FINAL INSPECTION REPORT

Ketchikan Ship Yard Cathodic Protection Project
Ketchikan, Alaska

July 2011

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EXECUTIVE SUMMARY

The July 2011 inspection of the Ketchikan Shipyard Facility included a visual inspection of the waterfront facilities including the sheet pile wharf, North Pier, fender system, and dolphins. It included an above and below water inspection. The inspection was one phase of a cathodic protection project and, as such, was focused on corrosion. The inspection included cathodic protection half-cell readings and ultrasonic thickness readings.

The following is a summary of the findings:

- The majority of the cathodic protection half-cell readings indicated no cathodic protection and active corrosion. The only exceptions were at the new berth which has a sacrificial anode system and at floating dry dock number one which had an impressed current anode system.
- Active corrosion was noted throughout the waterfront. This included heavy rust with layers of black oxide and pitting in places.
- The coating on the sheet pile cells was failing and coming off in sheets.
- There were drain holes in the interconnecting arcs on the sheet pile cell dock. Seawater enters the fill behind these arcs through the drain holes on the high tide and drains from these holes on the low tide. This exchange of fresh oxygenated saltwater is creating a corrosion issue behind the interconnecting arcs.
- The galvanizing on the north pier pipe piles has been consumed and active corrosion was noted on these piling.
- The timber pile system has steel H section walers. These have active corrosion. There are short sections of timber walers between the timber pile groups. Many of these short timber sections were rotten.
- The north dolphin was leaning slightly and appears to have been overloaded and moved slightly out of position.
- The impressed current cathodic protection system on floating dry dock number 2 was turned off. Evidentially this is due to the fact it was sitting on the grounding grid and going dry several times a day. The cathodic protection half-cell readings on the new sheet pile wharf adjacent to this dry dock were depressed and it is probable that the floating dry dock is adding to the load on the new cathodic protection system.
- The existing coating on the sheet pile wharf was tested and found to be generally free of asbestos containing materials (ACM), and had semi-volatile organic compounds (SVOC) and inorganic lead at levels below federal hazardous waste limits.

The following is a summary of the recommendations:

- Install sacrificial aluminum anodes to all of the submerged steel structures including the sheet pile cells and interconnecting arcs, the pipe piling for the north wharf, and dolphins and the walers on the fender system.

- Remove the loose coating on the sheet pile cells with sand or water blasting. Remove all of the coating from the low tide line to the top and recoat this area. We recommend a fast dry spray polyuria coating system that can be immersed shortly after application.
- Install a rubber check valves over the drain holes in the interconnecting arcs to reduce the exchange of seawater behind the sheets.
- Install sacrificial magnesium anodes in the underground area in the interconnecting arcs and in the main sheet pile cells. Install these in groups or in a ground bed configuration to minimize excavation and damage to the pavements and to minimize potential conflicts with existing utilities.
- Replace the short sections of treated timbers walers on the main fender system. Consider plastic lumber for this application.
- Install a new pile foundation for the north dolphin. Drive the main piling deeper and or install fins or other means to increase the capacity of this dolphin.
- Install control circuitry on the impressed current cathodic protection system for dry dock number 2 so that it will operate when submerged and shut off when it goes dry on the grounding grid.

1. INTRODUCTION

Existing Structure

The Ketchikan ship lift facility is located along Tongass Narrows near Carlana Creek. There have been waterfront facilities at the site since the early 1900s including various historical canneries and docks.

The current ship lift facility has been constructed in phases. The sheet pile cells were constructed in 1982 and 1983 for the State of Alaska DOT Vessel Maintenance Facility. This project included dredging and the construction of 15 circular sheet pile cells with connecting arcs. The cells were arranged to form a main wharf face and a submergence berth for a floating dry dock. There is an L shaped concrete cap along the face of the dock that is partially supported by pipe piling. The sheet pile cells and piling were originally coated and protected by an impressed current cathodic protection system. (This system has been shut off and was not in service at the time of the inspection. It seems to have been shut down for a considerable time and it was unclear as to when the last time it was in operation.) The construction of the sheet pile cells included a drain system consisting of a layer of gravel in and around the sheets and uplands and holes cut in the interconnecting arcs of the sheets at about elevation + 5.0 feet.

In 1985 and 1986 the pile supported North Pier was constructed. This pier is about 462 feet long and 43 feet wide. It has 24 bents of piling which include 30 inch diameter by 3/8 inch wall steel plumb piling and 24 inch diameter by ½ inch wall plumb and batter pile groups. The bents are on 20 foot centers and include a concrete pile cap. The deck includes a section of precast concrete tees and a concrete formed, timber decked, utility trench. The pilings were originally hot dip galvanized. This project included the installation of the fender system, the north dolphin / fender, and the dry dock dolphins.

The main face timber fender system includes groups of 3 timber piling connected with a three level steel waler system. The top waler is connected to the deck of the dock with side loaded cylindrical energy units.

In 1986 and 1987 the south berth was constructed. This included a fender system along the south sheet pile cells and two floating docks.

Tides

NOAA publishes the following tidal statistics for Ketchikan:

Highest Observed Water	21.3 feet
High Tide Line	19.4 feet
MHHW	15.4 feet
MHW	14.4 feet
MTL	8.1 feet
MLLW	0.0 feet
Lowest observed water	- 5.2 feet

NOAA reports that tidal currents in the narrows can exceed 1.5 knots

Inspection Program

The scope of work for the 2011 inspection program included:

- A visual inspection of the above and below water portions of the sheet pile cells and connecting arcs.
- A visual inspection of the above and below water portions of the North Pier and dolphins.
- A visual inspection of the above and below water portions of the main fender system.
- Cathodic protection half-cell readings at representative locations.
- Ultrasonic thickness readings at representative locations.

Diving support was provided by Global Diving and Salvage The fieldwork was done July 5, 6, and 7, 2011 under the direct supervision of John C. Daley, P.E., project engineer.

The diving inspection was done using the Association of Diving Contractors International (ADCI) consensus standards as a diving safe practices manual. This manual lists the minimum requirements for personnel and equipment to be used on diving jobs. In general the underwater inspections were performed using a three level approach to as described below:

Level I

A complete swim-through inspection of all identified underwater substructure items. This included visual or tactile inspection of each and every pile and each underwater structural component. In addition, the team visually inspected the above water portion of the

identified substructure items. Two-way communications were used for recording a dialog between the diver and the topside personnel describing the location, marine growth, and general condition of the structure.

Level II

Partial marine growth removal and close up visual and photographic inspection of selected portions of approximately Ten percent of the identified underwater substructure items. This was done in a manner designed to produce a statistically representative sample of the underwater components.

Level III

Non Destructive Testing (NDT) of selected portions of approximately Ten percent of the underwater structures. This was done at areas identified for specific inspections or randomly in a manner designed to produce a statistically representative sample. NDT consists of ultrasonic thickness measurements to determine the remaining wall thickness of the piles. Cathodic Protection ½ cell readings were also taken as part of the level III inspection.

This three level approach meets or exceeds the guidelines set forth in FHWA manual "Underwater Inspection of Bridges," and the ASCE "Standard Practice Manual for Underwater Investigations."

Cathodic Protection Half-Cell Readings and Corrosion

Cathodic protection (CP) half-cell readings were taken with a silver silver chloride reference cell and a voltage meter. This allowed the inspector to measure the potential of the structure with respect to a reference cell and to use this measurement to evaluate the effectiveness of the cathodic protection system.

Silver / Silver Chloride CP ½ Cell

The National Association of Corrosion Engineers (NACE) publishes standards and criteria for cathodic protection. One widely used criteria for adequate CP is to maintain

the structure at -0.850 volts or more negative with respect to a copper copper sulfate reference cell. Copper copper sulfate reference cells are not intended for use in seawater so it is typical to use a silver silver chloride reference cell. There is a correction factor that can be applied to correlate readings taken with a silver silver chloride cell to standards based on a copper copper sulfate cell. The correction factors vary depending on temperature, salinity, resistivity of the medium, and other factors. For the purposes of this inspection an approximate correction factor of 0.050 volts was applied so that a silver silver chloride CP readings of approximately -0.800 or more negative indicates adequate cathodic protection. It is acknowledged that this is not a rigorous correction but should be adequate to evaluate the general condition of the CP system.

Zinc and /or aluminum alloy sacrificial anodes (the most common types used in seawater) typically have a potential in seawater of between -1.000 and -1.100 volts with respect to a silver silver chloride half-cell. Impressed current anodes typically have potentials set to values in the -1.5 volt rage or more positive. (Higher voltages can damage coatings.) It is common to have CP readings approaching these values when the reference cell is held close to an anode. It is also common for the readings to drop off with distance from the anode. CP readings more positive than -0.800 generally indicate inadequate cathodic protection. Bare steel with no CP system will often have potentials less than -0.700. This indicates active corrosion.

Corrosion typically progresses in stages based on the age of the structure and condition of the CP system. Without CP, galvanizing typically lasts 15 to 20 years in seawater. As it nears the end of its service life, patches of bare steel will become exposed, typically covered with light red colored surface rust. Bare steel will first form a layer of red oxide (rust) and then will start to develop a black oxide layer under the surface layer. The black oxide can be associated with loss of section of the steel and with advanced corrosion. Fully active corrosion of bare steel will typically exhibit a hard crusty exterior layer of reddish brown corrosion deposits with thick chalky black oxide underneath. Each of these layers may be over ¼" thick and may come off in small sheets. When the corrosion deposits of this type are removed there will typically be shinny bare steel underneath with pitting and measurable section loss.

Ultrasonic Thickness Readings

An underwater ultrasonic thickness meter was used to measure wall thickness of steel elements. This meter is specially built for underwater applications. The diver cleans an area of the steel piling, removing marine growth and corrosion deposits, and then places the transducer on the cleaned area. The meter gives a visual reading that is reported by the diver and logged by the topside personnel.

The thickness readings can be compared to original wall thickness to determine section loss. It should be noted that there are tolerances for wall thickness in new material from the factory. These vary with the specification for the material but can range up to as much as +- 10% of the nominal value.

Underwater Ultrasonic Thickness Meter

There is little published guidance for acceptable levels of section loss. Obviously the consequences of section loss will depend on the application of the member in question. Highly loaded, highly stressed, primary structural members are less tolerant of section loss than lightly loaded, lightly stressed, secondary members. A rule of thumb that has been used previously in industry is that any member with 30% or greater section loss should be repaired or replaced. However, this depends on the application and some members may require repair or replacement prior to 30% section loss.

For this project the following nominal wall thickness are noted from the original design drawings:

Item	Section	Nominal wall thickness
Sheet Pile Cells	PS 28	3/8”
Sheet Pile Arcs	PSX 32	29/64”
Row B & C Piles	30” diameter	3/8”
Row A Piles	24” diameter	½”
North Dolphin	24” diameter	½”
Dry Dock Dolphins	42” diameter	½”
Main Wharf Cap Piles	16” diameter	3/8”
South Wharf Cap Piles	18” Diameter	½”

2. FINDINGS

Sheet Pile Cells

The sheet pile cells showed active corrosion, inadequate CP readings, coating failure, and section loss in places.

There were drain holes in the interconnecting arcs between the main cells. Seawater enters these drain holes on the high tides and pours out of these holes on the low tides. This results in an exchange of fresh saltwater that will result in an accelerated corrosion condition.

The impressed current cathodic protection system was not in operation at the time of the inspection and it was unclear as to when the last time was that it was operational.

Interconnecting Arc Note drain hole

Cell 5 Note coating failure

Typical main wharf cell

Typical interconnecting arc

Typical cell at mudline

Typical cell at mudline. Note coating gap

The CP readings on the cells were typically less than 0.600 volts. This indicates extremely active corrosion and no cathodic protection. The corrosion deposits included a red colored outer layer and layers of black oxide underneath.

The coating was failing. The majority of the failure was in the intertidal zone where it was coming off in sheets. Some of the coating was delaminated but still attached. This results in a condition where moisture is trapped behind the coating. If a CP system were present and active, this coating would shield the underlying steel from the CP system and result in pockets of corrosion under the delaminated coating.

The original sheets were only partly coated prior to installation. The portions of the sheets designed to be underground were not coated. However, during installation some of the uncoated sections of the sheets ended up exposed above the mudline. There is active corrosion on these sections of the sheets.

Dry dock number one had CP readings generally over 0.900 volts indicating adequate cathodic protection. There is a functioning impressed current CP system on the structure.

Dry dock number 2 had CP readings from 0.663 to 0.935 volts indicating variable CP potentials with areas that were below standards for cathodic protection. It was reported that the impressed current CP system for this structure was turned off.

The new sheet-pile bulkhead near dry dock number 2 was coated and had a sacrificial anode system. CP readings in the high 0.9 volt to low 1.0 volt range can be expected. Areas adjacent to the dry dock had readings of 0.855 volts. This indicates adequate cathodic protection but a slightly depressed potentially likely due to the added load from dry dock number 2.

North Pier and Dolphins

The galvanizing was consumed on the piling on the North Pier and dolphins. The CP readings were generally less than 0.700 volts and there was active corrosion. In general the galvanizing was 100% consumed below the tide line and there was a small amount of galvanizing remaining above the tide line in places.

Typical North Pier Pile

Typical North Pier Pile

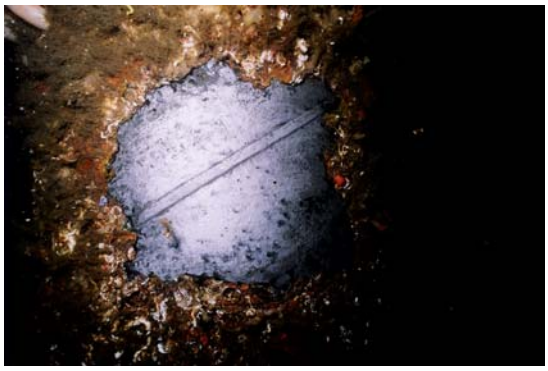
North Fender Dolphin

North Dry-dock Dolphin

North End of North Pier

Typical Marine Growth

Cleaned Pile Galvanizing Gone



Cleaned Pile Galvanizing Gone

The corrosion below the tide line included a thick crusty outer layer of corrosion deposits with a thick chalky layer of black oxide beneath that. The steel under the black oxide layer was shinny and had broad shallow pits.

The north dolphin fender is leaning slightly to the south. There are reports that it was overloaded in a hard berthing and partially straightened out. The original design drawings indicate that the dolphin vertical structural support piling have fins welded to them. The batter pilings do not have fins. The main support pilings are driven to a tip elevation of about 70 feet or about 40 feet of embedment. This type of design relies principally on soil friction to resist the loads. It is unclear what the berthing capacity of the dolphin is but it seems likely that the capacity has been exceeded in service.

Main Fender System

The main fender system has 3 levels of steel H beam walers. The lower 2 walers are submerged on a regular basis with the tides. The 2 lower walers show signs of corrosion. There are no anodes on the fender system. In addition, there are short sections of horizontal timber walers between each 3 pile timber fender group. These timber waler sections are bolted to the steel walers. The majority of the timber waler sections are rotten. This is likely due to the cut ends and drilled bolt hole areas where preservative treatment is missing or thin allowing for rot and marine borers to gain a foothold.

North Pier with fender in background

Fender on North end of North Pier

Fender on South end of South Berth

Top of Fender Main Berth

Typical fender waler

Typical fender waler

Typical fender waler

Typical fender waler

Typical timber waler

Typical timber waler

Cathodic Protection ½ Cell and Ultrasonic Thickness Readings

Location	CP Reading (Volts)	UT Reading (Inches)	Comments
Bent 1 Row A	0.623	0.485	Active Corrosion
Bent 2 Row A	0.634	0.490	Active Corrosion
Bent 3 Row B	0.625	0.325	Active Corrosion
Bent 4 Row A N Batter	0.631	0.400	Active Corrosion
Bent 5 Row C	0.619	0.335	Active Corrosion
Bent 6 Row A N Batter	0.628	0.470	Active Corrosion
Bent 7 Row B	0.628	0.355	Active Corrosion
Bent 8 Row C	0.622	0.340	Active Corrosion
Bent 9 Row B	0.627	0.330	Active Corrosion
Bent 10 Row A N Batter	0.640	0.470	Active Corrosion
Bent 11 Row B	0.631	0.340	Active Corrosion
Bent 12 Row C	0.631	0.365	Active Corrosion
Bent 13 Row B	0.591	0.350	Active Corrosion
Bent 14 Row B	0.618	0.350	Active Corrosion
Bent 15 Row A	0.629	0.470	Active Corrosion
Bent 16 Row A S Batter	0.623	0.570	Active Corrosion
Bent 17 Row B	0.619	0.340	Active Corrosion
Bent 18 Row C	0.630	0.355	Active Corrosion
Bent 19 Row B	0.619	0.355	Active Corrosion
Bent 20 Row C	0.631	0.340	Active Corrosion
Bent 21 Row B	0.634	0.320	Active Corrosion
Bent 22 Row A S Batter	0.640	0.475	Active Corrosion
Bent 23 Row C	0.638	0.355	Active Corrosion
Bent 24 Row B	0.645	0.330	Active Corrosion
Ramp Support East Pile	0.647	0.480	Active Corrosion
South dry-dock Dolphin Pile 1	0.685	0.485	Active Corrosion
South dry-dock Dolphin Pile 3	0.666	0.475	Active Corrosion
North dry-dock Dolphin Pile 1	0.635	0.510	Active Corrosion
North dry-dock Dolphin Pile 2	0.642	0.485	Active Corrosion
North dry-dock Dolphin Pile 4	0.644	0.475	Active Corrosion
North Dock Dolphin N Batter	0.637	0.475	Active Corrosion
North Dock Dolphin S Batter	0.635	0.485	Active Corrosion
North Dock Dolphin Plumb	0.635	0.460	Active Corrosion
North Dock Dolphin Fender	0.639	0.430	Active Corrosion
Cell 2	0.481	0.485	Active Corrosion
Cell 5	0.564	0.425	Active Corrosion
Arc 5 – 6	0.569	0.355	Active Corrosion
Cell 6	0.573	0.475	Active Corrosion
Arc 6 – 7	0.572	0.395	Active Corrosion
Cell 7	0.569	0.475	Active Corrosion
Arc 7 – 8	0.573	0.375	Active Corrosion
Cell 8	0.547	0.485	Active Corrosion
Arc 8 – 9	0.554	0.360	Active Corrosion

Cell 9	0.592	0.485	Active Corrosion
Arc 9 – 10	0.553	0.360	Active Corrosion
Cell 10	0.542	0.485	Active Corrosion
Arc 10 – 11	0.584	0.300	Active Corrosion
Cell 11	0.590	0.400	Active Corrosion
Arc 11 – 12	0.594	0.340	Active Corrosion
Cell 12	0.592	0.455	Active Corrosion
Arc 12 – 13	0.586	0.360	Active Corrosion
Cell 13	0.600	0.505	Active Corrosion
Arc 13 – 14	0.535	0.365	Active Corrosion
Cell 14	0.589	0.435	Active Corrosion
Arc 14 – 15	0.582	0.325	Active Corrosion
Cell 15	0.581	0.475	Active Corrosion
Dry Dock #1 NE Corner	1.010	NA	Adequate Cathodic Protection
Dry Dock #1 NW Corner	0.906	NA	Adequate Cathodic Protection
Dry Dock #1 SE Corner	0.956	NA	Adequate Cathodic Protection
Dry Dock #1 SW Corner	0.967	NA	Adequate Cathodic Protection
Dry Dock #2 NE Corner	0.935	NA	Adequate Cathodic Protection
Dry Dock #2 NW Corner	0.832	NA	Adequate Cathodic Protection
Dry Dock #2 SE Corner	0.825	NA	Adequate Cathodic Protection
New bulkhead	0.855-0.965	NA	Adequate Cathodic Protection

3. RECOMMENDATIONS

Sacrificial Anodes

It is recommended that sacrificial anodes be placed on the pipe and sheet piling as well as on the steel walers for the fender system. It is recommended that “Galvalume” aluminum alloy anodes be used in seawater. These should have an energy capacity not less than 1150 amp-hour per pound, a consumption rate of not more than 7.6 pounds per amp year and an open circuit potential of more than -1.05 volts versus a silver/silver chloride electrode.

It is recommended that anodes be welded directly to the piling or structure to AWS-D3.6 Class B standards by a diver. Welding the anodes directly to the piling will provide a low resistance electrical bond which is required for proper operation of the anode. Once installed this type of anode system is low maintenance and cannot be turned off as is the case with an impressed current system.

According to NACE standards typical current density for cathodic protection on the US West Coast is in the range of 7 to 10 milliamps of current per square foot of bare steel. Anodes should be designed based on an estimate of the square feet of bare steel, the anticipated service life (typically 20 or 25 years), and an anticipated consumption rate.

Using a value of 7.6 pounds per amp per year the size (weight) of an anode can be calculated to provide protection of a given surface area for a given service life. Reference NACE RP 0176-83 and NACE RP0387-99 for more information.

It is recommended that magnesium anodes be installed underground behind the sheet pile connecting arcs. These anodes typically come bundled in a conductive backfill medium. The assembly is similar to a potted plant. Because there is typically a burlap bag that holds the medium and anode they are often referred to as "Mag-Bag anodes". The magnesium anodes are buried in the fill behind the structure and electrically connected to the sheets with a wire and Cad-Weld connection. These anodes will provide cathodic protection to the underground portion of the sheet pile arcs. If desired magnesium anodes can be placed in the main sheet pile cells as well.

Note that the placement of underground anodes will require the carful location of underground utilities as well as pavement repair after installation. Due to this it may be desirable to place groups of sacrificial anodes together in a ground bed configuration as a means to minimize excavation and conflicts with other utilities.

It should be noted that sacrificial anodes have a limited current output and therefore have a limited range or distance of protection. It is difficult to get significant current at distances over about 15 feet from the anode. Therefore sacrificial anodes should be placed relatively close to the area requiring protection.

Coatings

The cathodic protection system will not protect the steel above the tidal or in splash zone. The only way to effectively protect this area is through the use of coatings or galvanizing. Since a large percentage of the existing coating in this area has failed it is important for the long-term service life of the structure that the coating be replaced.

There are a number of systems that can be considered, including various marine epoxies, urethanes, and spray metalizing. Because the tide zone area will be submerged several times a day any coating system applied to this area must cure to a point where it can be submerged in only a few hours after application. This narrows the selection of applicable coatings dramatically. We recommend that the existing piling be coated with a poly-urea or spray metailzing. Both of these systems will cure almost immediately upon application and can be submerged in minutes.

For a poly-urea system we recommend a Sherwin Williams Envirolastic AR425 be applied. 60 to 80 mils is recommended. This product requires a special applicator that mixes a two part product at the spray gun nozzle and dries to the touch in under a minute. Surface preparation should be SSPC SP-10 near white sand blast.

Spray metalizing is a field applied sacrificial coating of zinc and or aluminum. It requires a sand blast surface preparation and application of molten metal. This results in a coating that is similar to hot dip galvanizing. For spray metalizing we recommend that the system be specified in accordance with AWS C2.23M and C2.23:2003, or NACE No. 12, or

SSPC – CS 23.00.

In-place coating work under a dock is labor intensive and therefore, costly. One of the most costly operations is surface preparation which will typically include sand or water blasting. It is likely that and sand blasting operation at the ship lift will require containment and recovery of the blasting media and removed paint ships.

Sheet Pile Connecting Arcs

It is recommended that the drain holes in the sheet pile connecting arcs be fitted with rubber check vales to reduce the exchange of seawater behind the sheets. This will require welding a pipe stub over the holes and attaching the check valve to a flange or other fitting on the pipe section. There are commercially available products for this application such as J&S Headflex Duckbill check valves.

Timber Walers

It is recommended that the short sections of timber walers between the fender pile groups be replaced. Consideration should be made to using synthetic polyethylene lumber products for the replacement sections. This will alleviate the issue with rot and marine borers attacking the cut ends and field drilled bolt hole areas. If timber is used it should be cut and drilled prior to treatment with preservatives.

North Dolphin Fender

The problem with the North dolphin / fender is likely a pile capacity issue. To increase the capacity it is likely that a new pile support system be designed with larger and deeper driven piling. More information is required for this including the existing soil conditions, pile driving records, design vessel and berthing velocity etc. If the original geotechnical report is available that may help. Armed with this information preliminary design and investigation could outline the estimated capacity of the existing fender as well as new concepts, increased capacities, and a cost estimate for a repair.

Dry Dock #2 CP System

It is recommended that the impressed current CP system on dry dock #2 be retrofitted to include a control system that turns the system on and off at various stages of the tide.

APPENDICES

Appendix A: Inspection Figures

CARLANNA CREEK

PIPES
FUEL TANK
PIPES
FUEL TANK
FUEL TANK
BUILDING
CONTAINMENT DIKE
WASTEWATER TREATMENT PLANT
EQUIPMENT STORAGE
SAND SHED
FUEL
BLDG
SHEET PILE BULKHEAD
GRAVEL PARKING AREA
FLOATING DRY DOCK NO. 2
TRAILER
TRAILER
TRAILER
TRAILER
OFFICES
POWER PLANT
EXISTING BUILDING
EXISTING BUILDING
FLOATING DOCK
SOUTH BERTH
FLOATING DRY DOCK NO. 1
TRANSFER BRIDGE ABUTMENT
TRANSFER BRIDGE PIER
NORTH DRY DOCK DOLPHIN
SOUTH DRY DOCK DOLPHIN
NORTH FENDER DOLPHIN
RAMP
RAMP
TRAILER
TRAILER
TRAILER
BLDGS
FENDER SYSTEM
CONCRETE CAP
NORTH PIER
ORIGINAL WHARF

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

34 -12.5 | 48 -26.5 | 50 -28.5 | 50 -28.5 | 51 -29.3 | 52 -30.5 | 61 -35 | 59 -34 | 59 -34 | 59 -34 | 64 -39 | 60 -35 | 60 -35 | 57 -32 | 46 -21

A 2 | B 2 | 62 -37 | 62 -37 | 64 -39 | 61 -36 | 62 -37 | 65 -40 | 64 -39

A B C

24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

GRAPHIC SCALE
40' 0 20' 40' 80'
(IN FEET)

LEGEND:
34 DECK TO MUDLINE FIELD MEASUREMENT
-35 APPROX. ELEV MUDLINE

URS
700 G STREET, SUITE 500
ANCHORAGE, AK 99501
TEL: (907) 279-0543
FAX: (907) 276-7679

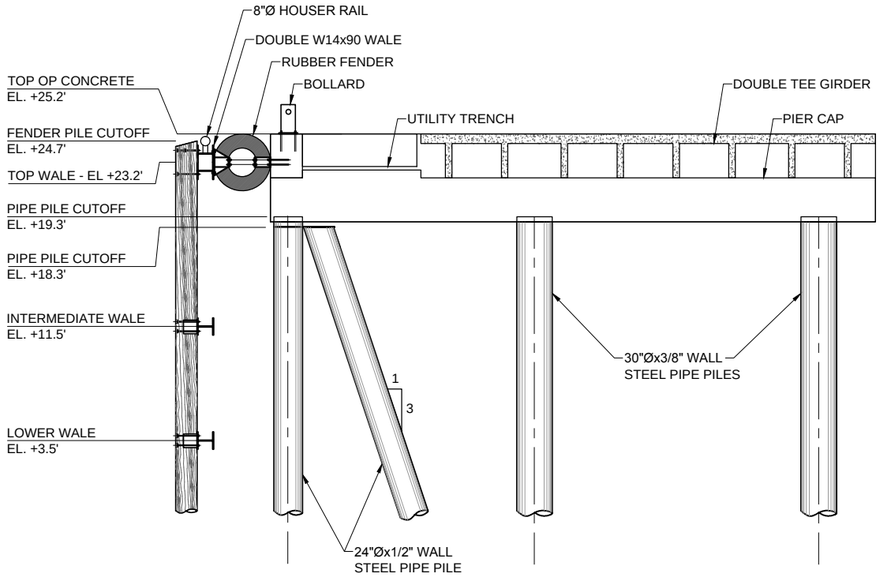
REVISIONS

NO.	BY	DATE	DESCRIPTION

CITY OF KETCHIKAN
KETCHIKAN SHIPYARD CATHODIC PROTECTION
KETCHIKAN, ALASKA
EXISTING SITE

PROJECT No: 26220918
DATE: 10/10/2011
DESIGNED:
DRAWN BY:
CHECKED BY:
SHEET: 1
PAGE: 1 OF 3

REV. 3/2010



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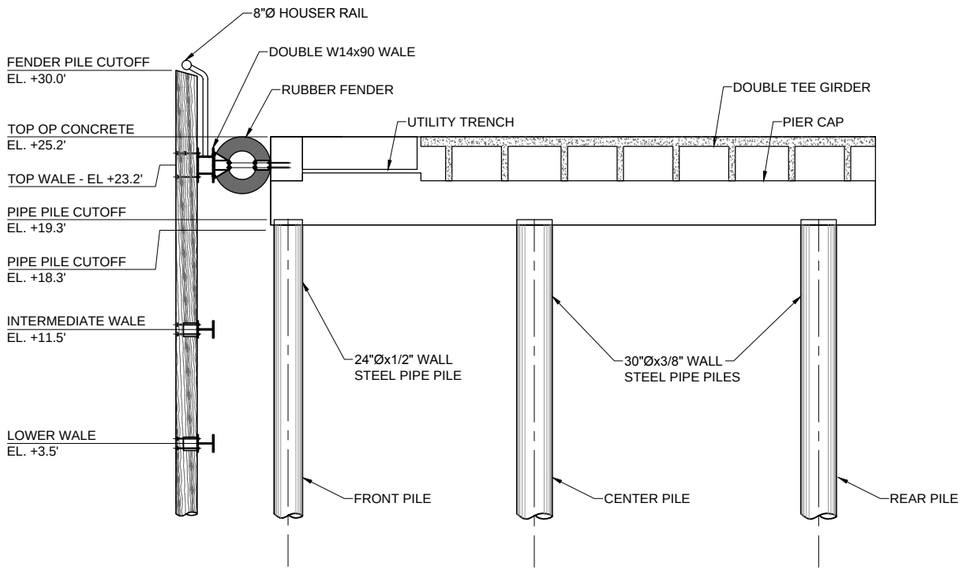

B/2 SECTION
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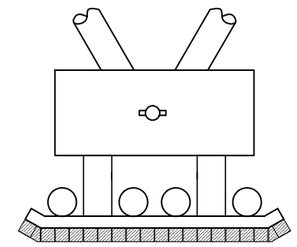
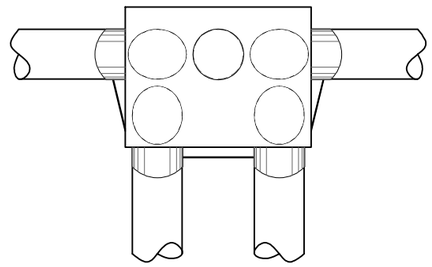
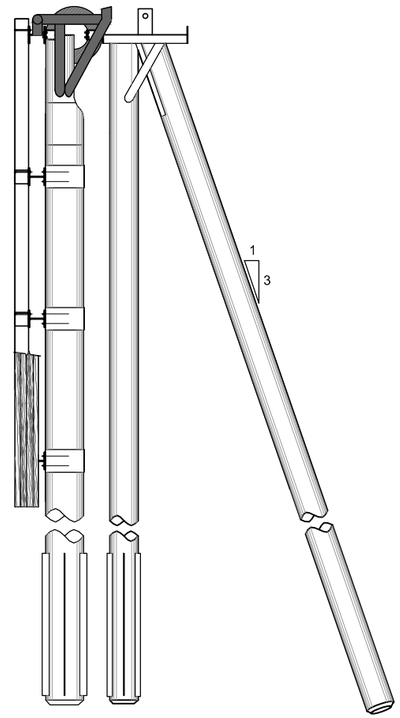


1/2 NORTH FENDER/DOLPHIN PLAN
SCALE: N.T.S.



3/2 NORTH DRY DOCK DOLPHIN
SCALE: N.T.S.



2/2 NORTH FENDER/DOLPHIN ELEVATION
SCALE: N.T.S.

URS
700 G STREET, SUITE 500
ANCHORAGE, AK 99501
TEL: (907) 279-0543
FAX: (907) 276-7679

REVISIONS			
NO.	BY	DATE	DESCRIPTION

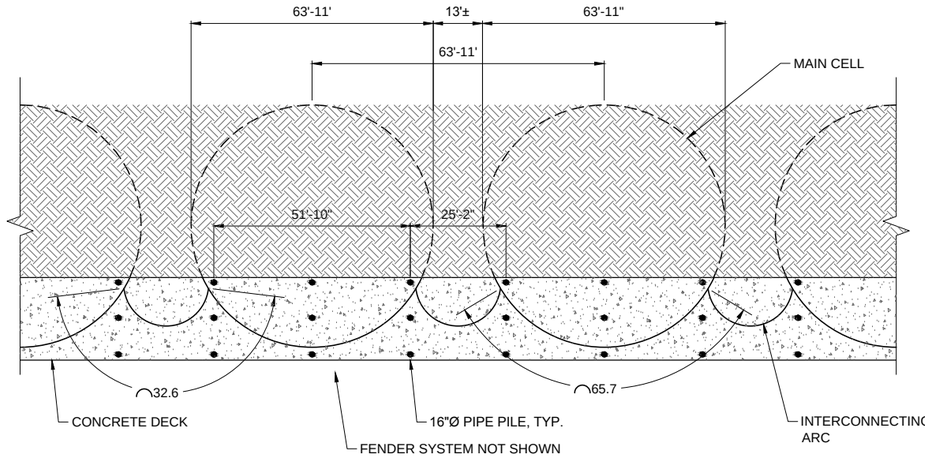
CITY OF KETCHIKAN

KETCHIKAN SHIPYARD CATHODIC PROTECTION

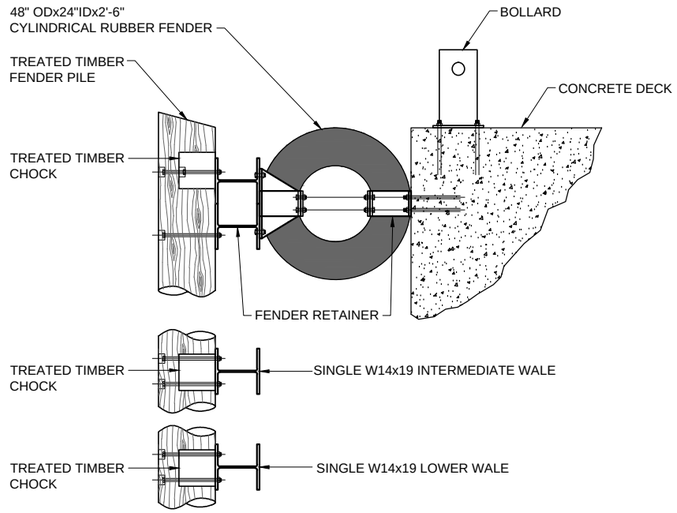
KETCHIKAN, ALASKA

SECTIONS AND DETAILS

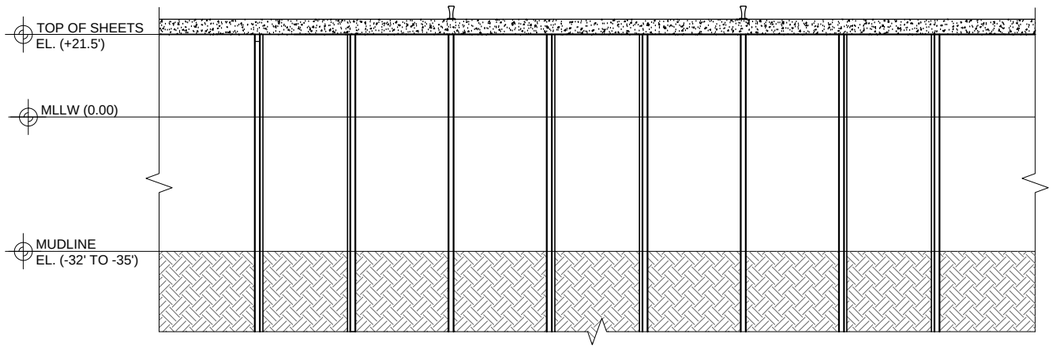
PROJECT No: 26220918
DATE: 09/10/2011
DESIGNED:
DRAWN BY:
CHECKED BY:
SHEET: 2
PAGE: 2 OF 3

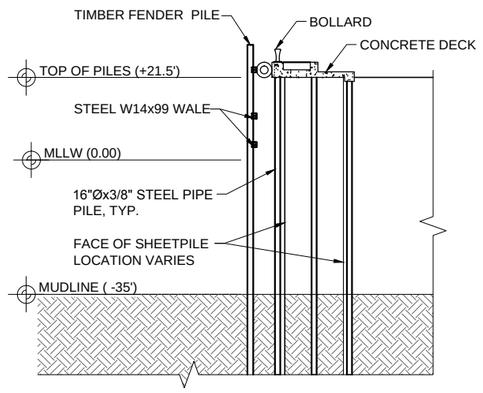


1/3 TYPICAL SHEET PILE WALL PLAN
SCALE: 1" = 20'-0"



3/3 FENDER SIDE VIEW
SCALE: 1" = 20'-0"





2/3 TYPICAL SHEET PILE ELEVATION AND SIDE VIEW
SCALE: 1" = 20'-0"

URS
700 G STREET, SUITE 500
ANCHORAGE, AK 99501
TEL: (907) 279-0543
FAX: (907) 276-7679

REVISIONS

NO.	BY:	DATE:	DESCRIPTION

CITY OF KETCHIKAN

KETCHIKAN SHIPYARD CATHODIC PROTECTION

KETCHIKAN, ALASKA

SHEET PILE WALL PLAN AND ELEVATION

PROJECT No:	26220918
DATE:	09/10/2011
DESIGNED:	
DRAWN BY:	
CHECKED BY:	
SHEET:	3
PAGE:	3 OF 3

REV: 5/2010

G:\PROJECTS\262209\7 KETCHIKAN SHIPYARD CP\ARD DRAWINGS & GRAPHICS\01 WORKING DRAWINGS\REPORT DWG\SCP1-1 CP1-3_GENERAL NOTES.DWG Revised: 9/12/2011 2:19:19 PM

Appendix B: Dive Reports

Global Diving & Salvage, Inc.

3840 West Marginal Way S.W.
Port of Seattle, Terminal 13
Seattle, WA 98106

GLOBAL
Diving & Salvage, Inc.

Divers • Constructions • Environmental Technicians

Daily Log

W/O #: 106321

From	To	Description
0730	1230	TRAVEL TO KETCHIKAN
1230	1330	CHECK IN HOTEL AND PICK UP RENTAL CAR
1330	1430	MEET W/JOHN DALEY ABOUT JOB TASKS
1430	1500	RCVD AND INVENTORIED GEAR
1500	1530	PRE JOB MEETING AND WALK THROUGH ON DOCK
1530	1800	GET WORK TRUCK, SHAKE OUT GEAR, ASSEMBLE AND TEST SOME GEAR
1800		OFF SITE

Date: 7-5-11 PO/Job #:

Customer: URS

Location: KETCHIKAN, AK

Service:

Crew: ZACHARY COOTS
JAMES SIMONSON
OTTO VISVADER

Equipment/ Supplies: SHALLOW AIR SPREAD, VIDEO SYSTEM, CYGNUS METER, KP SYSTEM

Contact: JOHN DALEY

Phone #: 907-306-4966

Filled Out by: ZACH COOTS

Quote Provided: ☐ Yes ☐ No

Quote #:

Global Diving & Salvage, Inc.

3840 West Marginal Way S.W.
Port of Seattle, Terminal 13
Seattle, WA 98106

GLOBAL
Diving & Salvage, Inc.

Divers • Constructions • Environmental Technicians

Daily Log

W/O #: 106321

From	To	Description
0700	0930	ONSITE, START SETTING UP DIVE SPREAD ON TRUCK, SAFETY MEET
0930	1000	MOVED INTO FIRST DIVE LOCATION AND SET UP SKIFF
1008	1103	DVR J. SIMONSONS LS @ 1008 AND REACHED SURFACE @ 1103 BT: 54 34' DEAPTH. UT + CP INSPECTION ON PILING
1105	1140	MOVE SPREAD TO NEXT LOCATION
1143	1233	DVR J. SIMONSON LS@ 1143 AND REACHED SURFACE @ 1233 BT: 49 41' DEAPTH. UT + CP INSPECTION ON PILING
1235	1345	MOVE SPREAD TO NEXT LOCATION AND SWITCH DIVERS
1400	1428	DVR J. DALEY LS@ 1400 + RS @ 1428 BT: 28 37' DEAPTH. UT + CP INSPECTION ON PILING
1430	1500	MOVE SPREAD TO NEXT LOCATION
1506	1547	DVR J. DALEY LS@ 1506 AND RS @ 1547 BT: 40 49' DEAPTH. UT + CP INSPECTION ON PILING
1600	1700	SECURE GEAR AND SPREAD FOR THE NIGHT. MARK LOCATIONS AND PLAN FOR NEXT DAY.
[redacted]	1700	OFF SITE

Date: 7-6-11 **PO/Job #:**

Customer: URS

Location: KETCHIKAN, AK

Service:

Crew: ZACHARY COOTS
JAMES SIMONSON
OTTO VISVADER

Equipment/ Supplies: SHALLOW AIR SPREAD, VIDEO SYSTEM, CYGNUS METER, CP SYSTEM

Contact: JOHN DALEY

Phone #: 907-306-4966

Filled Out by: ZACH COOTS

Quote Provided: ☐ Yes ☐ No

Quote #:

Global Diving & Salvage, Inc.

3840 West Marginal Way S.W.
Port of Seattle, Terminal 13
Seattle, WA 98106

GLOBAL
Diving & Salvage, Inc.

Divers • Constructions • Environmental Technicians

Daily Log

W/O #: 106321

From	To	Description
0700	0900	ONSITE, SAFETY MEETING, SET UP IN LOCATION FOR DIVING
0907	0932	DVR J. SIMONSON LV SURFACE @ 0907 AND RS @ 0932 BT: 25 37' DEAPTH. UT + CP INSPECTION ON PILING
0935	1000	MOVE SPREAD TO NEXT LOCATION
1009	1043	DVR J. SIMONSON LV SURFACE @ 1009 AND RS @ 1043 BT:34 40' DEAPTH. UT + CP INSPECTION ON PILING
1045	1200	MOVE SPREAD TO NEXT LOCATION
1205	1255	DVR J. SIMONSON LV SURFACE @ 1205 AND RS @ 1255 BT: 50 37' DEAPTH. UT + CP INSPECTION ON PILING
1300	1430	MOVE SPREAD TO NEXT LOCATION, SWITCH DIVERS
1438	1458	DVR J. DALEY LV SURFACE @ 1438 AND RS @ 1458 BT :20 41' DEAPTH. UT + CP INSPECTION ON PILING
1500	1830	DEMOBE TRUCK AND PACK UP MOST GEAR FOR SHIPPING
1830		OFFSITE

Date: 7-7-11 PO/Job #:

Customer: URS

Location: KETCHIKAN, AK

Service:

Crew: ZACHART COOTS
JAMES SIMONSON
OTTO VISVADER

Equipment/ Supplies: SHALLOW AIR SPREAD, VIDEO SYSTEM, CYGNUS METER, CP SYSTEM

Contact: JOHN DALEY

Phone #: 907-306-4966

Filled Out by: ZACH COOTS

Quote Provided: ☐ Yes ☐ No

Quote #:

Global Diving & Salvage, Inc.

3840 West Marginal Way S.W.
Port of Seattle, Terminal 13
Seattle, WA 98106

GLOBAL
Diving & Salvage, Inc.

Divers • Constructions • Environmental Technicians

Daily Log

W/O #: 106321

From	To	Description
0700	1000	FINISH PACKING GEAR, GET GEAR SHIPPED THRU LYNDEN
1000	1700	STAND BY IN KETCHIKAN FOR PLANE RIDE TO ANCHORAGE
1700	2200	TRAVEL FROM KETCHIKAN TO ANCHORAGE

Date: 7-8-11 PO/Job #:

Customer: URS

Location: KETCHIKAN, AK

Service:

Crew: ZACH COOTS
JAMES SIMONSON
OTTO VISVADER

Equipment/ Supplies: SHALLOW AIR SPREAD, VIDEO SYSTEM, CYGNUS METER, CP SYSTEM

Contact: JOHN DALEY

Phone #: 907-306-4966

Filled Out by: ZACH COOTS

Quote Provided: ☐ Yes ☐ No

Quote #:

#1

RECORD OF DIVE

☐ GDS – Seattle, WA
☐ GID – Rio Vista, CA
☑ GOD – Anchorage, AK

GLOBAL Diving & Salvage, Inc.

Diver: First JAMES Last SIMONSON (Given Name) Date: 7 / 6 / 11
Project: ALASKA SHIPYARD DOCK INSPECTION Work Order #: 106321
Location: KETCHIKAN, AK Platform/Vessel: SKIFF

Dive Supervisor / DPIC: Z. COOTS	Topside Personnel: J. DALEY	Air Temp: 55 °F	Altitude: Ø
Diver Tender: O. VISVADER	Stby Tender: O. VISVADER	Sea State: CALM	Current:
Diver Dress: DRYSUIT	Stby Diver: J. DALEY	Water Temp: 55 °F	
Diver Helmet: SL-17B	Stby Helmet: MILLER	U/W Visibility: 10'	
Diver Bailout: 3000 Psi AIR Mix	Stby Bailout: 3000 Psi AIR Mix	Bottom Type: DIRT	

Breathing Medium

Primary: Air: [✓] Compressor or [ ] HP 150 Psi Nitrox: ____ Psi ____ % HEO_2: ____ Psi ____ %

Back-Up: Air: [ ] Compressor or [✓] HP 2200 Psi Nitrox: ____ Psi ____ % HEO_2: ____ Psi ____ %

Breathing Sources

Bank	Mix	Start Psi	End Psi

Bank	Mix	Start Psi	End Psi

L/S: 1008	Surface Intvl: 12~~5~~04	Start Group: /	Max Depth: 34 FT	Work Completed: CP + UT INSPECTION ON CELLS 6+7	Dive #: 1A
L/B: 1102	Bottom Time: 54	RNT: /	Total Time: 54		
R/S: 1103	Table Used: 40 Depth 63 Time		End Group: G		

L/S: 1142	Surface Intvl: :39	Start Group: G	Max Depth: 41 FT	Work Completed: CP + UT INSPECTION ON ROUND PILE BENTS 1-11	Dive #: 1B
L/B: 1231	Bottom Time: :49	RNT: :56	Total Time: 1:45		
R/S: 1233	Table Used: 45 Depth 114 Time		End Group: M		

L/S:	Surface Intvl:	Start Group:	Max Depth: FT	Work Completed:	Dive #:
L/B:	Bottom Time:	RNT:	Total Time:		
R/S:	Table Used: Depth Time		End Group:		

In-Water Decompression

Dive #:			
Depth	Time	Reach / Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:			
Depth	Time	Reach / Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:			
Depth	Time	Reach / Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Diver Condition: GOOD Time: 1600 Dive Supv / DPIC Signature: [signature]

Diver Signature: [signature]

#2

RECORD OF DIVE

☐ GDS – Seattle, WA
☐ GID – Rio Vista, CA
☑ GOD – Anchorage, AK

GLOBAL Diving & Salvage, Inc.

Diver: First JOHN Last DALEY (Given Name) Date: 7 / 6 / 11
Project: ALASKA SHIPYARD DOCK INSPECTION Work Order #: 106321
Location: KETCHIKAN, AK Platform/Vessel: SKIFF

Dive Supervisor / DPIC: 2. COOTS	Topside Personnel: J. SIMONSON	Air Temp: 55°F	Altitude: Ø
Diver Tender: O. VISVADER	Stby Tender: O. VISVADER	Sea State: CALM	Current: 0-.5 KNOTS
Diver Dress: DRYSUIT	Stby Diver: J. SIMONSON	Water Temp: COOL	
Diver Helmet: MILLER	Stby Helmet: SL-17B	U/W Visibility: 10'	
Diver Bailout: 3000 Psi AIR Mix	Stby Bailout: 3000 Psi AIR Mix	Bottom Type: DIRT	

Breathing Medium

Primary: Air: [✓] Compressor or [ ] HP 180 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Back-Up: Air: [ ] Compressor or [✓] HP 2200 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Breathing Sources

Bank	Mix	Start Psi	End Psi

Bank	Mix	Start Psi	End Psi

L/S: 1400	Surface Intvl: 12:00+	Start Group: /	Max Depth: 37 FT	Work Completed: CP + UT INSPECTION ON CELLS 2-6 / STILL PHOTOS ON CELL 5	Dive #: 2A
L/B: 1428	Bottom Time: :28	RNT: /	Total Time: :28		
R/S: 1429	Table Used: 40 Depth 36 Time		End Group: D		

L/S: 1506	Surface Intvl: :37	Start Group: D	Max Depth: 49 FT	Work Completed: CP + UT INSPECTION OF BENTS 12 THROUGH 20 / STILL PHOTOS ON BENTS 16 + 17	Dive #: 2B
L/B: 1546	Bottom Time: :40	RNT: :26	Total Time: :66		
R/S: 1547	Table Used: 55 Depth 71 Time		End Group: K		

L/S:	Surface Intvl:	Start Group:	Max Depth: FT	Work Completed:	Dive #:
L/B:	Bottom Time:	RNT:	Total Time:		
R/S:	Table Used: Depth Time		End Group:		

In-Water Decompression

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Diver Condition: Good Time: 1600 Dive Supv / DPIC Signature: [signature]

Diver Signature: [signature]

#3

RECORD OF DIVE

☐ GDS – Seattle, WA
☐ GID – Rio Vista, CA
☑ GOD – Anchorage, AK

GLOBAL Diving & Salvage, Inc.

Diver: First JAMES Last SIMONSON (Given Name) Date: 7 / 7 / 11
Project: ALASKA SHIPYARD DOCK INSPECTION Work Order #: 106321
Location: KETCHIKAN, AK Platform/Vessel: SKIFF

Dive Supervisor / DPIC: Z. COOTS	Topside Personnel: J. DALEY	Air Temp: 50°	Altitude: Ø
Diver Tender: O. VISVADER	Stby Tender: O. VISVADER	Sea State: CALM	Current: 0-.5 KNOTS
Diver Dress: DRYSUIT	Stby Diver: J. DALEY	Water Temp: COOL	
Diver Helmet: SL-17	Stby Helmet: MILLER	U/W Visibility: 10'	
Diver Bailout: 3000 Psi AIR Mix	Stby Bailout: 3000 Psi AIR Mix	Bottom Type: SAND	

Breathing Medium

Primary: Air: [✓] Compressor or [ ] HP 180 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Back-Up: Air: [ ] Compressor or [✓] HP 2200 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Breathing Sources

Bank	Mix	Start Psi	End Psi

Bank	Mix	Start Psi	End Psi

L/S: 0907	Surface Intvl: 12:00+	Start Group: 1	Max Depth: 37 FT	Work Completed: CP & UT INSPECTION ON CELLS 14 & 15.	Dive #: 3A
L/B: 0932	Bottom Time: :25	RNT: 1	Total Time: :25		
R/S: 0933	Table Used: 40 Depth 27 Time		End Group: C		

L/S: 1009	Surface Intvl: :36	Start Group: C	Max Depth: 40 FT	Work Completed: CP & UT INSPECTION ON CELLS 13 THROUGH 11	Dive #: 3B
L/B: 1043	Bottom Time: :34	RNT: :24	Total Time: :58		
R/S: 1044	Table Used: 45 Depth 63 Time		End Group: H		

L/S: 1205	Surface Intvl: 1:21	Start Group: G	Max Depth: 37 FT	Work Completed: CP & UT INSPECTION ON BENTS 21 THROUGH 24, NORTH DRYDOCK DOLPHIN, AND NORTH MOORING DOLPHIN	Dive #: 3C
L/B: 1255	Bottom Time: 50	RNT: 64	Total Time: 1:54		
R/S: 1256	Table Used: 40 Depth 121 Time		End Group: L		

In-Water Decompression

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Diver Condition: GOOD Time: 1500 Dive Supv / DPIC Signature: [signature]

Diver Signature: [signature]

#4

RECORD OF DIVE

☐ GDS – Seattle, WA
☐ GID – Rio Vista, CA
☑ GOD – Anchorage, AK

GLOBAL Diving & Salvage, Inc.

Diver: First JOHN Last DALEY (Given Name) Date: 7/7/11
Project: ALASKA SHIPYARD DOCK INSPECTION Work Order #: 106321
Location: KETCHIKAN, AK Platform/Vessel: SKIFF

Dive Supervisor / DPIC: Z. COOTS	Topside Personnel: J. SIMONSON	Air Temp: 60	Altitude: 0
Diver Tender: O. VISVADER	Stby Tender: O. VISVADER	Sea State: CALM	Current: 0-.5 KNOTS
Diver Dress: DRYSUIT	Stby Diver: J. SIMONSON	Water Temp: COOL	
Diver Helmet: MILLER	Stby Helmet: SL-17	U/W Visibility: 10'	
Diver Bailout: 3000 Psi AIR Mix	Stby Bailout: 3000 Psi AIR Mix	Bottom Type: SAND	

Breathing Medium

Primary: Air: [✓] Compressor or [ ] HP 180 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Back-Up: Air: [ ] Compressor or [✓] HP 2200 Psi — Nitrox: ____ Psi ____ % — HEO_2: ____ Psi ____ %

Breathing Sources

Bank	Mix	Start Psi	End Psi

Bank	Mix	Start Psi	End Psi

L/S: 1438	Surface Intvl: 12:00+	Start Group:	Max Depth: 41 FT	Work Completed: CP+UT INSPECTION ON CELLS 8 THROUGH 10	Dive #: 4
L/B: 1458	Bottom Time: :20	RNT:	Total Time: :20		
R/S: 1459	Table Used: 45 Depth 24 Time		End Group: C		

L/S:	Surface Intvl:	Start Group:	Max Depth: FT	Work Completed:	Dive #:
L/B:	Bottom Time:	RNT:	Total Time:		
R/S:	Table Used: Depth Time		End Group:		

L/S:	Surface Intvl:	Start Group:	Max Depth: FT	Work Completed:	Dive #:
L/B:	Bottom Time:	RNT:	Total Time:		
R/S:	Table Used: Depth Time		End Group:		

In-Water Decompression

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Dive #:

Depth	Time	Reach Leave	Medium
FT		R / L	
FT		R / L	
FT		R / L	
FT		R / L	

Diver Condition: GOOD Time: 1505 Dive Supv / DPIC Signature: _____

Diver Signature: _____

Appendix C: Coating Analysis Memo

URS

Memorandum

Date: September 27, 2011

To: John Daley

Cc: 26220967 Project File

From: William Loskutoff

Subject: **Ketchikan Shipyard Facility – Ship Lift Dock Sheet Pile Coating Analysis**

In July 2011, URS performed an inspection of waterfront facilities of the Ketchikan Shipyard in Ketchikan, Alaska as part of a cathodic protection project. On July 6, 2011, URS collected a sample of coating from sheet pile of the ship lift facility. During the inspection, the coating on the sheet pile cells was failing and eroding off the pile surfaces. Active corrosion processes were observed during the inspection. The sheet pile cells for the ship lift facility were constructed in 1982 and were originally coated and protected by an impressed current cathodic protection system. Removal and replacement of the coating is planned to support the cathodic protection project. The coating sample was collected and analyzed for evaluating the presence or absence of hazardous materials in order to prevent worker exposure or site contamination during removing, handling, and disposal of the coating from the sheet piles. Removal and surface preparation during replacement of the coating will likely involve sand or water blasting.

SAMPLE ANALYSIS

The coating sample was analyzed for asbestos containing materials (ACMs), inorganic lead, and semi-volatile organic compounds (SVOCs). The coating sample (KSLD-1) was solid, pliable, with iron oxide staining on the outer surface. The inner surface of the coating was a light gray color and a smooth texture. Numerous barnacles, a marine calcareous crustacean were attached to the outer surface of sample KSLD-1. The sample exhibited a salt-water marine odor.

The ACM analysis was conducted by White Environmental Consultants, Inc of Anchorage, Alaska. Asbestos content was determined using polarized light microscopy in accordance with U.S. Environmental Protection Agency (EPA) Method 600/M4-82-020. Asbestos containing material is defined as materials containing more than 1% total asbestos based on EPA and the Occupational Safety and Health Administration (OSHA) criteria.

The inorganic lead and SVOCs Toxicity Characteristic Leaching Procedure (TCLP) analyses were conducted by SGS North America, Inc. of Anchorage, Alaska. TCLP analysis is designed to determine the mobility of both inorganic and organic compounds present in liquid, solid, and multiphase wastes. The TCLP analysis simulates landfill conditions to determine if a waste material will leach specific chemicals into the soil or groundwater. The TCLP evaluation for solids follows analytical test method Solid Waste Method 1311 (SW 1311). The lead TCLP analysis utilized SW1311 and EPA Method 6020. The TCLP SVOCs analysis utilized SW 1311 and EPA Method 8270D.

URS Corporation
700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.562.3366
Fax: 907.562.1297
www.urscorp.com

SAMPLE RESULTS

Sample KSLD-1 was analyzed for ACMs by White Environmental. A copy of the Bulk Sample Analysis for Asbestos report is provided as an attachment to this memorandum. Sample KSLD-1 was analyzed for TCLP lead, and TCLP SVOCs by SGS North America. A copy of the Analytical Laboratory Report is provided as an attachment to this memorandum. The TCLP laboratory results were validated and reviewed by a URS Project Chemist in accordance with Alaska Department of Environmental Conservation (ADEC) regulations. A Laboratory Data Review Checklist is provided as an attachment to this memorandum.

Based on the polarized light microscopy analysis, sample KSLD-1 does not contain ACMs. Based on the analytical results, sample KSLD-1 contains lead concentrations below the method limit of quantitation or practical quantitation limit. KSLD-1 contains concentrations of SVOCs below the method limit of quantitation or practical quantitation limit for all analytes tested. Table 1 summarizes the lead and SVOC analytical results for sample KSLD-1.

TABLE 1 – Sample KSLD-1 Lead and Semi-volatile organic compounds TCLP Analytical Results.

Analyte	Result (mg/L)	ADEC Groundwater Cleanup Level (mg/L)	EPA Hazardous Waste Regulatory Level (mg/L)
Lead	<0.0310	0.015	5
2,4,5-Trichlorophenol	<0.0620	3.7	400
2,4,6-Trichlorophenol	<0.0620	0.077	2.0
2,4-Dinitrotoluene	<0.0620	0.0013	0.13
2-Methylphenol(o-Cresol)	<0.0620	1.8	200
3&4-Methylphenol(p&m-Cresol)	<0.124	1.98	400
Hexachlorobenzene	<0.0620	0.001	0.13
Hexachlorobutadiene	<0.0620	0.0073	0.5
Hexachloroethane	<0.0620	0.04	3
Nitrobenzene	<0.0620	0.018	2
Pentachlorophenol	<0.300	0.001	100
Pyridine	<0.124	nr	5

Notes: mg/L = milligrams per liter

< = not detected. Limit of Quantitation shown.

TCLP-Lead by SW1311/6020

TCLP-Semi-volatile organics by SW1311/8270D

ADEC Groundwater Cleanup Levels per 18 AAC 75.345, Table C as amended October 9, 2008.

EPA Hazardous Waste Regulatory Cleanup Level per 40 CFR Part 261.

Bold = indicates analyte considered carcinogenic

CONCLUSIONS

One sample of coating from sheet pile at the Ketchikan ship lift dock facility was analyzed for ACMs, and TCLP lead and TCLP semi-volatile organic compounds. ACM was not found in the sample. TCLP lead analysis indicated non-detect concentrations below federal hazardous waste criteria. TCLP SVOCs analysis indicated non-detect concentrations for all analytes tested below federal hazardous waste criteria. OHSA regulations (29 CFR 1926.1101) and the State of Alaska Department of Labor (8 AAC 61) apply to all workplace activities involving asbestos-containing materials. The coating was not found to contain asbestos, and thus is not regulated by 29 CFR 1926.1101 and is not required to be disposed of as an asbestos-containing waste. OSHA regulations (29 CFR 1926.62) and the State of Alaska (8 AAC Chapter 61) apply to all construction work where employees may be exposed to lead. The coating was not found to contain concentrations of lead which would be likely to result in lead exposure to workers disturbing the coating and is not required to be disposed of as a lead-containing waste. OSHA regulations (29 CFR 1926.55) and Alaska Statutes (8 AAC 61.1100) apply to work where employees may be exposed to polynuclear aromatic hydrocarbons like cresol. The coating was not found to contain concentrations of polynuclear aromatic hydrocarbons (PAHs) which would be likely to result in PAH exposure to workers disturbing the coating and is not required to be disposed of as a PAH-containing waste.

References

Alaska Department of Environmental Conservation, 2008. *18 AAC 75-Oil and Other Hazardous Substances Pollution Control,* as amended October 9.

SGS North America, Inc. Alaska Division, 2011. *Ketchikan Dock*, Level II Laboratory Data Report, SGS Work Order 1113163, July 22.

URS, 2011. *Draft Inspection Report-Ketchikan Ship Yard Cathodic Protection Project, Ketchikan, Alaska,* prepared for Alaska Industrial Development and Export Authority, July.

White Environmental Consultants, Inc., 2011. *Bulk Sample Analysis for Asbestos, Ketchikan Ship Lift Dock,* WEC Project No. 11G-494, July 14.

WHITE ENVIRONMENTAL CONSULTANTS INC.
731 I St., Suite 203, Anchorage, AK 99501-
(907) 258-8661
FAX: (907) 258-8662

NVLAP® Lab Code: 200124-0

EMAILED

Bulk Sample Analysis for Asbestos

WEC Project #: 11G-494
Client Project#: 26220967.02000

Report #: 81415
Report By: C.Blanchard
Report Date: 7/14/2011

Client: URS Corp.
P.O. Box 203970
Austin, TX 78720

Collection Date: 7/6/2011
Collection By: CLIENT
TAT: 5 Day
Analysis By: D.Milton
Analysis Date: 7/14/2011
Received By: Milton
Received Date: 7/14/2011

Samples: 1 # Layers: 1

Project Name/Location: Ketchikan Ship Lift Dock

Client ID#	WEC ID#	Location	Material	Layer
KSLD-1	AB11-6414	None Noted	Coating	1 of 1

Homo-genous	Color
No	Gray

ASBESTOS

None Detected

% Non-Fibrous Materials: 100%

Other Fibrous Materials

None Detected

Milton Dave, Lab Analyst

Date 7/14/2011

Date 7/14/2011

Analysis performed by EPA Method 600/R-93/116. All quantities reported are based on visual estimation by PLM, unless point-counting method is requested and noted for the sample. Test report relates only to items tested and must not be used by client to claim product endorsement by NVLAP or any agency of the U.S. Government. Test reports must not be reproduced without the approval of WEC Inc., and are subject to WEC Inc. General Terms and Conditions (see reverse).

WHITE ENVIRONMENTAL CONSULTANTS INC.
731 I Street, Suite 203, Anchorage, AK 99501 Phone (907) 258-8661 Fax (907) 258-8662
4868 Old Airport Way, Fairbanks, AK 99701 Phone (907) 456-4637 Fax (907) 456-4638

CHAIN OF CUSTODY

Date: 7·14·11

Client Name: URS Corp Project Name: Ketchikan Ship Lift Dock Project #: 26220967.02000

Billing Address: _____ City: _____ State: ____ Zip Code: _____

Phone: _____ Fax: _____ Cell: _____

Email: _____

****By signing for these samples you are responsible for payment. We will not bill someone else on your behalf.****

Samples Relinquished By: W. Loskutoff Date: 7·14·11 Time: 10:52am

Samples Received By: C. Beauchamp Date: 7·14·11 Time: 10:52am

Samples Relinquished By: _____ Date: _____ Time: _____

Samples Received By: _____ Date: _____ Time: _____

Samples Analysis Type: **PCM** (PLM) **TEM** **LEAD** **TCLP** **Other (specify)**

Composite: **Y** **N**

Turn-around Time: **6 HR RUSH** **24HR** **48HR** **72HR** (5DAY)

Method of Payment: **CASH** **CHECK** **CREDIT CARD** (ACCOUNT)

Sample #	Collection Date	Sample Condition	Turnaround Time	Analysis Type	Volume (L) Air Samples	Time (min) Air Samples	Flow Rate Samples	A/R
KSLD-1	7·6·11	good	5DAY	PLM				CB

URS
William Loskutoff, PG
Senior Geologist
Project Manager

URS Alaska, LLC
700 G Street, Suite 500
Anchorage, AK 99501
Tel: 907.562.3366
Direct: 907.261.6736
Fax: 907.562.1297
william_loskutoff@urscorp.com

It is the responsibility of the Customer ... samples are correctly taken and packaged. WEC reserves the right to refuse samples for analysis which are obviously unsuitable due to damage, incorrect or insufficient labeling, or incorrect sample loading. WEC will contact the Customer as soon as such a problem is identified and will discuss with the Customer the course of action to be taken.

Revision Date: March 1, 2011 SRS

SGS

SGS North America Inc.
Alaska Division
Level II Laboratory Data Report

Project:	26220967.02000 Ketchikan Dock
Client:	URS Corporation
SGS Work Order:	1113163

Released by: Kurt Clarkson

Alaska Division Project Manager/Safety Officer

Kurtiss Clarkson
2011.07.22
15:33:57 -08'00'

Contents:

Note:
Unless otherwise noted, all quality assurance/quality control criteria is in compliance with the standards set forth by the proper regulatory authority, the SGS Quality Assurance Program Plan, and the National Environmental Accreditation Conference.

Client Name: URS Corporation
Project Name: 26220967.02000 Ketchikan Dock
Workorder No.: 1113163

Sample Comments

Refer to the sample receipt form for information on sample condition.

Lab Sample ID	Sample Type	Client Sample ID
1038218	* MB	MB for HBN 1220159 [XXX/25174]
	8270D - MB recovery for bis(2-ethylhexyl)phthalate is greater than the LOQ. This analyte was not detected above the LOQ in the associated samples.	
1038219	* LCS	LCS for HBN 1220159 [XXX/25174
	8270D - LCS recovery for butylenzylphthalate is outside of QC criteria (biased high). This analyte was not detected above the LOQ in the associated samples.	
1038220	* LCSD	LCSD for HBN 1220159 [XXX/2517
	8270D - LCS/LCSD RPD for several analytes does not meet QC criteria. These analytes were not detected above the LOQ in the associated samples.	
1038726	* CCV	CCV for HBN 1220777 [XMS/6074]
	8270D - CCV recovery for benzoic acid is outside of QC criteria (biased high). This analyte was not detected above the LOQ in the associated samples.	

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Laboratory Analytical Report

Client: **URS Corporation**
700 G Street Suite 500
Anchorage, AK 99501

Attn: **Bill Laskohoff**
T: F:

Project: **26220967.02000 Ketchikan Dock**

Workorder No.: **1113163**

Certification:

This data package is in compliance with the terms and conditions of the contract, both technically and for completeness, unless otherwise noted on the sample data sheet(s) and/or case narrative. This certification applies only to the tested parameters and the specific sample(s) received at the laboratory. If you have any questions regarding this report, or if we can be of further assistance, please contact your SGS Project Manager.

Kurt Clarkson

Project Manager

Contents (Bookmarked in PDF):

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (<http://www.sgs.com/terms_and_conditions.htm>), unless other written agreements have been accepted by both parties.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and AK100001 for NELAP (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6010B, 6020, 7470A, 7471B, 8021B, 8081B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, the National Environmental Laboratory Accreditation Program and other regulatory authorities. The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV	Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 2xDL)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RL	Reporting Limit
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.
All DRO/RRO analyses are integrated per SOP.

SAMPLE SUMMARY

Print Date: 7/22/2011 12:13 pm

Client Name: URS Corporation
Project Name: 26220967.02000 Ketchikan Dock
Workorder No.: 1113163

Analytical Methods

Method Description	Analytical Method
Metals by ICP-MS	SW6020 TCLP
Semi-Volatile TCLP Liq/Liq	SW8270D TCLP

Sample ID Cross Reference

Lab Sample ID	Client Sample ID
1113163001	KSLD-1

Client Sample ID: **KSLD-1**
SGS Ref. #: 1113163001
Project ID: 26220967.02000 Ketchikan Dock
Matrix: Solid/Soil (Wet Weight)

Collection Date/Time: 07/06/11 10:00
Receipt Date/Time: 07/14/11 14:00

TCLP Constituents Metals

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Lead	0.0310 U	0.0500	0.0155	mg/L	25	MMS7090	MXT4550	

Batch Information

Analytical Batch: MMS7090
Analytical Method: SW6020 TCLP
Analysis Date/Time: 07/19/11 17:29
Dilution Factor: 25

Prep Batch: MXT4550
Prep Method: SW3010A
Prep Date/Time: 07/18/11 08:50

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 50 mL
Container ID:1113163001-A
Analyst: NRB

Client Sample ID: **KSLD-1**
SGS Ref. #: 1113163001
Project ID: 26220967.02000 Ketchikan Dock
Matrix: Solid/Soil (Wet Weight)

Collection Date/Time: 07/06/11 10:00
Receipt Date/Time: 07/14/11 14:00

TCLP Semivolatile Organic GC/MS

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
2,4,5-Trichlorophenol	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
2,4,6-Trichlorophenol	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
2,4-Dinitrotoluene	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
2-Methylphenol (o-Cresol)	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
3&4-Methylphenol (p&m-Cresol)	0.124 U	0.200	0.0620	mg/L	1	XMS6074	XXX25174	
Hexachlorobenzene	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
Hexachlorobutadiene	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
Hexachloroethane	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
Nitrobenzene	0.0620 U	0.100	0.0310	mg/L	1	XMS6074	XXX25174	
Pentachlorophenol	0.300 U	0.500	0.150	mg/L	1	XMS6074	XXX25174	
Pyridine	0.124 U	0.200	0.0620	mg/L	1	XMS6074	XXX25174	
2,4,6-Tribromophenol <surr>	79.29	40-125		%	1	XMS6074	XXX25174	
2-Fluorobiphenyl <surr>	61.21	50-110		%	1	XMS6074	XXX25174	
2-Fluorophenol <surr>	56.92	20-110		%	1	XMS6074	XXX25174	
Nitrobenzene-d5 <surr>	58.8	40-110		%	1	XMS6074	XXX25174	
Phenol-d6 <surr>	57.96	10-115		%	1	XMS6074	XXX25174	
Terphenyl-d14 <surr>	82.98	50-135		%	1	XMS6074	XXX25174	

Batch Information

Analytical Batch: XMS6074
Analytical Method: SW8270D TCLP
Analysis Date/Time: 07/19/11 17:12
Dilution Factor: 1

Prep Batch: XXX25174
Prep Method: SW3520C
Prep Date/Time: 07/18/11 09:50

Initial Prep Wt./Vol.: 100 mL
Prep Extract Vol.: 1 mL
Container ID:1113163001-A
Analyst: DSH

SGS Ref.#	1037974 Leaching Blank		**Printed Date/Time**		07/22/2011 12:13
Client Name	URS Corporation		**Prep**	**Batch**	XXX25174
Project Name/#	26220967.02000 Ketchikan Dock			**Method**	SW3520C
Matrix	Solid/Soil (Wet Weight)			**Date**	07/18/2011

QC results affect the following production samples:

1113163001

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
TCLP Semivolatiles					
2,4,5-Trichlorophenol	0.0248 U	0.0400	0.0124	mg/L	07/19/11
2,4,6-Trichlorophenol	0.0248 U	0.0400	0.0124	mg/L	07/19/11
2,4-Dinitrotoluene	0.0248 U	0.0400	0.0124	mg/L	07/19/11
2-Methylphenol (o-Cresol)	0.0248 U	0.0400	0.0124	mg/L	07/19/11
3&4-Methylphenol (p&m-Cresol)	0.0496 U	0.0800	0.0248	mg/L	07/19/11
Hexachlorobenzene	0.0248 U	0.0400	0.0124	mg/L	07/19/11
Hexachlorobutadiene	0.0248 U	0.0400	0.0124	mg/L	07/19/11
Hexachloroethane	0.0248 U	0.0400	0.0124	mg/L	07/19/11
Nitrobenzene	0.0248 U	0.0400	0.0124	mg/L	07/19/11
Pentachlorophenol	0.120 U	0.200	0.0600	mg/L	07/19/11
Pyridine	0.0496 U	0.0800	0.0248	mg/L	07/19/11
Surrogates					
2,4,6-Tribromophenol <surr>	87.31	40-125		%	07/19/11
2-Fluorobiphenyl <surr>	59.15	50-110		%	07/19/11
2-Fluorophenol <surr>	60.32	20-110		%	07/19/11
Nitrobenzene-d5 <surr>	59.68	40-110		%	07/19/11
Phenol-d6 <surr>	65.83	10-115		%	07/19/11
Terphenyl-d14 <surr>	95.35	50-135		%	07/19/11

Batch	XMS6074
Method	SW8270D TCLP
Instrument	HP 6890/5973 STA

SGS

SGS Ref.#	1038218 Method Blank	**Printed Date/Time**	07/22/2011 12:13
Client Name	URS Corporation	**Prep Batch**	XXX25174
Project Name/#	26220967.02000 Ketchikan Dock	**Method**	SW3520C
Matrix	Water (Surface, Eff., Ground)	**Date**	07/18/2011

QC results affect the following production samples:

1113163001

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
Semivolatile Organic GC/MS					
2,4,5-Trichlorophenol	0.00620 U	0.0100	0.00310	mg/L	07/19/11
2,4,6-Trichlorophenol	0.00620 U	0.0100	0.00310	mg/L	07/19/11
2,4-Dinitrotoluene	0.00620 U	0.0100	0.00310	mg/L	07/19/11
2-Methylphenol (o-Cresol)	0.00620 U	0.0100	0.00310	mg/L	07/19/11
3&4-Methylphenol (p&m-Cresol)	0.0124 U	0.0200	0.00620	mg/L	07/19/11
Hexachlorobenzene	0.00620 U	0.0100	0.00310	mg/L	07/19/11
Hexachlorobutadiene	0.00620 U	0.0100	0.00310	mg/L	07/19/11
Hexachloroethane	0.00620 U	0.0100	0.00310	mg/L	07/19/11
Nitrobenzene	0.00620 U	0.0100	0.00310	mg/L	07/19/11
Pentachlorophenol	0.0300 U	0.0500	0.0150	mg/L	07/19/11
Pyridine	0.0124 U	0.0200	0.00620	mg/L	07/19/11
Surrogates					
2,4,6-Tribromophenol <surr>	82.1	40-125		%	07/19/11
2-Fluorobiphenyl <surr>	70.6	50-110		%	07/19/11
2-Fluorophenol <surr>	62.8	20-110		%	07/19/11
Nitrobenzene-d5 <surr>	67	40-110		%	07/19/11
Phenol-d6 <surr>	71.9	10-115		%	07/19/11
Terphenyl-d14 <surr>	87.4	50-135		%	07/19/11

Batch XMS6074
Method SW8270D TCLP
Instrument HP 6890/5973 STA

SGS Ref.#	1038354 Method Blank		**Printed Date/Time**		07/22/2011 12:13
Client Name	URS Corporation		**Prep**	**Batch**	MXT4550
Project Name/#	26220967.02000 Ketchikan Dock			**Method**	SW3010A
Matrix	Solid/Soil (Wet Weight)			**Date**	07/18/2011

QC results affect the following production samples:

1113163001

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
TCLP Constituents Metals					
Lead	0.00310 U	0.00500	0.00155	mg/L	07/19/11
Batch	MMS7090				
Method	SW6020 TCLP				
Instrument	Perkin Elmer Sciex ICP-MS P3				

SGS

SGS Ref.#	1038219 Lab Control Sample	**Printed Date/Time**	07/22/2011 12:13
	1038220 Lab Control Sample Duplicate	**Prep Batch**	XXX25174
Client Name	URS Corporation	**Method**	SW3520C
Project Name/#	26220967.02000 Ketchikan Dock	**Date**	07/18/2011
Matrix	Water (Surface, Eff., Ground)		

QC results affect the following production samples:

1113163001

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD		RPD Limits	Spiked Amount	Analysis Date
Semivolatile Organic GC/MS									
2,4,5-Trichlorophenol	LCS	0.0942	94	(50-110)				0.1 mg/L	07/19/2011
	LCSD	0.0883	88		6		(< 20)	0.1 mg/L	07/19/2011
2,4,6-Trichlorophenol	LCS	0.0976	98	(50-115)				0.1 mg/L	07/19/2011
	LCSD	0.0906	91		7		(< 20)	0.1 mg/L	07/19/2011
2,4-Dinitrotoluene	LCS	0.0992	99	(50-120)				0.1 mg/L	07/19/2011
	LCSD	0.0953	95		4		(< 20)	0.1 mg/L	07/19/2011
2-Methylphenol (o-Cresol)	LCS	0.0802	80	(40-110)				0.1 mg/L	07/19/2011
	LCSD	0.0717	72		11		(< 20)	0.1 mg/L	07/19/2011
3&4-Methylphenol (p&m-Cresol)	LCS	0.130	93	(30-110)				0.14 mg/L	07/19/2011
	LCSD	0.114	82		13		(< 20)	0.14 mg/L	07/19/2011
Hexachlorobenzene	LCS	0.0947	95	(50-110)				0.1 mg/L	07/19/2011
	LCSD	0.0906	91		5		(< 20)	0.1 mg/L	07/19/2011
Hexachlorobutadiene	LCS	0.0789	79	(25-105)				0.1 mg/L	07/19/2011
	LCSD	0.0735	74		7		(< 20)	0.1 mg/L	07/19/2011
Hexachloroethane	LCS	0.0735	74	(30-100)				0.1 mg/L	07/19/2011
	LCSD	0.0676	68		9		(< 20)	0.1 mg/L	07/19/2011
Nitrobenzene	LCS	0.0794	79	(45-110)				0.1 mg/L	07/19/2011
	LCSD	0.0720	72		10		(< 20)	0.1 mg/L	07/19/2011
Pentachlorophenol	LCS	0.144	103	(40-115)				0.14 mg/L	07/19/2011
	LCSD	0.140	100		3		(< 20)	0.14 mg/L	07/19/2011
Pyridine	LCS	0.0513	51	(20-76)				0.1 mg/L	07/19/2011
	LCSD	0.0272	27		61	*	(< 20)	0.1 mg/L	07/19/2011
Surrogates									
2,4,6-Tribromophenol <surr>	LCS		97	(40-125)					07/19/2011
	LCSD		91		6				07/19/2011
2-Fluorobiphenyl <surr>	LCS		79	(50-110)					07/19/2011

SGS

SGS Ref.#	1038219 Lab Control Sample	**Printed Date/Time**	07/22/2011 12:13
	1038220 Lab Control Sample Duplicate	**Prep Batch**	XXX25174
Client Name	URS Corporation	**Method**	SW3520C
Project Name/#	26220967.02000 Ketchikan Dock	**Date**	07/18/2011
Matrix	Water (Surface, Eff., Ground)		

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Semivolatile Organic GC/MS								
		LCSD	74		7			07/19/2011
2-Fluorophenol <surr>		LCS	64	(20-110)				07/19/2011
		LCSD	53		18			07/19/2011
Nitrobenzene-d5 <surr>		LCS	74	(40-110)				07/19/2011
		LCSD	68		9			07/19/2011
Phenol-d6 <surr>		LCS	74	(10-115)				07/19/2011
		LCSD	63		16			07/19/2011
Terphenyl-d14 <surr>		LCS	90	(50-135)				07/19/2011
		LCSD	88		1			07/19/2011

Batch	XMS6074
Method	SW8270D TCLP
Instrument	HP 6890/5973 STA

SGS

SGS Ref.#	1038355 Lab Control Sample	**Printed Date/Time**	07/22/2011 12:13
		Prep Batch	MXT4550
Client Name	URS Corporation	**Method**	SW3010A
Project Name/#	26220967.02000 Ketchikan Dock	**Date**	07/18/2011
Matrix	Solid/Soil (Wet Weight)		

QC results affect the following production samples:

1113163001

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
TCLP Constituents Metals								
Lead	LCS	1.03	103	(80-120)			1 mg/L	07/19/2011

Batch	MMS7090
Method	SW6020 TCLP
Instrument	Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	1038357	Matrix Spike	**Printed Date/Time**	07/22/2011 12:13
	1038358	Matrix Spike Duplicate	**Prep Batch**	MXT4550
			Method	Waters Digest for Metals by ICI
			Date	07/18/2011
Original	1113163001			
Matrix	Solid/Soil (Wet Weight)			

QC results affect the following production samples:

1113163001

Parameter	Qualifiers		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount		Analysis Date
TCLP Constituents Metals											
Lead		MS	(0.0310) U	9.35	94	(80-120)			10.0	mg/L	07/19/2011
		MSD		9.70	97		4	(< 30)	10.0	mg/L	07/19/2011

Batch MMS7090
Method SW6020 TCLP
Instrument Perkin Elmer Sciex ICP-MS P3

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1113163

(1)

CLIENT: URS Corp

CONTACT: Bill Loskutoff PHONE NO: 261-6736

PROJECT NAME: Ketchikan Shiplift Dock PROJECT/ PWSID/ PERMIT#: 26220967.02000

REPORTS TO: Bill Loskutoff EMAIL:

INVOICE TO: QUOTE #:

P.O. #:

SGS Reference #:

page 1 of 1

(2)

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/ MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used	Analysis Required (3) 8270 TCLP	Lead TCLP	REMARKS/ LOC ID
DA	KSLD-1	7/6/11	1000	Solid	1	1		X	X	

Second Volume: Relinquished: [signature] 7/14/11 (730)

Received: [signature] 7/14/11

(5)

Collected/Relinquished By:(1)	Date	Time	Received By:
[signature]	7/14/11	1400	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:
	7/14/11	1430	[signature]

(4)

DOD Project? YES NO

Cooler ID _____

Data Deliverable Requirements: 1730 AMPM

Requested Turnaround Time and-or Special Instructions:

Temperature Blank °C: _____ or Ambient [ ]

(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)

INTACT BROKEN ABSENT

(See attached Sample Receipt Form)

200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
6500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

White - Retained by Lab
Pink - Retained by Client

SGS

1113163

SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were **custody seals** intact? Note # & location, if applicable. COC accompanied samples?	Yes No (N/A) Yes No (N/A)	
Temperature blank compliant* (i.e., 0-6°C after correction factor)? * *Note: Exemption permitted for chilled samples collected less than 8 hours ago.* Cooler ID: _____ @ ambient w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ *Note: If non-compliant, use form FS-0029 to document affected samples/analyses.* If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." **If temperature(s) <0°C, were all sample containers ice free?**	(Yes) No N/A Yes No (N/A)	
Delivery method (specify all that apply): (Client) USPS Alert Courier Road Runner AK Air Lynden Carlile ERA PenAir FedEx UPS NAC Other: → *For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?*	Note airbill/tracking # See Attached (or N/A) Yes No (N/A)	
→ For samples received with payment, note amount ($) and cash / check / CC (circle one). (N/A) → For samples received in FBKS, ANCH staff will verify all criteria are reviewed. SRF Initiated by: (N/A)		
Do samples **match COC*** (i.e., sample IDs, dates/times collected)? * *Note: Exemption permitted if times differ <1hr; in which case, use times on COC.* Were analyses requested unambiguous?	(Yes) No N/A (Yes) No N/A	
Were samples in **good condition** (no leaks/cracks/breakage)? Packing material used (specify all that apply): Bubble Wrap Separate plastic bags Vermiculite Other:	(Yes) No N/A	
Were all VOA vials **free of headspace** (i.e., bubbles ≤6 mm)? Were all soil VOAs **field extracted** with MeOH+BFB? Were the bottles provided by SGS? (Note apparent exceptions.)	Yes No (N/A) Yes No (N/A) Yes No (N/A)	
Were **proper containers** (type/mass/volume/preservative*) used? * *Note: Exemption permitted for waters to be analyzed for metals.* Were **Trip Blanks** (i.e., VOAs, LL-Hg) in cooler with samples?	(Yes) No N/A Yes No (N/A)	insufficient volume
For **special handling** (e.g., "MI" or foreign soils, lab filter, limited volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?	Yes No (N/A)	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was **pH verified and compliant?** If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No (N/A) Yes No (N/A)	
For **RUSH/SHORT Hold Time** or **site-specific QC** (e.g., BMS/BMSD/BDUP) samples, were the COC & bottles flagged (e.g., stickers) accordingly? For RUSH/SHORT HT, was email sent?	Yes No (N/A)	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	(Yes) No N/A	SRF Completed by: KMB PM = Kurt N/A
Was **PEER REVIEW** of ***sample numbering/labeling*** completed (i.e., compare WO# on containers to COC, unique lab ID on each container, LIMS container labels used?) Was selection of ***"Bill to"*** client **PEER REVIEW**ed?	(Yes) No N/A Yes No N/A	Peer Reviewed by: MEM Metrics: 1048 7/14
Additional notes (if applicable):		

Note to Client: Any "no" circled above indicates non-compliance with standard procedures and may impact data quality.

SGS

SGS North America Inc.
200 W. Potter Drive, Anchorage, AK 99518
phone (907) 562-2343, fax (907) 561-5301

Characterization of TCLP Samples for LIMS Login

Date Characterized: 7/14/11 Analyst: KMB

Sample Container ID:	Matrix	%	Is sufficient volume/mass available?	Notes:
3103 \	Xylene miscible (Top layer * = matrix 3 **)		Yes / (No)	If multiple jars were received, were they consistent? Yes / No / (NA)
	Water miscible (Middle layer = matrix 6)			Was there only one layer? (Yes) / No / NA
	Solid (Bottom layer = matrix 7)	100		Other observations? Dock with barnacles
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?
	Xylene miscible (Top layer * = matrix 3 **)		Yes / No	If multiple jars were received, were they consistent? Yes / No / NA
	Water miscible (Middle layer = matrix 6)			Was there only one layer? Yes / No / NA
	Solid (Bottom layer = matrix 7)			Other observations?

Remember: ** = Chlorinated oils will be heavier than water and present as the bottom later.*
*** = Oils must be filterable to be logged in as matrix 3. Nonfilterable oils must be logged in as matrix 7.*

Laboratory Data Review Checklist

Completed by:	Shane Poston
Title:	Project Chemist
Date:	September 22, 2011
CS Report Name:	Ketchikan Ship Lift Dock
Report Date:	July 22, 2011
Consultant Firm:	URS Corporation
Laboratory Name:	SGS North America, Inc., Anchorage, AK; NELAP# AK100001
Laboratory Report Number:	1113163
ADEC File Number:	NA
ADEC RecKey Number:	NA

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   ☑ Yes ☐ No Comments:

   Sample was submitted to SGS North America, Inc., Anchorage, AK. Sample was analyzed for TCLP lead by SW1311/6020 and TCLP Semivolatile Organics by SW1311/8270D.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

   ☐ Yes ☑ No Comments:

   Samples were not transferred.

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   Sample receipt forms, documenting sample condition and temperature, were completed upon receipt at the laboratory. All of the COCs were signed and dated as relinquished by the field personnel and as received by the laboratory.

☒ Yes ☐ No Comments:

b. Correct analyses requested?

☒ Yes ☐ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

☒ Yes ☐ No Comments:

One sample was submitted to SGS, Anchorage, AK . Sample was received at ambient temperature. There are no temperature preservation criteria for TCLP samples.

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

☒ Yes ☐ No Comments:

1 solid sample of dock material was submitted. Samples was collected on July 6th, 2011.

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

☒ Yes ☐ No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

☒ Yes ☐ No Comments:

Sample receiving discrepancies were noted on the sample receipt form or laboratory case narrative.

e. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

☒ Yes ☐ No Comments:

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The laboratory case narrative identifies QA/QC deficiencies. Data quality/usability were determined by the URS Project Chemist.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

☒ Yes ☐ No Comments:

b. All applicable holding times met?

☒ Yes ☐ No Comments:

c. All soils reported on a dry weight basis?

☒ Yes ☐ No Comments:

NA, submitted sample was analyzed for TCLP lead and TCLP semi-volatile analystes.

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

☒ Yes ☐ No Comments:

e. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

☒ Yes ☐ No Comments:

ii. All method blank results less than PQL?

☒ Yes ☐ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☒ Yes ☐ No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

☒ Yes ☐ No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

☒ Yes ☐ No Comments:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☐ Yes ☑ No Comments:

The method SW8270D LCS/LCSD RPD exceeded the control limit for pyridine. LCS/LCSD recoveries were within control limits.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

Project sample ID KSLD-1.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☑ Yes ☐ No Comments:

vii. Data quality or usability affected? Explain.

Comments:

The TCLP limit for pyridine is 5.0 mg/L. The associated project sample was non-detect for pyridine at reporting level of 0.124 mg/L. No data quality or usabilty effects observed.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

☑ Yes ☐ No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

☑ Yes ☐ No Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

☑ Yes ☐ No Comments:

iv. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

☐ Yes ☒ No Comments:

Trip blanks are not applicable to this matrix/analysis.

ii. All results less than PQL?

☐ Yes ☒ No Comments:

NA

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

☐ Yes ☒ No Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No Comments:

NA

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☑ Yes ☐ No Comments:

NA

iv. Data quality or usability affected? Explain.

Comments:

No data quality or usabilty effects observed.

f. Decontamination or Equipment Blank (if applicable)

☐ Yes ☐ No ☑ Not Applicable

i. All results less than PQL?

☐ Yes ☐ No Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? Explain.

Comments:

NA

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

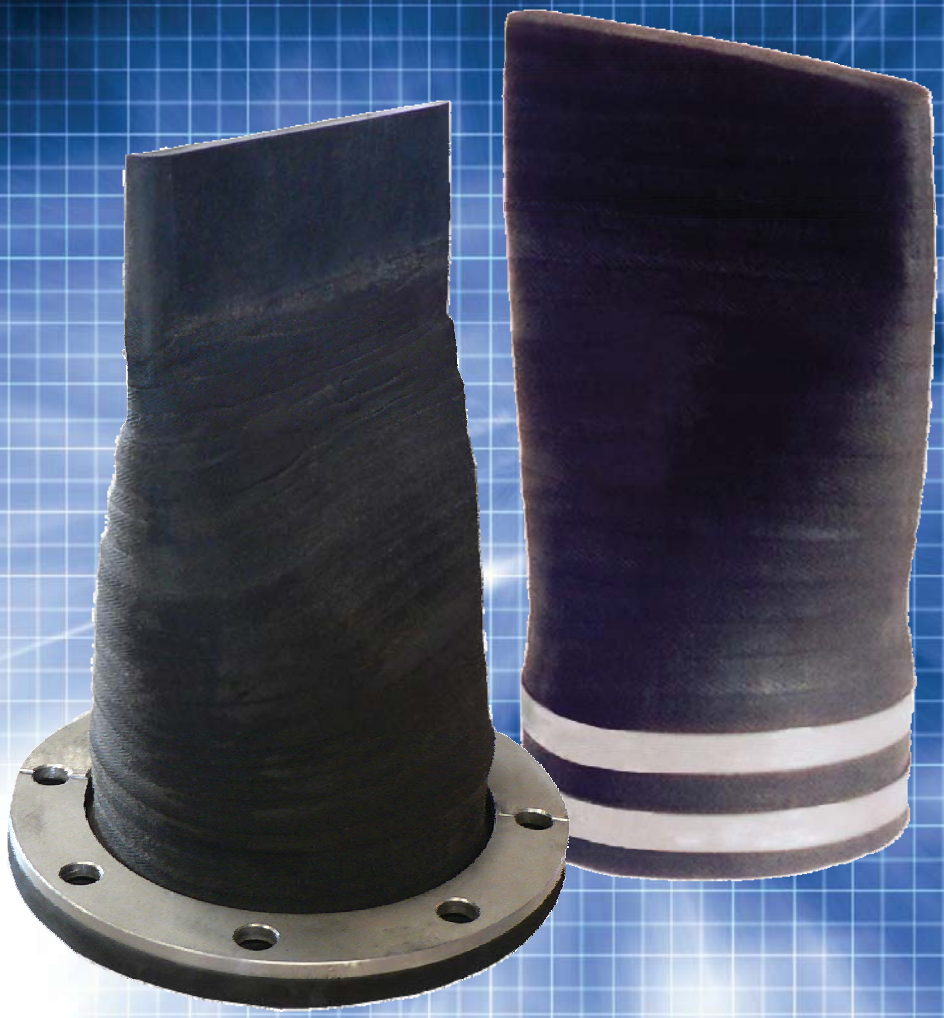
a. Defined and appropriate?

☑ Yes ☐ No Comments:

There are no additional data quality issues relevant to the reported analytes.

Appendix D: Rubber Check Valve Catalog Sheet

J & S Valve®



HedFlex Duckbill Check Valves

The J&S VALVE - Duck Bill Rubber Check Valve, is a cost effective way to control back pressures from sewage treatment plants, outfalls and tidal operations. They are a fully passive backflow device requiring neither maintenance, outside sources of power, or manual assistance to operate.

The J&S VALVE - HEDFLEX Duckbill Rubber Check Valves, are offered as direct replacements for ineffective and maintenance ridden flap type check valves, which are commonly known to seize, rust and bind in un-wanted positions. Unlike flap type valves, the Duckbill rubber check valves will handle large obstructions without jamming or having swing gates binding open.

Advantages of the J&S VALVE - HEDFLEX DUCKBILL CHECKVALVE Model DBV-09 Series Duckbill Rubber Check Valves:

- **Positive Backflow Prevention**
- **Manufactured to Your Head Pressure Requirements**
- **Simple Installation When Replacing Flap Valves**
- **Zero Water Hammer Problems**
- **35-50 Years of Service Life**
- **All Rubber Construction Resists Abrasive Slurries**
- **NSF/ANSI Standard 61 Certified Materials**
- **Very Quiet Operation**
- **Negligible Maintenance and Energy Costs**
- **Will Not Warp or Freeze**
- **Available in Sizes 1" to 96" (Available with special IDs to suit concrete pipe)**

Specify, the J&S VALVE - HEDFLEX DUCKBILL CHECK VALVE to provide backflow protection.

Elastomers: All of the J&S VALVE - HEDFLEX DUCKBILL VALVES are available in a various elastomers and back pressure capabilities to suit most applications.

The J&S VALVE - HEDFLEX DUCKBILL CHECK VALVES will not freeze or deform and function solely on inlet and back pressures which will be Present in most applications

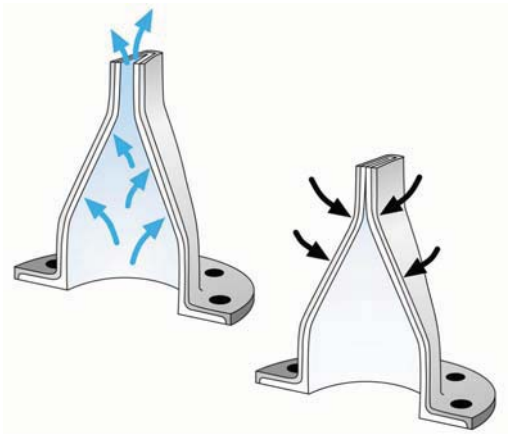
Each valve is carefully constructed using the finest of engineered materials and built by the most experienced rubber technicians in the industry.

APPLICATIONS:

- **Wastewater Treatment Plant**
- **Sewer Systems**
- **Potable Water Holding Tanks**
- **Airport Runways**
- **Parking Lots**
- **Residential Areas**
- **Commercial Centers**
- **Storm Water Discharge**
- **Flood Control Prevention**
- **Effluent Diffusers**
- **Marine Effluent Diffusers**
- **Flap Valve Replacement**
- **Aeration Systems**
- **Blow-Off Connections**
- **Lift Station Drain Valves**
- **Salt Water Barriers**
- **Tidal Walls**
- **Filter Drains**
- **Detention Ponds**

When an engineered solution is needed to solve a piping or backflow problem, call J&S VALVE

Improved design allows the straight bill check valves to be used in any application, from low head pressures to heavy sea water activity. The picture clearly shows the valve washes away the beach sand and debris



The Specified Back Pressure Forces the HedFlex Rubber Check Valve to Close Preventing Back Flow.

NOTE: Dimensional Drawings are Available at JandSValve.com

2323 1st Street ▪ Huffman, TX 77336 ▪ Phone: 281.324.3990
Fax: 281.324.6879 ▪ Email: sales@JandSValve.com ▪ JandSValve.com

J&S Straight Bill Design
vs.
Competitors Curved Bill Design

Straight Bill Design Offers:

- Full Flow Without Curved Bill Restrictions
- Low Head Pressure to Open
- Not Affected by Flows or Current
- Can be Installed without Large Protective Headwalls
- Flow even Under Marginal Head Pressure
- Washes Sand and Other Matter away from the Bill
- Provides Full Flushing from the Lip Area
- Not a Patented Design

Curved Billed Design Offers:

- Partial Flow Caused by Curved Bill Restrictions
- Higher Head Pressure to Open
- Not Affective in Dual Flow Applications; Rivers and Tide Change
- No Continual Flow Under Low Cracking Pressure
- Fails if Valve Lips are Blocked with Sand and Ocean Debris
- Requires Regular Maintenance to Prevent Clogging by Debris
- Patented Design to Eliminate Competition

In the photo on the left, the straight bill design on the left and the curved bill design is on the right. Notice that the straight bill design is operating under low-flow conditions while the curved bill is not. In the photo on the right, The curve bill has failed in many applications where trapped debris prevents the back pressure from sealing the valve. The curve bill collapses under the water weight causing the bill to remain open even when back pressure applies.

2323 1st Street ▪ Huffman, TX 77336 ▪ Phone: 281.324.3990
Fax: 281.324.6879 ▪ Email: sales@JandSValve.com ▪ JandSValve.com

J & S Valve®

Improving the Industry Standard!

J&S HedFlex Check Valves are constructed with superior high grade rubber and superior polyester reinforcement to improve performance, operation, and life expectancy. There are many grades of rubber that vary in chemical make-up. The elastomer's chemical make-up "the recipe" determines cost, characteristics, durometer (hardness and stiffness), and quality of the rubber parts used to construct HedFlex Check Valves.

The HedFlex product line must have the proper durometer, for memory, and strength to allow it to operate under specific flow-conditions, also to be strong enough to withstand the weight of water and specified back pressure. The exterior of the HedFlex Check Valves are coated to prevent damage from the ultraviolet rays of the sun. HedFlex Check Valves are fire retardant and treated so sea life will not adhere to it, and to prevent animals from eating it. The Hedflex Check Valve reinforcing plies, are a key factor in the construction of HedFlex Check Valves, for example, a tire rated for 80,000 miles of service has a superior rubber compound and reinforcement than a tire rated for 40,000 miles of service.

Duckbill Check Valves versus the competition is similar. HedFlex Check Valves use a much higher grade of rubber than the leading competitors. J&S uses a polyester fabric reinforcement compared to less expensive nylon. The polyester offers added strength to the product and will not wick fluids. Nylon Fabric is not as strong as polyester and will wick when exposed to liquids. This wicking action causes the rubber to delaminate and in-turn will cause the valve to fail.

J&S HedFlex Duckbill Check Valve Flange & Slip-on

J&S HedFlex Duckbill Inline Check Valve Flanged & Slip-In

Texas Factories

Dallas Area

Houston Area

2323 1st Street ▪ Huffman, Texas 77336
Phone: 281-324-3990 ▪ Fax: 281-324-6879
Email: sales@JandSValve.com ▪ Web Site: JandSValve.com

6/2010

HedFlex Duckbill Check Valve – Model DBV-09-FL

Bolt On ▪ Flanged ▪ Sizes 1” - 72”

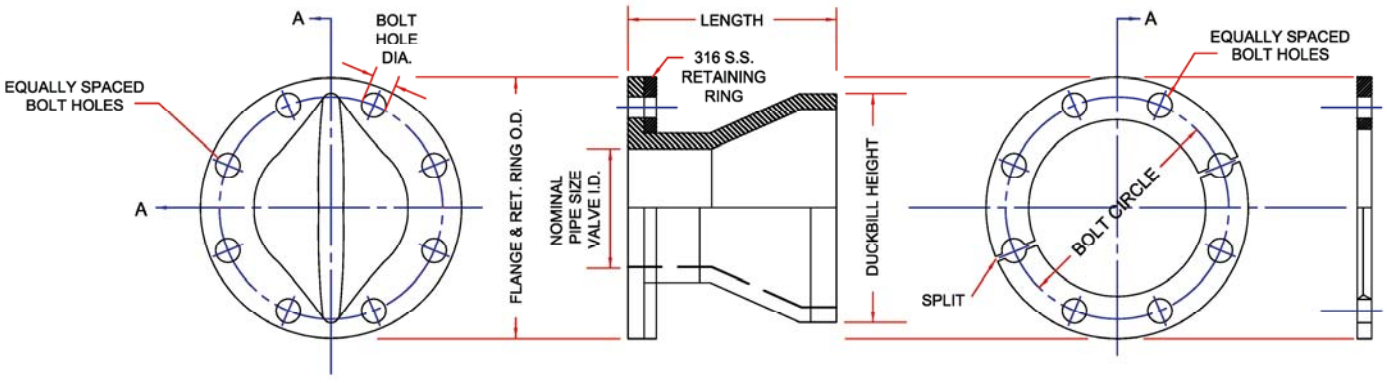
Model DBV-09-FL is designed to bolt to flanges.

Table 2: Sizes • Drilling • Weights

HedFlex Duckbill Check Valve J&S Valve Model DBV-09-FL

Nominal Pipe Size (Inch)	Length (Inch)	Duckbill Height (Inch)	Flange O.D. (Inch)	Bolt Circle (Inch)	No. Of Holes	Size of Holes (Inch)	Weight (Lbs)
1	4	2.125	4.25	3.13	4	0.625	3
1.5	5	2.625	5.00	3.88	4	0.625	4
2	6.5	3.875	6.00	4.75	4	0.750	6
2.5	7.5	4.625	7.00	5.50	4	0.750	8
3	8.5	5.500	7.50	6.00	4	0.750	10
4	10	7.375	9.00	7.50	8	0.750	14
5	12	8.750	10.00	8.50	8	0.875	17
6	13	10.500	11.00	9.50	8	0.875	22
8	15	13.750	13.50	11.75	8	0.875	27
10	17	17.000	16.00	14.25	12	1.000	39
12	19	19.625	19.00	17.00	12	1.000	62
14	21	24.750	21.00	18.75	12	1.250	81
16	24	26.500	23.50	21.25	16	1.250	125
18	26	29.750	25.00	22.75	16	1.250	210
20	32	31.500	27.50	25.00	20	1.250	312
24	42	43.000	32.00	29.50	20	1.375	410
28	45	46.000	36.50	34.00	28	1.375	483
30	47	49.000	38.75	36.00	28	1.375	555
32	53	51.000	41.75	38.50	28	1.625	605
36	58	55.250	46.00	42.75	32	1.625	665
42	62	66.250	53.00	49.50	36	1.625	965
48	72	74.500	59.50	56.00	44	1.625	1005
54	74	78.250	66.25	62.75	44	2.000	1085
60	82	85.000	73.00	69.25	52	2.000	1285
72	98	105.000	86.50	82.50	60	2.000	1500

Notes: 1. Larger sizes available upon request.
2. Weights are approximate.



2323 1st Street ▪ Huffman, TX 77336 ▪ Phone: 281.324.3990
Fax: 281.324.6879 ▪ Email: sales@JandSValve.com ▪ JandSValve.com

Appendix E: Coating System Catalog Sheet

Protective & Marine Coatings

ENVIROLASTIC® AR425

PART A B81V3200 — **ISOCYANATE**
PART B B81-3200 — **SERIES**

Revised 2/11

PRODUCT INFORMATION

TRM.85

PRODUCT DESCRIPTION

ENVIROLASTIC AR425 is a 100% solids, spray-applied, aromatic polyurea coating and lining system, which exhibits extraordinary toughness and elastomeric performance characteristics. It can be applied at thicknesses of 30-250 mils (750-6250 microns) or greater in multiple passes during a single application.

- Fast cure - short down time
- No VOCs and low odor
- Seamless flexible and waterproof
- Chemical resistant
- Impact, tear,and abrasion resistant
- Bridges moving cracks to 1/8"
- Retains physical properties at -20°F (-29°C) to 250°F (121°C)

PRODUCT CHARACTERISTICS

Finish: Semi-Gloss

Color: White, Light Gray, Medium Gray, Dark Gray, Black, Beige, Tile Red Siver Metallic, Caribbean Green

Volume Solids: 100%

VOC (calculated): 0

Mix Ratio: 1:1

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**30.0** (750)	**250.0** (6250)
Dry mils (microns)	**30.0** (750)	**250.0** (6250)
~Coverage sq ft/gal (m^2/L)	**6** (0.15)	**53** (1.3)
Theoretical coverage sq ft/gal (m^2/L) @ 1 mil / 25 microns dft	**1600** (39.2)	

Drying Schedule @ 30.0 mils wet (750 microns):

@ 73°F/23°C
50% RH

To touch:	45 seconds
To recoat:	
minimum:	45 seconds
maximum:	16 hours
Gel time:	15 seconds
Tack free:	45 seconds
Light traffic:	2 hours
To cure:	24 hours

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Pot Life: None
Sweat-in-time: None

Shelf Life:	12 months, unopened Store indoors at 70°F (21°C) to 90°F (32°C)
Flash Point:	200°F (93°C)
Viscosity (mixed):	550 cps
Reducer:	Not recommended
Clean Up:	Butyl Cellusolve™ (R6K25) or Dowanol PM™

RECOMMENDED USES

Designed for use in immersion or atmospheric exposure as a tough, flexible, impact resistant, waterproof coating and lining system. Ideally suited for use in areas to include:

- Water & wastewater linings
- Tank linings
- Cooling tower linings
- Secondary containment
- Geotextile linings
- Select fuel storage & containment
- Marine bridge and deck
- Offshore platforms
- Traffic bearing waterproofing
- Nuclear Power Plants
- Nuclear fabrication shops
- Manhole and sewer linings
- Basins and reservoirs
- Cold storage areas
- Waterparks & theme parks
- Marine bilge and tanks
- Tunnels
- Pipe line coating and select lining
- Rail bridge decks
- DOE Nuclear Fuel Facilities
- DOE Nuclear Weapons Facilities
- Suitable for use in USDA inspected facilities
- This product meets specific design requirements for non-safety related nuclear plant applications in Level II, III and Balance of Plant, and DOE nuclear facilities*.

* Nuclear qualifications are NRC license specific to the facility.

PERFORMANCE CHARACTERISTICS

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060	1000 g 1000 cycles CS-17: 6 mg loss
Adhesion	ASTM D4541	Concrete - 350 psi; Steel - 2,000 psi; Wood - 250 psi
Coefficient of Linear Thermal Expansion	ASTM C531 (in/in/°F)	4 x 10^{-5}
Crack Bridging (@ -26°C (-15°F) @ 1/8")	ASTM C836	Passed
Nuclear Decontamination*	ASTM D4256/ANSI N 5.12	99.5% (Hanford)
Durometer Hardness	ASTM D2240	Shore D-51
Fire Test of Roof Covering	ASTM E108 (comparable to UL 790)	Class A
Gardner Impact	ASTM D2794 (1/32" steel panels)	>160 in-lbs, direct and indirect
Mandrel Bend	ASTM D522 Conical Bend (1/32" steel panel)	Pass
QUV Weatherometer	ASTM G53, 3000 hours, UVB 313 bulb	Property Retention >90%
Radiation Tolerance*	ASTM D4082 / ANSI 5.12	Pass at 30 mils (750 microns), 60 mils (1500 microns), 120 mils (3000 microns), & 250 mils (6250 microns)
Salt Spray Corrosion	ASTM B117, 3000 hours	Blisters: None; Corrosion from scribe: 7.0 mm; Elcometer adhesion: 2,000 psi
Surface Burning Characteristics (Tunnel Test) @ 20.0 mils (500 microns) dft	ASTM E84 (Rating: Class 1)	Flame Spread: 10; Smoke Density: 35
Tear Strength	ASTM D1004	495 pli
Tensile Elongation	ASTM D638	425%
Tensile Modulus	ASTM D638	100% Modulus: 1,280 psi; 300% Modulus: 2,100 psi
Tensile Strength	ASTM D638	3,000 psi
Water Vapor	ASTM D1653-03, Method A (dry cup), Condition A; ASTM E96-00 Desiccant Method, Procedure A	60 mils (1500 microns), 77°F (25°C), 50% RH, 0.50 grains/hr ft^2 in Hg

*Substrate: Steel

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Protective & Marine Coatings

ENVIROLASTIC® AR425

PART A B81V3200 — **ISOCYANATE**
PART B B81-3200 — **SERIES**

PRODUCT INFORMATION

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RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Steel (lining):			
1 ct.	EnviroLastic AR425	60.0-80.0*	(1500-2000)*
Steel, with hold primer (lining):			
1 ct.	Copoxy Shop Primer	1.0 -1.5**	(25-40)**
1 ct.	EnviroLastic AR425	60.0-80.0*	(1500-2000)*
Concrete (lining):			
1 ct.	Corobond HS Epoxy Primer	3.0-4.0**	(75-100)**
1 ct.	EnviroLastic AR425	60.0-80.0*	(1500-2000)*
Concrete (containment and flooring):			
1 ct.	Corobond HS Epoxy Primer	3.0-4.0**	(75-100)**
1 ct.	EnviroLastic AR425	40.0-60.0	(1000-1500)
1-2 cts.	EnviroLastic PA	4.0-5.0	(100-125)
Concrete (containment, flooring):			
1 ct.	Corobond HS Epoxy Primer	3.0-4.0**	(75-100)**
1 ct.	EnviroLastic AR425	40.0-60.0*	(1000-1500)*
1-2 cts.	Cor-Cote HCR FF	15.0-20.0	(375-500)
Concrete (mechanical equipment room):			
1 ct.	Corobond HS Epoxy Primer	3.0-4.0**	(75-100)**
1 ct.	EnviroLastic AR425	30.0-40.0	(750-1000)
1 cts.	EnviroLastic AR200 HD (texture)	10.0-20.0	(250-500)
Concrete, low temperature or fast set:			
1 ct.	EnviroLastic LT Primer	2.0-3.0	(50-75)
1 ct.	EnviroLastic AR425	30.0-40.0*	(750-1000)*
Geo-Textile Lining (earthen base):			
1 ct.	Geo-textile non-woven, 3-4oz. Amoco "Petromat" Style 4599		
1 ct.	EnviroLastic AR425	80.0-100.0*	(2000-2500)*

*When used as a lining in immersion service, a minimum total dry film thickness of 60.0 mils (1500 microns) is required.
** Refer to Performance Tips section

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Steel:
- Atmospheric: SSPC-SP10/NACE 2, 3 mil (75 micron) profile
- Immersion: SSPC-SP10/NACE 2, 3 mil (75 micron) profile
- Concrete & Masonry: SSPC-SP13/NACE 6 or ICRI No. 310.2, CSP 3-5.

Surface Preparation Standards

Condition of Surface		ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature:
- Material: 150°F (66°C) minimum, 170°F (77°C) maximum
- Air and surface: -20°F (-29°C) minimum, 120°F (49°C) maximum
  At least 5°F (2.8°C) above dew point

Relative humidity: 80% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:
- Part A: 53 gallon (200L) drums
- Part B: 53 gallon (200L) drums

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

ENVIROLASTIC® AR425

PART A **B81V3200** **ISOCYANATE**
PART B **B81-3200** **SERIES**

Revised 2/11

APPLICATION BULLETIN

TRM.85

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel (immersion service)
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils / 75 microns). Remove all weld spatter and round all sharp edges. Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Iron & Steel (atmospheric service)
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils / 75 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 3-5. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required.

Follow the standard methods listed below when applicable:
ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
ICRI No. 310.2 Concrete Surface Preparation.

Concrete, Immersion Service:
For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2, CSP 3-5.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:
Material: 150°F (66°C) minimum, 170°F (77°C) maximum
Air and surface: -20°F (-29°C) minimum, 120°F (49°C) maximum
At least 5°F (2.8°C) above dew point

Relative humidity: 80% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer .....Not recommended

Clean-up .....Butyl Cellusolve™ (R6K25) or Dowanol PM™

Plural Component Heated Spray Equipment:
Equipment.....Graco Reactor EXP2 or HXP3
Gun .....GX7 DI,GX7-400, or GX-8
Fluid Pressure.....2,200 psi
Air Pressure .....100 psi
A Side Temperature 150-170F
B Side Temperature 150-170f
Inlet Strainer Screen .....30 mesh
Gun Screen.....80 mesh

If specific application equipment is not listed above, equivalent equipment may be substituted.

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Protective & Marine Coatings

ENVIROLASTIC® AR425

PART A	B81V3200	ISOCYANATE
PART B	B81-3200	SERIES

APPLICATION BULLETIN

TRM.85

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Agitate resin blend (B) component thoroughly with a drum mixer before use to disperse pigment and assure homogeneity. Do not thin. Do not mix "A" and "B" resins together. **Caution: Do not agitate in air and moisture.**

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**30.0** (750)	**250.0** (6250)
Dry mils (microns)	**30.0** (750)	**250.0** (6250)
~Coverage sq ft/gal (m^2/L)	**6** (0.15)	**53** (1.3)
Theoretical coverage sq ft/gal (m^2/L) @ 1 mil / 25 microns dft	**1600** (39.2)	

Drying Schedule @ 30.0 mils wet (750 microns):

@ 73°F/23°C *50% RH*	
To touch:	45 seconds
To recoat:	
minimum:	45 seconds
maximum:	16 hours
Gel time:	15 seconds
Tack free:	45 seconds
Light traffic:	2 hours
To cure:	24 hours

If maximum recoat time is exceeded, abrade surface before recoating.
Drying time is temperature, humidity, and film thickness dependent.

Pot Life: None
Sweat-in-time: None

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Butyl Cellusolve™ (R6K25) or Dowanol PM™. Clean tools and equipment immediately after use (including both "A" and"B" sides of plural component spray system) with Butyl Cellusolve™ (R6K25) or Dowanol PM™.

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PERFORMANCE TIPS

For concrete, always perform Calcium Chloride test as per ASTM F1869. Do not proceed with MVE >3 lbs.

**Where primers are used, do not fill the profile on concrete or steel with excess primer. Topcoat epoxy primers immediately after they become tack free. "Tack free" is defined as slight to medium pressure with a gloved hand, placed on a primed surface, that when lifted shows a slight imprint or distortion to the surface, with no transfer of primer to the glove.

For immersion applications, a minimum total dry film thickness of 40 mils (1000 microns) on steel and 60 mils (1500 microns) on concrete is required.

For Immersion Service: (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

May be applied in one or two coats to achieve the recommended film thickness.

For steel, stripe coat all chine, welds, bolted connections, and sharp angles to prevent early failure in these areas. For concrete, all cracks must receive a 6" wide by 30 mil (750 micron) dft detail coat.

Use only heated, plural component equipment capable of producting 2,500 psi at 160°F (71°C) and 2 gallon (7.56L) /minute output consistently.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Butyl Cellusolve™ (R6K25), Dowanol PM™, or Propylene Glycol.

While spraying, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Do not agitate in air and moisture.

Consult your Sherwin-Williams representative for specific application and performance recommendations.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

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