction

Pipeline construction includes installation and testing of the pipeline and related appurtenances. Pipe, fittings, valves, and accessories shall be furnished and installed at locations and in accordance with the details shown on the plans.

(1) General Construction Requirements

(a) General. The types and sizes of pipe to be used shall be as specified and as shown. Piping runs shown on the drawings shall be followed as closely as possible. If major relocations are required because of field conditions, they shall be approved by the Engineer.

Each piece of pipe shall be laid to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line. As the work progresses, the interior of the pipe shall be cleared of all dirt and debris of every description. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.

Under no circumstances shall the Contractor operate valves connected to the existing force main. Only the Owner or his authorized representatives will perform this operation and the contractor shall request this service at least 24 hours in advance. Under no circumstances shall raw sewage be allowed to flow into the Buena Vista Lagoon.

The inside of all pipes, valves and fittings shall be smooth, clean and free from blisters, loose millscale, sand and dirt when installed.

Pipe, fittings, valves and accessories shall be loaded, hauled, unloaded and handled in a manner which will avoid all structural damage or damage to the linings. Under no circumstances shall any such material be dropped. If damage occurs to any pipe, fitting, valve, or accessory, such damage shall be brought immediately to the Engineer's attention and he shall prescribe corrective repairs or rejection.

If a defect in a pipe is discovered after it has been installed, the Engineer may waive rejection on the condition that cradling or encasement is provided or other corrective measures taken. Any such work shall be done at the Contractor's expense.

Except as otherwise directed by the Engineer, pipelines shall be installed to the lines and grades shown on the drawings, with excavation and backfill conforming to the requirements of Section C2. Joints shall be assembled as recommended by the pipe manufacturer. Anchorage shall be provided as shown on the drawings and specified hereinafter.

At all times, including noon halts and other stopping periods, as well as over night, when pipe laying is not in progress, the open ends of pipe and fittings shall be covered in a manner acceptable to the Engineer.

(b) Cleaning of Pipe and Fittings. All lumps, blisters, and excess coating shall be removed from the bell and spigot end of each length of pipe without damage to the remaining lining and coating. The spigot ends shall be smooth and free of rough edges. Before assembly the outside of the spigot and the inside of the bell shall be made clean and dry and free from oil and grease.

(c) Laying of Pipe. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe cannot be put into the trench and in place without getting dirt into it, the Contractor shall have a heavy, tightly woven fabric bag put over each end of the pipe. These shall be left in place until the connection is to be made to the adjacent pipe. During laying operations no debris, tools, clothing or other materials shall be placed in the pipe. Should the pipe become dirty, it shall be cleaned by the Contractor, at his expense, before pipe laying operations may continue. Trench water shall be kept out of the pipe at all times.

As each length of pipe is placed in the trench, the joint shall be prepared for assembly, the spigot end centered in the bell and the pipe forced home and brought to line and grade. When forcing the pipe home, a method shall be used which will not damage the pipe. When it is necessary to deflect the pipe from a straight line, either horizontal or vertical, the pipe shall be assembled in a straight line, then deflected to the required degree of deflection. In the case of mechanical joint, the joint shall be loosely assembled, deflected to the required degree of deflection and the joint assembled tightly.

The maximum deflection shall be limited to 2° per joint for the 24-inch piping.

Pipe shall be laid with the bell ends facing the direction of laying unless otherwise specified by the Engineer. Where pipe is laid on a grade of 10 percent or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upward.

No pipe shall be laid when, in the opinion of the Engineer, trench conditions are unsuitable.

(d) Cutting of Pipe. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe, its coating or lining, and so as to leave a smooth end at right angles to the axis of the pipe.

The cut on the push-on joint pipe shall be tapered back 1/8-inch at the spigot end, at an angle of 30 degrees. This shall be done with a machine grinder or by file and shall leave no sharp or rough edges. The pipe shall be remarked on the spigot end to indicate when the pipe is fully seated in the bell.

(e) Pipe Welding. All pipe welding shall be done by shielded electric arc method by welders certified by the ASME. Welds and material shall meet the requirements of ASME Boiler Code, Class I. Field welding shall conform to the requirements of ANSI B31.1. Ductile iron pipe shall not be field welded.

(f) Flanged Joints. Flanged joints shall be made up square with even pressure upon the gasket and shall be completely watertight.

(2) Installation of Mechanical Joint Pipe

Wash socket and plain end with soapy water, then slip gland and gasket over plain end. Small side of gasket, and lip side of gland, face the socket. Paint gasket with soapy water. Insert plain end into socket. Push gasket into position with fingers, making sure it is evenly seated. Slide gland into position, insert bolts and tighten nuts by hand, then with ordinary ratchet wrench, tighten up bolts alternately (bottom then top, and so on, all around), using the torque ranges shown below.

Bolt size	Feet/Pounds
5/8-inch	45/60
3/4-inch	75/90
1-inch	85/100
1-1/4 inch	105/120

(3) Installation of Fittings and Appurtenances

Valves, fittings, restrainted joints, couplings, plugs, and caps shall be set and joined to the pipe in the manner specified above for cleaning, laying, and joining of pipe. The pipe shall not be required to support the weight of fittings and valves. Bolted connections must be hand torqued to the manufacturer's recommendation and approved by the Engineer. Welding shall be in accordance with Article C4.03(1)(e).

(4) Installation of Polyethylene Tube

Installation of polyethyene tube shall be as noted in ANSI A21.5, Section 5-4.2.1 and these specifications. All valves, pipe, fittings, and couplings shall be wrapped. All fittings that require concrete backing should be completely wrapped prior to placing the concrete.

The polyethylene tube seams and overlaps shall be wrapped and held in place by means of a 2-inch wide plastic backed adhesive tape. The tape shall be Polyken No. 900 (polyethylene), Scotchwrap No. 50 (polyvinyl) or equal. The tape shall be such that the adhesive shall bond securely to both metal surfaces and polyethylene film.

(5) Anchorage

An anchor, thrust block, or approved restraining system shall be installed in accordance with the details shown on the drawings at all valves, fittings and bends greater than 5 degrees in deflection. No hydrostatic test of the main shall be permitted until at least 3 days after all concrete reaction blocks have been placed.

(6) Acceptance Testing

The completed force main shall be free of obstructions and shall be tested for leakage. Demonstration that the line is free of obstructions shall be made by the Contractor by passing a line sized ball through the completed force main, or some other means satisfactory to the Engineer.

The leakage test shall be conducted by first slowly filling the test section with water in a manner assuring the expulsion of all air from the test section. Air shall be released from high points in the line by means of an existing outlet or, if such is not present, a tap and corporation stop shall be installed for that purpose. The line shall be filled, free of air and allowed to stand for 24 hours before starting the test.

The method and details of the test shall be suggested by the Contractor and selected subject to approval by the Engineer. The Contractor shall furnish and install in good working order the required corporation stop(s), pipe connection(s), line plugs and temporary thrust blocking, pump and all necessary apparatus including the pressure gage(s), to bring the pressure up to the specified point and maintain it.

The pipe and other joints may be left open for inspection during the tests or backfilled at the Contractor's option, except for any joint or joints specifically designated by the Engineer to remain uncovered during the test(s).

Where any section of the installation is provided with concrete anchorage or blocking, the hydrostatic pressure test shall not be conducted until the concrete has set 3 days.

The section to be tested for leakage shall not be tested against a closed valve at either or both ends unless the unpressurized side of the valve(s) is (are) exposed for inspection to determine whether any leakage is passing through the valve. A preferable method of confining the section tested is by means of temporary test heads or plugs left uncovered for inspection during the test and to be subsequently removed. Such test heads must be adequately blocked by temporary means.

The leakage test shall consist of measuring leakage in gallons per hour over a six hour test period. The test pressure shall be 100 psi applied and measured at the east end. At test pressure, the make-up water will be measured with an approved test meter or by pumping from a vessel of known volume.

Permissible leakage shall be within the following designated amount:

$$L = \frac{N D \sqrt{P}}{7400}$$

L = Leakage in gallons per hour

N = Number of joints

D = Diameter of pipe, in inches

P = Average test pressure in pounds per square inch

Should any test of pipe installed disclose leakage in excess of the above allowable, the Contractor shall at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

All test water shall be disposed of by the Contractor in a manner which will not cause injury to public or private property, or cause a nuisance or menace to the public.

The Contractor shall perform all testing operations in the presence of the Engineer.

C4.04 Special Construction Requirements

(1) General Requirements

The work to be performed under this contract will take place in conjunction with an operating sewage pumping station and the contractor shall schedule work with the Engineer when a connection to, or breakout of, existing facilities is required so that normal operation of facilities is not unduly interrupted.

(2) Connections to the Existing Force Main

The Contractor shall furnish and install all connections between the existing force main and the new pipeline generally as shown on the plans. It shall be understood that proposed connection materials shown on the plans are based upon record drawing information and that actual field conditions may vary somewhat from the record. The Contractor is therefore required to do exploratory excavation at each of the proposed points of connection before ordering any materials therefore in order to determine exact conditions as to size and type of materials existing and required and horizontal and vertical location of connection points.

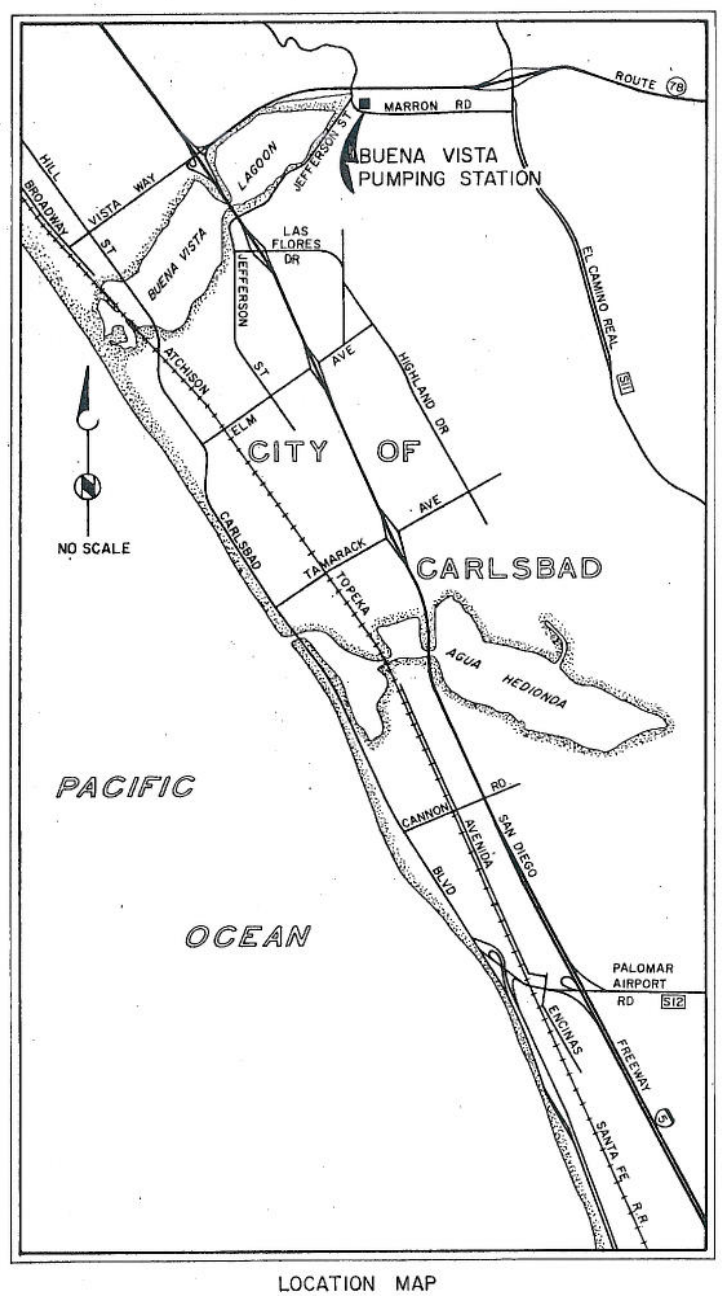
If, upon completion of exploratory excavation, differences are found to exist between actual conditions and those originally anticipated, the Contractor, subject to the approval of the Engineer, shall order materials and perform all work required to connect to the existing piping as found.

If substantial differences exist between conditions anticipated and actually found such that a significant increase or decrease in work and/or materials is experienced, consideration shall be given to an increase or decrease in payment for the connection so involved, although it is the intent of these specifications that an allowance be made in the prices bid for a reasonable amount of deviation between anticipated and actual conditions.

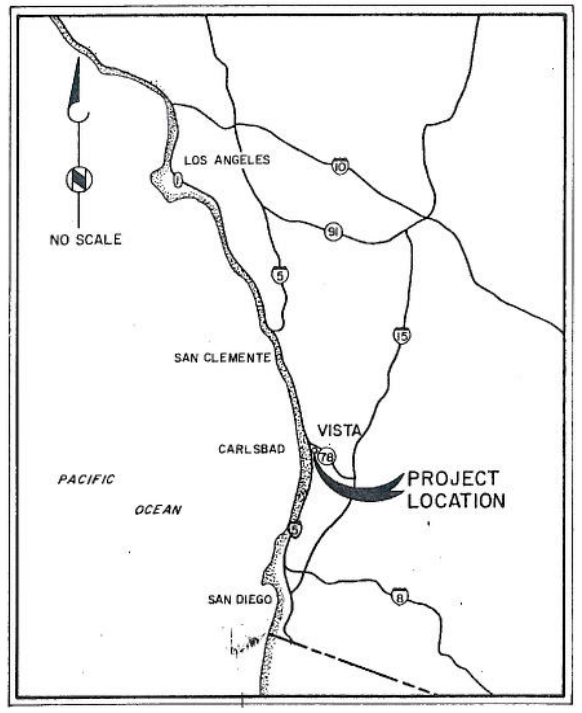
(3) Sequence of Construction Operations

The Contractor shall perform the work accomplished under this contract in a manner and diligence which shall minimize interference with the operation and function of the wastewater pumping station. A shutdown of the facility from 1 to 2 hours will be permitted provided that the details of time and manner of each shutdown shall be subject to review by the Engineer. The Contractor shall submit specific details in writing relative to the need, nature and timing for each shutdown at least two weeks prior to the date the shutdown is to occur. In general, it shall be assumed that the pumping station can be shutdown only between the hours of 2:00 A.M. and 6:00 A.M. Specifically, the contractor must submit plans to install valves 9 and 10 to the Engineer noting that the force main is under pressure and provisions must be made to relieve line pressure.

REVISION	DESCRIPTION	BY	APP	DATE
	[illegible]	M.O.	P.W.	9/9/82



LOCATION MAP



VICINITY MAP

GENERAL NOTES

1. ALL WORK SHALL BE DONE ACCORDING TO THE APPROVED PLANS AND SPECIFICATIONS, THE CURRENT CITY OF CARLSBAD SPECIFICATIONS, THE CITY OF CARLSBAD STANDARD DRAWINGS AND ALL APPLICABLE CITY OF CARLSBAD ORDINANCES.

2. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.

3. THE CONTRACTOR SHALL CONFORM TO LABOR CODE SECTION 6705 BY SUBMITTING A DETAILED PLAN TO THE CITY ENGINEER AND/OR CONCERNED AGENCY SHOWING THE DESIGN OF SHORING, BRACING, SLOPING OR OTHER PROVISIONS TO BE MADE FOR WORKER PROTECTION FROM THE HAZARD OF CAVING GROUND DURING THE EXCAVATION OF SUCH TRENCH OR TRENCHES OR DURING THE PIPE INSTALLATION THEREIN. THIS PLAN MUST BE PREPARED FOR ALL TRENCHES FIVE FEET OR MORE IN DEPTH AND APPROVED BY THE CITY ENGINEER AND/OR CONCERNED AGENCY PRIOR TO EXCAVATION. IF THE PLAN VARIES FROM THE SHORING SYSTEM STANDARDS ESTABLISHED BY THE CONSTRUCTION SAFETY ORDERS, THE PLAN SHALL BE PREPARED BY A REGISTERED CIVIL OR STRUCTURAL ENGINEER AT THE CONTRACTOR'S EXPENSE.

4. THE EXISTENCE AND LOCATION OF UTILITY STRUCTURES AND FACILITIES SHOWN ON THE CONSTRUCTION PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ATTENTION IS CALLED TO THE POSSIBLE EXISTENCE OF OTHER UTILITY FACILITIES OR STRUCTURES NOT KNOWN OR IN A LOCATION DIFFERENT FROM THAT SHOWN ON THE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN ON THE PLANS AND ANY OTHER EXISTING FACILITIES OR STRUCTURES NOT SHOWN.

5. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF THE CONSTRUCTION TO PERMIT THE REVISION OF THE CONSTRUCTION PLANS IF IT IS FOUND THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.

6. THE CONTRACTOR SHALL NOTIFY AFFECTED UTILITY COMPANIES AT LEASE 48 HOURS PRIOR TO STARTING CONSTRUCTION NEAR THEIR FACILITIES AND SHALL COORDINATE THE WORK WITH COMPANY REPRESENTATIVES.

7. NO WORK SHALL BE COMMENCED UNTIL ALL PERMITS HAVE BEEN OBTAINED FROM THE CITY AND OTHER SPPROPRIATE AGENCIES. THE CONTRACTOR SHALL NOTIFY THE CITY OF CARLSBAD AT LEAST 48 HOURS PRIOR TO STARTING CONSTRUCTION SO THAT INSPECTION MAY BE PROVIDED. (PHONE 438-5541).

8. WHERE TRENCHES ARE WITHIN CITY EASEMENTS A SOILS REPORT PERFORMED BY A QUALIFIED SOILS ENGINFER IS REQUIRED. COMPACTION REPORTS SHALL BE SUBMITTED TO THE PUBLIC WORKS INSPECTOR UPON COMPLETION OF THE WORK.

9. NO REVISIONS WILL BE MADE TO THE CONSTRUCTION PLANS WITHOUT THE WRITTEN APPROVAL OF THE CITY ENGINEER NOTED WITHIN THE REVISION BLOCK ON THE APPROPRIATE SHEET OF THE PLANS.

10. ACCESS FOR FIRE AND OTHER EMERGENCY VEHICLES SHALL BE MAINTAINED TO THE PROJECT SITE AT ALL TIMES DURING THE CONSTRUCTION.

11. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR TRAFFIC CONTRAL AROUND THE PROJECT SITE DURING CONSTRUCTION. ALL TRAFFIC CONTROL MEASURES SHALL BE IN CONFORMANCE WITH CITY OF CARLSBAD STANDARDS AND THE PROVISIONS OF THE TRAFFIC CONTROL MANUAL AS PROMULGATED BY THE AMERICAN PUBLIC WORKS ASSOCIATION. SHOULD ANY LANE OR ROAD CLOSURES BE NECESSARY TO COMPLETE THE WORK, THE CONTRACTOR SHALL SUBMIT A DETOUR PLAN TO THE CITY FOR APPROVAL AT LEAST ONE WEEK IN ADVANCE OF THE CONSTRUCTION.

INDEX OF DRAWINGS

UTILITY INFORMATION

PACIFIC TELEPHONE (CABLE LOCATING SERVICE)	(800) 422-4133
SAN DIEGO GAS AND ELECTRIC (CABLE LOCATING SERVICE)	(800) 422-4133
CITY OF CALSBAD	(714) 438-5541

George J. Kiddle, VISTA SANITATION DISTRICT
Richard H. Allen, CITY OF CARLSBAD

BROWN AND CALDWELL
CONSULTING ENGINEERS
EUGENE • PASADENA • SEATTLE
TUCSON • WALNUT CREEK

DESIGNED RLM
DRAWN RLM
CHECKED JDQ

SUBMITTED [signature] DATE 11/12/82
APPROVED [signature] DATE 6/30/82
APPROVED _____ DATE _____

FILE 773-19
DATE AUG '82

VISTA SANITATION DISTRICT
CITY OF CARLSBAD

BUENA VISTA FORCE MAIN

LOCATION AND VICINITY MAPS, INDEX OF DRAWINGS

DRAWING NUMBER 1
SHEET 1 OF 4

REVISION	DESCRIPTION	BY	APP	DATE
2	EASEMENTS ADDED	M.O.	RW.	9/3/82

EXIST. 24"ø FORCE MAIN W/RESTRAINED CAP, SEE NOTE 1

STA. 1 + 00 BEGIN F.M. - REMOVE CAP AND CONNECT TO EXIST. 24"ø F.M. ANGLE POINT 3°51'54" RIGHT

MATCH LINE - SEE BELOW

(N 39°21'26" W)

PORTION OF JEFFERSON ST. VACATED (ALL EASEMENT RIGHTS RETAINED CITY OF CARLSBAD RESOLUTION 5461) 2

TELEPHONE CABLE

24"ø DIP FORCE MAIN, FOR PROFILE, SEE DWG. 3

APPROXIMATE LOCATION OF 2-1/2" WATER LINE

STA. 2 + 15.11 ANGLE POINT 5°17'47" LEFT

EXIST. ELEC. CONDUIT

EXIST. 66" RCP

JEFFERSON ST R.S. 843 2

STA. 3 + 62.87 ANGLE POINT 56°15'00" RIGHT (45° AND 11-1/4° BENDS)

1 ℄ F.M. CURVE DATA

Δ = 7°22'38"
R = 792.75'
L = 102.07'
T = 51.11

STA. 5 + 14.81 E.C. ANGLE POINT 71°56'52" RIGHT

℄ BRIDGE ABUT.

INSTALL 4" INLET FOR AIR RELEASE VALVE SEE DET. C/4

STA. 5 + 45.78 ANGLE POINT 45°00'00" LEFT

5 + 62.78 ANGLE POINT 8°56'23" LEFT

℄ JEFFERSON STREET

20' PERMANENT EASEMENT

STA. 4+12.74 B.C. ANGLE POINT 79°19'30" LEFT

5.25'

7.25

5.25

ST4. 7+35 ± CONNECT TO EXIST. 24" F.M. INV.:+ 1.00± SEE NOTE 2

INSTALL 24"ø PLUG VALVE

STA. 7 + 07.20 ANGLE POINT 53°56'23" RIGHT

CROSS OVER CONNECTION SEE DET. A/4

MATCH LINE - SEE ABOVE

2 EXISTING 16"ø FORCE MAINS

TOP OF DIKE

℄ FLOOD CONTROL CHANNEL S 89°41'21" E

TOP OF DIKE

EXIST. 24"ø FORCE MAIN STUB W/CONC. THRUST BLOCK

EDGE OF CONCRETE

BUENA VISTA PUMPING STATION

ACCESS ROAD

30" SEWER

NOTES:

1. FOR LOCATION OF EXIST. 24"ø F.M. SEE BUENA VISTA FORCE MAIN PARALLEL LINE DRAWING - AUGUST 1975.
2. FOR LOCATION OF EXISTING 24"ø STUB SEE BUENA VISTA PUMPING STATION PHASE 1B IMPROVEMENTS DRAWINGS - MAY 1977.
3. CONTRACTOR TO FIELD VERIFY EXISTING PIPE ELEVATION PRIOR TO CONSTRUCTION.
4. 24"ø DIP HAS RESTRAINED JOINTS THROUGHOUT AND IS TOTALLY ENCASED WITH POLYETHELENE, WHERE BURIED.
5. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING VALVES SHOWN IN THIS PLAN AS (1) TO (7).

PLAN
SCALE: 1"=20'

REGISTERED PROFESSIONAL ENGINEER MICHAEL G. HOOVER No. 19155 Civil STATE OF CALIFORNIA

George J. Kiddle — VISTA SANITATION DISTRICT
Richard H. Ally Jr. — CITY OF CARLSBAD

BROWN AND CALDWELL
CONSULTING ENGINEERS
EUGENE • PASADENA • SEATTLE
TUCSON • WALNUT CREEK

DESIGNED JDQ
DRAWN RLM,JJS
CHECKED JDQ

SUBMITTED John F. McCarthy DATE 8/30/82
APPROVED Michael G. Hoover DATE 8/30/82
APPROVED _____ DATE _____

FILE 773-19
DATE AUG. '82

VISTA SANITATION DISTRICT
CITY OF CARLSBAD

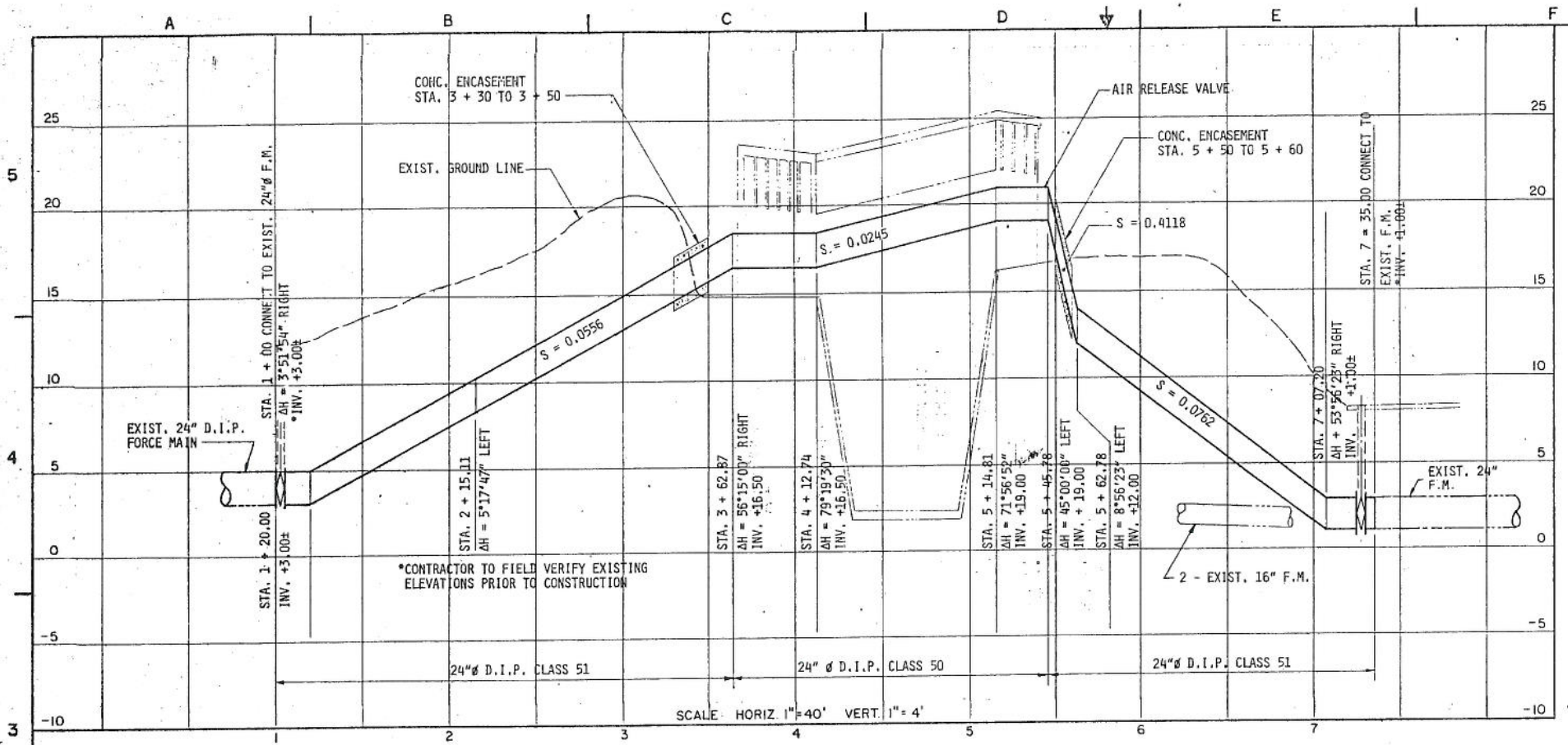
BUENA VISTA FORCE MAIN

PLAN
STA 1+00 TO STA 7+35

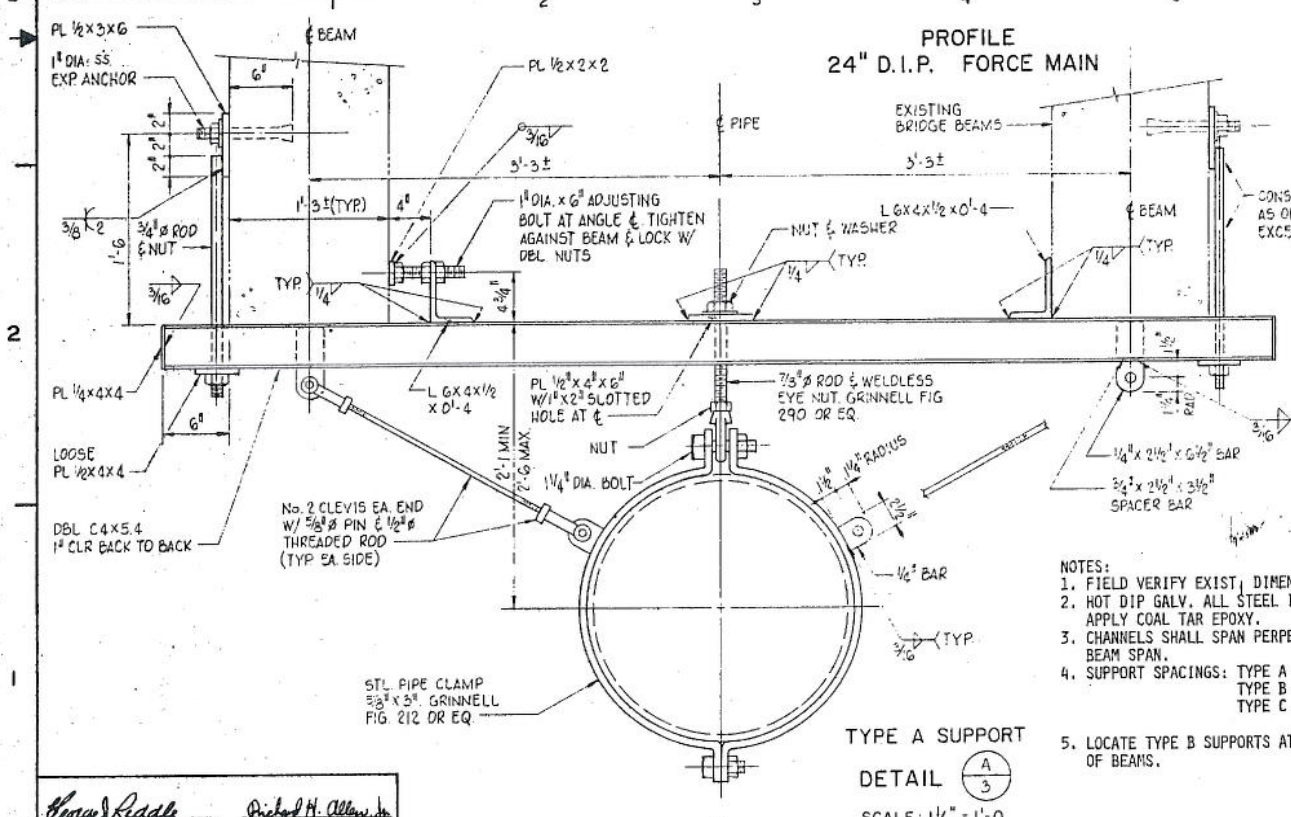
DRAWING NUMBER 2
SHEET 2 OF 4

DWG NO		REV

REVISIONS			
ZONE	REV	DESCRIPTION	DATE	APVD
		SIGNATURE BLOCK ADDED	9-13-82	OSW

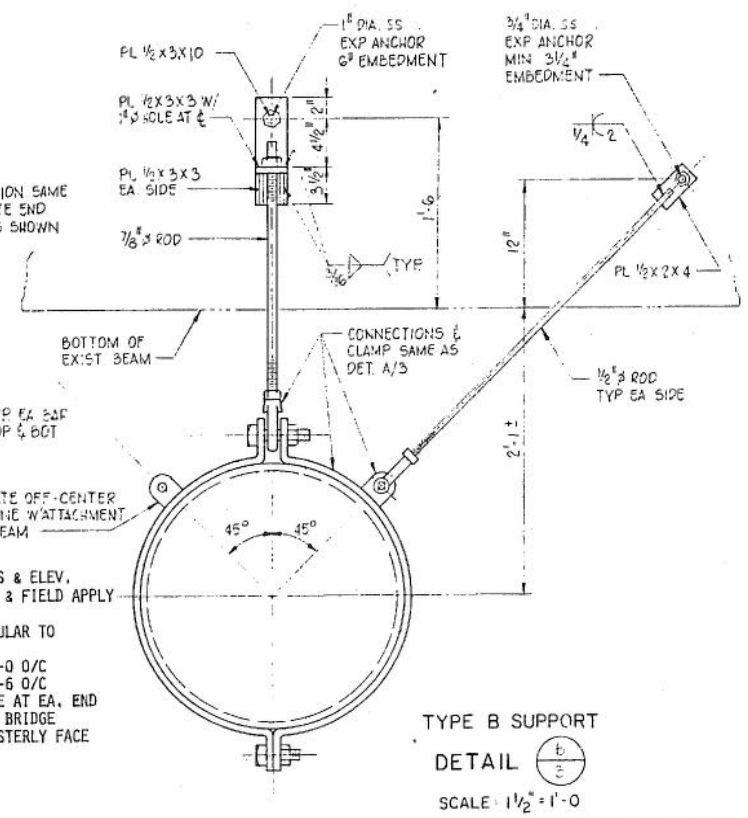


PROFILE
24" D.I.P. FORCE MAIN

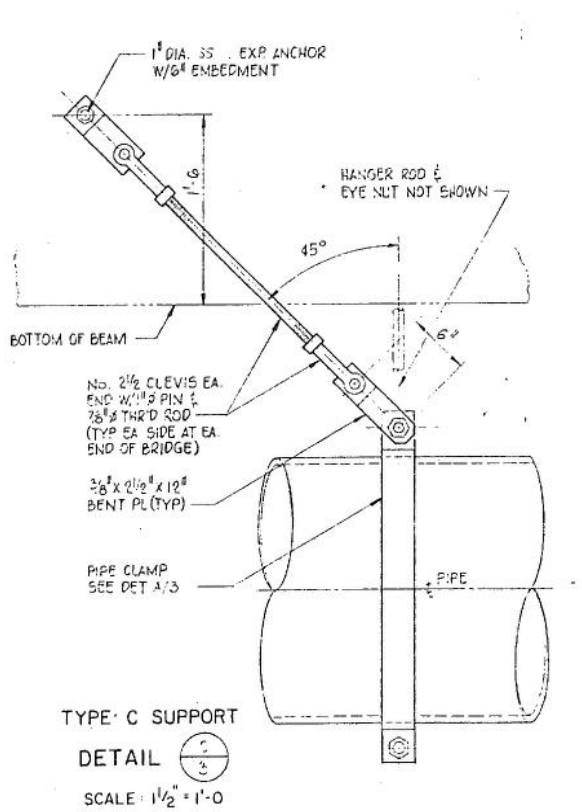


TYPE A SUPPORT DETAIL (A/3)
SCALE: 1½" = 1'-0

NOTES:
1. FIELD VERIFY EXIST. DIMENSIONS & ELEV.
2. HOT DIP GALV. ALL STEEL ITEMS & FIELD APPLY APPLY COAL TAR EPOXY.
3. CHANNELS SHALL SPAN PERPENDICULAR TO BEAM SPAN.
4. SUPPORT SPACINGS: TYPE A - 9'-0 O/C
   TYPE B - 6'-6 O/C
   TYPE C - ONE AT EA. END OF BRIDGE
5. LOCATE TYPE B SUPPORTS AT WESTERLY FACE OF BEAMS.



TYPE B SUPPORT DETAIL (B/3)
SCALE: 1½" = 1'-0



TYPE C SUPPORT DETAIL (C/3)
SCALE: 1½" = 1'-0

George J. Riddle — VISTA SANITATION DISTRICT
Richard H. Allen, Jr. — CITY OF CARLSBAD

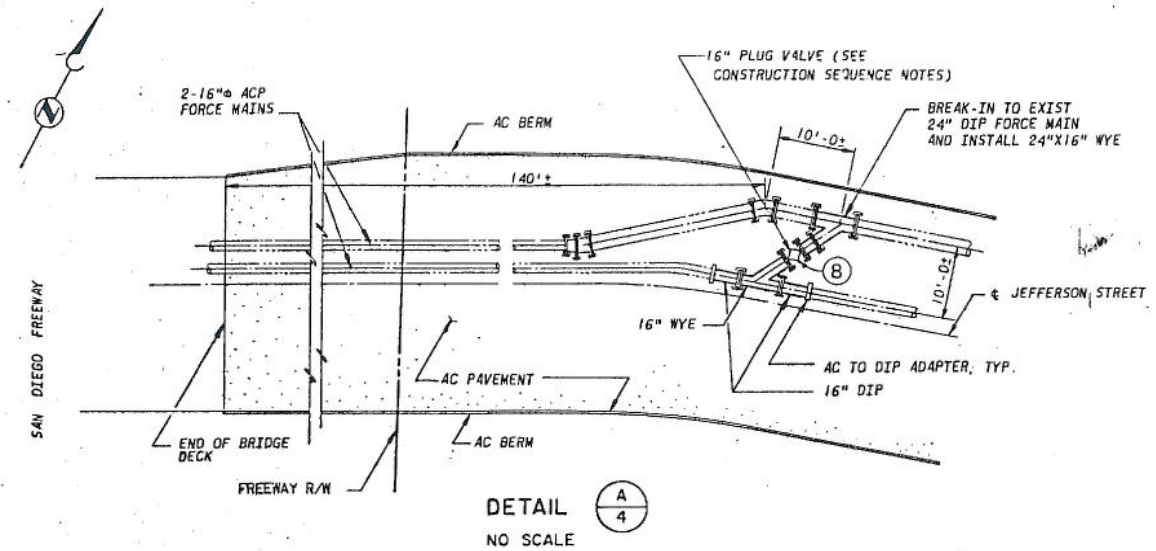
BCDGPB

BROWN AND CALDWELL
CONSULTING ENGINEERS

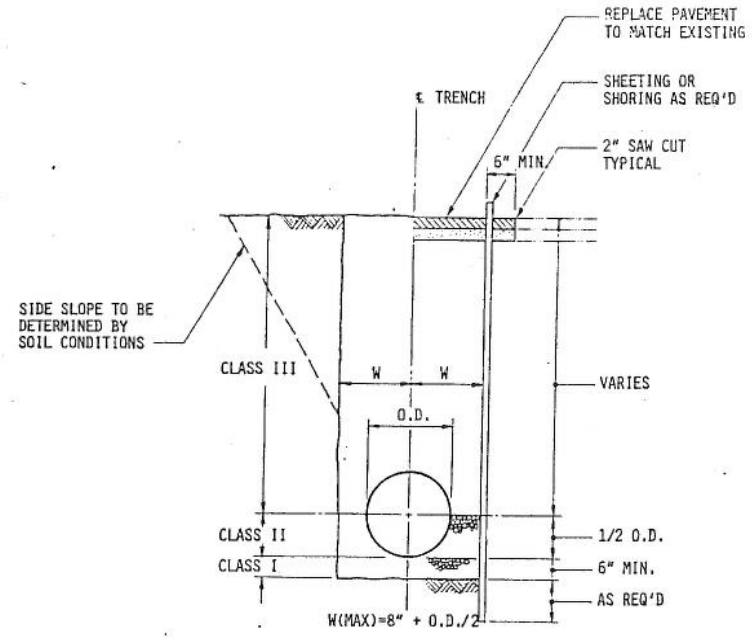
DESIGNED JDQ, SAP	SUBMITTED	DATE 8/31/82	FILE 773-19	VISTA SANITATION DISTRICT CITY OF CARLSBAD	BUENA VISTA FORCE MAIN	PROFILE AND MISCELLANEOUS DETAILS	DRAWING NUMBER 3
CHECKED JDQ, SAP	APPROVED For Brown and Caldwell	DATE 8/26/82	DATE AUG '82				SHEET 3 OF 4
DRAWN JJS	APPROVED	DATE					

DWG NO	SH

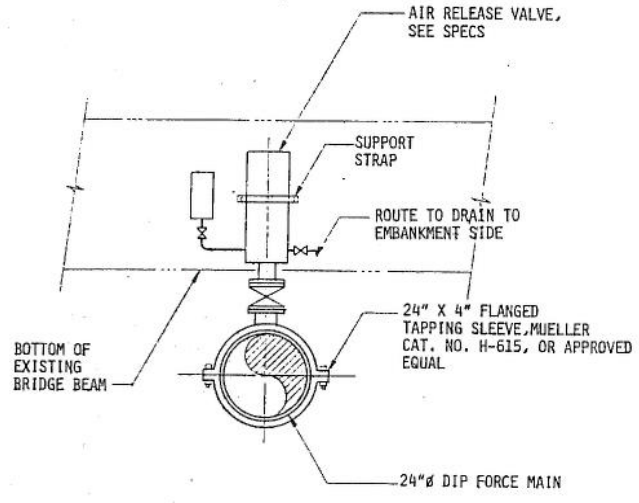
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APVD
		SIGNATURE BLOCK ADDED.	9-13-82	DSW



DETAIL A/4
NO SCALE



TYPICAL TRENCH SECTION
DETAIL B/4
NO SCALE



DETAIL C/4
NO SCALE

CONSTRUCTION SEQUENCE NOTES:

1. ISOLATE 16" F.M. BY CLOSING VALVE (7) (SEE PLAN, DWG. 2)
2. INSTALL 16" WYE AND 16" PLUG VALVE (8) AND CLOSE (SEE DET. A/4)
3. OPEN VALVE (7) AND CLOSE VALVE (6) TO ISOLATE 24" F.M. (SEE PLAN, DWG. 2)
4. COMPLETE CROSS OVER CONNECTION BY INSTALLING 24" X 16" WYE (SEE DET. A/4)
5. OPEN VALVE (8) , COMPLETE WORK PER PLAN AND PROFILE.
6. MODIFY OPERATING MECHANISM OF EXIST. PLUG VALVES AND VALVE BOXES TO COMPLY WITH SECTION C4, PARAGRAPHS C4.02(6) AND C4.02(7) OF THE PROJECT SPECIFICATIONS.

George J. Riddle — VISTA SANITATION DISTRICT
Richard H. Allen Jr. — CITY OF CARLSBAD

BCD6PB

BROWN AND CALDWELL
CONSULTING ENGINEERS

DESIGNED JDQ,SAP	SUBMITTED	DATE 8/30/82	FILE 773-19	VISTA SANITATION DISTRICT CITY OF CARLSBAD	BUENA VISTA FORCE MAIN
CHECKED JDQ	APPROVED For Brown and Caldwell	DATE 8/30/82	DATE AUG. '82		
DRAWN JJS	APPROVED	DATE			

DETAILS AND CONSTRUCTION SEQUENCE NOTES

DRAWING NUMBER 4
SHEET 4 OF 4

BUENA VISTA LAGOON
SEWAGE SPILL

4/1/07 - SUNDAY

18:52 A citizen observed possible sewage overflow entering Buena Vista Lagoon. The citizen contacted Carlsbad PD Dispatch.

18:55 Dispatch called City of Carlsbad duty person, Pedro Rodriguez, who was already in Carlsbad on another call

19:00 Pedro called to report sewage going into the Buena Vista Lagoon. He thought about 100 gallons per minute.

19:05 Jesse arrived at the site. He and Pedro checked site. Jesse estimated it to be about 1500 – 2000 GPM.

19:15 Jesse called Encina's emergency phone number. Jesse reported to them that the leak was coming from their force main.

19:22 Charlie from Encina said he was on his way. After that Jesse called Don Wasko.

19:30 Joe Orozco arrived.

19:40 Don arrived and they called in for assistance from staff.

20:00 Brian Alcala and Richard Motas both arrived. Don called Glenn and Cari. Don briefed Glenn and left a message for Cari. Cari called back in a few minutes. She advised Don that she would respond to the job site.

Don and Jesse went to the mall and assessed how to do a by-pass, diverting flows from the Vista/Carlsbad interceptor (next to Firestone) over to Oceanside lift station. Don then called the Oceanside emergency number and spoke to Jeremy. Jeremy suggested that he make the diversion at "Mossy" near College/78. This enabled Oceanside to divert an estimated 800-1000 GPM off of the Vista/Carlsbad line.

20:21 John Jardin of Encina called Carlos Mendoza. John was at the BVPS responding to an alarm condition of some sort and reported that Don Wasko had identified the location of a sewer Force Main Break at the Duck feeding area of the BV Lagoon. Carlos asked if John had called Rancho Dispatch, the callout service for Vista Wastewater. John indicated that he had not. Carlos indicated that he would call for a response and go to the site to investigate.

20:24 Carlos Mendoza called Rancho Dispatch for a response to a large scale spill and described the general location in the duck feeding area of Buena Vista Lagoon.

20:27 Carlos Mendoza called Larry Pierce to inform him of the situation.

20:28 Larry Pierce contacted Craig Trammel to notify him of a problem with the force main located just west of the Jefferson pump station and requested that he report to the scene.

20:30 George Solano received a call from City of Vista's Public Works Operations Manager, Craig Trammell, that there has been a major spill in Carlsbad on the force main leaving the Jefferson pump station. George took his family to his home and secured them. He then proceeded to head into the city yard to pick up unit 501 and respond to the site.

20:55 On-call Vista standby crewman, Derrick Fritz, was also responding and arrived on scene. Vista support Standby crewmen, Catarino Cobian, was also responding with one of the Vista Vactors to assist as necessary. Catarino was redirected to pick up Vista service truck unit 565 to support incident with scene lighting. Catarino arrived with truck unit 565 to light the scene.

Jesse called Baker Pumps to see if they could bring a pump to the site to do the by-pass and send 1500 gpm to Oceanside's pump station.

Omar delivered backhoe to leak site. Carlsbad crew cleared brush from around leak site. Carlos Mendoza, City of Vista Engineer, assisted Don by calling in emergency mark-out of other underground utilities in area of leak site.

21:00 Craig Trammel arrived on scene.

21:05 Carlos Mendoza arrived onsite, met with Don Wasko, and observed spill area. At Don Wasko's lead, Carlos began calling utility companies for emergency markout.

21:10 George Solano arrived on scene, which was located inside the duck feeding area north of Jefferson Street. When he arrived on scene, Operations Manager Craig Trammell was also on scene. The City of Carlsbad had already been on site and was using a back hoe, digging directly over the spill site in an effort to locate the pipe.

George's contact on scene was Don Wasko with the City of Carlsbad. George reported to Don that the City of Vista would assist as needed. Also on scene were Carlos Mendoza from the City of Vista and Mike Hogan from Encina Wastewater Authority.

21:30 Carlos provided assistance to Carlsbad crews in clearing the area for emergency excavation. Don Wasko indicated that Hubbard Construction and Filanc Construction had been called, but that they were not going to respond. In coordination with Carlsbad staff, Carlos called and left messages with contacts at Orion construction and Cass Construction to see if they would be able to respond.

Carlos met with Encina and Carlsbad engineering staff and brainstormed ideas on reducing flows until the line could be excavated. Mark Patnode of Oceanside agreed, and later diverted as much flow as possible to their line at the Haymar connection. Carlos went to City Hall to perform a search for drawings covering the failed line. He located some drawings and brought them to the field, along with diurnal flow curve from the pump station and VI meter to use for predicting volumes.

The decision was made to start the excavation with city forces. They dug down with caution, not knowing the depth of the force main. Vista and Carlsbad estimated that the line break was at a part of the line that was as low as 3 feet above sea level. The lagoon must be at least as high as high mean tide, or about 6 to 7 feel above sea level, meaning that shoring would be required to excavate. We discussed building a temporary berm to excavate and pump down to the line, relying on the berm to hold back the lagoon water. It was agreed that shoring would be much better, in not required to assure worker safety. After excavating down about 10-12 feet, the decision was made to stop digging with 580 Case backhoe.

22:45 Cari Dale responded to the site.

MONDAY 4/2/07

01:00 Carlos Mendoza left for home. Cari and Jesse drove to the Jefferson gravity line and observed flow through the line.

01:30 Jesse and Cari drove to the Water District to look for plans, hoping to find information related to the depth of the pipe. They were unable to find the information. They returned to the site. City staff met with Encina staff and Vista to compare notes and came to the conclusion that we were unsure of the depth of the pipe.

Jesse left a message at this time for Mark Biskup at the office of the Engineering Department to research this information and get back to them ASAP.

03:00 Waited for the pump to be delivered. Attempted to divert sewage from one of the manholes in the mall to Oceanside; but this did not work because of the depth of the manhole. Had to relocate next to Firestone.

03:00 Due to limited equipment and manpower, crews suspended operations between approximately 03:00 04:00 hrs, until day break when contractors would arrive on scene to continue mitigation efforts

05:00 Sewage diverted to Oceanside. Started to pump 1500 gpm into Oceanside's sewer system.
The extent of the spill could be seen at dawn. Calls continued to be made to contractors and staff to relieve the overnight people. Several calls were made looking for a contractor.
During the waiting time, Atlas Pumping trucks was called. A request was made for four 5500 capacity trucks to be delivered to the site in order to recover some of the spill.

06:12 Cari Dale called to see if Steve Plyler was headed into work. She told him there was a sewer spill and asked to meet her at Jefferson and Marron.

06:35 Steve arrived on site, and was briefed and assigned as the scribe.

07:40 Hubbard Contracting showed up after being called by Don Wasko to take a look at the spill. Due to the difficulty of the work, Hubbard was not going to be able to do the work for us. Vadnais Contracting was contacted (Jeff Anderson) from Vista.

07:45 The Buena Vista Pump station was shut off. That allowed water to start backing up at the basin of the pump station, reducing the amount of spill that was occurring. Tanker trucks were called to report to the pump station to start pumping out the wastewater and transport it to a manhole on the gravity system to the west of the leak.

08:00 Carlos Mendoza returned to the site of the spill. The current plan was to install a highline connection at the bridge and run it all the way to Interstate 5, while simultaneously digging up the line to repair it. Shoring and a crane were being mobilized along with a large trackhoe.
Carlos ran some calculations and expressed an opinion that the highline should be as large as possible, suggesting that a 12-14" hot tap and Hydra-stop could be used to convey flows through any combination of piping that would result in at least ½ of the 24" line area before it would be a cavitation and scour concern. Suggested that Encina be consulted as to any weakness of the pump station in handling the increased heads this might create.

08:00 George Solano arrived back at the site to continue operations and mutual aid support for the continued mitigation of the spill site. At this time, the City of Vista had responded all available manpower and equipment to the site to assist with mutual aid efforts.
Vista Vactor unit 507 was on scene in preparation to assist with vacuuming operations up stream of the pump station if needed to help reduce the flows coming into the station.
At this point the Vista crews were available as needed on site and prepared to assist as needed.
Vista crews brought in two tower lights, in preparation for the night work, and began assisting with setting them up. Vacuum operations began with a Vista Vactor upstream of the pump station in the Mall parking lot area.
Not only did the City of Vista respond with all available Wastewater Personnel, the City of Vista also responded with several Public Works street personnel to assist with shuttling in equipment.

08:20 Cari asked Steve to call and follow up with Dave Cammel who works at the CalTip Hotline of CDFG. Alan of Encina had previously notified him some time the night before. (Phone 888-334-2258) Steve got Dave Cammel's voice menu, but then got another number to call (916-445-0411). When he called that number, he got another voice menu where he finally

got an operator who said it's not their area and they would transfer to the SD office; so he asked for that number before being transferred. That number is 951-443-2944. Steve was successfully transferred and talked to Candice. She took brief info and asked if there was an OES number. Steve said he wasn't sure but he would find out and call her back. She said not to worry because if it had been previously reported, it would be forwarded to her by OES. Steve spoke with Cari and Don. They had already called and gotten the OES number at 2:00 AM. (OES #07-2061).

08:25 Cari asked Steve to call Clay Clifton. Don gave him Clay Clifton's number (619-338-2386). Steve called that number and got Clay's voice mail. He asked about the location, volume, status, mitigation, posting (Mike Hogan of Encina had started the posting)

08:30 Environmental Programs (EP) was contacted by Cari Dale and informed of the discharge. Encina Wastewater Authority (EWA) was on-site collecting bacteria samples and posting closure signs. It was requested that EP coordinate with EWA staff for monitoring and posting. Doug Campbell was to contact Environmental Programs to coordinate.

08:30 EWA Staff collected samples from shoreline around lagoon according to Buena Vista Pump Station Spill Response Plan (BV 1-6).

08:35 The V10- valve was shut off and that isolated the reverse flow of that line to the leak.

09:00 Cari asked Steve to call the Regional Water Quality Control Board (858-467-2952). Steve left a message for Bob Morris. Bob was out but was due back at 1300. Steve was given Brian Kelly's name to contact, but was told this was not Brian's area. Steve got Brian's voice mail and left a message.

09:15 Jeff Anderson of Vadnais Corporation showed up. He determined they would run two 12 hour shifts 7 – 7. The foremen were Ron Kaufold and Steve Winzel. They would first need to have sheet pile driving performed by a sub contractor to stabilize the lagoon from the leak area.

09:45 Steve called back to the Regional Water Control Board, asked for Brian Kelly, and got him. Brian asked Steve about the time, posting, cause, and time for repair mitigation. He said it appeared we had done everything we could.

09:45 Doug Campbell contacted Environmental Programs requesting assistance with sampling and beach closure signage.

10:00 EP staff on-site at beach. Signs posted from 600' south of Buena Vista Lagoon outlet to 1200' north of outlet per San Diego County Department of Environmental Health (SDDEH).

10:28 Dave with McMahon Construction showed up. He was selected to do the pile driving as a sub for Vadnais.

10:30 Carlos Mendoza returned to the Office to begin a larger search of the available records and data. He coordinated with Carlsbad Engineers, including Terry Smith and Mark Biskup, to make sure everyone had as much record information as possible. He packed the information he had and coordinated with Terry Smith to meet onsite.

10:30 EWA Staff collected bacteria samples at Pacific Ocean shoreline (75', 150', 300', 600' north and south, and 1200', 2000' north).

10:45 Hayne Palmour, Photographer reporter of the North County Times, showed up.

11:00 Eric Becker of the Regional Water Control Board showed up. He works for Bob Morris.

11:00 EP Staff collected NH3-N sample at BV5 (Highway 101 Bridge). Concentrations were <0.25 mg/l indicating that discharge had not reached Highway 101.

11:18 One pump was turned back on slowly at Buena Vista Lift Station.

11:20 Dept of Fish and Game showed up.

11:30 Cari gave Steve a note with the name of Noel Richards, Dept of Fish and Game, (fax number 760-510-1256). He is the Game Warden. He wanted to be notified when the leak was stopped.

12:14 Cari asked Steve to call Hubbs Seaworld to see if they had any ideas for mitigation of the lake. He talked with Karen. She did not have any ideas but would check around and call him back.

12:20 News 8 showed up.

12:30 Carlos Mendoza and Sudi Shoja arrive at site. By now the response was even larger.

12:45 Fox 6 showed up

13:40 Pump station was turned back off.

13:48 Carlos and Sudi left for the office.

14:05 Paul with Storm Water called Steve with an update. Paul said they posted 50 signs from Beach Street in Carlsbad to Cassidy St in Oceanside. They took 12 samples between 8:00 AM – 11:00 AM plus one at the 101 bridge. He mentioned there were no high nitrates at the bridge, indicating that it had not reached the beach. The samples would take 24 hours for the results.

14:15 The steel sheets showed up and were moved by crane in place.

14:45 Channel 10 showed up to meet with Glenn.

15:35 V10 was opened again, and the pump station was started again.

15:35 McMahon Contractor was offloading hydraulic hammer driver and had about 39 piles onsite.

15:40 Union Tribune Photographer/reporter showed up.

16:20 The first pile was driven in.

16:45 Allied Trench and Shoring brought approximately three 20' I-Beams.

17:10 Engine 2211 Carlsbad Fire Dept was on scene. Chief Hieser assigned Brad Dantzer to Steve to assist him in being a scribe.

17:30 Steve was asked to call Charlie Duvel of Encina regarding the availability of aeration equipment. Encina did not have any available.

17:30 City of Carlsbad City Manager, Ray Patchett calls emergency meeting to set up Incident Command System organizational structure, just adjacent to the spill site.

17:35 Charlie Duvel called, and they shut off the pump station again. Don Wasko closed the V-10.

17:42 Five steel plates were delivered by semi-truck.

17:45 Five 40' I-Beams were delivered by McMahon Semi-truck.

17:54 Steve was asked to call the City of Oceanside regarding recirculation equipment. He confirmed with Mark Patnode that they did have equipment available.

18:00 Carlos Mendoza visited the site again. Everything seemed to be coming along well.

18:15 The potential highline tie-in location being prepped by City forces was inspect ted..

18:18 Carlsbad City Manager arrived at spill site.

18:20 Steve called Oceanside regarding their recirculation equipment. They said they could be there by 7:00 PM with the equipment.

18:35 Blueprints of area rechecked for orientation of additional runs of pipe in the area of the break.

18:50 Oceanside pumps showed up
Contractor worked all day and late into the evening to install.

18:55 Vista after hours standby crew brought in their 6" trash pump to assist with removing the sewage from the excavation site once the excavation contractor was prepared.

19:00 The foreman for Vadnais switched to Steve Wenzel. He had a crew of four, McMahon's crew stayed at six.

19:04 Chief Hieser regrouped everyone and designated Elaine from Storm Water as water quality and contact for Fish and Game, Regional Board, etc. from that point on. Steve was established as Operations contact for the repair itself.

19:16 Meeting with Charlie of Encina in Operations took place.

19:52 Safety meeting with Ops about lock out/tag out and communication for the repair was held.
20:00 EP Staff collected initial dissolved oxygen (DO) samples at BV5 and BV6.
20:34 V-10 was re-opened.
20:37 Encina called and started the pumps again.
21:00 Carlsbad City crew went from Larry, Brian, Walter, Marty, Anthony and Dan to Peter, Ralph, Joe and Mike.
21:00 City of Carlsbad staff installed Pump #1 (6" water pump) on north shore of east basin for aeration.
21:15 Small hydraulic line on pile driving head was broken.
21:25 Hose was replaced.
22:23 Dave MacMahon went to fill Oceanside diesel pump with approx. 30 Gallons.
22:25 Fire Dept left site.
22:40 Encina pump shut off again.
23:10 Closed V-10.
23:30 Vista standby crews responded to assist with moving the pump and hoses into position to begin mitigating the sewage from the spill site.

TUESDAY 4/3/07

00:15 Started driving southside pilings to grade.
00:25 Opened V10.
00:30 Pump station turned back on.
01:20 Started pushing north pilings. Center pilings pushed lower to let the leak flow out.
01:36 Pump Station turned off.
01:40 Spilling had stopped. V-10 was closed.
02:10 North and south pilings are in. Excavator in position.
02:20 Excavator changes to small bucket.
02:38 Crane moves Vista pump in position to start de-watering.
03:20 Started excavating leak again.
03:25 Moved the pump and hose out of the way.
04:10 First load of rock dumped on the north side of the pipe.
04:30 Brought Vista pump back in to de-water again.
05:00 Confirmed with Alan that pump station had been locked out.
05:00 Found second pipe below south side of 24", also found crack on 24" on the side of pipe to the joint.
05:15 Continued to expose underneath pipe.
05:55 Ron Kaufold from Vadnais showed up with two new men. He was going to keep 2 men from the night before until a section of pipe was out. Then he would send those two men home, leaving a crew of three.
06:12 The pipe was OD'D.
06:30 Hubbard showed up and was put on stand-by for the highline work. They had a crew of four people.
06:45 2" electric sump pump was activated. Don Wasko took pictures of the break
Contractor and his crew continued exposing damaged section of pipe to prepare to saw cut the damaged section out. City of Vista, crews and officials continued providing mutual aid support as needed throughout this operation.
07:05 First cut on the pipe was started.

07:10 Second cut with the second saw was started.

07:30 Couldn't get the pipe removed in one piece, so they needed to do side cuts to section the pipe for removal. They stated they would leave the bad area in tact for observation

07:30 Carlos Mendoza visited the site. The pipe was exposed. Carlsbad staff indicated that there was a hole with some pieces of riprap rock material that appeared to have been against the pipe near the location of the break. From the top of the shored excavation. Carlos observed Vadnais Crews cutting a pipe section out with two 12" or 14" metal wheel type cut-off saws. The PE wrapping was pulled back from the broken section. The pipe appeared to be in good condition with a white coating that looked to be in good condition. Carlos could not see the broken part of the pipe from his angle.

By now it was confirmed that the hi-line would not be required.

07:50 Steve left the job site. Steve turned over the scribe duty to Don Wasko.

Excavation contractor continued to work on excavating at the spill site to begin locating the pipe.

Prior to dawn, the excavation contractor had reached the pipe and had one of his workers go in to begin hand digging around the pipe

At day break, the pipe had been uncovered by the excavation contractor and they began preparatory work to completely expose the pipe to initiate repair.

07:52 Steve gave Don the note taking job

07:52 Carlos Mendoza received call from Tech contractors that there was a spill at the Raceway Pump Station. He believes he called George Solano and Archie, who confirmed that there was already a response being mobilized. Carlos jumped in the car to focus on this new spill, with a feeling that the BV spill was being well handled by Carlsbad.

08:00 Met with California Department of Fish and Game (CDFG) representatives to review sampling plan and obtain guidance.

AM/PM Maintenance/monitoring of pumps on-going.

AM/PM Initiated fish recovery 2x per day. To be categorized by species, size, and number. Two samples of each species to be frozen for transference to CDFG.

AM/PM Initiated monitoring for sick or dead birds.

08:02 Encintas called – sending two Vaccon trucks in an hour.

08:03 Don called Corey @ Vallecitos. He'll send Vactor

08:13 Top half of sectioned piece of pipe out of trench.

08:17 Don called Mark from Oceanside. He okayed us using a second pump at Firestone.

08:18 Terry Smith called asking Don to advise Glenn of potential force main break on Vista's line near Faraday and Melrose.

08:30 EWA staff collecting bacteria samples from shoreline around lagoon (BV1-6 and at Pacific Ocean).

08:32 Mark Stone called Don who gave him a detailed review of the status of the situation.

08:33 Ronnie, Vadnais Foreman, advised Don that the all thread was on the way.

08:3 Mark Stone called Don with phone numbers for corrosion consultants.

08:39 Contractor removed bottom piece of sectioned pipe.

08:45 Initiated DO sampling from lagoon shoreline according to BV Spill Response Plan locations (BV1-6).

08:50 Two Vaccons from Encinitas arrived.

08:51 Don met with Jason Hubbard and instructed Jason to have his crews go into a stand-by mode.

08:53 Oceanside staff checked with Carlsbad staff on aeration set –up.

08:55 Jesse and Don conferred on Vactor truck set-up for recapturing spill. The decision was made to put vactor trucks into Vista/Carlsbad manhole in mall parking lot just north of Sears.

Clayton Dobbs brought three Urban Corp. to do trash removal.

08:56 Oceanside inquired about status of fuel deliveries.
08:58 Don called Pat Perkins on status of fuel truck.
08:59 Contractor prepping to cut new piece of 24' ductile iron 3'9" long.
09:00 Contractor crews began cutting into the pipe to prepare for its removal.
09:00 Dan Collins from fleet is at jobsite with Plavan fuel truck.
09:03 Fire Dept arrived.
09:06 Pat Perkins arrived and moved crane truck for contractor.
09:07 Vallecitos brought one vactor.
09:08 As part of the Raceway response, Carlos Mendoza called Don Wasko to request that the 10" highline be mobilized to the Raceway spill site. This was delivered at about 10:30 am. Once Raceway spill was contained, and beginning the morning of 4/4/7, Carlos Mendoza continued coordinating with Carlsbad, Encina, and Vista staff handling information requests from the press and regulators.
09:11 Don asked Clayton Dobbs to call corrosion consultant for him.
09:13 Don called Johnny with Baker to have him move the 10" highline for Carlos.
09:15 Elaine Lukey briefed Cari on samples.
09:16 Clayton advised Don that Schiff and Associates would respond and evaluate the corrosion situation of the pipeline.
09:20 Dan from Fleet advised Don that the fuel hose was not long enough. Don instructed Pat Perkins to use smaller fuel cans to make it work.
09:21 Kim McKee of Fish & Game arrived on jobsite. Encina lab is still doing samples.
09:24 Cari told Bob Johnson the Buena Vista lift station compound was 18" from spilling over.
09:27 Elaine wanted air compressor on the bridge to aerate the lagoon water. Dan Groff was moving the compressor there.
09:28 Denise Vedder arrives on jobsite
09:35 Omar is sent to help fuel Oceanside pump with diesel. Ronnie of Vadnais asked Don to inspect the corrosion of the pipe in the trench. Don instructed Ronnie to continue with repairs.
09:42 Clayton called and asked where to put the aerator. Don instructed him to situate it on the east side of Jefferson St Bridge.
09:48 Bob Johnson and Cari instructed Don to have all the spoils hauled away from the jobsite. Kim from Fish & Game said that we could not use any of it. Don called Gail at the office to get assistance hauling spoils.
09:51 Clayton advised Don that the aeration hoses would not stay under water while the compressor was running. Staff worked together to weight down the fittings.
09:52 Weston Company (dead fish removal) Damon Owen, Niki Woodward, Esther Goldstein.
09:54 Mark Stone called and asked for an update.
09:55 Deployed Pump 2 (air compressor) for additional aeration at Jefferson Street Bridge.
09:58 Steve Plyler called, lift station not spilling.
10:00 Clayton Dobbs called Don and informed him that Graham Bell of Schiff and Associates would be on site by 11:00 AM (phone for Graham Bell 909-841-6729.
10:00 Cari Dale spoke to Clay Clifton.
10:01 Gail called. Mark Schilling is sending 2 drivers to haul spoils.
10:04 Mark Schilling called to say he was sending Marco and Vince.
10:05 Cari advised Don that Ronnie told her repairs would take about one additional hour.
10:08 Cari talked with consultant about beach clean up (Robert Szolomayer). Consultant also wanted to speak with Bob Johnson, however Bob was not on site.
10:10 Mark Schilling called Don to report there was a project in Carlsbad that has brown sugar sand soil for Don to use as backfill material.

10:12 Cari reviewed lagoon with Fish & Game representative. The representative was asking for area estimate. Cari asked rep how long we have to monitor the water. The response was two weeks.
10:13 Buena Vista lift station retention compound was spilling.
10:15 Repair piece and couplings were tightened up.
10:21 Carlsbad staff asked the press personnel to leave the driveway.
10:22 Rock was delivered to jobsite for Vadnais use in backfilling.
10:23 Clayton advises Don that the aerator on bridge is up and running.
10:25 Don instructed Ronnie to haul off all the spoils, told him to use all the rock and that we would haul in native to cap it off with.
10:28 Contractor re-doing repair couplings (not a good fit the first try).
10:30 Don called Kim with Fish & Game for clarification on use of native soil for backfilling. Kim okayed use of native soil up to within 18" of finish grade. Instructed Don to import clean soil for the cap.
10:34 Don called Mark Stone after Kim gave okay for use of spoils.
10:35 Fire dept personnel arrived looking for the gas can they had left the night before.
10:40 Plavan Fuel Tanker on site to fuel jobsite equipment.
10:45 Cari called Elaine for direction on placement of aeration pump set-up.
10:50 Cari instructed Jesse to set up aeration pump.
10:53 Steve P arrived.
10:54 Carlsbad PD met Cari on jobsite. Chief Zoll arrived.
10:54 Plavan fuel truck left jobsite.
10:59 Contractor was still re-doing couplings.
11:00 Environmental contractor (Weston Solutions) on water collecting DO measurements according to sampling plan from 1997 SSO.
11:05 City of Vista officials visited site looking into trench and at sectioned out pipe.
11:10 Jesse will get Marco/Marty to haul off excess pipe with crane truck.
11:10 Fish & Game wardens arrived. They observed jobsite and took pictures.
11:10 Officer Hickey of Carlsbad PD asking about Jefferson Street closure.
11:10 Cari briefed the Fish & Game wardens.
11:15 Graham Bell wanted to inspect the pipe in the trench.
11:25 Couplings on and snug.
11:30 McMahon Construction is loading up excess sheeting.
11:30 Graham Bell took soil samples in trench as well as the plastic wrap that is around pipe.
11:39 Contractor re did the west coupling. Joe of Vadnais was not happy with the alignment of the repair coupling.
11:46 Mark Stone called Don. Don briefed Mark on the following: 1) we only need to bring in clean dirt for the top 18". 2) Bob Johnson suggest that everyone that visits the site needs to fill out a Hazmat contact form. 3) Vadnais is re-doing the coupling.
11:57 Graham Bell suggested we connect cathodic protection cables to pipeline.
12:06 Couplings were re-tightened.
12:08 Cari and Bob Johnson spoke to Don Wasko about any previous breaks along this pipeline and about the fish kill. Don advised them that Weston was picking up the fish.
12:08 Elaine is briefing Cari and Bob on the status of the other Vista break, located at Melrose and Faraday. She told them there was no Carlsbad staff at the Melrose site. Elaine gave a Regulatory Agency Report to Bob and Cari at that time.
12:18 Graham Bell completed his preliminary investigation.
12:21 Cari and Bob instructed Don to get Steve P to go home.

12:27 Steve opened valve. Don called Bruce to turn on the pumps at the lift station.
12:27 It was reported that the section of pipe had been removed and that the new repair section had been installed.
12:27 Repair to sewer force main completed.
12:36 Bruce Dale of Encina has one pump running at 72%. The repair looks good at this time.
12:40 Ronnie advised Don that Vadnais did not want responsibility of cadwelding cathodic protection cables to pipeline because of possibility of pipeline failure.
12:45 Cari instructed Don to call Mark Stone and brief him. Don advised Mark that we were cancelling the cathodic protection cable installation.
12:45 Deployed Pump 4 (air compressor) for additional aeration at "Duck Pond".
12:53 Buena Vista Lift Station compound stopped spilling.
12:53 All discharge of sewage has stopped.
12:55 Cari offered lunch to the contractors
12:58 Bob Johnson informs us that Elaine, Joe Garuba, Fish & Game and the Fire Dept photographer are going up in the helicopter for aerial surveillance of the lagoon.
13:00 Don checked with Bruce. Bruce is pumping at 12500 GPM at this time. Everything looks good.
13:10 Bob Johnson, Cari, Ronnie, Jesse and Don discussed options about leaving trench open for a few days. Ronnie called Jeff Anderson of Vadnais. Jeff will respond and meet to discuss.
13:20 Aerial viewing of site via SD Fire Department Helicopter. Plume appears to have just started to migrate into channel under I-5, consequently CDFG recommended addition of monitoring sites for DO and bacteria at channel under I-5.
13:24 Bill Plummer and Bob Johnson met with Fish & Game.
13:29 Kerry J of IT brings electronic supplies for Paul Hartman.
13:33 Jesse instructs Pat Perkins to get pallets to store sectioned pipe pieces.
13:36 Clayton shows Linda Kermott the trench.
13:37 Contractor is installing I-beam whalers to support trench walls.
13:42 Met with Don and Cari, briefed Bob J.
13:45 Joe G confirms that the entire inner lagoon is affected, based on the visual observation done from the helicopter.
13:49 Bruce confirmed he was pumping 12500 GPM. He felt this is full pressure. Bob J and Cari okay with Bruce's recommendation
13:49 Don instructs Ronnie to install Whalers in trench.
13:57 Bill Plummer discussed future pipeline options with Bob J.
14:00 Initiated clean-up of trash and litter around lagoon and BV Pump Station using City of Carlsbad contractor Urban Corps.
14:07 Cari, Clayton, Bruce, and Don discuss clean up of fence at Buena Vista Lift Station compound.
14:10 Cari had discussion with Eric Becker with the RWQCB. She introduced Bob J to Eric Becker.
14:17 Jeff of Vadnais arrived. Cari described to Jeff that we want to leave the trench open for observation.
14:20 Glenn arrived. Bob J briefed Glenn on the following: We decided not to use the cathodic protection cables; Bob showed Glenn the pipe, and then Bob briefed Glenn on the conversation of replacing the pipeline per Fish & Game's recommendation by summertime.
14:35 Adam and Chris of the Storm Drain Maintenance Crew arrived to assist with pulling dead fish.

14:35 Clayton spoke to Oceanside PW. They okay'd Carlsbad PW to shut down Lagoon View Way. Clayton will close it until further notice. Glenn was briefed on fish kill and status of force main. Cari talked to Eric Becker. Glenn did a press conference.

14:40 Don spoke with Vallecitos. They hauled out eight loads with their Vactor @ 1800 Gallons per load. Don told them they were done and thanked them very much for their efforts.

14:48 Ronnie asked Don about laying rock under the pipe up to spring line. Don concurred. Jeff Anderson of Vadnais informed Don/Cari that there would be a $12,000 a day stand-by charge to leave equipment on site.

14:50 Don spoke with Encinitas vactor crew. They hauled 10 loads @ 1800 Gallons per load. Don thanked them and sent them on their way.

14:55 Cari asked Jeff to get fencing to secure the trench for the evening.

14:58 Councilman Packard arrived. Cari briefed him and showed him the broken pipe.

15:07 Jesse and Don discussed relieving the remaining vactor crews of assisting.

15:12 Cari and Don discussed bullet points to brief Mark Stone on.

15:12 Meeting with Glenn, Bob J, and Jeff Anderson of Vadnais. Discussed cost break down of repair project. Charlie from Encina handed Glenn the phone to speak to John Jardin. Glenn and John Jardin discussed the necessity of pumping lagoon water back into the system. Charlie explained to Glenn the reasons for pumping back. (Regulatory agencies will require attempts to remove the sewage from the lagoon).

15:29 Cari, Glenn, and Bob J discussed pumping back options.

15:43 Paul H, Jesse, and Marco moved the bridge pump over to the lift station to pump sewage back from the lagoon into the station.

15:45 Carlsbad staff installed 6" pump next to Buena Vista lift station to pump back lagoon water back into sewer system in an effort to mitigate affects of spill.

15:46 Jesse and Don discussed overnight staffing issues. Don spoke with Johnny of Baker Tank about Johnny's crew removing remaining highline from the Jefferson Street.

15:58 Dan Groff hauled off sectioned piece of pipe.

16:00 Jesse called Baker Tank. They will get us a second pump that pumps between 1500 and 2000 GPM.

Discussion between Cari, Glenn, and Paul H. Paul will call Clay Clifton.

Cari and Mark Stone discussed pump back plan.

16:05 Officer Hickey asked Don when Jefferson St could be opened, Don responded about 8:00 PM.

16:10 Kim with Fish & Game, Keith Merkel, and Glenn had a discussion regarding backfilling and revegetation.

16:20 Elaine, Cari, and Don met. Elaine relayed to Cari and Don that the Fish & Game representative felt the aeration efforts were working well.

16:30 EP staff collected bacteria and DO samples under I-5 bridge (BV7 and BV8).

16:35 Jesse and Don discussed who was going to work what shift throughout the night.

16:40 Contractor layed rock under pipeline.

16:50 Richard M, Dan G staying until 10:00 PM. Joe O and Ralph K staying from 10:00 PM – 6:30 AM.

PM Sand berm constructed on beach at mouth of BV Lagoon (City of Oceanside).

PM Contacted bird rescue firm to be on standby for possibility of sick birds.

17:00 Initiated draw back of sewage and contaminated lagoon water into BV Pump Station en route to EWA.

17:15 Carlos Mendoza thanked Don for sending Baker Tank and the highline over to the other Vista break.

18:00 Cari was instructed by Mark Stone to keep Jefferson St closed for the night.

18:10 Staff working out plan to keep closed at Jefferson and Las Flores.
18:15 Don called Nick Roque and asked him to have two Streets workers cover the street closure at Jefferson and Las Flores for the night.
18:40 The trench looks good.
18:55 Abe Gill arrived and was sent to the west end of Jefferson/Las Flores.
19:00 Deployed Pump 3 (6" water pump) for additional aeration near Jefferson Street Bridge.
19:10 Jesse got aeration pump running.
19:11 Cari checked trench and aerator pump on bridge, everything looked good.
19:32 Richard and Brian are taking second pump over to lift station to set it up to pump water back from the lagoon into the pump station.
19:50 Steve arrived and reviewed jobsite with Don, Paul H, Cari, and Bob J.
20:00 Second pump added to draw back sewage and contaminated lagoon water.
20:10 Cari, Bob, Paul H and Don leave.
20:30 Did first round of checks, everything okay.
21:00 Walter and Todd made the rounds to make sure all the equipment was running, while Richard and Dan worked on getting second pump running at the lift station.
21:30 Walter and Todd returned to pick up other truck to return to the yard. Reported to Steve that after changing hoses, the second 6" pump at the lift station was able to run. Steve checked repair and also the compressors, everything running fine. Todd informed Richard about doing fuel checks at 12:00 AM, he said okay.
21:42 Charlie from Encina stopped by to say thanks for all the other help. Left liftstation open for restroom use. Encina staff got the bar screens clean, all back to normal.
21:49 Richard/Dan checked in with Steve waiting for Joe/Ralph to take over at 10:00.
22:00 Joe/Ralph arrived.
22:30 Steve checked repair – Okay.
22:45 Joe and Ralph check fuel levels, topped one off at half tank so all were equal at half tank.
23:30 Check repair – Okay, small amount of ground water seeping in from lagoon side of pilings.

4/4/07 – Wednesday

00:30 Checked repair - was same as previous, notice small drips from broken 2 ½ inch PVC irrigation line
00:45 Joe/Ralph/Steve ate dinner and then left to check the points.
01:30 Checked repair area - all the same.
02:00 Jesse arrived and met with Steve. Steve briefed Jesse on the pumps. The compressors are okay.
02:20 Jesse checked the repair area, everything looked good. Jesse checked with Joe and Ralph. Their reports on the pumps and air compressors were good. Then Jesse checked on the traffic control crew on Jefferson and Las Flores.
03:00 Checked the repair area, all is good. Joe and Ralph did their 3:00 AM checks. Everything was okay. The two pumps at Buena Vista Lagoon and the compressors running good also.
04:00 Joe and Ralph did their 4:00 check. At that time they noticed we needed to refuel. Ralph went to get fuel for pumps and compressors.
05:00 Jesse checked the repair site, all was good. At this time we refueled the pumps and air compressors.
06:00 Everything is good. We got more fuel for the next shift. At that time Performance Construction arrived at the site. Vadnais Construction arrived at the site.
06:30 Don Wasko arrived and started taking notes.
07:15 Crew meeting at the Kiosk with Jesse, Anthony, Ralph, Joe, Brian, Larry, Pat, Omar and Mike. Don spoke to Kim from Fish & Game. Sshe confirmed that the spoils were okay to be

used. Don called Mark Stone. He wants Elaine to call Kim from Fish & Game to verify that it was okay to use the spoils.

07:49 Don called Dan @ Fleet to schedule Plavon to schedule fuel delivery.

07:55 Elaine got the okay from Kim to use the spoils.
AM DO sampling was increased to 2x daily in lagoon.
AM Continued monitoring for sick/dead birds 2x daily
AM Continued fish recovery 2x daily.
08:00 Mark Stone arrived. Van Olin from Geo Eng arrived.
08:15 Don called Kerry at Plavon to inquire about the red diesel, she'll call back.
08:25 Mark Stone called, he wanted a date and time when Encina called the Regulatory Agencies.
08:28 Don called Bruce from Encina. He was going to check back on date and time and he would call Cari with information.
08:30 Don called Mark Stone.
08:30 EWA staff collecting bacteria samples from shoreline around lagoon (BV1-8 and at Pacific Ocean).
08:32 Don called Linda Kermott.
08:34 Plavon called Kerry back.
08:35 Elaine said the drawback intake relocation to under and West of Jefferson bridge was a great idea.
08:40 Van Olin from Geo Engineering met with Ronnie, looked at the trench, and reviewed options for the pilings. Van feels they should be left in place.
09:10 Don called Mark Stone and he told him to call Elaine. Ronnie called Jeff from Vadnais. Don called Dan at Fleet for Plavon. Don called Kerry back from Plavon to use their services.
09:20 Don called Lee Kuhns with NCTD and cancelled rail road training for following day.
09:35 Cari called and Don briefed her on events and Van Olin's ideas.
09:40 Bobby from Fleet repaired the air compressor fuel line.
09:48 Meeting with Patrick Vaugh, Van Olin, Elaine, Ronnie, Jeff, McMahon, Jesse and Don. Van explained why he thought the sheets/pilings should remain in place. He thought it would be a big risk to remove them. Jeff concurred with Van's suggestion. McMahon concured, he stated negative impact possibility. Jeff suggests Van call Kim from Fish & Game to review options. They had a conversation about pulling the sheets.
09:59 The sheets are 35' long and need to be pre-drilled before removing them. Total price for the City to purchase sheets = $90,000. Elaine is summarizing the conversation. The pipe is active. Van said pulling sheets would jeopardize surrounding pipeline and soil. 50' of sheeting on each side of break.
10:10 Elaine called Kim of Fish & Game and left a message. Pat Vaughn agreed that they should be kept in place.
10:20 Don called Mark and briefed him on the meeting. He told him to leave the sheets in place and cut them.
10:20 Elaine met with Fish & Game rep. Pat with Baker suggested HDPE.
10:20 Revised lagoon DO sampling locations based on inaccessibility and redundancy of old sites, in coordination with CDFG.
10:25 Contractor digging out to cut sheets down.
10:29 Called Sue to cancel the Railroad crossing training with staff. Don spoke to Cari and briefed her on the sheet decision.
10:40 Cari called and wanted Kim's contact information. Don will have Elaine call Cari with information.

10:50 Elaine met with Bill from Fish & Game and Eric Becker, regarding pump back time frame. Elaine was going to check with Mike Hogan of Encina about aeration pump time frame.
11:05 Cari called Don inquiring about temporaries working in untreated sewage.

11:07 Don called Mark Stone and asked if Carlsbad staff could open Jefferson Street if the highline was all picked up. Mark responded yes, that would be fine, let him know it was done.
11:15 George Solano and Craig Trammell met with Don about staffing issues.
11:20 Bob J arrived and Don briefed him on the events of the morning. Bob J advised Don that Councilman Packard was inquiring about warrantee on replacement pipe and couplings.
11:30 Baker Tank was bringing extra suction hoses. Elaine was briefing Bob J on pump back amounts. Her estimate was 3 days. Elaine asked Don to inquire with Bruce Dale on amount that was pumped last spill. Bruce replied 2 times the amount spilled. Elaine still wants to confirm with Mike Hogan.
11:55 Kim from Fish & Game called. She's okay with leaving the sheet pilings in the trench as long as we cut them off low enough so that the slope can be rebuilt.
12:05 Cari arrived and briefed by Elaine, Bob J and Don Wasko.
12:15 Staff stopped for lunch.
12:40 Ronnie needed PVC caps to cap off irrigation line in the trench, (west side 2 ½ " East side 2")
12:45 Don called Tom Sanchez and Rob Kline of the Parks Dept. They will bring caps over to jobsite.
12:50 Jeff/Frank of Leucadia Water District arrived at jobsite, advised Don that Leucadia staff hauled 18 vactor loads Monday and 9 loads Tuesday @t 1,000 Gallons per load
13:04 Don went to Buena Vista Lift Station, met Jesse and staff while they extended the suction hose father out into the lagoon (75' total length)
13:20 Rob and Tom delivered caps for irrigation.
13:20 Cari, Bob J discussed briefing issues.
13:30 Contractor has both ends of the irrigation lines capped off.
13:30 Cement cured on bridge pipe. Anthony backfilled trench with backhoe.
13:38 Contractor backfilling south wall cut down below grade. North wall being cut.
13:40 Scott Ruddinger (Code Enforcement) arrived and took pictures.
13:40 Paul H checked in. Cari instructed Don to have lead worker work all night shift.
13:58 Don met with Jesse and Pat, working out staffing issues.
14:00 Steve P arrived. Steve and Don discuss staffing options.
14:10 Don leaves. Baker called to pick up extra pipe.
14:30 McMahon semi arrived to pick up pile driver.
14:40 Allied Trench arrivedto pick up I-beams.
14:50 Don called, Plavan will be there at 4:00 to fuel everything up. Will be back again at 12:00 to refuel.
14:55 Reviewed/discussed DO data and fish counts with US Fish and Wildlife Service (USFWS). Discussed possible sediment bacteria sampling.
15:00 Diamond Company arrived to pick up fence panels.
15:04 McMahon Semi with pile driver pulling out of the jobsite.
15:15 Contractor broke abandoned phone line.
15:22 Baker Tank leaves with highline pipe.
15:40 Allied leaves with I-beams.
15:40 950 loader pulls out, getting loaded on to low boy.
15:48 Diamond leaves with fence.
15:50 ATT arrived to verify hit phone line. They verify it's dead.

16:00 Initiated benthic infaunal sample collection, covered east and central basins, 3 samples each.
16:15 Street sweeping on Jefferson St done.
16:20 Jesse left. Pat to pick up Tony at streets, then Pat went home until 10:00 PM.

16:25 Las Flores end opened up – first car through.
16:30 Todd, Walter, Clayton, Adam open up Jefferson @ Marron. Called Mark to inform.
16:38 Crane is parked.
16:47 Dept of Fish & Game left, McMahon Construction left.
17:00 Vadnais finishing backfill. Turned over to Mike L.
17:00 Check dig site, ok.
17:20 Discussed need for erosion and sediment control BMPs in construction area with incident commander.
17:30 Brian checked pumps and air compressors.
17:30 Adam checked traffic control.
18:00 Checked dig site, ok.
18:30 Adam checked traffic control.
18:30 Checked dig site, ok.
19:30 Checked dig site, ok.
19:30 Checked traffic control.
20:30 Check dig site, ok.
20:33 Brian and Larry checked pumps. Traffic control checked as well.
21:30 Checked dig site, ok. Brian and Larry checked the pumps, everything ok.
21:30 Traffic control checked, ok. Fuel cans filled.
22:00 Pat, Omar, Tony arrived on site.
23:00 Checked dig site, ok. Traffic control.

4/5/07 – Thursday

00:00 Checked dig site. Ok. Traffic control good as well. Added fuel to several pieces of equipment.
01:00 Checked dig site, ok. Traffic control good as well. Added fuel to O'side pump.
02:00 Checked dig site, ok. Traffic control ok. Topped off more of the equipment with fuel.
03:00 Checked dig site, ok. Traffic control looks good.
04:00 Plavan fuel tanker arrived. Topped off all fuel tanks as well as reserve tank at lift station.
05:00 All equipment okay on fuel, traffic control is good, dig site okay.
06:00 Don Wasko arrived to site.
06:15 Vadnais on site.
06:18 Performance drilling on site.
06:20 Paul H, Stromwater on site.
06:30 Checked fuel at Jefferson, bridge and pumps 1 & 2, O'side W and E pumps. Traffic control good, Dig site good
06:58 Omar, Tony on site.
07:16 Elaine from Stormwater on site.
07:30 Jayne from Vista Stormwater on site to meet with Elaine and Paul to discuss on-going monitoring.
07:38 First load of import, brought in to job site.
07:40 Craig, City of Vista.
07:40 Bob J arrived at job site, Don showed Bob J the job site.
07:48 Jesse on site.

07:50 Bob J instructed Don to call PD.
07:57 Don calls PD dispatch asking for assistance closing Jefferson St so contractor can move equipment.
08:00 Larry and Walter arrived looking for sewer tools.
08:00 Craig advised Don that Vista will stick to arranged schedule, they will bring out more compressors/pumps.
08:00 EWA staff continue bacteria monitoring at BV1-8 and Pacific Ocean shoreline. Beach samples reduced to 75' and 150' north and south of lagoon outlet per SDDEH. Weston staff continues lagoon and shoreline DO sampling. Weston also continues fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Modified aeration tubing and extended to reach further into lagoon. Completed benthic sampling in West basin. Continued 2x daily lagoon DO sampling.
08:14 Second load of import was delivered.
08:15 Paul H arrived at job site.
08:25 Ray/Dave from Encina arrive at job site, they need to take their truck back to Encina WasteWater Facility.
08:25 Craig/Cirilo of Vista met at bridge. Carlsbad staff will have air compressor moved off of bridge.
08:35 McMahon Construction flatbed arrived.
08:35 Carlsbad PD volunteer patrol arrived to shut down Jefferson St.
08:44 Pam Pretz brings refreshments.
08:50 Elaine/Jayne, Paul H/Dave R of the Weston Company discuss work plan for fish removal.
08:51 Bob/Tony move air compress off of bridge, putting it on west side of bridge where the force main had been excavated for the by-pass plan.
08:55 Third load of import.
09:15 Relocated Pump 2 to west side of Jefferson Street Bridge, south bank.
09:20 City staff loaded scrap sheeting up on to flatbed.
09:20 Paul H. wanted Don to note the following: Tuesday 4/3 @ 3:45 Carlsbad staff installed 6" pump next to Buena Vista lift station to pump back lagoon water back into sewer system in an effort to mitigate affects of spill.
09:37 Bob J called, had Don relay message to Ronnie that Bob received fax from Pacific Pipeline about warrantee issue on repair parts.
09:40 Steve P/Mario arrived. Discussed with Don staffing plan.
09:50 Elaine arrived, no word from Fish & Game, Elaine feels we will be required to aerate until the dissolved oxygen levels return to normal.
09:50 Elaine concurs with Don the schedule sounds good.
10:35 Clay Clifton, DEH meet and discusses situation with Paul H,
10:40 Clayton and Adam launch boat to work on aeration air lines.
10:42 Fourth load of import arrives.
10:51 Joe O arrived back on site to load scrap steel onto crane truck.
10:57 Clay Clifton leaves site.
10:57 D Barton of Carlsbad PD and Bob J on site.
11:06 Contractor truck leaves site.
11:07 Paul H, D Barton, Bob J leave site.
11:15 Fifth load of import arrives.
11:15 Brian, Todd, Ralph arrive.
11:25 North County Times on site looking for Elaine or Denise V.
11:29 Johnny with Baker Tank arrives.
11:32 Johnny with Baker Tank leaves.

11:33 Joe O leaves with scrap metal.
11:33 Steve P arrives, Eric Sanders delivers camera to Mario. Steve P and Don review schedule.
11:38 Elaine and Mo Lahsai (City of Oceanside) arrive.
11:38 Eric Sanders leaves.
11:54 Paul H, Storm Water, Encinitas and Leucadia did vactoring for us.
11:54 Sixth load of dirt arrives.
11:57 Dan W on site with food.
12:00 Dan W off site.
12:02 Mo Lahsai leaves site.
12:08 Steven Wenzel Trucking with load of dirt (7^{th}).
12:15 Equipment refueled.
12:18 Walt Juarez of Kissinger Trucking on site.
12:26 San Diego Errosion Control arrived with delivery of hay rolls.
12:29 Paul L on site.
12:38 Eighth load of dirt.
12:43 Claremont Equipment Rental came to pick up man-lift.
12:47 Chuck Bollinger and Jamie Madrigal, EWA on site.
12:54 Chuck Bollinger and Jaime Madrigal off site.
13:00 Check on O'side compress – ok.
13:05 Checked on pumps, fuel and hoses, 2 at plants – O'side.
13:06 Tom Vega and Ralph Coble from City of Vista Wastewater picked up hoses
13:12 Elaine off site.
13:13 Jesse on-site.
13:16 Barry with Red Mountain Machinery on site.
13:19 9^{th} load of dirt.
13:27 Barry with Red Mountain Machinery off site.
13:32 Joe O on site.
13:37 Turned off Jefferson compressor for work on hoses (Clayton and Adam).
13:43 Paul off site.
13:47 Kathy Hartman and Damon Owen of Weston Company on site.
13:49 Jefferson compressor turned back on.
13:53 Cirillo on site with canopy and heater for Vista crew working tonight.
13:58 10^{th} load of dirt.
14:00 SDDEH reduced closure area at beach to 500' north and south of lagoon outlet. Requested additional signage at ponded water behind berm at beach.
20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Repair site backfill was been completed and erosion control BMPs are in place.

4/6/07 Friday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline, added one sample location at beach ponded water behind berm (BV9). Weston staff continues lagoon and shoreline DO sampling. Weston also continues fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Called El Corazon Reclamation Facility (in O'side) to allow Steve Wenzel to dump dirt spoils on City of Carlsbad account (Job #729, Buena Vista Lagoon). Called El Corazon Compost Facility in O'side to allow Steve Wentzel to dump Green waste

spoils on City of Carlsbad account (Job #727, Buena Vista Lagoon). A photographer was on-site. City of Carlsbad Construction Dept. inspection conducted on soil erosion BMPs. Corrective actions required and completed same day. Second Construction inspection conducted to close out corrective actions

4/7/07 Saturday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon and shoreline DO sampling. Weston also continues fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/8/07 Sunday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon and shoreline DO sampling. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. 9 Hypodermic needles found on ground approx. 30 feet from compressor at staging area entrance westbound. Cones were placed as a precaution and appropriate personnel called to collect them.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/9/07 Monday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon DO sampling. Shoreline DO sampling continues. Weston also continues fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. A request is made for Cities of Oceanside and Carlsbad Police Departments to perform sweep around lagoon for transient relocation. A Resource agency coordination meeting is held on site to discuss changes to the environmental response efforts. Attendees included Judy Gibson and Marci Koski from USFWS; Bill Richards, Tim Dillingham, and Bill Paznokas from CDFG; Paul Hartman, Jamie Wood, and Elaine Lukey from Carlsbad Environmental Programs; Jayne Strommer from Vista; and Keith Merkel and Brad Stein from Merkel & Associates. Channel 10 News visits the scene. Signs are removed from Pacific Ocean shoreline and ponded area behind weir at mouth of BV Lagoon, per SDDEH. The signs around lagoon to remain in place.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/10/07 Tuesday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon DO sampling. Shoreline DO sampling continues. Ocean shoreline monitoring reduced to 75' north and south of lagoon outlet, per SDDEH. Weston also continues fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Pump back volume is reduced to approximately match the flow rate entering the lagoon from BV Creek.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/11/07 Wednesday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon DO sampling. Shoreline DO sampling continues. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Councilman Mark Packard visits site.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/12/07 Thursday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Weston staff continues lagoon DO sampling. Shoreline DO sampling continues. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/13/07 Friday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9 and Pacific Ocean shoreline. Merkel staff assumes lagoon and shoreline DO sampling duties. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. Keith Merkel visits site to assess impacts.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/14/07 Saturday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. EWA staff continues bacteria monitoring at BV1-9. Merkel staff continues lagoon and shoreline DO sampling. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

4/15/07 Sunday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Merkel staff continues lagoon and shoreline DO sampling. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA continues.

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4/16/07 Monday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Merkel staff continues lagoon and shoreline DO sampling. They also continue fish recovery and monitoring for sick/dead birds. Drawback of lagoon water into BV Pump Station for re-route to EWA continues. OK was given to remove closure signs from west and central basin of BV Lagoon, per SDDEH. CDFG personnel visit site.

13:00 A Resource agency coordination meeting is held at USFWS offices in Carlsbad for a status update and to discuss changes to the environmental response efforts. Attendees included Judy Gibson, Sharon Taylor, Jack Fancher, and John Brooks from USFWS; Noel Richards, Bryan Gollhofer, Tim Dillingham, and Bill Paznokas from CDFG; Bob Morris from the RWQCB, Elaine Lukey and Paul Hartman from the City of Carlsbad; Jayne Strommer from the City of Vista; and Keith Merkel Merkel & Associates.

20:00 Vista crew takes over and continues maintenance and monitoring of all aeration equipment. Drawback of lagoon water into BV Pump Station for re-route to EWA is.

4/17/07 Tuesday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Merkel staff continues lagoon and shoreline DO sampling. They also continue fish recovery and monitoring for sick/dead birds.

13:00 Resource agency coordination meeting was held at USFWS offices in Carlsbad for status update and to discuss changes in environmental response going forward. Attendees include: Judy Gibson, Sharon Taylor, Jack Fancher, and John Brooks from USFWS, Noel Richards, Bryan Gollhoffer, Tim Dillingham, and Bill Paznokas from CDFG, Bob Morris from RWQCB, Jayne Strommer from the City of Vista, Elaine Lukey and Paul Hartman from the City of Carlsbad, and Keith Merkel from Merkel & Associates, Inc..

20:00 Vista crew takes over and continues maintenance and monitoring of all aeration equipment.

4/18/07 Wednesday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all pump back and aeration equipment. Merkel staff continues lagoon and shoreline DO sampling. DataSondes (2 in east basin, 1 in central basin) are installed by Merkel staff for collection of DO samples for 24 hours. They also continue fish recovery and monitoring for sick/dead birds OK is given by SDDEH to remove all closure signs remaining around BV Lagoon (east basin). Helicopter sprays lagoon area for bugs with BTI in early afternoon hours.

20:00 Vista crew takes over and continues maintenance and monitoring of all pump back and aeration equipment.

4/19/07 Thursday

08:00 Carlsbad crew takes over and continues maintenance and monitoring of all aeration equipment. Merkel staff continues lagoon and shoreline DO sampling. Data collection by DataSondes continues. They also continue fish recovery and monitoring for sick/dead birds. All aeration pumps are removed from service for a 24-hour period to monitor DO levels with aeration. Casey Arndt inspects soil erosion BMPs at site of pipe repair.

20:00 Vista crew takes over.

ENCINA WASTEWATER AUTHORITY

A Public Agency

Temporary Offices
6220 Avenida Encinas
Calrsbad, CA 92011
Telephone (760) 438-3941
Fax (760) 438-3861 (Plant)
Fax (760) 431-7493 (Administration)

Ref: Admin.07-8459

April 17, 2007

City of Carlsbad
Attention: Glenn Prium, Public Works Director
1635 Faraday Avenue
Carlsbad, CA 92008

SUBJECT: Buena Vista Pump Station Force Main Spill Incident

Dear Glenn,

To determine the estimated spill volume, EWA evaluated three methods using data obtained from the meter downstream from the Buena Vista Pump Station.

The first method provides the estimated spill volume by averaging the flow from the 4 previous weeks for the days of the week in which the spill actually occurred (Saturday through Tuesday). Attachment 1 provides a summary of the aforementioned method.

The second and third methods EWA evaluated estimated spill volume by averaging flows from the previous 30 and 90 days from the date the spill occurred. Attachment 2 provides a summary of all methods evaluated.

Based on my review of these methodologies, it is my professional opinion that the most accurate method for determining the estimated spill volume can be accomplished by utilizing the first method (Attachment 1).

Please feel free to contact me should you have any questions or require additional information.

Best regards,

Michael T. Hogan
General Manager

cc:Larry Pierce, City of Vista
Chron. File

Attachments (2)

ATTACHMENT 1

Encina Wastewater Authority

Buena Vista Lagoon Forcemain Failure

March 31 - April 3, 2007

Estimated Spill Volume in Millions of Gallons

Calculation Methodology

The estimated spill volume presented below (in million gallons per day) is calculated based on a four week average of volume measured by the meter downstream from the BVPS (location C3). The days of the week used in establishing the average were the same as those of the actual spill; Saturday through Tuesday. Once the total variance was calculated from the average daily flow for the period specified, the number was adjusted by deducting the total flow diverted to Oceanside for treatment.

Downstream Meter Variance by Comparison to Days of the Week

	Saturday	Sunday	Monday	Tuesday	
	31-Mar	1-Apr	2-Apr	3-Apr	Total
Downstream Meter: Expected Daily Flow Based on Average of the Most Recent 4 Weeks on that Day of the Week	10.702	10.771	10.530	10.580	42.583
Downstream Meter: Measured Flows	10.479	7.428	6.683	8.579	33.169
Variance	0.223	3.343	3.847	2.001	9.414
Adjustment: Measured Flows Diverted to Oceanside					-2.085
Total Spill Volume Estimate:					**7.329**

ATTACHMENT 2

Encina Wastewater Authority

Buena Vista Lagoon Forcemain Failure

March 31 - April 3, 2007

Estimated Spill Volume in Millions of Gallons

Downstream Meter Variance by Comparison to 90 Day Average

	Saturday 31-Mar	Sunday 1-Apr	Monday 2-Apr	Tuesday 3-Apr	Total
Downstream Meter: Expected Daily Flow Based on Average of Most Recent 90 Days	10.702	10.702	10.702	10.702	42.808
Downstream Meter: Measured Flows	10.479	7.428	6.683	8.579	33.169
Variance	0.223	3.274	4.019	2.123	9.639
Adjustment: Measured Flows Diverted to Oceanside					-2.085
Total Spill Volume Estimate:					**7.554**

Downstream Meter Variance by Comparison to 30 Day Average

	Saturday 31-Mar	Sunday 1-Apr	Monday 2-Apr	Tuesday 3-Apr	Total
Downstream Meter: Expected Daily Flow Based on Average of Most Recent 30 Days	10.672	10.672	10.672	10.672	42.688
Downstream Meter: Measured Flows	10.479	7.428	6.683	8.579	33.169
Variance	0.193	3.244	3.989	2.093	9.519
Adjustment: Measured Flows Diverted to Oceanside					-2.085
Total Spill Volume Estimate:					**7.434**

Downstream Meter Variance by Comparison to Days of the Week

	Saturday 31-Mar	Sunday 1-Apr	Monday 2-Apr	Tuesday 3-Apr	Total
Downstream Meter: Expected Daily Flow Based on Average of the Most Recent 4 Weeks on that Day of the Week	10.702	10.771	10.530	10.580	42.583
Downstream Meter: Measured Flows	10.479	7.428	6.683	8.579	33.169
Variance	0.223	3.343	3.847	2.001	9.414
Adjustment: Measured Flows Diverted to Oceanside					-2.085
Total Spill Volume Estimate:					**7.329**

SUMMARY CALCULATION SHEET
LAGOON WATER PUMP-BACK TO SANITARY SEWER SYSTEM

Pump back was accomplished using two pumps rated at 2,200 GPM. With friction and head loss to the Buena Vista Pump Station where sewage was dicharged the pumps operated at a flow rate of 1,500GPM.

			Time On		Time Off	
Pump	Rate (GPH)	Rate (GPH)	Time	Date	Time	Date
Pump #1	1500	90000	5:00 PM	4/3/2007	4:00 PM	4/16/2007
Pump #2	1500	90000	8:00 PM	4/3/2007	10:55 AM	4/10/2007

	4/3	4/4	4/5	4/6	4/7	4/8	4/9
12-1a		180,000	180,000	180,000	180,000	180,000	180,000
1a-2a		180,000	180,000	180,000	180,000	180,000	180,000
2a-3a		180,000	180,000	180,000	180,000	180,000	180,000
3a-4a		180,000	180,000	180,000	180,000	180,000	180,000
4a-5a		180,000	180,000	180,000	180,000	180,000	180,000
5a-6a		180,000	180,000	180,000	180,000	180,000	180,000
6a-7a		180,000	180,000	180,000	180,000	180,000	180,000
7a-8a		180,000	180,000	180,000	180,000	180,000	180,000
8a-9a		180,000	180,000	180,000	180,000	180,000	180,000
9a-10a		180,000	180,000	180,000	180,000	180,000	180,000
10a-11a		180,000	180,000	180,000	180,000	180,000	180,000
11a-12		180,000	180,000	180,000	180,000	180,000	180,000
12-1p		180,000	180,000	180,000	180,000	180,000	180,000
1p-2p		180,000	180,000	180,000	180,000	180,000	180,000
2p-3p		180,000	180,000	180,000	180,000	180,000	180,000
3p-4p		180,000	180,000	180,000	180,000	180,000	180,000
4p-5p		180,000	180,000	180,000	180,000	180,000	180,000
5p-6p	90,000	180,000	180,000	180,000	180,000	180,000	180,000
6p-7p	90,000	180,000	180,000	180,000	180,000	180,000	180,000
7p-8p	90,000	180,000	180,000	180,000	180,000	180,000	180,000
8p-9p	180,000	180,000	180,000	180,000	180,000	180,000	180,000
9p-10p	180,000	180,000	180,000	180,000	180,000	180,000	180,000
10p-11p	180,000	180,000	180,000	180,000	180,000	180,000	180,000
11p-12	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Subtotal:	990,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000
Total:	**990,000**	**5,310,000**	**9,630,000**	**13,950,000**	**18,270,000**	**22,590,000**	**26,910,000**

	4/10	4/11	4/12	4/13	4/14	4/15	4/16
12-1a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
1a-2a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
2a-3a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
3a-4a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
4a-5a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
5a-6a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
6a-7a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
7a-8a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
8a-9a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
9a-10a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
10a-11a	180,000	90,000	90,000	90,000	90,000	90,000	90,000
11a-12	90,000	90,000	90,000	90,000	90,000	90,000	90,000
12-1p	90,000	90,000	90,000	90,000	90,000	90,000	90,000
1p-2p	90,000	90,000	90,000	90,000	90,000	90,000	90,000
2p-3p	90,000	90,000	90,000	90,000	90,000	90,000	90,000
3p-4p	90,000	90,000	90,000	90,000	90,000	90,000	90,000
4p-5p	90,000	90,000	90,000	90,000	90,000	90,000	
5p-6p	90,000	90,000	90,000	90,000	90,000	90,000	
6p-7p	90,000	90,000	90,000	90,000	90,000	90,000	
7p-8p	90,000	90,000	90,000	90,000	90,000	90,000	
8p-9p	90,000	90,000	90,000	90,000	90,000	90,000	
9p-10p	90,000	90,000	90,000	90,000	90,000	90,000	
10p-11p	90,000	90,000	90,000	90,000	90,000	90,000	
11p-12	90,000	90,000	90,000	90,000	90,000	90,000	
Subtotal:	3,150,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	1,440,000
Total:	**30,060,000**	**32,220,000**	**34,380,000**	**36,540,000**	**38,700,000**	**40,860,000**	**42,300,000**

LANDIS & ASSOCIATES
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CARLSBAD CA, 92008
(760) 533-5909

APRIL 11, 2007

MS. JAYNE STROMMER
STORMWATER PROGRAM
CITY OF VISTA
600 EUCALYPTUS AVE
VISTA, CA 92082

SUBJECT: DISCHARGE ESTIMATE IN BUENA VISTA CREEK

DEAR JAYNE,

AS WE DISCUSSED YESTERDAY, HERE ARE MY RESULTS OF THE ESTIMATION OF DISCHARGE IN BUENA VISTA CREEK AT THE STREAM GAGE NEAR EL CAMINO AVE. BRIDGE. THIS WORK WAS COMPLETED APRIL 10, 2007 AT 1:30 PM.

METHOD

RECONNED BOTH SIDES OF THE CREEK FROM BELOW W. VISTA WAY BRIDGE TO 600 FT. UPSTREAM OF GAGE TO OBSERVE CURRENT FLOW CONDITIONS AND TO IDENTIFY THE BEST X-SECTION FOR THE FLOW ESTIMATE.

I USED USGS TECHNIQUES OF WATER RESOURCE INVESTIGATION PROCEDURES FOR THIS ESTIMATE. THE FLOW X-SECTION WAS MEASURED AND THE VELOCITY WAS ESTIMATED USING LITERAL DRIFT.

DISCHARGE WAS THEN COMPUTED USING THE X-SECTION AREA (A) AND ESTIMATED VELOCITY (V) ; Q=VA.

RESULTS

FLOW CONDITIONS IN THE REACH ARE TYPICAL OF A CHOCKED CHANNEL, LOW FLOWS, WITH BRAIDED, MULTI-CHANNEL FLOW ACROSS THE CHANNEL AND UPSTREAM AND DOWNSTREAM OF THE GAGE CONTROL. THERE WAS SHEET FLOW AT THE GAGE AND PONDING CONDITIONS IN EACH BRIDGE CHANNEL REACH.

THE X-SECTION USED FOR THE FLOW ESTIMATE WAS IN TWO CHANNELS AND 600 FT DOWNSTREAM OF GAGE. THE ENTIRE X-SECTION WAS INSPECTED TO IDENTIFY ALL CHANNELS WITH FLOW. RESULTS OF THE FLOW ESTIMATE ARE LISTED BELOW, ALL FIELD NOTES AND CALCULATIONS ARE AVAILABLE IF YOU WISH.

	SECTION 1	SECTION 2
AREA	1.5 FT^2	0.9 FT^2
VELOCITY	1.3 FT/SEC	0.7 FT/SEC
Q	2 CFS	0.6 CFS

TOTAL DISCHARGE = 2.6 CFS

IF YOU SHOULD HAVE ANY QUESTIONS OR NEED ADDITIONAL INFORMATION PLEASE GIVE ME A CALL.

SINCERELY,

TIMOTHY P. LANDIS, P.H.

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-1	4/1/07	11:00 PM	Cari Dale, Asst GM CMWD	Containment of BV Station	Preventing additional sewage from entering lagoon
C-2	4/1/07	11:00 PM	Cari Dale, Asst GM CMWD	Containment of BV Station	Preventing additional sewage from entering lagoon
C-3	4/1/07		Cari Dale, Asst GM CMWD	Excavation of leak area	Quick action to contain spill
C-4	4/1/07		Cari Dale, Asst GM CMWD	Excavation by Carlsbad of break site	Quick action to contain spill
C-5	4/1/07	Midnight	Cari Dale, Asst GM CMWD	Manhole at Jefferson / I-5 Freeway	Majority of flow pumping through to gravity line
C-6	4/2/07	Early AM	Cari Dale, Asst GM CMWD	Continuing to clear area	Quick action to contain spill
C-7	4/2/07	Early AM	Cari Dale, Asst GM CMWD	Outflows from break	Documents spill event
C-8	4/2/07	Early AM	Cari Dale, Asst GM CMWD	Posting signs at lagoon	Quick action to contain spill
C-9	4/2/07	Early AM	Cari Dale, Asst GM CMWD	3 vactors and 1 pumping truck removing flows and transporting to gravity line	Quick action to contain spill
C-10	4/2/07	Early AM	Cari Dale, Asst GM CMWD	Pumper truck at BV station. View looking north	Preventing additional sewage from entering lagoon
C-11	4/2/07	AM	Cari Dale, Asst GM CMWD	Glenn Pruim interview	Informing the media and public
C-12	4/2/07	AM	Cari Dale, Asst GM CMWD	Glenn Pruim interview	Informing the media and public
C-13	4/2/07	AM	Cari Dale, Asst GM CMWD	Carlsbad crews expose forcemain to the east of the repair site in prep for hi-line (above-ground piping) installation	Quick action to contain spill
C-14	4/2/07	AM	Cari Dale, Asst GM CMWD	Carlsbad crews expose forcemain to the east of the repair site in prep for hi-line (above-ground piping) installation	Quick action to contain spill
C-15	4/2/07	AM	Cari Dale, Asst GM CMWD	Containment of area at BV station	Quick action to contain spill
C-16	4/2/07	AM	Cari Dale, Asst GM CMWD	BV Station holding area upwelling from gravity manhole. Normally flows to wet well (suction side of the pumps)	Quick action to contain spill
C-17	4/2/07	AM	Cari Dale, Asst GM CMWD	5500 Tanker removing sewage from BV Stateion	Quick action to contain spill
C-18	4/2/07	AM	Cari Dale, Asst GM CMWD	2 -5,500 gallon tankers removing sewage from BV Station	Quick action to contain spill
C-19	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring on truck	Quick action to contain spill
C-20	4/3/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring placement with crane	Quick action to contain spill
C-21	4/3/07	PM	Cari Dale, Asst GM CMWD	Carlsbad crews continuing to expose pressurized line for hi-line	Quick action to contain spill
C-22	4/2/07	PM	Cari Dale, Asst GM CMWD	Shee tpile shoring moved by crane	Quick action to contain spill
C-23	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring moved by crane	Quick action to contain spill
C-24	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-25	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-26	4/3/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring moved by crane	Quick action to contain spill
C-27	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-28	4/3/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-29	4/2/07	PM	Cari Dale, Asst GM CMWD	North side of shore pile shoring in place around repair site	Quick action to contain spill

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-30	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring placement equipment	Quick action to contain spill
C-31	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring placement equipment	Quick action to contain spill
C-32	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-33	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-34	4/2/07	PM	Cari Dale, Asst GM CMWD	Sheet pile shoring being driven into ground	Quick action to contain spill
C-35	4/2/07	PM	Cari Dale, Asst GM CMWD	Exposing forcemain near bridge for hi-line	Quick action to contain spill
C-36	4/2/07	PM	Cari Dale, Asst GM CMWD	Jackhammer for cement removal around pipe in area being exposed for hi-line	Quick action to contain spill
C-37	4/2/07	PM	Cari Dale, Asst GM CMWD	Backhoe Operators by Carlsbad for hi-line prep work	Quick action to contain spill
C-38	4/2/07	PM	Cari Dale, Asst GM CMWD	Backhoe Operators by Carlsbad for hi-line prep work	Quick action to contain spill
C-39	4/2/07	PM	Cari Dale, Asst GM CMWD	Jackhammering of concrete around forcemain	Quick action to contain spill
C-40	4/2/07	PM	Cari Dale, Asst GM CMWD	Carlsbad backhoe operator	Quick action to contain spill
C-41	4/2/07	PM	Cari Dale, Asst GM CMWD	Jackhammering pipe-prep for hi-line	Quick action to contain spill
C-42	4/2/07	PM	Cari Dale, Asst GM CMWD	Jackhammering pipe-prep for hi-line	Quick action to contain spill
C-43	4/2/07	PM	Cari Dale, Asst GM CMWD	Shore pile shoring being driven into ground. Carlsbad discusses with contractor	Documents spill event
C-44	4/2/07	PM	Cari Dale, Asst GM CMWD	Shore pile shoring being driven into ground. Carlsbad discusses with contractor	Documents spill event
C-45	4/2/07	PM	Cari Dale, Asst GM CMWD	Shore pile shoring being driven into ground.	Documents spill event
C-46	4/2/07	PM	Cari Dale, Asst GM CMWD	Shore pile shoring being driven into ground.	Documents spill event
C-47	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Saw cutting old pipe from forcemain	Documents spill event
C-48	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Saw cutting old pipe from forcemain	Documents spill event
C-49	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Saw cutting old pipe from forcemain	Documents spill event
C-50	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Saw cutting old pipe from forcemain	Documents spill event
C-51	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Discharge from circular pump on north side of lagoon in Oceanside	Aeration/Circulation efforts
C-52	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Close up - discharge from Circ. Pump	Aeration/Circulation efforts
C-53	4/3/07	7:00 AM	Cari Dale, Asst GM CMWD	Closeup of intake pump on north side of lagoon in Oceanside	Aeration/Circulation efforts
C-54	4/3/07	AM	Cari Dale, Asst GM CMWD	Removal of 1/2 pipe from forcemain work area	Documents spill event
C-55	4/3/07	AM	Cari Dale, Asst GM CMWD	Removal of 1/2 pipe from forcemain work area	Documents spill event
C-56	4/3/07	AM	Cari Dale, Asst GM CMWD	Removal of 1/2 pipe from forcemain work area	Documents spill event
C-57	4/3/07	AM	Cari Dale, Asst GM CMWD	Closeup of 1/2 pipe removed from forcemain.	Shows area broken away from use of pry bar to dislodge pipe

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-58	4/3/07	PM	Cari Dale, Asst GM CMWD	Glenn Pruim inspecting pry bar broken area	Documents spill event
C-59	4/3/07	PM	Cari Dale, Asst GM CMWD	Glenn Pruim inspecting pry bar broken area	Documents spill event
C-60	4/3/07	PM	Cari Dale, Asst GM CMWD	Closeup of prybar area broken on 1/2 piece of pipe	Documents spill event
C-61	4/3/07	PM	Cari Dale, Asst GM CMWD	Saw cutting of damaged section of pipe	Placement of hole relative to pipe position
C-62	4/3/07	PM	Cari Dale, Asst GM CMWD	Close up of saw cutting of damaged section of pipe	Placement of hole relative to pipe position
C-63	4/3/07	PM	Cari Dale, Asst GM CMWD	Close up of saw cutting of damaged section of pipe	Placement of hole relative to pipe position
C-64	4/3/07	PM	Cari Dale, Asst GM CMWD	Close up of saw cutting of damaged section of pipe - Also shows sheet pile shoring and depth of pipe	Placement of hole relative to pipe position
C-65	4/3/07	PM	Cari Dale, Asst GM CMWD	Shows sheet pile shoring and depth of pipe	Aeration/Circ. Ocurring during pipeline repairs
C-66	4/3/07	PM	Cari Dale, Asst GM CMWD	Shows sheet pile shoring and depth of pipe	Aeration/Circ. Ocurring during pipeline repairs
C-67	4/3/07	PM	Cari Dale, Asst GM CMWD	Shows sheet pile shoring and depth of pipe	Aeration/Circ. Ocurring during pipeline repairs
C-68	4/3/07	PM	Cari Dale, Asst GM CMWD	Shows sheet pile shoring and depth of pipe	Aeration/Circ. Ocurring during pipeline repairs
C-69	4/3/07	PM	Cari Dale, Asst GM CMWD	Shows sheet pile shoring and depth of pipe	Aeration/Circ. Ocurring during pipeline repairs
C-70	4/3/07	PM	Cari Dale, Asst GM CMWD	Closeup of sawcutting efforts and placement of hole	Documents spill event
C-71	4/3/07	PM	Cari Dale, Asst GM CMWD	Saw cutting pipe	Documents spill event
C-72	4/3/07	PM	Cari Dale, Asst GM CMWD	Placement of aeration equipment relative to repair area	Documents spill event
C-73	4/3/07	PM	Cari Dale, Asst GM CMWD	Recirc/Aeration at north side of lagoon in Oceanside	Documents spill event
C-74	4/3/07	PM	Cari Dale, Asst GM CMWD	Close-up - Recirc/Aeration at north side of lagoon in Oceanside	Documents spill event
C-75	4/3/07	PM	Cari Dale, Asst GM CMWD	Liquid holding area at BV pump station. 5,500 gallon pumper truck removing sewage (in background)	Documents spill event
C-76	4/3/07	PM	Cari Dale, Asst GM CMWD	Liquid holding area at BV pump station	Documents spill event
C-77	4/3/07	PM	Cari Dale, Asst GM CMWD	Liquid holding area at BV pump station	Documents spill event
C-78	4/3/07	PM	Cari Dale, Asst GM CMWD	5,500 gallon tanker at drive of BV station - removal of sewage - transported to gravity line on Jefferson	Documents spill event
C-79	4/3/07	PM	Cari Dale, Asst GM CMWD	Liquid holding area at BV station looking west	Documents spill event
C-80	4/3/07	PM	Cari Dale, Asst GM CMWD	5,500 gallon tanker removing sewage from BV station holding area	Documents spill event
C-81	4/3/07	PM	Cari Dale, Asst GM CMWD	BV holding station area	Documents spill event

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-82	4/3/07	PM	Cari Dale, Asst GM CMWD	Damaged section of pipe	Documents spill event
C-83	4/3/07	PM	Cari Dale, Asst GM CMWD	Close-up of damaged section of pipe	Documents spill event
C-84	4/3/07	PM	Cari Dale, Asst GM CMWD	Flex couplings arrive	Documents spill event
C-85	4/3/07	PM	Cari Dale, Asst GM CMWD	Damaged section of pipe	Documents spill event
C-86	4/3/07	PM	Cari Dale, Asst GM CMWD	Prepping new pipe for installation	Documents spill event
C-87	4/3/07	PM	Cari Dale, Asst GM CMWD	Litter removal from parking lot	Documents spill event
C-88	4/3/07	PM	Cari Dale, Asst GM CMWD	Flow to creek when holding area breached	Documents spill event
C-89	4/3/07	PM	Cari Dale, Asst GM CMWD	Stormdrain flow to creek at BV lift station drive	Documents spill event
C-90	4/3/07	PM	Cari Dale, Asst GM CMWD	Aerial documentation	Documents spill event
C-91	4/2/07		Cari Dale, Asst GM CMWD	Aeration west of repair site, south side of lagoon	Documents spill event
C-92	4/3/07	PM	Cari Dale, Asst GM CMWD	Vadnais (contractor) tightening screws on flex coupling	Documents spill event
C-93	4/3/07	PM	Cari Dale, Asst GM CMWD	hi-line pipe in place on Jefferson	Documents spill event
C-94	4/3/07	PM	Cari Dale, Asst GM CMWD	hi-line pipe in place on Jefferson	Documents spill event
C-95	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Placing circulation hose in place at northside of Jefferson bridge	Documents spill event
C-96	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Clean-up at BV pump station	Documents spill event
C-97	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Clean-up at BV pump station - return flows to bar screen area - pumper back to station	Documents spill event
C-98	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Pump back from creek	Documents spill event
C-99	4/3/07		Cari Dale, Asst GM CMWD	Paper left from holding sewage in compound	Documents spill event
C-100	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Return pump back from creek	Documents spill event
C-101	4/3/07	6:00 PM	Cari Dale, Asst GM CMWD	Pump back from the creek	Documents spill event
C-102	4/3/07	PM	Cari Dale, Asst GM CMWD	Secured repair area	Documents spill event
C-103	4/3/07	PM	Cari Dale, Asst GM CMWD	Looking across lagoon to the north	Documents spill event
C-104	4/3/07	PM	Cari Dale, Asst GM CMWD	Lagoon area	Documents spill event
C-105	4/2/07	Mid Day	Ronnie Kaufold - Vadnais Corp.	McMahon construction unloading I-beams	Materials used to shore trench
C-106	4/2/07	PM	Ronnie Kaufold - Vadnais Corp.	Pilings starting to excavate	Shows trend prior to excavation
C-107	4/2/07	PM	Ronnie Kaufold - Vadnais Corp.	Lagoon Side of Pilings	Shows trend prior to excavation
C-108	4/2/07	PM	Ronnie Kaufold - Vadnais Corp.	Lagoon Side of Pilings	Shows trend prior to excavation
C-109	4/2/07	PM	Ronnie Kaufold - Vadnais Corp.	Pilings being installed on south side - opposite of lagoon	Shows trend prior to excavation
C-110	4/2/07	PM	Ronnie Kaufold - Vadnais Corp.	McMahon setting lagoon side of pilings	Materials used to shore trench
C-111	4/3/07	AM	Ronnie Kaufold - Vadnais Corp.	Shows hole in 24" ductile iron pipe	Pic Taken in trench, pipe in place
C-112	4/3/07	AM	Ronnie Kaufold - Vadnais Corp.	Contractors hand digging under force main	Documents leak repair
C-113	4/3/07	AM	Ronnie Kaufold - Vadnais Corp.	Cutting out section of force main	Documents leak repair

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-114	4/3/07	AM	Ronnie Kaufold - Vadnais Corp.	3'9" section cut out of 24" ductile iron pipeline (forcemain)	Documents leak repair
C-115	4/3/07	AM	Ronnie Kaufold - Vadnais Corp.	Contractor tightening flex couplings on force main	Documents leak repair
C-116	4/5/07	PM	Ronnie Kaufold - Vadnais Corp.	Contractor backfilling (using native soil up to 18" below grade), also shows pilings cut down 2' below grade	Documents leak repair
C-117	4/5/07	PM	Ronnie Kaufold - Vadnais Corp.	Shows aeration pumping on lagoon view side/slope being backfilled	Documents spill event
C-118	4/5/07		Ronnie Kaufold - Vadnais Corp.	Shows pilings cut down on southside of trench	So Contractor could backfill
C-119	4/5/07	Mid Day	Ronnie Kaufold - Vadnais Corp.	Contractor backfilling	Documents spill event
C-120	4/6/07	PM	Ronnie Kaufold - Vadnais Corp.	Contractor installing erosion BMP's, rain expected - will keep soil in place	Documents spill event
C-121	4/6/07	PM	Ronnie Kaufold - Vadnais Corp.	Contractor installing erosion BMP's, rain expected - will keep soil in place	Documents spill event
C-122	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter (SD Fire) landing north side of the creek to pick up Fish and Game and City representatives	Documents spill event
C-123	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter (SD Fire) landing north side of the creek to pick up Fish and Game and City representatives	Documents spill event
C-124	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Cleaning the landing site for the helicoptor	Documents spill event
C-125	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Lagoon view looking southeast from the northshore	Documents spill event
C-126	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Elaine Lukey in helicoptor, representing the City on the flight and is the Stormwater Manager	Documents spill event
C-127	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Joe Garuba in the helicoptor. Joe works in City Manager's office and was in charge of logistics for the incident	Documents spill event
C-128	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Southeast view of lagoon from north shore	Documents spill event
C-129	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Southeast view of lagoon . The incident site is visible in the distance	Documents spill event
C-130	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Southern view of lagoon	Documents spill event
C-131	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of northeast portion of lagoon. Water clarity different in small pool	Documents spill event
C-132	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of northeast portion of lagoon. Water clarity different in small pool	Documents spill event
C-133	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Westerly view of lagoon. No visible plume line in east basin	Documents spill event

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-134	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Visual assessment of east basin. Water color different in small pools. No visible plume line in lagoon	Documents spill event
C-135	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Visual assessment of east basin. Water color different in small pools. No visible plume line in lagoon	Documents spill event
C-136	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Visual assessment of east basin. Water color different in small pools. No visible plume line in lagoon	Documents spill event
C-137	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of east basin. No plume line in lagoon	Documents spill event
C-138	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of middle basin. Water color appeared to be different than east basin. Plume did not appear to have crossed under the 5 Freeway	Documents spill event
C-139	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of middle basin. Water color appeared to be different than east basin. Plume did not appear to have crossed under the 5 Freeway	Documents spill event
C-140	4/2/07	PM	Kevin Johnstone, Volunteer CFD	view of middle basin. Water color appeared to be different than east basin. Plume did not appear to have moved into middle basin	Documents spill event
C-141	4/2/07	PM	Kevin Johnstone, Volunteer CFD	view of middle basin. Water color appeared to be different than east basin. Plume did not appear to have moved into middle basin	Documents spill event
C-142	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Southern view of middle lagoon. Plume does not appear to have crossed the 5 freeway	Documents spill event
C-143	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South west view of middle lagoon - no visible plume line	Documents spill event
C-144	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Southern view of middle and west lagoon. No color difference, no signs of contamination	Documents spill event
C-145	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the coast (southern). No signs of the plume or release into the ocean	Documents spill event
C-146	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the coast (southern). No signs of the plume or release into the ocean	Documents spill event
C-147	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the coast (southern). No signs of the plume or release into the ocean	Documents spill event

Buena Vista Spill Photos
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PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-148	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South easterly view of lagoon Water is flowing from lagoon (over the weir) into the ocean	Documents spill event
C-149	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South easterly view of lagoon Water is flowing from lagoon (over the weir) into the ocean	Documents spill event
C-150	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South easterly view of lagoon Water is flowing from lagoon (over the weir) into the ocean	Documents spill event
C-151	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Easterly view of whole lagoon. No visible plume line	Documents spill event
C-152	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Easterly view of whole lagoon. No visible plume line	Documents spill event
C-153	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Easterly view of whole lagoon. No visible plume line. Water over the weir and into the ocean	Documents spill event
C-154	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northeasterly view of lagoon. No plume visible	Documents spill event
C-155	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the weir. Water is flowing out of lagoon and into ocean	Documents spill event
C-156	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the weir. Water is flowing out of lagoon and into ocean	Documents spill event
C-157	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of the weir. Water is flowing out of lagoon and into ocean	Documents spill event
C-158	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North east view of middle lagoon. No visible plume line	Documents spill event
C-159	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North east view of middle lagoon. No visible plume line	Documents spill event
C-160	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of west/middle lagoon	Documents spill event
C-161	4/2/07	PM	Kevin Johnstone, Volunteer CFD	view of middle lagoon. No visible spill plume	Documents spill event
C-162	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northeast view of middle lagoon. Water color is actually cloud reflection	Documents spill event
C-163	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of middle lagoon. No visible spill plume	Documents spill event
C-164	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of middle lagoon. No visible spill plume	Documents spill event
C-165	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northwest view of middle lagoon. No visible plume line	Documents spill event
C-166	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northwest view of middle lagoon. No visible plume line	Documents spill event

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-167	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northern view of middle lagoon and connection under the 5. No visible plume lines	Documents spill event
C-168	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northern view of middle lagoon and connection under the 5. No visible plume lines	Documents spill event
C-169	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of east lagoon. Sampling boat visible in lower portion of picture	Documents spill event
C-170	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northeast view of east lagoon. Sample boat in lower left corner. Aeration crew in upper right corner	Documents spill event
C-171	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Northeast view of lagoon (east basin) Aeration visible in upper right corner of picture	Documents spill event
C-172	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of east lagoon. No plume visible	Documents spill event
C-173	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of eastern lagoon. Image covers spill site	Documents spill event
C-174	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of eastern lagoon. Image covers spill site	Documents spill event
C-175	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of eastern lagoon. Image covers spill site	Documents spill event
C-176	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North view of east lagoon. Helicoptor landing site in upper part of picture	Documents spill event
C-177	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. Spill site	Documents spill event
C-178	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Spill site staging area and pipe repair in middle of picture on right side	Documents spill event
C-179	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Spill site staging area and pipe repair in middle of picture on right side	Documents spill event
C-180	4/2/07	PM	Kevin Johnstone, Volunteer CFD	North west view of spill site. No plume detectable	Documents spill event
C-181	4/2/07	PM	Kevin Johnstone, Volunteer CFD	View of spill site and pipe repair. 2nd aeration visible middle left of picture	Documents spill event
C-182	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Spill site and pipe repair efforts. Staging area is located next to parking lots	Documents spill event
C-183	4/2/07	PM	Kevin Johnstone, Volunteer CFD	West view of pipe repair and spill site. No plume visible	Documents spill event
C-184	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Aeration of lagoon visible in lower portion. No plume visible	Documents spill event
C-185	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Spill site and aeration on north shore and on bridge	Documents spill event

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City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-186	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Spill site and aeration on north shore and on bridge	Documents spill event
C-187	4/2/07	PM	Kevin Johnstone, Volunteer CFD	West view of east lagoon	Documents spill event
C-188	4/2/07	PM	Kevin Johnstone, Volunteer CFD	West view of east lagoon	Documents spill event
C-189	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South view of work site	Documents spill event
C-190	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South view of work site	Documents spill event
C-191	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon, color variation in smaller ponds	Documents spill event
C-192	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon, color variation in smaller ponds	Documents spill event
C-193	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site	Documents spill event
C-194	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site	Documents spill event
C-195	4/2/07	PM	Kevin Johnstone, Volunteer CFD	South view of east lagoon. No plume visible	Documents spill event
C-196	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site	Documents spill event
C-197	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site	Documents spill event
C-198	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of Elaine Lukey spotting "bigfoot"	Documents spill event
C-199	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of Plaza Camino Real mall adjacent to the lagoon	Documents spill event
C-200	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Field photo	Documents spill event
C-201	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of high line pipe being layed out on Jefferson Street	Documents spill event
C-202	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of high line pipe being layed out on Jefferson Street	Documents spill event
C-203	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of north shore aeration site	Documents spill event
C-204	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of north shore aeration site	Documents spill event
C-205	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of north shore aeration site	Documents spill event
C-206	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of north shore aeration site	Documents spill event
C-207	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of north shore aeration site	Documents spill event
C-208	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Middle lagoon. No spill plume evident	Documents spill event
C-209	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Middle lagoon. No spill plume evident	Documents spill event
C-210	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-211	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event

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PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-212	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-213	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-214	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-215	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-216	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-217	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-218	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-219	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of east lagoon crossing under I-5 into middle lagoon. Color difference assumed to be end of spill plume. Plume did not appear to extend west of freeway	Documents spill event
C-220	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-221	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-222	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event

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City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-223	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-224	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-225	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-226	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-227	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-228	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-229	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-230	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-231	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-232	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-233	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-234	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-235	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event

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City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-236	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-237	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-238	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of lift station and overflow (containment) area. Vactor trucks/overflow is visible	Documents spill event
C-239	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-240	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-241	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-242	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-243	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-244	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-245	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-246	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-247	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-248	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-249	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-250	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-251	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-252	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-253	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-254	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event

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PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-255	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-256	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-257	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of work site staging area. Installation of coffer dam visible	Documents spill event
C-258	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-259	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-260	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-261	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-262	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-263	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-264	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-265	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-266	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event

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PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-267	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-268	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-269	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-270	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-271	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-272	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-273	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-274	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-275	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-276	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-277	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event

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PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-278	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-279	4/2/07	PM	Kevin Johnstone, Volunteer CFD	East lagoon. No visible signs of spill plume. Based on water color, plume assumed to have moved through most of east lagoon.	Documents spill event
C-280	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of work site. Pipe repair, aeration, and staging area are visible	Documents spill event
C-281	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photos of work site. Pipe repair, aeration, and staging area are visible	Documents spill event
C-282	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Photo of Chief Chris Heiser who helped coordinate aerial inspection	Documents spill event
C-283	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-284	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-285	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-286	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-287	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-288	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-289	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-290	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-291	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Helicopter landing site and fire engine to secure that site	Documents spill event
C-292	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Consulting with resource agency	Shows level of response from all levels of City staff
C-293	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Emergency Operations Support	Shows level of response from all levels of City staff
C-294	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-295	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-296	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-297	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-298	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-299	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-300	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-301	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-302	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-303	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-304	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-305	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Setting up to divert sewage.	Shows level of response from all levels of City staff
C-306	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-307	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-308	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-309	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-310	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-311	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-312	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View of pump station	Documents spill event
C-313	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-314	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-315	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-316	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-317	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-318	4/3/07	AM	Kevin Johnstone, Volunteer CFD	View from pump station	Documents spill event
C-319	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-320	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-321	4/2/07	PM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-322	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-323	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-324	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-325	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-326	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-327	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-328	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-329	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-330	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-331	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-332	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-333	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-334	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-335	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-336	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-337	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-338	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-339	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-340	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-341	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-342	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-343	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-344	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-345	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-346	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-347	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-348	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-349	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-350	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-351	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-352	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-353	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-354	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-355	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-356	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-357	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Shoring operation begins	Quick response from contractor and staff to stop spill
C-358	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-359	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-360	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-361	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-362	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-363	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-364	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-365	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-366	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-367	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-368	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-369	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-370	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-371	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-372	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-373	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-374	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-375	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-376	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-377	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-378	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-379	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-380	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-381	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-382	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Damaged pipe after removal	Document condition of pipe
C-383	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-384	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-385	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-386	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-387	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-388	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-389	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Contract personnel and City staff delivering	Shows level of response from City staff
C-390	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-391	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-392	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-393	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-394	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-395	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-396	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-397	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-398	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-399	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-400	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-401	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-402	4/3/07	AM	Kevin Johnstone, Volunteer CFD	Preparing for installation of new pipe	Quick response from contractor and staff to stop spill
C-403	4/3/07	8:37 AM	Paul Hartman, Sr. Env. Specialist	Encina staff sampling bacteria at BV01	Sampling required per BV pump station spill response
C-404	4/3/07	9:39 AM	Paul Hartman, Sr. Env. Specialist	Water flowing over weir at beach	Potential for impacts to reach Pacific Ocean
C-405	4/3/07	10:51 AM	Paul Hartman, Sr. Env. Specialist	Weston launching boat in east basin to	Monitoring as required per CDFG
C-406	4/3/07	11:19 AM	Paul Hartman, Sr. Env. Specialist	Weston monitoring for dissolved oxygen in	Documentation
C-407	4/3/07	12:00 PM	Paul Hartman, Sr. Env. Specialist	Encina monitoring bacteria at BV04. Weston	Documentation
C-408	4/3/07	12:03 PM	Paul Hartman, Sr. Env. Specialist	Hole in 24" force main	Cause of spill
C-409	4/3/07	12:03 PM	Paul Hartman, Sr. Env. Specialist	Hole in 24" force main	Cause of spill

Buena Vista Spill Photos
City of Carlsbad

PHOTO #	DATE	TIME	PHOTOGRAPHER	PHOTO SUMMARY	PHOTO RELEVANCE
C-410	4/3/07	12:59 PM	Paul Hartman, Sr. Env. Specialist	Pipe repair	Documentation of repair date and time
C-411	4/3/07	1:13 PM	Paul Hartman, Sr. Env. Specialist	Fire (City of SD) helicopter	Aerial survey of spill site - documentation
C-412	4/4/07	10:08 AM	Paul Hartman, Sr. Env. Specialist	Berm at beach preventing lagoon flow from	Water backed up high enough that weir is submerged
C-413	4/4/07	10:09 AM	Paul Hartman, Sr. Env. Specialist	Berm at beach preventing lagoon flow from	Water backed up high enough that weir is submerged
C-414	4/4/07	10:10 AM	Paul Hartman, Sr. Env. Specialist	Berm at beach preventing lagoon flow from	Water backed up high enough that weir is submerged
C-415	4/4/07	1:56 PM	Paul Hartman, Sr. Env. Specialist	Aeration pump #4	Documentation of aeration in east basin, near "duck
C-416	4/4/07	2:30 PM	Paul Hartman, Sr. Env. Specialist	Aeration pump #1	Documentation of aeration in east basin, north shoreline
C-417	4/4/07	2:30 PM	Paul Hartman, Sr. Env. Specialist	Aeration pump #3 in operation	Documentation of aeration in east basin near Jefferson
C-418	4/4/07	6:16 PM	Paul Hartman, Sr. Env. Specialist	Pylons under Jefferson Street bridge, east	Noting water level on pylons as pump back proceeds.
C-419	4/4/07	6:52 PM	Paul Hartman, Sr. Env. Specialist	Channel just east of I-5	Small, narrow channel of water connecting east and
C-420	4/4/07	6:52 PM	Paul Hartman, Sr. Env. Specialist	Channel just east of I-5	Small, narrow channel of water connecting east and
C-421	4/4/07	6:53 PM	Paul Hartman, Sr. Env. Specialist	Channel just east of I-5	Small, narrow channel of water connecting east and
C-422	4/4/07	6:53 PM	Paul Hartman, Sr. Env. Specialist	East basin, west end, looking east from I-5	Density of plant communities and west end of basin
C-423	4/5/07	7:09 AM	Paul Hartman, Sr. Env. Specialist	Berm at mouth of lagoon	No water from lagoon reaching Pacific Ocean
C-424	4/5/07	7:09 AM	Paul Hartman, Sr. Env. Specialist	Berm in place at outh of lagoon	No lagoon water flowing to surf zone (beach)
C-425	4/5/07	2:14 PM	Paul Hartman, Sr. Env. Specialist	Sinkhole at BV pump station	Conditions after sewage had been pumped from area
C-426	4/5/07	3:14 PM	Paul Hartman, Sr. Env. Specialist	Beach closure signs posted around ponded water west of weir at lagoon mouth	Per SD County Department of Environmental Health
C-427	4/5/07	3:14 PM	Paul Hartman, Sr. Env. Specialist	Beach closure signs posted south of lagoon mouth to Beech Street	Per SD County Department of Environmental Health
C-428	4/5/07	3:16 PM	Paul Hartman, Sr. Env. Specialist	Beach closure signs posted to south of lagoon mouth along beach	Per SD County Department of Environmental Health
C-429	4/5/07	3:16 PM	Paul Hartman, Sr. Env. Specialist	Beach closure signs posted at public access south of lagoon opening	Beach closure signs posted as required per SD County Department of Environmental Health
C-430	4/5/07	4:16 PM	Elaine Lukey, Env. Programs Manager	D.O. Sampling, BV03	Required per CDFG
C-431	4/5/07	4:17 PM	Elaine Lukey, Env. Programs Manager	Preparing to sample D.O. levels at BV03	D.O. monitoring as required per CDFG
C-432	4/5/07	4:17 PM	Elaine Lukey, Env. Programs Manager	Preparing to sample D.O. levels at BV03; demonstrating instrument procedures to Jayne Strommer	D.O. monitoring as required per CDFG
C-433	4/5/07	4:19 PM	Todd Amos, Utility Worker	Sampling for dissolved oxygen at BV08, central basin	Sampling required per CDFG, site added to sampling protocol on 4/3/07
C-434	4/5/07	6:34 PM	Paul Hartman, Sr. Env. Specialist	Erosion/sediment control BMP's in place at spill site after hole has been backfilled.	Stormwater erosion control/sediment control BMP's as required under order 2001-01


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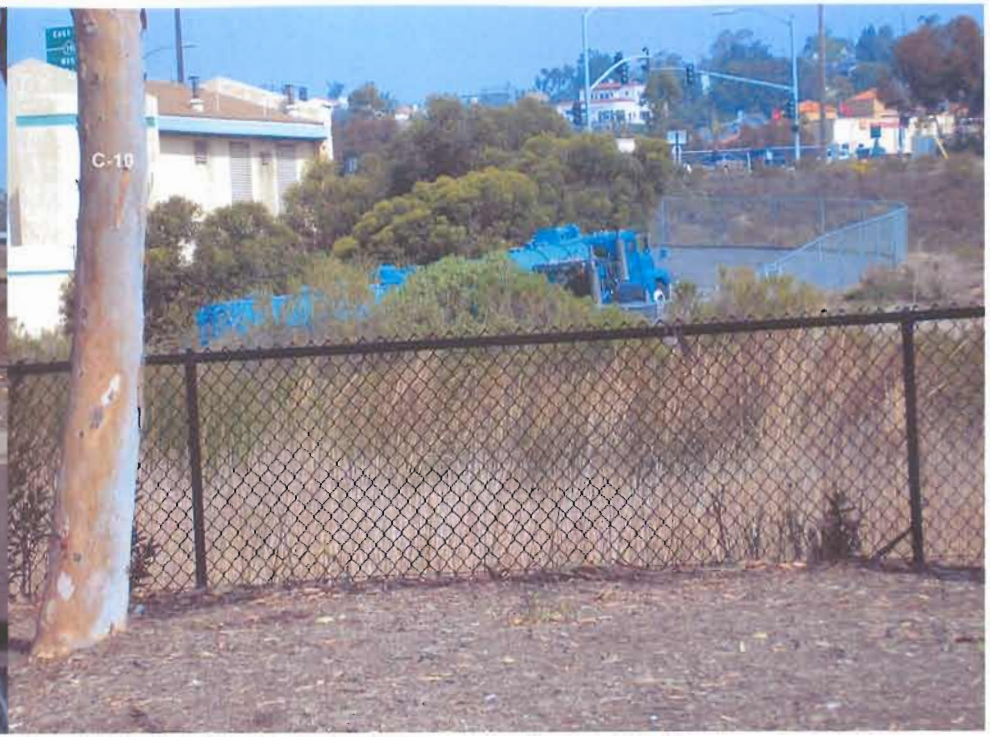
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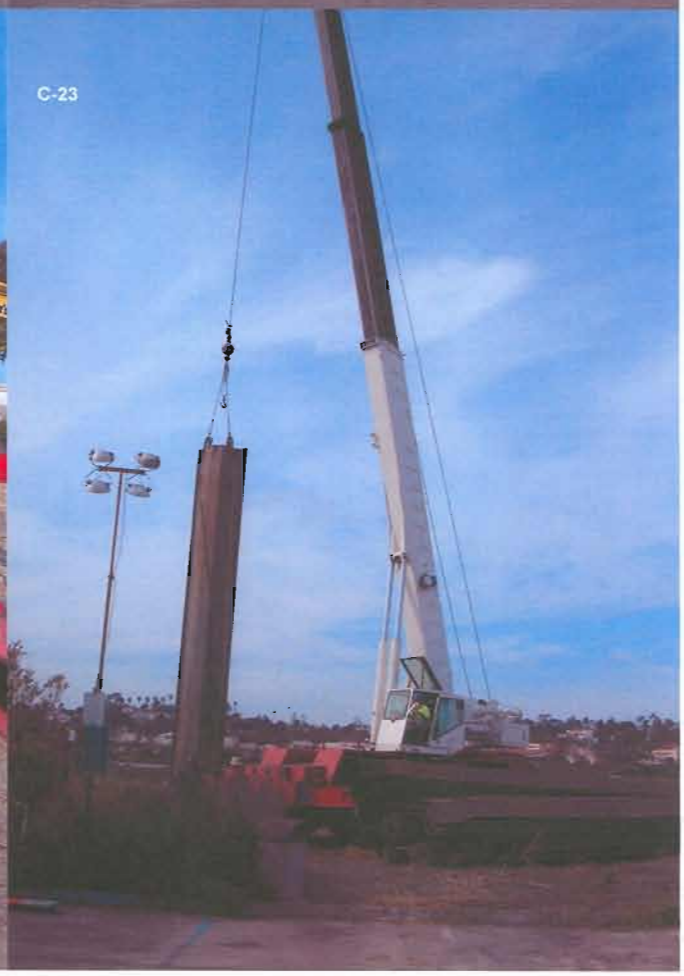
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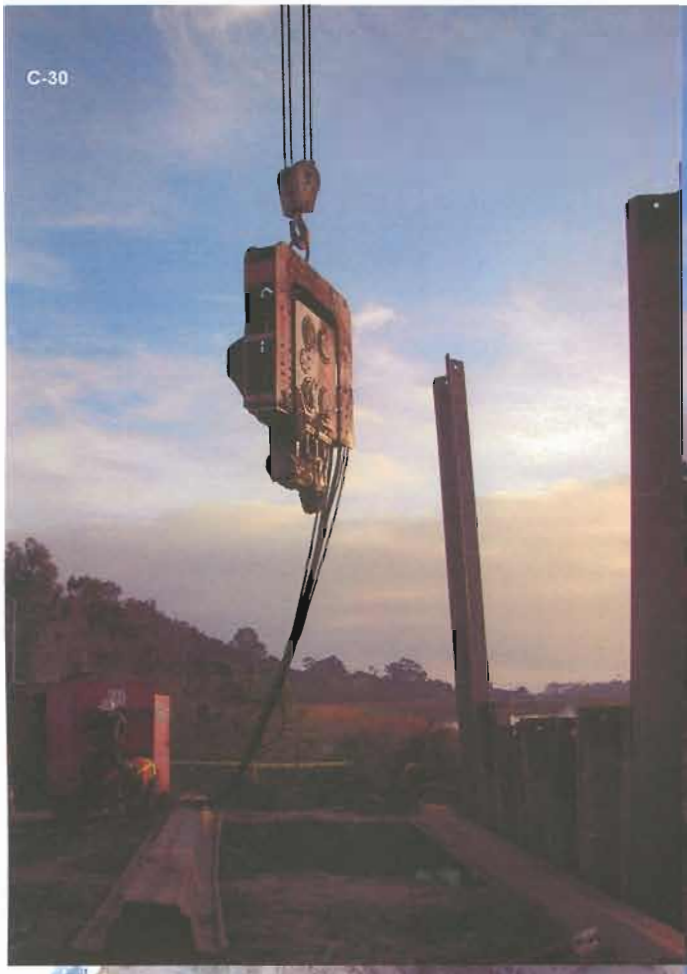
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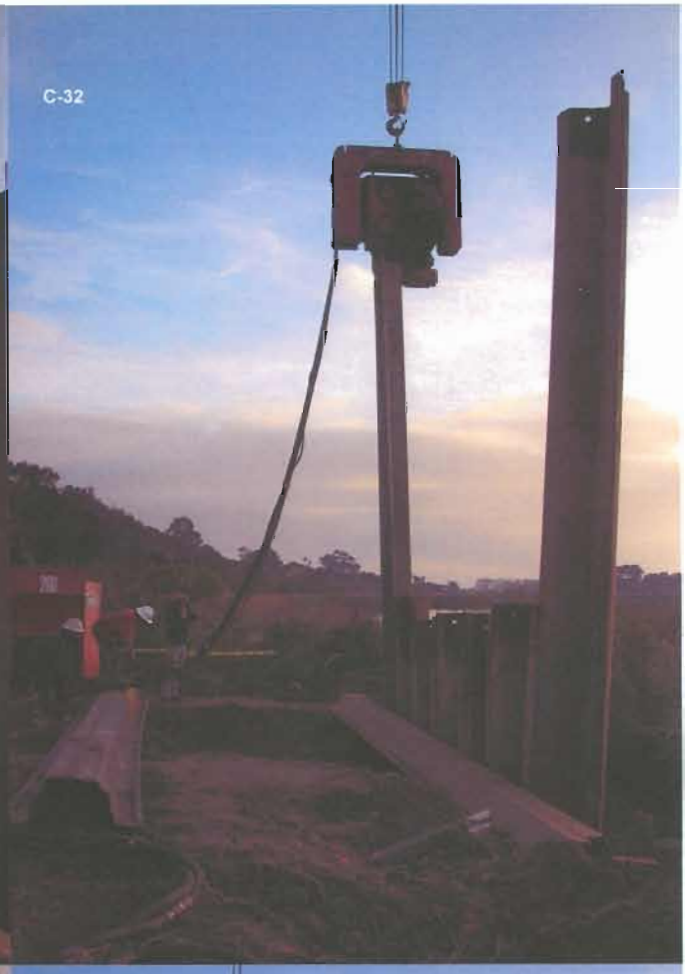
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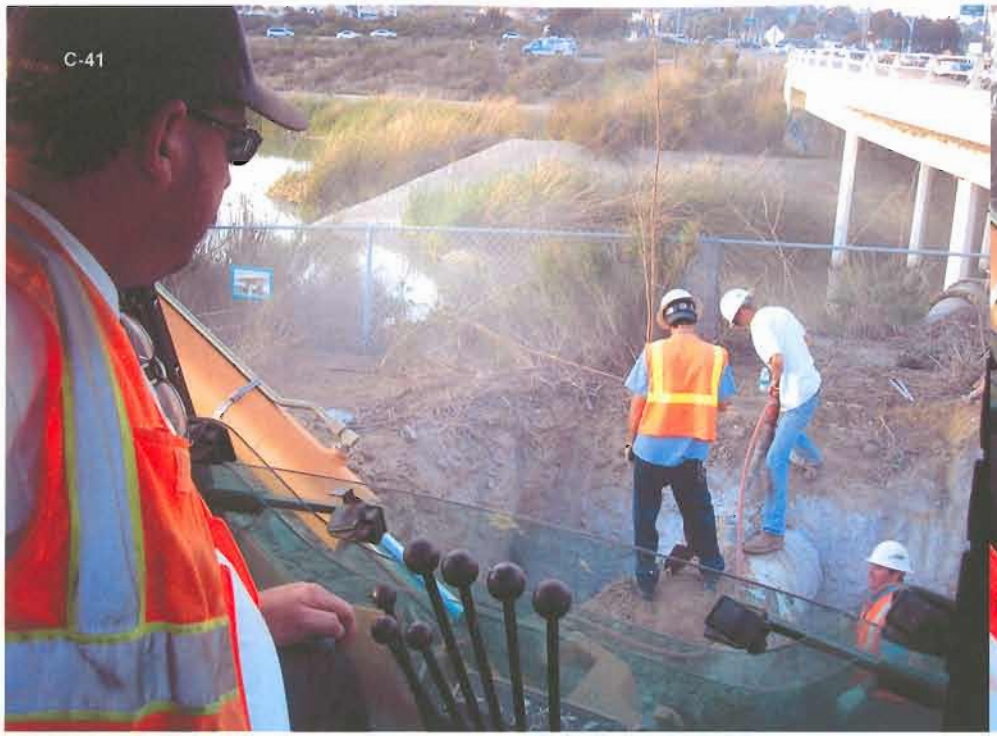
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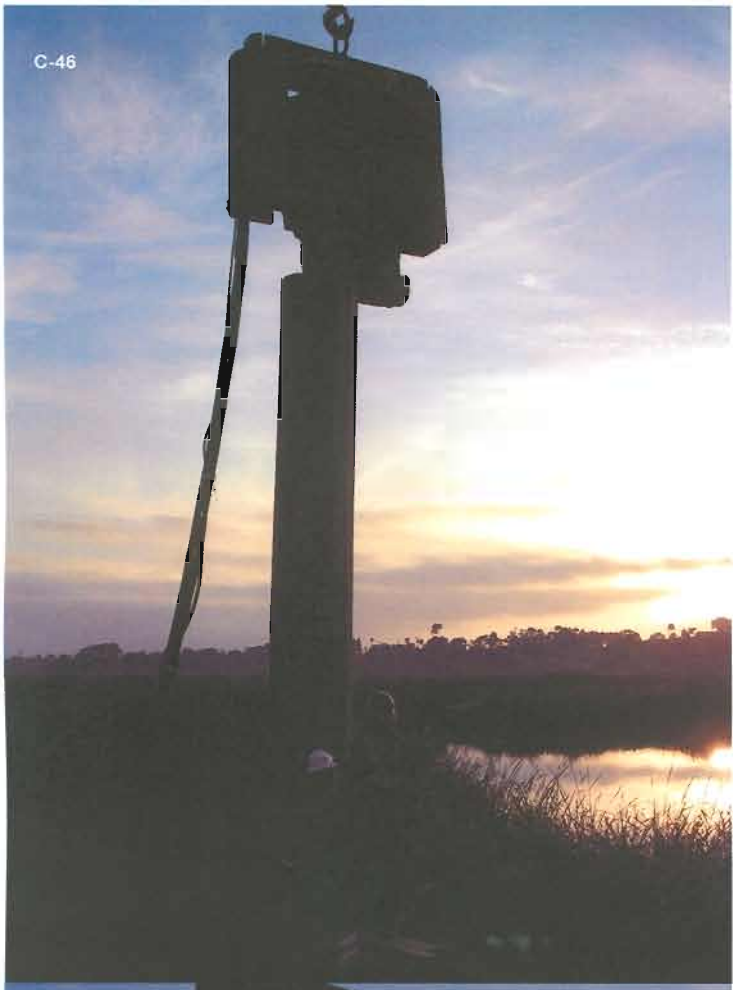

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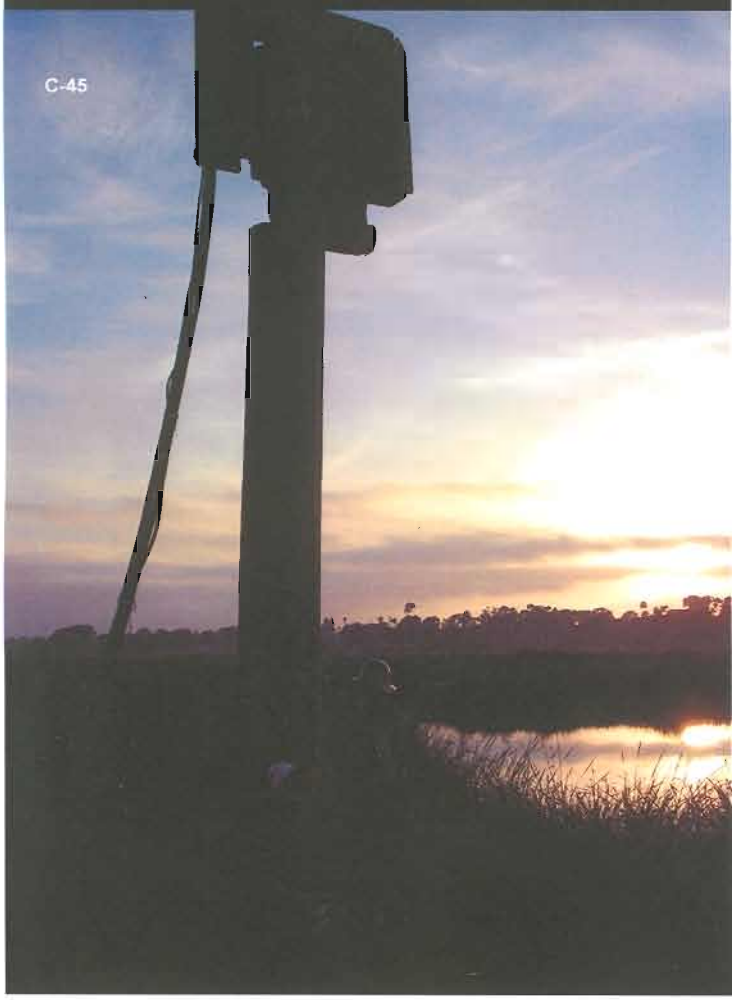

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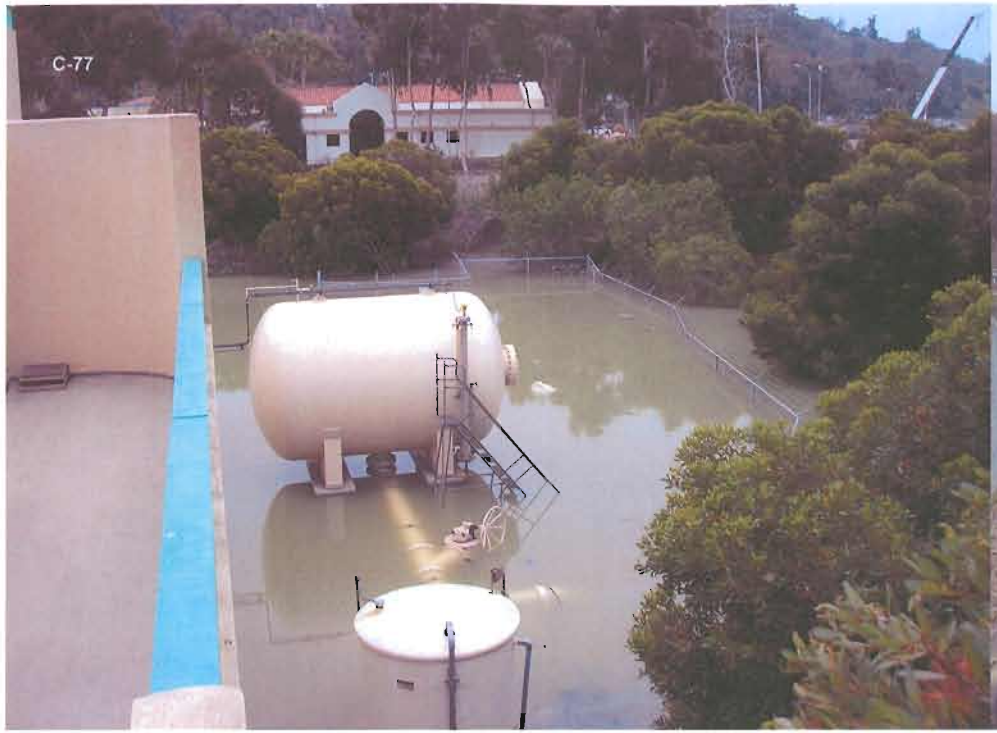
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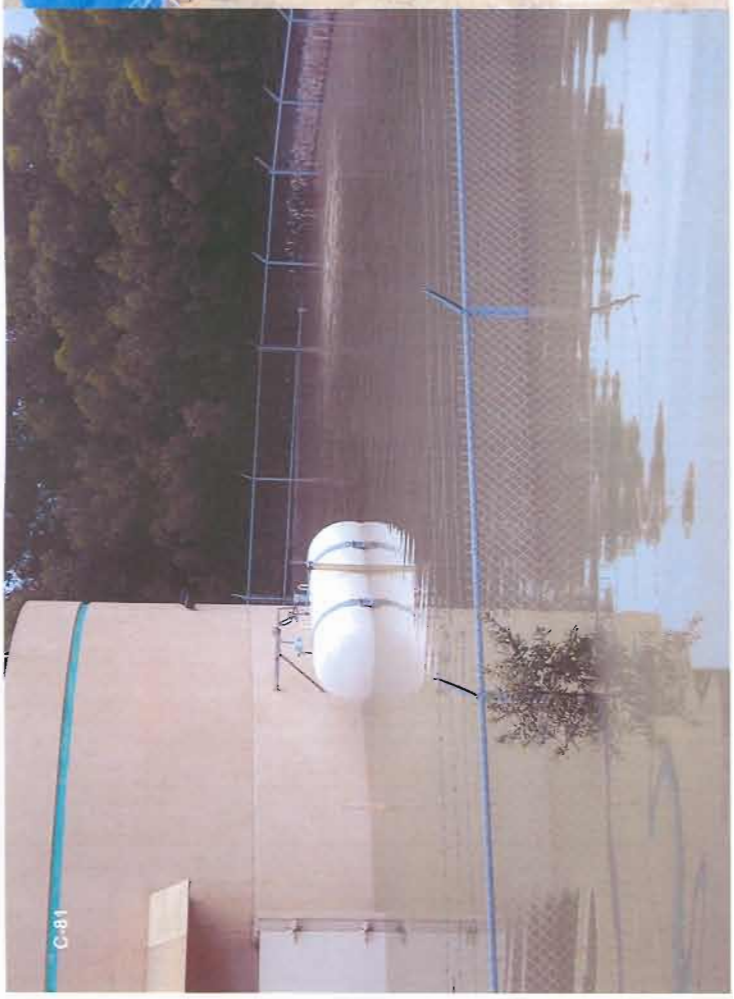
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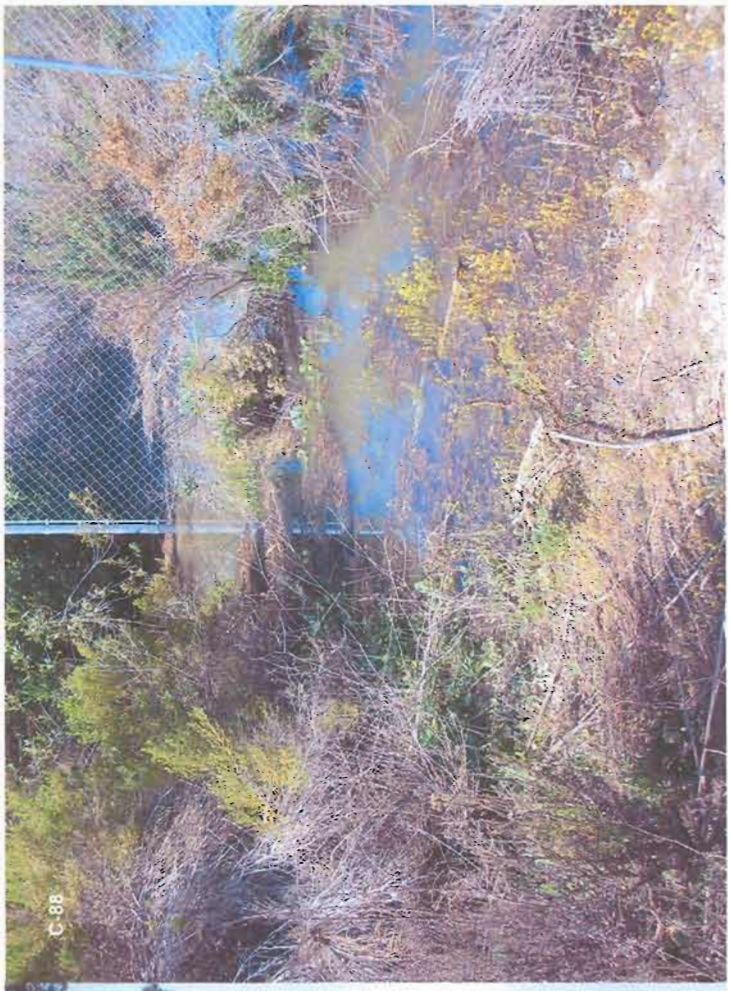

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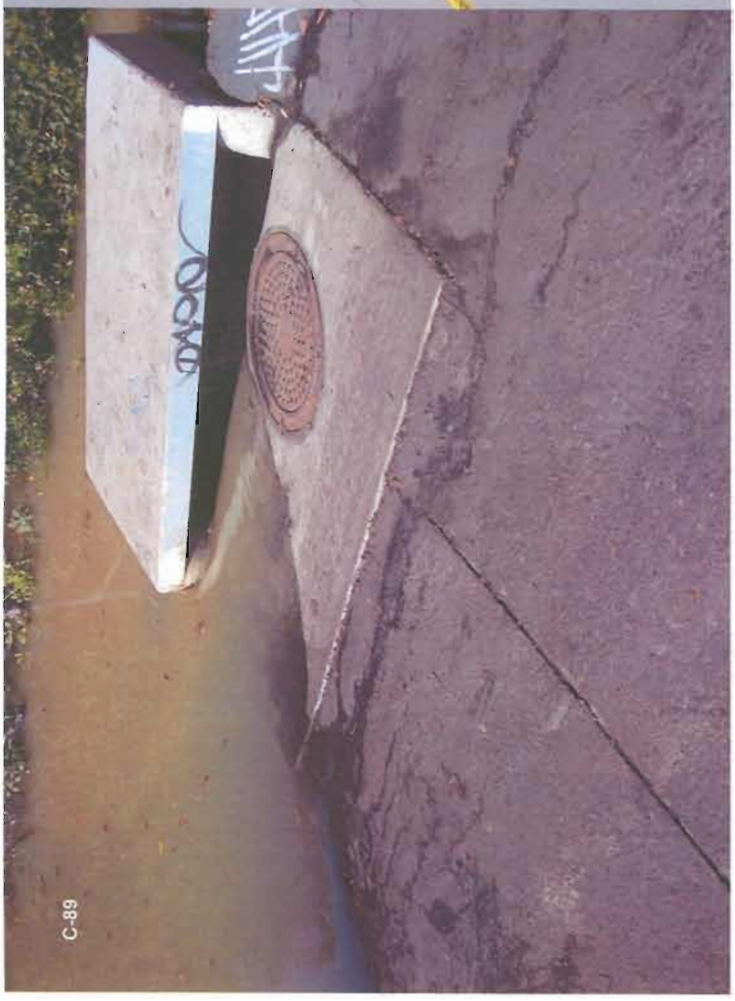
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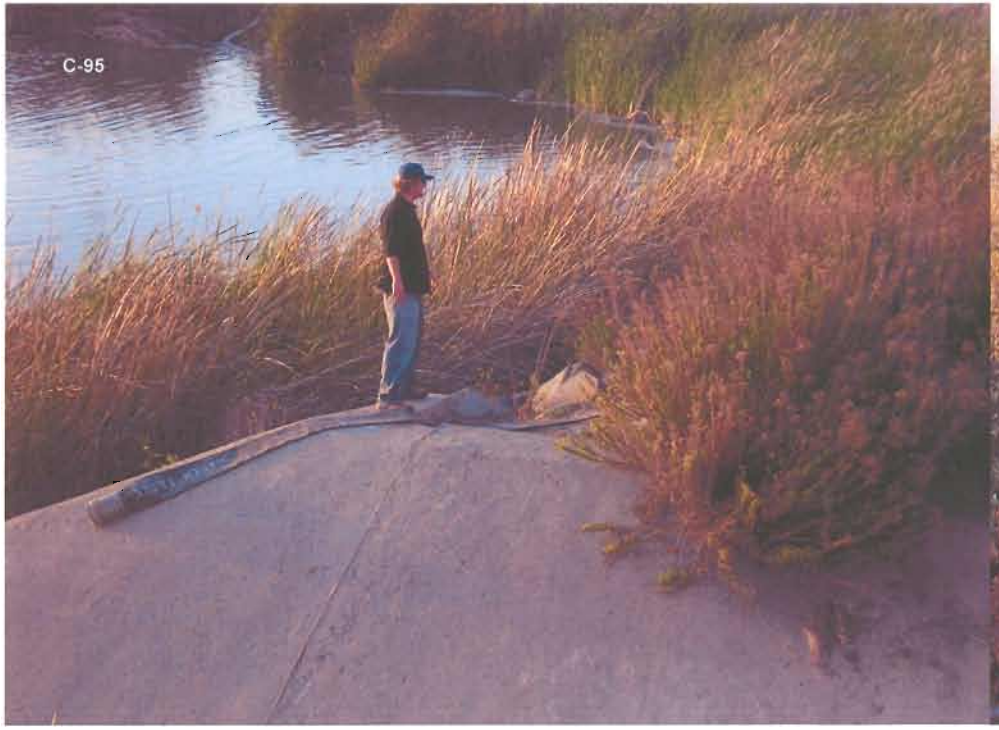
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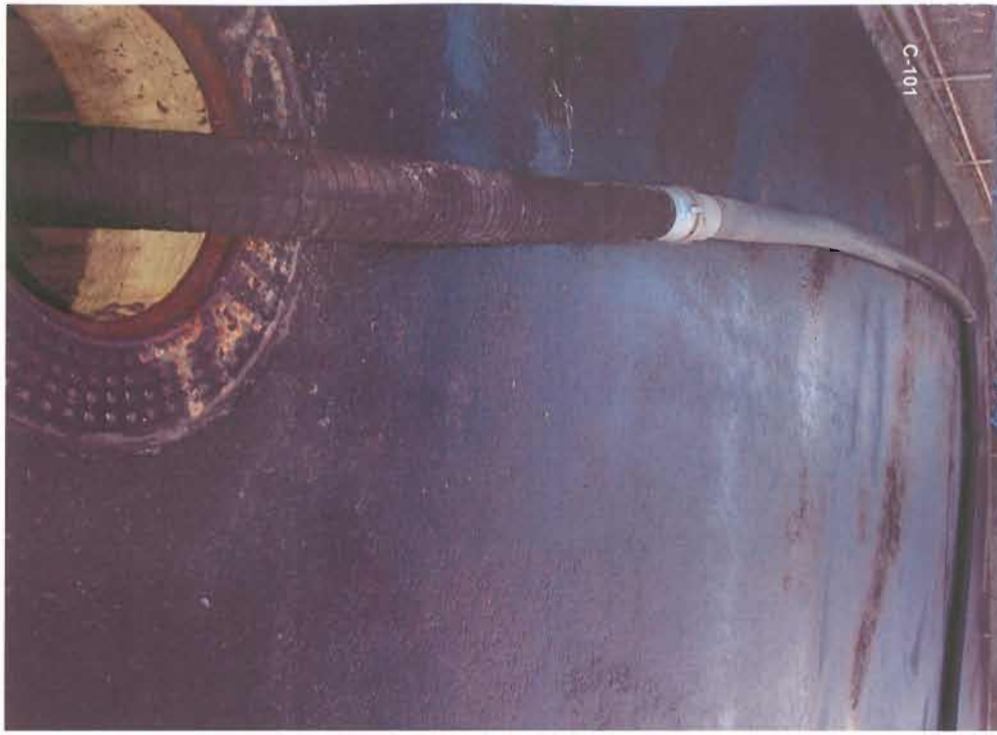
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