

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

(By Video Conferencing)

Original Application No. 288/2019

(With report dated 05.04.2021)

Balkrishan Vyas

Applicant

Versus

State of Rajasthan

Respondent

Date of hearing: 01.07.2021

**CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE M. SATHYANARAYANAN, JUDICIAL MEMBER
HON'BLE MR. JUSTICE BRIJESH SETHI, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

Respondent: Mr. Adhiraj Singh, Advocate for RSPCB

ORDER

1. The issue for consideration is the remedial action against illegal blasting and mining by M/s Jindal Saw Ltd., Bhilwada, Rajasthan resulting in damage to number of houses in the vicinity. The houses have developed cracks on the walls and leakage of water is taking place from the underground water tanks of some houses.

2. In pursuance of a direction of this Tribunal to ascertain facts, report dated 19.08.2019 was filed by the State PCB, annexing a report from the Geological Survey of India, finding that 375 buildings had cracks which were attributable to local vibrations and shaking. Operative part of the report is follows:-

“5. Conclusions and Recommendation

- i. Cracks in buildings are of common occurrence. A building component develops cracks whenever stress in the*

component exceeds its strength. Stress in a building component could be caused by externally applied forces, such as dead, live, wind or seismic loads, or foundation settlement or it could be induced internally due to thermal variations, moisture changes, chemical action, etc.

- ii. Cracks could be broadly classified as Structural and Non-Structural. Structural cracks which are due to incorrect design, faulty construction or overloading and Non-structural cracks are mostly due to internally induced stresses in building materials and these generally do not directly result in structural weakening. These are due to penetration of moisture or thermal variation. Cracks may appreciably vary in width from very thin hair cracks barely visible to naked eye (about 0.01 mm in width) to gaping cracks 5 mm or more in width.
- iii. **IMD data indicate that there is no seismic activity during the period from July, 2018 to January, 2019 in and around Pur Village. It is surprising to note that more than 375 buildings have suffered such kind of damage without any seismic event. As, the development of cracks in building and ground cannot be attributed to natural phenomena like earthquake, it is apprehended that it could be induced by local shaking and vibrations.**
- iv. **It is recommended to install tell tales across already developed- cracks to monitor the progress of cracks. Further it is also recommended to develop of progressive cracks by pre-splitting between the mining area and the village to keep the villagers safe from further development/ widening of cracks.”**

3. The report further stated that the District Magistrate, Bhilwada has constituted a team of Experts on 22.07.2019. Since the Tribunal sought further action taken report, report dated 28.02.2020 was filed as follows:-

“

1	Name of Work	Studies to investigate the reasons of cracks development in building of Pur village, Bhilwada, Rajasthan
2	Institute	CSIR-Central Building Research Institute, Roorkee
3	Site	Pur Village, Bhilwara, Rajasthan
4	Date of visit	28th January 2020 to 3rd February 2020
5	Type of work	Condition assessment of various buildings and monitoring of cracks in building

6	Status of work	<ul style="list-style-type: none"> • Condition assessment of 55 buildings of Pur Village, Bhilwara has been carried out in respect to typology of buildings, structural systems, construction materials, mapping of structural and non-structural cracks, other observations. The identified buildings were marked for monitoring at different locations in Pur village. • During studies, the cracks and other distresses in buildings were properly marked. The plan drawings of each building under distress were prepared. • The monitoring of cracks in buildings were carried out after installation of Demec gauges at different locations in the building. • Till date, about 216 locations were marked for crack monitoring. Readings were taken. It is expected to installation of more locations for crack monitoring. • Width of wider cracks were measured by Digital Vernier caliper
7	Observations	<ul style="list-style-type: none"> • The building stocks in Pur village were commonly found non-engineered with stone masonry wall having thickness varying from 3.35m.-0.45m. • The majority of the houses in the village were of G+1 structures or single storied. • Kota stone is used as flooring in the most of houses. • Foundation of buildings were found made with stone masonry with varying depth of about 1.0 m- 2.5 m. At a few places it was even deeper. • The roof slabs were made of sand stone slab and steel girders. A few houses also used wooden beams and I-
		<p>Section for providing support to stone slabs.</p> <ul style="list-style-type: none"> • Recent buildings were found constructed with R.C.O roof slab and brick masonry. In few places both stone masonry and brick masonry were observed along with R.C.C. roof slab and stone slab where new construction was done over/along the old structure. • The diagonal cracks were predominantly observed in walls etc. The cracks were also found between wall joints, surface floors, ceiling, skirting and walls. • Floor stone slabs were dislocated at a few places causing gaps between stones, which makes the surface uneven. • Most of cracks in walls were diagonal in nature and at some places cracks were propagated from floor to wall and then to

		<p>ceiling.</p> <ul style="list-style-type: none"> • Water leakage problem from cracked underground water tank in various houses were also observed.
8	Future	<ul style="list-style-type: none"> • The geotechnical investigations will be carried out at minimum 4 identified locations to assess the properties of soil and geophysical studies. The processing to carryout tests has been finalized and expected to start at the earliest after selection of appropriate agency. • The monitoring of cracks will be carried out for next six months.

”

4. The Tribunal sought further report about the remedial and mitigation measures to be taken and planned. Accordingly, further report was filed on 01.10.2020 annexing interim study reports which were summed up as follows vide order dated 12.10.2020:

“5. The interim reports are in respect of ‘blast induced vibrations and air overpressure and investigation on its damage potential vis-a-viz housing structures’ and ‘Hydro-Geological study’. The first interim report finds the extent of damage potential on the housing structure based on field trials in the area. The report is based on the investigation carried out by the team. The details of blasting field trials, monitoring of the blasts induced ground vibration and status of the work done are mentioned. The second study is based on the survey of the area within 2 KM radius from centre of the Pur village, using a series of filed experiments. The Committee also developed lithofacies map of subsurface zone of the study area and Aquifer characterization at different depths. Further, the Committee conducted chemical analysis of the water supply and the ground water samples and estimated ground water flow regime. The investigations by the Committee are on-going. The data has been collected and compiled but conclusion is yet to be reached and some further work is to be conducted for which the Committee has sought time. “

5. In above background, the State PCB has filed its final report on 05.04.2021 annexing the following:-

“

I. **Consolidated executive summary** submitted by Dr. Brijesh K. Yadav, Associate Professor Dept. of Hydrology, IIT Roorkee (U.K.), Dr. Harsh Kumar Verma, Sr. Principal Sci. & Head of the

section, Mining Science Research group, CSIR-Regional Research Centre CIMFR, Bilaspur (C.G.) and Prof. S. K. Singh , Sr. Principal Sci. & Head of the section, PPC group, CSIR-CBRI, Roorkee (U.K.)- (Enclosed herewith as **Annexure-A**).

- II. *Report on Hydro-Geological Study of Pur Village Area, Bhilwara, Rajasthan by Dr. B.K. Yadav and Team, Indian Institute of Technology Roorkee(U.K.)- (Enclosed herewith as **Annexure-B**.)*
- III. *Report on Scientific Studies on Blast Induced Ground Vibration & Air Overpressure and Investigation on its Damage Potential vis-a-vis Housing Structures in Pur Village, Bhilwara, Rajasthan by Central Institute of mining & fuel research (Council of Scientific and Industrial Research, New Delhi, Govt. of India) Regional Research Centre, Bilaspur (CG) 495001. (Enclosed herewith as **Annexure-C**.)*
- IV. *Report on Studies to investigate the Reasons for Cracks Development in Buildings of Pur Village, Bhilwara, Rajasthan by-CSIR-Central Building Roorkee - 247667 Uttarakhand. (Enclosed herewith as **Annexure-D**)*

6. It would suffice to reproduce the consolidated executive summary of the report which is as follows:

- “• *District Magistrate and Collector, Bhilwara vide its letter no: Jud/19/26230 dated 22.07.2019 requested a few esteemed institutions to carry out the scientific study and find out causes and effects of development of cracks in buildings/ structures/ roads/ drains in and around Pur village, Bhilwara, Rajasthan being an interdisciplinary problem. The district administration had also requested to suggest the mitigation measures and action plan to district administration/ state government.*
- *Accordingly, a joint site visit by the representatives of CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad, CSIR-Central Building Research Institute (CBRI), Roorkee, Uttarakhand and Indian Institute of Technology (IIT) Roorkee, Roorkee was carried out during 18-20 August 2019 to Pur village, Bhilwara. Subsequently a meeting in the office of the District Magistrate, Bhilwara District, Rajasthan was conducted for undertaking scientific studies to evaluate the possible causes of the crack in the buildings of Pur village, Bhilwara. In addition, the scope of works has been independently submitted by individual institutions to District Administration by CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad, CSIR-Central Building Research Institute (CBRI), Roorkee, Uttarakhand and IIT Roorkee, Roorkee based mutually agreed terms and conditions by all the stake holders.*
- *District Magistrate and Collector, Bhilwara vide letter no: Jud/19/26667 dated 09.10.2019 requested CSIR-CIMFR*

Dhanbad to evaluate the impact of the blast induced ground vibration. Similarly, CSIR-CBRI, Roorkee was requested vide letter No. Jud/19/26668 dated 09.10.2019 to carryout scientific study to investigate the reasons of cracks development in buildings of Pur Village, Bhilwara. Also, IIT Roorkee was requested vide letter no: Jud/19/26669 dated 09.10.2019 to carryout hydro-geological study of Pur Village Area, Bhilwara, Rajasthan.

- The detailed study reports carried out by CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad, CSIR-Central Building Research Institute (CBRI), Roorkee, Utrakhand and Indian Institute of Technology (IIT) Roorkee, Roorkee were submitted individually. However, brief of studies comprising all the studies were summarized as under:

CSIR-CIMFR, Dhanbad

- CSIR-CIMFR Dhanbad team have conducted altogether 15 experimental blast rounds at Dhedwas Iron Ore mine in different phases for the field investigations. The parameters of the experimental blast round were decided after reviewing the data of mine blasting operations carried out during April 2018 to Dec 2019.
- Experimental blasts have been conducted with different combination and range of parameters. Small as well as large blasts both in terms of number of holes and total explosive quantity were conducted both in overburden as well as in bottom benches.
- In experimental study, the blasts holes depths were varied from 3.5 m to 12.0m, total charge varied from 3.06 ton to as high as 10.06 tons, no of holes varied from 39 holes to 195 holes. Although, average maximum charge per delay in day to day mine blasting operation was 100 kg, experimental blast rounds upto 190 kg have been conducted to create a severe condition and to evaluate the impact of vibration. The range of experimental blast design parameter covered entire range of day-to-day blasting practices of Dhedwas iron ore mine, Bhilwara.
- Comprehensive vibration monitoring was carried out during blasting study. The complete exercise was carried out in presence of representatives from Pur village. Altogether vibration was monitored at 56 different locations. Monitoring locations were chosen considering size of blast, mine location the distance of the presence of any domestic structures. The monitoring locations include domestic houses and other prominent structures of the Pur village such as Temple and Mosques and community hospital. In all the cases, measurements were carried out in the direction with an intention to record maximum vibration as well as air overpressure intensity. Simultaneous vibration monitoring both in close-field as well as far-field using four set of four channel monitoring system was carried out. All these instruments are four-channel seismographs provided with one tri-axial transducer for monitoring of vibration (in mm/s or inch/s) and one-channel for monitoring of air overpressure/noise in dB (L) or

Pa. The instrument records vibrations in three orthogonal directions [i.e. Longitudinal (L), Vertical (V) and Transverse (T)] and peak frequency of vibration in individual directions as well as compute the peak vector sum of vibrations. The instruments also permit full wave recording at any instant of time for a preset duration. Sensors are having an articulation of spikes for proper coupling with the ground for more precise reading of particle velocity.

- Observed vibration data were analysis and a site specific mathematical relationship has been established correlating the maximum explosives weight per delay (Q_{max} in kg), distance of vibration measuring transducers from the blasting face (D in m) and recorded peak particle velocity (V in mm/s) using square root scaled distance at 95% confidence interval. The equation which shows attenuation characteristics of the blast induced ground vibration were further analysed in details to understand the damaging effect of vibration on domestic houses of Pur village with different blast design parameters.*
- It is observed that the blast induced ground vibration and air overpressure beyond a distance of 500 m from the blasting site remained less than 2.00 mm/s (with frequency ranging from 2.0 Hz to 30 Hz) and 115 dB(L) against recommended safe values of 5.0 mm/s and 134 dB(L) respectively. Analysis of propagation characteristics of the vibration reveals that ground vibration beyond a distance of 1.5 km decayed to less than 1.0 mm/s in majority of the cases. In most of the housing structure beyond 2.0 km from the blast site, equipment did not record any vibration and the values were not noticeable by human body. Therefore, it is concluded that observed blast induced ground vibration values are safe and well within the permissible limit as per the recommendations of Directorate General of Mine Safety (DGMS).*
- Based on the findings of the study it is concluded that impact of blast induced ground vibration and air overpressure in causing the damage to the housing structures of Pur village, approx., 2.5 km away is practically not possible. Cracks in the houses may be accounted to hydrogeological set-up of Pur village and its interaction with the weak non-engineered foundation of the houses.*
- It is however, recommended that an expert agency may be engaged to supervise blasting operations at Dhedhwas iron ore mine. Vibration monitoring shall be carried out by such expert agency in close co-ordination with representative of Pur village.*

CSIR-CBRI, Roorkee

- CSIR-CBRI, Roorkee has carried out survey of buildings stocks to assess the type of damages in the buildings and other structures. About 80 houses were randomly selected for crack monitoring by installing demec point. In addition, four bore holes were drilled in different locations in the Pur village of varying depths from 12m to 20 m. The different site locations were selected to know the sub-surface lithology of the surrounding region of the Pur Village, Bhilwara and also the central part of the Pur village.*

- *The Pur village is situated on schist, a high-grade metamorphic rock with vertical foliation. The bore log study found that the soil thickness overlying the rocks in the periphery of the village is very less, around 3m. However, in the inner region of the village, the fragmented rock, sand mixed with pebbles/boulders of rocks were found overlying the schist rocks. The overburden thickness of these loose rock fragments and soil above the bed rocks was found varying from 8m to 14m.*
- *The bedrock below the soil layer at a depth of 8m to 14m is weathered schist having low strength with vertical foliation. This may undergo dilation if saturated with water because of dominating mica minerals having swelling property. Although, the sandy soil was having adequate engineering properties.*
- *There is a thick heterogeneous soil layer comprises of sand and pebbles/boulders in the central part of the village where cracks are developed in the clusters of houses. There could be a possibility of washing out of fines due to water seepage in this soil layer or subjected to any kind of dynamic loading creating some void spaces. This may cause settlement of buildings resulting in appearance of cracks.*
- *It is inferred from the geotechnical investigations that the cracks are appeared in the buildings, which are situated on the considerably thick heterogeneous soil in the central part of the Pur village. The buildings situated at the village periphery having less overburden are less damaged than the buildings in the central part of the village where the loose soil mixed with rock fragments has a thickness varying from 8m to 14m.*
- *The damages were observed mainly in non-engineered and old constructed buildings. The crack pattern in the buildings clearly indicate towards differential settlements in foundation. The damages were observed in the form of diagonal cracks, separation of the walls, separations of floors with wall. The roofs made of stone slab placed over steel/ wooden girders were also found damaged.*
- *The damages in buildings were found mild to severe depending on the construction types and foundation systems. During study, it was found that damages due to cracks were mainly in stone masonry structures(non-engineered type buildings).*
- *The majority of reinforced concrete framed structure buildings and properly constructed masonry buildings were found with only minor cracks on surface of plaster.*
- *The cracks were monitored for about 8 months and found gradually progressing at several locations. It is also due to progressive nature of differential settlements.*
- *Therefore, it is advised that dismantling and reconstruction or repair and rehabilitation of buildings were taken up after considering all factors with due consultative meetings with affected residents. The excessively damaged buildings need to be vacated and affected people may be relocated to other locations.*

- *Proper categorization of the damages are therefore, important for post damage rehabilitation or reconstruction program for Pur village. It is advised to retrofit and strengthen the building foundations before retrofitting to buildings.*

Indian Institute of Technology (IIT) Roorkee

- *IIT Roorkee carried out comprehensive site surveys followed by a series of field experiments conducted during 07-11 November 2019 and 28 January to 01 February 2020, to know the hydro-geological behaviour of the study area.*
- *Initial field observation around the village indicates that the in-situ rock exposures have been significantly affected as a result of growing inhabitations and only partially eroded/isolated remnants of hillocks are found. Examination of one partially eroded hillock near 'Baoli Naka' revealed fragile exposures of grey black mica-schists with dip of 75-80 degrees in the N-130 degrees direction, implying strike of N40-220 degrees. The spot examination of the geological formations in the Sukhadia stadium indicated presence of isolated outcrops of schistose quartzites within the alluvial expanse. The quartzites displayed dips of 80-85 degree towards southeast and a strike of N50-230 degree. The quartzites also showed clear evidence of displacement as manifested by presence of slicken sides with visible silicification on the steep rock face(s).*
- *The project area contains gneiss and schist (Bhilwara Super group); gneiss, schist, phyllite, slate and limestone (Aravalli Supergroup); sandstone, shale and limestone (Vindhyan Super group); and alluvium as the major water bearing formations. The aquifers are localized within the weathered, fractured and jointed hard rock zones.*
- *A total of 19 geophysical surveys were conducted in and around the village using 06 vertical electrical soundings (VES), 11 electrical resistivity tomography (ERT) surveys, and 02 Surface nuclear magnetic resonance (SNMR) surveys using ground magnetic resonance (GMR).*
- *Findings of VES surveys conducted around the village show that the area contains thin top soil/alluvium of thickness varying between 1-5 m. The top layer of sand is underlain by weathered hard rock (schistose quartzite) having thickness ranging from 2-7 m, with its maximum value at Sukhadia stadium. Besides, the top veneer is directly comprised of weathered hard rock at Jindal Mata Mandir as seen from the high resistivity of the topmost layer. The above interpretation is corroborated by the presence of isolated outcrops (schistose quartzite) dotting the area. The rocks in these outcrops show steep dips towards SE, with presence of slicken sides at Sukhadia stadium, pointing to the incidence of displacement of rocks in the geological past. The weathered schist/quartzite is indicated to be underlain by hard/compact Schist/quartzite at depths varying between 5 m below the*

surface at Pathwari site and 9.5 m below ground level at Sukhadia stadium site.

- *The top soil depth in central part of the village is found thicker than the other sites situated at the village periphery particularly towards the mining industry. A sudden drop in resistivity along the survey line observed from 2-D ERT inversion near Bada (Teli) Mandir shows a presence of vertical fracture/anomaly which continued throughout the depth. Furthermore, a saturated soil or soft material zones are visible in the ERT images at couple of places in the subsurface of this site. A substantial variation in subsurface formation is also observed vertically and horizontally at other locations.*
- *A significant variation in water content and hydraulic conductivity observed with depth of GMR surveys indicates towards the sudden change in subsurface strata. These types of subsurface anomalies are prone for differential land settlement.*
- *The evidences relating to proneness to displacement within hard rocks strengthen the possibility of generation of new cracks and fractures in the area. In general, the village geology of its top subsurface is found significantly heterogeneous in nature. It contains varying thickness of sand mixed with gravels underlain by weathered/hard schist at random places making it vulnerable under the possible vibrations, surface overburden or other (sub)surface modifications.*
- *Possible water seepage from leaky drainage network seems further aggravating the observed differential land settlement and associated cracks. Extreme rainfall event of 1023 mm observed in 2019 monsoon period appears contributing land settlement. The isotopic analysis indicates that properties of seepage water and groundwater are found close, and hence, the high groundwater table in the surrounding area of the school seems to be main cause of seepage and waterlogging.”*

7. We have heard learned Counsel for the State PCB. No other party has put in appearance today. As is clear from the report of the State PCB dated 19.8.2019 extracted above that 375 building structures have developed cracks in the area as a result of vibrations. Visible reason for such vibrations is blasting for mining. No other reason is discernible. Still, it is surprising to note that the studies conducted, summarised above, do not attribute the cracks to the blasts during the mining nor specify any other logical reason.

8. Question is who is responsible for the cracks and what remedial measures are required. Whether the reports of the Institutes in question which have not been able to clearly spell out reasons for the damage to the houses in the vicinity of blasting sites can be taken as conclusive or reasonable inference is to be drawn that in absence of any other possible reason, the blasting is the reason for the damage and on that basis preventive and remedial measures can be directed. Further question is whether the statutory regulators have incorporated safeguards against unscientific blasting. If not, whether there is need for review at their level to prevent such damage. Our answer is that the blasting is the clear reason for damage to the houses, notwithstanding absence of scientific evidence. The victims need to be compensated and safeguards need to be adopted by the Project proponent. Statutory regulators need to review the regulatory regime. Reasons follow.

9. We may first note the undisputed legal position. The environmental law to be applied by this Tribunal under sections 20 read with section 15 of the NGT Act is the 'sustainable development', 'precautionary principle' and 'polluter pays' principle. 'Public Trust' doctrine requires the regulatory bodies to adopt safeguards against hazardous commercial activities affecting the safety of life and properties of the citizens. These principles are known and have been elucidated in judgements of the Hon'ble Supreme Court inter alia in *Vellore Citizens' Welfare Forum v. Union of India*, (1996) 5 SCC 647, *A.P. Pollution Control Board case*, *A.P. Pollution Control Board v. M.V. Nayudu*, (1999) 2 SCC 718 and *Arjun Gopal v. Union of India*, (2019) 13 SCC 523. It will suffice to quote the discussion on the subject from the last judgement which is as follows:

“37. ... In environmental law, “precautionary principle” is one of the well-recognised principles which is followed to save the environment. It is rightly argued by the petitioners that **this principle does not need exact studies/material**. The very word “precautionary” indicates that such a measure is taken by way of precaution which can be resorted to even in the absence of definite studies. In *Vellore Citizens' Welfare Forum [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647]*, this Court explained the principle in the following manner: (SCC pp. 658 & 660, paras 11 & 14-16)

“11. Some of the salient principles of “Sustainable Development”, as culled out from Brundtland Report and other international documents, are Inter-Generational Equity, Use and Conservation of Natural Resources, Environmental Protection, the Precautionary Principle, Polluter Pays Principle, Obligation to Assist and Cooperate, Eradication of Poverty and Financial Assistance to the developing countries. We are, however, of the view that “the precautionary principle” and “the polluter pays principle” are essential features of “Sustainable Development”. The “precautionary principle” — in the context of the municipal law — means:

(i) Environmental measures — by the State Government and the statutory authorities — must anticipate, prevent and attack the causes of environmental degradation.

(ii) **Where there are threats of serious and irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.**

(iii) **The “onus of proof” is on the actor or the developer/industrialist to show that his action is environmentally benign.**

14. In view of the abovementioned constitutional and statutory provisions we have no hesitation in holding that the **precautionary principle and the polluter pays principle are part of the environmental law of the country.**

15. Even otherwise once these principles are accepted as part of the Customary International Law there would be no difficulty in accepting them as part of the domestic law. It is almost an accepted proposition of law that the rules of Customary International Law which are not contrary to the municipal law shall be deemed to have been incorporated in the domestic law and shall be followed by the courts of law. To support we may refer to *H.R. Khanna, J.s' opinion in ADM, Jabalpur v. Shivakant Shukla [ADM, Jabalpur v. Shivakant Shukla, (1976) 2 SCC 521]*, *Jolly George Varghese case [Jolly George Varghese v. Bank of Cochin, (1980) 2 SCC 360]* and *Gramophone Co. case [Gramophone Co. of India Ltd. v. Birendra Bahadur Pandey, (1984) 2 SCC 534: 1984 SCC (Cri) 313]*.

16. The constitutional and statutory provisions protect a person's right to fresh air, clean water and pollution-free environment, but the

source of the right is the inalienable common law right of clean environment. ...”

38. *The precautionary principle accepted in the aforesaid judgment was further elaborated in A.P. Pollution Control Board case [A.P. Pollution Control Board v. M.V. Nayudu, (1999) 2 SCC 718] as under: (SCC pp. 732-34, paras 31-35)*

“31. The “uncertainty” of scientific proof and its changing frontiers from time to time has led to great changes in environmental concepts during the period between the Stockholm Conference of 1972 and the Rio Conference of 1992. In Vellore Citizens' Welfare Forum v. Union of India [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] a three-Judge Bench of this Court referred to these changes, to the “precautionary principle” and the new concept of “burden of proof” in environmental matters. Kuldip Singh, J. after referring to the principles evolved in various international conferences and to the concept of “sustainable development”, stated that the precautionary principle, the polluter pays principle and the special concept of onus of proof have now emerged and govern the law in our country too, as is clear from Articles 47, 48-A and 51-A(g) of our Constitution and that, in fact, in the various environmental statutes, such as the Water Act, 1974 and other statutes, including the Environment (Protection) Act, 1986, these concepts are already implied. The learned Judge declared that these principles have now become part of our law. The relevant observations in Vellore case [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] in this behalf read as follows: (SCC p. 660, para 14)

‘14. In view of the abovementioned constitutional and statutory provisions we have no hesitation in holding that the precautionary principle and the polluter pays principle are part of the environmental law of the country.’

The Court observed that even otherwise, the abovesaid principles are accepted as part of the customary international law and hence there should be no difficulty in accepting them as part of our domestic law. In fact, on the facts of the case before this Court, it was directed that the authority to be appointed under Section 3(3) of the Environment (Protection) Act, 1986 ‘shall implement the “precautionary principle” and the “polluter pays principle”.

The learned Judges also observed that the new concept which places the burden of proof on the developer or industrialist who is proposing to alter the status quo, has also become part of our environmental law.

32. *The Vellore [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] judgment has referred to these*

principles briefly but, in our view, it is necessary to explain their meaning in more detail, so that courts and tribunals or environmental authorities can properly apply the said principles in the matters which come before them.

33. A basic shift in the approach to environmental protection occurred initially between 1972 and 1982. Earlier, the concept was based on the “assimilative capacity” rule as revealed from Principle 6 of the Stockholm Declaration of the U.N. Conference on Human Environment, 1972. The said principle assumed that science could provide policy-makers with the information and means necessary to avoid encroaching upon the capacity of the environment to assimilate impacts and it presumed that relevant technical expertise would be available when environmental harm was predicted and there would be sufficient time to act in order to avoid such harm. But in the 11th Principle of the U.N. General Assembly Resolution on World Charter for Nature, 1982, the emphasis shifted to the “precautionary principle”, and this was reiterated in the Rio Conference of 1992 in its Principle 15 which reads as follows:

‘Principle 15.—In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for proposing cost-effective measures to prevent environmental degradation.’

34. In regard to the cause for the emergence of this principle, Charmian Barton, in the article earlier referred to in “The Status of the Precautionary Principle in Australia” [(1998) 22 Harvard Environmental Law Review 509 at p. 547] says:

‘There is nothing to prevent decision-makers from assessing the record and concluding that there is inadequate information on which to reach a determination. If it is not possible to make a decision with “some” confidence, then it makes sense to err on the side of caution and prevent activities that may cause serious or irreversible harm. An informed decision can be made at a later stage when additional data is available or resources permit further research. To ensure that greater caution is taken in environmental management, implementation of the principle through judicial and legislative means is necessary.’

In other words, the inadequacies of science is the real basis that has led to the precautionary principle of 1982. It is based on the theory that it is better to err on the side of caution and prevent environmental harm which may indeed become irreversible.

35. *The principle of precaution involves the anticipation of environmental harm and taking measures to avoid it or to choose the least environmentally harmful activity. It is based on scientific uncertainty. Environmental protection should not only aim at protecting health, property and economic interest but also protect the environment for its own sake. Precautionary duties must not only be triggered by the suspicion of concrete danger but also by (justified) concern or risk potential. The precautionary principle was recommended by the UNEP Governing Council (1989). The Bomako Convention also lowered the threshold at which scientific evidence might require action by not referring to “serious” or “irreversible” as adjectives qualifying harm. However, summing up the legal status of the precautionary principle, one commentator characterised the principle as still “evolving” for though it is accepted as part of the international customary law, ‘the consequences of its application in any potential situation will be influenced by the circumstances of each case’. (See First Report of Dr. Sreenivasa Rao Pemmaraju — Special Rapporteur, International Law Commission dated 3-4-1998, paras 61 to 72.)”*

10. Thus, once it is found that there are cracks in the vicinity of mining using blasting and there is no identified other reason for the blasts, absence of scientific certainty to show that the blasting is the reason cannot be a ground to assume that no preventive or remedial measures are to be taken for protecting the environment and the inhabitants. Burden of proof is on the project proponent. There is no data to show that such cracks are happening in other areas where blasting is not taking place. On principle of *res ipsa loquitur*, blasting has to be taken as a cause for the cracks, as submitted by the State PCB in its initial report mentioned earlier which annexed the report from the Geological Survey of India that more than 375 buildings had suffered damage which appeared to be due to local shaking and vibration. Thus, the approach in the three Experts study mentioned above that in absence of clear scientific proof of correlation of blasting and cracks in housing, damage could not be attributable to the blasts is against the principles of Environmental law to be applied by this Tribunal and to

that extent the reports cannot be accepted. However, the Recommendations for expert supervision of the blasting operations and for rehabilitation of the affected victims are acceptable.

11. Principle of “Absolute Liability” laid down in MC Mehta (1987) 1 SCC 395 and later judgements that liability of the person undertaking hazardous activities for commercial gains for any accident and loss is absolute is attracted. 375 victims whose houses have been damaged as per report dated 19.8.2019 submitted by the State PCB need to be compensated. Annexure-A to the report dated 18.01.2021 filed by the CSIR- Central Building Research Institute, Roorkee has a list of 79 buildings which have suffered damage which is reproduced below:

“Table A1: Location of Demec points at various places in Pur Village, Bhilwara

Sl. No.	Location	Demec Points
1.	<i>Govt. Primary School</i>	<i>D1, D2, D3, D188, D189,</i>
2.	<i>Govt. Higher Secondary School</i>	<i>D4, D5,</i>
3.	<i>Village General Hospital</i>	<i>D6, D6, D7, D8, D9, D10, D190, D191, D192, D217,</i>
4.	<i>Govt. Girls School</i>	<i>D11, D208, D209,</i>
5.	<i>Laxmi Narayan temple</i>	<i>D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D184, D185, D186, D187</i>
6.	<i>Madina Masjid</i>	<i>D134, D134, D135, D136, D137, D138, D139, D140, D141, D142,</i>
7.	<i>House No.2835</i>	<i>D12, D13,</i>
8.	<i>House No.2836</i>	<i>D14</i>
9.	<i>House No.2249</i>	<i>D15, D16, D17, D18, D19, D20,</i>
10.	<i>House No.2251</i>	<i>D21, D22,</i>
11.	<i>House No. 1936</i>	<i>D36</i>

12.	<i>House No. 1952</i>	<i>D37, D38, 39</i>
13.	<i>House No.1956</i>	<i>D40, D41, D42, D43, D45, D46</i>
14.	<i>House No.1962</i>	<i>D44</i>
15.	<i>House No.1970</i>	<i>D47</i>
16.	<i>House No.1982</i>	<i>D48</i>
17.	<i>House No.2213</i>	<i>D49</i>
18.	<i>House No.2377</i>	<i>D50, D51</i>
19.	<i>House No.2489</i>	<i>D52</i>
20.	<i>House No.2490</i>	<i>D53, D54, D55</i>
21.	<i>House No.2669</i>	<i>D56, D57</i>
22.	<i>House No.2491</i>	<i>D58</i>
23.	<i>House No.2496</i>	<i>D59, D60</i>
24.	<i>House No.2492</i>	<i>D61</i>
25.	<i>House No.2502</i>	<i>D62, D64</i>
26.	<i>House No.2505</i>	<i>D63, D65</i>
27.	<i>House No.1100</i>	<i>D66, D67, D68, D69</i>
28.	<i>House No.1095</i>	<i>D70, D71, D72, D100, D101</i>
29.	<i>House No.109</i>	<i>D73</i>
30.	<i>House No.1092</i>	<i>D74</i>
31.	<i>House No. 1093</i>	<i>D75, D76</i>
32.	<i>House No.841</i>	<i>D77, D78, D79, D80, D81</i>
33.	<i>House No.1064</i>	<i>D82, D83</i>
34.	<i>House No.1066</i>	<i>D84, D85</i>
35.	<i>House No.1068</i>	<i>D86, D87</i>
36.	<i>House No.1077</i>	<i>D88, D89</i>
37.	<i>House No.1073</i>	<i>D90</i>
38.	<i>House No.1067</i>	<i>D91, D92, D93</i>
39.	<i>House No.1079</i>	<i>D94</i>
40.	<i>House No.878</i>	<i>D95, D96</i>
41.	<i>House No.882</i>	<i>D97, D98, D99</i>
42.	<i>House No. 1353</i>	<i>D102, D103, D104, D105, D106,</i>

		D107, D108, D109
43.	House No. 1372	D110, D111, D112, D113, D114,
44.	House No. 1375	D115, D116,
45.	House No. 1378	D1017
46.	House No. 1582	D118, D119,
47.	House No. 1581	D120, D121,
48.	House No. 1635	D122
49.	House No. 1567	D123
50.	House No. 112	D124, D125, D126
51.	House No. 1126	D127
52.	House No. 1122	D128
53.	House No. 1132	D129
54.	House No. 1135	D130
55.	House No. 1141	D131, D132, D133,
56.	House No. 2245	D143, D144, D145, D146, D147, D148
57.	House No. 2249	D149, D150, D151, D152, D153, D153, D154, D155, D156, D157
58.	House No. 2248	D158, D159, D160, D161, D162, D163, D164, D165, D166, D167
59.	House No. 2235	D168, D169, D170, D171, D172,
60.	House No. 2234	D173, D174, D175, D176, D177
61.	House No. 2237	D178, D179,
62.	House No. 2826	D180, D181, D182, D183,
63.	House No. 2822	D193, D194, D195, D196,
64.	House No. 2824	D197, D198, D199, D200
65.	House No. 2823	D201, D202, D203, D204, D205
66.	House No. 2835	D206, D207
67.	House No. 2324	D210, D211, D212, D213, D214, D215
68.	House No. 1374	D2016
69.	House No. 2246	D218, D219

70.	House No. 2216	D220, D221, D222
71.	House No. 2226	D223
72.	House No. 2225	D224, D225, D226,
73.	House No. 2223	D227
74.	House No. 544	D228, D229, D230, D231, D232
75.	House No. 910	D233
76.	House No. 908	D234
77.	House No. 891	D235
78.	House No. 886	D236
79.	House No. 880	D237

12. The report also gives dimensions of the cracks in the said building. Details of remaining building mentioned in the report filed by the State PCB on 19.08.2019, with report from the Geological Survey of India need to be compiled.

13. In these circumstances, the project proponent has to take remedial measures in terms of compensating the victims and preventing damage in future. The State PCB has to ensure that suitable conditions are stipulated in the consent granted to Project Proponent (JS) which may also include siting requirements to avoid such damage. The Department of Mining and Safety needs to review safeguards in blasting operations in the areas in question and evolve appropriate monitoring mechanism, including periodic safety audits.

14. Particular care needs to be taken in handling of explosives, to prevent any accident. In this regard we may refer to a recent order of this Tribunal dated 11.6.2021 in OA 59/2021, **“In re: News item published in Times Now News dated 23.02.2021 titled “Karnataka: Six killed in quarry blast in Hiremagavalli, Chikkaballapur.”** In the said case, the

Tribunal appointed a fact-finding Committee which made suggestions for preventing such incidents. Concluding observations of the Committee, as incorporated in the said order, are

“CHAPTER 10 CONCLUDING REMARKS

The joint committee hereby submits that the main cause of the blast/accident is due to illegal possession and inappropriate handling of the explosive material by unauthorized persons who were working in M/s Shree Bhramaravasini M-sanders LLP (Stone Crusher), under the verbal instructions of the owners of M/s Shridi Sai Aggregates (Stone Quarry) and Shree Bhramaravasini M-sanders LLP in Hiremagavalli Village, Karnataka.

The joint committee ascertains the fact that the above accident has occurred due to mere negligence and ignorance of the employees of M/s Shree Bhramaravasini M-sanders LLP, Hiremagavalli village, Karnataka. This also determines that the owners of both M/s Shridi Sai Aggregates (Stone Quarry) and M/s Shree Bhramaravasini M-sanders LLP (Stone Crusher) have not taken due diligence and responsibility in handling the explosives and merely misguided the employees/staff of the Shree Bhramaravasini M-sanders LLP crusher by taking risk of their lives.

It was also observed that the owner of the quarry has non-complied with the provisions of the Mines Act, 1952 and The Explosives Act, 1884 which has been mentioned above under section 5.3 of the report, for due cognizance of concerned departments under Government of Karnataka and taking appropriate actions against M/s Shirdi Sai Aggregates, Hiremagavalli, Karnataka.

It is submitted that, the blast site at Sy.No.168 of Varlakonda Village having latitude 13°37'08" N and longitude 77°45'50" E is outside the leasehold area of the mine/quarry thus blast site does not come under the purview of the Mines Act, 1952. However, the management of the mine/quarry belonging to M/s Shridi Sai Aggregates has violated the provisions of the Mines Act, 1952 and allied legislation framed thereunder, although they were found operating the mine/quarry in a valid lease.

Considering the report, the Tribunal awarded compensation to the victims and directed that a mechanism may be evolved to provide information to all concerned about the mine operators procuring explosives, the area where they will use store and handle and safety aspects which are to be followed. Substance of relevant part of this order

and other regulatory measures be duly published in vernacular for information of the inhabitants and for better compliance. It was further directed that there was need to review the monitoring mechanism to avoid such incidents in future. The direction is reproduced below:

“we direct the Chief Secretary, Karnataka to monitor remedial action in terms of the above order in coordination with other concerned Authorities, including the District Magistrate, Chikkaballapur and Director of Mines. The Chief Secretary may oversee taking of safety measures in the light of the report to prevent such occurrences not only at the place of occurrence but also any other location of the State where there is possibility of such occurrences.”

15. Principle for awarding compensation under Section 15 of the NGT Act, are well settled. Reference is made to MC Mehta (1987) 1 SCC 395, Sterlite case, (2003) 8 SCC 575, MC Mehta (Kant Enclave), (2018) 18 SCC 397 and Uphaar case, (2011) 14 SCC 481. Compensation can be palliative/restitutionary or punitive/exemplary. Minimum compensation on restitution principle is a must but deterrent compensation can be awarded with reference to the turnover of a commercial undertaking, depending upon relevant factors. For restitution, cost of damage caused has to be worked out.

16. Applying a rough and ready estimate, we assess such compensation to be Rs. 1 lakh for each of 375 effected persons mentioned in the report of the State PCB dated 19.8.2019. If the victims have higher claims, they are at liberty to take their remedies. M/s Jindal Saw Ltd., Bhilwada, Rajasthan is directed to deposit a sum of Rs. 4 crores with the District Magistrate, Bhilwada within one month to enable compensation to be disbursed to the victims and for restoration of the environment. The said undertaking must take precautions in future and blasting must be scientific which may not cause damage to the property

of the inhabitants, which will be treated as a condition for mining and using blasting, apart from laid down safeguards. In default of such deposit or non-observance of safety norms, the District Magistrate, Bhilwada will be at liberty to take coercive measures of stopping the mining activities, till compliance. The amount deposited may be paid at the rate of Rs. 1 lakh to each affected person within three months after making an action plan by the District Magistrate.

17. We request the Rajasthan State Legal Service Authority to provide assistance to ensure that payments are made to the genuine victims.

18. The amount which may remain unpaid, out of the amount of Rs. 4 crores, may be spent for ecological restoration of the area by preparing an action plan by the District Magistrate within two months from today which may be overseen by Rajasthan State PCB and Department of Environment, Rajasthan Government. If any further amount is required, on polluter pays principle the project proponent will bear the same to extent its activities are held to be responsible even in absence of scientific evidence but based on reasonable inference, unless shown otherwise by the project proponent. The District Magistrate, Bhilwada will be free to take the assistance of such other Expert/Institution as may be considered necessary.

19. The regulatory authorities need to review its mechanism and must ensure laying down and monitoring compliance of safety precautions. For this purpose, the existing regulatory mechanism may be reviewed. In this regard, observations in para 14 above may be duly considered by the Department of Environment, Rajasthan in coordination with other concerned Departments.

20. Since the above order is being passed based on finding of damage to 375 houses in the report of the State PCB dated 19.8.2019 and quantum of compensation is being fixed on a most conservative assessment basis summarily, without applying the deterrence principle which may possibly be attracted on account of continuing violations for long, we have not considered it necessary to issue notice to the Project Proponent. However, the Project Proponent is at liberty to move this Tribunal if it is aggrieved by the order.

The application is disposed of.

A copy of this order be forwarded to M/s Jindal Saw Ltd., Bhilwada, Rajasthan, Rajasthan State PCB, Department of Environment, Rajasthan Government, District Magistrate, Bhilwada and Rajasthan State Legal Service Authority by e-mail for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

M. Sathyanarayanan, JM

Brijesh Sethi, JM

Dr. Nagin Nanda, EM

July 1, 2021
Original Application No. 288/2019
SN