

Memorandum

Appendix C

To : Carl Hauge
Peter Lee

Date : May 11, 1983

File No.:

Subject: Results of Nephelometer
Measurements, Delta Field Trip
April 12, 1983

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Geology Section

From : Department of Water Resources

This is the record for the continuous nephelometer and chlorophyll monitoring for April 12, 1983, the second day of the Delta boat trip. The route traveled is marked on the attached map.

<u>Location No.</u>	<u>Time</u>	<u>Description</u>
1	0825	Left Stockton Harbor
2	0829	upstream of Burns Cutoff
3	?	passed suction dredge
		chart speed = 20 cm boat speed = 8 knots sediment level drastically increases.
4	?	passed east confluence of Burns Cutoff - sediment level increased
5	?	passed dredge
6	?	passed Smith Canal
7	0852	passed Calaveras River
8	0853	passed west confluence of Burns Cutoff
9	0858	passed inlet to S.B. Tract
		boat speed = 8 knots
10	0907	passed Fourteen Mile Slough and Nav. marker #34
11	0910	passed west confluence of 14 mile Slough.
12	0915	passed Turner Cut
13	0921	passed Nav. marker #20
		Sed. level slightly up Channel widens Sed. level slightly drops
14	0925	passed Nav. marker #18
15	0928	passed Nav. marker #16
16	0932	passed Nav. marker #14
17	0934	passed Disappointment Slough
18	0937	passed Nav. marker #12
19	0938	entered Little Connection Slough
20	0952	entered Little Potato Slough
		sed. level increased

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21	1002	passed entrance to White Slough	Sediment level decreasing widening network of channels
22	1023	entered South Fork Mokolumne at Terminous	
23	1038	entered Sycamore Slough	drastic drop in sediment
24	1047	Turn around in Sycamore	then increase chlorophyll
25	1054	Entered South Fork Mokolumne	inversely related
26	1105	entered Hog Slough	drop then increase in sediment
27	1115	Turnaround in Hog Slough	increase then drop in chlorophyll
28	1124	entered S.F. Mokolumne	
29	1142	entered Beaver Slough	encountered shallow bar at entrance
30	1144	Turnaround in Beaver Slough	
31	1146	entered S.F. Mokolumne	
32	1214	Turnabout at New Hope Landing bridge	
33	1234	passed Beaver Slough	
34	1249	passed Hog Slough	Slight increase in sediment then back down to previous level
35	1301	passed Sycamore Slough	
36	1313	passed Little Potato Slough -	increase in sediment
37	1335	Wide area of channel peak of turbidity 240' of H ₂ O	
38	1343	Confluence of North and South Fork Mokolumne River	sediment slightly dropping
39	1357	dragline activity in the water	sharp increase then decrease in sediment
40	1432	Turnaround at Miller Ferry Bridge	sediment and chlorophyll curves very similar
41	1520	Confluence with Mokolumne River	very sharp increase in sediment, small increase in chlorophyll
42	1523	Confluence with Georgiana Slough	Sharp drop in sediment
43	1545	Confluence with San Joaquin River	Drop in sediment
44	1554	passed nav. marker #42	
45	1602	passed nav. marker #38	
46	1607	passed nav. marker #36	Trend is for slight increase in sediment
47	1610	passed nav. marker #34	
48	1615	passed nav. marker #32	Slight drop after Nav. marker #32

49	1622	entrance to Three-Mile Slough	sharp increase in sediment
50	1633	confluence with Seven-Mile Slough	increase in sediment
51	1642	entrance to Sacramento River crossed the channel	very sharp increase in sediment, went off scale
52	1647	turned downstream at right bank	
53	1655	passed nav. marker #18	sed. gradually dropping
54	1702	passed nav. marker #14	sed. slightly decreasing
55	1710	passed nav. marker #12	sediment decreasing
56	1714	crossing channel between marker # 9 and #11	sediment increasing
57	1718	entering Sherman Lake - left bank of Sacramento River	sediment decreased to a level similar to the level in Three-Mile Slough
58	1725	marker #2 in center of Sherman Lake	
59	1729	entered Mayberry Slough	drop in sediment
60	1734	entered San Joaquin River	sharp drop in sediment
61	1738	passed nav. marker #10	

The suspended sediment level in Stockton harbor was very low, but the chlorophyll level was high. Sediment levels markedly increased past Burns Cutoff (east) where the San Joaquin River enters the Stockton Deep Water Channel. Sediment levels decreased downstream from here to the entrance to Little Potato Slough (via Little Connection Slough). This reduction in suspended sediment is probably due to deposition. This conclusion is supported by the fact that the Stockton Deep Water Channel is dredged almost every year. Sampling from Stockton to the entrance to Little Potato Slough was done during low tide and high ebb current velocity.

Suspended sediment levels increased at the entrance to Little Potato Slough and peaked at the confluence with White Slough. This suggests that White Slough is a locally significant sediment source.

Sediment levels only slightly increased up the South Fork Mokelumne. The gates at the Cross Delta Channel were closed so this increase probably represents sediment exclusively from the Mokelumne. Suspended sediment levels drastically decreased in Sycamore and Hog Sloughs. On the other hand, chlorophyll levels drastically increased. It is concluded that runoff from agricultural lands surrounding these sloughs introduces a lot of nutrients, but little sediment. Sampling both up and down the South Fork Mokelumne was done during low and slack tide with diminishing current velocity.

Suspended sediment levels markedly increased just past Little Potato Slough in the South Fork Mokelumne. This could be due to scouring of the channel. Tidal current velocities and phases in the South Fork Mokelumne from Terminous to the confluence with the North Fork Mokelumne significantly differ from those in the north or the south forks. Oscillations between normal and reverse flows with substantial current velocities generate the potential for cyclic scour and deposition, particularly around the small islands in the channel. The peak in the turbidity graph probably reflects local scour around the islands near the confluence. Samples were taken during high tide and increasing current velocity.

The sediment levels gradually decreased in the North Fork Mokelumne to point A on the attached map and then increased again. This may reflect local deposition, or may not be significant because we only sampled the top metre of water. In the north and south forks of the Mokelumne (above Terminous) the tidal current fluctuations are not very significant, and reverse currents rarely, if ever, occur. Even though sampling in the North Fork Mokelumne was done during high flood current velocity, the flow of water and sediment was still downstream.

At the confluence of the north and south forks of the Mokelumne the suspended sediment levels sharply increased. Just downstream from Georgianna Slough the sediment level decreased. This sharp increase in sediment probably was a result of input from the Sacramento River via Georgianna Slough.

The suspended sediment remained constant at a level just greater than the level in the South Fork Mokelumne below Terminous. The sediment level dropped a bit at the confluence with the San Joaquin River.

At the entrance to Three Mile Slough the suspended sediment level sharply increased then remained constant at a level higher than the Mokelumne. Sediment levels again increased at the confluence with Seven Mile Slough and dramatically increased at the confluence with the Sacramento River. These samples were all taken at high tide and decreasing current velocity.

Suspended sediment levels declined entering Sherman Lake, and sharply decreased to about the same level as upstream San Joaquin River upon entering Mayberry Slough.

Recommendations - These additional data sources would help to explain some of the trends and anomalies of the data collected April 12, 1983. This would add to our knowledge of sedimentation and scour processes in the northern Delta:

1. Sample the north and south forks of the Mokelumne with respect to:

- a. Location number and size of bars present from or 1/2-mile upstream from the cross Delta channel to the confluence of the north and south forks.
- b. Cross section in selected areas (see attached map).
- c. Suspended sediment and bottom samples taken at individual locations throughout a single tidal cycle and consisting of a series of samples taken across the cross sectional area of the channel.
 1. Delta Cross Channel gates open - High Sacramento River flow >70000 cfs.
 2. Delta Cross Channel gates open - Low Sacramento River flow <15000 cfs.
 3. Delta Cross Channel gates closed.
2. Sample just down and upstream from the confluence of Georgianna Slough and the Mokelumne River using same method proposed for the north and south forks of the Mokelumne.

Attachments

High, Low, and Slack Water Times for the Delta
by River
April 12, 1983

	<u>High</u>	<u>Slack</u>	<u>Low</u>	<u>Slack</u>	<u>High</u>	<u>Slack</u>	<u>Low</u>	<u>Slack</u>	<u>High</u>
<u>San Joaquin River</u>									
San Francisco	2251	0033	0436	0656	1103	1254	1641	1907	2318
Collinsville - Pt. Sac.			0908	1021	1444	1530	2013	2232	0259
Antioch			0918	1128	1459	1706	2123	2339	0314
West Island		0443		1122		1704		2336	
Three-Mile Slough entrance			1024		1553		2229		
Prisoner's Pt.	0440		1115		1652		2320		
Ward Island	0759		1138		1711		2343		
Blackslough Lnd.	0515		1159		1729		0004		
Yulcan Island		0611		1204		1832		0055	
Stockton	0536		1223		1748		0028		
<u>Sacramento River</u>									
San Francisco	2251	0033	0436	0656	1103	1254	1641	1907	2318
Collinsville - Pt. Sac.			0908	1021	1444	1530	2013	2232	0259
Three-Mile Slough			0932		1504		2137		
Rio Vista			0943		1504		2148		
Walnut Grove			1127		1628		2206		
Clarksburg			1234		1724		2302		
<u>Mokelumne River</u>									
Georgianna Slough			1126		1649		2331		
Terminus			1148		1716		2353		
New Hope Bridge			1228		1748				

High, Low, and Slack Water Times for the Delta
April 12, 1983

	<u>Time that we passed</u>	<u>2251 High</u>	<u>0033 Slack</u>	<u>0436 Low</u>	<u>0656 Slack</u>	<u>1103 High</u>	<u>1254 Slack</u>	<u>1641 Low</u>	<u>1907 Slack</u>	<u>2318 High</u>
San Francisco										
Collinsville - Pt. Sac.			0409	0908	1021	1444	1530	2013	2232	0259
West Island	=1735		0443		1122		1704		2336	
Antioch	=1740		0445	0918	1128	1459	1706	2123	2339	0314
Three Mile Slough (Sac. R.)	1642			0932		1504		2137		
Rio Vista				0943		1504		2148		
Three Mile Slough (San Joaquin)	1622			1024		1553		2229		
Walnut Grove				1127		1628		2206		
Georgianna Slough	1523			1126		1649		2331		
Prisoners Pt.		0440		1115		1652		2320		
Ward Island	0938	0459		1138		1711		2343		
Terminus	1023/1313	0504		1148		1716		2353		
Blackslough Lnd.	0910	0515		1159		1727		0004		
Vulcan Island	=0905		0611		1204		1832		0055	
Clarksburg		0512		1234		1724		2302		
Stockton	0825	0536		1223		1748		0028		
New Hope Bridge	1214			1228		1748				

