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1 of 1

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HW 4.159

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(HEW-7174)

Route List

1. ~~B. F. Butler~~
2.
3.
4.
5.

INV.
B-47

FILE W. 10.47 W10.6

COPY 1 OF 1, SERIES MA

DATE July 24, 1947

SUBJECT RIVER WATER SAMPLING

Columbia & Yakima River Water - t Tests

To File

FROM B. F. Butler

COPY No. 1

BEFORE READING THIS DOCUMENT, SIGN AND DATE BELOW:

Classification Bacteria

DECLASSIFIED

By Authority of HAPCO Supervised

Classification - Declassification 2

By S. D. R. Date 4 / 5

E. J. B. 97

By S. N. R. Date 4/2/58

INVENTORIED
JUL 27 1951
DOCUMENT AND
INVENTORY UNIT

DECLASSIFIED

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Yakima River ~~_____~~
 ENGINEERING DIVISION ~~_____~~ COMPUTATION SHEET
 TITLE OF PROJ. Results of Paired Differences (t tests) PROJ. NO. W018W, 1977
 SUBJECT Between Station XI and Station VIII DATE Feb. 26
 COMPUTER A. Nielson

This document consists of 3 pages. Pages 10, 11, 12. SHEET NO. 10
 Copies, Series 1, SER. 1
 COPY 1 OF 1, SER. 1

Properties	N	t value	
pH	1.07	+ 2.2059	questionable
Alkalinity MO	1.03	- 1.85	
Alkalinity PH	1.01	0	
Chlorine	1.09	+ 9.89	
Hardness	1.03	- 12.8	
Albuminoid N	1.03	+ .199	
NH ₃ N	1.03	- .0349	
NO ₃ N	1.08	- .902	
Oxygen Dissolved	1.07	+ 2.09	questionable
Oxygen B.O.D.	1.00	+ .096	
Total Solids	1.09	+ 2.171	questionable
Turbidity	1.09	+ 1.556	

- t value indicates greater amount of property at Station VIII
 (above sewage outlet.)

+ t value indicates greater amount of property at Station XI
 (below sewage outlet.)

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Yakima River Water [REDACTED]
ENGINEERING DEPARTMENT **DUPONT** COMPUTATION SHEET

7175

SHEET NO. 2

TITLE OF PROJ. Results of Average Differences

PROJ. NO.

7174

2

SUBJECT (t tests) Between Station II and Station VIII

WORKS

COMPUTER

DATE

19

Properties	N	t value	
	Station II	Station VIII	
pH	111	110	+ .799612 NS
Alkalinity MO	111	110	- .199930 NS
Alkalinity PH	111	110	- .109589 NS
Chlorine	111	110	+ .421501 NS
Hardness	111	110	+ .006758 NS
Albuminoid N	111	110	+ .904020 NS
NH ₃ N	111	110	+ .006792 NS
NO ₃ N	111	110	- .235240 NS
Oxygen Dissolved	111	110	- .068539 NS
Oxygen BOD	105	105	- .380043 NS
Total Solids	111	110	+ .1701582 NS
Turbidity	111	110	+ .1525284 NS

- t value indicates greater amount of property at Station VIII
(above sewage outlet.)

+ t value indicates greater amount of property at Station II
(below sewage outlet.)

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1000 PM-11

Columbia River Water

ENGINEERING DEPARTMENT

COMPUTATION SHEET

PROJ. No. 3

DATE

WORKS

18

COMPUTER

Station I Station II

Properties

No. 1

Station I Station II

PH

Alkalinity MD

Alkalinity PH

Chlorine

Hardness

Ammonia N

NH₃N

NO₃N

Oxygen Dissolved

Oxygen BOD

Total Solids

Turbidity

- t value indicates greater amount of property at Station II
(Sample above 100-B Area - Center of river)

+ t value indicates greater amount of property at Station I
(Richmond - Center of River)

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET No. 3

TITLE OF PROJ.

PROJ. No.

SUBJECT

Alkal. PH

WORKS

COMPUTER

DATE

19

7-45

(2.7)

1-46

5-46

0

8-45

1.9

(1.3)

0

(.9)

(.4)

6-46

0

(.3)

1

0

(2.0)

(.4)

(.5)

1.0

(.1)

.3

9-45

1.1

2-46

.8

(.5)

.1

.9

(.4)

(.4)

1.5

(.3)

(.7)

.7

.4

(2.1)

.6

7-46

.8

.7

2.1

2.2

1.6

(.1)

(.8)

10-45

.4

0

(.4)

x

0

3-46

.3

.8

.2

(.1)

.8

4.1

5

1.2

1.4

.5

(.5)

1.2

(.1)

(.8)

(.3)

.6

(.3)

(.2)

(.1)

.4

2.8

(.3)

(.1)

11-45

(2.3)

(1.9)

.4

(.6)

.1

1.4

.8

.7

.1

(3.1)

.6

(1.4)

(2.2)

0

.1

(.8)

$N = 10.1$

2.5

7

$\Sigma X = 0$

(1.6)

1.2

$\Sigma X^2 = 162.79$

12-45

.3

4-46

.2

$\Sigma X = 0$

.4

0

$\Sigma (X-2)^2 = 162.79$

(.7)

1.1

$\sigma^2 = 16.11762$

.5

0

$\sigma = 1.269559$

2.3

0

0

(1.4)

0

Not sig

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Form G-450
DDM-5741 8-66 ROS

ENGINEERING DEPARTMENT

6

COMPUTATION

NEW 7174 No. 21

TITLE OF PROJ.

PROJ. NO.

SUBJECT: A1 Kai M6

WORKS

COMPUTER

DATE

19

2-27-45	2		-1		-6
	3	1-42-116	-2		7
2-3	-48		-53		4
	2.5		0	64	-18
	-1.3		2.4		-9
	-50		-7		20
	1.7		-16.7		-13
	-37		-9		-21
	1.2	3-1	5		0
2-3	-43		1.4		-3
	2.2		-5.9		-21
	-1.1		.3	7-2	2.5
	-2.1		.2		1.8
	-3.4		16.7		-14
	.7		-1.0		-6
	-9		.1		-1.2
11-2	.1	3-1	-1		-19.5
	-2.3		-1.2		-3.0
	-11		-1.0		-14
	-2.1		-6		-3.8
	-7		1.1	8-2	.6
	1.5		-2		1.5
	-7		0		1.9
	-7	4-2	.1		28
	-1.5		-1.6		1.1
11-2	-1.0		-1.4		.5
	-10		-1.0		-9.2
	-16		-11		
	-13		-1.6		
	-37		7	N = 1.03	
	-9		8	Σ1 = -73.2	
	-5		2.0	Σ1 = 1663.84	
	-10	5-3	19.8	X = -71.0629	
	-14		.8	Σ(x-x̄)² = 1251.822912	
	-2		-7	Σ² = 15066.197	
	1.7		21	σ = 3.81519	
	-1.4		-1.8	-C = 1.858190	
	5		4		

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PUGH 2M.01

CUPTINT

SHEET NO.

PROJ. No.

SUBJECT

Station VI - Sta. VII

WORK

COMPUTER

DATE _____

18

[REDACTED]

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Paired Differential
ENGINEERING DEPARTMENT **8** COMPUTATION SHEET **18W-7178** SHEET NO. **5**

TITLE OF PROJ. Balance - above PROJ. NO. _____
SUBJECT Hardness Star XI - Star VII WORKS _____
COMPUTER _____ DATE _____

7-45	8.9	1.2-15	1.2-6	5-46	1.2
	7.9		-5.2		0
8-45	4.4		0		1.2
	(1.1)	1-46	0		0
	4.4		-7.3		2.5
	6.6		5.2		(1.2)
	2.2		-1.2		(2.5)
	1.1		6.1	1-46	-3.7
	2.2		1.2		-1.2
9-45	7.5		2.4		-7.6
	8.1	2-46	0		1.1
	(2)		1.1		3.2
	(3)		3.6		(1.1)
	(2)		0		1.0
	4.1		1.2		-2.1
	5.1		1.2	7-46	1.19
10-45	2.6		3.6		3.2
	9.2		-2.4		-1.1
	-1.2	3-46	-2.4		0
	-2.7		-2.4		0
	-11.8		0		-3.3
	-6.7		3.6		1.1
	-10.8		(1.1)		-2.2
	-3.1		3.6	8-46	0
	1.3		1.2		3.2
11-45	(-2.7)	4-46	(-3.6)		(2)
	(-1.1)		-4.8		(1.3)
	7.1		(-3.6)	N = 103	0
	2.6		1.2	$\Sigma y = -5.51$	2.2
	(-1.6)		0	$\Sigma x^2 = 1841.6061$	0
	(-5.2)		(-1.2)	$\bar{x} = -0.53495$	1.1
	7.9		0	$\Sigma (x-y)^2 = 1891.3154$	1.3
12-45	(-3.9)		1.2	$\sigma^2 = 17.876809$	
	(-6.4)		(-3.6)	$\sigma = 1.226$	
	(-3.0)	5-46	(-1.2)	$\Sigma = 128409$	
	(-1.0)		0	1.61-5.19	

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9

COMPUTATION SHEET

94517 NO

PROJ. No. _____

А. Г. М. М.

WORKS

COMPLETED

1941-1942

— 14 —

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Form G-460
MAY 1962 EDITION

REPORT

SHEET NO

HEW. 7174

SUBJECT:

 NH_3 N.

Radical Reform

PROJ N.5

Works

COMPUTER

DATE _____

19

2.29	0.5	0	0.6
-0.04	1.40	13	-13
8.3	.09	.09	.61
	.05	.01	.61
	.02	.61	-1.12
	0	-0.01	0
	-0.05	.66	.02
	-0.1	.05	.61
	-0.8	-0.13	0
9.5	.08	0	0
	-0.6	.01	0
	-0.7	.01	-0.02
	-0.3	.11	-0.12
	0	.61	0
	-0.05	-0.01	-0.03
	.61	-0.11	-0.03
11.1	0	.11	.12
	-0.7	.13	-0.11
	0	-0.01	-0.02
	-0.1	.12	.05
	-0.3	0	.02
	.01	-0.08	.65
	-0.3	0	.05
	-0.7	0	0
	.01	0	-0.07
11.2	-0.5	0	0
	-0.7	.01	.07
	.02	0	
	0	-0.03	
	-0.8	-0.01	
	.01	-0.03	
	0	.01	
	-0.1	.01	
	0	-0.05	
	-0.2	0	
	0	-0.02	
	.01	0	

$\sum Y =$	103
$\sum X =$	09
$\sum X^2 =$	11259
$\bar{X} =$	000873
$\sum (X - \bar{X})^2 =$	12382115
$S^2 =$	001221
$S =$	034942
	Not 5%

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ENGINEERING DEPARTMENT

11

COMPUTATION SHEET

SHEET NO. 8

TITLE OF PROJ.

Planned Differences

PROJ. NO.

24717a

SUBJECT

National Bureau of Standards Station VIII

WORKS

NO. N

COMPUTER

DATE

19

<i>(.1)</i>	<i>12.23</i>	<i>-(.03)</i>	<i>0</i>
<i>0</i>		<i>.19</i>	<i>03</i>
<i>-(.07)</i>		<i>.01</i>	<i>0</i>
<i>0</i>		<i>07</i>	<i>03</i>
<i>01</i>		<i>06</i>	<i>03</i>
<i>0</i>		<i>01</i>	<i>04</i>
<i>(.02)</i>		<i>.01</i>	<i>01</i>
<i>(.10)</i>		<i>(.03)</i>	<i>01</i>
<i>.03</i>		<i>06</i>	<i>04</i>
<i>01</i>		<i>09</i>	<i>09</i>
<i>0</i>		<i>06</i>	<i>01</i>
<i>-(.05)</i>		<i>01</i>	<i>-(.05)</i>
<i>-(.01)</i>		<i>0</i>	<i>-(.03)</i>
<i>01</i>		<i>02</i>	<i>-(.02)</i>
<i>(.09)</i>		<i>-(.09)</i>	<i>-(.02)</i>
<i>-(.02)</i>		<i>-(.06)</i>	<i>-(.02)</i>
<i>-(.17)</i>		<i>-(.08)</i>	<i>0</i>
<i>08</i>		<i>(.03)</i>	<i>06</i>
<i>-(.03)</i>		<i>-(.02)</i>	<i>01</i>
<i>-(.03)</i>		<i>01</i>	<i>-(.02)</i>
<i>-(.02)</i>		<i>-(.02)</i>	<i>-(.01)</i>
<i>-(.02)</i>		<i>-(.02)</i>	<i>0</i>
<i>-(.08)</i>		<i>08</i>	<i>02</i>
<i>01</i>		<i>06</i>	<i>-(.03)</i>
<i>-(.05)</i>		<i>(.05)</i>	<i>05</i>
<i>-(.07)</i>		<i>06</i>	<i>05</i>
<i>(.07)</i>	<i>N=108</i>	<i>06</i>	<i>(.02)</i>
<i>(.08)</i>	<i>LY = -.47</i>	<i>-(.09)</i>	<i>-(.05)</i>
<i>090</i>	<i>2.1 = 2.33</i>	<i>07</i>	<i>-(.02)</i>
<i>(.02)</i>	<i>5 = 6.41</i>	<i>(.07)</i>	<i>-(.06)</i>
<i>(.08)</i>	<i>2.1 = 2.11</i>	<i>(.07)</i>	<i>06</i>
<i>(.05)</i>	<i>0 = 0.55</i>	<i>(.07)</i>	<i>0</i>
<i>02</i>	<i>5 = 0.107</i>	<i>(.07)</i>	<i>03</i>
<i>06</i>	<i>9.0237</i>	<i>01</i>	<i>-(.02)</i>
<i>(.07)</i>	<i>N=107</i>	<i>0</i>	<i>01</i>
	<i>5</i>		<i>-(.02)</i>
			<i>01</i>

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ENGINEERING DEPARTMENT

OUTPOST

12

STATION SHEET 26.71

NO. 9

TITLE OF PROJ.

Yukon River Station

PROJ. NO.

SUBJECT

Station XI - Station XII

WORKS

COMPUTER

DATE

11

7-95

- .2
0

- .2
- .9

1

8-95

.8
.3
0

- .3
- .1
0

5-77

- .1
.1
.3

- .4
- .1

1-96

.9
.1

8
0

.1
.6

.2
- .2

- .2
1

- .9
- .7

.5
.1

- .3
- .7

9-95

- .1
.8

2-96

.2
.4

6-97

- .2
- .7

2.3
.8

.1
.1

1
0

- .1
.6

.7
.5

0
1

.5
.9

.7
.5

- .2
0

10-95

1.0
1.0

0
- .1

7-97

1.2
1.8

1.1
- .1

3-98

- .2
- .2

- .5
- .5

- .1
- .1

.2
- .2

0
6

0
0

1
- .3

1
1

11-95

0
1

- .3
- .2

- .5
1

0
- .1

3
1

1
1

4-98

0

N = 167

Σx = 10.90

Σx² = 28.09

Σxy = 1018.9

Σy = 20.9791279

Σy² = 252.146

Σxy = 1021.4

Σy = 20.9791279

Σy² = 252.146

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13
480 2124
COMPUTATION SHEET
ENGINEERING DEPARTMENT
PROJ. NO. _____
SUBJECT: *Stallion ST. - Stallion VTC*
DATE: _____
SHEET NO. 13

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

7174

SHEET NO. 11/32

TITLE OF PROJ.

Wakarusa River Station

PROJ. NO.

SUBJECT

Station VI - Station VII

WORKS

Total Solids

COMPUTER G. Nelson

DATE 11/32

26.0	16.0	24.0
- 38.0	16.0	- 82.0
27.0	12.0	- 7.0
72.0	2.0	- 6.0
- 214.0	4.0	10.0
218.0	- 6.0	72.0
382.0	29.0	- 39.0
212.0	29.0	- 70.0
74.0	12.0	- 79.0
- 60.0	10.0	- 26.0
- 116.0	10.0	- 176.0
- 90.0	10.0	- 70.0
- 2.0	2.0	- 36.0
8.0	6.0	- 28.0
37.0	- 2.0	- 60.0
22.0	9.0	6.0
8.0	0.0	- 16.0
50.0	- 2.0	- 14.0
29.0	- 6.0	- 10.0
18.0	2.0	8.0
186.0	10.0	22.0
8.0	16.0	18.0
22.0	0.0	18.0
- 6.0	30.0	9.0
8.0	29.0	8.0
8.0	18.0	- 22.0
38.0	8.0	10.0
40.0	12.0	0.0
29.0	50.0	12.0
8.0	82.0	62.0
6.0	12.0	36.0
2.0	2.0	2.0
18.0	0.0	50.0
30.0	18.0	58.0
9.0	18.0	51.0
- 7.0	42.0	128.0
8.0		16.0

N=109

ΣX=1447

ΣX²=19717

ΣX=1375

Σ(X-X)²=71

Σ(X-X)²=4379

Σ(X-X)²=66

Σ(X-X)²=2.17

Σ(X-X)²=58.0

Σ(X-X)²=51.0

Σ(X-X)²=128.0

Σ(X-X)²=16.0

Σ(X-X)²=100

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15

42W.717A

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET No. 12

TITLE OF PROJ. Yakima River Station
SUBJECT Station XT Station 1111

PROJ. No.

WORKS

Turbidity

COMPUTER

G. Wilson

DATE

19

24.0	0.0	6.0
23.4	2.5	-10.0
15.0	5.0	-29.0
3.0	-1.0	-20.0
-67.0	4.2	-15.0
81.0	6.0	-23.0
119.0	5.0	-19.0
10.0	2.5	-90.0
5.5	7.0	-18.0
-8.5	8.0	-19.0
-19.5	-3.0	-12.0
-17.0	1.5	-11.0
10.5	1.0	-10.0
11.5	-1.5	-2.0
16.0	-3.5	-9.0
5.5	1.5	-6.5
8.0	0	0
16.5	1.5	3.0
-2.0	2.5	10.0
1.0	7.0	10.5
5.0	7.5	11.5
1.0	-18.0	16.0
1.5	14.0	9.5
-1.0	3.0	16.0
2.5	-6.0	8.0
7.0	-20.0	19.0
-1.0	3.0	23.0
3.0	32.0	16.0
5.0	3.0	0
5	-2.0	9.0
1.5	-7.0	1.5
-1.0	0	21.0
7.5	4.0	22.5
1.5	4.0	19.0
1.0	13.5	19.0
-5.0	2.5	1.5
-7.5	-7.0	5.0

N=109

$\Sigma X = 327.6$

$\Sigma X^2 = 45937.7$

$\Sigma X = 3.005561$

$\Sigma X^2 = 99.35309689$

$\Sigma X = 906.909195$

$\Sigma X^2 = 20117198.9$

$\Sigma X = 1.555555$

$\Sigma X^2 = 1.37$

$\Sigma X = 1.0$

$\Sigma X^2 = 1.0$

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16

H2W-7174

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO.

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

P/H

$$X = 2.15$$

$$0.02009$$

$$\sqrt{1.07} =$$

$$1.1 = .9929$$

$$0.99207$$

$$\bar{X} = 0.02009$$

$$\sum(X - \bar{X})^2 = 9.998065$$

$$2.13253 \times 10.399 = 22.0589032 = 22$$

$$r^2 = .008875$$

$$0.991207$$

$$r = .094207$$

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

17

4807171

SHEET No. 1

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

G. Nelson

DATE

11/17/71

$$N = 143$$

$$\sum X = -73.2$$

$$\sum X^2 = 1603.89$$

$$\bar{X} = -.710679$$

$$-.710679 \times \sqrt{103} = -1.858190$$

$$\sum (X - \bar{X})^2 = 1557.8182912$$

$$3.881519$$

$$s^2 = 15.066197$$

$$s = 3.881519$$

$$t = 1.858190$$

Alkalinity Ph

$$N = 101$$

$$\sum X = 0$$

$$\sum X^2 = 162.79$$

$$\bar{X} = 0$$

$$\sum (X - \bar{X})^2 = 162.79$$

$$s^2 = 1.611782$$

$$s = 1.269559$$

$$0 - 1.269559 \times 0 = 0 = t$$

$$1.269559$$

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ENGINEERING DEPARTMENT **CUPOND** 18 COMPUTATION SHEET

NEW 7174 SHEET No. 3

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

Chlorine Resin 4

COMPUTER

DATE

19

169.60

83.27

10.13

2.57

- 5 99783.04

9.4825

$N = 1.9$

$\Sigma X = 6.11$

$\Sigma X^2 = 33.8123$

$\Sigma Y = 2.4$

ΣY

$N = 107$

{ 5.75

{ 34.0923

$\bar{X} = 0.52752$

$0.52752 \sqrt{107}$

$\Sigma (X - \bar{X})^2 = 33.268976$

$\Sigma Y = 35979$

$\Sigma Y^2 = 10.1163$

$\Sigma XY = 2.989187$

Σ

$\Sigma = 350767$

$\Sigma Y^2 = 10.1163$

Hardness P. 5

94.31.4

9994.77

184126.01

$N = 103$

$\Sigma X = -5.51$

10.141889

$\Sigma X^2 = 1841.2061$

$0.53495 \sqrt{103}$

1284.89

Σ

$\bar{X} = -0.053495$

4.228

$\Sigma (X - \bar{X})^2 = 1841.3113476$

$\Sigma Y = 17.876009$

$\Sigma Y^2 = 4.228$

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#2W-7174

SECRET NO

PROJ. NO

WORKS

DATE _____

95772.97		1.55
04481		13.541

$$\begin{aligned} M &= 103 \\ \Sigma Y &= .55 \\ \Sigma Y^2 &= 13.59 \\ \bar{Y} &= .005339 \\ \Sigma (Y - \bar{Y})^2 &= 13.58706 \\ s^2 &= 13.5806 \\ s &= 3.68388 \\ R &= 1.99192 \end{aligned}$$
$$\begin{array}{r} 1014089 \\ 005339 \times 13 = 119142 \\ \hline 1363158 \end{array}$$

NH3 N Page 7

9777.7	9777.7	97777.7
166	1255	1259

$$\begin{aligned} N &= 103 \\ \sum x_i &= -09 \\ \sum x_i^2 &= .1859 \\ \bar{x} &= -.00873 \\ \sum (x_i - \bar{x})^2 &= .17582193 \\ s^2 &= .001221 \\ s &= .034942 \end{aligned}$$
$$- 000873, 10.19869 \Rightarrow -253562 \pm$$

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COMPUTATION SHEET No. 21

TITLE OF PROJ.

PROJ. No.

SUBJECT

WORKS

Chapman 13.02. H.C. 10. COMPUTER T. 11. 11. 11.

DATE 12

$$N = 100$$

$$\Sigma X = 2$$

$$\Sigma X^2 = 18.64$$

$$\bar{X} = .02200$$

$$\Sigma (X - \bar{X})^2 = 18.6396$$

$$\sigma^2 = .186396$$

$$\sigma = .431736$$

$$999.55.5$$

$$99999.2$$

$$2$$

$$.00220 \times 10 = .016324 = \bar{X}$$

$$131736$$

Total Solution Page 11

$$N = 109$$

$$\Sigma X = 1499$$

$$\Sigma X^2 = 977941$$

$$\bar{X} = 13.752293$$

$$\Sigma (X - \bar{X})^2 = 926826.312793$$

$$\sigma^2 = 1371.553328$$

$$\sigma = 36.140906$$

$$98704.0$$

$$1499$$

$$132792$$

$$977941$$

$$13.752293$$

$$1499/109$$

$$= 13.70807 - \bar{X}$$

$$66.140906$$

$$1499$$

$$\sigma$$

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COMPUTATION SHEET

SHEET NO. 7

TITLE OF PROJ. _____

SUBJECT _____

WORKS _____

COMPUTER _____

DATE _____

$$N = 109$$

$$\Sigma x = 327.6$$

$$\Sigma x^2 = 45337.7$$

$$\bar{x} = 3.005501$$

$$\Sigma (x - \bar{x})^2 = 19323.6968896$$

$$s^2 = 166.909195$$

$$s = 20.171989$$

$$74538.5$$

$$327.6$$

$$13059.85$$

$$45337.74$$

$$3.005501, 10.1103$$

$$1.555511$$

$$20.171989$$

$$Not 57$$

A) K_a ~~RR~~

P₄₁ = 2

$$79954.4$$

$$2000$$

$$91.92$$

$$162.79$$

$$N = 101$$

$$\Sigma x = 0$$

$$\Sigma x^2 = 162.79$$

$$\bar{x} = 0$$

$$\Sigma (x - \bar{x})^2 = 162.79$$

$$s^2 = 1.611762$$

$$s = 1.269559$$

$$0, 10.049875$$

$$a = -E$$

$$1.269559$$

~~$\Sigma x = 0$~~
 ~~$\Sigma x^2 = 162.79$~~
~~for differences~~

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23
COUPON

COMPUTATION SHEET No. 7171

TITLE OF PROJ.

PROJ. No.

SUBJECT

WORKS

NON

Page 8

COMPUTER

Calculator

DATE

19

$$N = 108$$

$$\Sigma x = -47$$

$$\Sigma x^2 = 2733$$

$$\bar{x} = -0.4351$$

$$\Sigma(x - \bar{x})^2 = 2712.55$$

$$\sigma^2 = .02511$$

$$\sigma = .050109$$

$$- .004351 \cdot 10.3923 = - .90237$$

$$.050109$$

$$Net$$

$$5.9$$

$$99.9768$$

$$1515$$

$$99999.53$$

$$.2733$$

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COMPUTATION SHEET SHEET NO. 7174

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

C

N 110

$\bar{X}$ 3.03

σ^2 1.151805

N 111

$\bar{X}$ 2.972164

σ^2 .911130

.057838 = .42150 NS
1.37219

+

Homolness

N 110

$\bar{X}$ 101.288181

σ^2 1.251702369

N 111

$\bar{X}$ 101.255851

σ^2 1.253404400

.032326 = .006756 NS
4.782997

+

Alb.N.

N 110

$\bar{X}$ 0.74181

σ^2 0.002053

N 111

$\bar{X}$ 0.669129

σ^2 .001390

.004992 = .904020 NS
0.005522

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COMPUTATION SHEET

NEW 7-17-53

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

NH₃N

$$N = 110$$

$$\bar{X} = .04327$$

$$\sigma^2 = .000864$$

$$N = 111$$

$$\bar{X} = .043243$$

$$\sigma^2 = .000865$$

$$.000027 = .000792 \quad NS$$

$$.003972$$

NO₃

$$N = 110$$

$$\bar{X} = .12345$$

$$\sigma^2 = .006566$$

$$N = 111$$

$$\bar{X} = .176036$$

$$\sigma^2 = .006667$$

$$.002586 = .235240 \quad NS$$

$$.010993$$

O.D.

$$N = 110$$

$$\bar{X} = 9.21909$$

$$\sigma^2 = 4.123734$$

$$N = 110$$

$$\bar{X} = 9.338180$$

$$\sigma^2 = 4.332906$$

$$.019090 = .068539 \quad NS$$

$$.218524$$

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COMPUTATION SHEET

NEW 7174

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

O-BOD

019040

N = 105
 $\bar{x}$ = 1859647
 σ^2 = 1456132

N = 105
 $\bar{x}$ = 894285
 σ^2 = 439063

135238 = 380043 NS
 092721

Total Solids

N = 110
 $\bar{x}$ = 2213919.1
 σ^2 = 8521814.8

N = 111
 $\bar{x}$ = 2040630.6
 σ^2 = 2847549.43

17.318750 = 112015.92 NS
 10.178025

Turbidity

N = 110
 $\bar{x}$ = 34.972727
 σ^2 = 28.9259347

N = 111
 $\bar{x}$ = 29.513063
 σ^2 = 58.9068197

5.409664 = 15252.84 NS
 3.540600

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28 Code 170.4 T
 ENGINEERING DEPARTMENT **POH** COMPUTATION SHEET
 SHEET NO. **HW-7174**
 TITLE OF PROJECT **T-Test** PRO NO.
 SUBJECT **Columbia River** (**II + V**) WORKS

COMPUTER DATE 19
PH
 $N = 11$
 $\bar{X} = 8.114504$
 $\sigma^2 = .025578$
 $N = 53$
 $\bar{X} = 8.090750$
 $\sigma^2 = .029032$
 $t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{N_1\sigma_1^2 + N_2\sigma_2^2}{N_1 + N_2 - 2}}}$
 $\frac{.023750}{.026602} = .892790$ NS
 02787

AIK M.O
 $N = 11$
 $\bar{X} = 60.296396$
 $\sigma^2 = 18.907558$
 $N = 53$
 $\bar{X} = 59.998113$
 $\sigma^2 = 18.017920$
 $\frac{.298287}{.724886} = .411489$ NS
 298287
 $\sqrt{(18.849930)(.027876)}$

AIK PH
 $N = 11$
 $\bar{X} = 2.439639$
 $\sigma^2 = 1.135258$
 $N = 53$
 $\bar{X} = 2.083018$
 $\sigma^2 = 1.046692$
 $\frac{35.6621}{1.70718} = 20.89023$

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

NO. 71074

(2)

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

C1

N = 53

$\bar{x}$ 543584

σ^2 059287

N = 111

$\bar{x}$ 584144

σ^2 072981

040560 = 922153 N.S.

043984

Hardness

N = 53

$\bar{x}$ 67654054

σ^2 60697169

N = 53

$\bar{x}$ 67469811

σ^2 51506258

184243 = 144360 N.S.

1276272

A16 N

N = 52

$\bar{x}$ 043653

σ^2 000907

N = 111

$\bar{x}$ 041743

σ^2 000906

028239

001950 = 375373 N.S.

005888

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

NO. 71.71 SHEET No.

TITLE OF PROJ.

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PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

NH₃N

N = 53

$\bar{X}$ = .026243

σ^2 = .000402

N = 117

$\bar{X}$ = .027477

σ^2 = .000402

.002194 = .652199 NS
.003364

N03

N = 53

$\bar{X}$ = .094716

σ^2 = .002677

N = 110

$\bar{X}$ = .081363

σ^2 = .001717

.077952

.013353 = 1.762306 NS
.007577

O.D

N = 53

$\bar{X}$ = 10.533962

σ^2 = 2.143374

N = 117

$\bar{X}$ = 10.551351

σ^2 = 1.971913

.017369 = .072626 NS
.009451

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COMPUTATION SHEET

SHEET NO.

TITLE OF PROJ.

DECLASSIFIED

PROJ. NO.

18W-7174

SUBJECT

WORKS

COMPUTER

DATE

O-BOD

230984

$N = 47$
 $\bar{x} = 959574$
 $\sigma = 361131$

$N = 103$
 $\bar{x} = 927184$
 $\sigma = 88799$

$\frac{032390}{150669}$

$\frac{214974}{NS}$

Total Solids

$N = 53$
 $\bar{x} = 95019867$
 $\sigma = 453377090$

$N = 110$
 $\bar{x} = 96509090$
 $\sigma = 510359014$

$\frac{14490223}{32731076}$

$\frac{399407}{NS}$

Turbidity

$N = 53$
 $\bar{x} = 92179245$
 $\sigma = 4947588$

$N = 110$
 $\bar{x} = 927118$
 $\sigma = 6395475$

$\frac{437873}{1243314}$

$\frac{338557}{NS}$

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DATE

FILMED

9 / 1 / 94

END