

DATE: 4/16/82

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for

Tide Station Used (NOAA Form 77-12): 945-2489 Upper Tenakee Inlet, AK

Period: November 1, 1981 - November 17, 1981

HYDROGRAPHIC SHEET: H-9982

OPR: 0342

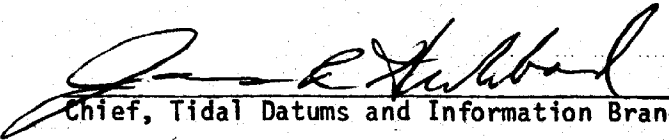
Locality: Upper Tenakee Inlet, Alaska

Plane of reference (mean lower low water): 11/1 - 11/10 @ 1900 hrs. = 13.2 ft.
11/10 @ 2000 - 11/17 = 5.1 ft.

Height of Mean High Water above Plane of Reference is 13.9 ft.

REMARKS: Recommended Zoning:

Zone Direct.


Chief, Tidal Datums and Information Branch

FIELD TIDE NOTE

OPR-0342-FA-81

Tenakee Inlet, AK

Field tide reduction of soundings was based on predicted tides from Juneau, Alaska, corrected as per project instructions as follows:

Time Corrections		Height Correction Ratio
High	Low	
-12 min.	-19 min.	x0.90

Correctors were interpolated by the HYDROPLOT system using program AM 500. All times of both predicted and recorded tides were based on Greenwich Mean Time (GMT). The predicted tides were acceptable for hydrography with no discrepancies in data attributable to tides errors.

The tide station at Juneau, Alaska (945-2210) was the primary gage for the project. Three wire levels were run to three bench marks on November 6th and December 4th, 1981. Agreement with historical level data was within 1 mm. ✓

Tidal data was collected from two tide stations in Tenakee Inlet. Station no. 945-2386 is located on the pier at the town of Tenakee Springs at 57°46'46.6"N, 135°13'03.1"W. ✓ Station no. 945-2489 is located in upper Tenakee Inlet at the site of horizontal control station "Paul", at 57°54'43.2"N, 135°39'34.2"W. ✓ Survey H-9982 was controlled by data from both gages.

Fischer-Porter ADR gage no. 7304A1380M20 was installed at the Tenakee City pier on October 31, 1981. The staff and float well were installed on May 1, 1981 during the first portion of the FAIRWEATHER's 1981 operations in Tenakee Inlet. Levels were run from the staff to five bench marks on October 31, upon gage installation, and on November 18, upon removal of the gage. Bench mark elevations compare within 2 mm to elevations recorded during the spring operations, confirming that the staff did not move significantly during the five month period between survey operations. A diver inspection at the time of gage installation confirmed that the float well remained securely attached to the piling and that the orifice remained clear of marine growth. The staff was leveled and removed with the gage and float well on November 18, 1981, at the end of hydrographic operations.

Bristol bubbler gage no. 68A14940 was installed at station "Paul", in upper Tenakee Inlet, on October 31, 1981. The staff and orifice were installed on May 16, 1981 and were inspected and cleaned by divers before their re-use. Both staff and orifice had remained securely installed and in good condition during the five month period. Levels were run from the staff to station "Paul" 1981 and three reference marks on October 31, 1981. Reference mark no. 3 was not found and was believed lost as there was evidence of a small rock slide in the area of this mark. A sixth mark, Paul RM 5, was installed and tied to

the staff and RM 4 the following day, November 1, 1981. This short level run between the staff, RM 4 and RM 5 on November 1, was used in conjunction with the October 31 level between the other bench marks, and abstracted as the beginning level run on the bubbler gage station.

The elevation of RM 4 above staff zero agrees within 1.1 mm of the May 1981 level runs. The elevation differences between bench marks are consistent with the May levels, to 1.0 mm. This data was confirmed by the ending level run on November 16 and supports the divers' assessment that the staff had not moved significantly during the five month absence of the FAIRWEATHER in Tenakee Inlet.

The level run between the staff and RM 4 conducted on October 31 erroneously indicated a change in staff elevation of +8.7 cm from the May 1981 records. This was inconsistent with the results of the divers' investigation and was suspect due to the use of an unmarked turning point to tie the staff to RM 4. This beginning portion of the October 31 level run at the bubbler tide station was rejected after data from November 1 and November 16 confirmed the elevation of the staff.

The bubbler gage and staff at station "Paul" were removed on November 16, 1981. Final levels run on this date are within 6 mm of the beginning levels.

Reference mark 3 was found and tied to the level run at this time. Reports that it was lost in a rock slide were erroneous.

OPERATIONAL PROBLEMS

The ADR gage at Tenakee Springs had the following problems during this survey:

The first recorded punch was at 1830Z on November 1, 1981. Within the first hour following this, the gage was adding and deleting punches from the high order code disk. The poor data involved only the 1, 2, 4 and 8 digit punches. This problem affected the quality of approximately 50% of the gathered data for twelve days, until the gage was replaced with ADR gage no. 7304A138QM12 at 1748Z on November 13.

Daily observations were made on the gage throughout this twelve day period of erratic punches in the high order digits. During these daily observations, the data preceding each observation was scanned briefly to see that all of the punch pins were punching and the readings were changing. However, the observer did not routinely determine whether all of the data gathered between daily observations was punched in the systemic numerical order of a tidal curve.

The erratic punching of tidal data was not detected during the first twelve days of operation because the observers reported that all of the punch pins were functioning and that the gage to staff differences were consistent with previous comparisons.

As a check on the quality of the data collected with the first ADR gage, hourly data points were plotted by FAIRWEATHER personnel. Except for the extreme highs and lows of tidal curves, the tide curves were smoothed using the good data points.

Recommendation is made that the ADR data from November 1 to November 13 be plotted and the curve be smoothed based on the good data points. Highs and lows of the tidal curves should be rounded based on bubbler gage data, using the comparison between the two gages from good data in the spring of 1981. A comparison between the Juneau and Tenakee Springs tidal datum may also be useful, since there is more available data to compare with these gage stations. There are two periods during these twelve days that the curve will have to be completely interpolated because the gage was punching reliable data less than 50% of the time. These times are November 12, 1436Z to November 13, 0048Z and November 13, 1536Z to 1706Z. Hydrography was run from 171000 to 235428Z on November 12 and from 163730 to 234232Z on November 13.

Aside from the problem with the high order code wheel, four other events account for lost data at the Tenakee Springs tide station. (See Table 1 for chronological list of problems with the ADR gage.)

On November 5, at 2224Z, the float appeared to be sinking. The float upon inspection was leaking and was replaced at 0200Z, November 6. The last good observation prior to November 5 was at 1848Z on November 4. The curve should be analyzed from this time to 2224Z on November 5 to determine when the float began taking water, as hydrography was run during this period (see times of hydro abstracts, JD 309 and JD 310).

On November 6 at 0512Z, the paper became jammed due to several bent punch pins and no data was gathered until November 10 at 2218Z when the gage was checked again. No hydrography was run during this period.

On November 13, an hour of tide data was lost between 1748 and 1848Z when the faulty tide gage was replaced. Data for this hour will have to be interpolated, as hydrography was run during the period.

Dependable tidal data was gathered by this gage from 1848Z, November 13, until 2230Z, November 15. On November 15, the gage was checked and three gage to staff comparisons were made. The gage was working well at 2230Z, when the last gage to staff comparison was made. Sometime after the cover was replaced on November 15 and before the next check on November 18, the plastic bag on the small quartz clock kept inside the gage became jammed under the wire take-up spool, hampering the motion of the reel. When the gage was checked on November 18, the reel was jammed completely. Removal of the clock allowed free motion of the float, but the staff to gage comparison was changed due to loose knots having formed in the wire. The action of the knots going taut, when the reel was released, changed the staff to gage comparison further, as the float was raised and lowered to check the freedom of movement.

The data after 2230Z, November 15 should be plotted in an attempt to determine when the gage jammed. A preliminary evaluation of the data by FAIRWEATHER personnel shows the first erratic data points at 0600 on November 16. The observed staff readings on November 18 are accurate, and the tide curve may be extrapolated.

The last hydrography in Tenakee Inlet was run at 2016Z on November 16, so only a small portion of this curve will require interpolation, if the tidal data is unuseable.

The bubbler gage in upper Tenakee Inlet was functioning well during the time that the ADR gages malfunctioned.

The bubbler tide station is in the middle of the survey area, within seven miles of all hydrography ran in Tenakee Inlet in November, and is recommended for the determinations of tide correctors. The Tenakee Springs tide station is over ten miles from the southeastern limits of the survey sheet.

Table 1

TENAKEE SPRINGS TIDE STATION (945-2386)

Chronological list of gage malfunctions

<u>Date and time (GMT)</u>	<u>Malfunction</u>
11/1, 1830 to 11/13, 1748	High order code disk erratically dropping and adding punches in the 8, 4, 2 and 1 digit columns.
11/4, 1848 to 11/5, 2224	Float began filling with water, noticeably changing gage readings.
11/6, 0200	Float replaced.
11/6, 0512 to 11/10, 2218	Bent punch pins caused paper jam. No data during this period.
11/13, 1748 to 1848	New gage installed, no data during this period.
11/16, 0600	Erratic readings due to jammed reel.
11/18, 2048	Gage removed.

The gage to staff difference on the ADR gage at Tenakee Springs was 19.72 feet, based on 13 good observations, prior to November 18. All comparisons are within .3 feet of the mean.

The bubbler gage at station "Paul", in upper Tenakee Inlet ran well throughout the survey, with only one minor problem. The gage lost approximately seven minutes per day between November 1 to 4 because the graph paper was not rolling smoothly through the sprocket holes on one side. This most affected the data from 0000 to 2200Z on November 3, and 1200 to 1650Z on November 4. The problem was remedied by a minor adjustment to the small metal guide which keeps the paper on the sprockets, at 1650 on November 4.

In mid-November, the recording pen was noticed coming close to the top of the graphic scale during extreme high tides. On November 10 at 1918Z, the pen was lowered 8.0 feet on the scale to keep the trace on the graph.


From November 1 to 10, the gage to staff difference, from seven observations, was 11.41 feet. All comparisons were within .4 foot of the mean. After November 10, when the pen was lowered by 8.0 feet, the gage to staff difference averaged 3.2 feet, from eleven observations. All comparisons were within .25 foot of the mean.

Submitted by:



Ann F. Trimble
Lt. (jg), NOAA

Approved by:



Walter F. Forster II
Cdr., NOAA