This is the full transcript of Frontline Scotland's *Silent Killer* programme, broadcast on Tuesday, 18 April.

**Presenter, Jane Franchi:** Natural gas, an energy success story. Around 20 million households in the UK use it. But without proper care, switching on those comforting flames could be slowly, insidiously poisoning you. Carbon monoxide can make you very, very ill.

**Debbie Davis (CO Support):** It started with headaches and nausea, and quickly progressed to memory loss and muscle spasms.

**Jane:** Carbon monoxide can permanently disable.

**Darren Taggerty:** She's definitely a changed person. I think she'll never be back to normal.

**Jane:** Carbon monoxide can kill.

**Peter Taggerty:** I knew when we found him, he eyes were open, so ... we knew he was dead.

**Jane:** According to official statistics around 30 people are killed each year by carbon monoxide poisoning. Nobody doubts the real figure is higher. So many cases go undetected and undiagnosed.

**Tom Magner, forensic engineer:** My best estimate is between 300 and 600 deaths a year.

**Jane:** Such is the concern about the death toll and the number of dangerous incidents that the Health and Safety Executive are conducting a major review of the gas industry and the way it's policed.

**Jane:** Glenrothes, in Fife, a designated new town. Many of its buildings were put up in the 60s. The block of council flats and maisonettes at Abbotsford Drive among them.
Autumn 1998, unbeknown to each other people living here began feeling unwell.

**Craig Innes:** I felt like I had flu-like symptoms, which was an ongoing thing, I just thought it was maybe a flu virus that I couldn't shift.

I was going into work feeling dizzy, going to the doctors, they were putting it down to hay fever. And generally I wasn't feeling good at all.

**Jane:** Next door others were also suffering.

**Stephen Boulton:** I had headaches quite a lot, and nausea quite a few times, but I wasn't actually sick. And I was quite tired all the time.

**Angela Russell:** I was suffering from tiredness a lot and really bad headaches and I didn't know what was the cause of it was.

**Jane:** Nor did anyone else. And in Stephen's case the symptoms were getting worse, frightening.

**Stephen:** On Friday night Angela and one of her friends next door went out.

**Angela:** I come back, and I chapped the door. I'd realised he'd locked it and I couldn't get in, and I kept chapping and there was no answer.

So I went to the next door to use the phone, and there was still no answer. So I was starting to get worried by this time because I could hear the telly was on, I could see the light. So my friend had to actually kick the door in.

And I walked into the living room to find Stephen lying on the couch, and I was standing in front of him shouting, because I'd got that much of a fright he never answered the door, and he still never heard me, I had to virtually shake him to get him up. I did think for a minute he was dead.

**Jane:** Two floors below them, Hazel Brown and her boyfriend, Mark Taggerty, had recently moved in to their ground floor flat. They'd been unwell for a week when Mark's worried brother went to see them on Sunday November 8.

**Darren:** Basically Hazel just answered the door, she took a while to answer the door, when she did answer it she collapsed and she just ... she sat at the door for a good five minutes to get fresh air, she still had her night-gown and that on.

And I mean, really the main pointer that was their headaches, and streaming and feeling
sick. I mean they were vomiting as well I believe at the time.

Jane: Hazel blamed meat they'd eaten, and the family assumed they were suffering from food poisoning. But when the couple hadn't been seen for 24 hours Mark's father decided to check up on them. He and Darren had to force the door.

Peter Taggerty: Two or three bumps and the door just went in, and I mean the heat in the house was tremendous. The hottest house I've ever been in, really hot.

And both of us knew the minute we opened that door there was something seriously wrong. We knew, and we just went right in, right in to the bedroom, and ... and a face you'll never forget.

Darren: No.

Peter: The picture's an image burnt into your brain. I knew when we found him, he eyes were open, so, we knew he was dead.

Darren: And we seen Hazel lying beside him, we knew that she was alive, but barely. I mean she was really that bad that, I would say another five or 10 minutes, maybe a quarter of an hour and she would be away. She was barely breathing at all.

Jane: Mark was dead. Hazel so critically ill from lack of oxygen that she had to be transferred to the hyperbaric unit in Aberdeen.

It specialises in treating divers suffering from the bends, a form of oxygen starvation. Hazel will never fully recover, she has permanent brain damage. Meanwhile investigations began in the flats.

Almost immediately it was suspected that the gas heating system was the cause, and specifically carbon monoxide - the odourless, invisible, lethal poison that's produced when gas doesn't burn properly.

All the flats in Abottsford Drive had the same heating system. Nobody knew how many other people could be affected. Six days after the tragedy the communal flues were checked.

Liz McGregor: On the Sunday, the council officials came out with a different gas company. They put what they described to us as smoke bombs in the basement flat inside the boiler.

When this happened there was a pipe that stretched in this airing company from my
boiler. This went ... it's a communal pipe that went up to the very top of the flats.

When they put smoke bombs into the boiler down below smoke was pouring out of my airing cupboard out of cracks in the actual flue, which could mean potentially, if there was carbon monoxide in my flat I could have been a victim as well.

**Jane:** Investigations revealed an even more fundamental defect. Behind the boiler in Mark's flat there were two critical metal plates which should have sealed the system against dangerous waste fumes.

They'd been installed more than 30 years ago and fixed with tape. The tape had perished. The plates had fallen off. Without them the flues couldn't operate properly.

Instead of the fumes, including carbon monoxide, being extracted from the flat they were being circulated around it, and through the communal flues to others in the building.

Crucially, 281 council houses in Fife had heating systems installed in the same way, including all the others in Abbotsford Drive.

**Angela:** Well, I got a fright because when it could have been one of us, and one death was more than enough.

**Peter Taggerty:** I feel angry with the Fife Council, I'm really angry with them. I mean they have to take the blame of this, the whole thing, 100%.

**Jane:** The Taggertys are suing Fife Council, who've now replaced all the defective heating systems. But earlier this year at Kirkcaldy Sheriff Court the Council were fined £5,000 for breaching gas safety regulations.

They admitted causing Mark Taggerty's death and Hazel Brown's permanent physical and intellectual impairment. The tragic consequences of an almost undetectable, lethal poison - carbon monoxide.

**Dr Alistair Hay, chemical pathologist:** Carbon monoxide attaches to the haemoglobin much more readily than oxygen.

So if you're in an atmosphere where there's carbon monoxide it will be taken up in preference to oxygen in the blood. The result is that the amount of oxygen that's circulating in the blood is reduced, so your heart has to work much faster and harder to try and get oxygen into your tissues.
Carbon monoxide, it is insidious, you can't smell it, and you know ... you're going to sit in front of your fire, you're going to feel sleepy, you might just say that you're tired or feel tired. And this is the major problem with the gas appliance.

Somebody's going to die, and really not be aware that they are necessarily in danger.

Jane: It kills, but there are many other victims who live with the severe and permanent illnesses and symptoms of the poison. And the long term effects are still being guessed at.

Dr Hay: The outcome for people who are severely poisoned is very variable. Some may recover, but others may go on to develop dementia, in fact they become senile. Some cases of Parkinson's Disease have developed following the exposure to carbon monoxide.

Whether the cases of Parkinson's were caused by carbon monoxide ... difficult to tell at this stage. But I think we know very little, and we certainly don't know enough about what is happening in brain cells as a result of exposure to carbon monoxide.

Jane: There is also, it's claimed, a lack of knowledge amongst doctors about the symptoms themselves. Even diagnosing it is a major problem for many GPs, as Debbie Davis found out.

She now runs a charity, CO Support, from her home. Debbie began suffering uncharacteristic ill health eight years ago.

Debbie Davis: I had in fact been to the doctors probably at least once a week, but I'd also been hospitalised three times during my exposure, but no once was carbon monoxide considered for the symptoms I was displaying.

Jane: The mystery illnesses continued for seven months until renovation work in her house revealed a completely blocked flue behind the gas fire she'd been using. Even then though her doctors weren't convinced.

Debbie: I immediately went to my GPs and said: "Guess what we found, the fire's completely blocked, I don't know the name of the stuff but I know it hasn't been able to escape."

And he said: "That's carbon monoxide and it would kill you or it doesn't, it certainly wouldn't give you the symptoms you've had."

Jane: To this day Debbie still hasn't been officially diagnosed by a doctor. It was a
specialist who confirmed she’d been poisoned.
And therein lies a major problem with the
accuracy of the statistics.

Symptoms can resemble flu for instance, and
are frequently diagnosed as such. Furthermore
there are bound to be deaths and potentially
fatal illnesses which aren't attributed to carbon
monoxide.

Dr Hay: I think you have to remember that
carbon monoxide is going to affect a number of
organs. And if someone has a heart condition,
for example, what carbon monoxide forces the
heart to do is work harder and faster to
circulate blood, that’s got enough oxygen to
get to the rest of the body.

So if somebody has a heart condition you
could imagine that exposure to carbon
monoxide would bring on all sorts of cardiac
symptoms and possibly precipitate a heart
attack. And we know carbon monoxide does
that. So a number of heart attacks may well
be attributed, or may well have been caused
by carbon monoxide.

But in many instances the cause of the heart
attack may not be identified, carbon monoxide
may not be put down as the cause of the
problem. In fact, I suspect, in most cases it
would probably never even have been
mentioned because no one would have a clue
that there was a problem with carbon
monoxide exposure.

Jane: According to research overseen by Dr
Hay up to a quarter of a million people a year
could be affected. Very few of the cases he
investigated were diagnosed by doctors, the
majority had come to light because engineers
had reported faulty gas appliances.

Dr Hay: It’s only those that are diagnosed by
doctors that go into final statistics.

So if doctors are recognising very few of the
cases it goes without saying that they’re
missing a large number, and how big a number
of cases being missed it's difficult to say at
this stage.

Jane: With such potentially fatal confusion
over just how prevalent carbon monoxide
poisoning is, Frontline invited forensic engineer,
Tom Magner, to take a snapshot survey of
households in Cardonald, in south west
Glasgow.

Mr Magner has investigated more than 200
carbon monoxide incidents, and is frequently
called as an expert witness in such cases.
Jane: We're doing research into gas appliance... do you have gas appliances in your house...

Resident: Yes.

Jane: Would you mind very much if we came in and checked them, is that all right.

Resident: Fine ...

Jane: Thank you.

Tom Magner: I have a concern here that this fire is not actually properly connected, and that combustion products may escape into the room.

The yellow flickering in the flame suggests that it's not burning as well as it should be.

Carbon monoxide level is going up at the moment, up through in the early 60s in parts per million, so carbon monoxide is being produced.

What tends to be showing is a trace of carbon monoxide within the appliance, I'm measuring it inside now. There's more yellow flickering in that than I would normally expect to see.

Jane: Just about every house we visited showed a low level of carbon monoxide near gas fires.

Tom Magner: It does illustrate the scale of problems when we've only been to a few houses in a very, very small area.

Jane: You identified really very, very small levels of carbon monoxide in all these cases. Does that mean that they're going to get worse?

Tom Magner: If something isn't done about them they are going to get worse. This is not a problem that goes away.

You have to deal with it, you have to have the appliance serviced properly, you have to have the installation made correct if it's incorrect.

Jane: But when we called at Liz Withers' home we learned of a major problem and a narrow escape from tragedy. Liz and her young son live with her parents.

Tom Magner: There's no carbon monoxide coming from this fire. It looks, in fact, a very new fire, have you had any problems at all with it.

Liz Withers: Well, it's a relatively new fire. We've had it now for about three years, and
we've had a bit of a problem with it.

Roughly about four months ago we were experiencing an awful lot of black soot.

**Tom Magner:** Can you show me on the fire where that was?

**Liz Wither:** Just ... in the morning, when I was getting up in the morning to come down to light the fire here was all black, and round there was all black.

My mum would sit here where I'm sitting just now, and I'd be sitting over there, and I found myself falling asleep for no reason, just very tired feeling all the time.

**Tom Magner:** What sort of time of day are we talking about?

**Liz:** Em, maybe late afternoon, evening, and I thought, maybe I'm just not feeling well, you know I didn't think for a moment that it could have been from the fumes from the fire.

We contacted the Scottish Gas Board. I remember the man saying to me: "You were very lucky because it was very, very dangerous and probably that's the reason why you were feeling so tired and falling asleep, with the fumes from the fires."

**Jane:** Tom Magner is one of many who think the official statistics are a gross underestimate.

**Tom Magner:** What I'm saying that more people die from this and more people are affected by it than the official figures, because there is a lack of understanding.

**Jane:** Is there any way that you've put a figure on these?

**Tom Magner:** My best estimate is between 300 and 600 deaths a year, and this is not a hard and fast one.

What I'm trying to do is look at each source in turn, see whether it's an underestimate or an overestimate, and this is the range I've been able to narrow it down to so far.

**Jane:** That's an incredible figure is it not?

**Tom Magner:** It's certainly a lot more than I expected.

**Jane:** What's the official figure?

**Tom Magner:** Around about 30 deaths a year. We're talking about 10 times that or more.
Jane: The question of responsibility is a thorny one. Obviously some rests with you and me, the consumers. It's up to us to make sure that appliances are regularly serviced by properly authorised engineers.

We're told to put our trust in firms who are registered with Corgi, the Council for Registered Gas Installers. Another company pipes the gas to your meter, Transco, who are also the emergency response team called out if there's a suspected gas leak.

But as we've discovered engineers and experts from both have missed problems, have overlooked, ignored, or failed to recognise the presence of carbon monoxide.

Before they retired, Iain Stewart was a doctor, his wife, Sina, a nurse. Yet neither of them recognised her classic symptoms.

Nor did more than 20 doctors and specialists Sina consulted. She had numerous different treatments. It was her daughter who suspected the gas fire. They called the emergency number, Transco.

Sina Stewart: In two or three minutes he'd completed his investigation and pronounced the fire safe to use: "There's nothing wrong with that fire."

So, I put the fire back on and when my family came home I said: "There's nothing wrong with that fire, you're imagining it."

Jane: A few weeks later Sina woke in the middle of the night. The sitting room lights were on. She assumed her daughter and boyfriend had fallen asleep.

Sina: I could see that the television was on. It was flickering, the programme transmission had ceased, and the fire was on, glowing bright, full on.

So I just pushed the door open, and this blast of ... oh ... overpoweringly hot air came out at me. They were asleep, or what I thought was asleep on the settee, slumped against one another.

When I put the television off and put the fire off, and I turned round to look at her and realised she was still asleep, or still not responding.

So I went and started shaking her, and obviously I said: "Get up, wake up, you're in a stupor."

Little did I know that she was either at best
semi-conscious, or worse unconscious when I came in.

And, so she kind of stood then, she¿.they were both dazed and rubbing their eyes as if to say where am I sort of thing¿.A few days after that she said "I don't think that gas fire is safe."

Jane: Once again the Stewarts called Transco.

Iain Stewart: The technician came in the next day and tested round the fire, and at the gas meter, and the boiler, and another gas fire we have.

And when he was seen to be just about finishing I said: "Exactly what are you testing for?" and he said: "Oh, incoming gas and escape of it, and there's no escape of gas."

And I said: "Do you test for any of the exhaust fumes, and carbon monoxide in particular?" and he said "No, if you want that done you have to get a private contractor to do it."

Jane: The Transco engineer advised the Stewarts not to use the fire and to call a Corgi-registered engineer.

The following day it was he who confirmed there was carbon monoxide present, something Sina feels the Transco engineer should have checked from the start.

Sina: Absolutely horrified, completely ... to think that we've suffered for months, and that my daughter had just about died because ... well, inefficiency at the very least.

Jane: Inefficiency, or lack of care. Just whose responsibility is it to check for carbon monoxide?

In an example in our programme a consumer phoned and the engineer came, and despite being told that the consumer wasn't feeling well, despite the suspicion that it could be the gas appliance, the gas fire in this particular case, the engineer said that the appliance was fine, and left.

Steve Gay, Transco: Well, our engineers are only able to make safe. Our engineers would carry out the necessary visible checks. We're not able to go and investigate an appliance.

Jane: Would you accept that this engineer was in the house for five minutes, and declared that the appliance was fine. Is that acceptable given the other evidence
which appeared to be given to him at the time?

Steve Gay: Well, without knowing the precise circumstances of that particular job I would expect the engineer to do the checks that he would normally do, but essentially would isolate the system if there was suspicion of carbon monoxide, and advise the consumer to have the appliances tested and checked by a Corgi-registered installer.

That's what I would expect to happen.

Jane: Which is precisely what the Transco engineer failed to do on the first visit. But if it is down to Corgi engineers to check your fire or boiler is safe can you really be sure that they do any better?

Debbie: The last analysis of the Health and Safety Executive's statistics clearly showed that 26% of the people who died of carbon monoxide poisoning had not had their appliances serviced. Seventy-four per cent had had the appliances serviced.

A recent Which report carried out by the magazine, four different houses with four separate boilers and twelve service companies.

Five service companies, they left the boilers in such an appalling condition it was thought necessary to report them to Corgi.

Jane: In Kilwinning in Ayrshire, George Meechan believes his boiler was in an appalling and dangerous condition after years of regular servicing by a Corgi-registered company.

The Meechans bought their council house three years ago and continued to use the servicing company the council had employed.

But in January this year they brought in another engineer, this time from Scottish Gas. He and they were in for a shock.

George Meechan: It tested that the readings and the carbon monoxide readings was about 0.9999, and he says: "Oh, this is just as about as high a reading as I've seen coming out of a boiler."

He says: "It's absolutely atrocious," ... he says ... So I well, I've been bothered with headaches and tiredness over the last couple of year now.
He says: "Well, I wouldn't be surprised." He said: "I'm not saying it is that that's caused it, but it could well be that that has caused it."

Jane: The engineer condemned the boiler until vital repair work was done. The local trading standards office have now taken up the Meechans' complaint.

The company concerned, James Frew of Stevenston, say that all the servicing on the Meechan's boiler had been correctly carried out.

It's cases like the Meechans and those identified in the Which report that have called into question Corgi's policing role.

The Which report that was published earlier this year didn't paint a rosy picture at all about gas servicing, the gas servicing industry, and in fact said that Corgi should sharpen its claws.

They identified several bad examples of bad workmanship. Do you think you should sharpen your claws?

Bob Henry, Corgi: Eh, well, Corgi would like to have sharper claws, and I think we do need to recognise that we work to a remit which is reasonably restrictive in that sense.

For instance Corgi doesn't have the powers to prosecute. It doesn't have the powers to take enforcement action, we have to pass that information to the Health and Safety Executive.

And we believe, quite strongly believe, that there should be some changes in the law so that when any job is done a completion certificate is actually issues by whoever has done that job stating exactly what the work is, that it was done correctly and so on, and that information in fact would be held by Corgi.

Now that would actually strengthen the monitoring of the work that's carried on quite significantly.

Jane: If there is evidence of poor or dangerous workmanship Corgi do act. They say they strike off around 100 companies a year, which raises another question: How did those companies qualify for registration in the first place?

Bob Henry: We are there to ensure that the appropriate training in fact has taken
place, and that people have been assessed, so they've been assessed as being competent.

The problem that we do come across is that people, even though they are competent, for whatever reasons don't do a job competently.

It's the same thing if someone's got a driving licence, that driving licence says that you are competent to drive, but we know from the accident statistics a lot of people do not drive competently. And unfortunately that does happen.

Jane: Corgi, and the industry, could be in for a major shake-up. The Health and Safety Executive are so concerned about the carbon monoxide death toll and poisoning incidents that they're conducting a complete review of the gas industry, and how its safety is policed.

Their recommendations are due this summer. In the meantime there are those who are already a tragic price for safety failures.

In Fife, a fatal accident inquiry is to be held into the death of Mark Taggerty. His partner, Hazel Brown, is suing the council - her life altered forever.

Darren Taggerty: I think it's affected her emotional system. She gets problems in her legs when she's trying to walk, tingles, numbness, it's obvious connected to the brain or whatever. I think she'll never be back to normal.

Peter Taggerty: And it could have been a major disaster. Well, for me it was a major disaster, but it could have been a lot worse, there could have been a lot more parents and brothers like ourselves.

Sina Stewart: When I see the sign that the gas board have on their vans: "You Are Safe In Their Hands", I would like to add a small word to that, and it's "NOT".