

623·454·8(47)“1962·08·5”

RUSSIAN NUCLEAR EXPLOSION OF
5 AUGUST 1962

On 5 August 1962, the Soviet Union carried out its second biggest nuclear bomb test in the atmosphere. According to newspaper reports, the explosion took place at 0908 GMT in the Novaya Zemlya region, the site of Russia's last series of atmospheric tests.

Two of the atmospheric tests of the last series conducted on 23 October and 30 October 1961 in the same region were recorded by seismographs in India at a few stations, preliminary study of which has already been made by Tandon (1961) and by Saha (1962). Though the exact location and time of the explosions and also their yields have not been officially announced, the present test conducted in the same region affords an opportunity for making a comparative study of the records and the following particulars are, therefore, of interest.

The test was recorded at the Seismological Observatory at the Ridge, Delhi by the 3-component Press-Ewing Long Period seismograph and the Benioff Short-Period Vertical seismograph. It was also partly recorded by the Milne-Shaw North-South component and the Sprengnether microseismograph (East-West component). The times of recording of the various phases are given in Table 1.

The relevant portions of the records of the Press-Ewing Vertical and North-South component seismographs are reproduced in Fig. 1. The test has not been recorded so well in the East-West component. This is understandable since the region in which the tests is reported to have been conducted lies more or less north of Delhi. It has been observed that the record is more or less identical in appearance to those recorded by the Delhi Observatory on 23 and 30 October. A characteristic feature of all the three records is that both P and PP have been recorded only as single waves. In earthquake records the

beginning is followed usually by a train of waves. The S phase has also been clearly recorded particularly in the N-S component. This was not so in the earlier records. As in the case of the explosions of 23 and 30 October the P phase was followed 4 hours 29 minutes later by long period waves of period about 4 minutes. These waves have also been recorded by the microbarograph installed at the Safdarjung Airport Meteorological Observatory at the same time. The travel time of the beginning of the long period waves works out to $4^{\text{h}} 37^{\text{m}} 28^{\text{s}}$ giving a velocity of 313 meters/sec for the waves, which is the same as the velocity of sound in air.

The epicentral distance from Delhi calculated on the basis of the P and S times is found to be $\Delta = 47.0$ degrees of arc (5217 km) and the ground zero time $0 = 09^{\text{h}} 08^{\text{m}} 39^{\text{s}}$ GMT. The above analysis is supported by the times of the other phases also. While it is not possible, with the aid of data from a single station to locate precisely the epicentre, it may be mentioned that the distance $\Delta = 47^{\circ}$ corresponds to that of the Novaya Zemlya region from Delhi. The zero time calculated ($09^{\text{h}} 08^{\text{m}} 39^{\text{s}}$) is also very close to the time $09^{\text{h}} 08^{\text{m}}$ reported in the newspapers. The direction of the first motion as recorded by the Press-Ewing seismographs agrees with the location of the epicentre in a northerly direction.

The amplitude of ground movement recorded, works out to be equivalent to that produced by a shallow earthquake of magnitude 5.8 in the Richter-Gutenberg scale. The corresponding figure in the case of the explosion of 23 October 1961 (of about 30 megatons yield) was 5.6 and that of 30 October 1961 (of yield about 57 megatons) was 5.9. Comparison with these values indicates that the yield of the explosion of 5 August was somewhat less than 50 megatons but much more than 30 megatons. It may be pointed out here that the explosion of 5 August is

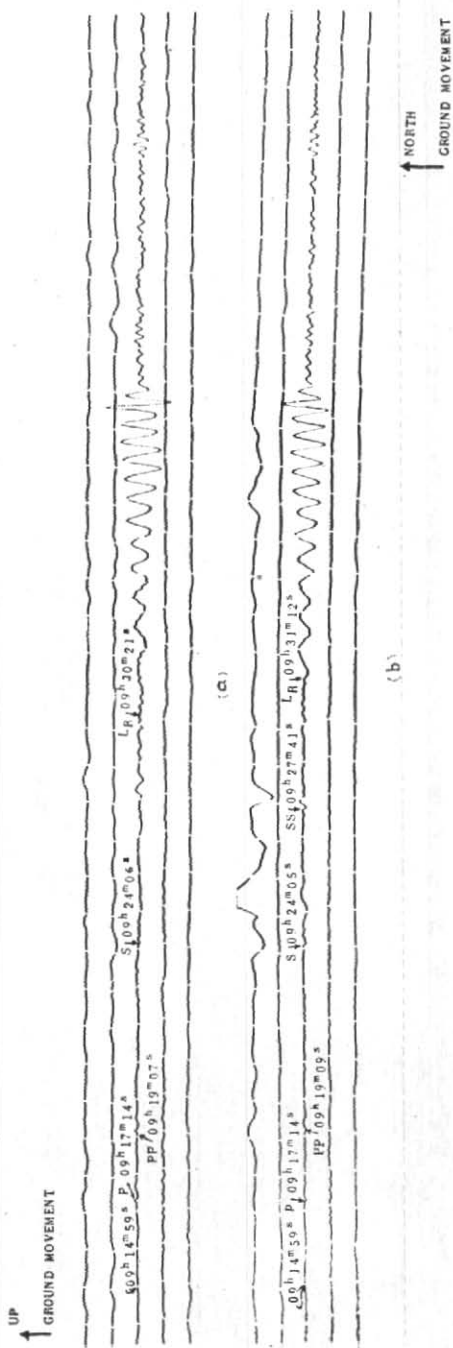


Fig. 1. Seismic records at Delhi of Russian Explosion of 5 August 1962

- (a) Press-Ewing Vertical ($T_0 = 14.3$ sec, $T_g = 82$ sec)
 (b) Press-Ewing Horizontal (N-S) ($T_0 = 15.8$ sec, $T_g = 90$ sec)

TABLE 1

Component	P	PP	S	SS	LR	Ground Roll	Remarks
Benioff (Z)	09-17-15	..	..	..	..	..
Press-Ewing (Z)	09-17-14	09-19-07	09-24-06	..	09-30-21	13-46-07	Max. ground motion 10.2 μ , T=19 sec
Press-Ewing (N-S)	09-17-14	09-19-09	09-24-05	09-27-41	09-31-12	13-47-59	Max. ground motion 6.5 μ , T=20.5 sec
Press-Ewing (E-W)	09-17-11	..	..	09-27-48	09-30-43	Very weak	Max. Ground motion 4.4 μ , T=17 sec

All times are in GMT; the records of the seismographs were cut off a few minutes after the beginning of the ground roll due to stopping of electric supply as a result of the power-shedding schedule operating in the city

reported to have taken place at an altitude more than that at which the explosions of the earlier series took place. Unless the exact height of detonation is known and its effect, if any, on the air to ground coupling taken account of, any estimation of the yield of the explosion would only be very tentative.

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REFERENCES

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