HEALTH AND SAFETY IN QUARRIES

A Hundred Years of Law

1895-1995 SAFETY LEGISLATION IN QUARRIES
practice are still to come. The rewards of putting that lesson into mutually consistent. The returns of building that lesson into workforce and economic survival and growth can be learned that managing the health and safety of its Quarterm two key areas in the boom times of the 1970s and 1980s, in the lean years which followed the industry. Quarterming had its best years in the boom times of the 1970s and risk of repeating them in the future. So what are the lessons of the past are forgotten or ignored we run the lessons of the past are forgotten or ignored we run the thinking of quarterming at the turn of the century. coined the phrase “the good old days” could not have been workplace risks which would be unthinkable today. Whichever rug the guarantor of rock falls from the quarry face and other day such as tuberculosis. Those who survived ill health daily destroying. Many workers fall victim to the diseases of the poisonous by hand must have been body and soul paid for our measurable wages. Swinging the fall track and towards a productive, healthy and safe industry. advance of technology have made on the long journey to the land, the quartermers, the quartermen’s companies and the help its readers recognize the contribution which it makes to its purpose is not only to commemorate the 100 years but to

Foreword
George Naden was still working at the age of 74.

CHAPTER 43

[An article from the Quarterly Journal of Chautauqua, 1894]
A Hundred Years of Law

Health and Safety in Quarries
Officers of the Crown had to be consulted for an opinion as to how the 20 feet of quartz was measured in bordering cases. The law is clear. The argument received short shrift although the owners excavated were not minerals as defined by the Act. This and gravel quarries argued that the substances they excavated were not minerals. Some owners of chalk and sand were considered that Mines Inspectors would be swamped by all quarries. It only applied to quarries over 20 feet deep as it is.

Figure 1

The Quarries Act transferred inspection duties from the Factory and Workshop Act. The Act was primarily designed to deal with cut-off different working of quarries as the Factory and Workshop Act the first attempt to exercise any real control over the Committee called the Open Quarries Committee. It was followed on the report of a departmental committee on January 1895, which came into force on

between two points was a straight line. They produced a diagram (Figure 1) and ruled it.
owners that year, with fines totalling £4,160.

Despite these successful prosecutions being taken against owners and agents, however, the legislature did not come into force much leniency was displayed towards the Chief Inspector's cause for complaint in this respect. The Chief Inspectors and the occasional present day companies and managers may be more disposed to prosecute the inspectors' readiness to prosecute the illegals,
since it was gradually overcome by the illegals' tactics, although this was not always so. The figures are definite; the Government has produced approximately 30 million tons of mineral with a net value of £200 million over 20 years deep. These figures are reliable and accurate, and the annual reports of the inspectors show a steady increase in the number of inspections and the amount of coal produced. From the first year of the Quaimes Act coming into force, the quality of the coal produced has improved, and the average of the Quaimes Act is required that certain provisions of the Metalliferous Mines Regulations of 1872 applied.

The Department's Special Rules deal with six matters: the safety of the quarry, the Blasting, the access to the quarry, the Machinery and Plant, the Duties of Official and Workmen, and the Ambulance. These Special Rules were drawn up by the Quaimes Committee and are now part of the Mines Act. The Department has been successful in this regard, and the industry is no longer at risk of the dangerous conditions that were common before these regulations were introduced.

The main requirement of the Quaimes Act was that it gave the

unnecessary and too stringent rules in his district as many owners considered them.

had not been very successful in establishing special

in some areas, one Inspector reported in 1867 that he

certainly a marked lack of enthusiasm towards the rules
decided with games at these centres and there was
games in his district. However, it is not clear how he
This method was in use as recently as 1936.

Stripping operations by the plow and gunfire method.

Underground workers in coal mines.

...was almost consistently higher than that for "The vast majority of quarries were hand worked and exa-"

...period the death rate per 1,000 employed in... in year... the death rate was approximately 20 per 1,000... probably for the depe... not included. The figures were probably for the depe... the least that quarters less than 20 feet... persons were killed and over 12,000 seriously injured... 10 years following the coming into force of the Act, 1150... dangerous occupation and, in the week... represented the greater part of a man's wages for a whole... reached 15 shillings, which probably... workers, and 1,000 request workers. The... of 19 years the Act was applied with great energy. The... enforcement of... required explosives. The... at the plotters, for breaches of the special... 'occurred' during investigations of the Act. A further 13... and, two for the dangerous condition of the position... of cases was not standing in a stationary position...
Explosives were frequently used to explosive and fired.

which was finally filled with explosive and fired. A
single hole with the object of forming a chamber
shaping explosive charges were fixed at the bottom of a
smaller that was referred to as monster or mine blasts. In
was usually either by triggering shots of tunnel blasts
by almost all and ordinary in the quarry. Primary blasting
also used. The control in many instances and explosives were used.

There was wide recourse to such economies as using
explosives and, although prohibited in the special rules,
explosives for the control of tunnel blasts. In many cases, workers had to buy their own
and 11.2 feet tall were reported in the same case of accidents.

The use of explosives was also a major cause of accidents.

In the first ten years were due to falls of ground.

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fall.

To construct the face to induce falls. Large

were so. The explosive could be increased by bouncing the planks.

more in height and it was claimed that speed in wheeling

without and the results sometimes up to 40 feet of

of the face. When absolutely necessary it

let to the edge of the face. When absolutely necessary it

while others believed the results of a number of men worked close to the face and over 40% of

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Access to the quarries was another frequent cause of accidents. It was often by ladders or in some cases by inclined haulage. Aerial ropeways or cages sometimes operated by water balance where two water tanks alternately filled and emptied. Stipulations made under the Special Rules were often disregarded especially in quarries several hundred feet deep. In these cases, riding in a skip at the end of a working day was much preferable to climbing endless ladders which could, as one report sympathetically stated, “put considerable strain on the heart.” On the other hand, aerial ropeways were a source of danger even when used for the normal purpose of extracting mineral, as a report for 1907 records: “When one pictures a wagon full of slate or stone dangling from a wire rope and swaying from time to time a piece will drop off and endanger the persons working on the floor of the quarry below.”}

Fatal accidents also regularly occurred to members of the excavation at night, often whilst engaged in poaching or other nocturnal activities although it was reported that the four killed in 1898 were intoxicated.

Means of access to terraces at a monumental quarry.
acquainted with the commercial rather than the working

to the concern, in the hands of persons who were better

They expressed the view that in many cases, manage-

e representatives of the worker who were informed of

for the observance of the Act and regulations.

superintendence and to be liable, together with the owner

of the quarry. He was also to exercise daily personal

The number of qaurries they were allowed to manage at

The Commission's report, published in 1914, recom-

The Commissioners, during the course of the inquiries,

one of the members of the Commission which inspected

A Royal Commission on Meteorological Mines was

in 1887 required that any qaurry

Fellow Worker

Slate Quarry, North Wales, for gallantry in rescuing a

industry of the first to be awarded in the Granty

Edward was issued a warrant for the infliction of the

also been marked by acts of bravery and in 1907 King

Over the years, accidents and incidents in qaurries had

be reported.

required certain categories of dangerous occurrences to

those disasters for more than seven days. The act also

requirement to report non-fatal accidents to include

The accident rate in qaurries was therefore, as in other

It was often disregarded.

the duty of ensuring this Act but, like other legislation,

enced. Local authorities, usually sanitary inspection, had

highway of public in open land within 20 yards of a

The Quarry Working Act of 1872 required that any qaurry
The workforce at Croft Quarry 1900. Taken when C. Roberts was made manager.
and those underground as mines.

To class those excavations open to the sky as quarries
considered that the only logical division would be
done of connection with the owners. The commission
classed as metallic ores mines and this was a particular
2. Some quarries, especially slate, had for years been
records could be maintained.
ings and abandonment of all quarries so that adequate
information to be given to the inspectorate of the open-
operations to come under a revised Quarries Act:
choose to apply to quarry processes and all quarrying
cease to apply to quarry processes and all quarrying
were abolished, the Factory Act

The report also included the following recommendations:

1. The 20 feet deep rule be abolished, the Factory Act

they might be a good thing for the younger generation.
"Certificates would never do in the Highlands although
a report records the unsatisfactory state of one owner whose
managers were much divided in their opinions and the
share of attention. On the other hand, owners and
side of quarries so that safety did not receive its proper

4. All new galleries (bunches) should not be more
than 60 feet high and existing galleries, more than 100
made and signed.

3. A daily examination to be carried out of the quarry
face and overhand and a report of the examination
made and signed.

2. Use of ropes. For men working on the face, to be made
use of ropes. For men working on the face, to be made

Compulsory.

The report contained stringent recommendations

and the provision of shelters.

warning and the provision of shelters.
dealing with missiles./Springing shots, headlining places,
Other recommendations covered the procedure for
expected as storage places for storage
they owners together with suitable places for storage.
These and that explosives be supplied solely by the
explosives and detonators should be subject to Government

The commission felt that explosives,
set of regulations. The commission felt that explosives,
requisites be combined in a single, comprehensive
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side of quarries so that safety did not receive its proper
Dressing down a face from ropes.

The Commission also examined the use of safety

Figure 2

Dust in the front of the wearer.

which issued from the pointed nozzle and blew away
which formed a major and powerful part of
sections which formed a major and powerful part of
lungs particularly in the slate and dressed granite
they would not be used.

thinking they were unnecessary because, even if provided,

many cases, very tough. Some owners were induced to

achievements were provided at quarries. It was, in

drying clothes. Attention was drawn to the fact that where

water and also that accommodation be provided for

for messrooms with facilities for heating food and boiling

The report also recommended that provision be made
size of the heap. However, at the vast majority of quarries the
their jobs. However, at the vast majority of quarries the
instance, the quarrymen who saw it as a literal to
gradually extended but still without opposition. In some
excavations had been introduced in 1899 and their use
there was demand in a particular area. One of the first
owned by local authorities and worked intensively when
mineral was still hand broken and loaded into narrow
Many of the quarries were small and a large number were
tons from 6,500 quarries with a workforce of 76,000.
By 1938 annual production was up to 164 million
much improved during the inter-war years and
gradually reduced. The average annual output was around 42 million tons. The position
4.3 million were employed, the number of employees had dropped by
almost half to around 4.3 million. The number of quarries to
By the end of the war with many men swept into the
explosives were used, were introduced until 1978.
spillout of an age limit for managers, at quarries where
contained in legislation until 40 years later in fact the
progressed and some of the recommendations were not
But, with the start of the first world war, were not
Many of these proposals were quite radical at the time.
One man recalls hand knapping in this quarry excavation activities 1903.
Commission. Specific versions of the rules were also
include some of the recommendations of the 1914 Royal
In 1924 a new code of special rules was drawn up to
and equipment to be carried out at six monthly periods.
restrictions for portable tools and for tests of the circuits
in 1924, The Regulations also stipulated that voltage
approval by the War and did not come into effect
shortages caused by the war and did not come into effect
equipment although some of these were released due to
were released due to
These led down requirements for electrical cables and
General Regulations (Electricity) came into effect in 1938.
20% of the 2,800 tons of explosives used in quarries
market in 1927 and three years later represented about
low explosives exploded by blasting, came onto the
cause of a misfire in a munition plant. Subsequent remedial
failure of the issue ten years later was considered the
to prevent the misfire of any part of the charge. This
A report stated that this would seem to definitely
large excavators were coming
western explosives were fired using cordwood detonant. The
primary blasts were fired using cordwood detonant which
rotation of detonating fuse, a lead tube filled with
boards of Trade and apart from any legal provisions
The high level of accidents continued and in the 20 year
since 1919 to 1938, there were 1,249 fatalities. 500 of
would come under the Quarries Act. Where plant would be included and only the excavation processes processes formed part of the main plant, the premises were still subject to the Factories Act and where.

However, any manufacturing processes on quarry supply

processes for the preparation for sale of the minerals. brought under the Quarries Act together with any changes. All quarries, regardless of depth, were now

supply

apply to quarries, it resulted in several important

and, as the general provisions of this Act did not

The Quarries Act 1937 came into effect on July 1938

Reps or do not state whether demand exceeded

took into the Wisconsin's found particular favour with

women's silk stockings drawn over the head and again

was used (Fig. 3). At another quarry the use of a

ground lime, a long when hood linked into the Wisconsin

men had their own preference and, at one producing

men and efficient, was available in 1938. At some quarries the

after extensive trials a Mark L. L. stated to be comfortable

progressing these matters was disappointing. In 1932

use of water sprays and exhaust ventilation but

mineral had a high silica content and these required the

and granite. Special rules were also drawn up for the

some sections of the industry such as iron ore, slate

introduced, after consultation with owners and
operated bucket also started to appear on the scene. Shovels, basic lam factors with 1/2 ton capacity, a
shovel, basic lam factors with 1/2 ton capacity, a
load, were best described as 'dodgy'. The first loading
load, were best described as 'dodgy'. The first loading
and windscreen, and with breaks and screening which
windscreen, and with breaks and screening which
left on the road and were to be seen when minus doors
left on the road and were to be seen when minus doors
vehicles or lories considered to have finished a useful
vehicles or lories considered to have finished a useful
stop block to the many quarters available service
stop block to the many quarters available service
5 tons capacity, which had to be charged against a
5 tons capacity, which had to be charged against a
were available together with small machines of about
were available together with small machines of about
purpose-built dump trucks, usually strengthened lories;
purpose-built dump trucks, usually strengthened lories;
mechanisation, already well established in many quarters;
mechanisation, already well established in many quarters;
working conditions were already available elsewhere;
working conditions were already available elsewhere;
mechanisation increased to work in quarters when better pay and
mechanisation increased to work in quarters when better pay and
reluctant to work in quarters when better pay and
reluctant to work in quarters when better pay and
severe labour shortage and men were understaffed by
severe labour shortage and men were understaffed by
years, increased to 137 million tons in 1939. There was a
years, increased to 137 million tons in 1939. There was a
production, which again had fallen during the war.
production, which again had fallen during the war.

with the outbreak of the Second World War,
with the outbreak of the Second World War,
the General Regulations were postponed indefinitely.
the General Regulations were postponed indefinitely.
intention to revise the overlaps between these rules and
intention to revise the overlaps between these rules and
Special Rules established at most quarries over 20 feet
Special Rules established at most quarries over 20 feet

health and welfare and the provision of first aid
health and welfare and the provision of first aid
and inspection of steam boilers and lifting machinery,
and inspection of steam boilers and lifting machinery,
and inspections of machinery, the equipment
and inspections of machinery, the equipment

Regulations also brought in requirements for all
Regulations also brought in requirements for all
General rules for the safe working of small quarries.
General rules for the safe working of small quarries.

In the light of these changes the Quarries General
In the light of these changes the Quarries General

Processing plant circa 1940.
and was a major advance in quarries legislation. It placed wide responsibilities on owners and managers of quarries and quarry persons and powers of inspectors, health and welfare, notification of accidents, employment, and effective supervision over all operations. The Act covered, amongst other matters, safety and the requirement that no quarry should be worked unless a manager had been appointed to exercise close control and oversee the working of the quarries. This Act, along with other Acts, brought in the statutory appointment of individuals as managers in the quarry industry. It was implemented on 1 January 1937, and it repealed the Quarries Act of 1894.

The Mines and Quarries Act 1954 came into force on 16 May 1954, and it introduced new regulations for the safety of workers in quarries. One of the key provisions of the Act was the requirement for managers to keep a record of accidents and near-misses, and to provide training for workers in safety procedures.

During this period, the quarry industry underwent significant changes. There was a shift towards mechanisation in the industry, with the use of power drills and other machinery increasing. As a result, the industry became more efficient and productive. However, this also led to an increase in the number of accidents and injuries among workers. The Quarries Act 1937 was a response to these issues, and it aimed to improve safety standards in the quarry industry.
of accidents in the previous ten years remained.

A million tons with a workforce of 90,000 but the number
by 1960 annual production had risen to around 200

concerned.

operation and to issue copies to the employees
up written rules to cover the safety aspects of an

was normally due from under water

Regulations with requirements which were general

1998 - Gravel and Sand Overhauling Examination

1998 - Vehicles running on rails

1996 - Updated versions of the 1938 electricity and

1996 - General Regulations

half of the 1970s.

A number of Regulations came into force in the later

Bottom hole drilling 1951.

men to work on or near the quarry face.

gram or mechanisation was

lower bench heights and mechanisation was

from falls of ground, the proportion of the total

high with 437 men killed. The pattern however was

men to work on or near the quarry face.

gradually reducing the need for larger numbers of

gradually reducing the need for larger numbers of
needed. It was the most intensively investigated into employment and to consider whether changes were the health and safety of persons in the course of their ship of land workers. To review the provisions made for
in 1970 a Committee was appointed, under the chairmen-
solid steel or in solution.
mine or quarry and applied whether the refuse was in a covering the stability and safety of tips or heaps from a followed and these led down stringent requirements Regulations 1971 & 1972, and the Tips Regulations 1971 & 1972.
injuries which often required an Olympic run of
October 1966 saw the tragic disaster at Aberfan when
vehicles at the quarry.

vehicles and everyone concerned with the operation of drivers and everyone concerned with the operation of who were required to draw up vehicle rules for issue to driver's vehicles had to be authorised by the manager. Quantities Vehicles Regulations 1970. Under these, drivers
Concerns Vehicles Regulations 1970. Under these, drivers

proportion of accidents due to the use of explosives

proportion of accidents due to the use of explosives

With mechanisation, the major cause of accidents was
hydrostatic breakers practically eliminated this hazard.
subsequent gradual introduction of drop balls and
speed, was the cause of numerous accidents. The
detonation, which often required an Olympic run of
reach shelter before the first shock started to
quantities it was the practice for a large number of men
secondary blasting, to not more than six. At many
limit the number of these landing points for one man in
the rules. The Regulations, amongst other matters,
manager who was required to draw up, shooting and m-s-

260, almost 60% of the total fatalities for this ten year
Family farms disappeared as they were closed down or
merged with larger operations and processing plants increas-
ing in size and capacity. Many of the small quarries and
mines with vehicles and processing plant increased in
through the 1970s and 80s mechanisation at quarries con-
exact work act reflects this philosophy.

examinations in most regulations under the Health & Safety
Act. A requirement for an employer to make an
assessments and consult the employees, which is
who create the risks and those who work with them.
about the present level of accidents. Lies with those

The primary responsibility for doing something
The Roberts report contained the statement:
readable format instead of previous stilted wording.
informational publications giving information in a
introduced regulations supplemented by approved
brought an entirely different concept to legislation.
acted together into the Health & Safety Executive. The Act
formed the majority of the inspectorates brought
work etc Act 1974. The Health & Safety Commission was
report published in 1972, led to the Health & Safety at
health and safety ever carried out in the UK and the
1988 came into effect on 1 January 1990 and were the
19th and 20th of the quarter. The combined results
showed that a total of 20 incidents were recorded. Over
an average of 2 years, the number of incidents was
15. For the 20 years between 1981 and 1990, there were
five fatalities, with no fatalities in the first 10 years.
Although these were more encouraging figures, the use
of explosives gave a much

Restricting visibility from the driving position,
the increased size of vehicles caused a hazard.
For concern was that 1971 to 1990, a particular cause
for concern was that the 20 years from 1971 to 1990,
with over 15% of the 248 fatalities in that period from
the use of vehicles now predominated and accounted
for a million tonnes per day. Serious injuries to operators.
A milestone or super quary, producing in excess of 5
million tonnes per day, resulted in a collapse of 3
The past 100 years have seen enormous advances in
generating both in technology and in the field of safety.

Quarries Inspectorate

The Quarries Inspectorate, reporting to the Head of the
Quarries National Inspectorate Group was also formed with
become part of the Field Operations Division of HSE. A
Quarries Inspectorate was broken and the Quarries Inspectorate
is still evolving. It was established in 1995.

Quarries in 1990 and is still evolving. It was established in 1995.

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Footnote

Injuries. The figures would be far greater if 5,200 fatalities and 40,000 accidents involving serious injury were excluded. But at a very minimum, there have been at least 20 fatalities annually. A report of the Inspectors' 1971 stated: "It would be impossible to estimate the number of those who are injured each year without knowing the number of those who are killed or injured, and the number of those who are injured at work."

However, the accident rate continues to be high in all industries, with 81 fatalities per annum. Employees producing approximately 300 million tonnes per annum.

There are now about 3,000 quarries with 43,000 employees. However, the accident rate continues to be high in all industries, with 81 fatalities per annum.
HSE
C20
Quarry
Published by the Health & Safety Executive 1995

1895-1995
YEARS IN QUARRIES
SAFETY LEGISLATION