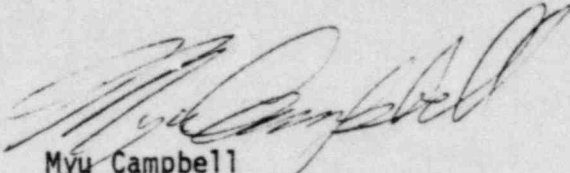


January 6, 1981

MEMORANDUM FOR: Stepan Chemical Company File
FROM: Myu Campbell, Radiation Specialist
SUBJECT: DOCUMENTS RECEIVED FROM LICENSEE DURING 80-01 INSPECTION

Enclosed are four (4) documents which were given to my by Mr. E. Swanson of Stepan Chemical Co. on November 24, 1980. The first is a copy of an aerial picture of the Maywood Chemical facility circa 1951. The second is a copy of the plot plan of the facility, also circa 1951. The third is a copy of an internal memorandum dated September 9, 1968 describing the closeout survey of the south dike area. The fourth is a copy of an internal memorandum dated July 26, 1963 describing the thorium process which was used by Maywood Chemical.


Myu Campbell
Radiation Specialist

Enclosures: As Stated

~~10 COPY TO THE INFORMATION~~

cc: HRSpicas

Memo to: D. H. Francis (4)

From: E. A. Swanson —

SEP 9 1968

Date: September 9, 1968

Subject: Status of Burial Project

The burial of waste material from the south dike was completed on August 3, 1968. A preliminary radiation survey was made by us, and indicated that the entire area had sufficient cover, showing that all readings were below 0.2 mrs/hr., the average limit specified by AEC for unrestricted use. Isotopes, Inc., of Westwood, N. J., made the final radiation survey on August 7. This survey, along with the building 77 area survey, was sent to the AEC on August 15, requesting that both former storage areas be released from the licensing requirements. In response to this request, Mr. R. G. Gilbert, Compliance Inspector for the AEC Newark office, made an independent survey of both former storage areas on Thursday, September 5. His survey substantiated the Isotopes survey, showing that both areas were well below the 0.2 mrs/hr. average. Spot readings of 0.3 and 0.4 mrs/hr. were noted. The AEC allows spot readings as high as 1.0 mrs/hr.

A letter received from the AEC on September 9, 1968, is attached, and states that both former storage areas can be released on an unrestricted basis.

Mr. John Russo of the Radiological Health Program of the New Jersey State Department of Health was called and informed of the AEC decision. A copy of the AEC letter was sent to Mr. Russo.

EAS/db

~~TO THE INFORMATION~~

POOR ORIGINAL

To: D. H. Francis

cc: DHFrancis - 4

From: E. H. Nichols

~~FOUO~~

JHuber

EHNichols

Date: July 26, 1963

HRSpiess

JFAlrutz

Subject: Thorium Process as of 1948 - Monazite Sand to Thorium Nitrate and Oxide.

Sand Processing

1. A charge of approximately 1000 pounds - 66° H₂SO₄ is placed in each of two kettles. The acid is heated until it begins to fume at which time about 8 bags of monazite sand is added. (The sand is not actually weighed and 8 full bags are not always added). The charge in the kettles is approximately 1000 pounds acid and 900 pounds monazite in each kettle. The mixture is cooked for about 4 hours with constant agitation.
2. When the mixture has cooked the required time it is dumped into receiving tanks where it is diluted with water. The material is agitated for 1 hour and the gravity is checked and adjusted to 40° Be by adding water. After the agitation has been completed the solution is allowed to stand for ½ hour and the rare earth salts with the exception of Thorium settle out. The 40° Be liquid is decanted off the top and pumped into a storage tank to be used for manufacturing of thorium salts. The R.E. salts remaining are dissolved in cold water and pumped to storage tanks.

This original separation of thorium from the rest of the R.E. salts is not quantitative. It is dependent on the fact that thorium sulfate is soluble in concentrations less than 40° Be and the other R.E. sulfates are insoluble in hot solutions at this concentration.

3. The 40° Be liquor, Thorium Sulfate, is pumped to the #2 evaporator and the solution is concentrated to 56° Be. At this concentration the thorium salts in solution are precipitated. The salts precipitated are really a mixture of ThP₂O₅; SO₄; HSO₃. The acid solution remaining from this precipitation is pumped to a storage tank and sold as spent sulfuric acid.

POOR ORIGINAL

~~TO CFR 2.790 INFORMATION~~

When the spent acid has been decanted the precipitated salts are dissolved in cold water to make a solution of 40° Be. This 40° Be solution is pumped to a lead storage tank or direct to Building #21 for processing to thorium salts.

Thorium Nitrate

The 40° Be liquor from process 31-01-1 is pumped to a lead tank and then diluted to 20° Be. This solution is allowed to settle and is then decanted to another lead tank. The residue is allowed to accumulate for several batches after which it is filtered on a Nutsch and stored in metal drums. This "black mud" is saved as the source of mesothorium.

The decanted solution is precipitated with oxalic acid (lab test shows a slight excess of acid) and the solution, after settling is pumped to the lime tank for disposal. The thorium oxalate which has been precipitated is washed several times in the same tank until laboratory tests show it is free from acid. The thorium oxalate is then filtered on a Nutsch filter and stored in wooden service containers.

"Soda ash extraction" - 1200 pounds thorium oxalate is added to 15% soda ash solution in steel tanks, ($\text{Na}_2\text{CO}_3 + \text{Na HCO}_3$); the small amount of NaHCO_3 is added to eliminate the possibility of an NaOH . When this crude thorium oxalate is converted to the carbonate any R.E. salts present are insoluble and the thorium carbonate is soluble. The solution is agitated and heated to 80° after which it is filtered in a press. The liquor (thorium carbonate) is placed in tank #2, and the press cake (R.E. Carbonate) is returned to tank #1 where it is washed and refiltered. The washed R.E. Carbonate cake is returned to process 31-05-1 where it is used in the manufacturing of R.E. Chloride cake.

The Thorium carbonate solution in tank #2 is treated with caustic soda, a laboratory control is used to determine the amount of caustic, and the thorium is precipitated as ThOH_4 . It is filtered in a press and the filtrate is returned to tank #1 as soda ash liquor for the next batch. In time this soda ash becomes so contaminated with silicates, etc. that a new batch is made and the old batch is pumped to the lime tanks for disposal.

~~10 INFORMATION~~

POOR ORIGINAL

The ThOH_4 is washed and pressed again until it is free from alkalis. This material is Thorium hydroxide technical.

Thorium Nitrate Finishing

Thorium hydroxide is dissolved in the HCl and made to 30°Be in a wooden tank. It is then transferred to a stoneware crock in which it is accurately measured by volume and $^\circ \text{Be}$ to determine the amount of electrolyte H_2SO_4 to use. The H_2SO_4 is added from measuring tanks to the solution which is cooled with ice and constantly agitated by hand. The solution starts at 30°Be and steadily falls with the addition of H_2SO_4 the Be falls to about 10°Be at which time it begins to rise. This is the critical point and determine when enough H_2SO_4 has been used. (as a check against calculated amount) Thorium sulfate precipitates and is filtered on a Nutsch. The solution is returned to process 21-02-1 to recover the R.E. values.

Thorium Sulfate is dissolved in cold water in a stoneware crock. Aqua ammonia is added with hand agitation and $\text{Th}(\text{OH})_4$ is precipitated. The $\text{Th}(\text{OH})_4$ is filtered on a suction filter, the liquor is discarded and the hydroxide is dissolved in HCl and the precipitation of $\text{Th}(\text{SO}_4)_2$ is repeated as above. The $\text{Th}(\text{SO}_4)_2$ obtained by the second crystallization is tested with a spectroscope for presences of R.E. If any R.E. is present, a third precipitation is made as the two above.

The $(\text{SO}_4)_2$ which has passed the test with the spectroscope is converted to $\text{Th}(\text{OH})_4$ with aqua ammonia as previously. It is filtered on a Nutsch and the product is pure $\text{Th}(\text{OH})_4$.

75 pounds HNO_3 is added to a stoneware crock and $\text{Th}(\text{OH})_4$ is slowly added from the cake on the Nutsch. $\text{Th}(\text{OH})_4$ is added to excess when the solution becomes cloudy. It is allowed to settle and the clear solution is transferred to another stoneware crock where H_2S is bubbled through to ppt. the heavy metals. The solution is filtered through filter papers on glass funnels and then evaporated in enamel pots to 150°C . The material is stirred out while cooling and the product is $\text{Th}(\text{NO}_3)_4$.

~~10 CFR 2790 INFORMATION~~

POOR ORIGINAL

Thorium Oxide C. P.

To make a crystal for production of Thorium oxide the previous evaporation in process 31-02-2 is stopped before the temperature reaches 150°C and additional HNO₃ is added. This liquor on cooling produces a large crystal which is filtered out and the liquor goes back as HNO₃ for the next batch.

The crystals are placed in silica dishes and ignited to the oxide over gas burners. When the open gas burners have ignited all that is possible at that temperature the material is placed in the gas furnaces (Lanthanum Building) and the final ignition is made.

The oxide is sifted through a 60 mesh sieve, packed, and shipped - ThO₂.

EHN/fe

~~10 CFR 2.790 INFORMATION~~

POOR ORIGINAL

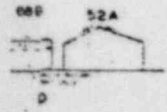
1951
→ N



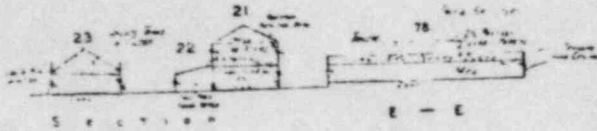
SDha NDIke

11

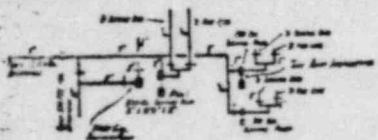
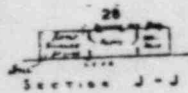
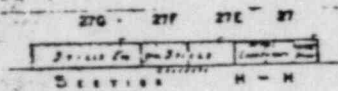
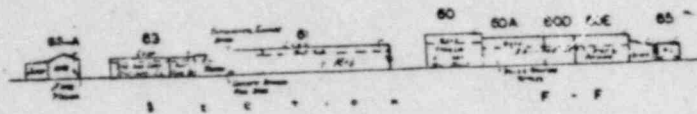
POOR ORIGINAL



110' RR



APPROX 0/100

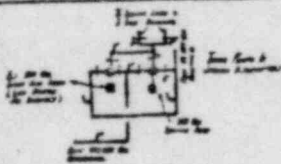


SECTION No. 1
SKETCH OF PIPING & EQUIP. FOR BUILDING 1-4
IN PLACE

RR SW

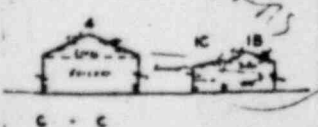


SECTION No. 2
SKETCH OF PIPING & EQUIP. FOR BUILDING 45
IN PLACE

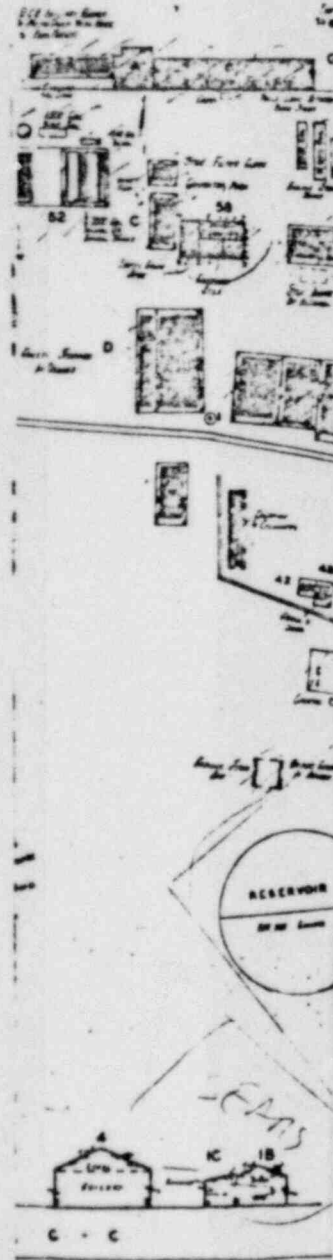


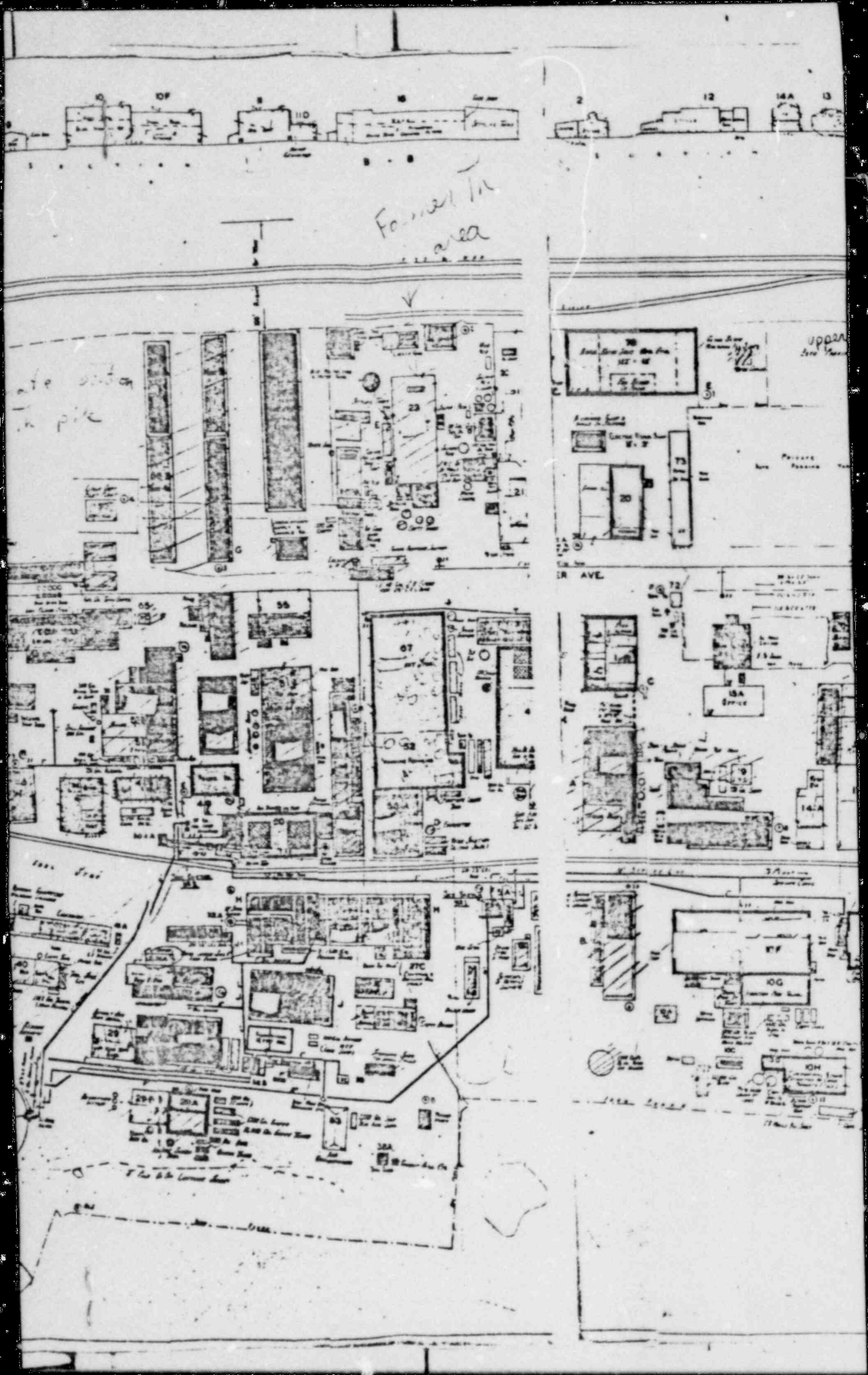
SECTION No. 3
SKETCH OF PIPING & EQUIP. FOR BUILDING V1
IN PLACE

Handwritten notes and signatures, including 'S.M.P.' and 'M.P.'.



SEAS





Former Tr
area

2 12 14A 13

10
11
11A
11B
11C
11D
11E
11F
11G
11H
11I
11J
11K
11L
11M
11N
11O
11P
11Q
11R
11S
11T
11U
11V
11W
11X
11Y
11Z
11AA
11AB
11AC
11AD
11AE
11AF
11AG
11AH
11AI
11AJ
11AK
11AL
11AM
11AN
11AO
11AP
11AQ
11AR
11AS
11AT
11AU
11AV
11AW
11AX
11AY
11AZ
11BA
11BB
11BC
11BD
11BE
11BF
11BG
11BH
11BI
11BJ
11BK
11BL
11BM
11BN
11BO
11BP
11BQ
11BR
11BS
11BT
11BU
11BV
11BW
11BX
11BY
11BZ
11CA
11CB
11CC
11CD
11CE
11CF
11CG
11CH
11CI
11CJ
11CK
11CL
11CM
11CN
11CO
11CP
11CQ
11CR
11CS
11CT
11CU
11CV
11CW
11CX
11CY
11CZ
11DA
11DB
11DC
11DD
11DE
11DF
11DG
11DH
11DI
11DJ
11DK
11DL
11DM
11DN
11DO
11DP
11DQ
11DR
11DS
11DT
11DU
11DV
11DW
11DX
11DY
11DZ
11EA
11EB
11EC
11ED
11EE
11EF
11EG
11EH
11EI
11EJ
11EK
11EL
11EM
11EN
11EO
11EP
11EQ
11ER
11ES
11ET
11EU
11EV
11EW
11EX
11EY
11EZ
11FA
11FB
11FC
11FD
11FE
11FF
11FG
11FH
11FI
11FJ
11FK
11FL
11FM
11FN
11FO
11FP
11FQ
11FR
11FS
11FT
11FU
11FV
11FW
11FX
11FY
11FZ
11GA
11GB
11GC
11GD
11GE
11GF
11GG
11GH
11GI
11GJ
11GK
11GL
11GM
11GN
11GO
11GP
11GQ
11GR
11GS
11GT
11GU
11GV
11GW
11GX
11GY
11GZ
11HA
11HB
11HC
11HD
11HE
11HF
11HG
11HH
11HI
11HJ
11HK
11HL
11HM
11HN
11HO
11HP
11HQ
11HR
11HS
11HT
11HU
11HV
11HW
11HX
11HY
11HZ
11IA
11IB
11IC
11ID
11IE
11IF
11IG
11IH
11II
11IJ
11IK
11IL
11IM
11IN
11IO
11IP
11IQ
11IR
11IS
11IT
11IU
11IV
11IW
11IX
11IY
11IZ
11JA
11JB
11JC
11JD
11JE
11JF
11JG
11JH
11JI
11JJ
11JK
11JL
11JM
11JN
11JO
11JP
11JQ
11JR
11JS
11JT
11JU
11JV
11JW
11JX
11JY
11JZ
11KA
11KB
11KC
11KD
11KE
11KF
11KG
11KH
11KI
11KJ
11KK
11KL
11KM
11KN
11KO
11KP
11KQ
11KR
11KS
11KT
11KU
11KV
11KW
11KX
11KY
11KZ
11LA
11LB
11LC
11LD
11LE
11LF
11LG
11LH
11LI
11LJ
11LK
11LL
11LM
11LN
11LO
11LP
11LQ
11LR
11LS
11LT
11LU
11LV
11LW
11LX
11LY
11LZ
11MA
11MB
11MC
11MD
11ME
11MF
11MG
11MH
11MI
11MJ
11MK
11ML
11MM
11MN
11MO
11MP
11MQ
11MR
11MS
11MT
11MU
11MV
11MW
11MX
11MY
11MZ
11NA
11NB
11NC
11ND
11NE
11NF
11NG
11NH
11NI
11NJ
11NK
11NL
11NM
11NN
11NO
11NP
11NQ
11NR
11NS
11NT
11NU
11NV
11NW
11NX
11NY
11NZ
11OA
11OB
11OC
11OD
11OE
11OF
11OG
11OH
11OI
11OJ
11OK
11OL
11OM
11ON
11OO
11OP
11OQ
11OR
11OS
11OT
11OU
11OV
11OW
11OX
11OY
11OZ
11PA
11PB
11PC
11PD
11PE
11PF
11PG
11PH
11PI
11PJ
11PK
11PL
11PM
11PN
11PO
11PP
11PQ
11PR
11PS
11PT
11PU
11PV
11PW
11PX
11PY
11PZ
11QA
11QB
11QC
11QD
11QE
11QF
11QG
11QH
11QI
11QJ
11QK
11QL
11QM
11QN
11QO
11QP
11QQ
11QR
11QS
11QT
11QU
11QV
11QW
11QX
11QY
11QZ
11RA
11RB
11RC
11RD
11RE
11RF
11RG
11RH
11RI
11RJ
11RK
11RL
11RM
11RN
11RO
11RP
11RQ
11RR
11RS
11RT
11RU
11RV
11RW
11RX
11RY
11RZ
11SA
11SB
11SC
11SD
11SE
11SF
11SG
11SH
11SI
11SJ
11SK
11SL
11SM
11SN
11SO
11SP
11SQ
11SR
11SS
11ST
11SU
11SV
11SW
11SX
11SY
11SZ
11TA
11TB
11TC
11TD
11TE
11TF
11TG
11TH
11TI
11TJ
11TK
11TL
11TM
11TN
11TO
11TP
11TQ
11TR
11TS
11TT
11TU
11TV
11TW
11TX
11TY
11TZ
11UA
11UB
11UC
11UD
11UE
11UF
11UG
11UH
11UI
11UJ
11UK
11UL
11UM
11UN
11UO
11UP
11UQ
11UR
11US
11UT
11UU
11UV
11UW
11UX
11UY
11UZ
11VA
11VB
11VC
11VD
11VE
11VF
11VG
11VH
11VI
11VJ
11VK
11VL
11VM
11VN
11VO
11VP
11VQ
11VR
11VS
11VT
11VU
11VV
11VW
11VX
11VY
11VZ
11WA
11WB
11WC
11WD
11WE
11WF
11WG
11WH
11WI
11WJ
11WK
11WL
11WM
11WN
11WO
11WP
11WQ
11WR
11WS
11WT
11WU
11WV
11WW
11WX
11WY
11WZ
11XA
11XB
11XC
11XD
11XE
11XF
11XG
11XH
11XI
11XJ
11XK
11XL
11XM
11XN
11XO
11XP
11XQ
11XR
11XS
11XT
11XU
11XV
11XW
11XZ
11YA
11YB
11YC
11YD
11YE
11YF
11YG
11YH
11YI
11YJ
11YK
11YL
11YM
11YN
11YO
11YP
11YQ
11YR
11YS
11YT
11YU
11YV
11YW
11YZ
11ZA
11ZB
11ZC
11ZD
11ZE
11ZF
11ZG
11ZH
11ZI
11ZJ
11ZK
11ZL
11ZM
11ZN
11ZO
11ZP
11ZQ
11ZR
11ZS
11ZT
11ZU
11ZV
11ZW
11ZX
11ZY
11ZZ

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

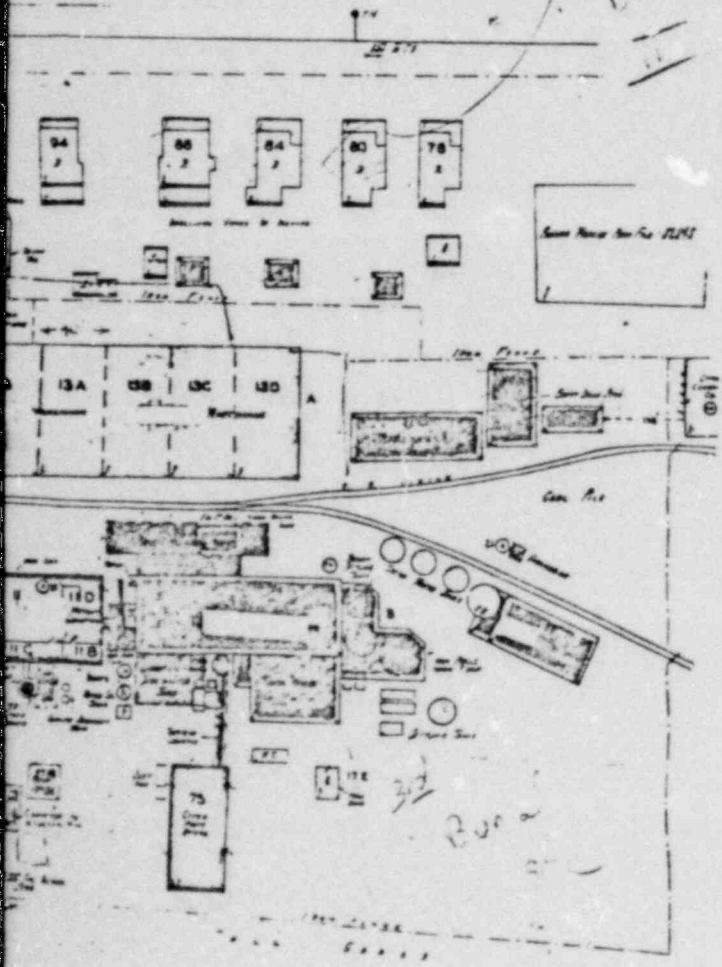
NEW JERSEY

13A 13B Vac 13D

A - A

Not
To
Scale
any more

Other
Eutia



MAYWOOD BRANCH CO. N. J.
 1914
 1915