Bad J Nordin Jr.
605 Cornell
Ft. Collins, Colo
Phone 484-0827

U.S. Geological Survey
To Foothills Research Center
Colorado State University
Ft. Collins, Colorado

En. # 119
Phone 494-8502
Carl E. Nordin Jr.
U.S. Geological Survey
P.O. Box 4247
Albuquerque, N. Mex.

Office: Room 274, Geology Building
Univ. of New Mexico
Albuquerque, N. Mex
Phone Ext 70311
Ext 2249

[DBS 491-6549]

Earl J. Nordin Jr.
U.S. Geological Survey
Civil Engineering Dept.
Colorado State University

W. Collins, Colorado
Office: 491-6573 8845

Home: 484-0827
605 Cornell Ave
St. Collins, Colorado
Keys: 243-1787
P.O. Box [2407] [298-2840]
Department
Call Mr. Jones on ½ to 1:00 payment

P.O. Box available at Embank Station

On Oregon

5 till
Jan. 2, 1962

Memo to Dave Dresdy on
I got renamed copies of "Before my lovely
channel woman of the Rio Pinar" from
Dr. Bordon. He had my few comments,
held suggested some places to cut. I will
need to take out about 8 pages.
Jan. 3 1962

I spent most of the day on a memo to PCB regarding the C - d/y relation. Somehow, I lost his memo & couldn't remember exactly what he wanted.

After an early supper, I went back to the office to outline "Sediment transport parameters," & to try the "Eqaul" transport equations. I believe I want to worthwhile to try to relate the bed load, \( Q_b \), to some measure of overall roughness.

The idea that \( Z = W^{0.7} \) or some power seems incorrect. The basic transport equations should be right:

\[
\frac{d}{dy} \left( -C \frac{d}{dy} \right) \frac{Q_b}{W} = 0
\]

The integrated equation is:

\[
\frac{Q_b}{C} = \frac{(d - y)^2}{y} \left( \frac{d}{dy} \right)
\]

where \( Z = \frac{W}{\beta} \) and \( \beta = \frac{C}{W} \)

The basic assumptions to integrate this are well detailed by Bratof (Jour Geophysical Research). It would seem that \( Z = W^{0.7} \) only if \( C, \frac{Q_b}{C} \approx W^{0.3} \).

Snowing, great wet flakes when I got home
at 11:30 pm.
Jan. 4, 1963

T = 29° F = 0730
30 °F at 2215

After 4 years, I'm finally come to working from
with Boydell (1956) transport equations. Usable equations
are A2d, p. 268 & 49, p. 271. With simulating
assumptions & in constant grain size, the relation
reduces to the form

\[ Q_B = k \left( \frac{e}{d} \right)^{3/2} \]

\[ Q_B = k \cdot \frac{a}{d} \left( \frac{e}{d} \right)^{3/2} \]

where a/d is applied
as Boydell's constant A, after Bulloch & Davy.

I applied the equation to Bernnolke Date, A-2 EF.
The transport rate of bed load, \( Q_B \), is high compared
to Einstein, M.E., & Journal (1 time), hence checked
the load through any range. The total load becomes

\[ Q_T = Q_B \left( 1 + B_2/B_3 \right) \]

where \( B_2 \) & \( B_3 \)
are constants for a grain size. Compared to
M.E., tells, the rates are too high of
low discharge & too low of high discharge.
The results are simple to compute, but I
haven't compared the tables of A-2 & F
by the two methods.
The equations are:

\[ Q_B = \frac{A \cdot B_a \sigma \left( \frac{e}{d} - \frac{e_T}{d_T} \right) \frac{g}{(e - f)^3 \cos(\theta)}}{(\sigma - f)^3 V_p} \]

\[ \frac{Lb \cdot Sec}{F_t^2} = \frac{Q_B}{g} \]

where

- \( A = 8.5 \) or a/d
- \( B_a = \) constant, function of grain size & d
- \( \sigma = \) grain density, 5.14
- \( f = \) fluid density, 1.94
- \( \rho = \) of bed from horizontal
- \( g = \) acceleration of gravity, 32.2 ft/sec²
- \( e_T = \) fluid since it is the bed \& its
- \( d_T = \) shell other

assuming \( \frac{e_T}{d_T} = \alpha \) & \( \cos \beta = 0 \), then integrates to

\[ Q_B = 49.8 \left( \frac{e}{d} \right) B_2 \left( \frac{e_T}{d_T} \right) \]

\[ = 13.2 \left( \frac{e}{d} \right)^{3/2} \]

for Bernnolke, \( B_2 = 0.165 \) & \( d_T = .29 \) mm.
Ej 49

\[ Q_3 = Q_0 \left( \frac{B_3}{B_0} \right) \]

\[ Q_T = Q_3 + Q_0 \]

from equation \( Q_T = Q_0 \left( 1 + \frac{B_3}{B_0} \right) \) which also yields a constant value.

I'll spend some time with this one in the upcoming weeks.

Finally, also, I just really do cope with Einstein's two frame function — it shows that everything finally falls in. The Riemannian space seems the logical place to apply it since I've already computed \( R \), \( R' \), \( \Psi \). I'll have to see how long it would take. I'd like to get at least the welding work, no 1948, to check against roughness.
\[ V = \frac{9}{7} \]

Then \[ q = \frac{49.8 \cdot V}{T} \]

\[ = 49.8 V \sqrt{T} \]

The term \( \sqrt{T} \) is the ohm power term, from where comes the classic error of power intensity, ca. 470. This eq. can also be written \[ q = 49.8 \frac{V}{T} \cdot S \cdot B \]

\[ = 49.8 \sqrt{V} \cdot T \cdot S \cdot B \]

In the normal case, \( S \) and \( B \) are constant, \[ q = \text{Constant} \cdot q_{0} \]

This implies that the concentration \( C \) is a constant independent of discharge. This is not a logical conclusion. Also the equations seem to lack the consideration of temperature. All temperature effects are included in \( B \) and \( B_{b} \). Probably this shouldn't be constant. I don't know what temp. the curves from \( C \& D \) are for.

The term \( S_{b} \rightarrow 0 \) when \( \Theta = 0.4 \)

\[ \Theta = \text{the dimensionless shear parameter, is approximated by} \]

\[ \frac{103 s}{T s} = \frac{T}{103 s} = 0.038 \]

when \( d = 0.14 \) mm = \( 0.00095 \) ft

\[ \Theta \leq 0.4 \text{ when } \frac{T}{s} \leq 0.039 \]

It is possible to account for age distribution by the equation \[ q_{b} = \sum (q_{b} \cdot 49.8) \cdot x \cdot 49.8 \]. However, if the lead material remain constant, the term \( q_{b} \) for the age does \( \sum (q_{b} \) also remain constant, so it's no help.
The term $1 + B_{3}/B_3$ should not be a constant. I think $B_3$ should vary with other, but I don't understand Bonnell's derivation well enough to say how I will vary.

Jan 6, 1963
$T = 27^\circ F$ at 0715
$39^\circ$ at 1340
$27^\circ$ at 1840

A.2. stated the 3 yr old does in church & won delights as we were. Gage's own by early pm for coffee.

Jan 7, 1963
$T = 22^\circ F$ at 720 A
$32^\circ$ at 2300

I learned thru the Einstein Bel local junction to Dr. Doe today for see A-2. 21 observations done from "aspects of flow no. 8" said from. The BEL has an interesting & not very realistic characteristic, when $\phi$ & $\phi$ become constant as they do in larger grain zones (when $B = 1.0$, or when $d/\lambda > 1.5$, where $\lambda$ is constant for a given $k_1, \phi$ & $\lambda$), the very small percentage of the larger zones constitutes the major portion of the bed load, as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Percent</th>
<th>1880</th>
<th>0000 159</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>100058</td>
<td>29.5</td>
<td>9.45</td>
</tr>
<tr>
<td>2.50</td>
<td>100116</td>
<td>51.1</td>
<td>5.15</td>
</tr>
<tr>
<td>3.50</td>
<td>100232</td>
<td>88.8</td>
<td>2.48</td>
</tr>
<tr>
<td>4.50</td>
<td>100464</td>
<td>1.5</td>
<td>3.28</td>
</tr>
<tr>
<td>5.50</td>
<td>100928</td>
<td>1.7</td>
<td>3.95</td>
</tr>
<tr>
<td>6.50</td>
<td>10185</td>
<td>3</td>
<td>14.9</td>
</tr>
<tr>
<td>7.50</td>
<td>10370</td>
<td>14</td>
<td>31.6</td>
</tr>
</tbody>
</table>
Jan 7. (continue)
from 0.06 - 2.0 mm comprises 96.4% of the bed
mill, 1.8% is finer & 1.8% coarser. It seems
completely illogical that 0.4% of the bed could
contribute with one 1/2 the bed load, I'll
compute the load just three times the 2.0 mm,

Even Bogard does better than this.

Note a mistake in the average age
distribution; 8.6% in the 5 - 1.0 class should
be 8.9%. Because I never had Einstein
an compute with the distribution given above (p.2)
I'll not make a change - very minor anyway.

Got the Ramsey to DDB & DDB off

today, received the report, "Doctors influencing
electron decision of the 2.0 kicks near Barnebry,
N.W." approval for 1060 meeting of Board next
Aug. This surprised me because I had clearly
indicated this to be a preliminary coff. I guess
S.K.L. sent it forward. I've got to cut 5 pages

Talked to Connie Stullison Xant. D.B.S.

is apparently going to Pakistan to confer
with Jim & Frank, Jim & I have now

Staff with Daryl, at least I'd better call
him & Connie & find out what.

Jan 8, 1963
31°F at 1100
30°F
2300

A mistake in Einstein's BCF

\( \phi = 1.65 \text{ d}^2 / \text{g} \) when d is given in

mean of each age bin re-computing today.

I'm just about three with A², I should

finish F by noon this day, Friday will

compile a post & start working again

January 14th.

Saw Dall Bechem a few minutes today.

He was able to work with Paint Service on
one of their joint projects.

Jan 9, 1963  \[ T = 29^\circ = 0.640 \]


Bishop developed a series of \( \psi' - \phi_t \) curves using measured total bed material transport rates, a specific curve for each diameter, \( d \), \( (d=0.19, 0.27, 0.47, 0.93 \text{ mm}) \)

\[ \psi' - \frac{\phi_5 - \phi_4}{d_{5/3}} \]

\[ \phi_t = \frac{q_B}{\phi_5^{3/2} d^{3/2} (\phi_5 - \phi_4)^{1/2}} \]

where \( q_B \) is \( \text{LBs/sec per foot of width} \)

The total B.M load \( \phi_t = \phi_t \text{Wd}^{3/2} \times 52,700 \)

I get 51,800 for the constant.

He doesn't show much of the field work, but the relation doesn't appear to hold for greater depths.

all the \( \phi \) curves rise sharply with upper regime flow probably because sandbars were present & occupy the major portion of the channel.

Bishop determined that coefficient \( A = B \)

in Einstein equation very with bed width size.

This finding appears worthwhile, but I question the \( \psi - \phi \) relations.
Jan 9, 1963

I worked all day on BLF for section F. I should finish tomorrow, although I'll need some time to smooth up the project proposal "Transport & Flow parameters in a controlled alluvial reach."

I'd like to start writing "Transport parameters of the Rio Grande" this week, but don't think I'll make it. I'll finish the BLF today, compile the summary, & etc., still have to get curios on V vs. F & V vs. C, which will take several days. I think should about finish the uplift works.

Sent a memo to DBS on his proposed Pakistan trip.

Jan 10, 1963

33°, @ 6:30 a.m.

All day on BLF for sec F - about an hour more to go.

Jan 11, 1963

T = 28° at 0700

12° at 2300

Finished the BLF for sec F, plotted leads, plan A-2 > F.

sent MB date to PEB

note to JER to use his fig. 8, same lengths in a short paper on S. Wonk
Jan 12
3° at 8 a.m.

It was clear & sunny but later cold all day. -16 at H. Collins. The woods huge & we froze stiff and firm. Some albatross came for lunch. We saw some good flocks of penguins.

Jan 13:
Jan 19, 1963
Cold again this AM. Got a ride from J.K.C. Day called FCA & they decided I should make the Jackson IAC 5th meeting.

Jan 28 - Fed 1 - Recommend some of the Bernade Gregor description.

Jan 15, 1963
Loc & I complete all bent o cure jelly & SSS aux for transport parameters: $q_T vs q$,
$q_T vs q_T$,
$q_T vs V$,
$C_T vs V$.

There is an apparent systematic trend in $q_T$ order, & in all cases the curves fall into two groups: confined sections - unconfined sections. This has some interesting implications.

Red our schedule for Jackson trip:

Leave Jan 27th, 1245 on cont # 274

Arr Dallas 1550
1V " 1710 on A = 406

Arr Jackson 1950

Leave " Feb 2, 1436 A = 633

Arr Dallas 1658
1V " 1735 cont 277

Arr Albuquerque 1851 " "
Jan 16, 1963

Started the first on "Transport parameters" today. It should go fairly well from here on. Joe is working with departure ratios to correlate with depth & temperature. It does not appear that there will be a correlation.

Jan 17

Rained schedule to attend AEC

Full try to report. We now learn from Manchurian L 2 at 235 p.m. on Apr 18 1962

in Dallas

to "

535 p.m. on Cont 277

Am., Albuquerque

651 pm

Jay, well on agenda. The program looks excellent. I guess I should have finished a page. We were right. There is no correlation of departures with temperature for the Bemidji data. I am convinced that temperature & depth are not independent — they should be a direct relation for given unit discharge between T, D & C. I still haven't figured out how to show it, but I'll find a way.

I completed the first sections of "Transport Parameters" today & started the section on transport relations after dinner. I didn't get far on it, only dim Joe died.
Jan. 18, 1963

Got a copy of Dr. Doadly's paper for the Jackson meeting, Sedimentation Conference. Not too impressive, he wanted comments so I spent most of the day reviewing and got the thing off to the editor. Read through the 1947 FIASC proceedings. Einstein had a good paper. His definition "the coarser particles which follow a bed-load function as bed-material load," is a pretty strong argument for the 0.67-1.25 mm mill.

There is some data delimiting in this size, but 0.6 is there in coarser size. I'll have to check this.

There is programming well enough to consider some project - I should (well) do 3 for ASCE:

1. Flow resistors of the Rio Grande near Benavidez, New Mexico (60 sq)
2. Sediment transport of the Rio Grande
3. Channel erosion & sediment transport

Rio Grande
I really need to get these done or started at least, before it collides.

Projected cost estimates of the project at 11,000 for FY 60, will need approval.

I'm off to J. mostly to tell of 27,000 project on the Bernardo Conveyance Channel.
Jan 19th

Notes to Dick Collins,

Mr. Bulgen, Harris St. Office, 50th

Complete Budget studies Ely 64 to Stl

with name on Bernado Brook project

Read Progress Report #2 by D. W. Huttell

"Investigations of some sedimentation characteristics

1. sand beds streams"—mostly temp. effects.

- Snowed from 8:00 to 3:00 pm, got down to about 10°. Drove was a horrid mess, took me an hour to get home. We went to the Bulgens about 3:20 & now two

men were on scene.

Jan 20th—Came up enough to haul dunes 7Γ yards & walked to Lake 40
ice fishing—about 3:00 went out
with Collins to Manuel E. & pulled
the Lake a mile to 20 down the
hill.
January 21, 1963

A note from DDS on his potential trip to Greece on Jul 15 - I proposed - & his answer to DDS's comments on his revised report. Also got a short paper from BBC to review.

I set up all stuff mentioned on college's paper. Bruce had suggested that

\[
\frac{g'}{g} = \frac{8905}{\sqrt{v}}
\]

Then \( g' = \frac{8905}{\sqrt{v}} \) & \( u' = \frac{5.35 F_{0.1} v}{18} \)

Compared to College's un., \( g' = 1.0 \times 1.0 \). It's close enough for now, more to come. There is really no need for the nomograph, then especially when the un. year gets, not a proper prop constant in dV/da, not correct in the concentration distribution, eq \( Z = \frac{a}{p U} \)

For when the \( p - p \) relation was arbitrarily divided by 2 to do same fit to measured data.

A.Z. was nice, I ended all with.
January 23, 1963

Wrote to Mr. from S. for E and F today. Got off projected cost estimate for F. projected for G. R. project proposal on Bernardo work. I feel as though I have a chance on it.

Took PM to Dr. on leg, vision apparently.
Jan 23, 1963

Got p. 6 of Colley's short paper so I can now finish the review. Will not be a lot freser. Red. Geomorphology & General Systems Theory, pp 50 & pp 40-40 on Sedimentation & Flume's Bulletin on Ultrasonic methods for sed. determination Bull 1141-A.

Jan 24, 1963

3. Re-read Kedigga (1938) & Bagard (6 Casp. Res., 1961), spent most of the day on the text for 'Transport Parameters etc.' I got thru a (4??) draft of main introductory will type that p till & started on 2nd rels.

Still pondering Colley's note. I'm not prepared to answer until I can think out some of the implications. I believe the implications of effective then & the constants are neglected, the results is too detailed for the presentation of a working monograph & not detailed enough for a Colley of effective...
2.6 - G

15 Jan 63

I don't think the world is ready for

Eddy. How can you apply an experimentally

determined $k$ to his new gadgets? What are

the implications?

\[
\frac{U}{U_m} = 5.75 \log \left( \frac{11.1d}{E} \right) = 2.3 \log \left( \frac{11.1d}{E} \right)
\]

$k$ is generally determined from velocity profiles.

It can be obtained from concentration distribution,

but this seems to really be stretching a
copy of Engineer's type notes.

Physical velocity measurements tell us
that \( v_y \) vs. \( \log y \), in fact if

the log-\( v_y \) e.g., \( \log y \) assumed to apply, the

proportionality constant = \( \frac{2.3}{E} \).

In fact, if \( \frac{4v_y}{\log y} = m = \) slope of the

of the plot \( v - \log y \), in ft/sec per log

cycle of depth, then \( m = \frac{2.3U}{E} \).

But after we compute \( k = \frac{2.3U}{m} \) 8.

reasoning the other way, let us say \( k = 0.9 \)

than \( U_x = m \). But the factor of

proportionality is much less than 1 ft/sec

Hence the avion of the concept of effective

strain. If \( k = 0.9 \) than prop. constant \( < U_x = U \).

If you apply a correction for experimentally
determined \( k = \frac{v}{0.4} \), then

you going right back where you

started from - an experimentally determined

\( k \) should be only from the reduction on
c from the Einstein-Chern relation. Never use a $c \neq 0$. 26 January - Sat
28 Jan. Monday

Carle & Riggs lined up some local SW cars & we went to Vicksburg - a beautiful little town fraught with Civil War monuments & other scenic wonders. We took a brief jaunt around the Waterway Experimental Station, broke into two groups on Instrumentation & model studies. I went with the first group. Saw some impact hemispheres, water used in pens to 16 channel wedgwood chart readers to convert to dgy, punch cards etc. Also saw their phase on temp. Studie. They were using coal as a bed material. Lunch at the Holiday Inn, we tried to return in time for the keynote address by Mr.Colorado. Had dinner Jim the Hotel (King Edward) & met with Misses Jane, Rachel, Simon, Collection (Dr.) B. I. Colly & others on the Bernado Project.

Not much accomplished - Sat in the Colly & sold until midnight. Met Vannar, Bruce, Al Joplin & many others. All went to wishing with his, teaching Georgia & Norman now.

29 Jan. 63 - Tuesday. Attended most of the conference. Simon told me he had a bunch of slides coming in, so had to improve it over a little. B.K.D. & J.K. gave good talk. Mothers came here about the dinner with D.P. Cato, Riggs, Godlewski, 1 p.m. at garrison. Back - about 11, p.m. E.K. came up to join D.P. & we talked more, mostly of Bernado Project.
30 January - Wednesday.

The meeting was a little today. The Banquet was well attended & well served, Steak, potato, salad, veg., pecan pie. We (IPB & WEC) sat with Simon, H. Guy, FCA & Wt. We then went to walk about a mile of towends to the old capital, new capital etc. & went to bed at a decent hour.
January 63

We held the conference at 9:05 a.m. to congregate in Castor Room. Daddy led off in all directions, I finally got told where to the Bermudian project. Present were O.B. Simon, Marty, Harold, Bob, Stan, Daddy, Rimmer, Huttell, and Curtis.

J.C. Rome & myself, Kennedy.

In general, all supported the project & the proposed team with some minor & mention. Curtis would like to add that his recently purchased pulque, (a project off the cuff type), I think healed by Smith, Huttell may have application in his homosexual thesis & tagged project study.

Set that most of the P.M. conference had a beer with Hadley, Schum, Emmet 589 said goodbye, went for a walk & so on after it broke up. A late raw steak dinner at Grimsby, followed by a short bridge with T. Maddox (opposing Curtis & Daddy) & about 100.
Tri 1 Jul 63

Up at 6:15 to catch 8:00 bus to Oxford.
The bus stopped about 1 mile out of town & a group of us walked the last 1 mile to reach it. 12 miles on, it stopped again & we dined about 1 1/2 hours waiting for a replacement bus. Arrived Oxford about 1:30. Lunch orientation talks on which I spent most of the day. Rtn @ 5:30, dined again at Union Captain. To see "Fiddler on the Roof" at 6:30, orientation & town nocturnes, coffee, Rand to alumni house about 10 pm.

The second facility was excellent, a large 4' flame about 100 long, resembling a continuous sample on the entomo. Second small studies, on ablatory currents clumping of sand, Jones on a sphere, & have a 2-hr. particle movement.

Their radiochemical group was impressive & the cloth group doing carbon dating. They have a program of their own, sediment records & are working on modifiable Einstein program. Andrew Bache agreed to send me anything they write up on this.

Eidel Emanuel Jaenen wrote reviewing our "Transport parameters" report in return for copies of the data.
Sat. Feb. 1, 1963

We got up at 6:00, had breakfast at the alumni house, & were on our way to Memphis at 7:30. Got to the airport about 9:00 a.m., because it was foggy or/and raining most of the way. Our flight was delayed until 3:30, so we left on an Edisons & got to Dallas with 7 minutes to make the Continental flight via Vortovert to Alllogo. They had a car for us & walked us out. Had a fine visit, for dinner on the way to Alllogo, getting in at 6:55 p.m., a minute the train got the kids met us. A.B. was not well so we had coffee with the Beaumage Dav & came home. Just lost his keys & coin purse with about 6:00 in it. She was real upset about it. — about 10:00, the security guard called & said he had found it.

Sunday 2nd Feb — Slept late, went by the airport after lunch — couldn’t find who had Janis keys — stopped to see mom, by the way to get some boxes, & home to start packing.
4 Feb 63 — Finished review comments to B.P.C.'s paper on monograph for Feb. Red copies of pp. 462, 5 for final proof before sending to printer. Sue will be glad to get more to have more time to finish some of this stuff. Picked up $7000 in from J. Angus for house sale we never agreed to be and this Friday. To the airport if dinner to see off T's ship. Don Paxson, security office who had them, listed a true public servant, assured me that there were more honest people than I thought it wouldn't even take a cup of coffee.

5 Feb 63 — De handed in our synopsis of part A, Coal Survey research for 1963. Ken Folk now came bearing in 1 noon on his way to El Paso — & gave him Computer Corp's, some images, Sage Annex & our vel & conc. concepts. De really need to get the anthology report done. If you someone needs us to do it. Miss H. finished my comments to Bobby. I spent a little time on T.B. I made up to do the task this pm & drove around a little clearing for apartments this pm. Sold Joe to clearing Danges — there may be some apt points for T.P. of R.C.
6 Jul 63 – I borrowed Dick Tripp’s pickup & loaded and all the stuff we are giving away or has become in the past. We only spent a few minutes at the office – we started on the garage & got most of our packing finished – Sheryl wound up tomorrow am.

Met the Nade’s this pm, the trip very pleasant. Later we went with mother to Mrs. Norwood, 1319 Dunrobin S.E. to see an apartment – a small but convenient, & handy to work, so will move in Friday.

I need 2 more large boxes.
1 tote
1 mailing pin
wet-proof bag & field clothes

To return:
1) gas can
2) Dick’s things, which Sheryl left for him going today
3) papers
4) cards
7 Jul 63 - The parked until noon. I went to town this am & hard to consider Bagardi & the MPM dollars. I've agreed to give it a try, I don't get much done. Picked up a couple 1 long boxes & we finished packing things before bed the bedroom.

8 Jul 63 - Friday - A cold donut & milk for the kids & coffee for us - The movers came at 9:00 & finished about 12:00. I took started behind cleaning & packed the car & we left at 12:30, storing our cooler & several items in the garbage. Had lunch at a place, left the kids & went back to 3:17 for the rest of our stuff & to mail the Nash's in Texas. Turned the keys & got 71 to lock on the m/o's payment. We looked left T. of 1004 & to the lot for an hour. A note from Bob on the Bernardo project. Joe worked & MPM - Needs help to work but don't look too good, I'll try to go one of them. Dinner at 4:00 & parked at the airport. The kids in sleeping bags. Cozy, at least we were able to travel.
9 14 - Sat -

A fairly warm day. We slept late and spent a few hours organizing, had coffee with Mrs. N., mother & Pat. Came by for a few minutes. Tried to get some boots at Coors. Finally went down town & got them in the run while she took up.
10 Jul 63 - Sunday -

It rained most of the morning, we slept in till about 8:00, had a leisurely breakfast, & Irish cream when I read off to 4:00 for dinner. A gathering of the clan - we left about 3 & took off for the laundry about 3:30. I stopped by the post office & read J. Barbellion's story of a great Western Sunday. Read a few pages & had to get them Shappard's MPM. Dominica's discussion of Hume & Schmid (AGU Trans 183, N. 5) & Bazangi.

Geo Res., V. 66, No. 10)
11 Feb 63 - Monday - I worked to wear, about 15 minutes - temperature about 15°F. - a brief excursion.

Spent most of the day checking PM, our papers from the Jackson meeting came in, & some from AES. Got a ride home with JPB family, it was still rather cold.

J & I went to Dr., I had a shot it was a boost. We got them down early & S got the flu to convalesce all but looks like Hotel D.M. looks, for A & F, worked about 2 hrs on St.

12 Feb 63 - Tuesday. I spent all day on the Meyer pitter, Mullen, etc., compared with constants according to Shomski & others - there are appreciable differences between these values & values by other authors, etc.

While these differences do not present major problems in PNB circles, that is the variation are generally less than 50%, they do raise an interesting problem and the concept of effective stress - a section I need to start on very soon.

The 13 - Back to hacking out last of STP, I took a few minutes to sit on on discussion w/ W. Nelson on Bernard's project & got together, some details on new paper. Got a note from Humesman requesting immediate delivery.
Jul 15, 63  
Friday

It warmed up AM, so I knew we were a went
home for lunch. Got started on SLP, finished
PP467-8 & went to have the (WAD) pub dinner.
Peter gave me a copy of a 'major paper'

I waited till 5:20 p.m. to go to Paul's
with my wife. We went to see a play.
I wish I had a delicious Irish stew & salad.
I went from about 8 till 10, then had a
couple of drinks, we set up till after midnight.

Jul 16, 63  
Saturday

I spent the am, till 11:30, on SLP.
I walked up the hill & of the ground. I
came back to do lab & worked till 300. Then
I went to the library with the kids to do some & the
Kayses. At 8:30 we congregated at the salon's
for a going away type party - Chips, Sugar,
Dessert, Spikes & someone named there, we broke
up about 2:00 a.m.

I'm having an especially good time
with Boydell & can't seem to get the
constant in his eye to come out in line
with anyone else.

Jul 17 - Sunday -
Tuesday, Jul 19, 1963

Today is Jock's birthday. I got a hand
check for the Jackson trip, cashed it
at the bank & ordered a dozen long stem
roses to be delivered this pm.

Wednesday, Jul 20

Finally got the finished copy of
Hearne's Channel Season off. I
have a thinly drawn hunch that I
might be rejected on the basis of too
many photographs. Oh well. I'll try somewhere
else. Going away down town to the
New Churchon - very pleasant - then to
Cafe de la - cup of coffee

Thursday, Jul 21

Spent most of the
day on STP. I'm not all that
satisfied with the thing -- and I need
desperately to finish it.

Friday, Jul 22

Spent all day at
the office on STP report. It's moving
pretty slow

Saturday, Jul 23

Went till 11 &
then downtown to pick up some new
clacks at Harry's. Re fuse with Lula - back
to work after lunch - a much dull morning
I think this saved some part of my
silence by writing two reports of our
studies. - Ed. Jones, Parsons, Bill
contain the 293 lbs. (climate should be)
other will be a continuation of "aspects"

Sunday Feb 24, 63

We made it to church at donuts &
vweet rolls afterward. We then off to the
Department for dinner. It was a
beautiful day. Spring weather is finally
fitting us.

We stopped in older town for a few
minutes & I browsed thru the bookstore.
They had some lovely old volumes of early
Sunday's (June, 1843) while King & an
impressive collection of Pima & Ethnology
report - I almost bought an early diary
of Col. Henry. "So received me whole".
Monday, 15 July 63 — A note today from E.S. Assistant Chief, WSC Pub. Section.

"Aspects..." is approved for when to open file of publication as a chapter in WSP 1498 "Studies of Flow in alluvial Channel." Thus far, only a few minor corrections on the figures, so its in fair shape.

Tuesday, 26 July 63 —

Corrected "Aspects..." and spent the day on the sections from characteristics & hydraulic variables - slow.

wed. 27 July 63 - at 9:00, I went up to help another move & hang her picture at the Hospitality House.
Thursday, 28 Feb.

Worked mostly on STP. The gy & tables are in good shape. W. & H. still need to do some at home & his being a good job. W. is his best at the tables & in good shape. I included the new on flow variable today. There remains a short section to complete on transport related to simple hydraulic variables, then a section on parameters for this time planned only three items, temperature & material characteristics, shear & effective shear. I should have some sort of order to do this by the weekend, next week to do tables of c, symbols, definitions & bibliography - I hope to be able to finish this by next Friday.

I hope to put my mind to winter this weekend, with luck we might finish it (rough draft) & get a finished copy of “application of some red down formulas to Ed. M. Farm” around before I leave.

We had a delightful Chinese dinner with the Curtis’ last night, Beach & Bella’s dinner equally delightful, I may go out with Connie & sometimes work if things go well with all. Kay is home in the hospital apparently a tune for the worse.

Jack stayed to play bridge when we got home there was a note that "Judy had a girl." The Jads Humble had a house and having been out to do it last week & no word today.

I’d brought a copy of DBS’ Johnson after real duty home to read & STP to work on. Should I out line from Paris, no more other notes.
March 63 - Friday - a very boring day. I should have stayed home. I can admit to accomplishing nothing.
Tuesday, 5 March 1963 - We finished
the last section of this for SFP about
6:00 it is all 4 a great weight off my
back - still a great deal of work to do on
it, but we're over the hump & should be
smooth sailing from here on. We still need
an obstacle which I may do tonight before I
leave (10:45 p.m.), a conclusion, TofC, fig
Rif which Jon has in order - symbols, definitions,
& etc. We should clean up these details
tomorrow & move on the Watson report &
do "Applications". I'd like to finish
both before I leave, but it may be
impossible.

Wed - March 63

Spent all day on details of SFP - Had lunch in
the Palace of New Chientown

Thursday, 7 March 1963 -

I finished "Transport Parameters" report
today - Murray is typing text, figures & tables
are I about done, Sue can polish this off, we
should be able to send revised copies to 11th or 12th
Don't 10. I start Watson & try for some
more on "Applications" report.

Friday, 8 March 1963 - I have tried to organise
my thinking on the Watson report; I believe that
I am about ready to hit it. - Gave a pint of
blood this 2:10, I haven't felt much like hitting

anything.
Saturday, 9 March 63. We dined early most of the day; took A.P. for a hand at 5 a.m. and a nap for a few minutes. To the lab this afternoon for a look at the Uniton report - the thing sure is a mess. I have no idea when, if ever, it might be in shape to utilize.

STP was red finished & may not be for several days - but its in fair shape at this point. We only have references & the preliminaries to finish. I think its a good report. I'd like to be working on "Application" but thence I've taken it to Dr. C. to finish.

Sunday - To church for breakfast
6:00 a for lunch
Copy for dinner
Spent the whole day dating.

Monday, 11 March 63
Finished on Uniton - Mon 14
Summer Uprising & D.B. printed STP.
So finished putting together the 5 copies about 5:30 PM - Some
across but nothing gross.
Tuesday, March 12, 1963

Copies of "Transpo parameters" were mailed out to J.E. Kennedy, U. of H., H.P. Guglielmo, A.T. Long, and E.A. Evans, A.T. Long, for field review. Also mailed copies of "Aproach & T.P." to D.G. in Quicksand.

Spent the day on the Uinton Report. Finally got the Preliminary Report in reasonable shape. I have a rough outline to follow & a fair idea of where I'm going. I hope I can have it handed out by Thursday pm.

Three more days here. Will try to finish Uinton & Temporary Storage at.

I'll leave this with Joe & take Applications & Time dependency with me.

Wednesday, March 13, 1963

Uinton

March 14

Uinton

I'm

Write on Uinton till 130, 00 hrs. I break for T.E. & lunch here. Spent all

PM packing, ended with 7 boxes &

some regular mail.
Sat 16th

Just cleaned our room
& I carried 3 boxes to
continued. Moved in
at 1004 for the night
Sunday 17 March 63

Off at 0850 to Colo via the Bann. & jack Alamos. We're soaked to the teeth - 55710 starting mileage

Arived Las Vegas N. V. 2 a.m. at 1430, 55912 - Windy all the way, we got to L.A. about 1130 a.m. left around noon. T. C. A.

Slept part of the way in

Arrived Waldenwag - 1900, stayed at Ramble motel

Monday 18th

Breakfast at the Ramble Edge at 7:30 a.m.,

Left Waldenwag at 0820 mileage 56037, died & broke,

Windy.

Arrived 24 Collins 1220

56316

Cheer in a Town House -

Do pub about 1000, Cheers with some

renters - not much on tap
June 19th

Took at house & off shown by
Mrs. Anderson, checked a house in Need
area by Sat.
About 5:30 went to see a place on
Cornell, up by Capt. Rory J. Crockett
quit 130 150 loan & cost to mom
in. We bought, checked Parkway motel to
rooms w/kitchen, 30 & 40 w/c, will
look tomorrow

A beautiful Sunny day all day, some
bitter than yesterday.

Wed 20th

Moved into Parkway motel

Thursday 21st

1st day at work. gen.
about 2 in 3 hour running
BBC's ASCO report & looked to
DBS on future work. Small projects
considered: (1) wheel to help form
a discus, (2) Transport by Einsten cause
systematically with spec. Gravity (3) transport roll
as a fraction of rate of space movement.
(4) Systematic decision in do. Question: may be
influence in terms of transport theory?
(5) AID control for effective tight & effective
valve & intuitions & application to field 2.5
etc. etc.
DBS spent 3 weeks on the Pakistan trip, didn't get any details from him, but apparently he was at least basically right in whatever he was trying to sell to T.E.C. They eventually ended up with some modified design content. An interesting point, which I am mentioned in his last letter, is that median diameter of dead oil decreases in a downstream direction precisely as a new pipe mentioned something about a change from 1.6 mm to 0.017 in some 30 or 40 miles.

DBS spent a day at V. of Bangkok Thailand & they apparently doing some interesting work. The term of argued about.

One was a means of measuring zone than a pipe flow.

\[ \text{AP} \]

By solving energy equations 'term 1 & 2' simultaneously, accounting for change in mass density of fluid & particle, the concentration can be determined within 2% for a range from 1 to 100,000 ppm.

Bread was some sort of Thai rope fiber an almost neutrally buoyant particle at the base of a column of water (say 1000 ml cylinders) is said to rise on the introduction of sediment at the top of the column. The effect of the sediment on the density of the fluid is said to transmit to the base & cause the neutral particle to rise. I am told of a ball of water & cannot get 1 to come. There was a current effect when the sediment gets to the bottom, but after we all we could
Friday 12 March 63

Got in a few minutes early to help D. Haffill sort a run with 3 ages of radioactive tagged sand. Spent most of the day standing around. The counting & transposing equipment is cumbersome & slow, required constant calibration & adjustment & the whole thing seemed extremely disorganized to me.

The bucket mill was buried in a hunk at station 45, flow was established at slope v 0.003, Ah 1.08, E - 10°C & v 2

Bad forms were ripples, a cloth was placed over the hosed grooves until flow well stabilized then removed. After some time (just before lunch) sound lateral traverses were made at normal stations along the flume - 3 faces at each station, 10 tested each of 3 ages, tagged with different mill. Then fixed longitudinal traverses down & of flume ended up in the pm with long hrs. of 2 stations on flume section [T T]. Summed 2.2 ft long, had about 5 3/8. Went back about 100, 3 3/8 ft in 4 730 - 5 45, recorded check date 1/10 had 10 25. Summed a run about 12 1/2, home about 12 30 pm. My books werehmixed up the new job, so Ken had 8.5. Put them up & I upset he a few. I think I'll catalog them as I upset them. We got a bookcase & file cabinet, so it's still Monday, if things go on.
Saturday, 23 March 63

Drove to Lawton & stopped by Capt. Crockett's. We're to meet at Farmer's Co. Alcohol Co. at 3:30 Monday. Spent the free cleaning & washing the car, shopping for food about 5:30.

Sunday, 24 March 63

Our first time at St. Luke's, we were late & a little rushed. J & A were confused, but seemed to come thru in good shape. It is a small church, crowded, a pleasant group, very friendly. The church school of the church was directed by the teacher, informed. We sat around tables,吃了 with coffee & cigarettes, but very informally. I learned more about the possessors today than I ever learned previously. After church we went to the drug store looking for things for the kids. Dinner about 2:00, naps, then drove for our first look at Horseshoe Res. I was cold & weedy & then home to munch on cold chicken.
Monday, 25 March 1963

Just to the security office for a parking sticker, then to the physical plant — a key. I started unpacking and cataloging boxes, & began to look at the data on bed load transport in ripples and dunes. If \( \lambda \) is the porosity, \( V_s \) is the velocity of dune movement, \( h \) the dune height, \( \rho_s \) the density (unit weight) the transport is given as

\[
q_t = (1 - \lambda) V_s \frac{h}{2}
\]

where \( V_s \) in \( \text{ft/sec} \), \( h \) in \( \text{ft} \), \( \lambda = \frac{V_t}{V_s} \)

If \( c = \text{vol conc} = \frac{\text{gellan occupied vol}}{\text{total vol}} \)

\[
\lambda = \frac{\text{voids}}{\text{total vol}}
\]

\[
1 - \lambda = c
\]

According to Bagdold (1956) \( c = 0.63 \)

\[
q_t = 2.65 \left( \frac{1}{2.4} \right) \left( \frac{0.63}{V_s \frac{h}{2}} \right)
\]

This pm I went with Capt. Croci to see a Sawyer (John Kochenburger) and signed a sales agreement. He may be out Thursday, perhaps not until Friday.
Wednesday 27 March 63

To the new job with DBS this PM. The facilities are excellent & it should be very comfortable. I wish now that I had moved directly here, I think I could get a lot more work done. It is a tremendous building, nothing in it right now.

Returned to try to work on the sketch. Some odd looks at chin movement.
Thursday, 28 March 63

Recopied both head & total head Jan. 27 #28

No word, started at 6 - Hi! had the
beets nice. I don't think I can break
it down into head food & total.

She'll start hooking out some sort of
paper tomorrow. I don't really know what
there is to say about this.

I began reading "River, Snow, and River
Channel Formation" today. It's a translation
from the Russian, published for

The National Science Foundation, Washington, D.C.

Dept. of Interior

Israel Program for Scientific Translations

Translated by: Y. Prushansky
Printed in Jerusalem by S. Monson
P. S. T Cat. No. 477
Price 1.75

Available from the Office of Technical Services
U.S. Department of Commerce
Washington 25, D.C.

I may try to order this

Got most of the paper from Capt. Crockfort

tonite. All I need to do is call the
bus. I send info back to Bancroft's
ask. I picked up our keys, anaesthetics
5th, survey, & 6th policy.
Friday - 29 March 63

Got our cheque from Albuquerque today, I'm happy to say. This pm I got a look at Walter Langbein's, 'A Theory for the Geometry of River Channels'. It hangs on pp 252 & 500, and I'm not sure what he says. Daryl is going to review it, I read a bit from it & then want much could be said about it.

Saturday - 30 March.

Jared cleaned while I took the 1st load to 605 Cornell Ave, about 9:30. In the morning we fairly well along so we had up & left the motel a little before 11. Carpenter arrived as we did worked till 12:00 back at 1:20 & finished about 2:45. So we worked in unpacked some of the kitchen, got the bed, up, went down town to eat dinner.

At a little after 8:00 we congregated at H.P. Guy's to see Daryl's eldest Hookee's daughter, sat with the kids. She was from of Paris Rome, Mount Home, Rong & Palo Pinos. It was quite a crowd.
Sunday - 31 March 63.
We spent the day unpacking. Got the
den washed, wored & limed. Finished
most of the kitchen stuff. Ken F.
came by & got most of our
boxes that for us. We had a delicious
Port roast for dinner & sort of
cold spread afterwards.

Monday - 1 April 63.
J. J. & I went downtown
on misc. errands. Got an oven
for a belt for the swing set,
lodged at garage, furniture etc.
The kids took a short nap, &
we went back downtown about
2:00, stopped at Sears & ordered
parts for the washer & the phone
office. They were due to hook our
phones up after 3:00, so we took
them home had a 7 up & turned
off to the lunch yard to get up
a 14' piece of mahogany & bought
to our service & took care. Our
phones were in by supper time. We
called mother after dinner. I shopped
down 1 board of the mahogany & got
for the day.
Tuesday - 2 April 63

We had a very busy day today. This A.M. J., A., & I went by the lot for mail & stamps. They enjoyed the flowers - 3000 to 9000 on they box. - Jolene & Kinney for kite string, we bought a bicycle - and Swinn for 29.05, & c. for a canoe - to the [illegible] with Don's hamilton. Got home about 10:30 & picked up Trish, S. to the P.O. For a dinner plate, hardware store for nails, pan lid, chain & lock (for bike) & Green Stony store for a boundary board. It turned cold & started to snow about 10:30.

Home for lunch, the kids slept from 12 - 2. Then we took off again & hit the furniture store - several.

Dining room & Hi-fi (magazines) & Bowley's. After 4:00 we went to Valley Furniture & bought a lamp shade, I picked up my bike & peddled home - Exhausted & cold. After 30 minutes rest, I peddled the kids around for a while. They were delighted - Sunbed room on the front room floor, but did not finish.

Wed - 3 April 63

Cleaned storage under stair well, some on utility room. Finished cleaning the bookcases & unpacked the box. L. & A. & I took a bike ride to the swings & pool while Trish shopped for groceries, in the Am we cleaned under dining room. In the dining room Bowley's delivered our. Dining room; got in the pan - lovely furniture, we are delighted with it.
Thursday - 4 April

Back to work, a pile of correspondence. M & R #43 (ASCE Hydr. definitions), a note from Joe. Rough draft of Temporary Storage paper. Still doesn't have it. - Neither did P. Factors affecting channel erosion - Main general comment was lack of substantiating data. - Naturally, all supporting data is in Albuquerque - Chief reviewer was Plaxman, U.S. - & others - Naumenko suggested I clean it up. So the Sedimentation meeting in Washington D.C. on April 64, I have mixed emotions about this, but will give thought to it.

Went down & got a new rear tire for the Bike. He was so accommodating that I insisted on paying cost on the tire (150).

Mr. representative of Steve Boo's nurseries & orchards, Louisiana, came by with a landscaping plan. Nice, but expensive - 260$ or so - we cut down to lawn, trees, & 6 shrubs, 1uy, & came to $84 - we must make a decision by Monday on this. Wrote a long letter to JP3, asked for files of P.R. supporting data.
Friday - 5 April 63

This was a most depressing day - and for no apparent reason, things at the office were in shambles - people in & out - confusion reigned.

I met a Dr. Bernard, from Cambridge, Eng., now at Cal tech on Cavitation studies - he had completed a study on movement of a single particle in a pipe with vel. of water = 5 fps, 2" dia. pipe, 0.2" particle of perspex or some neutrally (sq. 0.8 - 1.25) buoyant particle. Max vel. at 5 g = 1.0, the heavier & lighter particles gravitate or float to slower moving flow near the boundary - he has a paper in current issue of Jour.

I've almost finished a first draft of a short paper on fluid movement & had landed up - it's a lousy draft - not especially interesting, well organized, or enlightening - I talked to D.B. on other work - he's still interested in a small narrow 2 dim. plane to look at this idea. I can't see when anything would come of it, but I may have to take it up. - I'm hoping to try some ideas on influence of sp. gravity on trapped - finally get a copy of all meecs & computed parameters. D.B. is reluctant to let out on the 40 & 4C corrections & he's still not given any indication of the Pakistan data. Guess I'll have to get it from SRC, if I get it at all - I'd still like to hit a paper on some of these field data - but guess I'll pull it off - I'm still not at all sure what I'm supposed to be doing on what Daryl would like me to do - Guess I'll just dig into this S.E. problem & let it
I gave Leslie & Allen each a penny after dinner, & told them we'd go down & put them in their boxes later. — They immediately ran down stairs & Allen broke his elephant bank. We were all upset, & because we were both greedy & fussy, we were a little rough on them, popped them into bed without ice cream, & blamed them both. Poor little Leslie kept thinking that it wasn't her fault & it wasn't really it was mine. I should have given them the money — I could have gone down with them. I could have screamed at them, knowing that telling them something once or twice just doesn't get through. But more reason perhaps. I had a premonition that P.R.'s bank would get broken — I was never sold on the ideas of ESP, but someday I'll learn to give more thought to these premonitions. It's impossible to give an objective indication of these things. If you start thinking consciously of them, you have all sorts of premonitions cropping up all over the place, some of them, naturally, come to pass probably through conscious or unconscious sequence of associations. The disheartening thing is that, without trying to give thought to it, you probably have all sorts of premonitions, ideas, "flashers" which would fit some category of ESP, but are only remembered the items which come to pass. — So it's hard to assess what sort of accuracy to expect. I'm never recorded these things, perhaps I should begin to keep my
an account — this would get depressing & I always tried to put those things out of mind because I feel strongly that if I don't devote a full mental measure to my work I'll be swallowed up in a jungle of competitive & ruthless mass of associates, as Doc put it, "claiming their way to the top over their back-stabbed friends & colleagues." I don't feel a strongly as Doc, I think & especially evident & prevalent attitude in aircrafts large groups — but I am reasonably aware of my limitations, & right now I feel that if I stop for breath, I'll lose the pace. — But enough rambling — My premonitions now generally minor (the ones I remember) or deal with rather minor crises. — Although I think I know that we were having our last conversation the night Dad died, I tried to write down as much of it down, but I was too depressing — So was the dream, which must have occurred before thanksgiving, sometime, when I woke up, literally, in a cold sweat a with an unsightly fear, half paralyzed — the effects of the dream were short-lived — perhaps a few seconds or half a minute, & I remember very little by morning it almost nothing now — but I'll probably always wonder about it. I don't remember any of the preliminaries, leading up to the dream — Jack & I were together in a room very remnant of the U.K. of the small above house behind the Demonds on 11. 4th when we stayed when we died so all from 2: A. But I don't recall a bedroom.
The window was large & oval, draped with lace - I said something about 'it & 'he' in coming - the drapes or curtains rustled, not violently, but strongly, like a brief wind, & we felt a presence with us - but could see nothing - this is where I Drook 'Inspired' & I'm never been able to determine whether the presence was malignant or evil - we were at some stage of our instructions for confirmation at this time, there was some association between there & the dream - also between a book (drama novel murder mystery, the name of which I can't recall) which I was reading. Ultimately, I was associated the presence with an 'Angel of Death' & with a concept of the 'Holy Ghost' - Neither idea was especially helpful, so I adopted the eminently practical solution of writing it off as indigestion & forgetting it.
Saturday - 6 April 63 - Irish worsed while we rode by desel. flew kites. After nap, we went out to St. Callings nursery, checked the prices, stopped about 50c to pick up my father's Hamilton must watch, which I took in earlier in the war for repair & new band - things are a little brighter today.

Sunday - 7 April 63. Palm Sunday. We got up early & made it to church. The Kilpatrick's were up from a nap this pm., we drove over north with them to look at lots - some beautiful house, nice view - around several small lakes - very impressive.

Tomorrow I'll take a look at the light S.C. transport - I recall that Einstein & Chua corrected the hiding factor & pressure correction - x, y, a & E - & I think they introduced a Reynolds number correction for S.C. - I'll have to check these.

Monday - 8 April 63 - I believe I am finally settled to where I can get some work done. Not that I got anything done today, but at least I felt like working. And I finally got the desk cleaned at home. When I can try to accomplish something in evening. I need to finish 3 papers from Albany & Vinton. Applications & temporary storage ... I still haven't finished the short paper on headload transport & dream tomorrow.
May 1'll make it tomorrow.

Tuesday, 9 April 63

I concluded a rough draft of the short paper on hillyard transport & dune movement. It's still not right & I'll try to revise tomorrow. There is just temporary storage — I don't really say, & I'm convinced there is adequate material for a fine short paper. I don't know when to start revising.

Marvin Wood came by with a landscape plan (from H. Collins Nursery). He had a good plan (that expensive) & we will probably try to work with them at least on the ladies. I think I'll do the lawn myself. Next week I could get about 10 yds of manure & might try to line up some straw or something, the fall seems possible that the sod wouldn't need anything. It was evidently a hay field last fall. I've got some coming up all over the front & back.

Wed. 10 April 63 — I spent most of the day trying to work out something on Chinese paper — went back & worked.
Thursday, 11 April 63

Finished the short paper on "Bedload transport equation for dunes and ripples", Judy typed a 1st draft & I turned it over to DB3. Spent a little time with Chang's equations, his thesis is a mess - I don't know why they let him out - I finally collected all data for the light weight material, I'll start on it tomorrow.

Friday, 12 April 63 - Spent all day reviewing B.P. Cally's paper "Procedural computations of Bed-Material Discharge" (for ASCC). Looks like a good paper. Spent a couple of hours of her daring as I did.

Saturday, 13 April 63. We drove to Dowland to look at trees -- bought 4000 nursery trees to the P.O. to check 600 delivery. They sent some of our mail back already -- to H.C. Nursery to buy 1 lb Chirwood & 5 Shal. Gabs -- and Income tax refund $257 came back so I said just do 1 week about the 50 or so for trees -- took the training wheels off today & Dedie is learning to ride her bike without - She took 2 some 3-4 miles but she's doing well.
Sunday - 14 April 63

Early morning, June was up & excited about 3:30, I found the baskets & some eggs — I bundled her into bed with us, but she didn't sleep much till we all got up about 6:00. We had a hurried breakfast about 8:30. At 12:30 we met the K. patricks at the Union for lunch. It was crowded — but a good meal, banana ribs & roast, apple & beanings. I served at 4:00 for the children. Service. Ed came on for coffee, stayed for sandwich. Fell ~ 7:00
Monday 15 April 63 — Started Einstein BCF for light yellow with, 18 — 0.05, Khold computed these & turned up a series of gross errors.

Read "Sediment transport capability in erodible channels", by Shih-Wen Mao & Leonard Rice: a good paper. Tote on computed by BCF than assuming sediment inflow, P1, P2 in computed assuming F = 1.0 (inflation factor) & L05 is computed.

This is taken as max transport capacity.

It blew like a fire this pm.

Tuesday 16 April 63 — Spent some time on Einstein & the fine mist. Looks like it'll have to recompute all of the stuff — 10 day small odds that it comes in ok.

I ran a size analysis of the L tv very uniform, with dm = 2.8 mm. I had the same size in Einstein R1, which came out coarse the LP but less than 0. Guess we ran it that way.

Wed. 17 April 63 — Spent most of the day trying to revise "temporal deposits" paper. Just about finished it. Finally got a copy of Meyer-Peter & Muller 1948 paper to read — it's a tremendous piece of work, simple & straightforward. Nel got a copy made for my file.

Thursday, 18 April 63
Would fill 230 on "Temporary Storage"

Read by the Director for a dozen backup logs picked up L, T, & A & we drove out to the Hackathorne Nursery for a free sale—all these 100 specimens were priced over, ten bought & sheets including 2 spire, & came in & planted them. It was blowing like a gale again, & cold.

Friday, 19 April 63—Finished my remarks on "Temporary Storage" & shipped it off to JPB—also a note to Day requesting supporting data for a new season No. 3, P. 9, 200 Rheco studies. I would if bill send them. This am I went down & paid the lawyer, Kuchina & for the home sale, checked rent rolls of house mounted onto file, bought a new pair of lenses, came in my watch—3'11 in Dec, having a crystal fitted.

This pm I finished Einstein calculations on 3 of the 4 light weight redwood runs, using a straight 0.71 relation from a new age (2.8 mm), & to from actual measured fall velocities. They are not bad especially at lower transport—may need a Reynolds No. correction for the lower velocities.

I had a bad cough to date, so we drove out & got some medicine.
Saturday - 20 April 63 - a sort of dull day. J. A. and I went to the lot to pick up a map, we shopped for lunch, about 3 o'clock C. H.政务服务 brought our free - we were at the school yard swingin' it. I had to come in as. She wasn't feeling well.

Sunday, 21 April 63 - a cold day - some wind and rain this A.M. it was about freezing - we decided not to go to church. Spent some of the A.M. & P.M. trying to wear clothes - e.g. I made several mistakes, e may have to start all over. 38° 0 21 20
Monday, 22 April 63

Jotted w/DBS & talked about
includ. T.C. for C.W. Palestine
with Red copy to receive

by D.H. Nuttall & W. Sayn

An Investigation of Jizel Shalum

by T.H. Chang
D.B. Simons
E.V. Richardson

Tuesday: 23 April 63
Wed. 24 April 63

Finished review of N & S papers, am trying to get into Chem 1.

Thurs. 25 April 63 - Computation of change eq. for R & S. Near Bernalillo.
Dug out the clothesline.

Friday, 26 April 63 - 4 A.M. - Drove in a.m. to make a furnace mounted rocker.
Plowed the yard - Finished 10 to 2:15 p.m. to the front
Red shop & finished 3 p.m. - Cut out 2 real
Green rut, got my real working 1 5 - to work
in the rain. I started to rain about 7:40
and rounded it up at the end of the work.
Home at 9:30 p.m.

Saturday 27 April 63 - A little cloudy & too wet to work.
Killed the yard - We decided to leave town.
Then Big Thompson Canyon & to Estes Park.
Beautiful country, we had coffee after lunch
and came back about 1:30 p.m. Spent
the B.M. riding. The wind had blown
all day & the yard was covered to badly
in spots & couldn't break it.

Sunday, 28 April 63 - Up at 6:00, do
chores, home bond. Spent the p.m. - Off
on, putting the clothesline on, covered
in the evening on review of Chem 1 paper.

T = 48° at 8:30 p.m.
clear & still
May 23 - Monday.

Called at 1600 from Al Harrison to give paper for ASCE, Aug 7-9, 1963, University Park, Penn. Title: Observations on Sediment transport & channel Erosion Rio Quemado near Bernarda, New Mexico.

Spent AM on changes eq.

\[ q_B = K_r (T_c - T_r) V \]  
\[ q_r = K_r (T_c - T_r) V (T_c + 1) \]  

\[ F = \frac{d}{0.8} \sqrt{(V_i + \frac{2V_o}{v} I_o)} \]  

\[ a = 10 \frac{(T_c - T_r)}{(1-n)(T_s - T_c)(\text{Cond temp} - \text{Sed temp})} \]  

\[ d = 60 \phi \]  
\[ \phi = \text{Fraction of bed material} \]  
\[ T_i + T_r \text{ are integers for suspended eq} \]

\[ K_r \] is given as a function of \( V \) for the flume & constant for streams.

If \( K_r \) is constant, eq 1 is constant after Baguley, p4

In union paper, I mention Dancy's relation as

\[ C = 46d \]  
\[ V = 26d^{-0.45} \]  

May 1, 1963

McCallum, G.E., 1963, Advanced waste treatment and water reuse: Jour. Water Pollution Control Federation, Washington

May 2, 1963: U.S. CS. See advisory committee meeting. In attendance were P.C. Bandiet, E.C. Ame, B. Carter, George Swob, Dan Davady, DBS, HPE, DH H. B. Slay. ZKE, Kilpatrick, myself. Spent 10 A.M. on project, together at Long's Farm near Zoon, very dry. p.m. Sound wave lab, to W. Slay's seminar on dispersion. P.M. we ate lunch at cheswood lodge, to HPE's for sake of powerpoint.

May 3, 1963: More adv. com meeting, DBS said of better things along way announcing that, having run from circumstances, he wished leave the project & join C.S.W. stuff July 1. I heard all a little demoralizing.

May 4 — Saturday —

May 5 — Sunday — To church

6 May 63 — Monday — Spent the day chasing changes etc. etc.
7 May 63 - Sunday - Started 8:30 a.m.

8 May 63 - Worked at compile

9 May 63 - Worked on review comments till

10 May 63 - Late night drive. Wayne dropped me

11 May 63 - Early to work. CWS w/o changes to be. F was
gone a.m. No decided to leave. Flume running with weekend to try to solve

12 May 63 - Started to compile review comments for Cheng, S.E.P.

13 May 63 - Finished on review comments till

14 May 63 - Started to compile review comments for Cheng, S.E.P.
Sat - May 11, 1963

We took off to fish about 900. Got to 14 C
With waves, about 15 miles out
at 14 - Too much water &
too fast for the kids - Wind came up & it was a miserable
Say, well in all -

Booze about 100, lunch, naps.

I took come down with a bad cold & felt miserable - we stopped
about 1700 to have a hunk in shop

Stay from Mrs. for dinner.

Sundae.
Sunday, May 12, 63

Truck was out today so we didn't go to church. It was a windy, miserable day. About 10:30 I went to the lab. The small pump which feeds water to the large plenum pump had lost its prime, so I finally got it started again. Changed about 2 pm and it was down again - the pump was empty. So I started filling it. Shut it off about 5 pm, found out when the plenum gage is working while the water won't still am not sure when the plenum drain is. Bill S. didn't know - the guys stopped about 4:30, before I came done to shut it off. Dr. Han to the pump - he didn't know either. He'd lost it. I found out a few things about this outfit.

Monday - May 13, 63 - Started collecting data on development of alluvial Baros 8' Plume. Mapped N, S & W of S. Profiles.

Tuesday - May 14, 63 - Mapped N, S & W of HPG. Took 6 Samples.
Wed 15 May 13

Talked about new show w/ DBs on current & future work. Combined new narrow frame for (1) red form & recent (2) change in gradation D.S. (3) Inst. for press & red dust, one red frame.

Finished review of changes in paper - U.S. W.S. Slopes.

T.R. & K. Jackson were in for a few minutes.

Thursday - Started plotting red contacts, shut down the film on the pin to let it drain for gesture.
Sunday 5-19-63

Kennedy, J.F., 1963. The mechanics of drums and cymbals, in invisible Red Channels— I couldn’t get much out of Joe’s paper. The math was a little on the gym side— But I’ll try again.

J. D. & I took off to church. It rained about 2:00 P.M., so we slept in till 7:00— Juan had a bad cough & stayed home. After lunch we raked & planted the box yard— Juan & moms & I used asparagus for dinner & it used delicious.

Monday 5-20-63
Saturday 5-18-03 - We didn't really break out at the case of bawdy, but got around about 700 & by 930 we were off to leave our boxbound furniture behind at Bowling & do ten off seconds Greeley in search of oysters. We didn't find much & with Irish spotted a big bull snake by the car (230). At 80 I rounded new enthusiasm for it. We came into Greeley for lunch, hotdogs & shakes home about 130. Irish took a nap while Tesla & I took off to the S.E to hunt for more. We found about a qt. - I guess - pretty sparse.
Tuesday, 21 May 63

OBS has been working on a DAD correction for effects of offsets, etc., which is intriguing in many ways. I don't understand all the implications, but it goes something like this:

A plot of $v$ versus $v$ for plane bed before $v_k$ after movement falls on a straight line.

![Diagram of a plot with axes labeled $v$ and $v$, showing a straight line and labeled points.](image)
Friday, 24 May 63. I stopped & got the car
inspectors on the way to work - They put on
a new brake lining, which worked
much & drove out of the station. I went
on downtown to get my driver license &
have it to the Job. I try to get the VA to
give - the Job is a miserable mess
I finally get money after lunch & ran
15 VTs - I made to go
Saturday, 25 May 63 - We went asparagus hunting in the am & did quite well, brought home a large frozen bag. Also several & bugs in the room, while I worked on the east side of the house. Poor AR was exhausted & dropped into bed at 6:30 before we even finished dinner.

We finished raking the front & e side & handed out the roses in the kids wagon, we were exhausted by sundown & in bed by 9:30.

Sunday, 26 May 63
Up at 6:46, drank & crows. I planted the lawn before breakfast & we tore off to church. About 11 we tore off to the mountains about 2 1/2 miles of the pond & on state road & had charcoal chicken & we soaked (nothing), we ate & got home about 4:00 do water, plant a row of corn & clean up the garden tools. All exhausted again, we were in bed by 9:00.

Jim came back notice our car had been moved, one wheel up on the curb - I couldn't tell whether I had been driven or just some kids parked it.
1. Establish $V - V'$ relation for plane bed before movement.

2. For given correct $V$, compute $V'$ by trial & error, and compute $y' = \frac{(V_y / V)}{S}$. Compute effective val. $V = V' y' / y$.

3. Plot $Ay = y - y'$ versus $y$.

4. Note that $V / V' = y' / y_0$. Then $V = V' y / y_0$. To estimate mean velocity, $y_0$.

   a) Knowing $y$, $s$, & bed form, estimate $y$ with $y_0$ & determine $Ay$.

   b) Compute $y = y_0 - Ay$. $V' = \sqrt{gy} / S$.

   c) Enter Fig 1, with $V'$, read $V'$.

   d) Compute $V = V' y_0 / V'$.

The idea behind this is fairly simple.
Assuming a thin bed, the separation zone is found to extend c. 12 h downstream from the low crest, and by in a correction to produce flow within the confines of the shoreline. See.

By momentum, by continuity the shear stress along ab equals that shear along cd.

More interesting perhaps is the rigid boundary data fall in no small. In the

case of buffer by again corrects for the zone of separation at λ = a. A Fig. 3
particular roughness pattern.

A family of curves pass through the point 0.

When λ = a, load rough, Ay will approach zero as the depth increases to the
giant. When relative roughness no longer throws

load. Let k be 1/2, Ay will do nothing more than lessen its transition.

* From Fig. 1, \( V = kV^* \) and \( V' = kV'_* \)

From Fig. 3, \( y'_* = y_0 - (y_m + b) \)

Then \( V = k \left( \frac{y_0 - y_m - b}{y_0} \right) \sqrt{y_0} \)

where b is intercept \& m is slope in Fig. 3.

\[ \frac{y'_*}{y_0} = \frac{V}{V'} \]

* Something looks wrong here
June 1, 1963 -

It has become necessary, I believe, to set forth some
deadline & establish some schedule. Certain items press
but without order of priority, the following projects
are listed:

1) Complete "Sediment transport parameters"
2) Complete "Union" report
3) "Application of sediment transport parameters"
4) Obs. of sn. lines & channel erosion,
Rio Grande (ASC15 meeting, Aug 6, 1963)
5) Time dependency of sediment concentration
during flood events.
6) Movement of nappes & dunes & its relation
to sediment transport.
7) Effects of mean density of sediment on
transport
8) On the nature of bed forms & red.
Structure 55
3 June 1963 - Monday

Activities of this day were far from noteworthy, but I'm hard into a habit of neglect, so it is in order to at least record a few remarks. Today, Pope John XXIII died, and although my relation to Catholicism has always been one of detached interest & inactive sympathy, I can feel the sense of the passing of a great man. I doubt I would have attended a CSU student event the kick off dinner for St Luke's building fund drive. I've mixed feelings on St Luke's any increased participation in their program.

I received the final copy of "Temporary storage of fine sediment on islands & Point bars" from JPB, & sent the copy forward to the Brande chief without change. Spent the rest of the day preparing a rough copy of the annual status report for JPB. I'll get it tomorrow & with luck, will finish revising "Sediment Transport Parameters."

4 June 1963 - Tuesday - Sent the status report to JPB & the short paper to SKL. I'm very little confidence on the short paper. - 1724 Bob Vincent, who is unit leader for CSU coop. duty unit, & who had an interesting problem to discuss. To control fish in Flaming gorge reservoir before impoundment began, poison was introduced at 25 stations at 10 mile intervals for about 2½ days. Concn. was maintained roughly at 5 ppm, & monitored ds. & checked w/feel fish. The monitored load fell below 1ppm, & oxidation of poison w/ potassium permanganate ceased. 2½ days later, a slug of dead fish was injected at diversion with monument, some 60 mi ds from monitor station. During test period there was a 10°F drop in flow, but no major change in...
stage or temperature.

The problem: where & why did the kug of poison come from? Poison goes into solution.

Second possible answers:

1) Deliberate or accidental introduction after operations were supposed to cease - 2½ days after? Doesn't seem likely, but reports state 6 & F wanted to poison entire rock & D.V. wasn't overly convincing with denial of this possibility.

2) Errors in monitoring, in introduction of poison discounted because of 2½ day lag - industrial waste poison discounted.

3) Storage in pools, eddies, dead ends, etc - wouldn't disperse as a "kug."

4) Cumulative effect or fish - no

5) Uptake on red particles which log the flow - seems most likely answer.
6 June 63 - I couldn't find the negatives for the 244 paper - I may have left them in Albuquerque.

7 June 63 - Friday - Delivered reunion to JMS, HP6, JFK on Times, Parachute, & note to SPB. They were ready to go, but didn't get them in the mail.

8 June 63 - Saturday -
Yale, M.S., 1963, An expression for
the load transportation Journal Am. Soc.
Civil Engineers, v. 89, N° NY 3, p. 221-250

Eq. 84 - Wearing line expression,

$$P = \frac{P}{T_s D V_x} = 0.635 V \left[ 1 - \frac{1}{4} \log \left( 1 + 25 \right) \right]$$

where $P$ = solids discharge, wt in slabs per unit time & unit width
$V_s = \left( \frac{f_s - f}{f_s} \right)$ when $f_s = 5.14$, $f = 1.04$
$D$ = grain density, assumed constant
$V_x = \frac{1}{V_s} = \frac{V_s}{D}$
$s = \frac{T_0 - T_c}{T_c}$
$a = 2.45 \left( \frac{P}{P_s} \right)^{0.4} \sqrt{\frac{P V_x}{V_s D}}$

Then $q_b$ in dry weight per unit width & unit time

$$q_b = \frac{P}{T_s (f_s - f)} = 0.635 \left( \frac{f_s - f}{f_s} \right) D V_x \left[ s - \frac{1}{4} \log \left( 1 + 25 \right) \right]$$

$$= \text{Constant} \times V_x \left[ s - \frac{1}{4} \log \left( 1 + 25 \right) \right]$$

$$= \text{Constant} \times V_x s \left[ 1 - \frac{1}{4 s} \log \left( 1 + 25 \right) \right]$$

when Constant = 0.635 $f_s$ $g D$, in ft-lbs/sec unit

Steps in computation

1) compute $V_x$, $DV_x/V_s$, $T_0 = PV_x$
2) From graphs curve find $T_0 / T_s D$, entering with $DV_x$
3) Compute $T_0$ & $s = (T_0 - T_c) / T_c$
4) Compute $a$
5) Compute $a_5$, $1 / a_5$, $\log(1 + 25)$, & $1 / a_5 \log(1 + 25)$
6) Compute $q_b$ = constant $V_x s \left[ 1 - \frac{1}{4 s} \log \left( 1 + 25 \right) \right]$
14 June 63 — a "better than most" day. I got going again on the badland formula, took time to renew English as paper & returned to Jilin. Met James Wiggles, Virginia Polytechnical Institute, for the research institute in hydrology. A very pleasant chat about a recent PhD from U. of Michigan with what in hyd., wife from U.P., 3 children.

See RC & Bill Cliburn from T&K were in to see DBS.

WPC, JPB, & JFK called about a trip down White River Canyon. Sue had some trouble convincing myself that I was more important than what was, but after a little consideration, I managed to drum up enough enthusiasm to say "we can work more." I'm looking forward to the trip — looked up the sonic depth sounder (minus two recorders) to take to Allug. — Should send the recorders to Allug the middle week in July & perhaps arrange to go to E' Pesc then with John Harris on collecting more iron ore data.
Saturday - 15 June 1963

We flew to Denver about 7:30 & managed to arrive in Denver 30 minutes before any of the stores opened. Drawn around for about 20 minutes & spotted American Furniture & Diner & Show - so we headed for coffee & donut & then to D&G.

It's a fairly large store - 4 floors - has the warm, honey atmosphere of a mortuary, the clerks, none of whom were under 60, had the kitchen, sympathetic, consoling air of undertakers. I'm not sure how they manage to sell furniture in this300, sendy, atmosphere & their prices appeared about 30% higher - probably enormous overhead to heat that barn.

We wound up American West - the assigned salesman gave us a condescending "poor white trash" look & proceeded to show us around several floors of junk. We didn't see any thing we'd have as a gift. * This pretty

was finished our shopping enthusiasm - we

found the zoo & spent several hours walking

beneath, game, etc., etc., Denver has

a lovely zoo, mostly animals & in a "natural

habitats" setting. Jeff & Sue were pleased by

ducks & geese ( & a little frightened ) & liked staying

of popcorn. * The zoo exhausted us, we

decided against further furniture shopping & headed out of town, looking for a restaurant

Good old McDonalds - it started to rain &

roasted all the way to St. Collings.
16 June 63 — our first good rain of the season started sometime last nite — it was coming slightly when I went to bed about 10 & must have rained continually until 1 a.m. it turned out a gentle, steady rain, no lightning, thunder, or violence — very little wind. the ground soaked up about an inch as fast as I came down.

17 June 63 — Sept 4:30 a.m. 3/4, Kipling — heavy fog all the way to Denver. HD breakfast in Colo. SP at 7:00 a.m. in Waldeney about 9:30. From there we went over the Veto pass to Ft. Garland (there was fresh snow on ship there, so we stopped to take pictures) stopped at Colorado Cave at 12:30. HD Tours for lunch about 1:00, we wound up all at 5:50. Bill C & IFC were still at the office, we bumped to some depth found & I took 64-3600 to 4000, before I had a bite (we went to Bruce's & got dinner there) & went to bed about 9:00, very tired.

28 June 63 — Spent the day in the office, we covered mostly misc. stuff. Had dinner, stopped to see Jack, played cards & then to work till 11:00 pm. Called T & kids home.

19 June 63 — Joe & I finished research on "Transport Parameters" changed title, we got supplies for our final trip, set up equipment & made some preliminary plans for the trip.
The difference between a prejudice and a conviction is that you can explain a conviction without getting mad.
E. July 63

The last several weeks have been a real of confusion, in a vain attempt to be objective, I’d say that the last two weeks have set me back, work-wise, by at least a good month or six weeks. But there are some compensations; the week in Albuquerque was refreshing, some stimulating interchange with WK — the trip then white Rock Canyon, from Gila Bridge to Cochita, was, as usual, an inspiring venture. No Grande Canyon, which is awesome, dimensionless, beautiful & thrilling at once — The Rio Grande is a gentle run, yet not without tremendous sheets. Even at the extreme low flows (223 cfs the WPC yesterday), there are many holes and once, six foot deep & the rapids at Ancho & below are fun by any standards, the danger of being pinned under a rock & drawing a very minor — Even so, P. Cushman was dumped twice, losing glasses & hat — S. Pentzmann once or twice, J. F. Kennedy at least once, & D. Farabeggi, who met us upstream from Cochita do bring in a supply boat, once.

Parts of the canyon are barren, & there is no large timber to be seen. But this time there were many springs & deeps along the R. bank & even a good moister here along the L.B. We sampled many of them. For 60 B. chems & due to the low flow, made very poor time. Our first rate out we camped at, about 100 yards upstream from cross section 2. Somehow, we missed cross section #1 altogether. We had spent about an hour exploring the stream & canyon, which was flowing about 2 cfs. There was a small waterfall about 20’300 yards upstream from the mouth of the stream...
We saw almost no wildlife this trip. 13.11 p. reported a bear at a creek got in our kitchen & ratted a few cans.

We loaded about 6:00 Sunday morning. Hugged Cross section 2, & proceed to 3 about 9:00, when we ran slopes, a total rock study, rock cairn of some length etc. We proceeded to Enjutla, canyon 1 mile miles, 1.3. I had parked on a sand bar. Everyone was getting tired by this time, from there on down was dredging. Jack Dewey & Dane Samsley walked up from Coctiti & took the supply boat in, we were loaded on the road by about 7:00, & got to town about 7:30.

We drove back 2nd, mother, Patry, & Beauty K, left at 6:00 a.m. n 5:30 p. Sunday, we proceeded up the Poudre, Jones drove around Horsetooth Res, There, to Denver & the Zoo, Shopping downtown Friday night, Sunday to Estes Park & home via 550 & 5th st in Loveland, when I was born. We got the cabin on the road n 5:30 Mon 1 July.

1st & 2nd we moved from the old High. Job to Foothills Campus. Monday & sides Monday, besides etc on Tuesday. Rex nd my 3 supply cabinets & we got the main office nd up n building, have it ready to go in business. I still have second days organizing before 36 home things in order.
29 July 1963 - a pleasant week passed.

Yesterday the Eastern called about 600, 21st from .
and so we broke out an additional dogo holidays
for the week. I wanted. I wanted to have a visit to the
ha-hal days, Thus, & Sis, to begin both days for
the carnivals & Frontin day rodeo, none are done.
Johny & I have been all day sunday.
It seems almost impossible to keep up with the mass of good technical information coming out in the fields of hydrodynamics, fluid mechanics, & hydrology — & still have any time left to accomplish work — But there's much to be done, so it becomes necessary to critically appraise the current status of my work, to assess capabilities, to outline some broad objectives & to lay down ground rules. This is no small task, so I plan to spend some time on this.

Several ideas have emerged in a brief interlude today when I got aside all work & sat down to organize my office & files. These include:

1) A definite schedule, to include:
   a) Work time at home, probably am, before breakfast
   b) Schedule time for study & literature review, preferably in am & pm for short intervals
   c) Writing, math, etc in the am.
   d) Mechanical work - filing & cataloging, in the pm, say from 3 pm on

2) More physical activity

3) A running account of projects, with current status noted periodically

4) Some changes in work habits

and so on. I may try to time of the rapid reading drawing again. I'm convinced it's worth the money spent even if I haven't put much effort until then.

I sorted the E.W. Law maps which DBS left in my office. Complete Geologic maps of Arizona (rev.), Colo., Wyo., & N.M. — misc. Climatic maps (USGS), Nat'l Geog., Canadian...
The paper "Bedrock transport equation for ripples
and dunes" should be completed this week (rough
draft) in August, & I should get the discussion
of Yalin's paper on the road in the next few
weeks. The "applications" in my Rio Grande paper
goes well, I may try another on Rio Grande
studies—something a little more comprehensive than
I had planned on New unripened. I should try
to get more dependent shaped up. In 1934
hadn't meeting. Other projects include an investigation
of mass density effects & the paper (1938) on
best done for SECO in 1964.
I also need to set aside a few minutes a day
to do revision review on calculus. I can't seem
to get very far on this at home. So I try
to take it in to do the lot & let it.
ASCE Paper, Rio Rancho
Grain
Time dependency
Applications
Bed load transport from chains & ripples

Carl J. Mordin Jr
605 Cornell
St. Collins, Colo.
Phone 484-0827

office:
U.S. Geological Survey
To Civil Engineering Research
Colorado State University
Foothills Campus
St. Collins, Colo.
Phone 491-8645

1. ASCE
2. Disc. of Grain
3. Bed load transport, chains & ripples
4. Bibliography of ripple formation, bed forms, etc
5. Stuff of urban density, bed load transport
6. Applications
7. Time dependency

Est. comp. aug 20, '63
28
pub. nov
od
Jan 64

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\[d = 0.3 \text{ ft}, \quad D_{15}, D_{85} = 0.001, 8.002\]

\[ L = \text{Constant average slope} \]

\[ \text{unit width length} \quad L = \lambda A D \] where 

\[ D = \text{diameter} \]

The total volume passing per unit width and time equals the total volume of all particles striking a step during unit time in the above rectangular area of the bed:

\[ \frac{q_s}{(q_s - q)} = \frac{L}{A D^2} \]

\[ P_3 A_2 D^3 = \frac{A_2}{A_1} \lambda P_3 D^2 \] (1)

where

\[ q_s = \text{transport rate per unit width and time on bed, under water} \]
\[ q = \text{drift of sediment} \]
\[ g = \text{gravity acceleration} \]
\[ D = \text{Grain diameter} \]
\[ A_1, D = \text{area that the grain contacts the bed} \]
\[ A_2, D^3 = \text{Volume of the particle} \]
\[ P_3 = \text{Probability that a particle will start moving in any given second} \]
\[ \lambda = \text{dimensionless} \text{ represe} \text{ntative} \text{ for the length of one step} \]

Transposing

\[ \frac{q_s}{(q_s - q)} = \frac{A_1}{A_2 D^2} = \lambda P_3 \text{ sec}^{-1} \] (2)

\[ \frac{q_s}{(q_s - q)} g D^2 A_2 \]

\[ \bar{L} = \text{average time required for the water to remove one particle from the bed, such that} \]
\[ \bar{P} = \lambda P_3 \]

\[ P \text{ varies from zero to one} \]

\[ \bar{P} \text{ expresses the probability that the hydraulic lift on a particle is} \]
\[ \text{equal to or exceeds the weight of the particle.} \]
\[ P = \frac{A_1 \epsilon}{A_2 \lambda} \frac{\rho_{is}}{(\rho_{is} - \rho)gD^2} \]

\[ P = \frac{A_1}{A_2} \lambda \sqrt{\frac{\Delta S}{g(\rho_{is} - \rho)} \frac{\rho_{is}}{(\rho_{is} - \rho)gD^2}} \]

=
\[\frac{D}{\omega} = \frac{1}{F} \sqrt{\frac{DP}{g(p_s - p)}}\]  

(3)

where \(\omega\) = fall velocity of particle

\(F\) = settling velocity parameter, \(F = 0.816\) for \(D > 1\) mm

Compute \(F\) from Rubey's eq.

\[D = \sqrt{\frac{2g}{3} \frac{P_s - P}{\rho} D + \frac{3cM^2}{F^2D^2} - \frac{6M}{PD} = F\sqrt{Dg} \frac{P_s - e}{\rho}}\]  

(4)

hence

\[F = \sqrt{\frac{2}{3} \frac{3cM^2}{gD^3p(p_s - p)} - \sqrt{\frac{3cM^2}{gD^3p(p_s - p)}}}\]  

(5)

Then

\[t = A_3 \frac{\sqrt{DP}}{F \sqrt{g(p_s - p)}} = \frac{P}{P_s}, \quad P_s = P/4\]  

(6)

Substituting (6) in (1)

\[P = \frac{A_1A_3}{\lambda_0 A_2} \left[ \frac{1}{F} \frac{P_s - P}{(P_s - p)g} \sqrt{\frac{P}{P_s - p}} \frac{1}{g^2D^2} \right]\]  

(7)

Note that \(P\) also is that point of the bed where the ratio of the local lift to the average lift is greater than the ratio of the wt. of the particle to the total lift.

\[P = \frac{wt - wt}{wt}\]  

(8)

wherein the wt

\[wt = AD^3(p_s - p)\]

\[lw^t = AD^2 \nu^2\rho\]  

when \(\omega = \) local

Velocity near the boundary
\begin{align*}
\text{assume } v &= 11.6 \sqrt{\frac{Z}{P}} \\
Z &= Rg RS \\
\nu &= 11.6 \sqrt{gRS} \\
\text{Substitute in eq. 8:} \\
P &= f \left( \frac{A^2 D^3 (P_s - P)g}{(A_4 + D^2 \rho) (135gRS)} \right) \\
&= f \left( \frac{A_2}{135A_4} \times \frac{(P_s - P) D}{RS} \right) \\
\text{Combine eq. 7 & 13:} \\
P &= A \left[ \frac{1}{F} \int \frac{b_s}{(P_s - P)g} \sqrt{\frac{P}{P_s - P}} \frac{1}{g^{0.5} D^{1.5}} \right] = f \left( \frac{13}{P} \frac{(P_s - P) D}{RS} \right) \\
\text{in which } A &= \frac{A_1 A_2}{\lambda_0 A_2} \\
A &= \frac{135 A_4}{A_2} \\
\Delta \phi &= \frac{1}{F} \frac{b_s}{g^{0.5} D^{1.5}} \sqrt{\frac{P}{P_s - P}} \frac{1}{g^{0.5} D^{1.5}} \\
\phi &= \frac{P_s - P D}{P RS} \\
\text{and eq. 14 may be written:} \\
A \phi &= f \left( B \phi \right) = P 
\end{align*}
A, B & f must be determined empirically, by plotting \( f \) versus \( \psi \).

Using Zwik & Collier Data

\[
0.465 f = e^{0.391 \psi}
\]

for \( 0 < f \) less than \( 0.4 
\psi \) greater than \( 0.4 \)

\[
\begin{align*}
A &= 0.465 \\
B &= 0.391 \\
f(1) &= e
\end{align*}
\]  

If eq 18 is correct, \( \phi \leq 3.15 \) because \( \rho \) cannot exceed 1. \( \phi > 2.15 \) possible only if \( A \) becomes smaller.

No is constant for low values of \( \rho \).

For higher values, as \( \rho \) increases, local lift keeps the particles from settling. When this occurs,

\[
1 - \rho \text{ particles settle after step } \lambda \to \\
\rho \text{ start another step } \lambda \to \\
of these } \rho(1-\rho) \text{ particles settle after step } 2\lambda, \\
\rho^2 \text{ start another step } 2\lambda, \\
etc.
\]

The average distance handled by the unit

\[
\lambda = \frac{p_{w-1}^2 - 1}{p} \\
\rho(1-p) \text{ indicates } \lambda_0 = \frac{\lambda_0}{1-p}
\]

Substitute in eq 7

\[
\rho = \frac{A_1 A_3}{\lambda_0 A_2} \left[ \frac{1}{F\left( \frac{D}{2p} \right)} \right] \left[ \frac{b_5}{\frac{D}{2p}} \right] \left[ \frac{1}{\frac{D}{2p} + \frac{D^2}{2p}} \right]
\]
For quality, \( p_3 = 2.65 \) (5.14 slump/cu).

Einstein's 1950 \( \phi = \frac{F}{\phi_{1942}} \)

where \( F = \frac{w}{\sqrt{Dg(p_3 - p)}} = \frac{w}{10 \sqrt{g(p_3 - p)}} = \frac{w}{10 \times 12.2 \times 1.05} \)

1950 \( \phi = \frac{1}{7.28} \frac{w}{D^{\frac{1}{2}}} = 0.137 \frac{w}{D^{\frac{1}{2}}} \phi_{1942} \)

or

\( \phi_{1942} = \frac{\phi_{1950}}{w} D^{\frac{1}{2}} \times 7.28 \)
Equation 20 is in terms of wet weight.

\[ q_{ws} = \bar{w} \text{ in water} = (P_s - P) g \times \text{vol} \]
\[ q_{wB} = \bar{w} \text{ in air} = P_s g \times \text{vol} \]
\[ q_{os} = q_{wB} \frac{(P_s - P)}{P_s} \]

Equation 20, in terms of dry weight, is

\[ \frac{P}{1-P} = \frac{A_1 A_3}{X A_2 F} q_{wB} \frac{P_s - P}{P_s} \frac{1}{(P_s - P) g} \left( \frac{P}{P_s} \right)^{\frac{1}{2}} \frac{1}{g \frac{2}{3} D^{\frac{3}{2}}} \]

\[ = \frac{A_1 A_3}{X A_2 F} q_{wB} \left( \frac{P}{P_s - P} \right)^{\frac{1}{2}} \left( \frac{1}{g D^3} \right)^{\frac{1}{2}} (21) \]

Note 1:8 in Einstein 1950 paper (TB 1026)

\( F \) is included in \( A_3 \) (omitted incorrectly, from eq 37, p 33) such that

\[ t = \frac{A_3 D}{10} = A_3 \sqrt{\frac{DP}{g(P_s - P)}} \]

(compare with eq 3 & 6

\[ t = \frac{A_1 D}{10} = \frac{A_3}{F} \sqrt{\frac{D P}{g(P_s - P)}} = A_3 \sqrt{\frac{1}{F}} \]

Note 21: Einstein’s 1950

\[ \frac{P}{1-P} = A_1 \frac{\sqrt{13}}{\sqrt{2}} \phi = A_1^\star \phi^\star \]
v. 89, no. HY 3, pl. 1, p. 221-250

\[ p = f \left( x^2, p, p_1, D, d, V_s, V_k \right) \]  

where \( p \) is bed load discharge per unit width & time. \( \text{in ft}^3/\text{sec} \).

\[ X_m = \text{mean step length, distance AC} \]
\[ C_{x,m} = \text{mean velocity in x direction} \]
\[ \Theta_{ac} = \text{dimensionless term} \]

\[ X_m = C_{x,m}, \quad t_{x,m} \]

\[ C_{x,m} = \bar{v} \left[ 1 - \frac{1}{c} \ln \left( 1 + e^{-c} \right) \right] \]  

\[ \circ = \bar{v} \Theta_{ac} = 10 \Theta_{ac} \]

\[ \text{when } \Theta = \frac{L V + D_o}{D d_L} \]

\[ \text{for } D_0 \text{ minimum, } D_0 = \frac{\pi L}{6} \quad \text{and } \frac{D_0}{D} = 0.05 \pi, \quad \Theta = \frac{P}{P_3} \]

\[ \circ = a s = 2.45 \left( \Theta \right)^{0.45} \sqrt{Y_{eo}} \left( \frac{d_c - \frac{D_0}{D}}{D_0} \right) \]

\[ C_{x,m} t_{x,m} = X_m = \frac{D \frac{1}{2} \circ}{D_0 \frac{Z}{Z}} \left[ 1 - \frac{1}{c} \ln \left( 1 + e^{-c} \right) \right] \]
An article in Harper's (p. 62) mentions population growth of the world: I'm always been a cautious sort of Malthusian, so I went there with interest. The item of most interest was the chart below. Fig. 1 shows clearly an equal growth from 1800 to the present.

Population growth, from

Around 3 billion in 1950

To perhaps 6 billion in 2000.

Overproduction leads to major

1. limited availability of

Fig. 2

Acreage

1963

Land, area

1963

people

Land, area

Subsistence level

we can compress quantitatively some of the implications. Fig. 2, for example, shows the relation of arable land, in acres per capita, to time, and we can see that already we are in bad shape—about 1/3 of the people of the world are hungry. Of course, it would be possible to produce more food per acre by more efficient technology, and a possible subsistence level would be as shown above. Remarkable advances in farm technology have led to a production record (in U.S.) as shown in Fig. 3 and the same approach asymptotically some base level very close to

The factors leading to the remarkable
trend in figure 3 have ramifications, however, which may solve—or at least help solve—some of the problems. Consider the time lag between the development of theory in physical science and the application of this theory to some practical problem. Qualitatively, again, the trend is as shown in Fig. 4. By mid 20th century, there was no time lag between development of theory and application.
This was largely the result of the efforts to organize research brought about by WWII & the atomic bomb. The book of an idea you use to immediate speculation of applications to warfare, which will be called or "practical" applications, a major feature of this close gap between theory & practice was the idea of "feedback," where the performance of our model of a process is analyzed & fed back to some earlier stage to correct the direction of the action or reaction — about which much could be said.

But the remarkable, and sad, feature of Figure 4 — that by 1968 there is a complete reversion in time, by which we can see that the practical application of ideas are being developed years before the theoretical problems or aspects are dealt with. Some simple examples will suffice: the use of pesticides; radiation therapy, & drugs before long-term (as in many cases, short-term) effects are recognized; the use of thermo nuclear devices for both peace & war; the dispersal of words, the possibilities of biological mutations, of psychological persuasion that mass communication media, etc.

We need only to keep along these lines & there is a definite probability of widespread destruction of life either deliberately or accidentally.

The possibility of birth control presents a more attractive solution to many of the world's problems, as most of the world's suffering once recorded history may be traced directly or indirectly to population pressures. But between the Catholics & the Chinese, this seems to have slight chance of ever becoming a popular cause.
E.E. Tinney showed Einstein's paper relative to approximate shear & other related functions from theories for small $0.5 \times 10^{-6}$

homogenize ratio Proc. ASCC 184, no NY1.

8-31-63

Geog. area brought by a draft of his studies on fall activities.
A rather unfortunate case; I think George has the material for a four page, but is poorly organized & presented, to distinctly lacking in any sort of continuity. I have some qualms about it being PhD material, but this is up to DBS. I also have some misgivings about its use for OS65, with considerable more, it could issue 1 good paper in two short notes 1 A.E. quality.

Lover to in that George is going off in all directions. He has divided his efforts toward three areas: (1) surface area vs shape factor (2) Changes in viscosity due to inert particles (3) Viscosity changes due to charged particles. These three items would tie up in a next package, if handled correctly.

3 Sept. 63
15 Sept '63

a production was a planned demand. Finished "Red Head" up. In between & dinner a girl about half 7 there. On John finished. Should be able to wind them up by the end of the week & give some very serious thought to transport of blend will be $1/40 left. Op. goes on out tonight at 10. May try to drop some more for te 2 th. Then do both packed & hit the 8" for some studies of Scandinavia.
Dynamics of Sedimentation: by Parker Track

Sedimentation - 5 fundamental processes
1. Weathering
2. Erosion
3. Transportation
4. Deposition
5. Diagenesis or consolidation

Weathering: 2 fundamental processes
1. Mechanical disintegration
2. Chemical Solution
   - 5 factors influence weathering
   1. Parent Rock
   2. Climate, esp. temp. & rainfall
   3. Physical environment, topography
   4. Length of time the processes operate
   5. Action of organisms

Mechanical weathering - depends mainly on chemical expansion & strength of mineral constituents. Dominant in arid regions, cold regions, steep slopes.
Chemical Weathering: ion exchange process, depends on
1. Concentration of ions
2. Ox - red. potential (pH)
3. Temperature

Erosion:
1. Moving particles from position of rest
2. Abrasion by impact of moving particles

Agents of Erosion:
1. water
2. wind
3. ice
4. gravity
5. volcanic explosions
6. plants & animals
M.P.M. - USDA
T.B. 1026

U.S. Interagency Rpt 1 nov 12
U.S. Army Engr. Otst, St. Paul
Coop. Engr.
1217 U.S. P.O & Custom House
St Paul 1, Minn.
Cost 4 of $1. 19 of
$12 from U.S. Govt. printing office.

1. Class Notes: keep to hand in
2. Problems: in sect. of notebook
3. Notes on reading assignment
4. Handout M11
5. Perhaps a term paper
6. 2 Exams

Jane: Completed 10 chap.s on his book, has contract w/ McGraw-Hill

Govt. Agencies
1. USDA
2. Indian Service
5. U.S. B.E.
   Irrigation System
   Hydr. Structures
   Stable channels
   Reservoir Survey
7. Public Health Service
8. State Agencies, Consulting firms etc


Zelikin, A., 1964, Engineering v.19, no.11

Thompson, S.H., 1964, Angular measures: a new factor in the inv. of the transport of ground by streams.


I started sorting, cataloging, and filing in the Science Collection at CSU.

Footsteps campus reading room. This will eventually turn into a

night time. But if eliminating, he must never be an amazing

reason: an amazing range in depth scope of material. Early

systems in his filing then we begin / envelope first with

3x5 cards & amp; cards / typewritten classified by idea, a particular

projects.

Much of the staff have been removed. I cannot read, I mean

of the returns are pre-electric - So there are many

articles do the work do bring me up to date - Somewhat of a

job with all other hours joined - But I should get them

eventually.

Several projects in all hand, I cannot continue long record,

but they all must be done.

1. Annual review paper, "Bed load equation for

Ripples & debris.

2. Disc. of Vorti.

3. Study on effects of river density of bed will on

sediment transport.

4. Applications etc.

5. Time dependency of bed conc. during flood events

6. On structure of bed forms (SEP0 w/ OBS, P.O. 5)

7. Clean up "Stream Studies with light weight B.H.

But I think one job I need to get on very soon

is to key work under tech. publication & get a card

catalogue by author in U.S.65 Bibliography style.

Schoklitsch bed-load formula

\[ G = \left( \frac{86.7}{\sqrt{d}} \right) S^{1.5} (Q - B q_o) \]

where
- \( G \) = Bed load in pounds per second
- \( d \) = grain diameter in inches
- \( S \) = Energy gradient
- \( Q \) = Instantaneous discharge, in cfs
- \( B \) = Width of stream, in ft
- \( q_o \) = Critical discharge, at which movement begins, in cfs/ft

\[ q_o = 0.00532 d^{1/4} \]

Note: when \( G = 0 \), \( d \) is maximum,

\[ d_{max} (in \ mm) = 4770 \left( q S^{1/3} \right) \]

when \( d \) = uniform diameter or equivalent diameter, which is roughly \( d_{max} \) to \( d_{o} \).

Cutting friction on particles

\[ f_c = \frac{1}{4} (s, p) g d^2 \tan \theta \]  

where \( \theta \) is the angle of repose (1)

Relation of \( f_c \) to \( T_0 \) depends on the number of sand grains per unit area effective in taking the shear.

This number is \( p (\partial \varepsilon) \) when \( p \) is a factor indicating the proportion of bed covering the shear.

\[ T_0 = 2 p (S, \varepsilon) g d \tan \phi \]  

(2)

Note: Similarity of Dugdale 1956 expression

\[ \delta = \frac{1}{3} \text{ for spheres} \]

If the Dugdale \( \delta \) of the grain is \( > 3.5 \),

\( T_0 \) will be reduced by half because turbulence in the wake of the grain causes the force to fluctuate.

\[ \varepsilon_{\text{max}} = 2 \varepsilon \text{ Mean Force (White)} \]

White gives \( 0.30 = \varepsilon \) for \( \varepsilon < 3.5 \)

\[ \varepsilon = 0.35 \]

\[ T_c = 12 d \text{ when} \]

\[ \tan \phi = 1.0 \]

\[ p = 0.35 \]

\[ d = \frac{1}{3} \]

\[ (S - \varepsilon) g = 1.65 (62.9) \]

\[ \frac{1}{2} \text{ included} \]

12d used throughout by Kalinske, however

\[ \frac{s}{d} = \frac{1}{4} \text{ when } s \text{ is in all direction of } v \text{ about } v \]

\[ v = v_c \text{ may produce } 30^\circ \]

\[ v \text{ may produce } 1.15 v_c \]

\[ v \text{ may exceed } (1.75)^2 T_0 \]

Therefore \( T_0 = 4d \text{ may start motion} \]
Note: This is as assumed by E. M. Smales.

\[ \text{velocity of grain } u_g = (U - U_c) b \]  
\[ \text{where } u_g = \text{grain vel. at any instant} \]
\[ U = \text{instantaneous velocity} \]
\[ U_c = \text{critical frictional velocity} \]
\[ b = \text{rate} \]

To obtain mean speed of material
mean rate of material, by dry set 

\[ G = \left[ \frac{1}{6} \gamma g d^3 u_g \right] \left[ \frac{1}{8} \pi d^2 \right] \]
\[ \text{or } G = \frac{2}{3} dp \lambda_g \bar{u}_g \]

where \( \bar{u}_g \) = mean speed of material
\( \lambda_g \) = spec. vel. of material

To evaluate \( u_g \), it is necessary to express the manner in which \( u_g \) varies & find the mean when \( u_g \) of \( U - U_c \) for various \( u_g \):

\( u_g \) varies according to normal law, which is

\[ f(U) = \left[ \frac{1}{\sqrt{2\pi} \sigma} \right] \frac{e^{-\frac{(U-\bar{u})^2}{2\sigma^2}}}{\sqrt{2\pi}} \]

where \( f(U) \) = frequency function
\( \sigma = \sqrt{(U-\bar{u})^2} \) (\( \theta = 0.5 \) average deviation?)

\[ u_g = \int_{-\infty}^{+\infty} (U-U_c) f(U) dU \]

\[ \text{when } \int_{-\infty}^{+\infty} f(U) dU = 1 \]

\[ \delta(U-U_c) = t, (U_c-U_c) = t_c, \text{ and denote } u_g \text{ by } \bar{u}_g \]

\[ \frac{u_g}{U_c} = \left( e^{-\frac{t^2}{2\sigma^2}} \right) - \left( \frac{U_c-1}{U_c} \right) \left[ t - \int t \phi(t) dt \right] \]

where \( \phi(t) = \frac{e^{-t^2/2\sigma^2}}{\sqrt{2\pi} \sigma} \)

\[ \frac{\bar{u}_g}{U_c} = r, t_c = \left( \frac{U_c-1}{U_c} \right), \quad \frac{U_c}{c} = \frac{\sqrt{c}}{\sqrt{\sigma^2}} \]

\[ r \]

Note: \( u_g \) will have finite magnitude depending on even \( |u_g| > 1 \). When \( t = 0 \), flow is laminar.
Eq. 10 rate of load on main may now be written

\[ \frac{G}{v'd_j} = \left( \frac{2P}{3} \right) \left( \frac{U_j}{U} \right) \]

\( U \) is mean velocity of grain land

\[ U = C \sqrt{g s_3} \cdot C \sqrt{\frac{g}{p}} = 11 \sqrt{g s_3} = 11 V_r \]

if \( p = 0.35 \)

\[ \frac{G}{v'd_j} = 2.5 \frac{U_j}{g} \]

or

\[ \frac{G}{v'd_j} P = 7.3 \psi \left( \frac{U_j}{U_0} \right) \]

where \( \psi \left( \frac{U_j}{U_0} \right) = \frac{U_j}{g} \text{ from Fig. 2} \)

\[ G = g_0 = 7.3 P k_j v'd \left[ \psi \left( \frac{U_j}{U_0} \right) \right] \]

is final eq. in \( \text{t} \text{on} / \text{sec} / \text{ft}^2 \)

in \( \text{tons} \) per \( \text{day} \), per \( \text{foot} \) of \( \text{width} \),

\[ g_0 = 432 \cdot 0.35 \cdot 7.3 \frac{V_j}{d} \left[ \psi \left( \frac{U_j}{U_0} \right) \right] \]

where \( g_0 = \text{bedload transport rate, tons per day per foot width} \)

\[ \psi = 165 \left( \frac{U_j}{U_0} \right) \]

\[ d = \text{diameter of bed material, in feet} \]

\[ V_r = \sqrt{g s_3} \text{, in ft/sec} \]

\[ U_0 = 12 \text{d} \]

\[ s_0 = h d S \]

\[ g_0 = 1820 \text{ v'd} \left[ \psi \left( \frac{U_j}{U_0} \right) \right] \]
Go quietly amid the noise and the bustle, and remember what peace there may be in silence.
Three types: 
- **Transverse** - no vegetation
- **Parabolic** - "Bow Shaped" - by deflation or occupation
- **Longitudinal** - only long ridge tops are bare of vegetation

16 March 1964

a bit of soul searching the past week. Rather home searching. Form prices are exorbitant. It looks like a house I have
would yield about $200 less house for the same money,
we are more than a little discouraged by it all, I home
blindly decide to stay here. Do heart at property with the
idea of building, but I am not sure I really like
the idea of building is appealing, and my husband
in volving course home, so I would not build the pt. Day
you probably.

I started renew a horrid paper by drake on the
full velocity of regular charged particles. This is one of
the best interests of all subjects in physics, & his
poorly organized approach didn't lend much glamour to the
situation. Stated reading S. & S. paper on Kinetic
waves, I believe they are missing the concept.

PcB. & EDC decided upon & proceeded with two days of
conference to outline a 5 yr research plan along the line of
brad ground areas advanced by EDC. Although too early to
evaluate, it appears that the areas considered & questions asked
to be presented in prior proposal form later were so worked
to permit a liberal interpretation & to derive from generating a new
of paper now. I suspect everyone will proceed pretty much
in their own little box. HPC to his statistical analysis,
which I feel we will to unless, in controlled lab.
experiment, you should not have to rely on regression analysis
to determine the relative significance of the independent variables.
EWP wrote only to get into the 3' theme with 0.17 read
apparently with no specific objective in mind, was
proved to describe the statistics of particle movement as a
stochastic process, but his area of work will yield greater
benefits to the more fundamental. Also his results
will lead of further turbulence studies. I'm still involved,
but proceed with no major objective at this time. 1) small
my weight & physical & 2) finish the report of the
Crude oil - 3) Some still need been on top to
problems already discussed. The first two
Says I'm giving nine & more thought to the idea on time dependency & I see which was generated 2 yrs ago. I firmly believe in the utility of the ideas & plan to proceed with a paper soon.

It snowed Sunday night & most of Tues. The

Dinsmoor's called from Golden Sun Hills & arrived June, noon after flying 90 miles of wintry roads. He was still snowing last night & we convinced them to stay over & we had a hell of a time about 100 this morning. I made a to
dine, but my head went in it, we all exhausted 

Dolores & Frank (Arlo's birthday guy) got up longly, so
did the kids with Dinie, I am all enjoyed the

I am urged completely from the idea of building

a home; I'm still trying with it. I tried last week
to 200 for what & a house but I doubt hell causes

The main obstacle, of course, is the money, need he

have but to save up 3000 (it would be some
we could finance 75 10 6% from the bank)

so if I haven't seen an area where I want
to live. I would like still to the thought of trading

do some trading smaller homs. Before we did much

money into this. Once — I guess in South need to

gain 3 1/2 thought — new house prices in this

area are completely Prohibition (14-16 per sq ft)

Friday, 27 Mar 60

For him to talk bought do you want to

Lunch with Carl Miller.
It snowed good and flurries Friday night; was still snowing when we went to bed. We got a total of about 6" Saturday was clear & warm. S. P. & I walked to the Brooksdale while I had him
hair cut. Built a snowman & chopped for Emily things
5h.30. The Teds were up most of the night &
were rolled and 7h.30 to hunt eggs. We were all
stubborn, but went to bed 4h.30 pm Children's Essex
service at 5h.15.

If style is a lost cause, I'm afraid, and I've
come just intended for Success in spite of him, &
plan to ground worth as much work as I can handle.
Shall start with determinants & elementary matrices.
Don't hope to catch up.

Wed. 1 April 64

A light rain forecast. Done 1/4 really falling up; am to
write a sketch for DECE and next paper, select passages for
the next paper, get a note of 5h. 30 Dec, & finish application.
I feel the urge to start writing, need really to produce
these papers by fall. Rio Grande studies - anti-dune - application.
Time depending - pool & riffle channels - probably the 15th.

Friday, 22 May 64

The past few weeks have been uneventful &
not too productive. Done finish "Sedimentary Structures
created by flow in alluvial channels" by DECE, 842 &
E.C. & used in the analysis "Beaufort equation for
 riffle & dunes" by same - started & bogged down
on the anterior paper, started a disc. 1 McCleary
ASCE paper "Practical computation of lead into discharge" &
am pondering on a disc. 1 E.C. Penman "Sediment
Investigation - Middle Rio Grande". Damn, same
with I had planned to use. Discussed with
The possibility of writing something on the deposit was considered. However, some simple facts are known. Given some sediment and some movement, what can be said about the flow pattern and environment?

Given $d$, $r$, and $G$, one might establish the range of $R_e = rac{|r|}{v}$ and determine the used discharge, $Q$.

1. For antidunes, it is the same cases where they might be preserved (e.g., Harris and Steenstra, say, that in a constant wind):
   \[ L = f(V) \]
   \[ L = f(Re) \]
   \[ L = f(D) \]

2. For the plane bed, $C = f(D)$, $V = \frac{c}{g} S$.

3. For dunes, consider several possibilities:
   - From $S$ and $L$:
   - From Colby:
   - From Colby's data for some standard temp:
   - From Coleby:
   - From Coleby's data for some upper limit of $C$ for which dunes form with $V < 3V_c$ for dunes to exist.
No. 160 that dams occur usually with 71.

A ratio within certain limits selected

A. For ripples:

Consider the R-O-E found from Colby's plot, it

Perhaps can tie in an O-R-O relations of

As a first step in all this, surely need to get

Through a literature review of latest geologic work in

This land I shall probably need a couple of days of

Time on the subject. A mean problem is estimating

JKE assumes 177cm. To consider purchase of 1 &

Some Sounder, the Bernardo Control was under 3 feet

Of Sound at 1500 of 9 at least word, place had

Us 12T deep, Beam 24, S.S. 14.5T deep.

I'm back on "applications"; still, try to

Wind this up in the next few months &

Either the O.S. on date into a circular or

Maybe a prof. paper

2 June 62

The outline of our studies in the two courses which

I need to lecture O.S. class next year looks

In shape for a paper. I may try to knock

Out something very soon. I believe that is

Material for a few papers.

Should probably do some more on

The tributaries. If I can can get

Chang going for me, I could probably

Work it up this summer.
Matsumashi, J. 1957. Research on bed-load transportation under the eroding force near the Critical limit: Memphis of the faculty of Engineering, Kobe Univ., p. 24-42.

a de Boy, Baynold, F. chang type analysis. The only innovation is introducing M1 from an ostward viscosity in rock sand. Not clear.

Now, what come? To.
26 Sept 64.

Need to review Kondgoral - prob. theory & turb.

The Confluence problem.

Total and level of others.
Addition of long string polymers effectively reduces drag in pipe flow for turbulent flow. This is an Elrod-Watson effect, perhaps, incorporating fluid

resulting in an absorption of turbulent eddy energy within a time period similar to the time of elastic dynamic lag.

Could this method be used to determine some of the turbulence characteristics?

7-8-64

Thomas, R.H. & Walker, K. 1964 JFM, v 18 p 1
533 E JFM, v 16, p 12, p 228
Herbert, D.M. 1963 JFM, v 17, p 353
See for ref to J.G. oldroyd, 1958
Proc Roy Soc A 245, 278

See Wexelman, H.B. and Slattery, J.C. 1964
Upper and lower bounds on the drag coefficient of a sphere in a power model fluid: A.I.Ch.E.
Journal, v 10, n 3, p 383-388 - Aqueous Solutions of
Corboryl methyl cellulose.
Ferry, J.D. Viscous Properties of Polymers: Wiley,
New York, 1961


aug, 6, 1964

11 aug 1964

Schulitz, A.G.U. 1936 p+11
1941 p+11


... particle once set in motion is brought to rest at a velocity lower than the critical erosion velocity.

Projects:
2) Paper: "Interpreting laboratory environment of sedimentary Structures" in ASCE
3) Paper: "Sorting of River sediments by selective transport"
4) "Sediment transport"
5) Review Madison's paper
6) Ed A. Miller's translation
7) Applications...
8) Univerk geo.

Perhaps the most useful concepts & relations emerging from recent sediment transport studies, so far as interpreting sedimentation of alluvial deposits is concerned, are 1) defining (law of) two regimes, each with a characteristic range of bed forms;
2) establishing the character of the various bed forms;
3) determining the range of flow variables & transport rates associated with each;
4) relating the geometric properties of ripper & ripples to hydraulic & sedimentary variables, and
5) determining sediment transport rates as a function of single hydraulic variables & sedimentary variables.

12 Nov 1964

The vertical distribution of sediment in flow over a dune bed is generally much more uniform than theory predicts. This is due to additional suspension from large scale vortices originating near the dunes & rising to the surface as shown in Fig 1. The basal width of the surface shows an average diameter \( \frac{3}{2} D \) & area \( \frac{\pi (3D)^2}{4} \). The volume in the bed is approximated by a cone of height \( D \), or \( V = \frac{D}{3} \frac{\pi (3D)^2}{4} \).

From flow of Rio Grande near El Paso, the dunes on random bed assume a pattern (Fig 2), where \( \lambda \) (the mean length) is related to the flow depth (Fig 3) by the equation

\[
\lambda = 5D
\]
assuming a vortex among from each
drum, the ratio of the volume of water in the
vortex to the total flow volume would be

\[
\frac{\frac{3\pi b^3}{16}}{\frac{\lambda^2 d}{2}}
\]  

(2)

The mean observed concentration of the flow
is given by \( \bar{C} = C_0 + C_v \) \(^{(3)}\), where \( \bar{C} \) is the
observed mean concentration, \( C_0 \) is the concentration which
would develop without the vortex action (assumed
equivalent to the theoretical concentration) and \( C_v \) is
the additional concentration due to the vortex or eddy
among the drums.

The maximum concentration which would be
sampled in a cross section would be from an
integrated sample in one of the vortices:

\[
C_{\text{max}} = C_0 + C_v
\]  

(4)

where \( C_v \) is the added concentration within the boundary
of the vortex. The ratio of \( C_v \) is

\[
\frac{C_v}{C_r} = \frac{\lambda^2 d}{\frac{3\pi b^3}{16}}
\]  

(5)

Values of \( C_v \) can be approximately determine from
observations of \( \bar{C} \) and \( C_{\text{max}} \):

\[
C_{\text{max}} - \bar{C} = C_v - C_r = \frac{\lambda^2 d}{\frac{3\pi b^3}{16}} \frac{C_v - C_r}{C_r}
\]  

(6)
The vortex action responsible for the more uniform concentration distribution is an periodic phenomenon, varying in intensity with time. Furthermore, the effectiveness of the vortices in injecting quantities of sediment into the flow varies with some measure of flow intensity. Thus, \( C_R \) should vary according from a velocity near critical, when bed features are initiated, but the transport is very low, to some maximum value when the rate, shape, & opening of dunes are optimum for generation of large-scale vortices. Therefore, \( C_R \) should decrease but probably never reach zero in a natural channel because even on a reasonably plane bed there seem always to exist some irregularities capable of generating large-scale vortices which are in the surface.

\[ C_R \]

Values of \( C_R \) can be computed very easily from observations of depth & \( E_c \), etc. To check the order of magnitude, \( C_R \) can be estimated from Einstein's BCF & the standard conc. and Eq.
The velocity in the vortices is not a constant; its variation from bed to surface might be approximated by comparison with the diffusion of a jet. The transport capacity can be compared to the transport capacity of the mean fluid velocity in terms of a single ratio or in terms of the denominator $\frac{V-V_c}{V}$.

Particles thrown to the surface by the vortex action would travel a distance

$$L = \frac{D}{C}$$

However, material would not be uniform in the vortices, it is more concentrated near the bed, and would attain a distance from the bed and at the velocity in the jet becomes with distance from the boundary, some of the particles would thrown into the main slow current, it would move downstream according to the slow simplified eq.

The above ideas present only a simple model in an attempt to indicate why sediment concentration is more uniformly dispersed in flow over a deep bed than they predict. With the simple assumptions postulated, methods of determining although the field data are crude & the assumption greatly simplified, the model permits a physical picture of the phenomena & suggests empirical relations for providing more reasonable predictions of sediment concentration, and suggests some ideas for future studies. In particular, methods of predicting the statistical distribution of bed forms & of relating the distribution to mean flow parameters are needed (since many have attack this problem), and more information is needed on the formation, size, & intensity of the large scale vortices, & their relation to flow intensity & bed form. Better information on the vortices probably must await the development of instrument to measure turbulence, especially instrument in helmin.
for finding the part of the turbulence spectrum occupied by the large-scale eddies.

Feb 21, 1965

The validity of these ideas can be verified very quickly when one obtains results from size analyses of his first run in Bernard's Cowe. Channel (Feb. 3 & 4). The channel contained both a dune reach & flat reach. ET12's & Point samples were taken in both reaches on both days.

Ed. Bogolds manuscript: "the basic physics of sediment transport" last week. Tomorrow I shall begin a very critical search of Bogolds writings. I've read parts of the new paper, but it will take a while to digest.
Stepanoff, A.J., 1964, pumping solid-liquid mixtures; Mechanical Engineering; v. 86, no. 9, p. 29-35.
Rheology & pump performance
5 May 1965

During the past 10 weeks I reviewed Bogard’s paper, Storm King
& Jigotaur’s short paper on sedimentation curves from barrel cores.

Davidson’s treatment of Coles’ work. I reduced Coles’ curves
to a single curve & equation by subtracting V0 from each curve. This yields a family of curves
in which the slope of the line
are functions only of depth & the
intercepts functions only of grain size.

A transformation of coordinates to bring
the point of convergence to 1,1 yields
the following equation

\[ b_{cm} = \left[ 0.13^{1.13} \left\{ V - (d + 0.7D^{0.1}) \right\} \right] \times 1.8D \\
- 4.7d + 3.4 \]

The eqn is not dimensionally homogeneous, units are

- \( b_{cm} \) = tons/day/ft²
- \( V \) = mean velocity, ft/sec
- \( d \) = median diameter, in mm
- \( D \) = mean depth, in ft
- \( D \) = fall velocity of \( d \), 14 ft/sec

The eqn should be roughly applicable for

1 < \( V < 7 \) fps
0.1 < \( d < 1.6 \) mm
\( D < 100 \) ft

I developed my own critical velocity curve, expressed
as \( V_0 = d + 0.7D^{0.1} \).

These should be checked against Coles’ curve & field data.

I also worked specifically on Sd. Jumapo.

"Hydro. Environ. of Shallow Estuaries," which I plan to use
Section report.

6 May 1965

Garvan & EPC are out of abraded business, T. mt. area is now in.
HPC has suggested I help with paper on regression analyses.

We will have second volume study of Sennareh reach may 11-13.
Some serious thought should be given to the unsolved problems in sediment transport & river mechanics. Just, considering sediment transport and basic parameter studies, it is apparent that we are on the side of diminishing returns. Colby's work has provided a useful tool, probably as good an as can be devised at this time. Some shortcomings are:

1) What is the size distribution of the transported load?
2) What does one do in engaged stream or streams, when velocity is unknown?

The mechanics of sediment transport are still imperfectly described, and a more realistic model of the overall process is needed before further progress can be made. In particular a probabilistic model of the bed load movement should be developed along the lines of the step length, next period approach first introduced by Einstein in 1934 & now being perfected by Wm. Kienzle. A most major problem is to determine the mechanism by which transfer from bed layer to suspension, which must be of transfer from bed layer to suspension, which must be along the lines of Kienzle. While, Einstein, the probability that the instantaneous lift should exceed the submerged weight of the particles. Then, to maintain some constant level of suspension, the upward component of velocity must exceed the fall velocity. Any factor in the flow which would tend to shift the spectrum of turbulence toward the smaller eddies should also reduce the quantity & size of material in suspension. Obviously, we must learn a good deal more about the flow structure, especially in the layer near the bed where turbulence is generated & most influenced by the presence of solid particles.

One might logically question the presence of the bed configurations - the ripples, dunes & bars - on what causes them to form? what is the range of hydraulic environments under which they are found? At this time, it appears almost certain that their occurrence & characteristics are more closely related to bedload transport than to any other feature.

An adequate description of these features is still a most intriguing problem, & the approach developed by J. A. Hager using auto-covariance & spectral density analyses appears most promising. The stationarity of the process might be questioned, right now we need desperately some
very long time records at a single point over the bed to determine both the rate of movement of these features & the characteristics of their shape. This particular type of analysis & the work done by Bill Syme is most important. I believe it is essential to publish this soon in publication as soon as possible. A major problem at this time is a lack of physical interpretation of the results in terms of the process at the bed of a channel. Still, the model has much in its favor, a wide variety of phenomena are susceptible to such a treatment, i.e., turbulence, communications theory, ocean waves, etc.; & the current theory of general harmonic analysis is well developed & understood.
For over 100 yrs., with a notable lack of success, geologists have attempted to infer from ripple marks & cross bedding something of the environment under which a particular sedimentary unit was formed. Now ripple marks are the external form of configurations generated at a fluid-sediment interface by a current, and cross bedding is an internal manifestation of those configurations, ripple marks, and bars, migrate in the direction of flow, When we consider all the implications, it is not surprising that attempts to link ripple marks & cross bedding to environmental factors have been generally unsuccessful. In the 1st place, the evidence afforded the geologist is usually sparce from a few core samples or limited outcrops, and one can expect no more than qualitative answers from limited data. In the 2nd place, the generation of configurations at a fluid-sediment interface are sediment transport and fluid mechanics phenomena, and too often, the geologist is not properly trained in these fields to properly interpret the implications of his findings. Finally, even the fluid mechanician has generally shunned this problem; he has enough problems attempting to describe the characteristics of turbulent shear flow in mobile, rigid fluid of known properties over an boundary of specified roughness. The possibility of any rigorous treatment of the flow of a fluid with varying properties — that is, a fluid transporting enough solid particles to change its properties over a bed of mobile, cohesionless grains of heterogeneous size & shape that can only be described statistically, is so remote that the problem appears completely intractable.

The surprising fact, then, is that any progress at all should be made in this problem of relating ripple marks & cross bedding to environmental factors. The environmental significance of these features has not been elucidated; rather, the tools do not exist to provide precise quantitative answers. This is particularly true when one considers the entire spectrum of possible environments — wind-blown deposits, beach deposits, deep-sea deposits, material accumulated in lakes in deltas and tidal-affected estuaries, in stream channels and on flood plains.

Nevertheless, considerable progress has been made, much of it in just the last few years. Progress has not proceeded...
equally on all fronts, because some environments are significantly simpler than others, nor has the progress resulted from breakthroughs by one or a few individuals. Indeed, advances in this as in most fields have resulted from the contributions of innumerable workers and from the observations and accumulations of years of effort.

Perhaps the area in which most has been accomplished is in the interpretation of river channel deposits - more specifically, those deposits formed in channels of fine sand. Here, the environment is reasonably simple, the means of observation are at hand, certain aspects of the phenomenon are easily modeled in the laboratory, and there is strong economic the economic benefits to be derived from understanding these processes have stimulated a wide variety of investigations. For the rest of this discussion, attention will be directed primarily to this case of the flow of water in a sand-bed channel.

Because the configurations generated at the bed of an alluvial channel by the flow are a part of the broader phenomenon of sediment transport, it is understandable why the accumulation of useful information about these configurations was slow in developing and of rather limited scope.

Sediment transport processes are extremely complex, the basic causes of the phenomena are not understood, except in a rather general way, and no simple laws are available to describe the processes. Yet, certain broad principles may be put forth, and within this framework, the correlation of existing empirical data and the understanding of designed experiments can proceed with the expectation of some long term accrued benefits. It is proposed in the following sections, first to describe the simplified concept of sediment transport, as they relate to the phenomenon of bed configurations, next to consider some of the more important experimental and empirical data bearing on this problem, and finally, to indicate how some of this information might be useful in the problem of interpreting depositional environments of fluvial sediments.
When a fluid flows over a bed of cohesionless grains, the material comprising the bed, provided the flow velocity is of sufficient strength to initiate general movement, will be deformed into ripples, channels, or other irregularities of great variety in age and shape.
Recently, J. H. Alger, in a thesis study financially supported by the U.S. Geological Survey, applied the techniques of auto correlation and spectral density analysis of random processes to decoding and predicting the characteristics of dune profiles in sand bed channels (A statistical study of bed forms in alluvial channels: Colorado State Univ. M.S. thesis, 1965).

Sept 8, 1965

Today saw the revised draft of "spectral analysis of sand moves" ready for typing. I am not completely satisfied with the draft, but time is running out & I will no doubt have a chance at revision when ASCE gets through with it. I start school full-time the 15th & need to finish some other work before then.

Most of the next week will be on HP6 regression analysis & I would like also to finish the Vinton paper & give more thought to a good Bulletin on "The hydraulic environment of fluvial sediments." This paper has some extremely attractive possibilities, & I hesitate to give up or postpone it too long. Perhaps I can do it as a special study for ODEE in the coming year.

For several years now I have been following the work of John Hace with considerable interest. His ideas have developed along three lines: (1) a critical & detailed examination of Davison concepts & a revision of the concept of equilibrium & esp. the term "graded" to include the idea of dynamic equilibrium of an open system - his notions contrast considerably with J.H. Hace's (2) ideas on the rel. of particle size of bed material to slope. I am sympathetic with most of his ideas, but not with (3). Here, I
appears that he is attempting to apply concepts & ideas which are developed for fluvial sediments to bed materials which are not fluvial and are resuspended from other processes, such as glaciers, etc., attempts to relate such "bed materials" age to the flow are futile because the "bed load", the particles transporting of movement are probably much smaller. Accumulations of larger particles may be related only indirectly to mean flow characteristics, they may move only during floods of rare frequency or may represent the residual deposits of a totally different stream system with totally different hydraulic environments. Furthermore, in many such streams, the particles' age is not constant, varying with time of discharge. Some of my earlier ideas on rel. in the upper Rio Grande seem pertinent, I may dig these out & send them to you.
This has been a good & busy week. The full-time school resulted in major advances technically & academically, I think essentially completing my course work by June - but the results are high & one must question if they are communicated with the words. I seem hardly to see my family, now & then I think I becoming a complete stranger to my wife & children. Jeris's, lives has done remarkably well, but it hardly fair to see & Allen. This question of results in a certain amount of reassurance; I can only hope that I will not one day regret the decision I made.

But aside from exchanging family, cutting myself off completely from my professional world, & becoming completely alienated to social, local, national, or institutional happenings, then perhaps has less progress. At least I've learned and my course work research project proposed, these topics & foreseeable direction of my professional development are well over my head.

I am still considering the possibilities of the paper "Hydraulic Environments of Fluvial Sedimentation," and feel that it might be on extremely useful to my thesis, a great amount of useful empirical data exists on it should be compiled & summarized in a brief, generally available publication. From a theoretical standpoint, the information is much less satisfying; we have at this time no notion of the mechanisms leading to the different forms (velocity, density, etc.) generated at a fluid-sediment interface. By the flow, the dimensional generalization of yield are more than useless because they are misleading, & the approximations of kenneally or Reynolds require too simple a formula model & require experimentally determined constant which have an excellent probability of being dependent on equipment & operational techniques. Even more troubling, we have no realistic outcome on the mechanisms of sediment transport & its especially useful methods of making reliable predictions from a theoretical point of view.

Thus, any approach must be generally empirical, & must be necessarily be limited to the range of observed data at hand. Fortunately, by means of the techniques of some sounding, we are now in a position to present some authoritative data on the channel bed configuration, & with the techniques of auto-correlation & spectral density analysis of our disposed we no longer need to make use of the artifact of considering these configuration so
as simple two-dimensional geometric forms, except in those cases where such simplification is a distinct advantage.

I had outlined a good deal of this paper last fall, but I am almost certain that most of my ideas have changed enough to necessitate a full-scale revision of most of the paper. I think at this point it would be useful to introduce a few more statistical concepts & to attempt an analysis of some of the more extensive records.
This day I read Enid Platts M.S. thesis "Laboratory studies on the beginning of normal ripple formation in an alluvial channel."

I completed a note to Doc. Hyder, RMA, sending copies of AEC paper "Spectral analysis of sand waves" noting intention of submitting project proposal to pursue this study further. Still need 10 copies of paper in 20.

Some interesting comparisons would be:

1) Compare spectra for ripples & dunes, to see if there are specific differences which yield quantitative definitions.

2) Compare spectra for ripples
   a) coexisting
   b) unidirectional current
   c) ....

3) Compare spectra for dunes at flow differences.

3-24-66

This day I completed a first draft of "Floreal sediment transport" a 1,000 word article for an Encyclopedia of Earth Science edited by Prof. Rhodes W. Fairbridge, pub. Dept., Columbia Univ., & published by Reinhold Publishing. It ended up a 2,000 word 80 framed but drastically, it's due April 1. SCC was here the past two weeks on our IF

We're in the "zo" theme - rather disorganized; flying to Seattle on freight, NPG visiting relates to urbanization project, etc.

At present to tomorrow a prospective candidate for Ph.D.

Became to Closing with Student Council, Student Higher.

Instruments in F1, math & audit Louis, Louis & Jones, old's going to be a busy quarter & leaves only 1 course (F1, math) & Jones to contend with.

Discussed with U.W. Market the possibility of using remote sensing techniques in hydrology [CC memo from Chief Hydrologist & Robinson, who will up survey team for this, apparently with money from AEC], the possibilities seem clear. I have & it may try to incorporate $10,000 in my project. He is still diss. of lets having to study large alluvial bars in the field. Many other possibilities exist, but market has plans & appreciably all necessary equipment. I don't have the possibilities.
Recognized by me in his memo to Robinson. He and today
a memo suggesting F. Chung some project & projects of
mine, Carnegie, Robinson one financial. It will be esp.
interesting to see what develops here.
May 7, 1966

It comes time to give serious thought to my thesis. This has not been a profitable quarter; the course I'm taking are neither especially interesting or inspiring, i.e., they are not very well taught & it remains to be seen if they will even be useful. The coming year is also going to be rather grim, because my thesis.

1) Complete French requirement
2) " C.E. 227 or Equivalent
3) Obtain some facility with computers
4) Take over & run the project.

I should (2 may) concern here on some of these items this summer, probably 3 & 4. The first two can probably be handled easily during the regular school year.

The question of scheduling becomes important. I'm not sure when NPS will relinquish control, but I hope to transfer property & receive progress reports in June, with a few days vacation, run like mad through the rest of the summer, & then taper off in the fall to work on a tentative schedule might look like this:

June 3, 1966 - July 1: Start transport report & run B'fume
July 1 - Aug 10: Collect field data
Aug 10 - Sept 6: Vacation
Sept - Dec.: Analyze data, submit 1st draft due,
Jan review, theory
Mar 15:" 1st draft of thesis.

Sometimes, during this time, I will need to make several trips to Allegany, perhaps to Westport & Washingdon.

I intend to make some major changes in operation of the project. The 1st step will be to shut down the 20 cm flame indefinitely, until I can get FRC off into the problems of modeling & controlled variables. Ron assured that the biology question was not serious, I would like to hire Dr. Goldhill permanently if I can. I think
June 1966: The project turned out more productive than I thought it would be & I got many useful ideas from Dr. J. U., Mr. T. & Prof. Sandborn. I enjoyed jamming & only the Terrier tended to be a staff. I did nothing bad in the sun for 3 hours of the family & went to work yesterday & sued. Got some visions "in the air & the Adirondacks to Al Steckholm. I think it is time for a snowdown. I'll give one more day to make certain my vision is aligned with me & then quit. If the depression analyses report is no bad as I think it is, I'm going to check it all. He read it first thing today, so we need to inventory account payable in the next 30 days. So I think I'll come on transferring it now.

July 1966 - The trip to Albany June 16-30 was for me highly profitable. 17th we looked at Paramus & all. Bill Cortis going away down. 20-23rd on alb. many dye dispersion studies with Hugo & J. B. Yatskenka. Fri. 23 by J. B. & W. Mon. 27-29, June with D.R. & D.C. Notes on film & new & older stratified solubility. Outlined 2 paper (MDC authors) to two degrees for thesis.
Our meeting with Tom Hesse and Earl Herbein on 15 Sept. was very successful. Among other things, Tom M. said that

1) Bed forms were not key to answer many problems.
2) We should be studying alternate bars to understand fluvial.
3) We should be investigating field problems to bring to the laboratory.
4) We should be concerned with both applied and theoretical aspects of related problems.

Earl Herbein and Tom seemed satisfied with our studies, although we are behind schedule. They approved additional grad students & hiring in-a-fertile creative WAB. Paul Hockey agreed to serve as a consultant to our project. It was indicated that we probably would not keep D. Gruseck on project to give preference to Earl McMillan. I am curious to get inside students; there are enough problems to keep him busy for some time. I think it will be extremely profitable, without designing a priority, if think we will look at:

1) Can we determine a spectrum for a most probable random walk in the mean random problem, & thus find A & C possible models for deviations from the expected spectra might reflect variations in lithology, climate, topography, etc.
2) Can the model for random walks between continuing bars be applied to the alternate bar problem?
3) What sort of model can we develop for some forms:
   a) \[ \sum_{n=0}^{\infty} \frac{1}{n!} \frac{1}{2^{n+1}} \text{ a series of individual waves} \]
   b) Given \(L, \sigma, \hat{A} = -L + \varepsilon, A + \varepsilon \text{ random variable}, what is the spectrum? \]
   c) \(L, A \text{ random, N.V.} \]
   d) Classical random walks?
4) Models for bed load movement. How does Poly's solution fit with what we know about...
A number of other interesting problems arise, but I need to give serious thought to the possible applicability of various models to our problems.

Earl & Tom suggested we support Sam Kennedy to full extent for fluorescent screen studies. Sam Marshall today & be interested development of automatic sensing equipment might be a good M.S. study for a physics student. I need talk to Tom.

Say tomorrow, we should firm up commitments on 7, maybe 3 grad students tomorrow. I need to line up some more for them. I plan some minor research to accommodate thesis projects. I think fluorescent screen study of effects of particle shape offers possibilities.

Tom worked Dick & Ike to come to the Lone Colorado in February. I think we will try to move it.

Sept 31st to Gunnison to visit the Halls. Day:
1-8:30 to Denver, 9:30 to Buena Vista & Paniki: Sp. 50 to Gunnison. We had delightful weather: the resort was beautiful. went shooting & hunting old beer bottles sat. p.m., Sun to Blue Mesa dam, then back to put up family & open the club to Dale Brown, Crafts Butler - left ~ 10:30, slept with mail in hand & two old dog heads.
Stopped at Royal Gorge on Sunday, diner at Canyon City ~ 9:00, home ~ unbridled exhaustion.

Oct 1st - Beautiful fall weather; drove 9:30 to river to rendezvous & camped while we went to Blanca mine of dirt, boulders. Sun to Bedwin for new family members.
3 oct 1966

We got two new grad students this year, Christian Newhouse (Austin) & Carlos Ramirez (Columbia), both M.S. students. Rick is about to leave onto a trip. I'm in Austin, studying, and I think I'll do a project on one that is sound.

—agreed with Downs & Gessell to go 1/4 on my 8½ x 120 ft. with 4 obs window: environment probably will run in total 100.

We received a very pleasant note from von Schelling offering assistance on application to his math theory.

Hope to get Mike started on this very soon.

Still haven't got his transcript from Arizona.

Carl Wadding called and were requested news to outline proposal on reservation project, a new push by Thompson. Should be an interesting study & it looks like Bill is eager to take it step-by-step right on.

I would have to see step-by-step right on.

I would have to see if this would be an excellent chance to give up some additional money.

Extramural project is still very well able to do the project.

I'm in direct need and tell.

You know, it looks to get colder. I'm already to have really get some worn down.

I drive to leave early & get some worn down in the am. Before meeting with Rick, we plan to work on some long-term projects for the C.R.I.

T at 2300 - 38°F

32° at 0520

4 oct 66
Goldschmiedt, C. "The origin of Races". 26 July 63
In Arch. Sci. Am. 208, N. 3, 129 (1963)
Introduction

Ripple marks & cross bedding are features common to most sedimentary structures.

They have been studied extensively by Geologists for over 200 yrs.

The ultimate objective of these studies, generally, has been to infer from the ripple marks and cross bedding something of the flow characteristics or the environment under which a particular sedimentary unit was formed.

In a great majority of cases, the only useful information forthcoming from studying ripple marks & cross bedding has been the qualitative indication of current direction.

The environmental significance of these features has not been overlooked; rather, until very recently, the tools did not exist to permit a quantitative evaluation.

Ripple marks are the external form of configurations generated at a fluid-sediment interface by a current. Cross bedding develops as a result of these configurations - ripples, dunes, and bars - migrating in the direction of flow.
Today received the following books:


Discussed with EUR permission & studies & work for graduate students. A rough priority of topics seems to be:

1. Sediment transport model
2. Stochastic models
3. Big flow experiments
4. Shelf length - Rest periods
5. Sayocano's fall velocity study
6. Mckeevey - Hot films
7. Bennet - Propeller studies

Clean up items:
1. Kelly's thesis
2. Remaining data
3. Sketch of depositional environments

This leaves out of consideration any work on V. Kennedy's study on the air entrainment problem.
Application of Radioisotopes to the study of bed load movement
And transport in Rivers: Repod of a meeting of expets
IAEA Feb 1966 - STI/Rep/106

Meeting held 16-18 Aug 66
Deals only with bed load

Britain: 3 methods
1. Space integration
2. Time integration
3. dilution

1) Instantaneous \( x \) = distance to centroid

\[
\frac{x}{t} = V
\]

\( q_b = V b \) where \( b \) is depth of moving layer

2) Time integration method:

\[
qC = (Q + q)C
\]
\[
\approx Q
\]
\[
Q = \frac{bC}{t}
\]

Time integration - high transport rates
Space - low - or varying flow.

Surface labeling - \( r^2 \)
Volume - \( r^3 \) - no loss due to abstraction,

Incorporation: good for large sizes & limited with

Labeling discussed in detail.

Injection: seen immediately to get initial dist.

PLANNING EXPERIMENTS & INTERPRETING RESULTS

Depth of movement: from ripple & dune size
Core samples
Deduce response to depth of particle
Was 6 I talked to Sam Marshall on a payo. student
to develop instrumentation for U. Kennedy study. Iuzyno & Donley Allen
Young on their way here to add from Indiana.

Cogan reported a fringe on hiring sub-prof. 6 Oct 66

No way to hire emailing except WDR. U.D. really screwed up
In diverting water from a natural stream to an enlarged conveyance channel, three relatively simple systems may be used. The first consists simply of diverting some part of the total flow by a diversion as illustrated in Figure 1. The second method consists of diverting off some top part of the flow by means of edge logs or adjustable gates, and the third method involves the diverting of water at some depth in the flow by adjustable gates either in a diversion structure or along the banks of the channel. Obviously, one can work with combinations of these systems of diversion or with modifications, and indeed most modern control structures for diversion are complex combinations of design incorporating features from one or more of the above systems. Nonetheless, in essence all diversion in principle operate along the lines of one or the single ideas of Figures 1-3, and in preliminary design stages, it should not be required to know the details of operation. It is necessary only to obtain some estimate of how much of the flow will come the diverted water.

---

Fig 1. Plan View

Fig 2

Fig 3
Assume that one knows the following information:

1. Flow duration curve
2. \( Q_2 = f(Q_1) \) where \( Q_2 \) is bed material load
3. \( d_m \) = median size of bed material

A conveyance channel is designed to convey some design discharge \( Q_d \) at design width \( w \). It will be adequate at some specified outlet discharge, \( Q_w \), with a small allowable range of variation in \( V, F, D \). Generally, \( V \) is set with a lower limit required to meet the minimum required load entering the canal and an upper limit of \( \frac{V}{D} < 0.3 \) for bank stability.

The range in \( V, F, D \) is controlled by the

saturation load entering the canal. Having specified a range of \( V, F, D \), it remains to specify

\[ \frac{d_1}{d_2} = \frac{C_1}{C_2} \] as a function of \( Q_d \).

Once this is established, one can make some logical decisions on alternative actions:

1. design outlet structure to control \( C_1, d_2, C_2 \)
2. design sand pumping basin
3. dredge or maintain channel

Approach:
1. Define \( C_1 \)
2. Define \( C_2 \) from college's curves
3. Blove out \( C_1, C_2 \), define \( C_{min} \) and \( C_{max} \) for canal
4. Define design grid \( C_{min} \)
5. determine alternative actions.
A number of chores remain to be cleaned up, but unfortunately,
they are, for the most part, the sort of things that I
will need to do myself. I may well take the
time before Christmas to finish up a general report
on the Rio Grande. The work on "applications ..."
remains in the file as does the winter report on
"Hydraulic environments of fluvial sediments."
The report on "evidence to interpreting depositional
environments" remains ready to review. "Statistical
Properties of deltas" must be dealt with in
the near future. Then the sediment transport
report, which ORS still swears he will finish.
I amreluctant to do much on it, EUR &
ORS are both going on it.
In the development of equations for natural transport rates, some attention has been paid in experimental studies to the effects of particle density on transport processes. Without exception, these experimental studies have dealt with the problem simply by obtaining observations of flow properties and transport rates for a range of flow conditions with a bed material of one specific gravity and then replacing the bed material with one of a different specific gravity and repeating the experiment. But such experiments tells us almost nothing of the natural transport processes occurring in streams where the vast bulk of the material of the bed possesses a specific gravity of 2.6 to 2.7, say, in the gravity range, with only very small quantities of light and heavy minerals.

So the question arises: what is the effect of specific gravity on the transport processes of materials comprised of a natural mixture of sizes & specific gravities?

A natural place to start is to observe the behavior of magnetite in Rio Grande sands. The Rio Grande sediments contain large percentages of magnetite; it is easy to observe, & to separate. Observations both in the field & laboratory show that when the bed is riffled, the magnetite collects in bands perpendicular to the flow & at the costs of the ripples. It is also known to form in clusters on floors due to its magnetic properties & when analyzed for size distribution in the U.A. labs, the results are highly questionable due to this flocculation. So an additional question arises as to the effects of the magnetic properties. The experiment outlined below is designed to give some qualitative answers to these questions.
Step 1: Pull 200-300 lbs of Rio Grande Sand, enough for 8" flow. Pull 2000 g (approx.) for sieve analysis.

2. Remove magnetite from large sample (the 200-300") with electromagnet, weigh both parts & pull 15 g from each for V.I. and.

3. Recombine & reintroduce in 8" flask, run on ruffle bed from initially, observe tendency to bend on ruffle crest, to be trapped or collected in legs.

Test 3 flow conditions. If not, observe magnetite, introduce some 1 watch its behavior.

4. Remove sand, separate & deagora magnetite & repeat same 3 experiments. Introduce deagora magnetite & observe its moment, dispersion, trajectory over depth of burial, tendency to be trapped in legs, etc.

5. Run loose 8" sample on sieve & 15 gms on V.I. & record & repeat.

6. Run V.I. on samples from separated fractions.

Deagora in 8" & re-run on V.I.

Run sick end of on both exp. fractions
1. Obtain additional magnetite from stock sand to introduce in flow studies, & replace 15 gm sample if no magnetite is small
2. Photograph natural sand, split, etc
Questions:
1. Time of experiment
2. Where is 8" flume located?
3. Do we have or can we get electromagnet?
4. How do you degauss magnets?
It was a painless and timely was, but not without some interesting aspects. Mon- and Tues. were taken up with 2 Dep. Tr. Court conducted by K. Beve, chief personnel officer, S.M.B. He is a dod & do it, the courts. Thursday had a conference with the Standing Council. Of Peer Council on oceans & technology. The committee consisted of: Dave Weisberg, USGS; Sam Lyon, USGS; John Norry, NIH. In attendance were T.R. Owen, G.E. Hartley, myself, Tom Lyons, I. Ven Johnson. In the turned to Vanu Kennedy on project for transport of heavy minerals. Agreed to submit 2 project proposals, 1st on Floreal transport of heavy minerals, 2nd on structure for extracting heavy minerals. Both look like good projects. As when we talked to Mr. Simmons in Washington, he seems esp. enthused about the 1st: so I need to get both proposals to come down off to D.C. by Monday sometime.
Finally home managed to clean my desk of annoying details and am ready to go to work. Finished an '87 budget estimates, got in two project proposals: "Maximal transport of heavy minerals" & "Bearing structure for heavy minerals transported by streams". V. Kennedy is to forward to the Geo. division - 3 local Geo. Dept. about work to be done, projects in Coll. Weekly held appointments, having Wally, I really wanted, easily do to hold Sabbatical next year & did his thesis on the gold-bearing gravels of the Sierra. Spent almost a day running again & examining camp names for our new one, decided not to write a slide known to his slides comment; I won't play his little game.

Read some paper "Stochastic models in sediment analysis; channel processes", presented to attacks the problem of autocorrelation

\[ L, A, \theta \] random variables \( L = \bar{x} + \sigma \)

This qm. confused with DBM R.D. Ven 5, Tom on writing hole in & Huang. In short study of their state, a lot of objections to this, I couldn't see it. My only questions were:

1) Can it be done? 2) does the work play 71 time element.

Jed老家 will go in with his grand study? I will do possibly study, will mail again, but 14 to settle.

We will be in at the home near till May 15, 1967.


Vance Kennedy is coming up tomorrow; bringing two new share parts, separators, couplings, seeing days, maybe a row of lead & who knows what else. Vance is in the unfortunate position of having too many ideas & too many things in the fringe to get anything down - & I'm a little reluctant to get involved too far into his activities. I'm too much tied up, I'm not sure where to start. I think I should concentrate on getting the fluorine samples run & another up; my paper for Sep 77, thesis, stock models & transition environment. Also will finish the vision report. I'll try to get the field data from T.M. This week I'll try to establish priorities & move along, with the seven papers.

What we really need to establish is a need of schedule of major projects for the graduate students, thus commencing in an efficient getting the work done once since people.
Tidal Inlet: The waterway connection between the sea and a bay, lagoon, or a river entrance from which tidal and other currents flow.

1. Geologic origin - Zuany Gorges
2. Hydrologic - Run out cres
3. Tidal Drift origin

Inlet configuration determined by:
1. Bay or lagoon geometry
2. Predominant direction of tidal drift
3. Direction of tidal waves along the section

"Generally speaking, any tidal inlet is in a state of dynamic equilibrium."
H. Carrigan came thru on March 1 to take to Dr. Zvy on his thesis. He advised me to make it to Washington at least once a year to let people know we are alive. Rich & I will go Mar 20-21. Rich to a conference on Hot wires & I will see Robinson, Simon, Upton, & others. Recently submitted 3 project proposals:

1. Transport of heavy minerals: $30,000/yr Geo
2. Recovery structure for heavy minerals: $27,000/yr Div

I called Simon, the chances look good on No. 1 not so good on 2. I have no feel for 3, but might give it.

Harry Barnes & H. Peterson came in the 2nd March. H.B. suggested we might slip up to 10 to 15,000 to support U26 in a year, I don’t think that high. Study body section. It looks as if something can be reduced our section. It only $500 if something can be removed our section. I’m glad, but I’ll know more after the work trip.
How does one describe the statistical properties of the profile of a dune bed? A number of interesting possibilities arise. We consider $X$, the measured elevation at a point on the mean bed elevation as a function of $t$, $X = \mathcal{K}(t)$. In all cases we will have a continuous time series, but for computational purposes we will need values of $X$ at equal intervals $\Delta t$ and work with a discrete time series, $X = X(t_i), i = 0, 1, \ldots$. The values of the intervals $\Delta t$ along the abscissa are arbitrarily chosen, as a general rule for standard methods of time series analysis, $\Delta t$ should be smaller than half the period of the shortest wave component in the signal $X(t)$. 

\[ \mathcal{K}(t) \]
How does one describe the statistical properties of the profile of a dune bed? A number of interesting possibilities arise. Consider $X$, measured from the mean bed elevation, as a function of $t$, $X = X(t)$. In all cases, $X(t)$ is a continuous time series; obviously, there can be no discontinuities in the bed of a stream. However, for most computational purposes, it is convenient to read values of $X$ at equal intervals $\Delta t$ along the abscissa, figure 1, and to work with a discrete time series, $X = X(t_i), i = 0, 1, \ldots, n$. This artifice has two immediate advantages; first, it allows one to take advantage of high-speed digital computers; second, it permits collection of the basic data by a simple technique of probing, in cases where sonic sounding equipment are not available. Values of the interval $\Delta t$ are arbitrarily chosen. As a general rule for time series analysis, $\Delta t$ should be smaller than half the period of the shortest wave component in the record $X(t)$.

A direct and simple approach to the question of the statistical properties of the dune profile is to list all values of dune lengths, $L$, dune heights, $A$, ratios of length to height, $L/A$, called the ripple index, and angles of the upstream and downstream faces, and to determine the distributions or the probability distribution functions of these various factors. Generally, the probability distribution functions can be recognized as particular functional forms or can be described by simple equations, but the properties of the distributions can be accurately described in terms of mean values and the second and third moments about the mean. The determination of the values of $L$, $A$, and other factors of interest directly from the step-chord record of $X(t)$ is straightforward but tedious; a computer program was written to determine the various factors, the distributions, and the various moments of the distributions directly from the record of $X(t_i)$. The program, given in appendix A, has tolerance limits which may be set arbitrarily so that waves between with either

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Figure 1: Definition sketch of the profile of a dune bed.
Lengths or heights below less than specified limits are not considered. By application of these tolerance limits, one may concentrate on the properties of the large-scale features - the dunes - and suppress minor fluctuations in the record which might result from instrument noise or from a system of two scales of bed forms such as ripples superposed on the base of dune.

The results of this approach and some of the disadvantages and advantages of the method are discussed in a later section.

Another approach to describing the statistics of the dune profile is to investigate the distributions of the values of \( x \) as characteristic of the heights of the irregularities and to associate the crossings of the \( x \) axis with the characteristic length of the irregularities. This approach has several advantages. The distributions and moments of \( x \) are easily compiled and assume physical significance in terms of the process \( (c) \). The first moment, the average bed elevation, is zero by virtue of the manner \( x \) was defined. The second moment, the variance, is the square of the deviations of the values of \( x \) about its mean and thus is a direct measure of the variability of the bed. It has previously been shown that the variance of the bed elevation relates directly to the average height of the one-third highest dunes (Nordin and Alpert, 1966), and that it also relates directly to a simple flow parameter, the unit water discharge, for the limited conditions considered. Finally, the ratio of the mean to the standard deviation of the \( x \) values is a measure of dune steepness, similar to the ripple index. An obvious disadvantage of this system is that an entire wave form may occur above or below the mean bed elevation, and its length would not be considered in the distributions of the lengths between crossings of the \( x \) axis. However, the approach is simple and is free of any subjective definitions of how one will distinguish amplitudes and lengths. An evaluation of this technique and a comparison of the distributions of lengths with the distributions of \( L \) described in the first method is given in section -.
Perhaps the most direct approach to the question posed at the beginning of this section is to consider the process $X(t)$ as a stationary time series and to apply the standard techniques of time series analysis, the determination of the autocorrelation function and spectral density functions, to determine the properties of the process. Again, the variance of the process may be taken as some characteristic measure of the heights of the bed irregularities, and at least three logical choices exist for signifying a characteristic wave length. First, one may consider the wave length at the maximum point of the spectrum or a characteristic length. Second, as suggested by Plato, the distance between zero crossings on the autocorrelation function may be considered as one half the wave length $L$. A characteristic wave length. Finally, one may wish to consider the distance to the first zero crossing of the autocorrelation function as a sort of characteristic length.
Sunday, 17th March. I will fly to Washington for a week.

I'm not at all enthusiastic about the trip. Most of the week will be spent meeting political figures,quote,chaos,talking, reminding people that we are
more than a figure in their budget sheet, &
fighting for money. To me, this is not time
profitably spent; I would much prefer to spend
the time on technical issues. But if it remains
necessary, perhaps in the long run it may even
be profitable. From here it appears that Upson is
an old woman & close will be no help.

Simons & Rubinow may be on top of things,
but I don't see much hope for WES
staff officials.

V. Kennedy was here today; he has the
unfortunate tendency to overestimate abilities &
underestimate costs. We managed some preliminary
planning on our May 15th, but from here it
looks like a mess & I'm not sure whether we
will be able to accomplish what we
want.

Yesterday, Mrs. Trish Nemenz & I spent the day
at USBS, RAND's computer center - a
medium, unexciting experience. We did not get anything accomplished. Jim's
program to run 14 word length, anything to
for 2 records to computer a 3.5K air blank, up to
average time 30 seconds, at 750 per inch,
or 1250 per minute. I think when I get
back from Washington I'll try to get both
of them to go down for a couple of
days. This work is important.
is conditioned to the question of bad forms, I will be a major part of my thesis. Jack is leaving 21st of April, so I'm not sure I can get any help from him before then. I think the best students are at a point of need, but they're a waiting bunch. Come spring I'm going to get rid of all but 2. Right now we are overloaded. Our stuff looks like this:

Bennett
McCurney
Bee I
WAE

Gozwardi - grad
Kearse - PhD
Young
Sang -
Newhouser - MVS
Ramirez - Frank - MVS
Fred Morgan - warmly
Joe (Lynne) - WAC
Larry Brandon - WAC

I feel like a nurse maid to graduate students. I'd like to keep being, perhaps one other. When I get home from Washington, I think I can take the news.

Consider a short paper on size distribution of ESP, Pumic Sample, Dust pan sample, Core Sample. Grab smörgåsbord Call Hinc on this.
Rick & I left Denver airport ten minutes late (1930) & arrived in Dallas 10 mins early (1910). Drove 2 hours & 50 mins. We had dinner on the plane, picked up a taxi car, checked in at King Author's Court, Wilson Blvd, Arlington, & drove to downtown Washington where we walked up Lincoln Memorial & then to hôtel & gallery (or on how), a sandwich at 10:30 & then back to motel about 12 on, having driven around Washington, to see memorial, marblehouse, the ugliest bldg in Washington.

This am. had a fair breakfast in a beer bar when a bldg down & then to Arlington Towers, where we spent 15 minutes with upson, returned on electric for continued research council & off to meet Neil Williams, till 10:30, Pitt Corrigan, Bob Bland, Vatsesk, etc.

Bus to CSA bldg, lunch in cafeteria where we saw DnD, Nick, VMY, NACE. Talked to US Loan & W. Douglas till 12:30 & then to see Robinson till 15:20, Roy albany 11.15:20, Bus to A.T. Dinner to the old Angus Restaurant with VMY, DnD, NH, Vatsesk, Toy, Corrigan. To see + L.20, Rick & Hugh T. Ltd for Maryland & Hot wire Symposion. It & I visited some of the lunch Study figures.

Our talk with Robinson was very interesting. He's more interested in snow survey than sediment, but I'll give it a try. P.S. & pyl enthused a little about ice project. For 10:30, Roy seemed to think Johnson would join.

3-22-67

Yesterday it snowed again and freezing & I left the motel at 0645 & caught a bus to 19th & A to 20th to CSA bldg. A lovely breakfast in the cafeteria & then to see Franck Simon.
We agreed we would get food to study being missed. Transport was the most important in food supply. I offered him to R.A. Coffee came a week to end John Home Jones W.T. L. in Thistle. Ken offered me a job in week which sounds rather good. To A.T. with Corrigan in my motel for several dinners, dinner w/d.

Today to A.T. coffee w/corrigan, long talk with yachtsman brother with Joan George & others. 1:30-3:30 w/upson. I called some more then wrote.

Rich & Hugh came home & were the Drama at the Royal Coonstain after unsuccessful try for seafood at Hobart.

Thurs 3-23-67

To GSA to see Headlines, coffee no DRO & nice, H. Full, home to A.T. & spent evening with Smith. Lunch at Cafeilic, then to GSA, an hour with Headlines, then Laughrin. Drum with Baltzners (Bob & Liss) to DRO, HT, EHR

Fri 3-24-67

Saw H. Swanson (lucky for me), then H. Bow, to gun factory to see car Williams, PM with HPC, airport at 4:45, car. Dinner at 650, home about 8:30 pm.

1 cm = $10^8$ Angstroms (Å), 1 Å = $10^{-8}$ cm

C of electromagnetic radiation = $3 \times 10^8$ cm/sec in vacuum

Radiation according to wave theory

Only one component shown i.e., Plane polarized light

Number of waves passing a given point per second is frequency, $\nu$ cycles per second

$\nu = c/\lambda$

Monochromatic radiation: a beam with a given wave length or frequency.
Consider radiation as a stream of energy packets, called photons or quanta.

\[ \Delta E \] is the energy of a quantum traveling in the direction of the beam with velocity of light \( c \)

\[ \Delta E = h v \]

where \( h \) = Planck's constant = \( 6.62 \times 10^{-27} \) erg-sec.

\( v \) = frequency of wave motion.

In a given medium, the velocity may vary with frequency, i.e., dispersion.
Thursday & Friday we unloaded tons of ice from the big sale began, with deposits for the day totaling almost 200. Yesterday Allen knew his left elbow falling off a swing frame at Spring Cr. Park. We dashed off to PANH, called Dr. Wells, & got it set. Poor Joe, will be in his cast 6 to 8 wks.

Called Bona Wed. on contract, then F. Barrick, R. Carter, P.C.B. - we're getting no place on this thing & must know 550 Bills of 30,000. I may have to go to Washington to clear this thing up. Sun am getting sick of it.

Journal in a 1st thesis draft in Sept, about time of cashurity. I was not too happy with it, I was not at all impressed with my Comm. recommendations, so I've decided to rework the entire thing. So far she completed 2 of 5 chapters.

I still have both IASH papers to get in for review & publication, a discussion of Biilants GSA paper, closure of my & Algoe's ASCE paper & the two papers with Edgar to finish. I haven't heard one word from Rodriguez since he left Sept. 20th.

A major problem still is getting into the H.M. project. Joe & Campbell has a student to do some field work; I need to get Sepia, Grigg, & Carlos started on the experimental work. Must be in the 8" flume, every thing else is tied up. Rick & BSM are still in it, I hope to push before I get it thesis done.

Byt June is running out.
I am seriously considering a feasibility study of a fluorescent drum counter by the instrument shop. But before I do, I need to rough out some alternate design procedures & have a fair idea of which way we want to go: single count or total intensity. I haven't the 12th, so we should have all the equipment for this & have developed statistics for counting theory. Having seen Mike for several months, I unless I can get him on some useful statistical work, I may as well jear him. Perhaps we have enough to go into a simple particle dispersion model. Sent V.K., some samples from a trisne 1 album which he is running in his bedroom at night, Ron is looking at possibility of that annual review paper on florescent screens, & I think I may have Carlos work out something on magnetite.
A review of past year's activities shows progress in some areas, a complete lack of progress in others. The project "fluvial transport of heavy minerals" was funded; so far the progress is rather slow. We have (1) reviewed literature on placer deposits; (2) reviewed hydraulic equilibrium (3) N. Inggy's paper on re-entrainment in A.R. (4) Discussion of Blaunhardt paper (5) Collected some dispersion & fall vel. data with H. Johnson works. R.R. was, zined still working on tracer studies & Jim Wagner of Inst.

Pool is on feasibility study of counter techniques.

Spent a lot of time last year on the contract which still is not settled. Barnes & alman finally rec. continuing old contract - E & R noted today that he might go with 200 rather than 150. Barnes reported no money for current study.

N.J. is thin, we need may go back in 6 time.

1st of July - E. Hansen wrote in Dec. suggesting I couple a year co working for a Blaunhardt thesis.-- very attractive. I haven't answered yet -- time now on 2nd draft of thesis & will try to finish this month. I'll get him Labrador "Bullet" in about 2 weeks & A.R. recurred from broken arm. got a 5 web tomorrow.

29 Jan 68

Discussed with Frank Simonis today the project "fluvial transport of heavy minerals." I'm satisfied that we will receive our final 30000 this year & again next year unless there is a drastic cut in the heavy metals program, which don't seem likely. Our progress to date is not impressive, but our flumes have been tied up on rigid boundary studies. M. Dunay's turbulence & H. Johnson
Study of natural edge diffusivity. I'm been on my thesis & Ron on the flavanols. How study, now that we've made some reasonable progress, and the next few months should result in substantial output. Neil Gregg has done a fine job pushing some of this, he has lots of good ideas & is very dependable. Codex, in general, is a lost cause; I suspect him of
locating ambition.

I've really fallen down this year, that damnable thing is really a burden. I feel haemorrhagic until I finish it, and everything else has gone to pot. There seems a good chance now that I will reach the Feb. 20 deadline, but work still depends on

Drs.
3 March 1968  Sunday

It snowed all day yesterday, a wet heavy day — but it never froze and today was bright & shiny with a cool wind. I spent most of the weekend reading Brookes “World of Washington Irving” & Irish on D.M. Roslofs “The Inheritance of Ireland.”

I feel almost human again. My final exam was 16th February, on 21st I turned in the final exam form & signature sheets do Don Collins. Copies were all printed Friday, but only a bound for submitting as open book. The exam was not so much if in real or had I had expected it might be. It was somehow a tremendous letdown when it was all over & I had no emotions except to feel tired. I still haven’t accomplished anything since the exam; but some of the old enthusiasm is coming back a bit by the end of this week I should be in shape to wear shoes.

England Squeakbee visited 22 Feb from Utah State, looking for a job in CSU in Denver area. Sam Shultz came thru the 23rd — he is now on Banting, working with PBS on a compendium of bloodlet formulas; his search seems mostly oriented to confirming his views that the “Master” Schaedelitch is the only answer. He is retiring next year — divorced, he showed us pictures of his children; his son, 17, admitted to want point next year — I gave him some gold pieces for his daughter, which seemed to delight him. He admitted that he had to solve his laundry problems with 21
days on the road he had reported to Black
Avery briefly. a remarkable revelation for
30 August 3 Gentleman. We decided to
transplant till 6:30, when I deposited him
at the Armstrong Hotel.
Saturday the Dinorwics arrived at luncheon,
we played croquet with the youngsters, went on
a long ride, & celebrated with clam dip,
water quinols, scotch, & champagne, compliments of
Mr. She sat at dinner at 7:00 &
were there was still, so we settled finally
on the presence at the Panama house & now
scotch. They left about 5 Tuesday &
I felt horrible till Tuesday.
We arrived Sunday night, we were to fly
to Vals in the morning on board but
the weather turned bad. Dim warmed with
RVR on direct studies noon & dinner, left
and went on Thursday a remote coming
Samarre by marine personnel & one
by H.I., nothing at all accomplished Friday.
EVZ will be off to the Vals. I spent
it with Dinorwics leaving, his already at work,
we hardly saw him last week & it will
got worse.

Today the HPA's rode over on their
bikes & the Suga's came by with
a gift for graduation & ice tea.
This broke up a delightful chicken dinner, but
all was not lost as R.V & I polished it
off about 7:00.
The past week was interesting in several respects. Monday I received word from Egbert Hansen that the Technical University of Denmark had decided to allocate 104,000 Danish Kroner for my salary (per year) which is about $14,000. They mention 2 dates, July 1 & Jan 1, 1964, & suggest don't as best. They also suggested that I might obtain abroad support here. As an alternative, I am requesting 1& half Sunday support. I will call Roy Olmson on Monday to see if Henderson has made a decision.

On Wednesday we had a meeting with Carter, Benedict, Davey, Stallman, cobainson, etc. A rather leisurely agenda, but covered several points of interest. Paul insisted on the sediment report & CUV, 3-DGR agreed. Carter will try to scrounge 5,000 for field turbulence intensity measurements. I want us to undertake some wing-boundary studies of flow thru constructions.

We discussed Denmark - Carter will support me, BCD. Maybe, Stallman, yes, PB3-100. I called T.H. Monday & he might support the trip.

Thursday a group of GW experts met with UNIV project, Don Sundog, Wilson, Bratland, Twedt, Duke (ABS) & discussed CSU GW digital computer program. The meeting went exceptionally well & program. The meeting went exceptionally well & program. Williams between CSU & USGS helped up. I think that everyone left well satisfied with the session.

Dave Soper did a very fine job.

Today I assigned WES to trace study full time, with a promise for a $25 & a chance to co-author some short papers if he did the job with a reduction in Grade if he didn't. He was a little upset, but I think we have come to an understanding.

Wednesday was Peter's birthday & with his
Dear Bob,

We are scheduled to go shooting tomorrow. I expect the air rifle will be a great success, although she was a little touchy about it.

Today I received a call from Walter Hampshire on the paper "Statistical properties of dust profiles etc." for 1984. It will have to have 2nd priority next week. I still have to get the contract proposal, H.E.3's papers, & new Guy's project proposal in the mail.

I pointed Jim Wagner off the development of a single particle counter to a measure of concentration versus total light intensity measure. If it works, we will go ahead with an internal report on the tracer studies. We need also to get a short paper on relative rate of movement for the A.R.
This has been a week. EVE started with C500
W.A. SEGAL announced his intent to join 1142 at
Jamestown in Aug. I received approval for a
year leave to teach at Danmarks Tech last -
OLTMAN called today. I had already accepted
but hadn't yet received final confirmation from the
UNI. - PIERRE & MARIE CURIE. Ogden
from Lawrence, Inlow visited 12.07. his
spec. is C.W. in high energy physics.
Today Hadley Carrington passed through. Joe had
we picked up a car for Real McQ. & Jim
Defuni to museum Turb. in New Mex.

On May 25, EVE, C500, RAR & I went to
Tucson to see them. We flew to Allegany about
1000, where I had to call mother. She was
at painting class. Then we from city & Tucson
via Phoenix, arriving about 1200. Spent the P.M.
with TM discussing forthcoming film work. Surprisingly
he wants about the same thing we want. Combined
depth runs at 1, 2, & more depth with
whitewash. Range of & we can get. There were
no arguments, misunderstandings, or disagreements
between him & me. We ate dinner at El
Coral, a very elegant place on Riverside C/J.
I saw "Juno from the Wedding Crowd." Jesus
we looked at Second C/O. Mt. Tucson, Pankow,
S.E., Santa Cruz, drinking S.E. wt. of T.E.
Levin R.L. to Tucson. Wednesday
morning we spend with the District -
Burckin, M. Ross, Card Huggins, Thorn & Alley
in P.M. Thursday we drove Rio Grande
down as far as San Acacia. Return to
El. C 5:30 P.M. 8d. - 30th with Ed
Bashard & John Hamer.

Wednesday we had a blizzard - a
red many one. Closed the schools &
shattered many motors in Wyoming & as
as near as Virginia Dale. Friday 6bar Williams came thru on his way from Denver to Washington. We couldn't give them over 5. We had a dinner date with G. Smith, Addie Kem, & Smith. South town stood, who looked very snug in the car. E. Bill's mother.

June & Mary just left bed today A.R. The weather turned off warm. June & I had been in 70's since.

I completed closing on ASC paper, sent off "Statistical Properties of clumps from Stodola profiles" to director IPP, & have been working sporadically on "Application of Cross Spec. and in hybrid." I should finish it soon. Then to a paper on free velocity of cold fluids, ASCS Paper for M.I.T. out, & something on the concept of Hydraulic equilibrium. My thesis is in concept of Hydraulic equilibrium. My thesis is in open for report. I should do three papers. on Dim. Papke & more soon & fall. Then T.S. of chew quak will finish it in a week.
Carlos is getting nowhere with the sorting model for the H.M. Project. I am not quite sure what to do with his study or where to go from here. The whole experiment was poorly designed, the objectives were never clearly stated. It seems to me that the time has come to re-evaluate much of the sediment work; particularly the associated with the heavy metals program. Unless we can come up with something more useful then we have this year, we might as well cancel out on it. I think we can perhaps do something on the Gold Flakes that might be useful, and there is still a possibility of a short paper on the fluorosilicic tracer studies. The ideas on the migration of gold in gravels are not particularly promising.

11-15-68

Spring & Summer & Fall gone - This morning it was 13° F & Snow is still on the ground from Wednesday's storm. It was a long 7 months. May 12-14, Ron & Bob & I went to Washington. Mom, Toshi, family, Capals were here for graduation. I'm now sold our house to Dobson & moved to 301 Hillcrest - Also own Ruby w. Joe, 2SM, Scotty. 11-21-68 Jordan - 1720am on 20th. July 7 we went to Wyoming to see 2SM on antwells, camped on Fish Creek, tributary to the Hoback, which flows into the Snake. Stayed three 11th, 12th & 13th. Snow, Gros Ventes, Pine Bar, the Guest John P. O'Malley Gold mill, sampled, fished in 'Fish Creek', etc. In Aug 23rd I went to Wash, D.C. & to Boston ASCE. To Albuquerque 25-30 Aug, got shots of Cochiti, Galisteo, Alb. North Dakota. Joined CSU part time as Assoc. Prof. 12 Sept, started teaching Hydrology 2nd. 3 Oct, WC & 9 Brezinaus - TM traveled 788. Oct 16, 17, 18 - Calpe, JEB, DRE, Sallman on program. Sold our car in Sept, we are about ready to travel - Papers for good part, today & next week about England
has moved us to a house.

Not a very productive 7 months. Thesis is about ready to go as IP, sent 1st part of papers with Rodriguez to WEK this week, still haven't finished any ASCE papers. That is next. Should get papers on cold fall velocity finished before I leave.
All of my growing years I spent with my father, but I never knew him well. He taught me two things — to work hard & to be honest. The week he died he visited each of his children — I think he knew he was about to die. When I was very young, he wanted me to be an engineer — I never gave a thought to it, & it was not until I got out of the service that I gravitated into the field, more by default than by design. I often wonder what he would think now, if he were alive.

There is really no end to the possibilities today in the field of water resources. Fourteen years ago, the prospects were not so bright, but the challenge was no less.
26 April 1970

7 June 1970

Things are still a shambles. Until May 2, we lived at the main ranch, 5 miles N. of 1 etc., where the septate tone continuously backed up into the basement. After a choice of several good localities, it was said (while at 1) we were moved (as the country to 165 w. muleking, across from 129 polite & real place, 120 w. muleking, and 3 miles from the ranch 1), which we have not yet time to investigate. I got a lot on 164, but the Redcent, 2nd, 3rd, and fourth, are still in the woods.

The 16-26 June 802 the 1st time 1 met with a new tent, weather it & I did it on than they on 1 page.

July 20th 21st seminar at chutes for 1 activity 10.24, 10.42. We are in Europe for the 4th time. I knew J. 3.

25 June 1970

The person mechanics institute 12 over 1 was fairly successful. About 100 attended a stayed stationed was the banquet dish was nice & I left with 12. 1 could tell to 12.

E. 1 and 1/2 half came again. He said I'm going on 1 page. I found 20 pages expected realization from Wheller & chen & Brodby. The action is sloppy or 10 lodging, dad, I don't know what to do. 1 say can clean it up, fine.

Rader's is looking for men in east Pakistan. I'm tempted to look into this. 20.35 & 2 pm of 2 years. Still 1 mind 3 for 13 years. I think I'm a good chance of getting something. Apparently the job at N.I.H. is still unfilled.

Maybe I should have gone more thought to that. I only 1 still located somewhere else, I might have.
7 July 1970

Where do we go from here? I guess the next step is to become a registered professional engineer. A number of alternatives are open; I think at this point it will be best to concentrate on sediment, although I can see some gaping holes in turbulence, dispersion, & certain areas of stochastic hydrology. Maybe I'll take them all on.

In the last few years, I've been appointed to ACEC steering committee, awarded chairman of ASCE Sedimentation Comm., took part in Ear Marsh Institute (for 600.00). Just regarded by S.W. team, hosted by Naval Inst. & Ques. Comm. of AUSTRALIA in July & delivered 2 lectures to C. Kissel's seminar institutes & in sept. out to Kolding, Stockholm, Copenhagen, Tromsø, & Ullberg ford. Just started 2 manuscript in transport of coarse sediments, I think it is one that when & rigor thereof is in order.

I want to meet this week to discuss topics for our book on frequency domain in hydrology. This is important, we have a real chance to contribute, ignorance may stay till Jan & I have spoken to ODS to have him come with us. I must finish my text in stochastic hydrology. It would be good if I could have a break by my trip to Copenhagen. Perhaps I will try I will go to Denver to turn to the Regional staff, mostly Robert K. Keeler, perhaps to Washington to see Carter. This trip will be especially necessary if RSM doesn't come through. Also, she has to put well as assistant chief in the sed transport & I'd love on stochastic models in sed.

I may go to D.C. to see Carter next week.
Trish & her mom left for Cleveland this AM so we are batching.

27 Nov 1970

Projects: 1) RDU Report for Moscow 1060 mtg (Due 10Oct)
3) ASCE Phoenix mtg - (Due 10Dec)
5) Intro. to Stochastic Hydrology

Next quarter I'll teach advanced Hydrology
15 to MWF.

6) Size distribution of bed material in ephemeral streams.
7) Frequency Domain in Hydrology
8) Flume Studies
9) Broken line process (?) (?
10) Ecological effects of sedimentation

3 Dec 1970

I think that information theory has not been properly applied in hydrology. In classical information theory: $I = -\log P = -\log \frac{1}{n}$ if $n$ events are independent & equally likely. The rare event contains the most information. How much information is there in a hydrologic record?
To predict the properties of sand waves, we must proceed from some sort of stability analysis that gives an initial wave length, and possibly, an equilibrium height. On this must be superimposed a random component due to turbulence. Predict from this model the expected properties of the process to verify by laboratory data. Clearly, one would come up with a 2nd order model. How to include the preferred orientation of dunes is a different sorting due to sediment air flow up as a formidable problem - as a first approximation, it perhaps need not be considered. I shall propose these ideas to Englund, I have already to Kennedy. He's an experimentalist at heart, & apparently how countered with studies of the development of change in time of sand wave patterns. In our group at Ft. Collins, only Currett could cope with this problem, & he's not interested.
I think it was a mistake to send Matalas a copy of Dillavou's thesis. 121 a D20 shut me out on the
conference process, but I might beat them yet with
Majes - Why not? Dave has done nothing on their
papers, I may finish ours before the Pittsburg
meeting, Matalas & Kriebl for reviewers?

10 May 1971

I do not know yet how to evaluate the meeting today. Present
were Caddy, Benedict, Sitterson, Shullman, Moore, Burson. No word on
Mississippi test facility, no decisions made, no arguments &
little discussion. It seems fairly apparent that the
usefulness of the group so far as technical direction is
concerned is lost, we need them only to back finance
and personal types of decisions, their apparent contributions
with respect to appraisal & direction of research is
of some value in the tie with operational problems.
Their preoccupation with this leads I believe to
unfavorable assessment of scientific worth of research.

I have many qualms about coming times.

D20 is an opportunist & many of Dr. Y's accusations are true. He is using his special study students to
work on his own problems, he is unethical in his
relation with Y. he has taken unfair advantage of
181 & Jan, he is not to be trusted. H20 is
lazy, RMS is apparently a plagiarist. R22 & R32
are the only two with scientific integrity. HPG did
not again, on Friday he proposed a grand
scheme for urban sed. control, without any
discussion with anyone.
I believe I have limited talent as an experimentalist, and perhaps would be better suited to a theoretical, but not if my efforts are diluted by administrative or experiments. Should I broaden my interests and strive toward a general or narrow to some obscure specialty and become a scientist? Then seems to be no real way to make these decisions. We are led inescapably to some course of action.

Our plans for future sediment work are disjointed. Where to go from here? Perhaps I should push for a sedimentation & channel morphology study section.

1. Pipeline Crossings
2. Scour at bridge piers
3. Sediment rating curves
4. Regional analysis of sediment yields
5. Armoring & Sorting
6. Compilation
7.
m.m., groomed already to be a world traveler, is useless so far as experimental war is concerned.

I think I will cultivate Irish, Assyrian affiliation & ties with Scandinavia. Why not?
Things seem to be right with the world. I've finished my Pittsburgh paper, a short note on the
Hurst phenomenon in turbulence, is shaping up. But
today when we printed 10000 points of standardized
data, no points were over ±1 standard deviations. This
may be an error in the data; I may insist that it will
be plotted & that no turbulence reports be published
until this is cleaned up.
I have vowed to enjoy a leisurely summer,
I have no pressing commitments, only a
few meetings, no papers to write or
deadlines. I'll spend the summer on the
bone process and on the sediment data,
be his data is in order;
I plan to work on transport processes. Shall report
with G. Stoll & some work with R.K. Lee.
He is finally standing to think, but
so far he's come forth with no good topic.
I must try to see Fred before I leave;
some serious thought this summer to A.D.
Narain's thesis, Dr. I will be gone,
Narain in this study, Dr. I will be gone.
thus should be chance to get much done.
Zotovic is slowly being forced out, no
Zotovic is slowly being forced out, no
new this year, although he published 6 papers &
won the year, although he published 6 papers &
won the year, although he published 6 papers &
waited with Zeleucovic on the one decent dissertation
to be produced. J. Rowse1 is 1/2 a year in
have agreed to 3 no. reports on this topic,
probably the Shaw's project.
I have decided to put HSD & RSM in an OCB.

I am not sure how to approach RSM, but it must be done.
on 21 May 1971, I flew from Denver to Miami to see her mother, and one week later at 1330, 1, A & I left by car on a trip that turned out to be more of a pilgrimage than a vacation. At 1900, we were in Cozad, Neb., where we stopped by my aunt's house & found a deserted. We found then a gas station & located residence for my uncle R.L. Thompson, & drove to see him. — No one recognized me without hesitation, a remarkable feat by his 51 years, & his wife Lois, fed us chicken & beer & we talked till 7:30, when we left to see Marie, my mother's oldest sister, who claims to be 84 & is now residing in a nursing home at the hospital. She also recognized me at once & we visited some 30 minutes before hitting the road again.

It is some years since I had seen them. R.L. was thin & bent & walked with the aid of a cane, his skin like old leather & his bones poking out to give him the appearance of a scarecrow. Still his back was straight, his hair neatly parted just as I remember from 35 years ago, & his ashtray was filled with 1/8 & cigarettes butts. — Lois must be 60 years his junior, the wife of his nephew, my cousin Donald, whom I despise as a cheater & who ended up the town drunk.
He was a remarkable man. Tall, straight, strong as a horse, he had migrated from the hills of Kentucky to settle on 40 acres of farm land in the heart of the Nebraska farmland. In his early twenties, he married Nora Conley, the second or third eldest of the Conley clan, consisting of 11 children from a Scotch-Irish father and German mother. The Conley family were farmers, and they devoted their lives to their farm and to theashing of its land. Donald, their second child, who ungratefully refused ever to consider honest work a drudge, spent a few years in a small fortune. Even as a child, I loved his farm. The 40 acres seemed immense beside our 1000 acres of table land—pasture and farm land, that lay between the Republican and Platte Rivers, a dry farm that in those times—the 1930s—was totally unpasturized. Every square foot of his land was used to advantage. I especially loved toward the large red barn with its smell of leather and hay and horses, along the wall rested his rifle, oiled, loaded, and cocked, and I remember clearly him shooting a rat from the head for intruding into the spotless barn. He challenged nature with the calculated vengeance of any man who considers life's only virtue to be labor, and cows, pigs, and equally alike...
were decimated before his remarkable air,
knew only crime that they stole a few grains of corn from his garden or
stored them for winter the black walnut
that grew wild along the lane leading to
the pasture.

When I was 10, he offered to give
me a rearing colt, remarking that if
I saved my money carefully, when I
was 18 I could buy a second & then have
all the necessary accouterments to go into
farming for myself.

His tool shed was to me the most
fascinating building on the farm. In contrast
do my father, who tried desperately to
farm a section and do raise some
100 to 200 head of cattle and consequently
had no time for details, my uncle led
a meticulous and ordered life. Any time
he used a hoe, or spade, or scythe, it was
carefully cleaned, oiled, and replaced on its
designated hook in the shed.
arrived in Allepauge a week ago, a little stiff from our long drive. By the time we got to Fort Collins a week ago, I was sore, but exercise seemed to work it out. To the Sidewalk symposium honoring Einstein's retirement & after two days, I'm developing serious back trouble again. If it's not clear by mid-week, I'm off again for another operation. But maybe with exercise, it will clear up.

O100, 10 July 1971

a long siege of rest & exercise seems to have cleared up most of the back trouble. I've worked only part time now for the past month, but feel much better.

D20 Without question is an opportunist & not to be trusted. His personal vendetta with VNY has merged on unethical, & perhaps passed over the line in a number of cases. JWNF threatened last fall to have him removed from campus, his actions having jeopardized our entire efforts. — I have a strong urge to renounce experimental work, to become again involved in field work & practical problems. IPB is off to launch his boat for a first field study men, & I should probably go along, but with the same meeting next week, I guess I'll wait & go in Aug. — Called Ty D. on July 26 to find out if JKC is off to Seigmost for a training session next week. — Perhaps mon. I'll go to DFC to mend a few fences.
18 Sept 1971

when I got back to Ft. Collins on the evening of the 16th, it was snowing a bit. All night, it was awakened
by sharp cracks, almost like a rifle shot. This
break was amazing. I was still at it this morning.

Mon thru Thurs we met at Pere Marquette
Park to discuss periodic sediment sampling. I went
along the C.B. of the Wies, large
Limestone bluffs, the park itself was very
new, so old & sturdy, but very comfortable.

In attendance were L.E., T.O., E. Daryl, etc.

Leonard Nelson, Pat Borth, Col. Albert, Ross Tint, H.P.,
Bob Krieger, Frank Ames, Bill Schepic & me.

31 Oct 71: Food arrived me to teach basic hydrology.

I started off w/ short schedule - impossible - Department
Lyceum from Brondinh visited today. VMV is back
from Scandinavia - I may go to Australia in
Aug 72 - Council meeting & this evening
On the 19th, we shut off the flame, the culmination of 6 years' effort. It is difficult to say the pay-off. Three NPQs are published or in the mails. Start proc. of some 90s. Comparison report, HC & Johnson report on cross bedding & transport of living matrix. The comparison report should be rejected.

It is difficult to evaluate at this point the results of our efforts or to formulates on future work. Three or four reports should be forthcoming, some critical especially some recommendations for future field work, some research plans for the future. By the spring meeting of our advisory committee I should have a readiness.

9 Dec 1971

Today, I found another mistake in my data. We will check about a dozen records we're using for the Hurst phenomenon studies, if there is a preponderance of errors, I'm going to have to shoot him down.

The western AGU mtg was a shambles, the idiot projectionist furnished by the JDC
Tax Hotel managed to foul up every set of slides he touched.

I may go to Davis for 1AMH in March.

Eggert was highly critical of our Hurst paper.

Baron has a severe case of dyspepsia, we shall have to operate soon. We just checked up her's French books. She had oral surgery today & feels punk. — Dr. Swenson is incompelled. He sent rings that were a year old to Baselbe for oral surgery.

Holts has not yet done anything on our house design, but we meet with him Tuesday at 10:30.
14 Jan 1972

P. Toddovic suggested that we do a paper on

work on absolute of stochastic models in sediment

transport— I think it a very good idea.

Before Christmas I was called to Washington to
discuss more. 1 JPD, HEF, RRR to MTF. I was
given the chair for MTF, NASA, JPL etc. Normally
I was at C. — JPL and argued a year. RRR now
this year we were given no guidance except in
the time we go to net on 206 to become proposal.
Right now I think it a fixed. I give it 8 years
before it goes to pot.

RM argues about the mounted data. I

absolutely cannot imagine his state of mind.

I compiled our data for 1971 today. It looks
good but much still remains to be done. I don't
know when do stuff.

12 Feb 1972

TURBULENCE ON COOK

AMAZING. Teaching is getting to be a real

DRAG. BUCKS UP THE ENTIRE REACH.

OUR 2ND 80 FROM HOLL CAME 10 AT 50000.

About 800 with.

Tomorrow ill outline the LIMA paper.

Details for my seminar— SHEN wants

ME TO LECTURE AT INSTITUTE. 2 TALKS FOR R

ME. RSVP. OREY. COMM. FOR 2ND INT. HOD.

INTO. 2. ON US. COMM. FOR Barrecci Inst. OF

R. MEL. ORE. SESSION ON SCI. OF PURDUE

INTO.

Papers:

1. LIMA INTO
2. REG. 835 IN TURB.
3. PROP. OF SOME IONS
4. INTERMITTENT SGD. SANDERS
5. INTEGRATED PROCESSES
6. STORE MOBILES
7. BASIC DATA REPORT
8. PROP. OF ANNUAL S. E8. LOADS
9. DEMONSTRATION FLUME
10. KOMOSOV - ROGNER

24 Mar 1972

Two hips so far this year. The first to MTF & Second
to Atlanta for 1st conf. on subsequent sed. samples.

MTF is a grand installation rat in the swamps of
Louisiana some 40 miles from New Orleans. It was apparently
designed because of its low population density, remote & unsettled,
yet accessible by a large port from the pearl river
& canal specifically designed to transport missile boosters
in testing. A large part of the land was public, a
5-mile buffer zone was established around the point
where the NASA program cut back, the local director,
whose name I don't remember, but who will probably,
appeared to New States with plans to
establish an earth resource center, with other such.
agencies to come in. The director of Voss, President, was approached, who passed it on to Government, who said Center & Smithsonian to investigate. They talked directly with the NASA head men, according to Geo, who said he, having lived in the South for years, recognized the director as a typical fast talking Southern politician who would lie in his teeth & promise anything. Center reported back favorably & the who was in. Geo apparently was not enthused. Not was the Director, but Bill [word illegible] with E. Centre & the strong-brain tactics began—first all were transferred, then more pressure & a bribe of $500,000 this F.Y., already a 16-story construction to be finished about June—Everything "free." Already the marvelous computing facilities are recognized & being inadequate & terminal will be installed.

No one apparently was consulted except Center, & he is in complete command—My visit did nothing to cause me to change my initial reaction—It is a colossal blunder, 121, to commit that magnitude of research resources, money & men, into a venture predicated solely on political pressure & monetary bribes, & 212, to put it under Center, who basically is unsympathetic to research. (Vern Schmidt, who has been there from the beginning, commented that nothing of the facility is planned that could not be done cheaper & more efficiently elsewhere.) 321, to save ties with the academic community.

Timing of the NIF Cape was excellent, with the president's personnel calling a jobs search. No one, I think, refused. Two years ago, half of them would have quit. No choice was given, except in timing, characteristically, most were hand picked by Center, no one (except Wright D. Hambell) with any fashionable or experience is included.

25 Mar 72

Kot Kindsvater, from GS Tech recently was appointed GS-15 Step 10 to Voss & it is rumored that he is slated for a job in Washington—Perhaps chief of research & TIC when Washington retires? He also might veer into the job of other director, but I could not imagine why. DBS says he am (K) isn't thine on his feet.
Just finished reading "Dems and other disasters" by Arthur E. Morgan (1971). "Police, Sergent, Public, Boston." A remarkable book by a remarkable man. At 93, I guess he can afford to be on the Corp, but I'll outline him.

29 Mar 1972

Work to be done?

1. Persistence & self-similarity in turbulent shear flows.

2. Stochastic models of particle motion.

3. Flume studies - open file report.

4. Annual sediment loads - Bangor.


6. 

15 April 1972

To DC. the 17th. Paris 24th. Last week we signed a contract. Contact without applied for a coast loan with notic. Red letter of commitment for $1,200 from Columbia. I have still to finish Hurst phenomenon in turbulence.

11 May 72

On May 2nd early said I should pass 1978 In promo. to 3rd I talked to Ty Brown when we went down to and saw A. E. Brown. Ty said he didn't fit the categories. I would support it. Ty said that he didn't want to say anything to you. You are the only one who knows that. I am a letter of rec. at Cather's suggestion w/ cc to J. Upton.

To W. J. in our agency Comm. wrt:

PCB, Pollok, Whit Bonpland, Doc of things (363 infantry) ed. Hamor (F.S.) R. Lively (Capt) - Check history of Fairman Creek.

To W. J. in our agency Comm. wrt:

PCB, Pollok, Whit Bonpland, Doc of things (363 infantry) ed. Hamor (F.S.) R. Lively (Capt) - Check history of Fairman Creek.
C.T. Yang was awarded the Norton award for 1971.
I think that yesterday I found a fundamental error
in his development: Minimize

\[ \frac{dy}{dt} = \frac{1}{H_0} \frac{dH_0}{dt} (\ln H_0 - \ln y), \quad H_0 \text{ constant} \]

or \[ \frac{dH_0}{dt} \rightarrow \text{minimum}, \]

i.e.

\[ \frac{d}{dt} \ln H_0 = \frac{1}{H_0} \frac{dH_0}{dt} \]

\[ \Rightarrow \quad \frac{1}{H_0} \frac{dH_0}{dt} = \frac{dH_0}{dt} \min = \frac{dH_0}{dt} \min \]

25 May 1972

Bob myerz was in today to discuss the last
load sampler for South Fork in Wyo. He is
elaborating on a new-designed piece of equipment,
apparently to be built & installed by the shop here.
— T.M. Jr told D&D to sit tight pending some
major reorganization.

21 June 1972

R. Cash will be B.H. at Atlanta, Moulton BMR,
Joe Callahan (Chief of NW Branch) to Arlington.
Dumore heard of a leak, director for NTF will be
chosen. D&D has asked for a line job, Dist,
or something like it. UMY stopped in West. By
noon Monday to get Dave moved. Bill
Hatekreass from Sacramento stopped today. Will be
going to school here next fall (gr. 10.) Saw
Don Johnson at AOOA only today — a comedy
program. Then agreed to pay to only 1
lecture a State. And, I have still to get
a weekly

10 July 1972

One paper forward for director’s approval & one
in review [Bangkok mtg], will send it forward
this week - Next two lectures for B.M. &
2 for Stock mtg in Aug. Then O.F. second
& pres. final of four dates. Stochastic model
paper - send warm paper.

Things at MIF look grim. Camp. Terminal not
put near offices - NASA took over towing been
V.S. decided W.R. didn’t give enough thought to
his Eq. & held that up. S.S. raised APB to
come down to see how his work fits into
M.I.S. work? - Every mistake that possibly could
be made in setting up MIF was made

1. Major policy decision on research made under
   a combination of coercion & bribes
2. Strong-arm tactics to get bodies
3. NASA got the upper hand
4. No responsible high level officials at site
5. S.S. & V.S. assuming tech decisions over people
   who basically are more competent
6. Some ties with academic community
7. S.S. becoming NASA instead of V.S.
27 Aug 1972

Jane & Lisa Enslow returned to Copenhagen yesterday after 4 weeks as our "house" guests. It was a nice visit, but hard on everyone, esp. Patricia.

2 Sept 1972

Ghosts -
Visions - Paul & Helen
Note from Van Auw
Fournier - Rodier will be here next week
Call Geo Taylor on USAID Rev - 
Both papers for institute finished ok.
8 Nov 1972

Finished reply to Fisher's comment on Nord paper

9 Nov 1972

The Hunt phenomenon & dispersion
Persistence & Dispersion in Rivers

23 Dec 1972

A most remarkable finding. Longitudinal
dispersion in rivers is non-Fickian. The
variance of the concentration distribution of a
dispersant increases with time according to

\[ \sigma^2 = \frac{2L^4}{3H^2}, \quad 0 < H < 1, \quad H = 0.7 \text{ to } 0.8. \]

Planning & Decisions

A worm's-eye view of planning & decisions
at the Washington level is that decisions are
made, arguments to support these decisions then
are put forth. Decisions are announced in
such a way that any logical inputs from
individuals involved become simply obstructious
arguments rather than a logical part of
the planning which should have been considered
before the decision was made.
27 Feb 73

M.M. was in today - N & Nancy separated. N.M. &
C.C. had a family outing at Tucson. Violent, apparently.
I don't know why, but related to ERZ & family in some way.
Go to Poona High w/ERZ & family. In jack comment on
Good. Will call Fri. to get any comments on
his program. - Call JD on Fri. & GS will move
on disp. process for diss. - I'm ready to get him
switched to us as proj. prof. from ERZ. - 11-15 to
All to review Cadet program. - JD was in Fri.; I could
find out more about his work -
2 finished reviews of cheng. Staff paper. Bad.
Two weeks ago we had job on mid. program.
It was an experience.

25 Apr 73

Things have been a shambles all spring. Hastings
retired & Ted Moolen will replace him. Upson
will retire in June 30, I'm top contender but told
Ted I didn't want the job. T.M. probably
will retire soon. C. Kindsvater is in as a
Staff scientist - probably Center's payoff for past
favors. Wait Hoffman chief of s.w.

Dam brave Ed Kersay. Two weeks ago,
Monday I met with Al Harrison on
Missouri River Stage study, flew to K.C. &
Rollo, K.S. not interested in our project but
is esp. interested in velocity shift.

AGU mtg esp. dreamy. I objected to writing
comprehensive report of no avail.

Joyce left 12th & T.D. snatched the position,
we will go own if personal even get off work.
As, get a registry.
Bob mosed probably will transfer here in July.

26 June 73

On May 7, EAM called to ask me to tele DDEEC.
The request upset me as we already had discussed it
& I knew how I felt. I never learned why. I
cannot argue on something cold but then one
can hardly make a case for intuition. The
situation I became progressively worse till Mon.
C.C.'s call up at 10:30 & the PC called him.
Suggested I become progressively worse till Mon.

(Signed) Friday that DH 12r. & J. & I am.
Dane instead of march & doubled to 11 C. One year
ago UMA stepped in DC to get Dave.
moved & I inferred to close the operation here. Now I wonder if he was successful? I think I will find out. I want my tented if he returned to the island.

But it strange that we cannot communicate honestly. I do not know what the Division would think I have not been able to make clear what I wanted to do.

18 July 1973

A man should have something to say about where he lives, what he does, with whom he shall work. If his work is not satisfactory, something more should be demanded of him. If his work is satisfactory, or perhaps even outstanding, why then is something more demanded of him? At this time, I am resolved to leave the Survey.

30 July 1973

Henry Cavendish said that Neandertals is predictable, but Huxley was a disaster.

From the Secretary's point of view, predictable mediocrity is to be preferred to unpredictable genius.

26th Sept 73

The Jacobs were here today, lunch prepared a marvelous turkey dinner. Sean is still depressed, quite naturally, after his exam session Wed 8th & Mon 10th. 30 Aug - 14 Sept, Istanbul & Paris, IAHZ's IAHS Comm. msg. A bad trip: my ticket was not ready, my bag was damaged, took forever to file a claim, left my coat at Altea office, had to reapply when Council was meeting, no room, ended up in the Memory basted turkey, hung w/Sally's confetti wild on May 4th.
The only bright spot was UNESA P.D. got home w/10 even after leaving the Consternation at Istanbul. 10
Cocktail reception; folk dancing; Dinner w/Esseen, Krach, DBS, Banquet; Sat w/Jim Droge, it was a
busy time in Istanbul - asked DBS for our
WSO last week, no comment yet. Things in
Denver also in O.S.S. in Pan; pretty sketchy.
Hendricks' should retire - Utah lab, and C.A.
to Denver, no space at all.
JKE at Iowa & D.C. 14 Games chic an alternative to CSO. I have considered
commuting to Denver, but my head is
not in it at all. I still am resolved
to leave the surgery.

22 Aug 1973

Finished dispersion report except for a couple of
figures, abstract, & some corrections. It is a good
report, I think.

Met with T.M. & A.C. on 12 Oct, nothing very
definitive came from our meeting. I'll
submit draft of objectives & project
proposals this week.

We've had lovely warm fall weather. 75 today.
Paired the dog with
18th - to Omaha Corp office for meeting
on tank-led form project.
On Oct 7th, Dave Krantz died in California of cancer. Sunday, O'Brien (35) dropped dead while shoveling snow, a sudden hemorrhage. Yesterday or today, Charlie Kisel, 44, father of 8, died of a heart attack in Tucson while playing handball.

This has been a season of bad news, and I have been uneasy and depressed by it all.

Friday it snowed, & Saturday, 16 inches in all, & we spent the weekend at home tending the fireplace. Monday was cold & touchy, at 22°F, the snowmelt is still dripping from the roof.

Last another round with TM Friday, on BH avalanche work. Another wrong decision, he should get my letter Friday.

Dale Narriman - our new motto from P. Haas.

Tucson, Iowa City, Gainesville - F JC is not completely out of the picture yet, but probably.

To pineville by Thursday. WFC has project there, mil w/corp on Friday morning. I'll stay with Bill & Mary.
There is a remarkable tendency for people to wish away their problems, and so it is with the Watergate affair. Nixon clearly either is incompetent or dishonest — and still nothing will be done. The energy crisis is now to the point, something must be done, and very soon.

Winter is arrived, every morning there is a bit of ice on the lake, gone by noon, & each day it comes more.

Allen, a week ago thrice, was suspended from school for ten days for stealing. He & three others stole keys from a teacher's desk on Monday, & on then, they broke into the shop. Her boy's he has been at this for some time.

Tomorrow we will hit the books.
Lee went to lolo spr. today w/ Poudre band for semi-final football. Poudre got trounced 35-6 by Mitchell.

No one can do as he likes with my time.

Organization charts have no intrinsic value.
Jan 30, 73, I shall lecture to the Corp Housing course at Davis, will stop to see H. Fischer & Bob around Monto Park, return via Tucson & Albuquerque.

8 Dec 1973

Hendrick will step down from chief hydrologist, J. Baedraff will be Deputy ass't Ch for research & T.C. Cragwell probably will be chief H. Barnes is now chief of S.W. Sci project ch Lawrence, ESM acting coord. of WRT & I don't believe it, 1st pp, with 30 p of merit directly plagiarized from Dr. N. & T. & ch was published. His latest paper w/Keefe contains several pages lifted from Fischer.

Today was warm & sunny, with our high temperature around 60°F. We to a Volley Ball tournament, we set up the campfire candy sale at the Meet, now Jody Runyan, B. H. Lee (candy) wanted this p.m. - he was voted the most valuable player & got a blue ribbon - we went to a tennis play from 120-30 I felt bad that I did not go to see her play.
B.G. (Andy) is with Harga, they are currently working on power Ria Reservoir for N.W. Power, which will strip mine for coal in Montana.

26 Dec 1973

Gastrolith. Smooth stone, from Dinosaur's Garden - found in Lowll, Wyoming -

30 Dec 1973

The year ends, & as I have promised, the time is now to think about the future. Phoenix, Eugeneville, Iowa City, Fort Collins, Denver - these are only some of the choices.

After Jan 1, I shall talk to Christenson, Kennedy, & others. I may still go to Denver with U.S. G.

- John Bradbeer to be D.A.C.R.T.

Hendricks will step down. Comm. for new chief hydrologist - Clark, Langer, Hastings. That job in Washington I would take, but there is no chance that
It will be offered.


Harry Barnes - Chief - SW

went Hoffman - to Director's office.

Maybe I should go to Washington.

Ditterson will be in Salt Lake City

this spring - Senturek should be here in

Jan.

12 Jan 74

IKE to GS15, RSM to GS14 - He is 1st Prof. P.

Still contains many pages plagiarized. T. Koeber

has applied for Socorro job. Senturek is here now

but I haven't seen him.

Why on Hydro program, UVM plans to ask

for new high level staff member (AQ8 & 9, mostly)

I am not sure what he has in mind, maybe

laying some groundwork, maybe just probing.

I would not work with or for him.

I had hoped to make a decision by now.

But it is impossible, too much depends on

who is the new chief hydrologist. I guess it

will be Joe Craigwell or Ted McLaughlin.
21-25 Jan at 201 - Snowstorm the 21st, beautiful weather the rest of the week. Roads clear on the way home. L & D. saw the entire mountain, we need to relax. — 27 Jan 1 Feb
I go to mentor, Davis for CER Training course, to Rancho to see Hugo Fisher. —
Rsm is 68-14 - He charged DP that enough to avoid plagiarism charge. Carter amazes me. He is completely dishonest.
No news on new chief hydrologist - The choice will make a great difference to me.
C. Belt - St Louis - ind. will copyright work on Miss no. St Louis. Red meet Cr. H. make 1st week.
S. Rentz - CS15 -

Wolman, Linn, Cragwell submitted by Cram?

5 March 74

Still no choice for the Hydrologist. O. D. Hovenson & Peter will be here in a week, he will teach at J. of Utah. I was in California in Feb, 1st to sorp HEC to lecture, 2nd to mexican park on Alaska pipeline bid. DBS & EUR served as consultant to N. W. (Blanchard et al) & have been asked to resign. Rich had a back operation last week, is up & around in good shape.

This week will write to Tucson, Madison, maybe Bloomville & some city. The Madison bit looked pretty good.
Joe Craigwell new chief hydrologist - no change
For Action

1. C vs V
2. Q vs V
3. List all equations & std deviations
4. Flow Duration curve
5. " " Table with period of record
6. Ave bed mlv curves
7. " " " table
8. Table of sources for size
9. Try Einstein \(\theta = \frac{1}{\rho} \)
10. Plot load \(A_2\) versus \(F\).
11. Try Bishop's \(f - y\) relation.
12. Read load at \(A_2\) vs \(F, Q_3\)
Some technical notes

Fischer proposed

$$K_e = \frac{U^2 f}{\kappa U D}$$

From hydrologic geometry

$$w v l \sim Q^2$$
$$D \sim a^2$$
$$v \sim Q^b$$
$$S = a^{-0.5}$$

is $$v \sim u$$. If so $$K = f(Q)$$, the slope $$r$$ can be predicted. - Compare with empirical data.

$$G = N_o/\bar{a}$$ derived by Does & Bond

$$G = f(\frac{K}{U}, \frac{K}{U})$$

$$G \sim \frac{(x)^{-0.5}}{(U)^{2}}$$

$$\rightarrow 0, x \rightarrow \infty$$

empirical data show $$G$$ constant. does the log-normal dist. have constant skewness?

Compute $$E(G)$$, plot $$r$$ vs log $$t$$; is the concentration time distribution log-normal?

Given: log-normal dist. - $$f(x)$$ - how can we estimate elements from $$f(x)$$ so that $$f(y)$$ is Rayleigh's distribution?
30 June 14

We've decided to rent the house & move to Des Moines about Aug 15. Need to put in yard & irrigation system before then. Talked to JFK & U. of A., but decided against both.

1 Sept 1974

Bought a townhouse 24667 W Ellsworth, moved 22, 23 Aug, in 26th, moved office 3rd day, live in Gordon St. High, R. R. in Bell St High, leased 832 Gregory Dr. to John & Nancy Hrad & Kenan Houston. So far, L. & P. both their schools. Office a shambles, but home at least organized now.

19 Jan 75

Spent most of the holidays cleaning & painting 832 Gregory Road & listed with Van Schrock Co. John Smith, a neighbor down the road. It was a depressing experience for us all, but now that our last tie to H. C. is cut, I'm called JFK at down for a job will know in about one month.

W. Loughlin, Prof Sedman (U of Waterloo) here Friday.

15 Feb 75

Called JFK about a job at IHR things there are very tight & it does not look good. But I should know in about a month.

I am depressed & depressed, & my depression seems to permeate all our lives. Our house is not yet sold, which bears heavily on us.
To Washington at Christmas & again Jan 26 - Feb 1 to course on Helmyon filters. I do not see any immediate applications, but ordered two copies of book for Rob & Troutner & will try it on long, linear depression.

Report: "Erosion & Sedimentation" approved

" with Todrovic approved for term research.

- Allan is in Frad, Montana, w/ Randy & W. Nelson
Semi-arid regions are characterized by ephemeral streams which transport extremely high concentrations of suspended materials which eliminate large quantities of sediments to the major water courses.
Bendict
Barter
Hubbell
Maddock
Simons

Ames

Water over top of gates & drain (~30'f) guess ~20 cfs flow in channel. Try to bypass with corrugated pipe. Construction time about 1 month.

Plan for diversion of about 20 cfs. Have to contact with U.S.B. today. Bids on concrete & rock Friday. Sheet piling (~$0) on order. Shelter 8 x 10 ft. by 8 ft. high.

State Game & Fish Dept. have long-term lease on land, will not object to any activity along channel. R. Charles, U.S.B. says no memo of agreement is needed.

March 1, 1963

OSRR - Would tree interfere with channel maintenance? Phragmites clearing to commence in fall, from Bernardo heading to San Acosta.
To: District Attorney, Albuquerque, New Mexico

From: Carl Nordin Jr., Albuquerque, N.M.

Subject: Records - Project proposal for the Bernardo Study
Jan. 5, 1963

Temporary storage of fine sediment in islands and point bars.

Often it is found that a significant portion of the material which composes the wetted perimeter of a natural channel becomes fines as the discharge in the channel increases from a winter base flow through a spring runoff event. Normally, the reverse would be expected—low velocities accompanying low flows should permit deposition of relatively fine sand, while the higher velocities with higher discharges should sweep the finer sands from the bed into suspension, leaving the coarser bed material to remain as bed load.

It is also noted during many spring floods that the transport rates of the coarser fractions of the sediment load, the bed materials, shows no clear functional relation to the flow, and that many minutes yet asymptotic changes occur in the composition of the bed material.

The two phenomena appear related, and

In channels with well defined pool and riffle configurations, when the bed material is relatively coarse and of bemodal distribution, this is precisely what happens. At low flows, fine sand is trapped in the pools. At flood levels during a spring flood, the sand is removed from the pools and the bed material becomes progressively coarser.

In both types of channels it is noted that during many spring floods the transport rate of the coarser fraction


Uniform Wave Conveyance Channels on Alluviated Material, by D.B. Semons & M.L. Allibertson

V.86, No. HY5 - May 1960

Doc.: Jan Mar 61

July 62
of the sediment load—the bed material—there no clear functional relation with the discharge, with the velocity, or with any other hydraulic variable.
\[
\frac{1}{\rho c} = 1.84 (V_c)^2, \quad \frac{\nu}{V_c} = \frac{1}{3.9} V_x^2
\]
\[
\frac{c}{\nu} = \frac{V}{V_c} = A
\]
\[
\rho_B = 13.2 \frac{V}{V_c} (\frac{V}{V_c}) (1.39 V_x)^2
\]
\[
= 49.8 \rho_B A \frac{V}{V_c}^3
\]
\[
= 18.4 \frac{V}{V_c} ^2 \quad \text{MeV} \cdot \text{cm}^2 \text{sec}^{-1}
\]
\[
q_B = 69.5 \frac{V}{V_c} B_B \quad \text{from where comes}
\]
\[
\text{thestreamfunction} \quad \nabla \times \mathbf{v} = \rho \mathbf{f}
\]
\[
= 49.5 \frac{V}{V_c} B_B \rho
\]
\[
= 69.5 (62.4) \rho \left( \frac{V}{V_c} \right)^2 B_B
\]
\[
= 4330 \rho \left( \frac{V}{V_c} \right)^2 B_B
\]
\[
\text{If } S \text{ is constant, } B_B \text{ is constant,}
\]
\[
q_B = K q
\]
\[
\rho \to 0 \quad \text{when } \Theta \to 0.04
\]
\[
\Theta = \frac{\rho}{\rho_0} \quad 0.3 \quad 0.098
\]
\[
\rho = 0.098
\]
\[
\rho^2 = 0.03^2_2
\]
\[
\rho < 0.04 \quad \text{where } B \leq 0.03\]

1. Set design, geometric mean size.

2. Fraction $f_3$ for each size $d$

3. $E$

4. $\psi = \frac{f_3 - f_0}{E_{1/6}}$ note $\psi$ varies for each size class.

5. $X = 0.77A \Rightarrow A \geq 1.80$

   $X = 1.398 \Rightarrow A \leq 1.80$

   where $A = \frac{d_{50}}{u}$

   $s = \frac{11.16 u}{u'}$

   and $x$ is a function of $k_{50}/s$ (Figure 4)

   $k_{50} = d_{50}$ in feet

6. Calculate $d/x$

7. $\frac{\psi}{s} = f(\frac{d}{x})$ from figure 7

8. $Y = f(k_{50}/s)$ from figure 8

9. $\beta x = \log_{10} \left(10.6 \frac{X}{\Delta}\right)$

10. $z = \log_{10} 10.6 = 1.025$, $(\frac{e_3}{\beta x}) =$

11. $\left(\frac{e_3}{\beta x}\right)^2 =$

12. $\psi x = e_3 Y \left(\frac{e_3}{\beta x}\right)^2 \psi$

13. $\psi = \psi(\psi x)$ from figure 10

14. $I_{B_{BB}} = \psi \left(\frac{e_3}{\beta x}\right)^2 d_2 \left(1.65^{1/2}\right) \times 43.7$ tons/day per ft width

15. $I_{B_{BB}} \times w = I_{B_{BB}}$

16. $A = 2d/D$

17. $z = 0.04 \frac{d}{u'}$

18. $P = 2.303 \log_{10} \left(\frac{30.2 x D}{E_{1/6}}\right)$

19. $I_1, I_2$ are functions of $A \times z$ (Fig 1 & 2) $I_{21}$ negative

20. $\psi = (1.1 + I_{21}) \psi_{93}$
Jan 9, 1963

Sediment transport parameters
1. Location map
2. Slope
3. Bed material
4. Transport relations
   1. \( Q = Q_t \)
   2. \( q_t = q \)
   3. \( q_t = \bar{V} \)
   4. \( C = \bar{V} \)

Estimating total sediment transport (long term)
1. \( Q \) vs \( Q_t \) & Sed rating curves
2. \( Q_{os} \) vs \( Q_t \), \( Q_t > Q_{os} \), try \( Q_{os} \) on 3rd variable
3. \( Q_{os} \) vs \( Q_t \) Transport parameters. See A.2 & F only

1. Total transport rates
   a) Bagwood
   b) Einstein BHF (A.2 & F various weeks)
   c) Sonnen
      i. \( Q_t \) vs \( Q \)
      ii. \( Q_{os} \) vs \( Q_t \)
      iii. \( Q_t \) vs mod Einstein

2. Bed load transport rates
   a) Bagwood
   b) Einstein BHF
   c) Sonnen
   d) M.E.

3. Bed load - Roughness
Dear Carl, Iris & Allen:

Will you please sign the card where the check mark is? 

I have had it lying around since Dec 31st and decided to get on the ball. I opened a new savings account in my name so they could pay cash for the $670 I explain more later. They did not ask me for it and I offered to do it. They want it taken automatically each Mo so I thought it best to open an acct there, rather than have it mailed to Alb. Fed. or Sandia. They are paying 7% and it is all A-OK according to the Amalgamation.
The note is for 5 yrs. but they want to pay it off as fast as they can. I wanted to help them out as Mary was always very kind and considerate of me while at home. I paid Mrs. H. S. Evan's $150 00 in the bank every month, and the house was sold for $13,300. They have done the improving themselves, and with a lot of help. I see people who do everything, shingles, sanding, painting, putting on the new roof of the house. Peraply moved in on New Year's Day.

I don't think I can help them some. I certainly am anxious to get see the weather about New Year's Day. I haven't been feeling very good. Really haven't been going much. I want to get some rest and then go back.
EXPLANATION OF ABBREVIATIONS
SEE OTHER SIDE FOR COVERAGE CARRIED

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AUTO LIAB</td>
<td>Bodily Injury and Property Damage Liability</td>
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<tr>
<td>MED</td>
<td>Medical Payments Coverage</td>
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<tr>
<td>COMP (FWT)</td>
<td>Comprehensive (1-6 = Comprehensive; 2 = Fire, Wind, Theft; 3-8 = $50 Deductible Comprehensive)</td>
</tr>
<tr>
<td>COLL</td>
<td>Collision (1 = 80%; 4 = $25 Deductible; 5 = $50 Deductible; 7 = $100 Deductible)</td>
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<tr>
<td>ERS</td>
<td>Emergency Road Service or Towing and Labor Cost</td>
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<tr>
<td>U</td>
<td>Uninsured Automobile Coverage</td>
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<tr>
<td>DEATH &amp; DIS</td>
<td>1 = Auto Death and Dismemberment. 2 = Auto Death, Dismemberment and Total Disability</td>
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<tr>
<td>PERS LIAB</td>
<td>Personal and Residence Liability</td>
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<tr>
<td>FARM</td>
<td>Farm and Personal Liability Policy</td>
</tr>
<tr>
<td>RES</td>
<td>Residence and Personal Liability Policy</td>
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If the company revises the form of policy issued to you, any provisions broadened without additional premium charges for the applicable insurance will be extended to you as of the date such revised policy form is approved or accepted by the appropriate State supervisory authority.

Identification and Record of Payment

CARRY THIS CARD WITH YOU. IT IDENTIFIES YOU AS A STATE FARM POLICYHOLDER.

Please Fill in Your Agent’s Name and Phone No.

AGENT’S NAME

PHONE NO.

IF YOU HAVE AN ACCIDENT

1. Write down names and addresses of persons involved and any witnesses.
2. Notify the police immediately.
3. Report accident to State Farm promptly. (If there are injuries, phone the nearest agent or Claim Office immediately.)
4. Do not admit liability. Discuss the accident only with the police or a known State Farm representative.

If you have an accident, please fill in your agent’s name and phone number.
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**Policy Due Date**

- **Month**: JUL
- **Day**: 19
- **Year**: 63
- **Amount Due**: $35.70

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The amount due is based on rating information available at the time of this notice. The policy number and automobile insured are:

- **Policy Number**: 779 522 A1906
- **Make**: 57 VOLKS
- **Class**: 1030
- **Policy Due Date**: 09-21
- **Address**: 605 CORNELL
  - **City/State**: FORT COLLINS COLO

Enter the date and check number: 7-5-63 # 83

Payment by due date continues this policy in force for six months. If a formal receipt is wanted, check here and mail back the entire notice.

* Amount due may be adjusted as a result of additional rating information submitted.