# NATIONAL BUREAU OF STANDARDS REPORT NBS PROJECT NBS REPORT 

## $1203 \times 40-5218$

## U. S. DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS

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# Progress Report ior Janvaryooumne 2956 

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Pesearch in Applications of Mathenatical Statistics to Problems of the Chemical Corps
(NBS Project 1103040-5118)

This repori contang a sumany of the wore done dusing the quartero Results of this worl are briemy stated. recho nicel reports written 1 n conection with this project are mentioned but are trensmitted soparately.

## (1) Computation or atmospheric diffusion

TWo basic codes have been written fox SEAC for evaluo ating the dosage of a grid point as a function of the diatance from the sovres. The first of these computes values 02
foz giwen values of 作 $\alpha_{,} \beta, P$, I at a roctangular grod $X_{0}(\Delta x) z_{n}$, Yo (Ay) y table of $64 x 240=25,360$ entries in abowt is hours.

The second code computes the effects of iN sources on a gria point. The code calls por the following quantities \&S input

$$
\begin{aligned}
& \text { B, } a_{8} \beta_{3} P_{8} L \text { : constants related to type of } \\
& \text { souree } \\
& \text { : Iengeh and widih of area of } \\
& \text { interest }
\end{aligned}
$$

$$
\begin{aligned}
& { }^{2} \mathrm{X}_{2} 000 \text { : } \mathrm{X} \text { coordinates of grid points } \\
& \text { IO AY : inhtial I coordinate, } \\
& \text { increment in } \mathrm{I} \text { 。 }
\end{aligned}
$$

The code computes the sum of the efrects from the in sources at each point on the groid：$X_{1}, X_{20000,} Y_{0}(\Delta Y) X_{m}$ （See Figure）


The $X$ and $Y$ coordinates of the $N$ point sources are tandom numbers from rectangul ar distroibutions 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．

- 3 -

| Distence of grid point <br> inom origin <br> $($ meters) | Time (minutes) <br> per groid point |
| :---: | :---: |
| 100 | 02 |
| 500 | 08 |
| 1,000 | 105 |
| 2,000 | 30 |
| 5,000 | 80 |
| 10,000 | 150 |

A manuscript on ${ }^{\text {a }}$ Some Framples of the Use or High Speed Computers in Statistics ${ }^{18}$ by J. H. Cameron prepared for ino clusion in the Proceodings of the "Conference on the Design of Experiments in Army Research Development and Testing ${ }^{12}$ was submitted。

# NATIONAL BUREAU OF STANDARDS REPORT NBS PROJECT 

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## U. S. DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS

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# Progress Report for Januaryoounn 1956 

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Research in Apolications of Mathematical statistics to Problems of the Chemical Corps
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## (1) Computation of armospheric difiusion

Tuo basic codes have bean mritten for SEAC for evalum ating the dosmge of a grid point as a function of the distance from the source. The first on these computes values 06
fos giten values of 號 $B, P$. I at a rectangular grid $\mathbb{X}_{0}(\Delta x) x_{M}, J_{0}(\Delta y) y_{m}$ o This codo was used to compute a taine of $64 \times 240=25,360$ eniries in about $1 \frac{3}{3}$ hours.

The second code compures the efrects of iN sources on a grid point. The code calls por the following quantities as input

$$
\begin{aligned}
\beta_{,} a_{y} \beta_{2} P_{3} \quad: & \text { constants related to type of } \\
& \text { source } \\
\%_{2} b: & \begin{array}{l}
\text { Iength and width of grea of } \\
\end{array}
\end{aligned}
$$



$$
\begin{array}{ll}
X_{I} X_{2} 000 & \text { : } X \text { coordinates of grid pointe } \\
Y_{0} \text { aI } & \text { : initian I coordinate } \\
& \text { increment in } X 0
\end{array}
$$

The code comprites the sum of the effects from the N sources at each point on the grid: $X_{1}, X_{20000} Y_{0}(\Delta Y) I_{m}$. (See siguro)


The $X$ and $I$ coordinates of the $I T$ point sources are tandom numbers from pectangular distributions with ranges $0 \& X \& a$ and $0<K<b$ 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 ror each grid point.

| Distance or grid point <br> iron origin <br> (neters) | Time (minutes) <br> per grid point |
| :---: | :---: |
| 100 | 02 |
| 500 | 0.8 |
| 1,000 | 1.5 |
| 2,000 | 30 |
| 5,000 | 80 |
| 10,000 | 150 |
| 12,000 | 18. |

A manuscript on "Some Eramples of the Use of High Speod Computers in Statistics ${ }^{18}$ by 3 . $\mathrm{H}_{\text {。 }}$ Cameron prepared for ino clusion in the Proceedings of the "Conference on the Design or Exporiments in Army Tesearch Develoment and Tesing" wes submitted。



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