

Narrator VO: Here is the footage from “Site Safety Seminar for Capital Works New Works Contracts”, which was held on May 12, 2014

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Her presentation topic is “Avoidance of Damage to Underground Gas Pipes”

Hello everyone. I am Ng Yuk-wah, an engineer from Gas Standards Office, Electrical and Mechanical Services Department.

These few years are the prime time for construction industry. Apart from a number of large-scale infrastructures, lands have been allocated to construct buildings. I am honoured to share with you how to avoid causing damages to underground gas pipes. This is what I am going to share with you today.

First, let me explain the Ordinance related to the construction works near gas pipes and the consequences of damaging gas pipes.

Then, I will briefly introduce the Code of Practice issued by EMSD “Avoiding Danger from Gas Pipes”.

It explains preventive measures of a few incidents. Just in case it is too boring, I have also prepared a few cases for sharing. Hope we can get some insight from them.

First, in Hong Kong, Gas Safety Ordinance enforces gas safety from importation, manufacture, transportation, supply and its use. We call it Cap. 51, i.e. Chapter 51, under which there are seven Regulations.

Of course I will not go through all of them with you. I am afraid it would be too boring for you.

Today I would focus on Cap 51B “Gas Safety (Gas Supply) Regulations”, because Regulation 23A under Cap 51B specifies precautionary measures regarding works carried out in the vicinity of gas pipes.

According to Regulation 23A(1), no person shall carry out, or permit to be carried out, any works in the vicinity of a gas pipe. It means both workers and company have the

responsibility, because it is the company which permits workers to work near gas pipe. You shall not carry out any works near a gas pipe, unless you have taken all reasonable steps to ascertain the location and position of the gas pipe before commencing the works.

As for Regulation 23A(2), if you carry out works or permit works to be carried out, the Regulation requires that all reasonable measures are taken to protect the gas pipe from damage arising out of the works that would be likely to prejudice safety.

This is what the regulation says. Now let me highlight a few keywords.

What is 'gas' referred to? In the Ordinance, 'gas' is referred to town gas, LPG and natural gas.

Most underground gas pipes found on streets or estates are for town gas, the total length of town gas pipes amounts to 3,500 kilometers long.

However, in some estates, about 14 estates, LPG is supplied.

We need to pay attention and should not ignore the estates with no town gas supply, we should take the following steps to inspect the gas pipes as well.

Natural gas would seldom be seen because it is used for electricity generation by the two electricity companies as well as gas production by the town gas plants.

In the Ordinance, it also mentions what is a "gas pipe". In the Ordinance it is called "gas main", which is an underground gas pipe we usually see.

A "service pipe" is referred to a pipe on the external wall. An "installation pipe" is installed inside a house. Generally, that is the classification of gas pipes, more details could be found in the Ordinance.

Regulations 23A(1) and 23A(2) focus on the "gas main" and the "service pipe" respectively.

Today I will focus on "gas mains", which are the underground gas pipes.

Here are some photos showing different types of underground gas pipes.

There are steel pipe, ductile iron pipe and another one chosen – the one that sticks out – called syphon pipes [any English term? If not, please ask Ms Ng, the EMSD

officer]. When carrying out works, we should pay attention to note this small pipe sticking out from the gas pipe on the ground. Other types of pipes are polyethylene pipe, i.e. PE pipe, and galvanized pipe. Usually what we come across are PE pipes and ductile iron pipes, i.e. DI pipes.

We should mention the penalty of contravening Regulations 23A(1) and 23A(2). For contravention of Regulation 23A(1), the maximum fine, i.e. level-4 fine, is HK\$25,000 and imprisonment of 6 months. As for the contravention of Regulation 23A(2), the maximum fine is HK\$200,000 and imprisonment of 12 months. Daily fine of HK\$10,000 would be charged for continuous contravention. I believe none of us want such punishment.

Despite the legal punishment, as seen in these news reports regarding the damages to gas pipes in some sites and during works in Hong Kong,

The damages will cause gas leakage, fire, explosion, affect transport, cause traffic jam and cause gas supply disruption, etc. We all don't want our company and workers to be subject to the danger or citizens to be adversely affected.

To avoid the accidents mentioned, EMSD has issued a Code of Practice which can be downloaded from EMSD website.

The Code has two aims.

First, it aims to provide guidelines for the industry.

It explains what are the reasonable steps and measures to be taken.

This is the Ordinance we just mentioned.

Not many know what 'reasonable' means.

The Code of Practice states what precautionary measures need to be taken when carrying out works.

The second aim is that, if a company is accused of contravening Regulation 23A, the company can defend itself with the Code.

To prove the company has complied with the Ordinance by fulfilling all requirements in the Code.

Let me briefly introduce the precautionary measures in the Code.

Before works are carried out, as required in Regulation 23A(1), you need to ensure the location of underground gas pipes.

What do we need to do then?

There are four safety steps.

First, we need to obtain the site plan or underground gas pipe plan and related information from the gas supply company.

Then, we proceed to detect pipes and find the approximate location of pipes according to the plan.

After the detection, we use hand-held tools to create trial-holes to confirm the location,

Because sometimes there may be errors.

Then we proceed to safe digging with hand-held tools.

A safe distance should be kept if large machines are used, such as an excavator.

These steps are repetitive.

In case of large-scale projects, such as railway projects and new estate projects,

All three steps mentioned above should be conducted.

To ensure location and position of underground gas pipes, i.e. both the alignment and depth of gas pipelines.

In most of the accidents, detection stopped after pipeline alignment was detected.

But we also need to know the depth so as to confirm the position of gas pipelines.

There are also some precautionary measures in the four safety steps.

The precautionary measures are drawn from some accidents that happened in the past.

Let me share with you.

It is not about simply obtaining plans from a gas supply company, but you also need to pay attention to the drawing scale.

Generally speaking, take the gas company as an example, as we are talking about gas pipes,

plans provided by gas company are usually in the scale of 1:1000.

For example, if this is your site, at a glance you can see a straight line,

but when you enlarge it, you can see some bends.

If it is unclear to you,

you can ask the gas supply company to provide a plan in appropriate scale and higher resolution,

then you can have a clearer plan.

When you obtain the plan, do not think it is 100% accurate,

because roads maybe resurfaced or changed,

so it can be not very accurate.

For example, in some cases, the green lines show where the gas pipes are,

but when you arrive at the scene, you can see the air valve pit is at the “cross”.

Then, you have all the reasons to suspect the gas pipe is actually the red line,

which in reality is the correct location of gas pipe.

When you get the plan,

you need to check against the actual situation,

the location of air valve pit

can also give you some hints

of where the underground gas pipes are.

When you request plans, remember you should tell the gas supply company the location of your construction site,

for example, what kind of works need to be carried out, some works that may involve piling.

Since the affected area of such works is relatively larger, you can inform the gas supply company in advance.

If you are not certain about how big the affected area is,

or how far the gas would be affected,

you can consult the gas supply company. Alright, after getting the plan,

as I said we need to do detection.

Trained workers should be employed to detect pipes by using pipe locating device.

Most of the time, we found that in many accidents detection had been done,

but no marking was made on the ground,

leaving workers unaware of the detection result.

Many companies only put the detection report on site, but workers may not be able to understand.

Therefore, we should remember to mark it on the ground after detection, and explain to construction workers the detection result and provide safety guidance.

For example, there are some markings on the ground that indicate the location of a gas pipe,

so where can the worker dig? What is the safety distance to dig?

We should provide workers with safety guidance.

One more reminder, given that PE pipes are more common, yet some PE pipes are without metallic tracers, and they could not be detected.

When you obtain the plan from the gas supplier and you know there is a PE pipe but cannot detect it, it could be because the metallic tracer is broken or the PE pipe was installed before 1995 when metallic bands were not required, though the number is relatively small.

If you have doubts, you should consult the gas supply company. Alright, after the detection, it's time to make trial-holes with hand-held tools.

Sometimes when the road is paved with concrete and you can use neither hand-held tools nor shovel to dig, you need to use a hand-held electrical tool, but there is a depth limit.

For example, according to the Code of Practice, if you use a hammer breaker to break the ground, for the pavement, only 150mm depth is allowed. And for carriage road, only 300mm depth is allowed.

When the pipe is exposed after making trial-hole, you should be aware that water pipe and gas pipe may look alike sometimes, especially for DI pipe.

Later I will share with you a case in which a worker mistook a gas pipe for a water pipe and damaged it.

If you are not sure if it is a water pipe or a gas pipe, you can consult the gas supply company.

After getting the plan, the plan may show it is 600mm deep before making a trial-hole.

Sometimes works under carriageways or roads would affect the depth of the pipes, in this case, the pipe is in fact 270mm deep instead of 600mm shown on the plan.

Therefore, we need to pay attention to the depth of gas pipe when making a trial-hole. It is most important to use hand-held tools to dig.

When a pipe is exposed in the trial-hole, safe digging is needed. Try to use tools such as shovel

which are easier for the workers to control the strength during digging. We should also dig on the sides of the gas pipe, instead of upon the gas pipe.

You may think this is rather simple, but many accidents have arisen because of it.

We need to expose the gas pipe by digging horizontally, and be aware whether there are warning bands and signs. If you see one, it means you are close to the gas pipe. In the Code of Practice, it is also required that the safety distance between any gas pipe and mechanical tools, such as a excavator, should be at least 1 meter.

There is a table in the Code of Practice. Though I will not go through it in detail,

it serves as a reference on the affected areas of gas pipes for different kinds of works.

When you have confirmed the location of gas pipes before the commencement of works, then you proceed with the measures to protect the gas pipes, which is required under Regulation 23A(2). Unless you have disconnected the gas and have safety proof, you have to assume that the gas pipes are filled with gas. In case of some large-scale projects, you may need to apply for the disconnection or re-routing of gas by the gas supply company. This practice is common.

Take railway works as example. Usually we need to negotiate with the gas supply company for re-routing the gas pipes before works commencement.

Protective measures should be taken if welding or open flames is involved near the gas pipes, for instance, using a thermal protective screen or fire-resisting blanket, because when the worker is welding, especially PE pipes which are plastic, we need to prevent the rather fragile gas pipes from melting.

If gas pipes are discovered during digging, we need to provide some support and protection to protect them from being damaged by nearby construction works. Do not use rocks or concrete to wrap the gas pipes when backfilling. Instead, use small material such as sand to backfill the gas pipes.

If there are warning bands or concrete slabs, or other protective installations for the gas pipes originally, they must be restored to their own places.

If they are damaged, we can ask the gas supply company to restore it so as to avoid other workers or contractors working without the protection of gas pipes.

Normally everybody would sleep in the middle of my sharing.
Now let me share with you five cases.

The case took place in the neighborhood, but I am not telling you which estate it was. There is a public estate nearby. The case took place in the end of 2012. A flushing water pipe burst in that estate. The management company asked a contractor for emergency repair. Since the contractor thought it was an emergency, he did not ask for plans from the gas supply company nor carry out detection.

The contractor did not do any of the four safety steps. As a result, they damaged a ductile cast iron gas pipe when they broke the concrete with a hydraulic breaker. They were fined for the breach of Regulation 23A(1).

I can tell you, it is not alright to skip the four safety steps just because there is an emergency. As stated in the Code of Practice, you can dial the emergency hotline of gas supply company if it is urgent and you do not have time to obtain plans from the gas supplier for detection. The gas supply company will tell you what safety measures to take. Emergency repair is not an excuse for not taking the four safety steps.

This case took place in the end of 2013. The contractor has just been convicted two weeks before.

It was an improvement works of CCTV in an estate. The contractor at that time had the plan and had employed a worker to carry out the detection, but the contractor did not give the gas pipe plan to the worker. The worker was asked to detect gas pipes on his own. The worker only detected underground power cables instead of gas pipes.

The worker who did the detection actually mentioned to the contractor that gas pipe detection was not yet done so the contractor should send other people to do the detection, but the contractor didn't do so. As a result, a PE pipe was damaged when they used an excavator to dig. The contractor was fined for the breach of Regulation 23A(1) two weeks ago.

This is an estate redevelopment by a private developer. The contractor did have the plan and did carry out the detection, but after the detection, they considered the pipe was not within the construction area because it was a few hundreds of millimeters away from the hoarding, so they did the digging.

This is the hoarding. The worker damaged a PE pipe when he was digging near the hoarding. It demonstrates the importance of trial-holes, because detection alone may not be accurate.

His detection did indicate the pipe was out of the construction area, but this one to two meters' discrepancy caused him to break the PE pipe. As a result, the contractor was fined for a breach of Regulation 23A(1).

This was a water works project. This case took place a few years ago, in which a water pipe on a road was to be replaced. The worker had obtained the plan, carried out the detection and made the trial-holes, but it was very close to the pipe, less than one meter. As I said, the distance from the pipe has to be at least one meter if an excavator is to be used, but he did not comply with that because it was too urgent. Actually all the works are urgent. He damaged a ductile cast iron pipe when he did sheet piling with an excavator. The contractor was fined for the conviction of breaching Regulation 23A(1).

The four cases I mentioned were about breaches of Regulation 23A(1), so I will share with you a case about the breach of Regulation 23A(2).

This case is water pipes replacement project. The contractor did all the four safety steps.

They found the gas pipe and exposed it, but they neither marked on the pipes nor told workers which were gas pipes and water pipes. They didn't do any protective measures. During the investigation, the contractor told us that they knew protective measures were necessary, but there was limited space that they didn't do the protection.

The contractor did not consult the gas supply company. As a result, the worker mistakenly cut the gas pipe instead of water pipe. It doesn't show the water pipe. He thought it was a water pipe so he cut it off. The contractor was fined for the conviction of Regulation 23A(2).

Everyone should note that, after ensuring the location of gas pipes, protective measures need to be taken to protect the gas pipes. Frontline workers should be clearly informed of the detection results. We find that contractors have done a lot, but there was a lack of communication. It was a communication problem.

To avoid the abovementioned accidents, we have done a lot of promotion. Today my role is to promote and share with you, to introduce our Code of Practice to prevent accidents.

I have also brought some of our many promotional publications for your easy reference.

They can also be downloaded from our EMSD website or you may request us to dispatch to your frontline workers. We aim to provide guidelines to management companies and frontline workers, as well as the public.

Secondly, apart from seminars, you can also ask for further seminars from us for your frontline workers. We also inspect some construction sites and observe if workers have taken enough safety measures. I prefer early promotion of gas safety to post-incident review. The time spent or influence on the public may be much greater.

Let me show you the numbers of gas pipes damage incidents involving third parties in recent years.

The Ordinance and Code of Practice were put into force in the end of 1996. The number of incidents had dropped from around 90 to around 10 cases in recent years. Many large-scale projects, no matter it is superstructure works or building projects, are anticipated in the coming few years. Most importantly, it all depends on everyone

to remember the four safety steps, before carrying out works, take the four safety steps to confirm the location of gas pipes, followed by protective measures to avoid accidents. Lastly, there are two telephone numbers. The first is 1823, the Government hotline.

Since I do not know whether it is town gas or LPG that your construction site is on, you can call 1823 for enquiry. You will then be directed to relevant colleagues who will arrange safety seminars for your workers or sub-contractors.

Here, I have also shown the telephone number of town gas company. There are other telephone numbers of other natural gas companies in our Code of Practice. Since many of the pipes are underground town gas pipes, these are the numbers which you can dial to obtain plans or seek gas suppliers' advice.

Thank you everyone. This is the end of my presentation.