FIELD TIDE NOTE
OPR-0186-MI-86
ICY STRAIT, ALASKA

Field tide reduction of soundings was based on predicted tides from Juneau, Alaska as listed in "Tide Tables, 1986, West Coast of North and South America." These were corrected for the hydrographic survey area using zoning provided by Sea and Lake Levels Branch (N/OMS12) as follows:

Time Correction: (Times are direct)
Height Correction: (X 0.92)

These tides were interpolated using a PDP8/e computer and program AM 500. The time zone for all predicted and recorded tides is UTC. The tidal datum is MLLW.

In accordance with Project Instructions, OPR-0186-MI-86, the following tide gages were used to obtain tidal information:

STATION #	NAME	LOCATION	FIELD SHEET
945-2210	JUNEAU, ALASKA	58° 17.9'N 134° 24.7'W	Primary gage used as control for datum determination
945-2368	SWANSON HARBOR, ALASKA	58° 12.9'N 135° 24.7'W	20-1-86 "O" (H-10227) 20-2-86 "P" (H-10231)
945-2516	PT. ADOLPHUS, ALASKA	58° 17.2'N 135° 48.2'W	20-3-86 "N"

JUNEAU, ALASKA (945-2210):

The primary gage in Juneau, Alaska served as the control station for datum determination. This gage was established by NOAA and maintained during the entire project by a contract observer, Mr. Jim Rodewald, P.O. Box 215, Juneau, Alaska, 99803.

Levels were run from the ETG scribe to five permanent benchmarks, including the primary benchmark. Opening levels, run on September 15, 1986, and closing levels, run on November 7, 1986, agreed well with elevations differing by 0.007 feet or less. These levels also agree well with levels run by Pacific Operations Group on June 12 and 13, 1986 with the exception of the section between the ETG scribe and BM B (1982). The difference on this section was 0.015 feet. Pacific Operations Group has been notified of this discrepancy. During the period of hydrography there was no evidence of staff or crustal movement. It is recommended that a new primary benchmark be designated. The present primary benchmark, (BM #8, 1922), was originally set vertical in the side of a building 0.5 feet above the sidewalk. However, the benchmark is no longer completely

FIELD TIDE NOTE
OPR-0186-MI-86
ICY STRAIT, ALASKA

Field tide reduction of soundings was based on predicted tides from Juneau, Alaska as listed in "Tide Tables, 1986, West Coast of North and South America." These were corrected for the hydrographic survey area using zoning provided by Sea and Lake Levels Branch (N/OMS12) as follows:

Time Correction: (Times are direct)
Height Correction: (X 0.92)

These tides were interpolated using a PDP8/e computer and program AM 500. The time zone for all predicted and recorded tides is UTC. The tidal datum is MLLW.

In accordance with Project Instructions, OPR-0186-MI-86, the following tide gages were used to obtain tidal information:

STATION #	NAME	LOCATION	FIELD SHEET
945-2210	JUNEAU, ALASKA	58° 17.9'N 134° 24.7'W	Primary gage used as control for datum determination
945-2368	SWANSON HARBOR, ALASKA	58° 12.9'N 135° 24.7'W	20-1-86 "O" (H-10227) 20-2-86 "P" (H-10231)
945-2516	PT. ADOLPHUS, ALASKA	58° 17.2'N 135° 48.2'W	20-3-86 "N"

JUNEAU, ALASKA (945-2210):

The primary gage in Juneau, Alaska served as the control station for datum determination. This gage was established by NOAA and maintained during the entire project by a contract observer, Mr. Jim Rodewald, P.O. Box 215, Juneau, Alaska, 99803.

Levels were run from the ETG scribe to five permanent benchmarks, including the primary benchmark. Opening levels, run on September 15, 1986, and closing levels, run on November 7, 1986, agreed well with elevations differing by 0.007 feet or less. These levels also agree well with levels run by Pacific Operations Group on June 12 and 13, 1986 with the exception of the section between the ETG scribe and BM B (1982). The difference on this section was 0.015 feet. Pacific Operations Group has been notified of this discrepancy. During the period of hydrography there was no evidence of staff or crustal movement. It is recommended that a new primary benchmark be designated. The present primary benchmark, (BM #8, 1922), was originally set vertical in the side of a building 0.5 feet above the sidewalk. However, the benchmark is no longer completely

vertical making it difficult to position the level rod for accurate measurement.

SWANSON HARBOR, ALASKA (945-2368):

On September 17, 1986 a 0-30 foot BRISTOL Bubbler tide gage, S/N 67A-10292, was installed six feet above high water line in a protected rock niche on the southeast side of Ansley Island, Swanson Harbor, Alaska. The orifice was placed 200 feet offshore from the gage and was secured to a fifty pound concrete anchor. On September 18th a 1" galvanized steel pipe staff was installed near a large rock outcrop approximately 175 feet offshore from the gage. This staff broke on September 22nd and was replaced on September 23rd by a 4" X 4" wood staff.

The gage was operated and maintained by MT MITCHELL personnel and ran satisfactorily with only minor problems from the time it was installed on September 17th until it was removed on November 15, 1986. On September 23rd it was noticed that the gage was running on local time and at 2000Z it was reset to UTC. The gage continued to run on UTC for the remainder of the project. On October 25th at 1600Z the marigram chart paper ran out. This was not corrected until October 28th (DOY: 301) at 2300Z. This incident occurred during one of the ship's inport weekends. The MT MITCHELL, (VESNO: 2220), ran four hours of bottom samples, (DOY: 301: 1850Z-2300Z), while the gage was not operating. On October 29th at 0700Z the marigram jumped sprockets. This was corrected on October 30th at 0100Z. The hourly heights scaled from the marigram were corrected for both time and height offsets.

Based on the average of all staff to gage comparisons the height datum for this gage is as follows:

Pipe Staff (SEPT. 19-SEPT. 23 @ 1600Z):	0.0 on marigram equals -3.9 on the staff
Wood Staff (SEPT. 23 @ 1700Z-NOV. 15):	0.0 on marigram equals -3.4 on the staff

There was no evidence of orifice movement . All hourly heights of tides were abstracted from the marigrams by MT MITCHELL personnel and timing errors were distributed linearly throughout the period between observations.

Three historic permanent benchmarks, including the primary benchmark, were recovered by MT MITCHELL personnel on September 16th. On September 17th MT MITCHELL personnel established two permanent marks. Opening levels were run to these five benchmarks on September 18 and 19, 1986. On September 21st

levels were run from BM 2368 B (1986) to the 1" galvanized steel pipe staff. Then on September 23rd, following the installation of the 4" X 4" wood staff, levels were again run from BM 2368 B (1986) to the new staff. Closing levels were run to all five permanent benchmarks and the staff on November 13, 14, 15, and 16, 1986. The elevation differences obtained from the opening and closing level runs indicate that there was staff movement of up to 0.05 feet. The distance from the staff to the furthest benchmark is approximately one and a quarter miles. The level run itself is difficult. The terrain varies from gravel beach to large rock outcrops and rocky slide areas to spongey marsh areas. The complete level run cannot be finished in one day and must be accomplished at various states of tide.

It is recommended that BM 1 (1901) be designated as the primary benchmark because it is set in bedrock. The present primary benchmark, BM 4 (1959), is atop a large boulder which rests on spongey ground.

PT. ADOLPHUS, ALASKA (945-2516):

On November 4, 1986 a 0-30 foot BRISTOL Bubbler tide gage , S/N 67A-10294, was installed ten feet above high water line on top of a large rock outcrop on the second rocky point west of Pt. Adolphus Light on the northeast tip of Chicagof Island, Alaska. It is at the same site used by NOAA Ship DAVIDSON in 1976. The orifice was placed 220 feet directly offshore from the gage and was secured to a 1" galvanized steel pipe "T"-stand which was anchored in place with rocks. On November 5th the orifice exposed at low tide. At 1800Z on November 5 it was moved to deeper water. After the orifice was manually moved to deeper water there was no further evidence of orifice movement.

On November 5th a 4" X 4" wood staff was installed 200 feet offshore from the tide gage at the northwest edge of a large rock outcrop.

The gage was operated and maintained by MT MITCHELL personnel and ran satisfactorily with only minor time errors from the time it was installed on November 4th to the time it was removed on November 15, 1986. All times were recorded in UTC.

Based on the average of all staff to gage observations, the height datum for this gage is as follows:

NOV. 4 @ 2200Z - NOV. 5 @ 1843Z: 0.0 on marigram equals -2.8 on staff

NOV. 5 @ 1941Z - NOV. 15 @ 1830Z: 0.0 on marigram equals -9.1 on staff

Additionally, all hourly heights of tides were abstracted from the marigrams by MT MITCHELL personnel and timing errors were distributed linearly throughout the period between observations.

On October 30, 1986 MT MITCHELL personnel established three permanent benchmarks. Opening levels run to these three benchmarks, on November 5th and 6th, and closing levels run on November 15, 1986, agree very well. There is no evidence of crustal or staff movement.

ZONING:

Field inspection of tide data indicates that predicted tidal times and ranges are very similar to actual tides obtained on the marigrams. As per Project Instructions OPR-MI-0186-86 use the following tidal information for final plotting:

FIELD SHEET	TIDE STATION
Survey H-10227 Survey H-10231	Swanson Harbor, Alaska Station #945-2368
Field Sheet MI-20-3-86	Pt. Adolphus, Alaska Station #945-2516

Swanson Harbor, Alaska
Field Tide Note
April - May, 1987

The tide gage located in Juneau, Alaska (945-2210) served as the reference station for the predicted tides used for correctors on surveys H-10238, H-10240, H-10227 (addendum) and H-10231 (addendum) as specified by Project Instructions OPR-0186-FA-87.

Predicted tide correctors were interpolated aboard the FAIRWEATHER using data from the 1987 West Coast Tide Tables and PDP-8 program AM 500, dated November 10, 1972. All correctors calculated were based on zone correctors supplied by the project instructions and tabulated below.

Time Correction		Height Correction
High Water	Low Water	Range Ratio
0	0	X .92

All times of predicted and reported tides are expressed in Universal Coordinated Time. Predicted tides were acceptable for hydrography with no discrepancies in the raw data attributable to tidal errors.

A Bristol Bubble, Model 15 analog tide gage (range 0-30 feet) was installed in support of the above mentioned hydrographic surveys. Location and period of operation are as follows:

Site	Location	Period
Swanson Harbor, Icy Strait, AK 945-2368	58/12/18N 135/06/30W	4/5/87 - 5/17/87

SWANSON HARBOR

Tide gage (SN # 63A2920) was installed in Swanson Harbor on the southeast side of Ansley Island, Icy Strait, Alaska on April 5, 1987 (DN 95). A three-hour observation on April 6 confirmed that the gage was operating with consistent gage to staff differences. The gage was removed at the finish of hydrographic operations on May 16, 1987 (DN 136).

The orifice at the Swanson Harbor tide gage was secured to a 150-lbs cement block with an angle iron placed vertically to support the orifice which was secured with hose clamps. Tubing was placed between the orifice and gage (approximately 200 feet) and was secured with boulders along its length. A 14-foot fiberglass staff was erected at the site by securing its base within a fracture at the base of a large outcrop. The staff was then shored with an 8-foot 2X4. Guy wires and cables were secured to the staff at the 6-foot and 14-foot marks. Cables which connected to the top of the

staff were anchored to the outcrop by means of eye bolts and turnbuckles which were tightened to give the staff rigidity.
The gage itself ran perfectly throughout the project, although the clock consistently ran fast requiring the marigram to be advanced 24 hours on four separate occasions. The zero mark on the tide staff corresponded to 6.6 feet on the gage.

LEVELING

The comparision of opening and closing level runs suggests that there was no significant staff movement. The staff apparently settled 0.003 meters during the course of the survey. No differences in elevation were recorded between level runs to suggest that the benchmarks had been disturbed.

ZONING RECOMENDATIONS

None.

vertical making it difficult to position the level rod for accurate measurement.

SWANSON HARBOR, ALASKA (945-2368):

On September 17, 1986 a 0-30 foot BRISTOL Bubbler tide gage, S/N 67A-10292, was installed six feet above high water line in a protected rock niche on the southeast side of Ansley Island, Swanson Harbor, Alaska. The orifice was placed 200 feet offshore from the gage and was secured to a fifty pound concrete anchor. On September 18th a 1" galvanized steel pipe staff was installed near a large rock outcrop approximately 175 feet offshore from the gage. This staff broke on September 22nd and was replaced on September 23rd by a 4" X 4" wood staff.

The gage was operated and maintained by MT MITCHELL personnel and ran satisfactorily with only minor problems from the time it was installed on September 17th until it was removed on November 15, 1986. On September 23rd it was noticed that the gage was running on local time and at 2000Z it was reset to UTC. The gage continued to run on UTC for the remainder of the project. On October 25th at 1600Z the marigram chart paper ran out. This was not corrected until October 28th (DOY: 301) at 2300Z. This incident occurred during one of the ship's inport weekends. The MT MITCHELL, (VESNO: 2220), ran four hours of bottom samples, (DOY: 301: 1850Z-2300Z), while the gage was not operating. On October 29th at 0700Z the marigram jumped sprockets. This was corrected on October 30th at 0100Z. The hourly heights scaled from the marigram were corrected for both time and height offsets.

Based on the average of all staff to gage comparisons the height datum for this gage is as follows:

Pipe Staff (SEPT. 19-SEPT. 23 @ 1600Z):	0.0 on marigram equals -3.9 on the staff
Wood Staff (SEPT. 23 @ 1700Z-NOV. 15):	0.0 on marigram equals -3.4 on the staff

There was no evidence of orifice movement . All hourly heights of tides were abstracted from the marigrams by MT MITCHELL personnel and timing errors were distributed linearly throughout the period between observations.

Three historic permanent benchmarks, including the primary benchmark, were recovered by MT MITCHELL personnel on September 16th. On September 17th MT MITCHELL personnel established two permanent marks. Opening levels were run to these five benchmarks on September 18 and 19, 1986. On September 21st

levels were run from BM 2368 B (1986) to the 1" galvanized steel pipe staff. Then on September 23rd, following the installation of the 4" X 4" wood staff, levels were again run from BM 2368 B (1986) to the new staff. Closing levels were run to all five permanent benchmarks and the staff on November 13, 14, 15, and 16, 1986. The elevation differences obtained from the opening and closing level runs indicate that there was staff movement of up to 0.05 feet. The distance from the staff to the furthest benchmark is approximately one and a quarter miles. The level run itself is difficult. The terrain varies from gravel beach to large rock outcrops and rocky slide areas to spongey marsh areas. The complete level run cannot be finished in one day and must be accomplished at various states of tide.

It is recommended that BM 1 (1901) be designated as the primary benchmark because it is set in bedrock. The present primary benchmark, BM 4 (1959), is atop a large boulder which rests on spongey ground.

PT. ADOLPHUS, ALASKA (945-2516):

On November 4, 1986 a 0-30 foot BRISTOL Bubbler tide gage , S/N 67A-10294, was installed ten feet above high water line on top of a large rock outcrop on the second rocky point west of Pt. Adolphus Light on the northeast tip of Chicagof Island, Alaska. It is at the same site used by NOAA Ship DAVIDSON in 1976. The orifice was placed 220 feet directly offshore from the gage and was secured to a 1" galvanized steel pipe "T"-stand which was anchored in place with rocks. On November 5th the orifice exposed at low tide. At 1800Z on November 5 it was moved to deeper water. After the orifice was manually moved to deeper water there was no further evidence of orifice movement.

On November 5th a 4" X 4" wood staff was installed 200 feet offshore from the tide gage at the northwest edge of a large rock outcrop.

The gage was operated and maintained by MT MITCHELL personnel and ran satisfactorily with only minor time errors from the time it was installed on November 4th to the time it was removed on November 15, 1986. All times were recorded in UTC.

Based on the average of all staff to gage observations, the height datum for this gage is as follows:

NOV. 4 @ 2200Z - NOV. 5 @ 1843Z: 0.0 on marigram equals -2.8 on staff

NOV. 5 @ 1941Z - NOV. 15 @ 1830Z: 0.0 on marigram equals -9.1 on staff

Additionally, all hourly heights of tides were abstracted from the marigrams by MT MITCHELL personnel and timing errors were distributed linearly throughout the period between observations.

On October 30, 1986 MT MITCHELL personnel established three permanent benchmarks. Opening levels run to these three benchmarks, on November 5th and 6th, and closing levels run on November 15, 1986, agree very well. There is no evidence of crustal or staff movement.

ZONING:

Field inspection of tide data indicates that predicted tidal times and ranges are very similar to actual tides obtained on the marigrams. As per Project Instructions OPR-MI-0186-86 use the following tidal information for final plotting:

FIELD SHEET	TIDE STATION
Survey H-10227 Survey H-10231	Swanson Harbor, Alaska Station #945-2368
Field Sheet MI-20-3-86	Pt. Adolphus, Alaska Station #945-2516

Swanson Harbor, Alaska
Field Tide Note
April - May, 1987

The tide gage located in Juneau, Alaska (945-2210) served as the reference station for the predicted tides used for correctors on surveys H-10238, H-10240, H-10227 (addendum) and H-10231 (addendum) as specified by Project Instructions OPR-0186-FA-87.

Predicted tide correctors were interpolated aboard the FAIRWEATHER using data from the 1987 West Coast Tide Tables and PDP-8 program AM 500, dated November 10, 1972. All correctors calculated were based on zone correctors supplied by the project instructions and tabulated below.

Time Correction		Height Correction
High Water	Low Water	Range Ratio
0	0	X .92

All times of predicted and reported tides are expressed in Universal Coordinated Time. Predicted tides were acceptable for hydrography with no discrepancies in the raw data attributable to tidal errors.

A Bristol Bubble, Model 15 analog tide gage (range 0-30 feet) was installed in support of the above mentioned hydrographic surveys. Location and period of operation are as follows:

Site	Location	Period
Swanson Harbor, Icy Strait, AK 945-2368	58/12/18N 135/06/30W	4/5/87 - 5/17/87

SWANSON HARBOR

Tide gage (SN # 63A2920) was installed in Swanson Harbor on the southeast side of Ansley Island, Icy Strait, Alaska on April 5, 1987 (DN 95). A three-hour observation on April 6 confirmed that the gage was operating with consistent gage to staff differences. The gage was removed at the finish of hydrographic operations on May 16, 1987 (DN 136).

The orifice at the Swanson Harbor tide gage was secured to a 150-lbs cement block with an angle iron placed vertically to support the orifice which was secured with hose clamps. Tubing was placed between the orifice and gage (approximately 200 feet) and was secured with boulders along its length. A 14-foot fiberglass staff was erected at the site by securing its base within a fracture at the base of a large outcrop. The staff was then shored with an 8-foot 2X4. Guy wires and cables were secured to the staff at the 6-foot and 14-foot marks. Cables which connected to the top of the

staff were anchored to the outcrop by means of eye bolts and turnbuckles which were tightened to give the staff rigidity.
The gage itself ran perfectly throughout the project, although the clock consistently ran fast requiring the marigram to be advanced 24 hours on four separate occasions. The zero mark on the tide staff corresponded to 6.6 feet on the gage.

LEVELING

The comparision of opening and closing level runs suggests that there was no significant staff movement. The staff apparently settled 0.003 meters during the course of the survey. No differences in elevation were recorded between level runs to suggest that the benchmarks had been disturbed.

ZONING RECOMENDATIONS

None.