NATIONAL BUREAU OF STANDARDS REPORT

NBS PROJECT		NBS REPORT
1103-40-5118	17 July 1956	4781

Progress Report for January--June 1956

on

Research in Applications of Mathematical Statistics to Problems of the Chemical Corps

(NBS Project 1103-40-5118)

NBS

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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This report contains a summary of the work done during the quarter. Results of this work are briefly stated. Technical reports written in connection with this project are mentioned but are transmitted separately.

(1) Computation of atmospheric diffusion

Two basic codes have been written for SEAC for evaluating the dosage of a grid point as a function of the distance from the source. The first of these computes values of

$$\phi(x,y) = \begin{cases} 0 & x < 0 \\ Mx^{-\alpha-\beta} \exp\left\{-P\, y^2\, x^{-\alpha d} - Lx\right\} & x > 0 \end{cases}$$

for given values of M, α, β, P, L at a rectangular grid $x_0 (\Delta x) x_m$, $y_0 (\Delta y) y_m$. This code was used to compute a table of $64 \times 240 = 15{,}360$ entries in about $1\frac{1}{2}$ hours.

The second code computes the effects of N sources on a grid point. The code calls for the following quantities as input

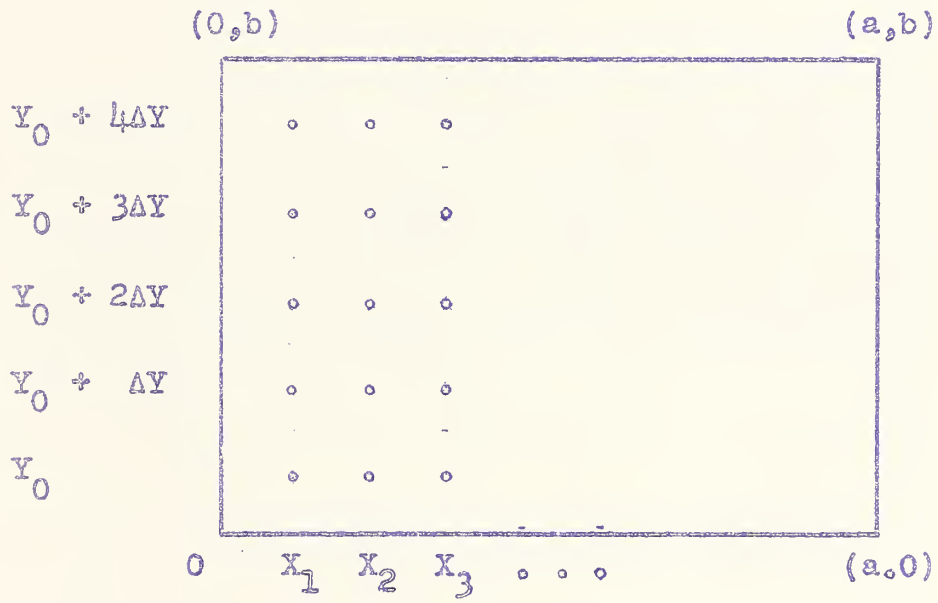
M, α, β, P, L : constants related to type of source

a, b : length and width of area of interest

X_1 X_2 ... : X coordinates of grid points

Y_0, ΔY : initial Y coordinate, increment in Y.

The code computes the sum of the effects from the N sources at each point on the grid: X_1, X_2, ..., Y_0 (ΔY) Y_m. (See Figure)



The X and Y coordinates of the N point sources are tandom numbers from rectangular distributions with ranges $0 < X < a$ and $0 < Y < b$ respectively.

The computation time is proportional to the number of source points to the left of a grid point. For the case P on which tests were made the following table gives the computation time required for each grid point.

Distance of grid point from origin (meters)	Time (minutes) per grid point
100	.2
500	.8
1,000	1.5
2,000	3.
5,000	8.
10,000	15.
12,000	18.

A manuscript on "Some Examples of the Use of High Speed Computers in Statistics" by J. M. Cameron prepared for inclusion in the Proceedings of the "Conference on the Design of Experiments in Army Research Development and Testing" was submitted.

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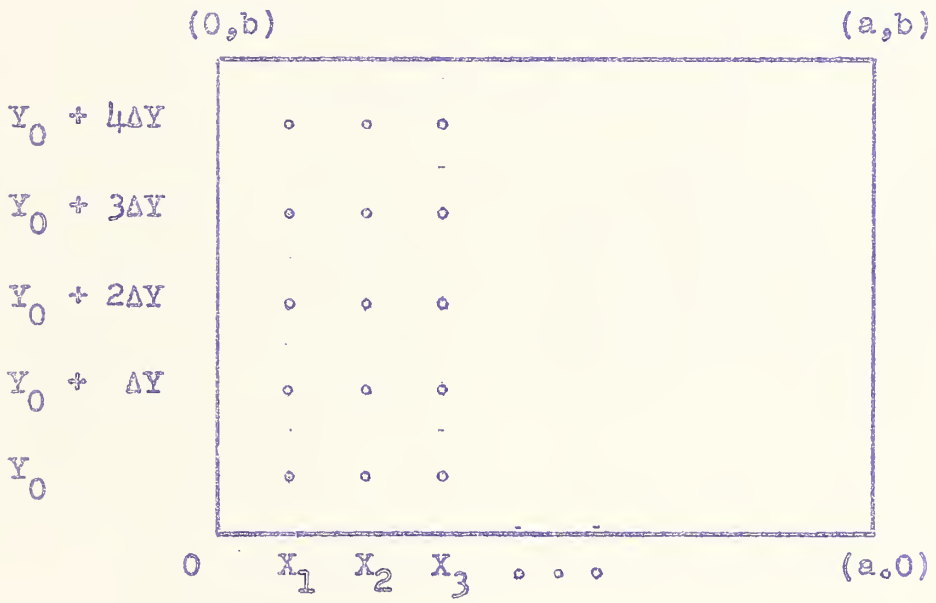
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