MEEHAN

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1982 No. 9597P

THE HIGH COURT

BETWEEN:

MICHAEL MEEHAN

PLAINTIFF

AND

ANTHONY REID AND JOHN MURPHY

DEFENDANTS

Judgment of Mr. Justice Francis Murphy delivered the 5th day of March 1985

This is a claim by the Plaintiff for damages for nuisance alleged to have been committed by the Defendants in the working of a quarry and in particular by the discharge of explosives therein.

The Plaintiff is a farmer and resides at Derryvane House, Glaslough in the County of Monaghan, where he has a farm of some eighty acres. The Plaintiff's dwelling-house is a two storey structure comprising four bedrooms, together with three living-rooms and a kitchen. A small boiler-house adjoins the west gable-end of the building. Insofar as they are material to these proceedings, the Plaintiff's farm buildings comprise two distinct sets of out-offices, one of which is some distance from the dwelling-house and was accordingly referred to throughout the proceedings as "the remoter buildings" and a second set or complex of out-offices which adjoin or are adjacent to the dwelling-house and, having been constructed

more recently, were throughout the proceedings referred to as "the new buildings".

The remoter buildings consist of a cubicle house (or byre), a silage pit, a collection yard and a slurry tank. It seems that the silage pit and the cubicle house were built first some time towards the end of the 1960's or the beginning of the 1970's. The slurry tank and collection yard of the remoter buildings were added in or about the year 1977.

The new buildings were designed to serve similar functions. The two comprise a silage pit, a cubicle house, a collection yard and a slurry pit. However, immediately adjoining those buildings there is also erected a milking parlour and a dairy. The new buildings were commenced in July 1979 but it emerged towards the end of the evidence that the milking parlour and the dairy were part of a separate contract which was undertaken in 1980 and completed in December of that year.

The lay-out of the Plaintiff's dwelling-house and of the remoter buildings are delineated on one plan prepared by Mr. Henry J. O'Connell, engineer and the lay-out of the new buildings is described on another such plan. It may be of some relevance to record that the length of the walls of the silage pit, the cubicle house and indeed the slurry tank are all sixty feet. The width of the silage pit and, I believe, the slurry tank, is thirty-five feet. The width of the cubicle house is twenty-four feet. The measurements of the structures comprising the remoter buildings are set out in the plan thereof already referred to.

There is a quarry, I gather it is known as Dowagh Quarry, situate approximately one thousand metres from the Plaintiff's

dwelling-house. During the years 1977 to at least December 1981 and perhaps some months later, that quarry was owned and operated by the Defendants. In the earlier part of that period the Defendants in the course of their work discharged explosives on three or four days in the year and towards the end of the period discharged six or seven explosions per year.

It is the Plaintiff's case here that these explosions caused decorative and structural damage to his dwelling-house and both the new and remoter farm buildings. It is alleged that the ground vibrations caused by the explosives caused cracking to the interior and exterior walls of the dwelling-house - indeed that the cracks so caused extend through the wall itself and are not confined either to the exterior or interior plaster-work. There is an allegation, too, that damage was caused to the boiler-house at the point where it adjoins the main building and to the porch at the front and back of the house. It is also contended that cracks which appear in the ceiling of the house were caused by these explosions. The position of these cracks is indicated in the plan prepared by Mr. O'Connell and in addition to the evidence given by the various witnesses photographs were put in evidence showing these cracks. In addition, four pieces of plaster measuring about three inches long and about a half inch in width and in depth were likewise put in evidence. It was explained that these fell from the ceiling in the bedroom immediately following a particular explosion which occurred in the Defendants' quarry.

If cracking appears in the dwelling-house it is even more evident in the farm buildings. Perhaps these are most dramatically recorded in the photographs produced in evidence

by Mr. McCaughey, one of the engineers called on behalf of the Defendants. In photographs 20, 21, and 22 he shows the substantial cracks appearing in the remoter buildings and in photographs 14 and 16 he shows the cracking in the west and east walls of the cubicle house of the new buildings. However, what is even more dramatic is to consider those two photographs in conjunction with photograph (h) produced by Mr. O'Connell which shows a crack on the west wall of the silage pit. It is common case that these three cracks are in line one with another. In fact the evidence on behalf of the Plaintiff is that the crack runs across the silage pit up the wall dividing the silage pit and the cubicle house and through the concrete on either side of the passageway through the cubicle house and finally up the wall, the eastern wall, of the cubicle house as shown in photograph 16. The witnesses called on behalf of the Defendants could not confirm or deny whether there was a crack running along the base of the silage pit as the pit was full when they inspected it. They readily accepted, however, that such a crack was likely to appear there. No crack was apparent in the passageway within the cubicle house and there was something of a controversy as to whether such a crack existed. Mr. O'Connell said that he made a particular search for such a crack and applied a pressure hose to remove the dung and debris from the area where the crack might be expected to be found without success. Mr. McCaughey did not suggest that he had seen any crack in that area himself but expressed the belief that such a crack was likely to exist but would probably be very small indeed. There are cracks too in the side and long wall of the slurry tank in the new buildings as shown in photographs 18 and 19

and there is what appears to be a very slight crack indeed where the dairy joins the milking parlour. The latter is indicated at photograph 17 in Mr. McCaughey's book of photographs.

If the damge which is apparent in the dwelling-house and farm buildings of the Plaintiff was caused by the explosives discharged by the Defendants, then it is clear that the activities of the Defendants in the quarry constituted a nuisance and they would be liable to compensate the Plaintiff for the loss which they had occasioned to him.

Whether the explosions were the cause of the damage is essentially a question of fact. However in this regard a distinction may be drawn between questions of facts as to events which did or did not occur and facts or conclusions relating to the opinions of experts.

The Plaintiff presented his case in this way. The evidence which he tenders is to the effect that his dwelling-house though built at the turn of the century was totally renovated in 1973 and that he had certain decoration completed in the years up to 1978. Again the remoter buildings were erected about 1970 in a competent workman-like fashion on an area which the evidence suggests was an old quarry and Mr. O'Connell, the Plaintiff's engineer, expressed the view that it was erected largely on a rock foundation. Particular evidence was directed towards establishing the high standard of the workmanship involved in the new buildings. Witnessess were called from the builders who erected the structure, Messrs. Garvin and Harte, to explain how the site was laid out, the extent of the excavations involved, the depth of the foundations and, indeed, the standard of the workmanship. The case was made that this work was done in

accordance with a specification adopted by the Department of Agriculture for buildings of this nature and that indeed such work was done and the structure was passed by the appropriate official of the Department to enable a grant to be paid in respect thereof. Given this background the Plaintiff and his witnesses contend that one can eliminate settlement of foundations or defective materials or workmanship as an explanation of the defects which occurred. At the same time, the Plaintiff would argue, vibrations were being caused by the explosions let off in the quarry. All the members of the Plaintiff's family were familiar with these explosions. They saw them occur and in their dwelling-house felt the vibrations. Indeed the extent of the vibrations is illustrated by the falling of the pieces of plaster to which I have already referred and a test which the Plaintiff carried out on the pier of his front wall where he placed a bottle which was dislodged as a result of vibration. There was a further incident in which a slate was found near the house immediately following an explosion and again it is suggested that this is physical evidence of the effect which the vibrations had on the dwelling-house. Attention is drawn to the large number of cracks which have occurred and, understandably, the Plaintiff attaches importance to the fact that the remoter buildings, which are nearer to the quarry than the dwelling-house is, are particularly dilapitated and damaged.

There is one area of fact on which the parties were deeply divided. Mr. Meehan swore that he complained to the Defendants on a number of occasions - I think four in all- in the years 1979 to 1981, to the Defendants about the damage which they had caused to his premises. Each of the Defendants

denied that any complaint was made before November 1981. Again I think that Mr. Meehan was anxious to establish that he was troubled by ill-health in the years between 1978 and 1982 and certainly his doctor confirmed that this was the case. In any event it appears that no written complaint was made before the 1st March 1982, and unhappily by that time the Defendants had sold the quarry. As a fact it is clear that no detailed complaint was made by Mr. Meehan during the period when the Defendants owned the quarry. In fact it was the month of June 1982 before his Solicitors were in a position to give any particulars of the matters in respect of which he complained - and on the other hand no investigation was carried out of the precise manner in which the Defendants carried out their business during the relevant period. However, it seems to me that this dispute is a matter of peripheral importance only. The question remains "did the ground vibrations emanating from the Defendants' quarry cause all or any of the damage which the Plaintiff's premises have sustained?"

The defence to the Plaintiff's claim is based primarily though not exclusively on the application of technical and scientific evidence to two distinct matters of fact accepted by both parties. The first of these accepted facts concerns the amount of explosives supplied to the Defendants' quarry between 1976 and the 6th of November 1981 and the dates on which such explosives were so supplied. It is highly regrettable that the Defendants kept few and preserved no records of the amounts of explosives used by them: the dates on which they were used: the points at which the explosives

were discharged: the number of relays employed; the maximum instantaneous charge employed and the precise location within the quarry where the explosives were used. The only documentation forthcoming consisted of invoices emanating from Irish Industrial Explosives Limited who were the suppliers of explosives to the Defendants during the relevant period. These invoices are, however, more useful than might at first appear. Strict security on the movement and use of explosives is designed to ensure that quarry owners and similar operators can only obtain at any given time sufficient explosives for their immediate use and that any explosives not used on the day on which it is supplied must be either destroyed or returned to the supplier. Evidence was given on behalf of the Defendants by Mr. Reid that in fact they did retain from time to time a box or boxes of detonating relays which do contain an explosive charge but subject to that I am satisfied that these requirements were carefully controlled by the Gardaí and indeed the Army so that one may assume, as the experts did, that a quantity of gelignite and/or frangex supplied on any given date to the Defendants was used on that date or alternatively returned to Irish Industrial Explosives Limited. It would be wholly unreasonable to infer in the circumstances that the Defendants accumulated any quantity of explosives which would have enabled them to detonate an explosion involving a greater quantity of explosives than is listed in any given invoice. The second crucial fact which formed the basis of so much of the technical evidence concerned a vibrograph reading or report. This document sets out information relating to the technical data recorded at the foundation of the Plaintiff's front door in

respect of a charge detonated at Dowagh Quarry on the 3rd October 1984. The total charge used on that occasion was 1525 kilogrammes. However, by the use of a series of detonating relays the total charge was in fact subdivided into a series of smaller charges, in that case measuring 62.5 kg, separated by intervals consisting of a fraction of a second. These smaller charges are described as the Maximum Instantaneous Charge (or M.I.C.) and it is common case amongst the experts for both the Plaintiff and the Defendants that it is the M.I.C. rather than the total charge which determines the extent of the ground vibration and its potential for causing damage. The distance from the quarry to Mr. Meehan's house is recorded at 1060 metres and the Peak Participle Velocity (or P.P.V.) or more correctly the highest component within the velocity was recorded at one millimetre per second. The frequency was recorded in the report at circa 40. It was, however, accepted by the witnesses on behalf of the Defendants that it was difficult to make a precise reading in respect of such frequencies. There was a similar but earlier recording made on the 12th of March 1982 when a total charge of 1200 kg was discharged with an M.I.C. of 40 kg. There was some dispute as to the precise location of the vibrograph on that occasion and some conflict as to the correctness of the distance at which the possible location was situate in relation to the quarry. The recorded distance was 1350 feet and the result in the P.P.V. in all of its components was recorded at 1.5 mm per second. Having regard to the situation of the vibrograph and possible doubts as to the distance of its location from the quarry, clearly

that report is of less assistance to either party.

In fact the total charge detonated on the 3rd October 1984 represents the upper range of the total charge available on any given date to the Defendants. If, therefore, the Defendants employed a similar number of delays the M.I.C. for their operations should be of a similar order to that shown in the 1984 report. Whilst it must be accepted that there are other variables such as the precise situation of the explosion within the quarry and the depth to which the explosive was covered and similar factors, it was the evidence of the Defendants' experts that the P.P.V. shown in the 1984 report was fairly representative of an M.I.C. of 62.5 kg detonated at the recorded distance of 1060 metres. Moreoever, there is a wide margin for error as the consensus within the information published by distinguished international bodies make it clear that under almost any known circumstances a ground vibration would require a P.P.V. several times that recorded in the October 1984 report before it could cause damage. Indeed the nature and extent of P.P.V.'s at low levels was illustrated by Mr. McCaughey, an engineer called on behalf of the Defendants, who swore that the familiar domestic vibrations involved in the closing of doors and the walking through rooms and so forth created a P.P.V. in the range of three to five millimetres per second. Indeed Mr. McCaughey also explained by reference to the formula V equals 2πf multiplied by D (where V equals the P.P.V.: D equals the displacement and F the frequency) that a P.P.V. of seven millimetres per second would involve an amplitude or

displacement less than the thickness of a piece of paper and that whilst this could give rise to a sensation of vibration that it could not be a cause of damage.

Faced with this evidence - or having anticipated it - Counsel on behalf of the Plaintiff drew attention to two of the Irish Industrial Explosives Limited invoices, the first dated the 15th April 1981 and the second the 6th of November 1981, neither of which included detonating relays. On that basis it was argued that the probability was that the Defendants detonated the total amount of the explosives delivered on those dates in single instantaneous charges, with of course a correspondingly greater shock-wave than would have resulted from the subdivision of those charges into smaller M.I.C.'s.That this ever happened the Defendants emphatically denied. Mr. Reid in particular explained that on occasions relays were not ordered as it was their practice to retain some of this material or equipment in the office attached to the quarry.

The Defendants counter that case by assuming for the purposes of argument that the total charge was on occasion detonated instantaneously and ascertained the P.P.V. levels which one might expect to find, the first at Mr. Meehan's house and secondly at the remoter buildings if the very large charges had been used. This information can be obtained, as the experts explained, by plotting what is described as "the scaled distance values" against their respective vibration values. In fact the results of this exercise are set out in a report prepared by Mr. Higgins dated the 16th of October 1984 and put in evidence by agreement

between the parties. What this shows is that even if a charge of 1950 killogrammes were used this would produce a P.P.V. of 6.6 mm per second at the Plaintiff's residence and 14.2 mm per second at the remoter buildings. These upper limits were extended to a figure of 2114 kg and these produced P.P.V.'s at the two sites of 7 and 15.8 respectively. Cross-examination established in fact that the graph produced by Mr. Higgins would indicate a P.P.V. of .6 for an M.I.C. of 62.5 kg and this as Mr. Higgins explained was consistent with the recording taken in October 1984. He contended that the distinction between 1 mm and .6 was of little significance at that level.

The argument made on behalf of the Defendants rests to some extent upon the integrity of the expert witnesses called on their behalf as well as their skill and expertise in reading and analysing the available information and in drawing conclusions therefrom. I was fully satisfied as to the integrity of both Mr. Higgins and Mr. McCaughey and I was equally impressed by their expertise. That being so I feel I must accept that on the best interpretation of the technical information available that the maximum P.P.V. to which the Plaintiff's dwelling-house could have been exposed was a figure of 7 mm per second. Having regard to the recommended levels proposed in the German DIN 4150; the U.S. Bureau of Mines; the Swedish recommended vibration levels and the Swiss regulations as put in evidence by Mr. Higgins, it would be extremely difficult to conclude that the cracking to the dwelling was caused by blasting operations in the Defendants' quarry. Indeed it is interesting to note that in a case of O'Neill and

Roadstone Limited in which I gave a judgment in October 1983 I concluded on the basis of the evidence in that case that in respect of houses built in 1972 that "a P.P.V. of 10 would represent a completely safe limit". Needless to say I mention this as a matter of interest rather than a matter of authority. Every case must be decided on its own facts and in particular the evidence adduced therein.

However, the matter does not end there. To bring the P.P.V. up to the level of 7 it is necessary to assume or conclude that the total charge available to the Defendants on certain dates was detonated instantaneously because on those dates no detonating delays were delivered to them. If it is reasonable to assume that the Defendants did not use delays on those days on which they were not ordered surely it is equally valid to assume that they were used on the dates on which they were delivered? On that basis it would follow that in every case before the 15th April, 1981, the maximum instantaneous charge was a fraction,and perhaps a small fraction,of the total amount of the charge detonated on any given date. As Mr. Meehan has sworn that he complained of cracking in the years 1979 and 1980 it follows that he is asking the Court to accept that the cracks were caused by relatively small M.I.C.'s. This is particularly the case in respect of the substantial crack in the new buildings. The erection of those buildings commenced in July 1979 and they were completed some months later. Mr. Peter Harte in his evidence stated that sometime about Christmas 1980 he was collecting the last payment due to his firm in respect of the cost for erecting those buildings when the Plaintiff pointed out the cracking to him. It follows, therefore, that this crack emerged sometime between mid 1979

and the end of 1980. Certainly it existed before April 1981 which was the first occasion on which explosives were delivered to the Defendants unaccompanied by detonating delays. On any reasonable analysis of this evidence it seems to me to be highly improbable that the new buildings were exposed to a ground vibration with a P.P.V. in excess of 2 or 3 prior to the date on which the cracking appeared. When it is recognised that the international scales (such as the Swiss regulations and the Swedish vibration levels)place reinforce concrete - of which the new buildings were in part constructed - at the more secure end of the scale it seems to me unthinkable that the cracking which did occur could be attributed to the blasting operations carried on by the Defendants.

Undoubtedly the remoter buildings are significantly closer to the quarry and, as the evidence showed, subject to a significantly larger ground vibration emanating from the quarry. However, it still seems to me that the levels of vibration which I accept occurred could not have caused the damage apparent in those buildings.

It is not necessary for the Defendants to establish or the Court to decide what did in fact cause the damage which the Plaintiff's premises have in fact suffered. However, as the Plaintiff's claim is based partly, and indeed largely, on negativing the possible alternative causes so as to establish the blasting as the culprit it may be helpful to comment upon the evidence given in respect of the possible causes of the damage.

In respect of the new buildings the Plaintiff was at pains to provide detailed evidence as to the care and skill with which they had been constructed and by so doing to exclude any possible

inference that the major cracking was caused by settlement of foundations or thermal shrinkage of the materials used in the construction. In his evidence Mr. McCaughey, the very experienced engineer called on behalf of the Defendants, drew attention to the sloping ground into which the cubicle house of the new buildings had been laid. He pointed out - as indeed Mr. Harte confirmed - that it would be necessary to excavate into the slope to produce a level surface. Mr. McCaughey went on to say that he believed that at the left hand side of the east wall of that house (see photo 15) rock infill had been used to help achieve the appropriate level. He believed that what he saw of the cuttings for the new foundations adjoining that house supported that view. However, the gist of his evidence was, as I understood it, that there was less (or different) support for the front of the cubicle house than there was for the rear and that a settlement occurred as a result of this differential which caused the wall to rotate and thus create the crack shown in that side-wall. Unfortunately Mr. McCaughey's theory in this respect had not been put to the witnesses called on behalf of the Plaintiff so I permitted the Plaintiff liberty to call additional witnesses after the conclusion of the Defendants' case. These additional witnesses gave evidence that no rock infill was used but did confirm, as I say, that the slope was levelled by removing approximately one foot of top-soil first and then digging out the soil to a dept of one foot at the front of the buildings to a depth of seven feet at the rear to produce a suitable ground level. When the walls were erected the ground was covered with some inches of stone: duly compacted and then covered with concrete. I fully accept the evidence given on behalf of the Plaintiff

in that respect but again, as I understand it, that evidence does not affect the principle which Mr. McCaughey sought to apply. He contended and the Plaintiff's witnesses necessarily accept that the soil carrying the foundations varies at least in the sense that the rear has been excavated to a greater depth than the front. Whether this is a probable cause of the cracking would, I believe, require further expert evidence from soil engineers but it does seem to me logical for Mr. McCaughey to offer it as a possible explanation. The fact that the crack runs all, or if Mr. O'Connell's evidence were preferred most, of the way through the cubicle house and the silage pit on the walls adjoining both of those buildings seems to me to lend support to Mr. Caughey's theory. Certainly it is a theory which to my mind must be preferred to one which suggests that low level P.P.V.'s could cause damage to reinforced concrete structures.

In relation to the remoter buildings,Mr. McCaughey suggested that the cubicle house included in that complex had settled at the left-hand side of the gable-end shown in photograph 20 and that this had produced again a rotation movement which resulted in the cracking in the middle of the wall. Mr. O'Connell disputed this partly on the ground that he says the foundations in that area are rock and partly because the crack, as he saw it, did not widen at the top. In fact Mr. McCaughey contended that the settlement was visible and that there is a perceptible lowering of the gable-end. Mr. O'Connell disputed that conclusion. Having looked closely at photograph 20 I would prefer Mr. McCaughey's conclusion on that point.

With regard to the dwelling-house, it emerged in the course of the evidence given by Mr. McGuinness that this building

was constructed of stone and that accordingly the inside surfaces were not level. In applying plaster it was his task to produce a level finish. As a result the thickness of the plaster varied from place to place. That this could and would result in thermal movement with possible cracking was not seriously disputed. It may be that vibration emanating from the quarry was the cause of some plaster falling but only in the sense that some minuscule vibration was necessary to produce the final dislodgment: the inherent cause was in my view the nature of the plaster as applied to the particular surface. The cause of the cracks which penetrated the external pebble-dash and plaster right through to the interior of the building is more difficult to explain. It seems to me that effectively both parties accept that it was not caused by settlement of any description. Mr. McCaughey would attribute the cracking to thermal changes. What Mr. McCaughey queries is why the plaster was removed in the first instance in 1973 unless there was some significant defect which could not be remedied by repainting and if any such defect existed within the structure of the building that it was likely to reoccur when the new plaster was put on. I would find it difficult on the available evidence to reach any conclusion as to the cause of these cracks but if I am forced to chose between thermal variations and ground vibrations at the maximum level for which the Plaintiff could reasonably contend on the available data, I would have to choose the former over the latter.

In summary, it seems to me that much, if not all, of the damage suffered by the Plaintiff's premises has been convincingly attributed either to thermal variations or to settlement. Accepting as I do the evidence in that regard the Plaintiff's cas

which is based in part on the pattern of cracking caused to a wide range of buildings exposed to vibrations emanating from the Defendants' quarry is significantly weakened. However, the crucial factor in my view is that on any reading of the scientific evidence damage to the Plaintiff's property by a vibration was improbable and on taking a reasonable assumption as to the Defendants' conduct in using detonating relays when they were availbale, it seems to me that I can say with virtual certainty that no structural damage was caused to the Plaintiff's premises by the Defendants in the period prior to April 1981. If, therefore, cracking occurred in that earlier period one must look to some action other than vibration as the probable cause thereof.

In these circumstances I must dismiss the Plaintiff's claim.

Francis D Kelly

5/3/85