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HSH-7275

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FILE W10.6

Route List

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

DATE July 24, 1947

SUBJECT RIVER WATER SAMPLING

Columbia River Water - Analysis of Variance

To File

FROM B. F. Butler

COPY NO. 1 #

BEFORE READING THIS DOCUMENT, SIGN AND DATE BELOW:

CLASSIFIED BY **1159** ON **04-22-2010** BY **SP-10**

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By Authority of HAPJ Supervisor
Classification - Declassification 7/7/58

By S. J. Cole Date 4/2/58

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JUL 27 1951

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FORM-PR-1

ENGINEERING DEPARTMENT

(CUPUND)

COMPUTATION SHEET

SHEET No. 1

TITLE OF PROJ. Columbia River Water

W.D. 8

PROJ. No.

SUBJECT Analysis of Variance

W.D. 40

WORKS

Stations I, II, III

COMPUTER

A. 6. 01

DATE

COPY 1 OF 1, SERIES MA

Property	Stations	Dates	This Document	Pages No.	Copies Series
-pH-	NS	S	35	1	1
Alkalinity MD	NS	S			
Alkalinity PH	NS	S			
Chlorine	NS	S			
Hardness	NS	S			
Albuminoid N	NS	NS			
NH ₃ N	NS	NS			
NO ₃ N	NS	S			
Oxygen Dissolved	NS	S			
Oxygen B.O.D	Q	S			
Total Solids	NS	S			
Turbidity	NS	S			

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO. 1

TITLE OF PROJ. Columbia River Water

PROJ. NO.

SUBJECT Analysis of Variance

WORKS

Stations IV, V, & VI

COMPUTER

DATE

Property	Stations	Dates
pH	N.S.	S
Alkalinity MD	N.S.	S
Alkalinity PH	N.S.	S
Chlorine	N.S.	S
Hardness	N.S.	S
Albuminoid N	N.S.	S
NH ₃ N	N.S.	Q.S.
NO ₃ N	N.S.	S
Oxygen Dissolved	N.S.	S
Oxygen BOD	N.S.	S
Total Solids	N.S.	S
Turbidity	N.S.	S

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HEW 1175

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO

TITLE OF PROJ.

Columbine

SUBJECT

NH₃ N

(I, II, III)

PROJ NO

WORKS

DATE

11/7

96

COMPUTER

total .069 - .052704 = .016298

Station .052978 - .052702 = .000271

Date .054533 - .052702 = .001831

Inter .016298 - .000271 - .001831 = .010196

		Df	Mean S	F	95	99
Station	.000271	2	.000136	0.378 NS	334	545
Date	.001831	14	.000416	1.16 NS	206	230
INT	.010196	28	.000360			
total	.016298	44				

Columbine

Album N

(I, II, III)

total .0919 - .071259 = .020641

Station .071794 - .071259 = .000535

Date .0827 - = .011441

INT .020641 - .000535 - .011441 = .008667

Df

S	.000535	3	.000287	0.802 NS		
D	.011441	13	.000980	2.643 P	210	296
INT	.008667	26	.000333			
Tot	.020641	41				

Columbine

Album N (I)

(IV, V, VI)

Totals 120.544 - 210.808 = 149.4592 ✓

Station 28924 - = .072232 - .060145 = .00222

Date 842866 - 632058 = 072733

I .722102 00902

S	.072232	8	.037216	1.44 NS	.01121	32
D	.060145	14	.045147	1.61 NS	.0137	35
INT	.00222	28	.000803		.000347	
Tot	.074599	44				

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W2W.7175

ENGINEERING DEPARTMENT

REPORT

COMPUTATION SHEET

SHEET NO

TITLE OF PROJ. Colubian
SUBJECT Colubian No. (I, II, III)

DATE COMPUTER WORKS

INT. DATE
STAT
TOTAL

145697.01 - 145555.922 = 141.088
145555.922 - 145555.922 = 0
145697.031666 - 145555.922 = 141.112666
119.3947
9.333
25.76

S	D	TOTAL	INT	DATE
2	4.6665	0.50745	8.8859	
14	8.17105			
28	9.200			
44				

Colubian (II, IV, VI) (omitting 9-20)
Total 0.24 = 0.57992
Stat 0.60195
Date 0.72733
INT 0.09024

ST.	THICK	INT	TOTAL
2	0.08243	0.0924	0.26059
13	0.14791	0.1139	0.0949
26			
41			

Colubian (I, II, III) PH
Total 307.75 - 244.533555 = 63.216445
Stat 244.797333
Date 301.61
INT 5.92622

STAT	DATE	INT.
2	213778	0.505
14	57.076495	19.262
28	5.92622	5.92622
44	63.216445	

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FORM NO. 11

ENGINEERING DEPARTMENT

5
DUPONT

COMPUTATION SHEET

H2W 7175

SHEET NO. 3

TITLE OF PROJ.

SUBJECT

Colubin

Co. 2

(I, II, III)

PROJ. NO.

WORKS

COMPUTER

DATE

19

Total 7.56 - 910.11 = 6.649770
Stat 9506.66 - = .040444
Dates 6.896.000 - = 5.976.444
Inter - = 163.289

Station	.040444	2	.020222	0.995
Dates	5.976.444	14	.426888	18.887
Inter	.632.87	20	.022604	
Total	6.649770	44		

Colubin C.I. (I, II, III)

Total 21.3203 - 18.4448.2 = 2.875498 - $EX^2 - \frac{(EX)^2}{N}$
Stat 18.477246 - 18.444804 = .032444 $\frac{(EX)^2}{N}$
Dates 21.096366 - " = 2.651564 $EX^2 - \frac{(EX)^2}{N}$
Inter 2.875498 - .032444 - 2.651564 = .19149

Station	.03244	2	.016222	2.37
Dates	2.651564	14	.189347	27.698
Int	.19149	28	.006838	
Total		44		

Columb. n Hardness (I, II, III)

Total 153504.56 - 152.891.2555 61820
Stat 152892.8773 - 1.1218
Dates 153.468.5133 576.7578
Int 34.9204 34.9204

Station	1.1218	2	.5609	NS
Dates	576.7578	14	40.196905	53.03
Inter	34.9204	28	1.249157	53.03

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FORM 87-1

ENGINEERING DEPARTMENT

COMPUTATION SHEET

6

HW-7175
SHEET NO. 4

TITLE OF PROJ.

PROJ. NO.

SUBJECT

WORKS

COMPUTER

DATE

19

Columbium

PH

(I, II, III)

Total	3061.9822 -	3061.949075 =	.533125
Brags	3061.459675		.01055
Ball	3061.906066 -		.456991
Inter			.065584

Station	01055	R	.00528	2.41	NS
Date	.456991	1E	.13466	1891	S
Inter	.065584	30	.00317		
Total		37			

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Columbus

pH

Station

Date

I

II

III

8-26	8.08	8.10	8.10	ZR 24.29
8-19	8.10	8.10	8.01	24.25
8-12	8.00	8.05	8.05	24.10
8-5	8.02	8.04	8.13	24.24
7-29	7.80	7.90	7.92	23.62
7-22	8.02	8.02	8.02	24.03
7-15	7.55	7.50	7.93	23.78
7-8	8.11	8.20	8.10	24.21
7-1	8.05	8.10	7.87	24.02
6-24	8.02	8.05	8.02	24.09
6-10	8.00	8.00	8.01	24.01
6-3	7.94	7.94	7.99	23.95
5-27	7.75	7.76	7.75	23.26
5-20	7.90	7.82	7.98	23.76
5-13	7.80	7.90	7.85	23.55
5-6	7.90	8.03	8.01	23.94

7/6

ZR 18.748 ZR 128.06 ZR 127.80
ZX 1015.8776 ZX 1020.9578
X 7.9275 X 8.003950 X 7.9875

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Columbian

8

H 2W-7775

Alkal. M.O.

Station

Date

I

II

III

8-26	53.9	58.4	55.7	163
8-19	57.7	58.9	57.6	174.2
8-12	57.2	56.9	58.0	172.1
8-5	58.4	56.2	58.0	172.6
7-29	55.7	55.0	55.9	166.6
7-22	54.1	55.4	56.2	165.7
7-15	58.6	58.3	58.0	172.9
7-8	57.6	57.7	58.3	173.8 ✓
7-1	58.1	59.6	57.6	176.0
6-24	58.6	59.1	57.6	175.3
6-10	55.8	56.2	56.1	169.1
6-3	55.4	54.1	56.4	165.9
5-27	52.9	53.4	52.5	158.3
5-20	57.4	58.0	56.0	171.4
5-13	59.0	58.9	58.2	176.1

N 15

N 15

N 15

EX 851.1

EX 856.1

EX 952.1

2549.5

EX 1185.1

EX 1189.1

EX 1184.1

EX 1185.1

EX 1189.1

EX 1184.1

EX 1185.1

EX 1189.1

EX 1184.1

EX 1185.1

EX 1189.1

EX 1184.1

EX 1185.1

EX 1189.1

EX 1184.1

EX 1185.1

EX 1189.1

EX 1184.1

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Columbus

9

H2W-7175

Alkal. Ph.

Station

Date

I

II

III

8-26	4.8	3.7	3.4	11.9
8-19	2.5	2.3	2.5	7.3
8-12	1.8	2.0	2.7	6.5
8-5	4.7	3.2	5.3	13.2
7-29	2.5	2.6	2.6	7.7
7-22	1.9	2.3	3.2	7.4
7-15	2.6	2.9	3.5	9.0
7-8	2.5	2.4	1.9	6.9
7-1	2.5	2.8	2.4	7.7
6-24	2.8	2.8	2.4	9.0
6-10	1.8	2.6	2.5	6.9
6-3	2.4	2.8	2.3	7.5
5-27	0.0	0.0	0.0	0.0
5-20	0.0	0.0	0.0	0.0
5-13	1.7	1.6	1.7	5.0 109.9

N 15

N 15

N 15

EX 34.5

EX 34.

EX 34.1

EX 103.17

EX 92.28

EX 112.07

EX 11.12

EX 2.6666

EX 2.433333

EX 11.12

EX 15.013356

EX 2.966666

EX 11.12

EX 15.013356

EX 2.966666

EX 11.12

EX 15.013356

EX 2.966666

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Columbus 10

NZW-7175

CO

Station

Date

I

II

III

8-26	0.0	0.0	0.0	
8-19	0.0	0.0	0.0	
8-12	0.0	0.0	0.0	
8-5	0.0	0.0	0.0	
7-29	0.0	0.0	0.0	
7-22	0.0	0.0	0.0	
7-15	0.0	0.0	0.0	
7-8	0.0	0.0	0.0	
7-1	0.0	0.0	0.0	
6-24	0.0	0.0	0.0	
6-10	0.0	0.0	0.0	
6-3	0.0	0.0	0.0	
5-27	1.6	1.3	1.1	3.5
5-20	0.5	0.8	1.6	2.9
5-13	0.0	0.0	0.0	

N 15

N 15

N 15

6A

EX 1.6

EX 2.1

EX 2.7

EX 1.40

EX 2.23

EX 3.77

$\bar{X} = 1.6666$

$\bar{X} = 1.401$

$\bar{X} = 1.8$

$\sum (X - \bar{X})^2 = 2.136$ $\sum (X - \bar{X}) = 3.251$

$\sum (X - \bar{X})^2 = 2.136$ $\sum (X - \bar{X}) = 3.251$

$\sum (X - \bar{X})^2 = 2.136$ $\sum (X - \bar{X}) = 3.251$

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Columbus

11

AEW-7175

CI-

Station

Date

I

II

III

Sub -

8-26	0.20	0.46	0.30	96
8-19	0.26	0.20	0.36	.82
8-12	0.53	0.46	0.46	1.45
8-5	0.56	0.46	0.56	1.58
7-29	0.66	0.66	0.73	2.05
7-22	0.66	0.79	0.89	2.34
7-15	0.89	0.79	0.89	2.57
7-8	0.73	0.63	0.73	2.7
6-1	0.46	0.56	0.46	1.48
6-24	0.56	0.56	0.46	1.53
6-10	0.53	0.56	0.53	1.62
6-3	0.56	0.56	0.63	1.75
5-27	0.63	0.56	0.56	1.75
5-20	1.02	0.96	1.19	3.17
5-13	1.12	1.06	1.42	3.60

N

15

X 15

N

-EX (9.37)

-EX (9.27)

-EX (10.17)

2881

-EX 1.1087 -EX 1.3687 -EX 8.2419

-EX 1.6174 -EX 1.6184 -EX 4.7802

-EX 1.5365 -EX 1.5850 -EX 1.6398 -EX 1.3466

-EX 1.7175 -EX 1.2044 -EX 1.0877 -EX 1.6

-EX 1.5874 -EX 1.0030 -EX 1.9903 -EX 1.9

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#2W-7175

Columbian

12

Deadness

Situation

Date

I II III

8-26	52.9	54.0	52.9	159.8
8-19	60.5	60.5	59.4	180.4
8-12	60.5	60.5	58.3	179.3
8-5	59.4	59.4	58.3	177.1
7-29	59.4	59.4	59.4	178.2
7-22	57.2	58.3	58.3	173.8
7-15	59.4	59.4	58.3	177.1
7-8	58.3	58.3	57.2	173.8
7-1	54.0	54.0	51	163.1
6-24	52.9	52.9	52.9	159.7
6-10	61.3	56.3	58.8	176.2
6-3	58.8	56.3	57.5	172.6
5-27	53.8	55.0	55.0	163.8
5-20	60.0	63.8	62.5	186.3
5-13	68.8	66.3	67.5	202.6

N 15' N 15' N 15'

EX 877.2

EX 874.4

EX 871.4

(2623)

EX 573.32.177

EX 571.6.4.28

EX 508.65.14

EX 58.416

EX 58.49.33.7

EX 50.93.33

EX 58.416

EX 58.49.33.7

EX 50.93.33

EX 58.416

EX 58.49.33.7

EX 50.93.33

EX 58.416

EX 58.49.33.7

EX 50.93.33

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EX 0.389
EX 1.219
EX 0.397

N 14 N 14 N 14 N 14

5-13	0.07	0.03	0.12
5-20	0.05	0.04	0.03
5-27	0.04	0.04	0.03
6-3	0.04	0.02	0.01
6-10	0.04	0.04	0.04
6-24	0.02	0.02	0.04
7-1	0.03	0.03	0.06
7-8	0.02	0.04	0.04
7-11	0.04	0.06	0.02
7-22	0.02	0.03	0.02
7-29	0.04	0.05	0.08
8-5	0.09	0.04	0.07
8-12	0.02	0.01	0.02
8-14	0.47	1.82	1.22
8-26	0.07	0.06	0.05

Station
I
II
III

Album N.

Columbus

13

H2W-7135

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42W-7173

Columbus

14

NH₃ N

Date

STATIONS

I

II

III

8-26	0.05	0.05	0.04	.14
8-19	0.05	0.02	0.03	.10
8-12	0.01	0.05	0.02	.03
8-5	0.04	0.03	0.04	.11
7-29	0.05	0.03	0.12	.20
7-22	0.03	0.03	0.03	.09
7-15	0.04	0.03	0.02	.09
7-8	0.05	0.02	0.05	.12
7-1	0.07	0.03	0.04	.14
6-24	0.03	0.02	0.03	.08
6-16	0.01	0.04	0.04	.09
6-3	0.02	0.05	0.01	.08
5-27	0.02	0.03	0.01	.06
5-20	0.05	0.02	0.01	.08
5-13	0.04	0.02	0.02	.08

N 15

N 15

N 15

(154)

EX

56

EX

47

EX

51

EX

12

EX

12

EX

12

EX

13

EX

13

EX

13

EX

10

EX

10

EX

10

EX

10

EX

10

EX

10

DECLASSIFIED

SHEET NO

TITLE OF PROJ

Columbia River

No. 5

PROJ. NO.

SUBJECT:

(I, II, III)

WORKS

COMPUTER

DATE _____

18

SOL		CL		CAP		F		LIMITS	
5	005692	62	005692	374	N	339	345		
5	110973	75	002772	9	SE	206	206		
5	115370	80	002916						
5	115370	80	002916						

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET No. 17

TITLE OF PROJ.

Columbia

PROJ. NO.

SUBJECT

I H III

Oxygen BOD

WORKS

COMPUTER

DATE

Date	I	II	III	
5-6	2.5		2.0	
13	2.2	1.1	1.7	5.0
20	1.6	1.2	1.3	3.1
27	2.3	1.3	1.8	5.4
6-3	1.6	1.6	1.6	3.8
10	2.8	1.9	2.5	7.2
24	1.5	1.0	1.9	4.4
7-1	9	1.0	1.0	2.9
8	2.6	2.8	2.3	7.7
15	1.5	1.3	1.4	4.2
22	1.2	1.8	1.2	3.6
29	9	1.5	1.5	2.9
9-5	1.5	1.1	1.9	3.5
12	2	1.3	1.1	4.4
19	1.6	9	1.2	3.7
26	1.5	1.2	1.7	4.4
	23.0	17.3	20.3	60.6

Total 100.78 - 81.603 = 19.172

Station 82.692 - 11 = 71.692

Det 96.66 - 1 = 95.66

Inter 1.14 - 1 = 0.14

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

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100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

100.78 - 81.603 = 19.172

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ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO. 4

FILE OF PROJ.

Columbia

PROJ. NO.

SUBJECT

(I, II, III)

Total Solids

WORKS

COMPUTER

DATE

18

Date	I	II	III	
5-6	126		146.6	
13	92	92	104.0	289
20	104	104	89.0	296
27	124	138	100.0	362
6-3	66	90	89.0	244
10	96	106	96.0	298
24	112	114	96.0	320
7-1	82	76	78	234
8	96	92	94	258
15	100	92	100	292
22	74	70	70	214
29	80	78	66	224
8-5	112	104	100	316
12	66	54	60	180
19	96	96	90	282
26	92	98	106	296
	1378	1400	1306	7102

IV 386824

Total	386824	-	374,284.8	=	12539.2
Sub	374,477.3333				192.5333
Diff	384765.3333				10491.5333
Rate					1966.1333

Sub	102.5333	2	205.0666	1.44	13
Diff	17400.5333	84	7456.6666	71.63	5
Rate	1966.1333	83	166.6667		

DECLASSIFIED

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19

4869.5

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO. 5

TITLE OF PROJ.

Calculation

PROJ. NO.

SUBJECT

(Z 11.11)

Stability

WORKS

COMPUTER

DATE

19

<i>Date</i>	<i>I</i>	<i>II</i>	<i>III</i>	
5.6	20.5		17.0	
13	17.0	14.5	12.0	13.5
20	17.0	16.0	19.0	52.0
27	26.5	29.5	23.5	79.5
6.3	19.5	20.5	23.5	50.5
10	13.5	12.0	9.5	35.0
24	9.5	10.5	9.0	28.0
7.1	12.0	14.5	20.5	47.0
8	7.0	9.5	7.0	23.5
15	13.5	13.5	12.0	39.0
22	9.5	4.5	9.0	20.5
29	13.5	12.0	9.5	35.0
9.5	19.0	19.0	15.5	53.5
12	9.5	9.0	7.0	24.5
19	4.5	4.5	4.5	13.5
26	5.5	3.0	5.5	14.0
	122.5	191.5	185.0	(567.0)

EC 3969.5

<i>6.2</i>	<i>8869.5</i>	<i>7144.2</i>	<i>172.3</i>
<i>6.2</i>	<i>7145.033333</i>	<i>11</i>	<i>1.633333</i>
<i>8.2</i>	<i>3705.333333</i>		<i>1.561133333</i>
<i>9.2</i>			<i>1.625333334</i>
<i>37.2</i>	<i>1163.3333</i>	<i>8166.0</i>	<i>14.11</i>
<i>DD.2</i>	<i>1561.133333</i>	<i>11.5695</i>	<i>17.11</i>
<i>DN.2</i>	<i>162.3333</i>	<i>5.8047</i>	

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FORM PH-41

ENGINEERING DEPARTMENT

20

COMPUTATION SHEET

N 2 W-7175

SHEET No. _____

TITLE OF PROJ. _____

PROJ. No. _____

SUBJECT _____

WORKS _____

COMPUTER _____

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Stations. IV V VI

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ENGINEERING DEPARTMENT

DUPONT

COMPUTATION SHEET

SHEET NO. 11

TITLE OF PROJ.

Columbia River

PROJ. No.

SUBJECT

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WORKS

COMPUTER

DATE

18

Date	IV	V	VI	
7-5	8.02	8.00	8.00	24.02
9	8.10	8.02	8.20	24.32
12	7.90	7.98	7.95	23.83
16	7.70	7.75	7.72	23.17
19	8.00	8.02	8.00	24.02
23	8.00	8.00	8.00	24.00
26	8.15	8.20	8.20	24.53
30	7.98	8.02	8.00	24.00
8-2	8.03	7.70	7.92	23.65
5	8.20	8.10	8.08	24.38
9	7.95	8.02	8.10	24.07
13	8.12	8.10	8.25	24.37
16	8.66	8.02	8.02	24.04
20	8.18	8.15	8.18	24.51
23	8.05	8.03	8.03	24.11
27	8.10	8.10	8.10	24.13

EX 128.38

128.21

128.75

1" (385.24)

N:16

3094.2102

Total 3094.2002 - 3093.477908 = 722.92

Stations 3093.486937 - " = 0095.25

Dates 3094.0720 - " = 594.59

Interpolated = 1186.75

Stations	1095.21	1095.21	1095.21	1095.21
Dates	1095.21	1095.21	1095.21	1095.21
Interpolated	1095.21	1095.21	1095.21	1095.21

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ENGINEERING DEPARTMENT

22

COMPUTATION SHEET

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TITLE OF PROJ

Columbia

IV 1, 71

Alkal M.O.

PROJ. No.

WORKS

COMPUTER

DATE _____

1

Date	IV	V	VI	
7-5	57.3	59.8	59.0	176.1
9	59.6	61.0	59.6	179.2
12	57.1	57.7	58.6	173.4
16	56.0	56.9	56.5	169.4
19	55.2	54.9	55.1	165.2
23	55.8	55.6	56.1	167.5
26	53.7	54.0	53.8	161.5
30	55.6	56.6	56.2	168.4
8-2	55.2	52.8	54.3	162.3
5	56.6	55.1	57.5	169.2
9	55.0	57.0	57.3	169.3
13	55.1	57.0	57.0	172.1
16	53.4	53.6	58.2	175.2
20	57.5	56.3	57.0	174.8
23	59.0	59.7	61.3	179.7
27	59.1	58.4	57.5	175.0
Σ 708.2		910.6	915.5	Σ 2790.3

Σ/ 708.2

9/10/6

915.5 EX 2734.3

$N=16$

Ex² 155929.37

Total 155929.59 - 758,2602 = 171.3298

Station	759.99062 -	1.73092
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Dile 90382333- 145.63

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
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ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO. 5

TITLE OF PROJ.

Columbia
(N.Y. 112)

PROJ. NO.

SUBJECT

alkal. Pb

WORKS

COMPUTER

DATE

19

Date	IV	V	VI	
7.5	1.4	1.3	1.6	4.3
9	1.8	3.5	2.5	7.8
12	2.4	1.9	3.5	7.8
16	1.2	2.0	2.3	5.5
19	3.2	2.5	2.3	7.
23	2.2	2.1	2.3	6.6
26	1.7	2.0	2.4	6.1
30	2.3	2.7	2.6	7.6
8.2	1.9	1.1	9	3.9
5	3.7	2.5	3.2	9.4
9	2.8	2.3	3.1	8.2
13	3.3	1.7	3.1	8.1
16	3.9	3.7	2.9	10.5
20	3.7	2.9	3.1	9.7
23	3.0	3.1	4.2	10.3
27	3.3	3.4	4.0	10.7
	44.8	38.7	44.	Ex 123.5

E/2348.87

Total	349.87 -	317.755208 =	31.119792
Stations	310.645625 -		1890417
Date	359.46.3333 -		24.008125
ENTER			

Stations	290.117	114	1.1	1.52	2.2
Date	22.000135	16	1.670119	5.36	1.1
ENTER	0.01647	28	29.343		

DECLASSIFIED

DECLASSIFIED

062 50
 ENGINEERING DEPARTMENT **24** COMPUTATION SHEET
 SHEET NO. 4
 TITLE OF PROJ. *Columbia River*
 SUBJECT *(IV, V, VI)* *Q/*
 PROJ. No.
 WORKS
 COMPUTER DATE 19

Date	IV	V	VI	
7-5	56	53	46	1.55
9	89	89	73	2.51
12	89	82	82	2.53
16	112	102	79	2.93
19	112	99	99	3.10
23	36	56	63	1.55
26	73	63	63	1.99
30	63	79	73	2.15
8-2	60	56	66	1.88
5	53	56	56	1.65
9	46	56	56	1.58
13	26	20	30	.76
16	16	16	20	.52
20	40	36	46	1.22
23	30	36	30	.96
27	40	30	46	1.16
	9.17	9.19	9.28	

Ex 27.94
 Ex 19.3572

Total	19.3572	-	16.263409	=	3.093792
Stations	16.263409	-		=	0.02554
Date	19.139466	-		=	2.086058
Inter		-		=	

Stations	20.1384	2	60.1277	1.8673	2.12
Date	2.086058	15	19.139466	28.133	1.12
Inter	20.516	30	60.2683		
	0	47			

DECLASSIFIED

DECLASSIFIED

25

H.E.W. 7175

ENGINEERING DEPARTMENT **DUPONT** COMPUTATION SHEET

SHEET NO. 5

TITLE OF PROJ.

Calculation

PROJ. NO.

SUBJECT

IV, V, VI

Hurdness

WORKS

COMPUTER

DATE

Date	IV	V	VI	
75	55.1	57.2	56.2	168.5
-9	57.2	56.2	57.2	170.6
14	58.4	58.3	58.2	175.9
16	61.5	58.3	60.5	180.3
19	55.1	54.0	54.0	163.1
23	54.0	54.0	54.0	162.0
26	54.0	55.1	54.0	163.1
30	60.5	60.5	60.5	181.5
32	58.3	59.4	58.3	176.0
5	58.3	58.3	60.5	177.1
9	58.4	57.2	58.3	174.9
13	58.3	59.4	58.3	176.0
16	56.2	58.3	57.2	171.7
20	58.4	60.5	59.4	179.3
23	56.2	56.2	56.2	168.6
27	54.0	54.0	54.0	162
	916.9	916.9	916.8	

EF 2750.6
EPM 159867.9 ZV

Total 157867.92 - 620.8408 = 247.0792

Station 620.84125 - = 60.45

Difference 846.9133 - 226.0725

Enter 2100.625

Station	2004.5	2	2002.3	10	Station 200
Difference	200.0525	13	130.0715	21.50	Station 21.5
Difference	200.0525	30	130.0715	21.50	Station 21.5

DECLASSIFIED

DECLASSIFIED

DATE									
COMPUTER									
11	09	03	03	03	03	03	03	03	03
12	05	07	07	07	07	07	07	07	07
13	02	01	01	01	01	01	01	01	01
14	04	03	03	03	03	03	03	03	03
15	02	02	02	02	02	02	02	02	02
16	06	06	06	06	06	06	06	06	06
17	02	02	02	02	02	02	02	02	02
18	03	03	03	03	03	03	03	03	03
19	03	03	03	03	03	03	03	03	03
20	02	02	02	02	02	02	02	02	02
21	03	03	03	03	03	03	03	03	03
22	01	01	01	01	01	01	01	01	01
23	09	03	03	03	03	03	03	03	03
24	07	02	02	02	02	02	02	02	02
25	09	03	03	03	03	03	03	03	03
26	11	03	03	03	03	03	03	03	03
27	09	03	03	03	03	03	03	03	03
28	07	02	02	02	02	02	02	02	02
29	09	03	03	03	03	03	03	03	03
30	03	03	03	03	03	03	03	03	03
31	07	02	02	02	02	02	02	02	02
32	09	03	03	03	03	03	03	03	03
33	07	02	02	02	02	02	02	02	02
34	09	03	03	03	03	03	03	03	03
35	07	02	02	02	02	02	02	02	02
36	09	03	03	03	03	03	03	03	03
37	07	02	02	02	02	02	02	02	02
38	09	03	03	03	03	03	03	03	03
39	07	02	02	02	02	02	02	02	02
40	09	03	03	03	03	03	03	03	03
41	07	02	02	02	02	02	02	02	02
42	09	03	03	03	03	03	03	03	03
43	07	02	02	02	02	02	02	02	02
44	09	03	03	03	03	03	03	03	03
45	07	02	02	02	02	02	02	02	02
46	09	03	03	03	03	03	03	03	03
47	07	02	02	02	02	02	02	02	02
48	09	03	03	03	03	03	03	03	03
49	07	02	02	02	02	02	02	02	02
50	09	03	03	03	03	03	03	03	03
51	07	02	02	02	02	02	02	02	02
52	09	03	03	03	03	03	03	03	03
53	07	02	02	02	02	02	02	02	02
54	09	03	03	03	03	03	03	03	03
55	07	02	02	02	02	02	02	02	02
56	09	03	03	03	03	03	03	03	03
57	07	02	02	02	02	02	02	02	02
58	09	03	03	03	03	03	03	03	03
59	07	02	02	02	02	02	02	02	02
60	09	03	03	03	03	03	03	03	03
61	07	02	02	02	02	02	02	02	02
62	09	03	03	03	03	03	03	03	03
63	07	02	02	02	02	02	02	02	02
64	09	03	03	03	03	03	03	03	03
65	07	02	02	02	02	02	02	02	02
66	09	03	03	03	03	03	03	03	03
67	07	02	02	02	02	02	02	02	02
68	09	03	03	03	03	03	03	03	03
69	07	02	02	02	02	02	02	02	02
70	09	03	03	03	03	03	03	03	03
71	07	02	02	02	02	02	02	02	02
72	09	03	03	03	03	03	03	03	03
73	07	02	02	02	02	02	02	02	02
74	09	03	03	03	03	03	03	03	03
75	07	02	02	02	02	02	02	02	02
76	09	03	03	03	03	03	03	03	03
77	07	02	02	02	02	02	02	02	02
78	09	03	03	03	03	03	03	03	03
79	07	02	02	02	02	02	02	02	02
80	09	03	03	03	03	03	03	03	03
81	07	02	02	02	02	02	02	02	02
82	09	03	03	03	03	03	03	03	03
83	07	02	02	02	02	02	02	02	02
84	09	03	03	03	03	03	03	03	03
85	07	02	02	02	02	02	02	02	02
86	09	03	03	03	03	03	03	03	03
87	07	02	02	02	02	02	02	02	02
88	09	03	03	03	03	03	03	03	03
89	07	02	02	02	02	02	02	02	02
90	09	03	03	03	03	03	03	03	03
91	07	02	02	02	02	02	02	02	02
92	09	03	03	03	03	03	03	03	03
93	07	02	02	02	02	02	02	02	02
94	09	03	03	03	03	03	03	03	03
95	07	02	02	02	02	02	02	02	02
96	09	03	03	03	03	03	03	03	03
97	07	02	02	02	02	02	02	02	02
98	09	03	03	03	03	03	03	03	03
99	07	02	02	02	02	02	02	02	02
100	09	03	03	03	03	03	03	03	03

ENGINEERING DEPARTMENT
COMPUTATION SHEET
SHEET NO. 25
PROJECT NO. 100-100-100
DATE 10-1-55

DECLASSIFIED

DECLASSIFIED

ENGINEERING DEPARTMENT

CUPONT

COMPUTATION SHEET

SHEET NO.

TITLE OF PROJ.

Columbia

PROJ. NO.

SUBJECT

DEV. VI

NH₃ V

WORKS

COMPUTER

DATE

18

Date	IV	V	VI	
7-5	08	03	07	.18
-9	02	04	03	.09
-11	02	03	04	.19
-16	01	05	07	.13
-19	05	01	01	.07
23	03	03	04	.10
26	08	04	05	.17
30	09	01	02	.07
8-2	01	01	03	.05
-5	04	02	07	.13
-9	00	02	01	.03
13	03	03	03	.09
16	01	01	06	.08
20	13	02	03	.08
23	03	07	03	.13
27	01	01	00	.02
	.19	.43	.59	

EX. 157

EX. 0683

Total 0683 - 047502 = 0020798

Station 048310 - = 000016

Dates 057566 - = 010883

DEV. VI 004102

Station 002816 2 000016 1.315

Dates 010883 15 000016 1.315

DEV. VI 009102 30 000016 1.315

DEV. VI 009102 30 000016 1.315

DECLASSIFIED

DECLASSIFIED

ENGINEERING DEPARTMENT

28

COMPUTATION SHEET

H-8 W-7175

SHEET No. 2

TITLE OF PROJ.

Columbia

PROJ. No.

SUBJECT

IV, V, VI

NO. 3

WORKS

COMPUTER

DATE

18

Date

IV

V

VI

.

25

05

06

06

.17

9

14

14

18

.44

12

13

11

12

.38

16

08

10

12

.30

19

19

21

21

.61

23

18

22

21

.61

26

09

10

10

.29

30

11

12

11

.34

3-2

15

12

12

.39

5

02

01

02

.05

9

13

11

09

.33

13

12

12

12

.36

16

19

11

11

.41

20

17

19

18

.54

23

10

08

11

.29

27

10

11

13

.34

1.95

1.91

2.01

EX 3187

EX 8343

Total

8343

-

717952

= 116448

Stations

718168

-

= 200316

Dates

823766

-

105914

Intersect. of

50

44

81

11

200316

-

200316

1465

2128

105914

15

200316

20.76

010218

30

200316

DECLASSIFIED

DECLASSIFIED

ENGINEERING DEPARTMENT

29
COMPUTATION SHEET

SHEET NO. 5

TITLE OF PROJ.

Columbia

PROJ. NO.

SUBJECT

TH, VI

Oxygen Dew

WORKS

COMPUTER

DATE

Date	IV	V	VI	
2-5	10.6	10.9	10.5	32.
9	10.2	10.5	10.2	30.9
12	10.2	10.4	10.2	30.8
16	8.9	8.9	8.9	26.7
19	8.7	9.0	9.1	26.8
23	8.6	8.7	8.0	25.7
26	8.5	8.6	8.5	25.6
30	7.9	8.0	8.0	23.9
2-2	8.4	8.3	8.1	24.7
5	8.3	8.1	7.9	24.3
9	8.2	8.1	8.0	24.3
13	7.8	7.9	7.7	23.4
16	8.6	8.6	8.6	25.8
20	8.8	8.8	8.9	26.5
23	8.7	8.6	8.6	25.9
27	8.6	8.6	8.7	25.9
	14.1	14.2	14.0.3	
				Ex 4.3.3
				Ex 3766.25

Total	3766.75	-	3732.976875	=	33.773125
Stations	3733.01815	-		=	0.9125
Dates	3766.243233	-		=	33.266958
Inter		-		=	4.15417

St	0.9125	2	0.2563	7.19	7.19
Dates	33.266958	15	2.57513	1.0016	0.25
Inter	4.15417	30	0.3125		

DECLASSIFIED

DECLASSIFIED

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET No. 19

TITLE OF PROJ.

Columbia

PROJ. No.

SUBJECT

N.V.V.

Oxygen B.O.D.

WORKS

COMPUTER

DATE

Date	IV	V	VI	
7.5	1.4	1.9	1.6	4.9
9	1.8	1.1	1.1	3.0
14	1.9	1.4	1.6	3.9
16	6.7	8.1	7.4	22.2
20	2	1.1	1.3	3.2
23	9	9	8	2.6
26	11.6	1.5	1.9	4
30	6	8	1.5	2.9
31	1.2	9	4	2.5
5	1.0	6	2	1.8
9	3	2	3	.8
13	4	2	2	.8
16	2	4	4	1.0
20	5	4	4	1.3
23	3	1	8	1.2
27	4	2	4	1.0
	18.0	19.8	19.3	
			EX	57.1
			EX ²	202.95

Total 202.75 - 67.925208 = 134.824792

Station 68.033125 - = 10.7917

Inter 199.456660 - = 131.53458

Inter 199.456660 - = 131.53458

EX² 57.1

EX² 57.1

EX² 57.1

EX² 57.1

EX² 57.1

EX² 57.1

DECLASSIFIED

DECLASSIFIED

ENGINEERING DEPARTMENT

COMPUTATION SHEET

SHEET NO.

31

4820-7175

TITLE OF PROJ.

Columbian

PROJ. NO.

SUBJECT

IV, V, VI

Total Analysis

WORKS

COMPUTER

DATE

19

Date

IV

V

VI

7-5

72

20.0

70

214

-9

90

84

90

264

-12

98

94

94

276

16

80

98

96

274

19

68

88

74

230

23

106

102

100

308

26

98

90

92

380

30

84

80

84

246

8-2

104

116

100

320

5

90

100

104

294

9

94

80

92

266

13

58

56

64

178

16

108

98

98

304

20

84

98

88

270

23

104

94

92

290

30

96

110

114

320

1424

1458

1452

E1 4354

E1 410028.00

Total

40,0229.00

-

371,324.0833

=

8703.9167

Station

391365.25

-

411667

8-1

398,884

-

2559.9167

Final

13088.53

DECLASSIFIED

DECLASSIFIED

32

K 8. W. 7. 17.5

ENGINEERING DEPARTMENT

COUPON

COMPUTATION

SHEET NO. 12

DECLASSIFIED

Columbian

(Turbidity)

PROJ. NO.

WORKS

COMPUTER

DATE

10

Date	IV	V	VI	
7-5	11.	9.5	8.0	28.5
-9	8.	8.0	8.0	24.0
14	13.5	8.0	9.0	29.5
16	14.5	16.	16.0	31.5
29	9.0	10.5	5.5	24.0
23	9.5	9.5	7.8	26.0
26	8.0	7.0	8.0	23.
30	12.0	10.5	10.5	33.
8-2	9.5	16	9.0	33.5
5	11.5	11.5	6.5	11.5
7	20.0	15.5	20.0	55.5
13	8.0	5.5	9.5	23.0
16	12.0	5.5	7.0	24.5
20	11.5	11.5	11.5	33.5
23	7.0	7.0	14.5	18.5
27	7.0	8.0	14.5	29.5
	157	143.5	144.5	

EX-1147.0

EX-11906.5

Total 4906.5 - 4162.6275 = 743.8725

Station 4168.71875 - = 603.125

D. 4742.5 - = 579.8125

Total 15796.575

DECLASSIFIED

DECLASSIFIED

DECLASSIFIED

Columbus

33

DECLASSIFIED

(9)(5)
H2W.71

Album N

Date

Station

IV

V

VI

8-27	0.04	0.01	0.05	.10
8-23	0.04	0.07	0.02	.13
8-20	1.26	0.13	0.13	1.52
8-16	0.02	0.03	0.02	.07
8-9	0.01	0.02	0.03	.06
8-5	0.09	0.06	0.03	.18
8-2	0.07	0.02	0.02	.11
7-30	0.03	0.03	0.03	.09
7-26	0.03	0.02	0.02	.07
7-23	0.04	0.03	0.02	.09
7-19	0.02	0.01	0.01	.04
7-16	0.14	0.07	0.06	.27
7-12	0.05	0.07	0.03	.15
7-9	0.02	0.04	0.03	.09
7-5	0.05	0.03	0.03	.11

(1.52)

N. 15

N. 15

N. 15

(308)

EX. 1.91

EX. 64

EX. 53

EX. 1.6331

EX. 0.118

EX. 0.305

X. 1.6332

X. 0.118666

X. 0.30533

DECLASSIFIED

DECLASSIFIED

DATE

FILMED

9 / 15 / 94

END