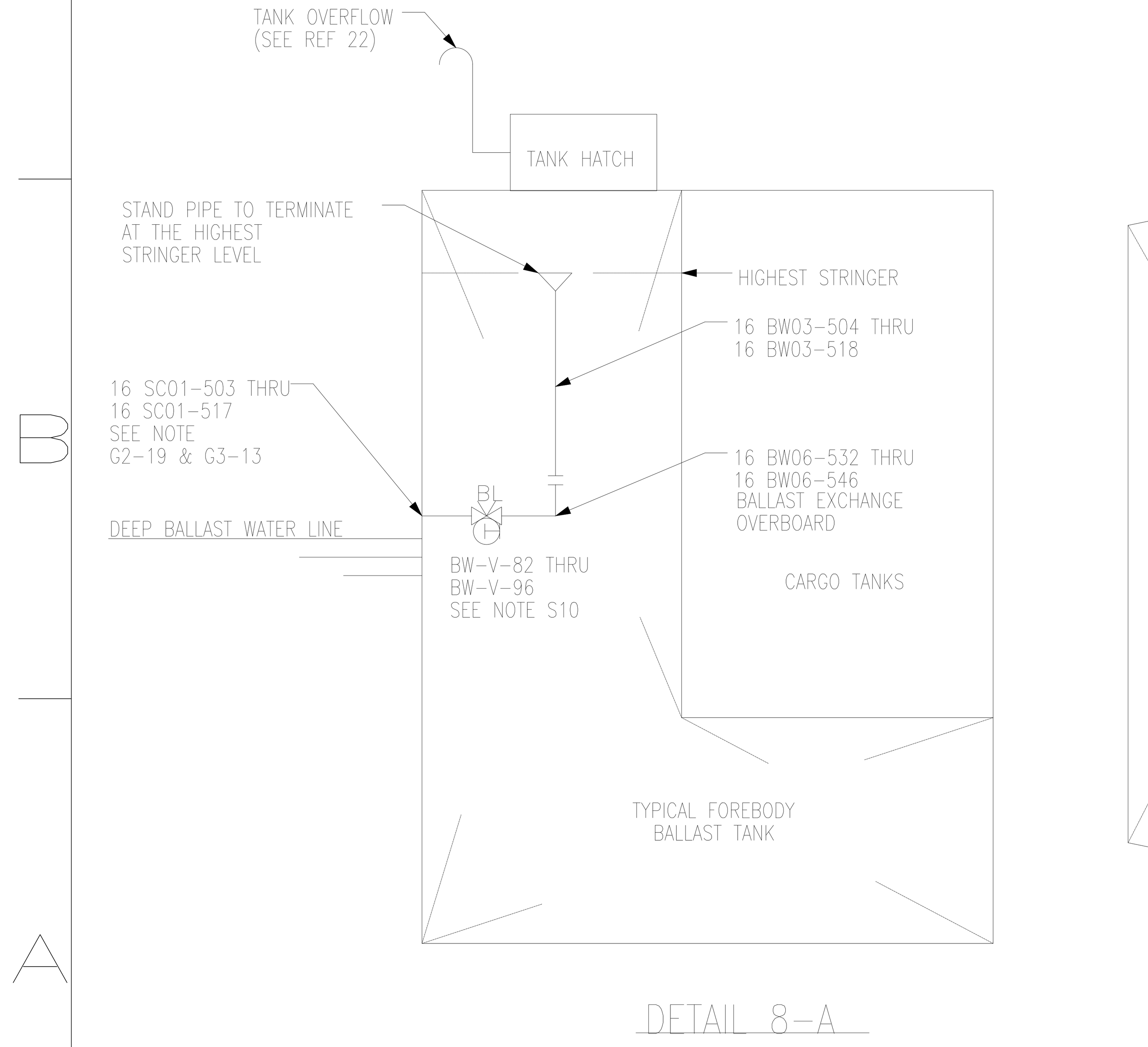
SYSTEM DESIGN DATA (A15)

SYSTEM	SERVICE	OPERATING TEMPERATURE		DESIGN TEMPERATURE		OPERATING PRESSURE		DESIGN PRESSURE		ABS CLASS	HYDRO TEST PRESSURE	
		(° F)	(° C)	(° F)	(° C)	(PSI)	(BAR)	(PSI)	(BAR)		(PSI)	(BAR)
BW01	BALLAST, SEAWATER, OUTSIDE OF TANKS	90	32	90	32	77	5.3	109	7.5	III	109	7.5
BW03	BALLAST, SEAWATER, INSIDE OF TANKS (GRP)	90	32	90	32	77	5.3	109	7.5	III	109	7.5
BW05	BALLAST, MUD TREATMENT SUPPLY (SST)	90	32	90	32	109	7.5	109	7.5	III	109	7.5
BW06	BALLAST, SEAWATER, INSIDE TANKS (STEEL)	90	32	90	32	77	5.3	109	7.5	III	109	7.5
BW07	BALLAST, AFT, SEAWATER, OUTSIDE OF TANKS	90	32	90	32	183	12.6	223	15.4	III	223	15.4

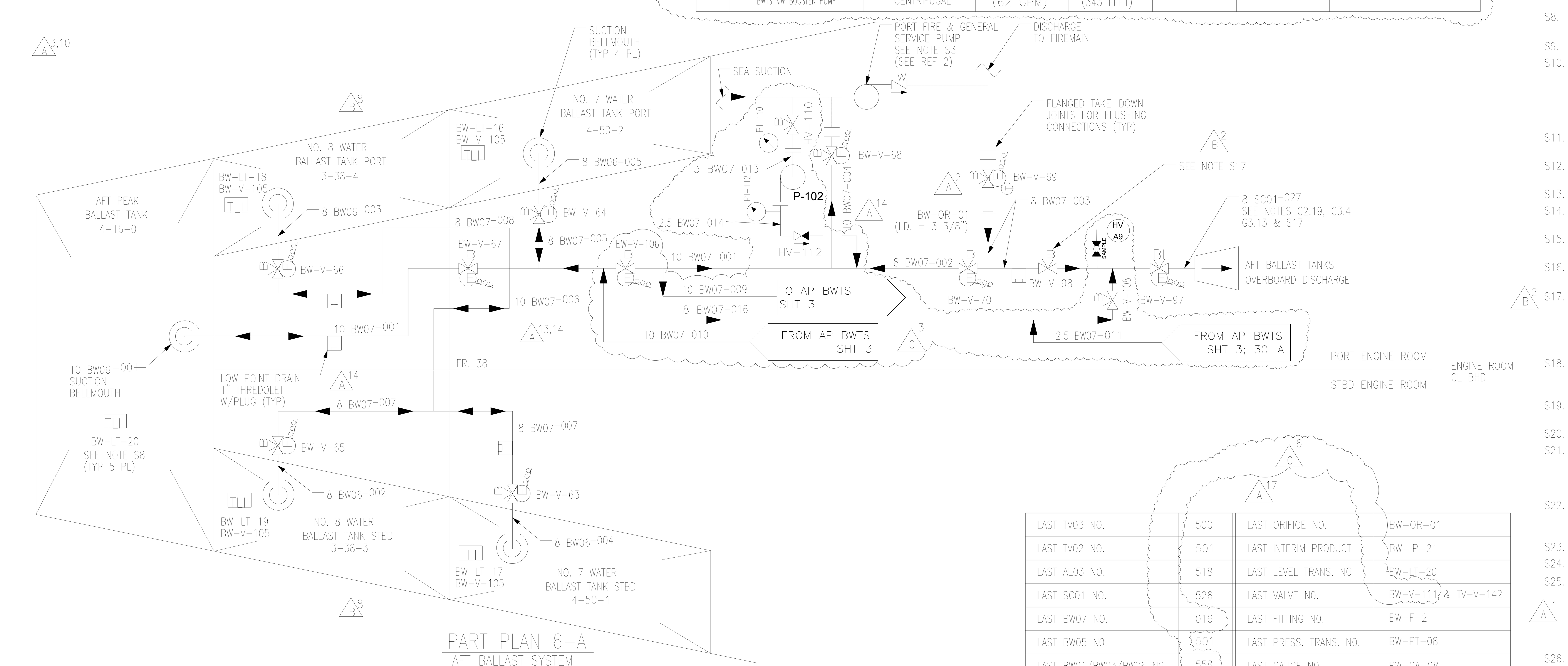
PUMP TABLE (A9) (B7)

QTY	SERVICE	TYPE	RATED CAPACITY	RATED TDH	SHUT-OFF HEAD	PURCHASE SPEC NO.	REMARKS
2	BALLAST PUMP	VERTICAL CENTRIFUGAL	2850 M3/HR (12540 GPM)	30.0 M (98.4 FEET)	50 M (164 FEET)	484-342-7567	MOTOR DRIVEN
2	BALLAST STRIPPING EDUCTOR	FIREMAIN ACTUATION	250 M3/HR (1100 GPM)	20 M (66 FEET)	N/A	484-342-7612	E/R FIRE PUMP ACTUATION AT 8.7 BAR (126 PSI). 7 M (23 FT) SUCTION LIFT
2	BALLAST MUD CHEMICAL INJECTION PUMPS	AIR MOTOR DRIVEN METERING PUMPS	0.072 M3/HR (0.32 GPM)	5.5 BAR (80 PSI)	N/A	484-342-7397	AIR SUPPLIED AT 6.9 BAR (100 PSI) WITH 7.5 BAR
1	PORT FIRE & GENERAL SERVICE	VERTICAL CENTRIFUGAL	470 M3/HR (2069 GPM)	109 M (358 FEET)	137 M (449.5 FT)	484-342-7375	MOTOR DRIVEN SEE REF 2
1	AP BWTS BACKFLUSH PUMP	HORIZONTAL CENTRIFUGAL	42 M3/HR (185 GPM)	12 M		UGS-160M	
2	PUMP ROOM BWTS BACKFLUSH PUMP	HORIZONTAL CENTRIFUGAL	181 M3/HR (797 GPM)	12 M			MOTOR DRIVEN GAS TIGHT BULKHEAD MOUNT
1	P-102 BWTS SUPPLY PUMP	HORIZONTAL CENTRIFUGAL	63 M3/HR (277 GPM)	12 M		UGS-160M	
1	P-100 BWTS MW BOOSTER PUMP	VERTICAL CENTRIFUGAL	14 M3/HR (62 GPM)	105 M (345 FEET)			

(C4)



DETAIL 8-A
BALLAST WATER EXCHANGE PIPING
(TYPICAL FOR ALL FOREBODY BALLAST TANKS ONLY)
SEE NOTE S5



PART PLAN 6-A
AFT BALLAST SYSTEM

LAST TV03 NO.	500	LAST ORIFICE NO.	BW-OR-01
LAST TV02 NO.	501	LAST INTERIM PRODUCT	BW-IP-21
LAST AL03 NO.	518	LAST LEVEL TRANS. NO	BW-LT-20
LAST SC01 NO.	526	LAST VALVE NO.	BW-V-111 & TV-V-142
LAST BW07 NO.	016	LAST FITTING NO.	BW-F-2
LAST BW05 NO.	501	LAST PRESS. TRANS. NO.	BW-PT-08
LAST BW01/BW03/BW06 NO.	558	LAST GAUGE NO.	BW-GA-08

SYSTEM SPECIFIC NOTES

S1. REFER TO THE BOOKLET OF SYSTEMS DIAGRAMS FOR DETAILS ON
- HULL APPLICABILITY
- DIAGRAM APPROVAL
- LIST OF REFERENCES
- LIST OF EQUIPMENT
- GENERAL NOTES
- DRAWING SYMBOLS

S2. SYSTEM IS DESIGNED FOR EITHER FREE FLOODING OR SIMULTANEOUS PUMPING OF TWO PAIR OF FOREBODY PORT AND STARBOARD BALLAST TANKS DURING BALLAST AND DEBALLAST OPERATIONS.

S3. FILL AND DISCHARGE OF THE AFT WATER BALLAST TANKS IS ACCOMPLISHED BY THE PORT MACHINERY ROOM FIRE AND GENERAL SERVICE PUMP. MACHINERY ROOM BALLAST SYSTEM VALVES ARE ELECTRIC MOTOR OPERATED WITH ALL AFT BALLAST OPERATIONS, INCLUDING PUMP AND VALVE CONTROL AND MONITORING PROVIDED FROM THE IACMS IN THE CCR.

S4. THE WATER BALLAST TANK TEST HEADS ARE 2.4 M (7.87 FEET) MINIMUM ABOVE THE UPPER DECK.

S5. BALLAST WATER EXCHANGE IS NORMALLY PERFORMED BY THE "FLOW THROUGH" METHOD FOR THE FOREBODY BALLAST TANKS WITH THE USE OF THE BALLAST EXCHANGE OVERBOARD VALVES (SHOWN IN DETAIL 8-A). THE EQUIVALENT OF THREE TANK VOLUMES OF DEEP SEA BALLAST WATER IS PUMPED THROUGH TWO PAIRS OF FOREBODY PORT AND STARBOARD BALLAST TANKS SIMULTANEOUSLY. USING THIS METHOD, THE BALLAST WATER IN ALL FOREBODY TANKS CAN BE EXCHANGED IN 36 HOURS. ALTERNATIVELY THE "REPLACEMENT" METHOD MAY BE USED. THE AFT BALLAST TANKS ARE PROCESSED BY THE "REPLACEMENT" METHOD REQUIRING EACH AFT BALLAST TANK TO BE EMPTIED AND THEN REFILLED BY THE FIRE & GENERAL SERVICE PUMP.

S6. THE FOREBODY BALLAST PUMPS ARE LOCATED IN THE CARGO PUMP ROOM WITH THE DRIVE MOTORS LOCATED IN THE ENGINE ROOM. PUMP OPERATION IS CONTROLLED FROM THE IACMS IN THE CARGO CONTROL ROOM.

S7. A TEMPERATURE MONITORING AND ALARM SYSTEM IS PROVIDED IN ACCORDANCE WITH REGULATORY BODY RULES FOR PUMP BEARINGS, CASINGS AND STUFFING BOX SEALS, AND ARE INTEGRATED INTO THE IACMS IN THE CCR.

S8. EACH BALLAST TANK SHALL BE FITTED WITH A TANK LEVEL INDICATOR OF THE PRESSURE TRANSDUCER TYPE WITH A DISPLAY ON THE CARGO CONTROL AND ENGINE ROOM CONSOLES IN THE CECR.

S9. BALLAST TANKS WILL BE PROVIDED WITH VENTS AND SOUNDING TUBES AS REQUIRED BY THE REGULATORY BODIES AND SHOWN ON REF. 22.

S10. FOREBODY BALLAST VALVES HAVE HYDRAULIC ACTUATORS MOUNTED DIRECTLY TO THE VALVES, REMOTELY OPERATED FROM THE CARGO CONTROL ROOM VIA THE IACMS AND PROVIDED WITH VALVE POSITION INDICATORS. ACTUATORS FOR OPEN/CLOSED TYPE VALVES ARE PROVIDED WITH MEANS FOR MECHANICALLY LOCKING IN FINAL POSITION. PROVISION IS ALSO MADE FOR ALL TANK VALVES TO REMAIN IN THEIR LAST POSITION UPON LOSS OF POWER AND BE PROVIDED WITH LOCAL OPERATION OF THE VALVES FROM THE "VALVE DECK BOXES" LOCATED ON THE UPPER DECK ADJACENT TO THE TANKS SERVED. PORTABLE HYDRAULIC HAND PUMPS ARE ALSO PROVIDED FOR EMERGENCY VALVE OPERATION. SEE REFERENCE 28.

S11. BALLAST VALVES ARE REMOVABLE TO THE UPPER DECK THROUGH ACCESS HATCHES OR BOLTED EQUIPMENT REMOVAL PLATES SO THAT NO HOT WORK WILL BE REQUIRED TO BE PERFORMED.

S12. BALLAST TANK INERTING IS PROVIDED AS SHOWN ON THE INERT GAS SYSTEM DIAGRAM REF 11 VIA SYSTEM SHUT OFF VALVES AND A SPOOL PIECE, UNIQUELY MARKED AND NORMALLY SUBSTITUTED BY A BLANK, RIGID, DUMMY SPOOL.

S13. GAS FREEING OF BALLAST TANKS SHALL BE ACCOMPLISHED AS SHOWN ON THE INERT GAS SYSTEM DIAGRAM, REF 11.

S14. BALLAST TANKS ARE PROVIDED WITH TANK CLEANING OPENINGS FOR USE WITH PORTABLE TANK CLEANING MACHINES. TANK CLEANING OPENINGS ARE PROVIDED FOR ALTERNATE FRAME SPACES.

S15. FOREBODY TAILPIPE BELLMOUTHS ARE LOCATED AT THE AFT END OF THE TANKS, AFT BALLAST TANK TAILPIPES ARE LOCATED AT THE LOWEST PRACTICABLE POINT IN THE TANK.

S16. WHERE PRACTICABLE EDUCTOR SUCTION HAVE A MINIMUM 10 TIMES THE PIPE DIA. OF STRAIGHT PIPE PRIOR TO THE SUCTION FLANGE. THE EDUCTOR DISCHARGE HAS A MINIMUM 3 TIMES THE PIPE DIA. OF STRAIGHT PIPE FROM THE DISCHARGE FLANGE.

S17. OVERBOARD DISCHARGE CONNECTIONS, EXCEPT FOR THE PUMP ROOM SUCTION/DISCHARGE SEA CHEST, ARE ABOVE THE WATERLINE AT THE STORM BALLAST CONDITION OF 12.21 METERS ABOVE BASELINE. ALL OVERBOARDS ARE LOCATED SO THAT INTERFERENCE WITH LIFEBOAT HANDLING AREAS AND DISCHARGE INTO FLOW STREAMS WHICH ARE LIKELY TO ENTER SUCTION SEACHESTS ARE AVOIDED. ALL OVERBOARDS ARE PROVIDED WITH DOUBLE VALVES WITH THE OUTBOARD VALVE BEING ELECTRIC OR HYDRAULICALLY OPERATED FROM IACMS AND THE INBOARD VALVE BEING MANUALLY OPERATED WITH THE PUMP ROOM INBOARD VALVES BEING MANUALLY OPERATED FROM THE UPPER DECK.

S18. BALLAST SYSTEM MATERIALS ARE EPOXY COATED STEEL IN THE MACHINERY ROOMS AND PUMP ROOM, AND FRP WITH EPOXY COATED EXTRA STRONG STEEL FITTINGS AND VALVE MANIFOLDS WITHIN THE FOREBODY BALLAST TANKS IN ACCORDANCE WITH MATERIAL SCHEDULE NASSCO DWG 484-370-7160.

S19. TO PROVIDE A TOTALLY COATED PIPING SYSTEM THE PIPING SHALL BE DESIGNED AND ARRANGED TO PROVIDE ACCESS TO ENABLE REPAIR OF DAMAGED EPOXY SURFACES DUE TO WELDING, FABRICATION AND INSTALLATION.

S20. TANK DESIGN AND STRUCTURAL ARRANGEMENTS ALLOWS FOR EFFICIENT BALLAST DRAINAGE.

S21. A CROSS-CONNECTION IS PROVIDED FROM THE BALLAST SUCTION TO THE CARGO PUMP SUCTION MAIN FOR EMERGENCY DEBALLAST OF CONTAMINATED BALLAST TANKS TO SHORE FACILITY OR TO THE SLOP TANK FOR DECANTING. THE CROSS-CONNECTION IS FITTED WITH A PORTABLE SPOOL PIECE. THE SPOOL PIECE IS UNIQUELY MARKED AND NORMALLY SUBSTITUTED BY A BLANK, RIGID, DUMMY SPOOL.

S22. TANKS, PIPES AND THEIR SUPPORTS ARE TO BE SUITABLY GROUNDED EITHER BY WELDING OR BOLTING DIRECTLY TO THE SHIPS STRUCTURE OR THROUGH THE USE OF BONDING STRAPS IN ACCORDANCE WITH NASSCO STD. 76-61-511. GRP PIPING CONTAINS INTEGRALLY WOUND ELECTRICALLY CONDUCTIVE FIBERS TO REDUCE THE ACCUMULATION OF STATIC ELECTRICAL CHARGES.

S23. PIPING WILL NOT BE SUPPORTED BY OUTER SHELL BOTTOM STRUCTURE.

S24. BALLAST SYSTEM TAKEDOWN JOINT CONNECTIONS ARE FLANGED IN THE PUMP ROOM AND "DRESSER" TYPE COUPLINGS INSIDE THE TANKS.

S25. THE BALLAST MUD TREATMENT SYSTEM AS SHOWN ON DETAIL 7-C IS PROVIDED TO CONTROL MUD ACCUMULATION IN THE FOREBODY BALLAST TANKS THE SYSTEM IS LOCATED IN THE PUMP ROOM ACCESS TRUNK. THE STORAGE TANK IS FILLED VIA A BARREL PUMP FROM THE UPPER DECK. THE SYSTEM SHALL TREAT THE INCOMING BALLAST WATER AT A MAXIMUM SOLUTION RATE OF 25 GALLONS PER 4000 LONG TONS OF BALLAST WATER. THE INJECTION PUMPS ARE AIR DRIVEN, MANUALLY CONTROLLED. THE GR 304 STAINLESS STEEL STORAGE TANK IS SIZED WITH SUFFICIENT CAPACITY TO TREAT TWO (2) FULL BALLAST TANK VOLUMES PER MONTH. BALLAST WATER FOR THE AFT BALLAST SYSTEM WILL BE DRAWN THROUGH THE HIGH SEA SUCTION SEA CHEST, REDUCING THE INTAKE OF MUD AND THEREBY ELIMINATING THE NEED FOR MUD TREATMENT.

S26. A COAMING IS PROVIDED UNDER THE BALLAST MUD TREATMENT UNIT FOR COLLECTION OF DRAINS AND LEAKAGES FOR EVENTUAL MOP UP BY THE CREW. NO DRAIN TO BILGE IS REQUIRED.

REVISIONS

REV	ITEM	SH	ZONE	DESCRIPTION	DATE	APPROVED
A	1	1	3-A	MODIFIED NOTE S25 TO INCLUDE PROVISIONS FOR AFT BALLAST SYSTEM MUD ELIMINATION (PER -01 ISSUE)		
	2	1 2	VAR	ADDED SYMBOLS FOR THROTTLING VALVES FOR CLARITY. VALVE NO'S BW-V-38, 39, 42, 43, & 69 (PER -01 ISSUE)		
	3	1	7-C	DELETED MUD TREATMENT DISCHARGE VALVES TO REFLECT EQUIPMENT PROVIDED (PER -01 ISSUE)		
	4	2	13-B 13-D	DELETED FIREMAIN PRESSURE GAUGES BW-GA-09 & 10 FOR BALLAST EDUCTOR ACTUATION. NOT REQUIRED PER BP DISCUSSIONS (-01 ISSUE)		
	5	2	13-A 13-C	REVISED ARRANGEMENT OF EDUCTORS TO REFLECT TEAMTEC EDUCTORS. (PER -01 ISSUE)		
	6	2	15-C	ADDED VALVE NO BW-V-99 PER BP AGREEMENT TO SHORTEN LENGTH OF PIPE BETWEEN SEA SUCTION DOUBLE SHUT OFF TO MEET SHIP'S SPEC. REQUIREMENTS. (PER -01 ISSUE)		
	7	2	10-B	DELETED STRIPPING BRANCHES TO PORT AND STBD DEEP TANKS, VALVES BW-V-74 & 77, AND ADDED SUMPS FOR MAIN SUCTION BRANCHES. TO SUIT LATEST ARRANGEMENT OF THE THREE DEEP TANKS. (-01 ISSUE)		
	8	2	VAR	DELETED INTERIM PRODUCT DESIGNATORS ASSOCIATED WITH BALLAST STRIPPING EDUCTORS AND PORT & STBD DEEP TANK SUCTIONS TO SUIT DETAIL DESIGN ARRANGEMENT		
	9	1	4-D	REVISED RATED TDH FOR INJECTION PUMPS AND FIRE & G.S. PUMP AND ADDED SHUT-OFF HEADS FOR FIRE & G.S. PUMP AND BALLAST PUMP PER LATEST SUPPLIER VFI		
	10	1 2	7-C 9-B	RELOCATED DETAIL 7-C, MUD TREATMENT SYSTEM, TO 9-B, SEPARATE AIR SUPPLY MODULE SHOWN, LEVEL ALARM SETPOINTS ADDED, REVISED PIPING DETAILS PER LATEST SUPPLIER VFI		
	11	2	11-C	REVISED TYPICAL QUANTITIES OF MAIN AND STRIPPING SUCTION LINES AS A RESULT OF REVISED ARRANGEMENT OF BALLAST DEEP TANKS		
	12	1	3-D	REVISED NOTE S5 TO CLARIFY BALLAST WATER EXCHANGE OF ALL FOREBODY BALLAST TANKS CAN BE COMPLETED IN 36 HOURS PER OWNER'S COMMENT (PRCF #152)		
	13	1 2	VAR 13-B	REVISED AFT BALLAST SYSTEM LAYOUT, RELOCATED CONNECTIONS TO INERT GAS SYSTEM AND CARGO OIL SYSTEM TO REFLECT DETAIL ARRG'T		
	14	1 2	VAR VAR	AFT BALLAST SYSTEM MATERIAL SCHEDULE CHANGED TO BW07, ORIFICE PLATE ADDED IN DISCHARGE FROM FIRE & G.S. PUMP, ADDED LOW POINT DRAINS AND FLANGED JOINTS FOR HYDRO TEST CONNECTIONS IN ACCORDANCE WITH PRODUCTION MARK-UP (TCM BP-00087)		
	15	1	8-D	ADDED TABLE OF SYSTEM DESIGN DATA PREVIOUSLY SHOWN IN BOOKLET OF SYSTEM DIAGRAMS, 342-484-7162, AND REVISED NOTE 1		
	16	2	VAR	INSTRUMENTATION ROOT VALVES CHANGED TO DIAPHRAGM TYPE TO REFLECT MATERIAL SCHEDULE		
	17	1	4-A	UPDATED TABLE OF LAST NUMBERS USED	9/17/01	K.M.S.

REVISION B CONTINUED ON SHEET 3 ZONE 17-D

(B6)

HULL NO	SHIP NAME	BUILDING YARD
487	ALASKAN LEGEND	NASSCO
486	ALASKAN NAVIGATOR	NASSCO
485	ALASKAN EXPLORER	NASSCO
484	ALASKAN FRONTIER	NASSCO

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DATE: MAR. 22, 2001

ALASKA CLASS TANKERS FOR BP OIL SHIPPING COMPANY, USA

TITLE: SEGREGATED BALLAST SYSTEM

DRAWING NUMBER: 484-342-7116 | REV: C
SCALE: NONE | SIZE: G | SHEET: 1 OF 4

NASSCO
NATIONAL STEEL AND SHIPBUILDING COMPANY
2798 HARBOR DRIVE
SAN DIEGO, CA 92113