

**China's Practice of Enhancing Work
Safety and Promoting Work
Resumption, and Case Study of
Construction Enterprises under
COVID-19**

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General Contents

China's Practice of Enhancing Work Safety and Promoting Work Resumption under COVID-191

Case study of work resumption and work safety management of Chinese construction enterprises under COVID-1997

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Resumption under COVID-19**

Contents

1 Challenges on work safety brought by COVID-19	4
2 Governmental regulatory countermeasures	7
2.1 Policy, vision and strategies.....	7
2.2 Countermeasures during COVID-19 pandemic outbreak	11
2.3 Countermeasures during the centralized work resumption	20
2.4 Safety inspection measures during regular COVID-19 prevention and control	37
3 Enterprise risk control countermeasures.....	48
3.1 Confirmation of the safety conditions on work resumption.....	49
3.2 Enhancing staff management under COVID-19 prevention and control	55
3.3 Actions to take for staff under quarantine or infection.....	60
3.4 Training and education for the staff.....	61
3.5 Responding there is insufficient investment in work safety.....	63
3.6 Safety management f under the underlow operation of a plant....	64
3.7 Work safety checking.....	66
Appendix 1	70
Appendix 2.....	73
Appendix 3.....	75
Appendix 4.....	77

Appendix 5.....	80
Appendix 6.....	83
Appendix 7.....	84
Appendix 8.....	87
Appendix 9.....	91

China's Practice of Enhancing Work Safety and Promoting Work Resumption under COVID-19

The COVID-19 pandemic that broke out at the end of 2019 not only seriously endangered people's lives and health, but also had a huge impact on the production and operation activities of enterprises, making work safety conditions complex and unstable, work safety risks and hazard significantly increased, and the difficulty of government regulation and business management became extremely hard. In order to ensure the safety of people's lives and health to maintain and promote sustainable economic development, this practice summarizes China's experience and practices in strengthening work safety during pandemic management.

This practice identifies the impact of COVID-19 pandemic upon the work safety of enterprises and the reasonable, feasible control measures adopted from the two perspectives, the government and enterprises. It not only provides guidance for China's overall safety development and pandemic prevent and control, but also hopes to provide other economies with pragmatic approaches.

1 Challenges on work safety brought by COVID-19

COVID-19 pandemic is difficult to prevent and control, its development situation is difficult to predict, and its scope of influence is

wide. It determines that more attention must be paid to the development of the government's role, accurately identifying various uncertain factors brought by COVID-19 pandemic, and coordinating pandemic management. Work with various economic and social undertakings to promote the coordinated efforts of the government, society and enterprises to have better work resumption for the safety of enterprises, and to create a favorable environment for the stable and orderly operation of the economy and society.

The COVID-19 epidemic has had a significant impact on the production and operation activities of various enterprises. During pandemic outbreak, pandemic management, material production enterprises, warehousing and logistics enterprises, hospitals and isolation sites, etc. have undergone overload operation, while power supply, water supply, gas supply, passenger transport and other infrastructure enterprises sustained to operate at a high speed. A large number of enterprises, after the pandemic suppression, would start work resumption in cluster, some enterprises and construction projects have increased production and expanded capacity in order to meet the schedule and speed up the progress. Some enterprises see phenomenon of frequent suspension and resumption, hasty product changing, and underemployment. In addition, affected by the epidemic, the flow of personnel is limited, and the difficulty of enterprise recruitment is highlighted.

The above impacts and changes have brought great impact on the work safety of enterprises in following area:

(1) **Increased complexity of work condition.** Under the influence of COVID-19 epidemic, various uncertainties have superimposed, and abnormal production states such as repeated suspension and resumption, temporary product changing, production increase, expansion, rush construction period and rush progress have increased significantly.

(2) **Increased operation burden in some areas.** During the outbreak of pandemic, the industry of pandemic protection and supplying civil necessities continued to operate overload, and most of them involved hazardous substances such as explosives, and the work safety risk increased.

(3) **Reduced cost paid on work safety.** Affected by market fluctuations, some enterprises have difficulties in production and operation, resulting in a reduction in work safety investment and a decline in work safety support capacity.

(4) **Increased underload operation in some industries.** The COVID-19 epidemic has had a huge impact on the supply chain and industrial chain. Some enterprises have overstocked their products, which makes the production system in an underload operation state and increases the risk of process safety.

(5) **Inadequate training and education on safety knowledge and**

skills for some temporary recruitment. Under the background of pandemic management, the flow of personnel is limited, which may lead to the lack of key positions in some enterprises, the large increase of temporary staff, and the lack of staff safety capabilities.

2 Governmental regulatory countermeasures

COVID-19 is a new hazard affecting the production safety of enterprises, which has a very complex impact on work safety. As its impact goes far beyond the enterprise level, emergency management authorities should play a more active role, via coordinating work safety and pandemic management to create work safety conditions, Chinese emergency authorities struggle for stable economic and social development.

2.1 Policy, vision and strategies

2.1.1 Policy

Whether in pandemic management or work safety management, Chinese emergency authorities should adhere to the policy of "people first, life first", adhere to the concept of safe development, protect people's life safety and health at all costs, and always put people's life and health in the first place.

2.1.2 Vision

Make every effort to ensure of work safety under the background of

COVID-19 epidemic prevention and control, reinforce the importance of safe development. Our vision is to serve development, to safeguard development and to promote development with work safety, and create a good safety environment for epidemic prevention and control, maintain stable economic operation and social harmony and stability.

2.1.3 Main strategies

In order to ensure the effective implementation of the concept and policy, combined with the new hazard of work safety under the influence of COVID-19 epidemic, we should innovate the enforcement and inspection strategies and methods, and constantly improve the efficiency of work safety inspection law enforcement.

(1)Combination of supervision and service. During the outbreak of the epidemic and the period of start work resumption in cluster, we should put work safety service in a prominent position, improve service awareness, and integrate service into examination and approval, permission, acceptance, examination, education and training, inspection and law enforcement. On-site guidance and other links of supervision and law enforcement will help and promote the safe production of enterprises to the greatest extent during resumption.

(2)Division and categorization in inspection.

① Inspection by division. According to the level of pandemic risk, different ways of work safety inspection and law enforcement and services

are adopted for low-risk areas, medium-risk areas and high-risk areas. Be good at innovative inspection enforcement practice for high-risk area.

② Inspection by category. Categorize companies in key sectors vs. general sectors, well-grounded in safety vs. less skilled in safety management. It is important that industries that supplies vital social needs are separated treated; hence categorize companies in pandemic management supplying, social supplying and other industries. Large companies enjoy better resource at safety management, hence categorize by large companies vs. medium & small companies. Governmental inspection, enforcement and services shall focus on high-risk, less skilled, pandemic management supplying, social supplying, medium & small companies.

(3) Providing tailored tactics during the different periods. On the basis of dividing and categorizing, we should focus on major risks, important places and key enterprises, and implement precise services, precise management and precise law enforcement.

① During pandemic outbreak, for the enterprises of ensuring pandemic management and people's livelihood, in view of the characteristics of high fire risk, the focus is on fire safety, precise identification and precise service.

② During the period of start work resumption in cluster, enterprises with weak safety management and poor work safety conditions should

implement "one enterprise, one policy", organize experts to provide on-site assistance and guidance, and focus on the assistance and guidance of small and medium-sized enterprises.

(4) Solutions from both the symptoms and fundamentals. In the context of the normalization of pandemic management, work safety inspection should be continuously strengthened while ensuring the strengthening of safety services. Focusing on key sectors, undertake specific hazard mitigating, lifting safety benchmark, preventing work safety major risk at the source.

(5) Innovative enforcement and inspection practice. Under the background of pandemic management, we should innovate work safety enforcement and service means, optimize inspection mode, and improve work safety inspection & management efficiency. In this regard, Chinese emergency management authorities activated on-line qualification review, digitalized inspection, big data analysis, and perform unnoticed enforcement visits at times; for significant challenges and major risk & hazard, remote expert meetings were held, and on-site helps were given. For staff at key posts and newly entered, on-line free safety trainings were offered during pandemic.

Government	philosophy	People first, life first				
	Sole purposes	Serve, guarantee and promote development with sound safety				
	Tactics	Supervision service	Categorize & Division	Precision enforcement	Cure symptom & illness	Innovate inspection practice
Enterprises	Timeline	Outbreak of COVID	Cluster resumption under COVID		Normalized COVID management	
	Industries	Supplier of necessities	High-risk sectors & general sectors		All sectors	
Main Risks		<ul style="list-style-type: none"> 1. Overload operation 2. Change in production 	<ul style="list-style-type: none"> 1. safety elements beyond control 2. safety system change 3. less input to safety management 4. more craft risks 5. underskilled staff 	<ul style="list-style-type: none"> 1. Change in production 2. less input to safety management 3. more craft risks 4. under skilled staff 		

Figure 1: work safety inspection & management strategic framework

2.2 Countermeasures during COVID-19 pandemic outbreak

During the outbreak of the COVID-19 epidemic, the vast majority of enterprises were shut down, and the main task at this stage was to ensure the safety of people and the operation of society. During this period, the Overload operation of **epidemic prevention** material production enterprises, warehousing and logistics enterprises, hospitals and isolation sites, and the continuous operation of power supply, water supply, gas supplying, passenger transport and other guaranteed operation enterprises. The work safety risk has increased significantly, so all sectors must attach

great importance to work safety.

2.2.1 Countermeasures for the epidemic-securing industries

For the epidemic-securing industries, emergency management authorities work with relevant industry supervising departments, focus on fire safety, and clarify deploying in time. And on this basis, the implementation of point-to-point precision services became feasible.

2.2.1.1 Deploying

(1) Clarify the focus and means of work. The emergency management authorities and the fire safety rescue authorities mobilized and deployed in a timely manner, and clearly defined the production enterprises of pandemic management materials, the designated hospitals for centralized treatment, and the newly built designated hospitals. The transformation of quarantine points should be taken as the focus of fire prevention and control, and the door-to-door guidance of fire safety service and the implementation of precise service should be taken as the main working mode.

(2) Issue fire safety regulations and requirements. The emergency management authorities and the Fire Safety Rescue Center, in conjunction with the health and construction departments, promptly issued relevant fire safety regulations and requirements to clarify the technical requirements for fire prevention in temporary hospitals where fever patients are concentrated. Clarify the responsibilities of all parties involved in fire

safety management, fire safety inspection contents, key inspection parts, drill requirements and key precautions during the drill.

(3) Establish fire safety evaluation mechanism. The fire safety rescue authority has set up a fire safety supervision and guidance group to establish a fire safety situation assessment and dispatch mechanism during the pandemic management period. To guide departments at all levels to follow up fire safety risk preventing measures in key areas in a timely manner.

(4) Establish a comprehensive information sharing and joint working mechanism. The fire safety rescue authorities at all levels and the local pandemic management headquarters, relevant industry departments, local authorities, and the work places of various regions work together to timely establish information sharing and work collaboration mechanism.

2.2.1.2 Services

(1) Guide all in-charge departments for industries and local authorities put fire safety duty to practice. Give full play to the comprehensive coordination function of the Safety Committee of governments at all levels. Urge and guide all industries in-charge departments and local authorities to strengthen the management of vital supplier industries for pandemic control Strengthen supervision and inspection.

(2) Establish a fire safety service team to provide door-to-door services. Local fire safety rescue organizations organize local fire safety forces to

adopt one hospital/one enterprise, one policy principle to provide fire safety guidance services and identify various fire safety work safety hazard to the company doors.

① For material production enterprises and warehousing and logistics enterprises serving pandemic management, we should focus on guiding and supervising enterprises to implement fire prevention and control measures, strengthen self-management, identify hazards and reduce risks.

② For designated medical institutions and of quarantine points, take uninterrupted fire safety inspection to help identify fire hazard.

③ For new designated hospitals and quarantine points from design, construction to operation, the whole process should be under tracking, active service, and strict management.

(3)Notification & awareness rising. The fire safety authorities shall prepare fire safety tips or notices in a timely manner, strengthen publicity through various means, remind all units to pay attention to fire safety matters, and remind them to organize and carry out fire patrol and inspection in a timely manner. Activities including hazard prevention and control, supervision and inspection, strengthening safety education and training, emergency evacuation drills, etc are carried out widely.

(4)Innovation of fire safety inspection enforcement practice. By means of information technology, the fire safety status of inspection objects

can be understood through telephone reminders, Wechat SMS prompts, remote video supervision and inspection, and the implementation of fire safety measures can be guided.

Interpretation of terms — emergency management authorities are supervising fire safety in China

The emergency management authorities of the State Council shall supervise and administer the fire safety work throughout the country. The emergency management authorities of the local people's governments at or above the county level shall supervise and administer the fire safety work within their respective administrative areas, and the fire safety rescue authorities of the people's governments at the same level shall be responsible for its implementation. Other relevant departments of the people's governments at or above the county level shall, within the scope of their respective duties, practice duty in fire safety in accordance with the provisions of this Law and other relevant laws and regulations. For example, the housing and urban-rural construction departments are responsible for supervising and urging the responsible units of construction projects to strengthen the fire safety management of housing construction and municipal infrastructure construction according to law, and the transportation departments are responsible for the fire safety management of passenger stations and ports. In the management of wharfs and means of transport, the relevant departments shall be urged to implement fire safety accountability and related fire safety work systems according to law, and the health and family planning departments shall be responsible for fire safety in medical and health institutions. The education department is responsible for schools, kindergarten management and so on.

Case study 1 — Promulgating fire safety rules

1. On January 26, 2020, the MEM fire safety Rescue Center issued the Notice on Fire Safety Supervision and Management in the Special Period of Fire Management. It is clear that the current key points of fire prevention and control are the production enterprises of epidemic prevention and control materials, the centralized treatment of designated hospitals, the

construction of new designated hospitals, and the transformation of quarantine points, which require the innovation of fire safety inspection methods to fulfill duty in fire safety services.

2. On January 28, 2020, the Safety Committee Office of the State Council, MEM issued the Notice on performing duties in Current Safety Production. Require members of the Safety Committee of the State Council, as well as local work safety committees and fire safety rescue teams, Make every effort to guarantee pandemic management related key workplace work safety consultation services, and list the inspection and service key contents of different workplaces.

3. On February 14, 2020, the Safety Committee Office of the State Council, MEM issued the Notice on Doing a Good Job in Current Safety Management, which clearly put forward the strategy of implementing precise services for key areas of safety management. To carry out door-to-door service, at the same time, it is required to innovate management means, implement online approval, digital management, and strengthen big data analysis and judgment through information platform, video scheduling, video surveillance of important parts, etc.

Case study 2 — Precision Onsite Services

During the pandemic management period, MEM implemented "one hospital, one policy" and "one enterprise, one policy" for designated medical institutions, isolation sites, pandemic management material production and logistics enterprises. More than 2,700 safety service groups for these special places have been set up throughout the country to provide point-to-point safety guidance services. As of February 2020:

Newly built designated hospitals and quarantine points. During the design and construction of Wuhan Huoshenshan and Leishenshan hospitals, Hubei Fire Safety Corps set up a work safety consultation services group to guide the fire safety work in the construction process. Improve the fire safety fortification level, coordinate the installation of single smoke alarm, and donate fire extinguishing equipment. When it was put into use, the fire safety rescue team of Hubei Province synchronously built two supporting fire safety rescue stations and operated them synchronously to provide "personal" guard services for the hospital.

Material production enterprises, warehousing and logistics enterprises. Hubei Fire Safety Rescue Team provided door-to-door fire safety inspection services to 32 fire safety goods

manufacturing enterprises in the province to guide the implementation of fire safety requirements. Beijing, Hebei, Inner Mongolia, Anhui, Chongqing, Guangdong, Yunnan and other fire safety rescue teams carry out door-to-door fire safety inspection and guidance for medical protective equipment production and storage enterprises to help improve the level of intrinsic safety, and for hazards that cannot be controlled for a while. Assign a special person to guide the implementation of temporary care measures.

Designated medical institutions and quarantine points for suspected cases. Hubei Fire Safety Rescue Team used information technology to strengthen fire safety inspection in 251 epidemic-related medical institutions and 59 quarantine points. Beijing, Shanxi, Shanghai, Jiangsu, Zhejiang, Henan, Hainan and other fire safety rescue teams organized fire safety supervisors to conduct on-site inspections in designated hospitals and quarantine points.

Case study 3 —Strengthening notification and awareness.

In February 2020, the Xiangyang Branch of the Fire Safety Rescue Corps of Hubei Province formulated the fire safety commitment letter and notification letter during the prevention and control of UNK1, in which the commitment letter is mainly aimed at fever clinics and designated hospitals, requiring relevant personnel to sign and seal. Wechat will be sent to the fire safety rescue brigade of each administrative region for reference, and the notification will be sent to the relevant enterprises to urge them to work better for fire prevention and control, so as to make each enterprise more clear about fire safety accountability and key precautions.

2.2.2 Countermeasures for livelihood protection sectors

For livelihood protection sectors, the emergency management authorities shall assist and guide all relevant departments to carry out safety inspection with checklists, help to implement the responsibility system of enterprises to ensure the controlled and safe operation of enterprises.

(1) Establish work safety service working groups. We will strengthen

targeted assistance to companies supplying civil necessities and carry out multiple rounds of door-to-door work safety consultation services. Communicate with the pandemic management headquarters and other departments in a timely manner in view of the shortage of materials for companies supplying civil necessities for pandemic management. Local emergency authorities coordinate and solve the problems of companies supplying civil necessities for pandemic management to the maximum extent.

(2) Power supply, water supplying & drainage, gas supplying heat supplying, and communication infrastructure.

① Power departments should strengthen the inspection of channels, stations and lines, and strengthen the management of equipment operation and maintenance.

② Water supplying & drainage companies shall decontaminate production & supply facilities well enough, monitor the water quality real-time, and enhance daily sewage management for pandemic prevention.

③ Gas supplying management departments should improve the level of scientific dispatch, improve the ability of emergency response, and ensure the safe supply of gas.

④ Heat supplying department should strengthen equipment inspection, find problems and solve them in time, and ensure the heat supplying needs of residential communities, hospitals and other important

places.

⑤ Communication departments should confirm smooth flow of relevant network data and the maintenance of network base stations during the Spring Festival holidays to ensure the smooth operation of equipment.

(3) Information submission and on-duty reports. During pandemic, public serving industrial sectors including power supply, water supplying & drainage, gas supplying heat supplying, communication infrastructure shall enhance on-guard shifts system, formalize information submission, strengthen interconnection with local emergency management authorities, and make sure that connection in hot and manned 24-7.

(4) Strengthen emergency plans. Departments strengthened the operation and dispatch emergency management and duty by means of science and technology and information technology, and comprehensively carry out hazard identification management. Scientifically develop emergency plans, timely implement first response and emergent repairing, and improve water supply, power supply, and gas supplying capabilities.

Case study 4 —emergency management Bureau, Chaoyang district, Beijing. companies supplying civil necessities and maneuvering city operation to provide safety consultancy service

From March 3 to 4, 2020, the emergency management Bureau of Chaoyang District, Beijing, jointly with relevant departments, went deep into the city operation. Companies supplying civil necessities to provide safety consultancy service. The inspection team successively visited five enterprises, including the Beijing Gaoantun Waste Incineration Co., Ltd. located in Jinzhan, Olympic Village, and Shibalidian areas, the Gaoantun Sanitary Landfill Site in Chaoyang District

of Beijing, a water plant of the Beijing Water Supply Group Co., Ltd., and the Beijing Dongfang Taiyang Agricultural and Food Market Co., Ltd. The waste incineration workshop, landfill site, water supply activated carbon filter room and non-staple food market greenhouse were inspected respectively. Local supervising departments gained detailed understanding of safety performance in garbage disposal, water supply operation, non-staple food import and export, staffing and so on.

2.3 Countermeasures during the centralized work resumption

After seeing pandemic mitigated, a large number of enterprises are start work resumption in cluster, and enterprises at this stage are generally faced with the interference of factors such as changes in production systems, reduced investment in safety, inadequate capacity to ensure safety, and high accumulation of work safety risk. It brings great uncertainty to the market. In this context, the emergency management authorities adhere to the principle of sectioning and categorizing in enforcement, and offer management with precision, strengthen work safety consultation services.

2.3.1 Give full play to duties

Form collaborative, joint prevention efforts to promote work safety in the context of the COVID-19 pandemic as we advance corporate safety initiatives, joint prevention & control mechanism helped work safety policies and pandemic management policies to be deployed, undertaken and reviewed at same pace.

(1)Timely introduction of work safety services and guidance

measures. The emergency management authorities are responsible for the joint prevention of the State Council and governments at all levels, thus should actively promulgate favorable policies for resumption, offering work safety consultation services, and achieve success in pandemic management as well as work safety.

(2) Give full play to the overall coordination role of the Safety Committee office. Give full play to the overall coordination role of Safety Committee offices of governments at all levels, based on comprehensive coordination and classified guidance, strengthen the implementation of work safety responsibilities of housing, public security, traffic police, fire safety, market supervision and other departments. Strengthening work safety consultation services in all industries in the context of pandemic management.

Interpretation of terms —State Council joint prevention mechanism

It is a cross-ministry coordination mechanism platform at the level of the Central People's Government launched by the Chinese government in response to the outbreak of COVID-19 in early 2020. The mechanism is a COVID-19 pandemic joint prevention led by the National Health Commission. Joint prevention Ministers in charge of the relevant Ministries shall be appointed as the group leaders respectively, with clear responsibilities, division of labor and cooperation, so as to form an effective joint force for epidemic prevention and control.

Case study 5 — Actively perform emergency management in serving resumption

1. MEM Promulgates Eight Measures to Promote Enterprise Safety Production and Management as a Whole

On February 26, 2020, MEM formulated and promulgated eight measures to comprehensively promote enterprise safety management and emergency response, requiring emergency management authorities at all levels to actively serve the general picture, strengthen safety risk assessment, and innovate work safety inspection to serve the companies resumption well. See Appendix 2.

2. The emergency management authorities of all provinces, municipalities and autonomous regions have actively introduced convenience measures

On March 1, 2020, the Emergency Management Department of Jilin Province issued the Ten Measures to Support the resumption safety preventing of Enterprises during the period of pandemic management: prolong the validity period of certificates; on-line approval & reviews;; streamline resumption procedure; inspection focus only on major hazards; change inspection practice; reduce company administrative burdens, provide expert safety services; offer on-line safety courses, and go easy on administrative citations.

2.3.2 Simplify administrative approval process

Under the special background of pandemic management, emergency management authorities facilitate the resumption of enterprises and accelerate the resumption of enterprises through streamline approval process.

(1)Optimize the administrative approval process.

① Expired certificates are automatically extended. If the work safety license of the enterprise, the qualification certificate of the safety evaluation, testing and inspection institution and the safety certificate of the principal person in charge of the enterprise, the safety management personnel and the special operation personnel expire, the validity period

will be automatically extended to the end of this year.

② Open up a green channel. For enterprises in key industries or those that cannot be handled online and are relatively urgent to be handled on the spot, we should open up a green channel for advance booking, early intervention and on-the-spot examination.

(2) Innovation of administrative examination and approval methods.

① Online processing of administrative examination and approval. Where work safety "Three Simultaneousness" procedures are required for new construction, renovation, expansion, or reconstruction projects, optimize applying procedure for qualification shall be conducted. Implement online rapid processing, and conduct on-site verification after the completion of the pandemic management.

② Implement commitment instead of certificates. Qualified special equipment licensees are encouraged to renew their licenses free from reviewing by means of self-declaration and commitment

Interpretation of terms—"Three Simultaneousness" system

According to Article 31 of the Work Safety Law of the People's Republic of China, the safety facilities of new construction, reconstruction and expansion projects of production and business units must be designed, constructed and put into use simultaneously with the main projects, and the investment in safety facilities shall be included in the budget estimates of construction projects.

Case study 6 —Zhejiang Province "runs at most once" service activities, vigorously

promoting resumption

During pandemic, the Zhejiang Provincial Department of Emergency Management has organized a "make one run" service activity to simplify the approval process, improve administrative efficiency, adhere to the enterprise demand-oriented, and accelerate the promotion of enterprises. The emergency management system of Zhejiang Province combs in advance the situation of enterprises that have expired and changed their certificates in the past six months. For those who are about to expire and change their certificates, it actively inquires about the current situation evaluation and other preparations, and guides the online declaration. Fully implement "online office" and "palm office", enterprises can apply through Zhejiang government service network or "Zhejiang office" APP.

2.3.3 Accelerate work safety condition review for resumption

Adhering to the principle of categorization, for general production enterprises, the examination and approval of enterprise qualification verification and filing shall be cancelled in an all-round way, and the production of enterprises shall not be restricted. For enterprises that have had work safety accidents in recent years and have poor work safety conditions, the work safety condition audit system shall be implemented, but at the same time, the review process shall be simplified and active assistance shall be provided, helping it to reach the work safety benchmark.

(1) Implement the work safety commitment system. For enterprises in key industries with good safety foundation and no accidents since 2019, on the premise of implementing safety production measures, the main responsible persons of enterprises make safety commitments, no longer

report at different levels; instead, officials come to site acceptance and seal.

(2) Work safety condition review for resumption. For key enterprises with accidents in the past three years and poor work safety conditions, under the premise of strict work safety conditions, the audit procedures should be accelerated to promote safety. For enterprises failing to meet the requirements of pandemic management and work safety, resumption will not be granted for the time being, and countermeasures will be taken according to the specific conditions and problems of enterprises to assist enterprises to resume as soon as possible.

① Define the resumption work safety conditions. Enterprises under any of the following circumstances shall not pass the resumption approval.

- a. The main responsible person, work safety management personnel, special operation personnel and other employees of the enterprise have not been trained and qualified, and have not been certified to work.
- b. The operating personnel fail to receive centralized training, pass the examination and sign the labor contract
- c. The work site should be equipped with monitoring and control equipment according to the regulations, but it is not equipped with monitoring and control equipment according to the regulations.
- d. The management of production equipment is chaotic, and there is an explosion of electrical equipment.

- e. Illegally storing, transporting, or using civil explosives.
- f. Labor organization and management are chaotic, subcontracting in violation of regulations, contracting at different levels, and contracting for management.
- g. The major work safety hazard found in the safety inspection has not been completely eliminated.
- h. Or there are other unsafe factors.

② Improve the efficiency of resumption approval. Based on the principle of reviewed and approved on site, we will speed up the efficiency of examination and approval, reduce the procedures of review at different levels and approval by leaders, and bring them into the green channel. For work safety matters requiring on-site examination and acceptance, the emergency management authorities shall immediately arrange staff to organize on-site inspection after receiving the application materials from the enterprises, and immediately approve the enterprises that meet the requirements.

Case study 7 —Enterprise resumption work safety conditions issued by some cities

Beijing: enterprise work safety in resumption should achieve "five strictness": strict pandemic management measures

Strict work safety accountability; strict safety education system; strict hazard identification and risk management mechanism; strict emergency prevention measures.

Guangzhou: Five Conditions for Enterprises to Enter the Market: Prevention and Control Mechanism in Place

Staff identification is in place; facilities and materials are in place; internal management is in place; publication education is in place.

Hangzhou: Enterprises Implement Six Non-Starts:

The main person in charge of the enterprise, do not start work; the person in charge of enterprise technology not in, do not start work; the person in charge of enterprise safety not shown, do not start work; the operator of key positions in the enterprise not in place, do not start work; the enterprise equipment installation is not intact, do not start work ; The enterprise resumption plan has not been implemented, do not start work

Zhengzhou: Enterprises must achieve "six musts and six ensures":

Enterprises must formulate scientific and standardized management plans to ensure safety and order. New recruits and transferees shall be trained to ensure that the staff are safe to work; risk & hazard identification must be comprehensively carried out to ensure that the prevention and control measures are in place; the hazardous work approval system must be strict to ensure that the safety management of the work site is in place; emergency treatment of key devices must be formulated to ensure safe operation.

2.3.4 Highlight more services and guidance

Under the background of pandemic management, offering work safety consultation services instead of enforcement is the main way to ensure the safety operation of enterprises.

(1) Carry out baseline identification. The emergency management authorities shall timely mobilize, carefully deploy, actively coordinate and assist the relevant departments to carry out in-depth baseline identification of various enterprises within the administrative region, so as to prepare for the emergency of enterprises. According to the principle of "highlighting the key points and giving consideration to the general ones", the work is

carried out in the vital supplier industries for pandemic control (sites) within the administrative region. The companies supplying civil necessities, key industry enterprises, and general production enterprises are comprehensively investigated, and the list of various enterprises is sorted out.

(2) Implement diversified work safety door-to-door service. Focus on hazardous chemicals, fireworks and firecrackers, mines, metal smelting and other key industries with prominent work safety in resumption problems, as well as "three places and three enterprises" ("three places" refers to workplaces involving explosive dust, paint spraying and confined space, and "three enterprises" refers to metal smelting, ammonia-involved refrigerating and ship crafting enterprises)

① Establish a coordination mechanism for enterprise contacts. The emergency management authorities fully connects with all kinds of industrial enterprises, and carries out supervision and inspection on key industrial enterprises in the administrative region, such as coal chemical industry, fireworks and firecrackers, chemical industry and metal smelting. Establish liaison systems such as liaison officers stationed in enterprises and grid management to provide information support and convenience for further door-to-door guidance, expert services and point-to-point guidance.

② Expert Safety Guidance Service. For key and difficult issues, major risk & hazard, experts in relevant majors come together to offer on-

line troubleshooting or on-site service, to better help companies at risk in following manner:

- a. Online service answers questions and puzzles. Provide online security consulting services, answer questions and solve doubts for enterprises at any time, actively contact enterprises, understand the specific situation and problems of enterprises in detail, organize experts to analyze and study, and provide enterprises with corresponding professional solutions free of charge, provide advice on solving problems related to during pandemic work safety.
- b. On-site guidance for identifying hazard. Organize experts to go deep into the enterprise site and conduct point-to-point service. To inspect and guide the dangerous parts of the enterprise's production, to help find problems from the aspects of intrinsic safety design of the device, process operation, equipment integrity management, maintenance of safety facilities of the device, special operation management, change management, surrounding environment of the enterprise, emergency disposal plan, emergency rescue resources, etc. Put forward improvement measures to eliminate hidden dangers in time.

① Coordinate with third party service providers. Guide social superior technical forces to participate in work safety public services and enterprise work safety hazard identification management, and actively

coordinate third-party service agencies to provide timely work safety services to enterprises within the administrative region to enhance the scientific practice and standardization of work safety.

(3) Provide safety training services

Targeted safety training measures shall be taken for the person in charge of the enterprise, new staff, transferred staff and special operation staff.

① Safety training for enterprise leaders in key industries. The safety training of enterprise leaders and work safety management personnel in key industries should adopt the combination of online and offline methods. Through training activities, the training and assessment rate of key enterprise leaders should reach 100%.

② Education and training of general enterprise leaders. Online training is allowed for the initial training and refresher training of the main responsible persons and work safety management personnel of enterprises in general industries. In view of the situation that security administrators and technicians in key positions are unable to returning to post due to illness, the emergency management authorities promptly dispatches personnel to provide on-site guidance services. Conduct one-to-one talks with enterprise safety management personnel and key temporary personnel to ensure that pandemic management and work safety responsibilities are conveyed in place.

③ Education and training for new staff and transferred staff. Online training can be used for the induction, job transfer and safety re-education of other employees in the enterprise. All new and transferred staff must receive "three-level safety education and training", focusing on work safety knowledge, post operation procedures, identification of dangerous and harmful factors, emergency escape and first aid knowledge at the construction site, emergency handling of accidents, etc., and can only take up their posts after passing the examination.

④ Examination management of special equipment operators.

- a. The examination for special equipment operators shall be organized by means of separate organization, with a small number of people and multiple batches, and on the premise of adequate protection.
- b. Before resuming the examination, conduct a comprehensive inspection of the examination equipment, and the work safety hazard found in the inspection must be rectified before resuming the examination. The relevant safety inspection data shall be filed for future reference after being signed and confirmed by the inspectors and the person in charge of the project.
- c. For obtaining evidence after the examination, the first is to apply for online processing, and encourage special equipment operators to apply for (change) certificates online on the local assessment management platform. Second, the reexamination shall be

postponed. If the special equipment operator submits an application for reexamination and is accepted by the issuing authority after examination, the issuing authority may extend the validity period of the special equipment operator's certificate if the examination cannot be arranged in time due to the examination.

(4)Strengthen Work Safety Responsibility Insurance. Emergency management authorities coordinate with insurance companies to give full play to the greater effectiveness of Work Safety Responsibility Insurance and provide strong protection for production enterprises under the background of emergency management authorities.

① Expand the coverage of Work Safety Responsibility Insurance. The Work Safety Responsibility Insurance-insured enterprise shall, from the date of insurance, Employees of the insured enterprises who are infected with the COVID-19 in their production and operation activities will be included in the coverage of Work Safety Responsibility Insurance free of charge.

② Extend the Work Safety Responsibility Insurance Term. If an insured enterprise of Work Safety Responsibility Insurance needs to stop work temporarily due to the government's emergency management work, it shall extend the insurance period for the enterprise free of charge. The specific extension period shall be determined according to the actual shutdown time.

③ Allow businesses to pay in installments. During the period of pandemic management, the insurance premium payment method of new insured enterprises of Work Safety Responsibility Insurance is flexibly handled, allowing enterprises to pay in installments. For small, medium and micro enterprises that renew their insurance, they can postpone the payment of the first premium of work safety liability insurance.

(5) Offering work safety checking service. Continue to organize experts and safety officers to help enterprises, carry out accident hazard identification, technical guidance and other services, and help enterprises implement work safety accountability.

① Define the key items of safety inspection service. Focus on the implementation of corporate work safety responsibility, law person responsibility and sectional responsibility. Focus on compliance of work safety legislation & standards; make sure the company designates work safety management authorities and staffing them with full (part)-time personnel; clarify hazard identification rectify and major hazard source monitoring situation, emergency management situation, and safety training situation.

② Increase the intensity and frequency of hazard identification. During the epidemic, we continued to increase the intensity and frequency of work safety hazard identification, organize joint law enforcement forces, go deep into various enterprises in the administrative region, and continue

to carry out multiple rounds. Full coverage of work safety hazard identification mitigating work. At the same time, we will urge all departments to comprehensively strengthen the safety and security management and emergency preparedness of the Olympic Games, smooth the transmission of information, and conscientiously perform in planning, teams, materials, equipment, and other work.

③ Rectify identified hazard in time. For the problems found in the inspection, put forward practical rectification measures, according to the established time limit, the prescribed node to confirm rectification. For hazards that can be solved immediately, help enterprises to solve them immediately, and keep a close eye on those that cannot be solved immediately, and help enterprises to formulate hazard solutions.

Case study 8 —enterprise baseline identification by emergency management Bureau of Zhejiang province

During the peak period of the Spring Festival in 2020, in view of the potential safety hazards existing in the rush production of some key material production enterprises, Zhejiang provincial emergency management department carry out baseline identification. Of pandemic management enterprises at that fast speed. On New Year's Eve, the production enterprises of epidemic-related materials in the whole province were investigated, and 96 production enterprises of epidemic-related materials were sorted out, which were further refined into assault production enterprises and normal production enterprises according to their production scale and material varieties. According to the variety of production, the assault production enterprises are subdivided into six categories, such as mask production, disinfectant production and protective clothing production. The baseline identification work provides important guidance for the follow-up pandemic

management and work safety, and gains valuable time.

Case study 9—work safety services in selected areas

1. Implementing grid management in Ningbo petrochemical development zone

In the work of pandemic management and resumption, Ningbo Petrochemical Development Zone gives full play to the advantages of grid management and divides it into several groups according to the distribution of enterprises, each group has several grids under its jurisdiction, and each grid has a grid leader and a number of grid members. Be responsible for the enterprise docking and service in the grid. From the end of January 2020 to March 5, 2020, the grid members arranged 29100 staff in enterprises, established information files for more than 900 staff, and screened out 232 key personnel. In terms of work safety, 88 grid leaders and grid members from 26 grids sink to the front line and fight side by side with enterprises every day to guide the work safety work of enterprises in real time. See Appendix 5 for details.

1. Hangzhou Nanhu District implements point-to-point services

On January 30, 2020, the first batch of 19 district-level organ volunteers in Nanhu District of Hangzhou City were trained in enterprise recruitment, management and safety work, and on January 31, the first batch of enterprise volunteers were all in place. It has been stationed in 15 enterprises to carry out point-to-point service work. And implement the system of daily reports on the implementation of the law. In order to ensure during pandemic work safety, the District UNK1 specially issued more than 7000 safety regulations of "Eight Requirements and Two Strict Prohibitions" in the "Enterprise Safety Notification Card" to remind enterprises to strengthen safety management. See Appendix 4 for details.

1. Harbin organizes experts to customize safety guidance services

In April 2020, Harbin Work Safety Technical Service Association organized safety experts to provide safety guidance services for the construction project of Harbin Metro Line 3 of CCCC Harbin Metro Investment and Construction Co., Ltd. on the video line. More than 300 managers from various departments of CCCC Harbin Metro Line 3 Project Company and key managers from civil engineering and electromechanical construction units participated in the training to help key enterprises such as CCCC Harbin Metro Investment and Construction Co., Ltd.,

Longjian Road and Bridge Co., Ltd. Ensure the safety and stability of key projects.

1. Tianjin Xiqing District Coordinates Third Party Service Center

During this period, the emergency management Bureau of the government of Xiqing District of Tianjin actively coordinated the third-party work safety service agencies. Carry out auxiliary work safety inspection and hazard identification. By employing experts in safety engineering, fire safety engineering, construction, metallurgy, hazardous chemicals and other fields, it effectively compensates for the unprofessional safety technology and unskilled safety standards of the local government and industry departments. The short board of hazard identification is not deep enough to assist government departments to find out the work safety involved. Fire safety, construction and other aspects of work safety hazard 68 90 items, and the implementation of precise monitoring and rectification.

Case study 10 —Safety training for one million employees in enterprises in Zhejiang province

On March 5, 2020, the Zhejiang Provincial Bureau of Emergency Management formulated and issued the "Implementation Plan of Safety Training for Millions of Employees in Zhejiang Enterprises", which combines offline teaching with online learning to train nearly 400000 small and micro enterprises in processing and manufacturing, safety management personnel and safety management personnel. Personnel in key positions and 5. Seventy thousand "three places and three enterprises", the main responsible persons of enterprises with high risk such as general industry using dangerous chemicals, and safety management personnel have implemented full coverage safety skills upgrading training. At the same time, combined with the requirements of this year's epidemic management, the "Zhejiang work safety network college" has been developed and launched. Since May 2020, the number of offline trainees has reached 281,000, and the number of online trainees has reached more than 405,000.

Case study 11 —Beijing offering work safety checking service

Beijing emergency management Bureau: implement double "16 items" of industrial enterprise emergency management inspection

In March 2020, the resumption of enterprises entered an accelerated period, the returning to post of personnel returning to Beijing entered a peak period, and all kinds of safety accidents entered a prone period. The emergency management supervision and inspection forces at the district, street and township levels in Beijing will continue to carry out emergency service guarantee work for industrial enterprises in accordance with the "16" inspection standards for work safety "of industrial enterprises, and guide the whole link and process of enterprise UNK2. At the same time, enterprises are urged to strengthen work scheduling, requiring enterprises to arrange special personnel to take charge of health supervision and other related work. Since February 21, when the emergency management supervision and inspection of industrial enterprises was launched, the emergency management system at the municipal and district levels has inspected 44725 enterprises and promoted enterprises to rectify 2949 problems, publicized 381 enterprises that have not implemented the rectification measures sufficiently. See Appendix 3 for details.

Case study 12 — Strengthening Work Safety Responsibility Insurance to Help Enterprises Grow in Resumption

In February 2020, PICC launched ten measures of work safety liability insurance to relieve the difficulties of small and micro enterprises, help enterprises to do well in work safety and pandemic management at the same time, and help enterprises, especially small and medium-sized enterprises, to overcome operational difficulties and confirm a smooth and orderly resumption. See Appendix 6 for details of the ten initiatives.

2.4 Safety inspection measures during regular COVID-19 prevention and control

When enterprises enter the production period after the COVID-19 lockdown, the phenomenon of catching up with the construction period, speeding up the progress, increasing production and expanding production is generally increasing. At the same time, some enterprises are affected by

unstable factors such as changes in the industrial chain and supply chain, and their production capacity is reduced. The phenomenon of population redistribution is frequent, and the work safety risk preventing work face is facing greater challenges. In this context, Chinese safety inspectors must insist on Cure both the symptoms and the diseases and strengthen work safety inspection, preventing major work safety risk.

2.4.1 Strengthen work safety enforcement and inspection

(1) Standardize work safety enforcement procedures. Combined with the special background of pandemic management, Chinese emergency officials should further standardize the work safety enforcement procedures and improve the efficiency of during pandemic work safety enforcement. The first is to standardize the preparation before inspection. A comprehensive inspection plan shall be formulated before the inspection, and the inspected unit shall be informed in advance after the inspection time is determined, and the inspection plan shall be prepared by comprehensively analyzing the nature of the inspected unit, key locations, key process links and other factors. The second is to standardize on-site inspection procedures. In general, it should include: opening meeting, on-site law enforcement inspection, and summing-up meeting. Third, standardize the follow-up work of inspection. At the end of the inspection, it is necessary to set up a law enforcement inspection account at the first time, make a decision on punishment for violations of laws and regulations,

and organize a review of law enforcement inspection for enterprises ordered to rectify within a time limit.

(2) Precision work safety enforcement. Relying on big data, information platform and other means comprehensively sort out and summarize the name, scale, administrative license and other basic information of key enterprises in the administrative region, as well as administrative law enforcement, safety identification and other related information. On this basis, the enterprise classification is implemented, and the enterprise work safety level is established according to the different types of production and operation work place and the level of accident risk. Through this, Chinese authorities may accurately carry out work safety inspection for different enterprises at different tactics according to enterprise level.

(3) Standardize enforcement practice. Chinese emergency officials comprehensively implement the "three systems" of public announcement of administrative law enforcement, record of the whole process of law enforcement, and legal review of administrative law enforcement decisions, and promptly and actively publicize law enforcement responsibilities, law enforcement basis, law enforcement standards, law enforcement procedures, supervision channels, and law enforcement results. We should implement classified and precise law enforcement, differentiated management, and reasonably determine the range of discretion, not only to prevent arbitrary law enforcement, different standards, but also to prevent

simplification and "one size fits all", so as to ensure that law enforcement penalties are fair, just, accurate and legal.

(4)Strictly investigate and punish illegal acts. Strengthen routine law enforcement and inspection, make full use of administrative penalties, take the charge of monitoring, media noise and other means, increase penalties and deterrence for violations of laws and regulations, and urge enterprises to fully implement them. Enterprises and main responsible persons who have serious violations of laws and regulations such as evasion and resistance to work safety inspection should be included in credit records in accordance with the law and regulations, and punishment for dishonesty should be strengthened and severely punished.

(5)Strengthen the connection between administrative law enforcement and criminal justice. Emergency management authorities at all levels further strengthened communication and cooperation with public security organs, people's procuratorates, people's courts and other departments in their daily work, and held regular joint meetings. Coordinate and solve important work safety issues, and regularly jointly report information on the transfer, filing, arrest approval, prosecution and judgment results of suspected work safety crimes within their respective administrative areas.

Case study 13—Refusal to rectify serious accident hazard will be sentenced

On December 26, 2020, the 24th meeting of the Standing Committee of the 13th National People's Congress voted to adopt the Criminal Law Amendment (11).In view of the crime of

forcing illegal and risky operations, as well as the closure of production safety equipment and facilities and data information, refusing to rectify serious accident hazard, and carrying out illegal and dangerous production operations without approval. As well as the provision of false certification documents and other issues related to production safety to amend and improve the criminal law."Knowing the existence of serious accident hazard and not excluding it" in relation to work safety, Those who still take risks to organize operations "and" refuse to rectify serious accident hazard "" and engage in illegal production and operation activities without authorization "will be convicted.

2.4.2 Supervise hazard identification & risk control

Some enterprises still have insufficient risk mitigating and work safety inspection in the production process after resumption. For this, monitoring identification mitigating risk & hazard is used to enhance major risk & hazard identification and mitigating.

(1)For newly discovered major work safety hazard, the city and county levels shall take the charge of monitoring. The governments and industrial departments at the county and municipal levels shall be responsible for the highly risky enterprises involved in the production, operation, storage, transportation and hazardous waste treatment of explosive and toxic substances that are likely to cause mass casualties. Organize experts to carry out risk identification and work safety evaluation. For the major work safety hazards found in the inspection, specific rectification plans shall be formulated one by one, so as to achieve "five fixed" responsibilities, measures, funds, time limits and plans, and an

account shall be established by the city level. County authority takes the charge of monitoring.

(2) All major work safety hazards that cannot be completed on schedule shall be subject to suspension of operation. If the project cannot be completed on schedule or work safety cannot be guaranteed, the project shall be suspended till problems rectified, and if the circumstances are serious, it shall be closed down according to law, should the inspection found that safety commitments were not fulfilled; safety responsibilities were not implemented, and risk hazard identification management insufficient. Where there is a "three violations" (i.e., commanding code and labor rules), the responsible person and the person in charge of the enterprise shall be punished together, and the result of the punishment shall be publicized.

2.4.3 Conduct accident escalation investigation

During pandemic, governments at all levels may, when necessary, investigate and handle matters that should have been investigated and handled by governments at lower levels. The government authorizes the emergency management authorities to take the lead in setting up an accident investigation team and organize relevant departments to carry out investigations into accidents that have been decided to be dealt with investigation by one grade above. In case of any of the following circumstances, investigation by one grade above shall be carried out in

accordance with the decision of governments at all levels:

(1) The case is particularly complicated or the social impact is particularly bad.

(2) Where there may be cases of concealment or false reporting.

(3) Accidents occurred in non-coal mines, hazardous chemicals, fireworks, metal smelting, construction and other industries.

(4) The second or more accidents occurred in the same enterprise within two years.

(5) Accidents incurred in the enterprise during the period of Safety Committee take the charge of monitoring mitigating major work safety hazard.

(6) Accidents occurred within 12 months after the enterprise was warned and notified by the Safety Committee office or its responsible person was interviewed.

(7) Other matters that the Local safety office deems necessary to submit to the Safety Committee for a decision on the handling of the investigation by one grade above.

Interpretation of terms—China's accident classification investigation provisions

The current classification of accidents in China is based on the State Council's Regulations on the Reporting, Investigation and Handling of Accidents, which came into effect in 2007, and is divided into four levels: extremely serious accident (more than 30 deaths). Serious accident (10 to 29 deaths), major accident (3 to 9 deaths), general accident (less than 3 deaths). The accident level is linked to the level of the accident investigation team and the accident discretion

of accountability. The extremely serious accident shall be investigated by the State Council or the department authorized by the State Council, and the serious accident shall be investigated by the local provincial government. The investigation by one grade above means that the provincial government will investigate and deal with any major accident (the number of deaths reaches three) during the specific inspections.

Case study 14 —State Council take the charge of monitoring major Accident investigation in 2020

In the whole year of 2020, the Safety Committee of the State Council imposed take the charge of monitoring on the investigation and punishment of 6 serious accidents .During the period of take the charge of monitoring, the State Council urged the provincial government to organize relevant departments to carry out accident investigation in accordance with relevant laws and regulations, and put forward handling opinions in strict accordance with the time limit. The accident investigation report shall be examined and approved by the Provincial Safety Committee and submitted to the Safety Committee Office of the State Council for examination and approval in the form of Provincial Safety Committee documents, and then the case shall be closed and published to the public in accordance with the procedures. After the case is closed, the accident investigation report and the accident handling decision shall be submitted to the Safety Committee Office of the State Council for the record in a timely manner.

2.4.4 Carry out warning education of typical cases

(1)Compilation warning & education case study coverage. Emergency management authorities put professionals in work safety to develop inspiring typical case studies. Case studies should cover the occurrence, root cause, investigation, aftermath, rectification and lessons learnt from accidents, and publicized in forms of handbooks, academic books and videos in various industries and sectors.

(2)Organizing education and learning activities. The emergency management authorities shall organize the persons in charge of key units within the administrative area to carry out the Case study warning of typical work safety accidents, study deep into the situation, root cause, workplace and enterprise problems. Moreover, for departments failed to see the challenge, and aftermaths to the persons held guilty, lessons learnt and how to rectify to prevent from happening again, this learning process is vital. Through learning from past failures, local officials need to improve safety awareness for local key sectors of hazard.

Case study 15 —Typical Case study warning & education

In January 2021, MEM, together with the Safety Committee Office of the State Council and the Office of the National Disaster Reduction Commission, sorted out the case study of various sudden disasters and accidents in 2020, and announced ten typical cases in 2020. It was demanded that all workplace supervisors should conscientiously sum up the successful experience of emergency rescue and on-site disposal, and promote all regions, departments and enterprises to organize and learn relevant accident lessons.

2.4.5 Conduct special rectification activities to mitigate serious risk

Under the background of the new normal of pandemic management, Chinese companies should put the containment of major accidents in a prominent position, strengthen the control from the source, carry out special work safety control in key industries, and highlight preventing major work safety risk.

(1) Strengthen source management. Refine work safety risk evaluation system and demonstration mechanism to strengthen the management of the source of safety production. Strictly implement the safety facilities "Three Simultaneousness" and work safety permission system, and strictly control the work safety access threshold. Establish "Two key chems and One major source" (hazardous chemical processes under the key supervision of the government Work Safety authority). For hazardous chemicals of major inspection and inspection of major hazard source), establish a joint prevention and control mechanism for safety accidents in construction projects. Safety risk assessment and demonstration should be carried out for urban and rural planning, functional areas (development zones, industrial parks, chemical industry agglomeration zones), and major engineering projects.

(2) Work safety improvement in industrial parks and other functional areas.

① Formulate work safety source management in industrial parks, standardize the planning and layout of industrial parks, strictly control the entry of projects into the park, rationally distribute enterprises in the industrial park, improve public facilities, and further enhance the intrinsic safety level of industrial parks.

② Establish a risk classification management and hazard identification management safety prevention and control system for

industrial parks, carry out overall safety risk assessment for industrial parks, rectify and upgrade within a time limit in accordance with the principle of "one park, one policy", and promote the close-cycle management of industrial parks in an orderly manner.

(3) Raise the entry threshold of the chemical industry.

① Further strengthen the investment intensity of projects, strengthen the management of negative lists, strengthen the intrinsic safety requirements of enterprises, and put forward strict access thresholds in terms of safety, environmental protection, technology, investment and land use, so as to attract chemical projects with good market prospects, high technological level, advanced safety and environmental protection, and strong industrial driving force. In principle, the investment of new chemical projects should not be lower than a certain standard

② Strictly implement the national industrial structure adjustment guidance catalogue, and prohibit the construction of new (expanded) pesticide, pharmaceutical, and dye intermediate chemical project; establish accident prevention system that is scientific, systematic, active, preventable and comprehensive, to ensure safety controllability in tech, gear, men and management.

Interpretation of terms—Three-year Action Plan for National work safety focused mitigating

The National Three-year Action Plan for work safety focused mitigating is a national work

safety focused mitigating plan issued by the Safety Committee of the State Council, focusing on risk high hazard more. Accident-prone coal mine, non-coal mines, hazardous chemicals, fire safety, road transportation, civil aviation, railway and other transportation, industrial parks, urban construction, hazardous waste and other 9 industries to concentrate personnel and concentrate on carrying out concentrated mitigations or investigations. On April 1, 2020, the three-year national work safety focused mitigating campaign was launched and will end in December 2022.

Case study 16 —Jiangsu Province Raises the "Threshold" of Chemical Industry Park Access, and Enterprises that do not Meet the Standards will be closed and relocated by the end of 2020

The General Office of Jiangsu Provincial Party Committee issued the Plan for Promoting the Safety and Environmental Protection Level of Chemical Industry in Jiangsu Province, which put forward a series of strict measures, such as "promoting the performance according to law and regulations", "reducing the number of eco-sensitive chemical production enterprises along the Yangtze River", "reducing the number of chemical production enterprises in environmentally sensitive areas". The Plan proposes to strengthen the closure, reduction, transfer and transformation of enterprises outside the park, and requires all enterprises with high safety risks, poor environmental management and low technology level to be closed and withdrawn by the end of 2020. In addition, the Plan also calls for reducing the number of chemical production enterprises below the scale, closing down and withdrawing all enterprises that fail to meet the safety and environmental protection standards by the end of 2020, and encouraging enterprises that meet the standards to enter the chemical industry park for better development.

3 Enterprise risk control countermeasures

The work safety risks brought by the COVID-19 pandemic to enterprises mainly include the work safety risks arising in the production process of enterprises, the work safety risks arising when staff are quarantined or infected with COVID-19, The new staff or the temporary

replacement staff have the risk of insufficient safety skills, the risk of Under load operation of the device, and the risk of reduced work safety input, etc. Enterprises must take targeted measures to deal with these problems.

3.1 Confirmation of the safety conditions on work resumption

After a long-term shutdown of the enterprise, the production system is restarted, and the equipment is running, starting and running-in. Therefore, the enterprise should conduct a comprehensive work safety conditions confirmation of the production system before putting it back into production.

3.1.1 Chemical enterprise work safety condition confirmation

(1) Safety preparation before power-on.

① Prepare the power-on management scheme, which generally includes: organization structure and division of responsibilities resumption safety organization and preparation, safety training, power-on PSM, power-on tech codes in key operations, especially risk management procedure & accident emergency plans.

② Before power-on, confirm whether the device has safe power-on conditions item by item according to the division of responsibilities, including joint inspection and confirmation of work safety conditions in

cleaning, purging, airtight, replacement, single commissioning, and linkage commissioning, feeding and other links. All inspections shall be signed and traceable.

(2) Confirmation of work safety conditions in tank farm and warehouse. The main contents to be clarified include: various alarm and automatic interlocking systems in the tank farm are in good condition and effective. Haz-chem storage is having reasonable stock. Emergency gears at stockpile are good to go. Explosives storage is free from combustion substances and electrical gears. Hazardous waste and residues within the facility are handled properly. Storage with hazardous gas is properly ventilated.

(3) Confirmation of major hazard source work safety conditions. For the major hazard source, it is necessary to ensure that the temperature, pressure, liquid level, flow and other parameter information are continuously monitored; major hazard source are identified and documented according to latest standards, all alarms functioning well; all thunder prevention, special equipments and safety attachments are in effective duration.

(4) Confirmation of hazardous craft work safety conditions. Main issues include: post personnel holding valid hazardous craft work permits to work; the key monitoring parameters on-site table indicating values should be consistent with the process card control values; the setting of

safety valves, explosion-proof membranes, and explosion-proof doors are consistent with the design article; the process operation record before resumption did not show over-temperature, over-pressure, or over-level situation; safety instruments such as pressure gauges, thermometers, and flow meters are in the validity period of the test and are in normal use.

(5) Confirmation of special operation work safety conditions. The safety risk analysis was carried out truthfully before the confirmation of the special operation; the hot work level of the dangerous operation permit was confirmed to be correct, and the sampling and monitoring of toxic, harmful and combustible gas was carried out and met the requirements; maintenance, construction before resumption , Hoisting and other operations are equipped with vigilance and on-site safety monitoring personnel; special operations such as power-on process, open fires and limited spaces operations are submitted to higher supervisor for approval.

3.1.2 Coal mine work safety condition confirmation

(1) Retrieving work face work safety conditions confirmation. Confirm that the height and width of the upper and lower safety exits of the retrieval work face meet the requirements; the number of work face support and head gate hydraulic support meet the requirements, and the quality of the head gate and advance support meets the requirements; the work face pump station pressure meets the requirements; The strength of work face shield support meets the requirements.

(2) Developing work face work safety conditions confirmation. Before putting into production, ensure that the temporary support of the front probe beam of the work face is fully equipped, and the tailgate support is intact; the hazard detection with bores, detectors and bars of the work face are designed and constructed in accordance with relevant regulations, and are tagged and well documented; No failed bolt bars and cables in belt conveyer tunnel.

(3) Ventilation work safety conditions confirmation. Confirm that the mine ventilation equipment is intact and the ventilation system meets the relevant requirements; the main ventilation fan realizes "dual main ventilation fan and dual power source", "three specials" (dedicated lines, special transformers, special switches), and "two lock-outs" (ventilation power and degassing power are locked-out) and main ventilation fan operation sensor; the mining work face adopts comprehensive dust-proof measures; the roadway fire-fighting system is complete.

(4) Haulage & machinery work safety conditions confirmation. The auxiliary inclined shaft track transportation wire rope does not have any problems such as extrusion, bending deformation, rusting, etc.; the auxiliary inclined shaft transportation "one slope and three gears" all meet the requirements; the main inclined shaft belt is intact, and the belt comprehensive protection is complete.

(5) Water management work safety conditions confirmation. Confirm

that the mining work face water detection and release equipment is intact; the mining work face has been geophysical and drilling for verification before operation.

3.1.3 Confirmation of non-coal mines work safety condition

(1)Confirmation of work safety conditions of electromechanical equipment. Main issues: confirm complete parts and components, belt tightness in line with technical requirements, technical nameplate, responsibility plate and equipment nameplate; pressure gauge, thermometer, ammeter, voltmeter, safety valve, pressure regulator complete , The indication is accurate; safety protection, complete monitoring devices, sensitive and reliable action; over-current and under-voltage protection, reliable action, the setting value meets the technical requirements, and the grounding system is perfect.

(2)Confirm the work safety conditions of drainage facilities. Ensure that the pump room has communication facilities that directly reach the exchange or control room; the indoor grounding system is complete, and the metal shell has a grounding protection device; the open-pit mining pit bottom drainage pumping station that is in danger of flooding, has work, Spare water pump; electrical equipment in the water pump room has protection devices for over current, overload and loss of pressure.

(3)Confirmation of work safety conditions on the work site. Ensure that all work sites and dangerous points have good lighting; equipment

walkways, ladders, floors, and places for personnel to pass and operate are clean and safe; drill holes, wells, and karst caves in the mining realm , Sinkholes, mud pools and sumps, with cover plates or fences, and obvious signs; blasting points, rock drilling operations, loading and unloading points, crushing workshops and other locations and operations adopt dust-proof technical measures.

(4)Confirmation of work safety conditions for blasting operations. Before the operation, confirm that there are full-time personnel responsible for the management of blasting equipment and obtain the corresponding qualification certificates; the management personnel are familiar with the on-site situation and have rich knowledge and experience in the management of blasting equipment; explosive detonators must not be stored in the same warehouse; compile blasting design manual for chamber blasting and medium-deep hole blasting.

3.1.4 Confirmation of general industry work safety condition

Before the general industry enterprise is put into production, the following items shall be examined:

(1) Whether there are potential accidents in the implementation of work safety laws, regulations, rules and regulations, and operating procedures, and whether there are major hazard. According to the Criteria for determining general industry major accident hazard.

(2) Whether there is accident risk in the use, maintenance and service

of facilities and equipment.

(3) Whether there are hidden dangers of accidents in the process of on-site safety management of dangerous operations such as hot work and temporary power use.

(4) Risk identification, which monitors whether there are defects in the early warning process.

(5) Whether the safety training of employees and the certification of special operation personnel are implemented in place.

(6) Whether the equipment, distribution and use of safety equipment and labor protection articles are in place.

(7) Whether there are any defects in the formulation and drilling of the emergency rescue plan and the preparation of emergency rescue materials and equipment.

3.2 Enhancing staff management under COVID-19 prevention and control

After the outbreak of COVID-19 pandemic, some employees in enterprises may be unable to be on duty, and on-the-job employees may also face the risk of COVID-19 infection, which will result in job loss and great work safety risk. Therefore, staff management is a very important management work during the COVID-19 pandemic. Enterprises should take effective measures to ensure the stability of the staff team as far as possible and create good conditions for work safety.

3.2.1 Management of staff returning to post

(1) Encouraging staff returning to post to go back to work and offering incentives when the economy slows.

(2) For the enterprise staff that is unwilling to returning to post and rework, inform them of the policy requirements and the importance of the epidemic management in time, and take the initiative to persuade them to returning to post. In time.

(3) For employees who are reluctant to returning to post due to psychological fluctuations, appropriate psychological counseling can be given to them while informing them of the policy requirements and the importance of returning to post.

(4) In view of the shortage of personnel in key positions and the difficulty of recruitment, enterprises should rationally plan their manpower and work arrangements to alleviate the operational pressure caused by the shortage of personnel.

(5) On the premise of respecting the wishes of employees and reaching consensus among all parties, enterprises can adopt the way of "sharing employment" to share idle labor resources across enterprises and allocate them to enterprises with employment demand gaps, so as to alleviate the shortage of employment in some enterprises.

3.2.2 Management of the health and safety of the staff

In the process of COVID-19 prevention and control, physical and

mental exhaustion caused by some personnel sticking to their posts for a long time, and the increasing pressure of pandemic and work safety, we should strengthen the protection of staff's physical and mental health.

(1) Strengthen blood pressure monitoring, body temperature detection and other health checks; refine workplace disinfection and personnel protection.

(2) Timely grasp the impact of the spread of the epidemic on the psychological pressure of college students, timely identify high-risk groups, and timely carry out necessary psychological counseling.

(3) Grasp the health status and travel trends of all staff, and understand their travel history, contact history, disease history and other key information.

(4) Send the relevant knowledge of pandemic management to the staff through Wechat, SMS and other channels in a timely manner to raise awareness of prevention and achieve scientific protection.

(5) After the outbreak of the epidemic, the pandemic situation and the protective measures to be taken should be announced to the staff in a timely manner to prevent panic.

3.2.3 Management of the access of workplaces

(1) Staff returning to post in high-risk areas shall be subject to 14-day medical isolation and observation, and can enter the operation site only after passing the health test.

(2) Centralized accommodation and closed management shall be implemented for construction personnel, and timely filing shall be made with the relevant departments of the local government.

(3) After the health status of all personnel entering the site is assessed, the admission card will be re-issued. The construction site shall be managed in a closed way, and personnel must take body temperature measurement before entering the site.

(4) Create conditions to organize and carry out network security training for medical observation and isolation personnel.

3.2.4 Management of the staff who work in the operation rooms

(1) Reduce the number of operators in the centralized operation room, and it is suggested to restore the original decentralized operation mode according to the specific situation if the original operation conditions are available.

(2) For the device where the internal operator and the external operator work at the same place, keep a sufficient distance. Relevant work is communicated through walkie-talkies and telephones as far as possible.

(3) Each unit shall strengthen the management of the central control room, check the body temperature of people who are not in the area, and register relevant information.

(4) Conditional workplaces can adjust the operation mode of the shift or arrange personnel to prepare for the shift according to their own

actual conditions, so as to cope with the adjustment work under emergency conditions.

3.2.5 Management of hand-over between shifts

Under the background of COVID-19 pandemic, the risk of staff infected with COVID-19 increases, which brings uncertainty to the normal work safety of enterprises. In order to effectively cut off the transmission channels of the virus, hand-over between shifts should be streamlined. Reduce direct contact with people.

(1) Avoid face-to-face hand-over between posts, use online office platform, and keep abreast of relevant situations for hand-over between shifts. If there is any doubt about the content of the text hand-over, communicate with each other by telephone in a timely manner.

(2) During the period of pandemic management, the shift leader and the shift leader are respectively responsible for mastering the number of employees on duty and their physical and mental conditions, and managing the work of pandemic management on duty.

(3) Strictly control and reduce the number of managers who participate in hand-over between shifts, and try to arrange and report work by telephone, electronic instructions, etc.

(4) Ensure and improve the quality of hand-over between shifts during pandemic management. On the basis of "Ten Hand-overs & Five Veto Situations", in addition to hand-over safety, environmental protection,

production, equipment and quality, etc., strengthen on-duty operations and abnormal situation reports, put pandemic management (disinfection), temperature measurement, pandemic management materials and other situations into the hand-over contents between shifts and write hand-over and hand-over between shifts and take personal protection during the period.

(5) Posts are encouraged to hand-over the production situation in detail through text or SMS and Wechat.

3.3 Actions to take for staff under quarantine or infection

Once employees are quarantined or infected with COVID-19, if they do not make emergency plans in advance, there will be vacancies in their posts, and if they are not handled properly, the risk of accidents is very high. Enterprises should take the following measures according to the actual work situation:

(1) When a suspected or confirmed case occurs in a device and one shift needs to be isolated for observation after the assessment of the health and safety department, other shifts can work normally. According to the actual situation, it is suggested that the standby personnel should form a team to replace, or change the shift mode, such as changing the original four-shift in two turns mode to three-shift in two turns, and other shift modes should be implemented for reference.

(2) When there is a suspected or confirmed case in a device, the other

two shifts can work normally when the two shifts need to be isolated for observation after the assessment of the health and safety management department. In combination with the actual characteristics of each unit, the unit is responsible for the internal adjustment of relevant personnel, and the company is responsible for the adjustment of personnel who have worked in the unit and have the ability to work, so as to form a team system to ensure the normal and stable operation of the unit.

(3) When a device has a suspected or confirmed case, and most of the personnel need to be isolated for observation after the assessment of the health and safety management department, it shall be handled according to the impact of the device on the overall operation of the company.

① Should the units with problems have little impact on the overall operation of the company, the shutdown of the units will be arranged according to the actual situation.

② In the extreme case that the epidemic exposed device has a great impact on the overall production and operation of the company, there is not enough manpower to take over the post, the device cannot be shut down, and the conditions for isolation and observation outside the plant are not available, local quarantine and observation measures shall be taken.

3.4 Training and education for the staff

During the COVID-19 pandemic, some positions of staff in an enterprise are difficult to be on duty in a short period of time, the enterprise

has to recruit new staff or temporarily replace staff, and some old staff is also unfamiliar with safety skills because of a long period of absence. Safety training must be strengthened.

(1) Carry out pre-job training and three-level education training (plant-level safety education, workshop-level safety education and post safety education) for newly recruited staff, transferred staff and other key groups in a timely manner.

(2) The enterprise shall strictly examine and verify the qualifications of special operators, ensure that they are on duty with certificates, and conduct pre-job safety education for special operators.

(3) Organize and carry out safety education for personnel in safety management and key technical positions to ensure that all personnel have work safety knowledge and management ability corresponding to the production and operation activities of the enterprise.

(4) In order to avoid concentration, diversified teaching methods such as video training and online learning can be used instead of traditional safety training, and repeated learning can be used to achieve the purpose of strengthening learning and consolidating safety knowledge.

(5) The enterprise organizes and carries out watching accident warning & education videos, power-on programs, job safety risks, job safety responsibilities, safety operating procedures, emergency response, process indicators and other safety warnings & education.

(6) Through education and training, enterprises should ensure that all employees know post risk identification, post work safety responsibilities, post operation procedures and post emergency handling knowledge.

3.5 Responding there is insufficient investment in work safety

In the context of the COVID-19 epidemic, some enterprises are facing operational difficulties due to market fluctuations, resulting in insufficient investment in safety, inadequate security measures, and increased work safety risk. In order to overcome the problem of insufficient investment, enterprises should take corresponding mitigation measures.

(1) Actively connect with relevant government departments, fully understand the economic support policies for production enterprises, apply for government loan support, and ensure that the investment in production is not reduced.

(2) In order to cope with the situation of insufficient safety technical force and weak management, it can actively request the local government to provide work safety technical assistance, and invite emergency management authorities to increase the frequency of safety inspection for the enterprise. Find and solve problems in time.

(3) Strengthen the inspection, maintenance and service of equipment and facilities, grasp the early and prevent the small, eliminate the hidden dangers in the bud, reduce the failure rate of equipment and facilities, and

reduce the investment in equipment maintenance.

(4) Strengthen team building and work safety education and training for all staff, improve work safety awareness and skills of all staff, pay special attention to hazard identification, post responsibilities and emergency response capabilities of staff, and reduce accidents.

(5) Strengthen the communication between the financial department and the safety management department of the enterprise, standardize and improve the use and distribution of the safety expenses of the enterprise, so as to maximize the effectiveness of safety investment and reduce unnecessary waste.

3.6 Safety management f under the underlow operation of a plant

Under the background of COVID-19 epidemic, affected by factors such as industrial chain, supply chain and logistics, some enterprises have to reduce their production load because of the backlog of products and the increase of inventory, so that the system is in the state of operation under low work load. As a result, the work safety risk of some high-risk production units, especially chemical units, has increased significantly. In this regard, the following measures can be taken:

(1) Formulate the operation under low work load scheme, strengthen the analysis and judgment of the main problems of the operation under low work load of devices and facilities, and take targeted improvement measures. And develop emergency plans.

(2) Actively adjust the production structure, give priority to the use of high-quality raw materials for the production of high-risk process units, rationally adjust the load of units, and maintain safe and stable operation.

(3) Monitor the operation parameters (temperature, pressure, liquid level, flow rate, rotation speed, etc.) of the under load device, and focus on the deviation from the design or potential hazards of the production equipment and process flow of the operation under low work load device. Timely implement prevention and control measures for problems deviating from process indicators and design data.

(4) Focus on the safety management of hazardous chemicals, explosive products and other high inventory status, strictly prohibit over-temperature, over-pressure, over-liquid level operation, the tank farm interlocking alarm system should be put into operation in good condition, the solid warehouse is strictly prohibited from over-high stacking, and strengthen the fire inspection of the warehouse.

(5) Strengthen site management to ensure the safety and control of various operations, focus on small connecting pipes (connecting pipes between pressure vessels, pressure pipes and pressure gauges, liquid level gauges, exhaust valves and other pipe fittings, valves and instruments, with small diameter and thin pipe wall thickness), increase patrol inspection, and increase the frequency of temperature measurement, pressure measurement and vibration measurement.

(6) Strengthen patrol inspection, strengthen the monitoring of all kinds of vulnerable parts and special equipment, timely formulate inspection plans for pressure vessels, pressure pipes and other special equipment, and intensify the inspection of key parts such as tank farms, long-distance pipelines, heat tracing systems, electrical instruments and chain alarms.

(7) Enterprises with primary and secondary major hazard source should pay attention to the alarm management of the work safety risk monitoring and early warning system for hazardous chemicals, so as to deal with the alarm in time.

3.7 Work safety checking

The COVID-19 epidemic has led to a significant increase in production instability and work safety risk, and work safety checking is an important means to detect risks and problems in time. Enterprises should strengthen the organization and leadership of work safety checking.

(1) Before resumption, actively accept the inspection and guidance of local emergency management, fire safety and other departments on the work safety situation of the enterprise to ensure work safety. Take the initiative to accept the guidance and requirements of local health departments on the health management of enterprises.

(2) The enterprise shall implement the supervisors leading each shift system for work safety checking, arrange the supervisors leading

each shift plan of the enterprise, be on duty strictly, and keep an eye on the site. Focus on the key points, focus on the weak links, and find and solve problems in time.

(3) Establish a daily inspection team, clarify the specific responsibilities of each member of the team, strengthen the daily communication and exchange of each member, and establish a daily inspection and reporting mechanism.

(4) The daily inspection team shall focus on the inspection of key equipment; key parts, important places and main posts, and each inspection shall be recorded in writing.

(5) For the production enterprises of pandemic management goods and materials, attention should be paid to the inspection of the management of dangerous goods, especially to the source factors of explosion caused by electrical short circuit, heating caused by electrical overload, starting of non-explosion-proof electrical equipment, static electricity and work involving open fire.

(6) It is necessary to check whether the daily disinfection, ventilation, and cleaning of the workplace, the living place of workers, and the surrounding environment have been done well, with emphasis on strengthening the management of the safe use of flammable substances such as alcohol and No.84 disinfectant.

(7) Check whether emergency plans, emergency material

preparation, emergency support team scheduling, emergency vehicle arrangement and other preparation systems are established and improved to deal with all kinds of emergencies, so as to ensure timely and effective handling of all kinds of emergencies.

(8) Check the emergency duty system, strictly implement the system of leaders on duty and important posts on duty 24 hours a day, strengthen the sense of responsibility for accident prevention and emergency rescue, and at the same time, timely and truthfully report dangerous accidents and deal with them in time.

Interpretation of terms — Ten Hand-over & Five Veto Situations

Ten Hand-over: 1. Hand-over class production situation and task completion situation; 2. Hand-over equipment, instrument operation and use situation; 3. Hand-over unsafe factors to take preventive measures and accident handling situation; 4. Hand-over equipment lubrication three-level filter and tool quantity and defect situation; 5. Hand-over process indicators perform the situation and prepare for work; 6. Hand-over original records are correct and complete; 7. Hand-over raw materials using and product quality situation and existing problems; 8. Hand-over superior instructions, requirements and precautions; 9. Hand-over post equipment tidy and regional hygiene; 10. Hand-over leak, loose, drip and rips situation.

Five Veto Situations: 1. Veto in case where production is not normal, and the accident has not been handled; 2. Veto in case where there is a problem with equipment or process, and it is not clear; 3. Veto in case where post hygiene is not well done; 4. Veto In case where records are not complete, unclear, and inaccurate; 5. Veto in case where local authorities specify that the task on duty is not completed.

Case study 17 — Enterprise pandemic management and work safety

1. After the outbreak of the epidemic, Zhejiang Mingfeng Industrial Company received instructions from the provincial, municipal and county credit and municipal supervision departments on the emergency production of protective clothing. It quickly screened and assembled 260 workers to put into the production of protective clothing. During the pandemic, the company paid attention to both pandemic management and work safety, and was listed as the provincial key enterprise for the production of pandemic management materials. During the peak period of pandemic, the daily output was stabilized at about 3,000 sets. See Appendix 7 for details.

2. Since the outbreak of pandemic, Shanxi Tiandi Wangpo coal mining Co., Ltd. has promoted pandemic management and work safety as a whole, achieving "zero" infection and "zero" safety accidents. It ensures that "under the background of normalization, work safety" can be controlled, will be controlled and is under control ". See Appendix 8 for details.

3. In order to promote safe production under the background of pandemic management, Yanshan Petrochemical Company set up a leading group of pandemic management at the first time, on the premise of clear division of responsibilities. Coordinate and promote the two tasks of pandemic management and work safety of the company. Since the emergence of the epidemic situation, the company has achieved good results in prevention and control, and its work has been stable and orderly. See Appendix 9 for details.

Appendix 1

China work safety inspection system and authorities

1. China work safety inspection system

Under the work safety act, the national work safety inspection system implemented in China at the present stage is a system combining the comprehensive supervision of the national emergency management authorities with the special inspection of the relevant functional departments of governments at all levels.

The emergency management authorities of the State Council shall exercise comprehensive supervision and management over the work safety work nationwide

The relevant departments of the State Council in charge of transportation, housing, urban and rural construction, water conservancy, civil aviation, agriculture and rural areas, and education shall, in accordance with the Work Safety Law and other relevant laws and administrative regulations, supervise and administer the work safety work in relevant industries and fields within their respective responsibilities. The relevant departments of the local people's governments at or above the county level shall, in accordance with the provisions of the Work Safety Law and other relevant laws and regulations, supervise and administer the work safety work in relevant industries and fields within their respective responsibilities. If the responsibilities for the supervision and administration of work safety in new industries and fields are not clearly defined, the local people's governments at or above the county level shall determine the supervision and administration departments in accordance with the principle of similar business.

The emergency management authorities and the departments that supervise and administer the work safety work in the relevant industries and fields are collectively referred to as the departments responsible for the supervision and administration of work safety. The departments responsible for the supervision and administration of work safety shall cooperate with each other, practice duty together, share information and resource, and strengthen the supervision and administration of work safety

according to law.

Work Safety Committee of the State Council						
Coordinates						
Levels of government	Comprehensive supervision	Managing safety in jurisdiction areas				
State Council	Ministry of Emergency management	Ministry of Public Security	Ministry of Transportation	Ministry of Construction	Ministry of Education	And more
Provincial	Bureaus of Emergency management	Bureaus of Public Security	Bureaus of Transportation	Bureaus of Construction	Bureaus of Education	And more
Municipal	Unban Emergency Bureaus	Unban Emergency Bureaus	Unban Transportation Bureaus	Unban Construction Bureaus	Unban Education Bureaus	And more
County	County Emergency Bureaus	County Emergency Bureaus	County Transportation Bureaus	County Construction Bureaus	County Education Bureaus	And more

Figure 2 China work safety inspection system

2. China work safety inspection system and authorities

(1) Work Safety Committee of the State Council

The Work Safety Committee of the State Council was set up in accordance with the Circular on the Establishment of the Work Safety Committee of the State Council issued by the General Office of the People's Republic of China on March 17th, 2001, with the aim of strengthening the unified leadership of work safety work throughout the country. The members of the Safety Committee are the principal heads of the Ministry of Public Security, the MEM, the Ministry of Transport, and the All-China Federation of Trade Unions, etc.

The main responsibilities of the State Council Safety Committee are: under the leadership of the State Council, it is responsible for research, deployment, guidance and coordination of national work safety management, and in response to major incident, coordinate and guide relevant departments. Accomplishing other State Council

assignments if any given

(2) Ministry of Emergency Management of P.R.C.

The MEM of the People's Republic of China is an integral part of the State Council, which was established in March 2018 in accordance with the institutional reform plan of the State Council approved by the First Session of the 13th National People's Congress.

The main responsibilities of the MEM are to organize the preparation of the overall national emergency plans and plans, guide the work of various regions and departments in dealing with emergencies, and promote the construction of emergency plans system and plan drills. Establish a disaster reporting system and release the disaster situation in a unified way, coordinate the construction of emergency response forces and material reserves and dispatch them in a unified way during disaster relief, organize the construction of disaster relief system, guide the emergency rescue of work safety and natural disasters, and undertake the work of the national headquarters for dealing with particularly serious disasters. MEM guides the prevention and control of fires, floods and droughts, geological disasters, etc. MEM is responsible for the comprehensive supervision and management of work safety and the supervision and management of work safety in industrial, mining, commercial and trade industries.

Appendix 2

MEM Promulgates Eight Measures to Promote Enterprise Safety

Production and Management as a Whole

On February 26, MEM formulated and promulgated eight measures to comprehensively promote enterprise safety production and management, requiring emergency management authorities at all levels to actively serve the general picture. Guarantee general picture, strengthen safety risk assessment, and innovate work safety inspection practices

First, the expiration certificate is automatically extended. If the work safety license of the enterprise, the qualification certificate of the safety evaluation, testing and inspection institution and the safety certificate of the principal person in charge of the enterprise, the safety management personnel and the special operation personnel expire, the validity period will be automatically extended to the end of this year.

Second, the online processing of administrative examination and approval is adopted. For new construction, reconstruction and expansion, product changing projects and other projects that need to go through the work safety "Three Simultaneousness" formalities, Optimize applying procedure for qualification process, implement online fast processing, and conduct on-site verification after the completion of processing.

The third is the streamline resumption procedure. Enterprises with better safety management that have not had accidents since 2019 will resumption on their own under the premise of implementing safety prevention measures. The main person in charge of the enterprise makes a safety commitment, no longer reporting at all levels, and on-site inspection and acceptance. Chapter; for self-examination, self-reporting and self-revision safety risk & hazard, the focus is on implementing online tracking and guidance services.

The fourth is to take the initiative to reduce the burden on the enterprise. Improve the work safety hazard identification governance information system, and replace the

manual statistical form filling with automatic analysis reports; implement safety inspections for the record, the results are mutually recognized, and repeated inspections are avoided.

The fifth is to implement the work safety commitment system. Adhere to the divisional and categorical guidance, and implement the commitment system for companies with a good safety foundation and lower work safety risk. No on-site inspections will be carried out during pandemic management. Accurate inspections are carried out for accidents and concerns. Guidance and assistance, standardized civilized law enforcement, strict prevention and simplification, one size fits all.

The sixth is to develop expert safety guidance customized services. For key and difficult issues, major risk & hazard organizes experts to conduct point-to-point online consultations and on-site services to help companies effectively prevent and control safety risks.

The seventh is to strengthen online safety training. Organize experts and professional inspection personnel to provide free online safety training for key employees of the company and newly hired personnel, focusing on the job safety operating procedures.

The eighth is to implement Work Safety Responsibility Insurance measures to benefit enterprises. In conjunction with finance, the Banking and Insurance Regulatory Authorities extend the insurance period for insured and renewed companies, delay the payment of premiums, reduce or exempt the premiums of newly insured companies, and give priority to insurance company safety prevention expenses for participating pandemic management work.

Appendix 3

Beijing emergency management Bureau on strengthening pandemic management measures for safety production and service guarantee

From the outbreak of the epidemic to February 2020, Beijing emergency management mainly carried out the following work:

The first is to strengthen enterprise resumption services, and provide work safety services for key enterprises such as chemical industry, pharmaceutical manufacturing and hazardous chemicals during the pandemic management period. To formulate and issue the "Five Ones" working measures, and issue six safety tips for hazardous chemicals enterprises and eight safety tips for general industry resumption. The city's emergency management authorities at all levels provided 1,672 times of safety guidance services, including 763 times of on-site guidance services and 909 times of video guidance services, 1,283 personnel were dispatched, 283 work safety hazards were eliminated, and 86 difficulties were solved to help enterprises solve problems.

The second is the emergency allocation of emergency supplies. According to the needs of the allocation of supplies issued by the community prevention and control group of the city's pandemic management work leadership group, for some mountainous areas and areas with no properties managing service, no security, and open communities in the city, their pandemic management personnel on duty urgently need cold supplies, and the city emergency bureau launched the emergency allocation mechanism of materials, overcoming the difficulties of scattered allocation of materials and insufficient freight capacity in emergency allocation of disaster relief materials such as cold-proof tents, cotton coats, quilts, cots, etc. As of February 16, urban emergency management authorities have accumulatively distributed to relevant streets (towns and villages), the community (village) allocated 14 batches of various disaster relief materials, totaling 13,824 pieces (sets). Among them, 6 batches of municipal disaster relief materials, 11474 pieces (sets) were used; 8 batches of district-level materials, 2350 pieces (sets) were used.

The third is to extensively carry out safety publications. Publish "3 articles and 15 items" safety tips for home use disinfection products during the period of pandemic, and "4 articles and 31 items" safety management specifications for disinfection products used by medical and health institutions during pandemic management.

With the change of the city's economic development situation, work safety work is also facing some new situations and new problems that need to be solved urgently, such as enterprise registration, administrative approval and registration, examination and certification of special operators, etc. In order to further improve the work safety, disaster prevention, mitigation and relief, and rescue and relief work, on the basis of the previous work, 11 specific service guarantee measures were further introduced.

Appendix 4

Resumption work safety consultation services Guide for hazardous chemicals & mines companies resumption in Hangzhou

I. Preventing safety risk in hazardous chemicals and mining companies of key concern during resumption

Hazardous chemicals mines enterprises should pay attention to both pandemic management and the superposition of security risks brought about by it, and need to pay close attention to the unsafe behavior of people, the unsafe state of things, the unsafe factors of the environment, and management defects. Focus on the following safety issues:

(i)Enterprises that continuously produce hazardous chemicals and mines::

1. Absence of staff leads to post replacement, work without training and fatigue operation.

2. The upstream and downstream of the industrial chain are not synchronized, resulting in inventory expansion (some products of the same enterprise (pandemic management) sell well, and some are overstocked because the downstream enterprises do not start) and excessive storage.

3. Third-party service enterprises, operators are not in place, resulting in leakage, machinery and equipment running with diseases, etc.

(ii)Hazardous chemicals mining enterprises waiting for resumption:

Machines and equipment are stopped for a long time, maintenance, cleaning and rectification operations are increased, especially special operations such as hot work and limited space are dangerous, and accidents are easily caused by insufficient manpower and lax management

2. If the instrument is not operated for a long time, the sensitivity will be reduced, the safety requirements for power-on commissioning, purging, replacement, air tightness and other operations will be high, and the utilities such as water, electricity and gas may not operate normally, which will bring potential safety hazards.

3. It is difficult for non-local workers to get to their posts. After they get to their posts, some of them are still in the holiday syndrome and are not in the working state. Risky and illegal operations occur from time to time.

4. Backlogs in production may result in rushed or overcapacity production

5. There is a shortage of pandemic management supplies, which can generally last only 10-15 days, which may lead to stop-and-go or partial start-up, triggering a chain reaction.

6. Mining enterprises need more third-party services for mining and blasting operations, and the inventory of civil explosive materials is not large, most of which need logistics and transportation, resulting in more temporary vacancies in mines enterprises, and the safety of production is threatened from frequent starts and stops.

II. Guide and help enterprises to implement measures to reduce risks.

(1) Implementation of accountability. Effectively fulfill the two responsibilities of public health pandemic management and work safety. The main person in charge confirms the work safety in resumption condition of the enterprise, strictly declares the filing regulations, and makes a safety commitment at the same time.

(2) Implement the resumption plan. For the special situation of pandemic management, formulate a complete, feasible and targeted safety resumption plan; clarify the safety risk management, hazard identification management, emergency preparedness and disposal measures, etc. to be implemented. Not before the plan is perfect hastily resumption.

(3) Implement risk research and judgment. In view of the temporary measures of pandemic management and the current status of enterprise work safety, sort out potential safety risks one by one, and clarify the management list. Focus on prevention and control safety risks caused by rush work, ill-decided construction, labor shortage, industrial chain imbalances in supply and demand, obstructed logistics, etc.

(4) Implement policies on personnel returning to their posts. Ensure that key personnel are in place during the resumption process, especially for highly risky enterprises such as building (subway) construction, transportation, hazardous chemicals mines, etc., to be the main person in charge, technical person in charge, and safety

person in charge, after the key positions are in place, the operators will start work. Important positions such as blasting, hoisting and other dangerous operations are insufficient, and the work safety conditions will not be started.

(5) Implement education and training. Resumption all-staff safety training is carried out through various methods such as video teaching, online training, written notification, posting safety warnings (safety operation instructions). New staff must pass the safety training before taking up their posts.

(6) Implement hazard management. Carry out a comprehensive self-examination before resumption, focusing on checking whether fire safety, mechanical equipment, electrical wiring, hazardous chemicals storage, electrical explosion-proof, etc. are in place, and whether special operators are certified to work, and whether hazardous operations are implemented Approval, etc., do not eliminate hazard and do not start work. After normal resumption, we must adhere to daily safety inspections.

(7) Implement emergency preparedness. Focus on preventing safety risks caused by power outages, water outages, gas outages, etc., strengthen emergency material storage and inspections, and ensure that emergency treatment measures for dangerous work posts and key devices in sudden situations are in place.

(8) Implement pandemic management guarantee. Ensure that pandemic management and work safety are in place simultaneously, make sure staffs are equipped with protective masks, disinfectants, infrared thermometers and other pandemic management supplies, and enhance disinfection and protection of public places in the enterprise, implement staff survey, management plans, etc. pandemic management related management.

Appendix 5

Grid service mode in Ningbo during pandemic

In accordance with the working principle of “unified platform, unified positioning, and unified mechanism”, the grid will be built as a unit for the management committee of the Party Working Committee to strengthen park management services, the frontier of policy dissemination and publication, the tentacles of information collection and storage, and the service of enterprise employees. Window, to realize the focus of park management service work is moved down, and the threshold is moved forward.

1. Set up the grid scientifically. In accordance with the grid construction goal of "clear boundaries, adequate personnel, clear responsibilities and tasks, and convenient management and services", combined with the actual situation of the park, park is divided into several regions according to the distribution of enterprises; each region has several grids under its jurisdiction. Each grid comprehensively considers the enterprise scale, the number of employees, production and operation conditions and other factors, and reasonably determines the grid division scale to achieve full coverage of the area. On this basis, according to the "1+1+ x" (i.e. 1 region team leader + 1 grid leader + multiple grid members) mode, grid work force configure is formed. The regional team leader is assumed by the committee leader, the grid leader is assumed by the department-level leader, and other agency cadres are the network grid members. In addition, each grid can widely absorb related functional departments in the park, third-party inspection authorities and corporate representatives as grid auxiliary forces to participate in grid management.

2. Clarify responsibilities and tasks. The grid is mainly responsible for the two-way transmission of information between the functional departments of the management committee (hereinafter referred to as the departments) and the enterprise, and assists in the implementation of phased key tasks. The film leader is mainly responsible for coordinating the networks in the film group Grid conducts work, regularly listens to the situation reports of each grid, and does a good job in contacting

key enterprises in the film group (major projects) and other related work. The grid manager is the first person responsible for the grid management service work, coordinates arrangements, and guides and urges the network Grid members carry out management services such as policy publication, situation collection, guidance and assistance, and report grid situation-related work to the film team leader in time. Grid members focus on four tasks in accordance with the requirements of "one job with multiple capabilities": one is to be a good information officer, mastering the sentiments of the Internet and the people, collecting all kinds of basic information and dynamic information in a timely and effective manner; the second is to be a good instructor, guiding and helping enterprises to improve the ability and level of production and management and party building; the third is to be a good server, provide services and help to companies, employees and other groups in the grid, and safeguard legitimate rights and interests; the fourth is to be a good publication member, and carry out the publication of policies and regulations to companies, employees and other groups in the grid.

3. Innovate working mechanism. In accordance with the grid operation idea of "integration of grids, information interaction, and closed-loop operation", establish and improve the grid operation mechanism. The first is to establish a grid transaction access mechanism. The grid is undertaken by the Party Working Committee, the key tasks of the stage that are uniformly arranged by the management committee are arranged by the office. The second is to establish a deadline for processing and information feedback mechanism. The affairs assigned to the grid or the affairs transferred to the department by the grid should be handled in a timely manner, and the results of the handling should be in Feedback within a certain period of time (generally no more than 5 working days). The third is to establish a departmental responsibility system. Each department should have a dedicated person responsible for grid affairs, specifically responsible for the department's receipt of reminders and feedback grid diversion affairs. The fourth is to establish regularly contact and analyze the research and judgment mechanism. In principle, the grid manager and grid staff contact the companies in the grid no less than once a month, and the frequency of visits can be increased when the work is necessary

to achieve the "five must visits" (must interview on important time nodes, must visit companies for major business changes, must visits for safety and environmental accidents, must visits for petitions and stability maintenance incidents, must visits for major activities). The regional team establishes a quarterly work meeting system, timely exchanges work information, analyzes and judges grid management work Situation tasks, sum up work experience, and explore the establishment of a long-term mechanism.

Appendix 6

Ten measures of PICC work safety liability insurance to help enterprises develop during resumption

PICC has launched ten measures for work safety liability insurance to relieve the difficulties of resumption companies, help companies do work safety and pandemic management at the same time, and help companies, especially small, medium and micro enterprises, to overcome business difficulties and resumption in a stable and orderly manner.

The first is to expand the scope of protection and expand the liability for infectious diseases free of charge; the second is to protect the rights and interests of enterprises and extend the insurance period free of charge; the third is to ease the pressure on enterprises and appropriately postpone the payment of insurance premiums; the fourth is to support online insurance to ensure smooth financial services; the fifth is to deepen hazard identification, to resolve the risk of resumption links; sixth is to strengthen prevention work and expand the scope of application of prevention costs; seventh is to upgrade service methods and carry out online training; eight is to innovate service methods to help enterprises pandemic management; nine is to open green channels for timely payment of insurance compensation funds; tenth is to provide financing services to alleviate the financial pressure of enterprises.

Appendix 7

Zhejiang Mingfeng Industrial Co., Ltd., work safety management during resumption

Zhejiang Mingfeng Industrial Co., Ltd., located in Tiantai County, Zhejiang Province, was established in August 1994 with more than 700 employees. Originally, the company was mainly engaged in the production of automobile covers and industrial protective clothing. After the outbreak of COVID-19 in 2020, the company took advantage of its production capacity of industrial protective clothing to produce medical protective clothing for the first time, and allocated 72920 sets of protective clothing to provinces and cities. The completion rate of the provincial transfer order ranks first in the category of protective clothing, contributing to the pandemic management general picture of the whole province and even the whole country.

Firstly, the government and enterprises work together to deepen guidance services around the clock.

On January 27, 2020, Tiantai County, Zhejiang Province, after learning that the company had the production capacity of industrial protective clothing, immediately set up a working group composed of credit, emergency, health, municipal supervision and other departments to dock at home on the same day, provide all-weather squatting service, actively dock with provinces and cities, and make full use of the emergency approval channel of the provincial drug administration system. Government helped coordinate the purchase of equipment, pass processing, raw materials, staff; a series of problems such as product change in trial operation can realize sample inspection on the second day and full resumption on the third day. At the same time, on January 27, Mingfeng Company set up an emergency leading group at the first time, with the chairman personally as the group leader, and started the "fire line product changing mode" on the same day to carry out workshop clearance, production equipment acquisition, raw material procurement, and overall mobilization and deployment. Under

the guidance of emergency departments, quickly formulate the COVID-19 Epidemic Prevention and Control Emergency Work Plan and the Implementation Plan for Safety Production, and push forward the work at full speed, with more than 100 personnel in place in one day. In 2 days, raw material, staff protection and logistic supplies are in place. In 3 days, 2 workshops are renovated with 5 product lines ready for operation. In 5 days, it passed the requirements of Technical Requirements for Disposable Protective Clothing for Medical Use, and within one week, the company achieved record of 4000 daily output of medical protection suits.

Secondly, real-time follow-up, all-round escort during resumption

Insist on all elements and the whole process be covered to strictly control the return of personnel and take targeted safety measures. All safety management personnel shall return to their posts at the first time to ensure on-duty, safety management force and work safety inspection. For key places such as production workshops, strict disinfection and sterilization measures should be taken according to the requirements of installing a sterilization lamp at every two stations, disinfecting twice a day and testing bacteria regularly. Strictly control the post personnel density, ensure the safety distance of the post, avoid gathering as far as possible, and create a healthy and safe working environment. Canteens, dormitories and other crowded places, set up single dining space, temporary isolation area to prevent cross-infection of personnel, lay a safe foundation for the resumption under epidemic.

At the beginning of February, the company organized all employees in two batches to carry out safety training in each workshop of the production department after guidance in early February. The content includes: safety operation procedures, rules and regulations, emergency rescue and emergency handling skills, resumption safety measures; occupational disease and labor protection products protection and use knowledge ; workshop hazard source and management measures training, etc., to further improve the work safety awareness of all staff, master the company and personal job safety risk points, protective measures and emergency actions to take, and consciously abide by the company's various rules and regulations and safety operation specifications.

Thirdly, perform risk identification and hazard identification in the whole chain.

In view of the safety risks existing in the transformation of enterprises in the special period, the emergency management Bureau of Tiantai County has carried out analysis in advance, and believes that there may be a lack of safety experience in the special situation of pandemic management. The reduction of staff on duty may cause insufficient, work safety inspection. New material for new product may lead to risky storage, and urgent needs may result in rush production.

The Commissioner in the enterprise guides all employees to find out the risk base of the enterprise, through the safety risk grading assessment, to know which parts have high-risk, and to concentrate the limited resources and efforts on the high-risk parts. Better eliminate work safety hazards and build a strong safety defense line made safety management more intact. Early estimation of risks and full-staff involved safety management totally changed past practice where only a handful of officials run safety management, and a aura of everyone involve, everyone responsible for safety is formed.

Establish a resumption safety inspection team composed of the main persons in charge of the enterprise, work safety managers, production supervisors and other important positions, implement a 24-hour non-stop duty system for the leadership team, and carry out regular resumption safety inspections. The main inspections are electrical wiring equipment, machinery equipment, and workshop and warehouse operating environment, fire safety equipment and facilities, occupational health, labor protection, special equipment, etc., fully cover work safety management and hazard identification.

Appendix 8

Shanxi Tiandi Wangpo coal mining Co., Ltd work safety management during resumption

I. Enterprise Profile

Tiandi Wangpo belongs to China Coal Science and Industry Group Co., Ltd. and is mainly engaged in coal mining and sales. At present, it has one mine and one shaft, with a designed production capacity of 3 million tons per year. It was completed and put into operation in January 2014. It has a supporting washing plant and a special railway line. All kinds of certificates are complete and valid. It is a normal production mine.

II. Organization and management

(1) Organization:

Team leader: Chairman, General Manager

Deputy group leader: each deputy general manager

Members: deputy chief engineers, heads of departments and offices (district teams)

(2) Division of responsibilities

The team leader is responsible for the overall coordination of the pandemic management and work safety of the whole company, and is fully responsible for the pandemic management and work safety, and is the first responsible person.

The deputy group leader is responsible for assisting the group leader in the work of pandemic management and work safety within the scope of his responsibility.

Each member is responsible for the management and work safety of the department.

The pandemic management office is responsible for the comprehensive coordination of the company's pandemic management.

(3)Safeguard measures

1. The pandemic management office must report all kinds of information in time and perform well in all kinds of emergency work. At the same time, all units should attach great importance to it, strictly abide by the various requirements of the state, and take good care of personal protection.

2. While doing well in the work of pandemic management, each unit shall focus on the work safety work in strict accordance with the division of responsibilities, operate according to the rules and procedures, and strengthen the management of hazard identification to ensure work safety.

III. Main practices

(1) The pandemic management organization is non-stop. The pandemic management work class has strict division of responsibilities, strengthens the pandemic management working mechanism, continues to increase joint forces, guarantors, finances, and material resources, and actively purchases all kinds of pandemic management materials for storage, according to the pandemic situation at any time, the distribution will be carried out, and all areas and vehicles in the mining area will be completely decontaminated at fixed points and time.

(2) Continuous transmission of information. Timely collect information and requirements from government departments and superior companies make full use of the company's public number to inform all employees of the situation, standardize policy interpretation, issue prevention and control measures, and clarify relevant disciplinary provisions.

(3) The education of Party members is constantly on file. By posting pandemic management publication posters in office areas, staff canteens, apartment buildings and other places, and using Wechat accounts and company websites to popularize personal protection and emergency response knowledge. Further guide all mine workers to understand pandemic management.

(4) Diversification of safety training.

The first is the implementation of the Internet + learning mode, the use of the

company's "learning to strengthen enterprises" mobile APP for online education, the implementation of the monthly points assessment and monthly random examination system, the normal organization of learning and training, to promote learning by examination.

Second, the offline training is strictly in accordance with the relevant regulations of the superior and the company's mass management, the implementation of sitting at an interval of more than 1 meter, wearing masks throughout the training in batches and venues. Through the mode of "decentralized training + network education" to carry out staff education and training, to ensure that staff safety training is continuous.

(5) The work of resumption will not stop.

The first is strict security access. Scientifically formulate the resumption work plan and strictly resumption procedures. Strictly follow the national regulations and standard organizations to carry out the "full coverage" resumption hazard identification, eliminate hazard in time, and standards must not be reduced due to pandemic reasons, seek to provide safe access guarantees for safety resumption.

The second is to strict personnel standards. For situations in which individual personnel cannot arrive in time during pandemic management, strict resumption of staffing is required, for incomplete management and technical personnel, unqualified employee training, and workplaces where special types of work cannot meet the requirements, production must be reduced, and developing footage must be reduced, while reducing new work face point.

The third is strict on-site management. Supervisors leading each shift go down the well, focus on the site, and focus on the weak links. They shall strictly focus on duty, and report problems as soon as possible. Strengthen risk management and hazard identification, strict restrictions on personnel each shift, and minimize personnel Gathering. It is strictly forbidden to work overtime, fatigue work, supervisors shall scientifically and rationally organize production, and it is strictly forbidden to organize production beyond capacity, strength, and fixed staff.

The fourth is strict assessment. We have launched anti-"three violations" focused mitigating activities and special warning & education actions, intensified the

crackdown on various violations, and conducted assessments in strict accordance with the "four do not let go" principle for accidents to further improve the safety awareness of all employees and reduce habitual violations.

Appendix 9

Yanshan Petrochemical Company's work safety management under COVID-19 prevention and control measures

Yanshan Petrochemical Company, affiliated to China Petrochemical Corporation, was founded in 1967 and established in 1970. It is one of the earliest and largest modern petrochemical complexes in China. At present, the crude oil processing capacity exceeds 10 million tons per year, and the ethylene production capacity exceeds 800,000 tons per year. It is the largest production base of synthetic rubber, synthetic resin, phenol acetone and high-quality finished oil in China.

In order to promote safe resumption in the context of pandemic management, on February 26, 2020, the group company held a video conference on coordinating and promoting COVID-19 management and resumption, mobilizing all staff to act quickly, and doing all the work of pandemic management and resumption. During the meeting, the chairman of the group company and the leader of the pandemic management work leadership team made Deploying, requiring a deep understanding of the importance and urgency of coordinating and promoting pandemic management and economic and social development.

The chairman demanded must build a more rigorous defense against pandemic during the resumption process, maintain a high degree of vigilance, implement protection requirements, and make emergency plans. It is necessary to implement more detailed prevention and control measures to ensure resumption to ensure that the measures are in place and prepared in an orderly manner Under the situation, the resumption work is promoted in an orderly manner, with the focus on strengthening staff health monitoring, strengthening the inspection of pandemic management measures in the workplace, adopting flexible working models, doing well pandemic management in places where people gather, providing protective medical supplies, and strengthening prevention and control knowledge education. It is necessary to do a better

job of resumption by region, business, and project more accurately. The company works according to situation home and abroad. The specific measures of the group company include:

I. Work safety management measures

(1) During the COVID-19 management period, strictly implement the "two specials and two important" management, and strictly control the frequency of high-risk operations. For high-risk operations that really need to be carried out, management personnel must be arranged for on-site inspection and implementation of management measures. It is necessary for leaders at all levels to go deep into the front line, to command forward, and to give full play to the leadership's safety leading role in special times.

(2) Take work safety centralized mitigating as the starting point to ensure production safety and stability. Each workplace must be solid, and deepen the work safety centralized mitigating, strengthen leakage management, and strengthen work safety inspection & management of various operations on site. Strictly implement regulations such as Ten Measures for Safety Management of Direct Operation Links.

(3) Strengthen personnel health management. In the course of COVID-19 prevention and control, each workplace should address the physical and mental exhaustion caused by long-term adherence to the post of some personnel during the COVID-19 prevention and control work, and the situation such as increased pandemic and work safety pressures, so as to effectively strengthen the physical and mental health protection of staff. Strengthen blood pressure monitoring, body temperature detection and other health identification; be serious about workplace disinfection and personnel protection. Timely grasp the impact of pandemic transmission on staff's psychological stress, timely identify highly risky groups, and timely carry out necessary psychological counseling.

(4) Strengthen the work safety management under operation under low work load. Each workplace shall develop an operation under low work load plan, strengthen

the equipment, and analyze and judge the main bottlenecks and existing problems of the operation under low work load, and take preventing measures in a targeted manner. It is necessary to strengthen patrol inspections and deal with all kinds of alarms in time. It is necessary to do a safe management of the high inventory of hazardous chemicals, prohibit over-temperature, over-pressure, and over-liquid level operation, and the interlocking alarm system of the tank area should be put into use in good condition, and the solid warehouse super-high stacking is strictly prohibited, and fire protection inspections in warehouses be strengthened. Special emphasis is placed on workplaces with a major hazard source of one and two levels. The alarm management of the national MEM hazardous chemical work safety risk monitoring and early warning system should be paid great attention to.

(5) Strengthen on-site safety inspection, supervision and services. In special times, safety supervisors from the safety inspection team and fire safety center should strengthen their responsibilities and actively provide safety technical services for the front line. Guide the grassroots to behave well in work safety during the special period. Strengthen the on-site high-risk operation supervision and inspection, strictly enforce the law, and intensify the investigation and punishment of on-site violations.

(6) Effectively promote the implementation of the HSSE management system. All workplaces must follow the requirements of the HSSE management system to compact the main management and operation responsibilities of the system elements, and the person in charge of the elements must take the responsibility for the effective operation of the elements.

(7) Strictly follow Group Company's safety benchmarks during resumption of engineering and maintenance projects. Hold fast to safety benchmarks during resumption of engineering and maintenance projects, strictly review and approve the resumption of construction projects, and resolutely not start resumption if they do not meet the conditions. Strengthen the coordination and docking with the contractor. Take effective measures to prevent the spread of pandemic. Engineering and maintenance project safety benchmarks during resumption are as follows:

① Establish a strict resumption plan and pandemic management plan. The

review, acceptance, and approval of the resumption plan must implement the relevant regulations of the local government.

② Before resumption, the resumption plan should be reported to the Development and Engineering Management Department or the Mechanical Power Department, and the professional office will report it to the group company.

③ Before resumption, the main person in charge, technical person in charge, safety person in charge, and safety management personnel of the project department of the construction project's territorial workplace and construction workplace must be in place, and strictly implement the requirements of the "Ten Measures to Strengthen the Safety Management of Direct Operation Links".

④ Construction personnel from outside Hubei Province who come to Beijing will be quarantined for 7 days, and construction personnel from Hubei Province who come to Beijing will be quarantined for 14 days. Only after they received closed and supervised medical observations and passed the health test could they enter the construction site. For Hubei and other severe pandemic areas and places where local government clearly notified as closed management area (workplace, community), their personnel are not allowed to return to post.

⑤ Implement centralized accommodation and closed management for construction personnel, and timely file with the relevant local government departments. Accommodation and catering pandemic management shall be implemented in accordance with the relevant requirements of the pandemic management work leading group office of the group company.

⑥ After the health status of all personnel entering the site is identified, the admission card is re-issued. The construction site is closed and managed, and the personnel must take temperature measurements before entering the site.

⑦ Create chances to organize on-line safety training for quarantined personnel.

⑧ The construction workplace should have the ability to independently solve pandemic management supply problems.

II, pandemic management measures

(1) Strengthen employee education and science publication. The company timely publishes various deployments and requirements of the superiors and the company regarding pandemic management through the new media and the Petrochemical Communication System, forwards the scientific knowledge of the authoritative media about pandemic, and guides employees to strengthen their own protection. Tell staffs do not believe in rumors, do not spread rumors, report problems according to procedures, and follow the unified command of superiors. The company's party committee requires party members and leading cadres to take the lead in not engaging in New Year greetings, not visiting, and not organizing and participating in gatherings and dinners.

(2) No large-scale meetings are held. Production commands are carried out through the joint office system. Each workplace reports the production operation situation through the joint office system on time, and the relevant company leaders and the production command center issue production scheduling instructions through the joint office system. Suspend the factory area maintenance & construction operations, stop large-scale activities, close badminton halls, swimming pools and other public venues to reduce frequent movement and concentration of personnel.

(3) Adhere to the "daily identification" and "zero report" working mechanism. Supervise and urge all workplaces to strictly identify personnel who have recently travelled to the epidemic area or who have had contact with people in the epidemic area, and report the prevention and control work daily before 16:00 in the afternoon. The identification form of people coming to Beijing from the epidemic area, and the registration form of people coming to Beijing from the epidemic area are reported to the company's pandemic management office through OA. Should it be verified that there is a history of direct contact with people returning from the epidemic area, a 14-day quarantine observation is arranged for them as soon as possible.

(4) Strict disinfection. The disinfection interval of the staff shuttle bus has been increased to once per shift, and the shuttle bus around the factory has been increased to once every two hours. The toilets in the factory and office areas are equipped with

disinfectant hand sanitizer. The frequency of disinfection in crowded places is adjusted to once a day; tell workers do not wear work clothes to go home.

(5) Insist on carrying out body temperature monitoring. On the basis of the body temperature monitoring of the personnel entering the factory organized by the company, each workplace is required to monitor the body temperature of the employees on duty again, so as to monitor once a day, and save monitoring records.

(6) Strict "three prohibitions" for key positions. Canteen staffs, security guards, conference services, bachelor apartment services and staff from other key positions are prohibited from visiting, gatherings, and banquets.

Case study of work resumption and work safety management of Chinese construction enterprises under COVID-19



International Exchange and Cooperation Center,
Ministry of Emergency Management

**Case Study of Work Resumption and Work Safety
Management of Chinese Construction Enterprises
under COVID-19**

Case study research team

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Preface

The sudden outbreak of COVID-19 at the beginning of 2020 has put a huge impact on all countries in facing the severe challenge of work resumption under the background of the epidemic prevention and control. Under the premise of ensuring safety, it is a top priority and important issue facing the government in promoting work resumption, restore and maintain economic safety and sustainable development. China is the first country in the world to quickly control the epidemic and resume work and production, and accumulated rich experience in the above-mentioned fields. As an important member of APEC, China hopes to join hands with many other countries to promote safe and healthy work in the Asia-Pacific region, jointly respond to the global crisis and inject confidence and momentum into boosting the world economy.

In August 2020, the International Exchange and Cooperation Center (hereinafter referred to as “IECC”) of the Ministry of Emergency Management (hereinafter referred to as “MEM”), under the leadership and support of the Department of International Cooperation of MEM, won the Asia-Pacific Economic Cooperation (APEC) technical assistance project "Strengthening work safety and promoting work resumption under the normalization of epidemic prevention and control" (hereinafter referred to as the “project”). This project meets the requirements of the APEC disaster reduction framework in responding to the “new normal”, focusing on strengthening corporate anti-risk capabilities, promoting safe resumption

of work in APEC economies, maintaining the stability of the industrial chain and supply chain, promoting stable economic development, improving disaster resilience, and achieving the normalization of social production and life order.

The “Case study of work resumption and safety management of Chinese construction enterprises in post COVID-19 Era” (hereinafter referred to as "Case Study") is a sub-project of the APEC project.

In the context of international epidemic prevention and control, how to resume work and production as soon as possible has become a hot topic that enterprises and employees in various countries are most concerned about. This report takes Chinese construction companies as an example to exchange experience and share cases with APEC member companies on the resumption of labor-intensive enterprises under the background of normalized epidemic prevention and control. In late February 2020, the Chinese government quickly controlled the spread of COVID-19 after taking effective prevention and control measures. Governments at all levels in China formulated a series of policies and measures to promote the orderly resumption of work and production, and escort the development of enterprises. After the epidemic control was stabilized, various industries in China quickly resumed work and production. The construction industry has characteristics such as labor-intensive. While confronting with COVID-19, it also needs to ensure project construction and maintain a good work safety situation. The case study attempts to summarize the efforts made by Chinese government and construction enterprises in safe work resumption

under the background of epidemic prevention and control. These explorations are good practices in meeting the challenge of work resumption under the background of COVID-19, and also a learning model for the whole global construction industry. China's conditional safe resumption of work, which can also called as “Chinese experience” can be used for reference by governments at all levels and the world's construction enterprises.

The case study is divided into four chapters and an appendix. **The first chapter** analyzes the unique difficulties confronted by construction industry under the background of epidemic prevention and control, namely "labor shortage" and "cost increase", and proposes the challenges of work resumption and work safety. **The second chapter** separately elaborates relevant policies made by China's central government and local governments at all levels to resume work safely under the epidemic prevention and control. **The third chapter** summarizes effective methods to ensure work safety of the construction site in the premise of accelerated work resumption. The five cases shared in the article not only cover overseas Chinese-funded enterprises with strict management and mature experience, but also have practices in designing, monitoring, constructing, and safety management in China's construction industry with the assistance of high technology. In addition, there also have PICC's successful experience in using work safety liability insurance to help China's construction industry in fighting against COVID-19 and ensure work safety. **The forth chapter** puts forward suggestions for actions of China's

construction industry under the conditions of normalized epidemic prevention and control. **The appendix** contains the full text of the "Guidelines for the Resumption of Housing and Municipal Engineering" issued by the General Office of the Ministry of Housing and Urban-Rural Development of the People's Republic of China.

The case study research group is composed by Hu Yuhong, Huang Haihui, Liu Hongbo, Liu Xiaobing, Liu Lu, and Liu Xiuting, with Huang Haihui as the main writer. The research group investigated and studied safe work resumption of five major state-owned enterprises, which are China Three Gorges Corporation, China Communications Construction, China Power Construction, China State Construction, and China Gezhouba Group, and extensively collected materials made by governments at all levels and construction enterprises on scientific work resumption in respond to COVID-19 and ensuring work safety. The leadership of IECC, Mr. Chen Jiang and Mr. Wang Qinghua gave strong support to the case study and proposed amendments. After 10 months' effort and several amendments, the manuscript of the case study was finally completed. It is hoped that the case study can use the APEC platform to tell Chinese story on emergency management, and implement the important instruction of General Secretary Xi Jinping "Tell good Chinese story, spread the voice of China, and show a true and comprehensive China".

On the occasion of the review of the case study, we would like to express our heartfelt thanks to the relevant leaders, experts and friends who had given enthusiastic support and help to the research work of this subject

and the review of this report! Due to the rush of time and lack of deep research into the Chinese construction industry, there may be some omissions and fallacies that are hard to verify in the process of compiling this case study. We welcome different voices from all of our readers!

Contents

Chapter I: Impact and Challenge: Giving overall consideration to work safety and epidemic control in China's construction industry under COVID-19	107
Section I: Severe challenges for work resumption	107
1. The work resumption of domestic construction industry has encountered the challenges of "labor shortage" and substantial increase in costs	107
2. Unique challenges faced by overseas Chinese Enterprises.....	110
Section II: Challenges of work safety after work resumption	111
Chapter II: Effective policy guidance of Chinese governments at all levels.....	114
Section I: the CPC Central Committee and the State Council: Respond effectively	115
Section II: Ministry of Housing and Urban-Rural Development: a “Guideline” for the whole construction industry	117
Ministry of Emergency Management: eight measures to keep the bottom line..	117
Section III: Local governments: adapt to local conditions	122
Case I: Strengthen the safety supervision of construction enterprises, ensure work safety and work resumption.....	122
Case II: Support enterprises to enjoy preferential policies such as tax, cost, finance and insurance in accordance with law, open up the "last mile" of policy implementation	126
Case III: Establish and improve the epidemic prevention and control system for work resumption sites.....	130
Chapter III: Enterprise Practice Cases	132
Section I: Work safety measures in the process of work resumption	133
Section II: Practices of Enterprises Work Resumption and Work Safety	135
Case I: Textbook-style work safety experience——China Three Gorges Group	

Guinea project case in epidemic prevention and control, work resumption and work safety.....	135
1. Basic situation of the project.....	136
2. Arrangement for project resumption	137
3. Project epidemic prevention and control measures	138
4. Risk investigation and control measures on work safety.....	145
5. Emergency management.....	152
Section III: Information technology and artificial intelligence shines.....	155
Case II: “Digital Brain” to quarantine virus	155
Case III: Eye-cloud of online epidemic fighting.....	158
Case IV: “Cloud-monitoring” of smart site platform.....	162
Case V: New approaches and technologies to improve the level of work safety	163
Case VI: Liability insurance of work safety supports scientific epidemic prevention and work safety for enterprises.....	167
Chapter IV: Predictions and Suggestions: Actions under the Background of Normalized Epidemic Prevention and Control.....	172
Appendix: Guidelines for work resumption of municipal housing projects.....	175

Case study of work resumption and work safety management of Chinese construction enterprises under COVID-19

The construction industry accounts for a large proportion of China's total economy. Due to its large scale of fixed asset investment, large number of urban and rural employment and strong ability to drive the development of upstream and downstream related industries, the comprehensive work resumption of the construction industry, as well as work safety in post COVID-19 Era plays an extremely important role in ensuring people's livelihood, stimulating the economy and promoting development.

At the end of February 2020, after Chinese government took effective measures on epidemic prevention and control, the spread of COVID-19 was quickly controlled. The housing and urban-rural development authorities in various parts of China formulated a series of policies and measures to promote the orderly resumption of work and production. Local governments at all levels had also introduced policies with their own characteristics to support work resumption, maintain economic stability, and to escort the development of enterprises. After the epidemic situation was controlled, various industries in China put work resumption on the agenda. As labor-intensive industry, while fighting against COVID-19, the construction industry also did good job in maintaining construction progress and a better work safety environment. In 2020, the number of

work safety accidents in housing construction and municipal engineering in China decreased by 14.5% year-on-year, and the number of deaths decreased by 11.3% year-on-year.

Chapter I: Impact and Challenge: Giving overall consideration to work safety and epidemic control in China's construction industry under COVID-19

Section I: Severe challenges for work resumption

The whole construction industry in China faced great challenges in front of COVID-19 in 2020. The delayed resumption of work, the strict returning policy of migrant workers, and local policies on work resumption delayed the project progress, which greatly affected the output value and income of the construction industry.

1. The work resumption of domestic construction industry has encountered the challenges of "labor shortage" and substantial increase in costs

The construction industry has characteristics such as labor-intensive, numerous open-air operations and inconstant operation sites that follow construction projects. Compared with traditional manufacturing industry, the standardized management is more difficult and the conditions for epidemic prevention and control are more complex. In previous years, most construction enterprises completed the arrangement of personnel and

materials around the 10th day of the first lunar month, and the labors resume work after the Lantern Festival, so as to promote the construction as scheduled. Affected by COVID-19, local governments successively issued relevant policies on the delay of project resumption after the Spring Festival. Most regions require enterprises to start construction no earlier than 24:00 on February 9th, 2020, and enterprises in Hubei Province no earlier than 24:00 on February 13th. However, from the actual situation, as of mid-February 2020, except for projects that cannot be intermitted such as epidemic control, emergency rescue, and some key projects, most domestic construction enterprises resume work with reference to the above time, and most amongst them are administrative and management personnel. Most engineering construction projects delayed resumption plan due to local policies and late-return of migrant workers.

Migrant workers are the main force engaged in front-line projects in China's construction industry. According to the census report of migrant workers in 2018 issued by the National Bureau of Statistics, there were 53.63 million migrant workers engaged in the construction industry in 2018, accounting for 18.6% of the total number of migrant workers. Meanwhile, mobile personnel accounts for large proportion among migrant workers. In 2018, there were 172.66 million mobile migrant workers (172.66 million), accounting for 59.88% of the total migrant workers, of which 75.94 million were employed in other provinces. On the one hand, COVID-19 sharply reduced the number of returning migrant workers. On the other hand, the strict epidemic control policies have led to a significant

reduction of mobile workers transprovincially. Hence, there is an extreme shortage in construction labors in the short term, which dragged down the progress of the project. In addition, most places require returning labor from other provinces to be quarantined for 7-14 days. This time-lag also forced the delay of construction period.

In terms of the policy aspects, due to the high concentration of personnel on the construction site, the local housing and construction departments put forward stricter requirements for epidemic prevention and control on the construction site, such as closed and centralized management on the construction site and living quarters; Strengthen health screening and personal protection for labors; Strengthen the sanitary inspection and disinfection on the construction site. This initiative makes work resumption of construction enterprises more cautious. In addition, most places require construction sites to be equipped with sufficient medical supplies such as masks and disinfectants. However, in the early stage of epidemic prevention and control, the overall medical supply is tight, and the difficulty of material procurement also increases the difficulty of work resumption.

The "labor shortage" and the requirements for epidemic prevention and control have pushed up the project cost and greatly reduced the profits of the construction industry. On the one hand, measures such as returning personnel quarantine, procurement of medical materials and strengthening daily monitoring will lead to an increase in costs; On the other hand, the centralized work resumption makes the supply of upstream construction

materials and mechanical equipment tight, additionally there is issue of "labor shortage", which will raise the project cost as well.

2. Unique challenges faced by overseas Chinese Enterprises

China's construction industry includes a large number of overseas Chinese enterprises and overseas project parts of Chinese enterprises. Compared with domestic counterparts, the challenges faced by these companies in safe work resumption include difficulties in customs clearance and the adverse effects of closed traffic. These factors will generate problems of:

(1) Insufficient staffing. Personnel of design, supervision, construction and other parties involved in the construction cannot enter the site, special equipment testers cannot inspect on-site, and operators cannot return home country to replace their qualification certificates.

(2) Equipment and materials are limited. Material procurement and transportation are limited, equipment and materials cannot be cleared, damaged equipment cannot be replaced as planned, and spare parts cannot be supplemented in time.

(3) Employees cannot return home in normal shifts. Affected by the epidemic prevention and control, employees of overseas Chinese funded enterprises cannot shift work in normal style, which is prone to psychological anxiety or various psychological problems. Therefore, labors may lack of concentration and emotional stability, which will put negative impact on work safety.

Section II: Challenges of work safety after work resumption

On the premise of the accelerating work resumption, how to ensure work safety on the construction site? Affected by COVID-19, work resumption of construction projects in China in 2020 is generally late. In order to catch up with the progress, some resumed projects may face potential safety hazards such as inadequate safety inspection and incomplete on-site protective facilities.

In May 2020, the Department of Housing and Urban-Rural Development of Hunan Province reported that there were 8 construction work safety accidents in Hunan in the first quarter of 2020. In addition to that, Shaanxi, Jiangsu, Shanxi province also met a series of construction work safety accidents in the first quarter, which aroused widespread concern in the society.

Under the background of COVID-19, the work safety situation is more severe, mainly demonstrated in:

1. The rapid resumption of work has resulted in "over emphasis on production and neglect of safety" and reduced cost in work safety. Facing the impact of COVID-19, in order to make up for the losses, many enterprises are prone to make unscientific schedule, resource allocation, and safety investment allocation. The thought of attaching great importance to production efficiency can easily lead to negligence on safety issues.

2. There is a shortage of labor, and a lack of skilled labors. At present, most construction companies pay equal attention to epidemic prevention

and control and work resumption. For construction companies, how to realize work resumption under the premise of ensuring the health and safety of employees, especially skilled workers, and to alleviate the pressure of "labor shortage" had become a realistic problem. Currently, the construction site has a high degree of electrification. If there is a lack of skilled manual workers, the construction period will be delayed. In order to meet the increasing demand for construction, some companies are forced to hire lower-skilled workers, which bring new work safety risks.

(3) It is difficult to ensure the quality of personnel training. Affected by COVID-19, the safety training of on-site personnel cannot be carried out on schedule, the safety training disclosure of new entrants cannot keep up. Employees may lack of site risk identification, mental concentration, and operation standardization. The unsafe behavior of employees has become one of the crucial risks restricting work resumption.

(4) Inadequate safety management and inspection, as well as various significant hidden dangers. Affected by COVID-19 and regional factors, the work resumption may face problems such as inadequate maintenance after equipment restart, incomplete troubleshooting of hidden dangers after long-term shutdown, and "disjointed" of process handover, etc.

(5) The phenomenon of catching up with the schedule of construction projects is increasing, which easily leads to accidents.

Judging from the situation of work resumption in China's construction industry, although most construction sites have taken a series of positive and effective measures to strictly strengthen on-site control, there are still

safety accidents. For example, there are four safety accidents in Hunan Province in March 2020, which are striking accidents in unloading process (before work resumption), mechanical injury accidents in lifting steel pipe (before work resumption), collapse accidents in cantilever frame (after work resumption) and collapse accidents in construction process. Additionally, according to the website of the people's Government of Qindu District, Xianyang City, Shaanxi Province, a wall collapse accident occurred on April 8, 2020 at the construction site of GuDu new home project in Qindu District. On April 20th, 2020, a fire broke out at a construction site in Nanjing, Jiangsu Province. The fire went from the scaffold on the first floor to the third and fourth floors.

The reason for object strike accident is unreasonable storage of tools on construction site, the improper setting of various safety protection sheds or safety channels, and the illegal removal of scaffolds and templates. How to prevent such accidents? The most direct way is to take fixed measures to prevent objects from falling, strengthen on-site safety management, avoid artificial parabolic, and strictly abide by safety operation rules.

Fire is a common kind of accident on construction site, especially in spring and winter. The direct reason is that the fire source is not effectively controlled, such as smoking, nonstandard hot work and overload or short circuit of electrical system. In addition, non-compliant storage of flammable materials and unsuited fire equipment are main triggers of the fire as well.

In the construction process, there are many hidden dangers such as

inadequate protection of the edge hole, improper temporary power use, incomplete scaffold and formwork support system, and inadequate fire safety measures. Due to the epidemic situation, there may be other safety risks caused by medical materials. For example, improper storage of medical alcohol may generate explosion or fire; improper use of disinfectant may stimulates respiratory tract and even pose threat to life and health; improper disposal of masks causes "secondary pollution".

Chapter II: Effective policy guidance of Chinese governments at all levels

After the outbreak of COVID-19, China's housing construction system strictly exercise responsibility for work safety supervision, made the slogan of "the same deployment, inspection and implementation" of epidemic prevention and control, work resumption and work safety, and earnestly guarded the two bottom lines of "no major safety accidents and no internal cluster infection". This chapter introduces some policies and good practices, which formulated by the central government and local governments at all levels, about work resumption and work safety under the situation of epidemic prevention and control.

Section I: the CPC Central Committee and the State Council:

Respond effectively

The conference of COVID-19 prevention and control and economic and social development were held in Beijing in February 23rd, 2020. Xi Jinping, general secretary of the CPC Central Committee, chairman of the CPC Central Committee and chairman of the Central Military Commission, put forward eight requirements for orderly work resumption: first, the implementation of accurate work resumption which sorted by zones and classifications. Second, strengthen macro policy adjustment. Third, comprehensively strengthen measures to stabilize employment. Fourth, resolutely complete the task of poverty alleviation. Fifth, promote work resumption of enterprises. It is necessary to implement accurate prevention and control measures in accordance with zones and classifications. Sixth, do best to ensure agricultural production in spring. Seventh, ensure the basic livelihood of the people. Eighth, stabilize foreign trade and investment. These eight points require that "accurate work resumption sorted by zones and classifications" is an overall and principled requirement, and the other seven points are measures put forward in close connection with all aspects of the "six stabilities".

On February 21st, 2020, Joint Prevention and Control Mechanism of the State Council standardized work requirement of epidemic prevention and control, issued "Guidelines for epidemic prevention and control and work resumption in enterprises and institutions", which promote the steady and orderly work resumption of enterprises and institutions.

The guidelines put forward that all units should strengthen employee health monitoring. Summarize the daily health status of employees and report to the local disease control department.

Second, do a good job in workplace prevention and control. Strengthen the registration management of incoming and outgoing personnel, maintain ventilation in the workplace, set hand washing equipment in the workplace, clean and disinfect the work and living places, reduce employee gathering and collective activities, shorten the time and control the scale of meetings to be held, strengthen the management of employees' group meals, provide medical services, standardize garbage collection and disposal, and strengthen the cleaning of garbage cans, and disinfect regularly.

Third, guide employees' personal protection. Strengthen publicity and education on epidemic prevention and control, ensure personal protection, avoid going to crowded sites, especially places with poor air mobility, and correctly wear masks and other protective articles.

The guide emphasizes that all units should clarify their responsibilities on epidemic prevention and control, and deal with abnormal situations. Do a good job in the response after the discovery of COVID-19 cases. The units that found COVID-19 cases should implement the strategies of 'internally preventing virus proliferation and externally preventing virus output', and strengthen the epidemiological investigation of COVID-19 cases, tracking management of close contacts, disinfection of epidemic spots, etc.; Units where virus has spread shall

implement the strategy of ‘internally preventing virus proliferation and externally preventing virus output’, temporarily close the workplace according to the severity of the situation, and resume work after the epidemic is controlled.

Section II: Ministry of Housing and Urban-Rural Development: a “Guideline” for the whole construction industry

Ministry of Emergency Management: eight measures to keep the bottom line

In order to give overall consideration of epidemic prevention and control and engineering quality and safety, and to guide various construction enterprises to steadily and orderly promote work resumption, the general office of the Ministry of Housing and Urban-Rural Development of the People's Republic of China issued "Guidelines for Work Resumption of Housing and Municipal Engineering" (hereinafter referred to as the "Guide") on March 24th 2020. The purpose of the guide is to escort construction enterprises in various regions to steadily and orderly promote work resumption. The guide is made of seven parts, which are: general provisions, the conditions for work resumption, epidemic prevention and control on work site, quality and safety management, emergency management, supervision management and safeguard measures (see Appendix 1 for the contents of the guide).

1. General provision. The "Guide" is applicable to the operation and

management of the construction site for work resumption of housing and municipal projects during epidemic prevention and control. The guide specifies that the local competent departments of housing and urban-rural construction at all levels and relevant departments shall, under the unified leadership of the local Party committee and government, actively guide and assist local construction enterprises to conditionally resume work by different zoning, classification and time sharing. Adhere to accurate supervision by different levels and zoning, adopt differentiated strategies according to various risk level of epidemic prevention and control, implement epidemic prevention and control, as well as quality and safety supervision, timely and properly deal with emergencies, and resolutely prevent the occurrence of cluster infections and quality and safety accidents.

2. Conditions for work resumption. The guide requires the establishment of prevention and control mechanism, the formulation of special plans, the strengthening of personnel health management, the preparation of construction site and quality and safety inspection. In terms of personnel health management, the guidelines require that special personnel shall be designated to take charge of personnel health management, establish a "one person, one file" system, effectively grasp the situation of personnel flow, and carry out health management for all employed personnel according to the requirements of epidemic prevention and control. Meanwhile, strengthen communication with migrant workers, strictly implement personnel management requirements on project location,

and eliminate work resumption of non-compliant personnel. Strengthen the management of migrant personnel, make arrangements for migrant personnel, and coordinate migrant labor in same area retuning via "point-to-point" shuttle bus.

3. On-site epidemic prevention and control. The guide requires personnel registration, strengthening construction organization, publicity and education, operation area management, office and living place management. The guide specifies that, according to relevant requirements of epidemic prevention and control, the enterprise should modify construction design plan, special construction scheme and emergency plan, add requirements on epidemic prevention and control, and ensure sufficient supply of materials, personnel and funds. Optimize the construction plan, give priority to arranging mechanical entry operations, reasonably arrange special sub-projects such as labor-intensive or limited space ones, so as to avoid over-concentration of labor.

4. Quality and safety management. The guide requires focusing on the investigation of the safety status of more dangerous sub-projects, carefully checking the formulation, update and implementation of the special construction scheme. Illegal behaviors are strictly prohibited such as no plan and implementation of special construction scheme. Meanwhile, it is necessary to check the safety status of formwork support system such as scaffold, hoisting machinery and equipment, deep foundation pit engineering construction and urban rail transit engineering construction, list hidden dangers of safety and quality problems (defects), formulate

reliable rectification plans according to relevant standards and specifications, and take effective measures to eliminate hidden dangers in time.

5. Emergency management. The guide requires the establishment of an emergency team and sufficient supply of emergency materials. Professional training shall be received from local health, disease control and other departments, and there must be an emergency plan for epidemic prevention and control. In case of the outbreak of epidemic, relevant person-in-charge should report to local departments and start the emergency plan, take shutdown measures and close the site as soon as possible. Contingency plan shall be carried out immediately according to relevant regulations. In addition, relevant units shall cooperate with health, disease control and other departments on epidemiological investigation, medical observation, and thorough disinfection on site.

6. Supervision and management. The guide requires strengthening the supervision of epidemic prevention and control and project quality and safety during work resumption, strictly urging responsible units or personnel to rectify issues found on epidemic prevention and control, construction safety hazards and project quality problems. If it is found that incomplete work resumption condition or unqualified performance lead to the spread of COVID-19 or safety accidents, the unit concerned shall immediately stop the project for rectification, relevant person-in-charge shall be held accountable for negligence of duty.

7. Safeguard measures. The guide emphasizes that local housing and

urban-rural construction authorities at all levels and relevant departments must actively research and take initiatives to ensure the interpretation, refinement and implementation of the “Guide”. Meanwhile, achieve the “last critical step”, which is the linkage between the policy and enterprises, publicize and interpret policies to enterprises, support enterprises to enjoy preferential policies such as tax, cost, finance and insurance according to law. If there is shortage of materials and equipment that may affect project resumption, local government shall actively coordinate the issue, so as to truly benefit enterprises and encourage work resumption.

On February 26th, 2020, the Ministry of Emergency Management formulated and issued eight measures to comprehensively promote enterprise work safety and work resumption, strengthen safety risk research and judgment, innovate safety supervision methods, firmly hold the safety bottom line, guide and help solving practical difficulties, and support all kinds of enterprises in work resumption. The eight specific measures are as follows: first, the expired certificates are automatically postponed. Second, administrative examination and approval can be proceeded online. Third, simplify the procedures of work resumption. Fourth, take initiatives to reduce burden on enterprises. Fifth, implement work safety commitment system. Sixth, carry out customized services for expert safety guidance. Seventh, strengthen online work safety education and training. Eighth, implement measures to benefit enterprises from safety liability insurance.

Section III: Local governments: adapt to local conditions

Governments from all over the country have formulated a series of policies and measures to orderly promote work resumption. Localities at all levels have also introduced various policies in accordance with local conditions to support work resumption of enterprises and promote stable economic operation.

Due to factors such as high concentration of personnel, the housing and construction authorities across China have put forward stricter requirements for epidemic prevention and control on construction sites, such as closed and centralized management on construction sites and living areas; strengthening health screening and personal protection for labor workers; strengthening the sanitary inspection and disinfection of the construction site etc. Most localities require construction sites to be equipped with adequate masks, disinfectants and other epidemic prevention and control supplies.

Here are some good practices of local governments in China on work resumption of the construction industry under epidemic prevention and control.

Case I: Strengthen the safety supervision of construction enterprises, ensure work safety and work resumption

All localities have adjusted measures to local conditions, strictly reviewed work safety conditions and paid close attention to the

investigation of potential safety hazards, so as to ensure safe work resumption.

1. Liaoning Province: Remove hidden dangers on site.

On February 10th, 2020, Liaoning Provincial Department of Housing and Urban Rural Development issued several measures on supporting and promoting enterprises to resume work and do a good job in epidemic prevention and control and work safety on construction sites in the province (Liao Zhu Jian [2020] No. 10), which required to remove potential hazards on the site such as temporary houses after rain and snow, enclosing wall, drainage system, deep foundation pit, safety protection facilities and temporary power consumption, and fire hazards such as wood, formwork, office and dormitory at the construction site. Ensure that the pit, groove, ditch slope and fixed wall support structure of slope foundation pit are stable, and the scaffold has no shaking and deformation problems. Ensure that the foundation and attachment of hoisting machinery and equipment are stable and reliable, various safety devices are complete, sensitive and reliable, and the foundation and main structure of temporary constructions such as dormitories and offices are intact without leakage, collapse, collapse and other problems.

2. Zhejiang Province issued the "six no starts".

The Department of Emergency Management of Zhejiang Province strictly reviewed and supervised the conditions of work resumption of various enterprises, and issued the "six no start" policies on work resumption for the construction industry. The six situations are: the main

person in charge of the enterprise is not on duty; The technical director of the enterprise is not in place; The person in charge of enterprise safety is not in place; Operators in key positions of the enterprise are not in place; The equipment and devices of the enterprise are not in good condition; The enterprise's production restoration plan is not in place.

3. Nanchong, Sichuan province, carried out inspections of "three treasures, four ports and five borders (which will be interpreted next)" in



deep foundation pits, high slopes, and high formwork

On February 14th, 2020, the Urban and Rural Construction Bureau of Gaoping District, Nanchong City, Sichuan Province issued “Notice on the Safe Work Plan during the Period of Epidemic Prevention and Control in the Construction Field of Gaoping District”, highlighting the safety preparations for work resumption. The Notice requires inspections of "three treasures, four openings and five borders" in deep foundation pits, high slopes, and high formwork to effectively eliminate potential safety hazards.

Generally speaking, "three treasures, four openings and five borders"

are commonly used in construction safety management.

“Three treasures” refers to safety helmets, safety belts, and safety nets. Safety helmets must be worn when entering the construction site, which protects the lives of labor workers; safety belts refer to protective equipments that prevent labor workers from falling from high altitude. The safety belts must be able to carry the weight of the human body and should be fastened on a firm and reliable position. Safety nets consist of two parts: horizontal safety nets and vertical safety nets. These are also protective measures to prevent objects and people falling from high altitude. Horizontal safety nets must be able to withstand certain impact force. High-altitude object falling experiments are generally adopted to verify the reliability of horizontal safety nets.

“Four openings” refer to passageway openings, stair openings, reserved openings and elevator wellhead. Enclosure measures should be taken on both sides of the passageway, and two protective shelters should be set on the top. The distance between the protective shelters should be 500mm, and the plate thickness should be 50mm. Warning signs must be hung at the entrance of the pithead. The entrance of the stairs must be constantly blocked to prevent random entry of personnel. The reserved openings shall be less than 300mm, installed with fixed cover. If greater than 300mm, guardrail must be installed around. A fixed protective net must be installed at the elevator wellhead, and the height shall not be less than 1.2m.

“Five borders” refer to the periphery of the balcony, the roof, the sides

of the stairs, the periphery of the frame structure floor, and the periphery of the foundation pit without protective measures. Two railings must be installed to all these border areas, and the height must be no less than 1.2m.

Case II: Support enterprises to enjoy preferential policies such as tax, cost, finance and insurance in accordance with law, open up the "last mile" of policy implementation

1. List the cost of epidemic prevention into overall project cost.

All localities actively introduced relevant measures, for example, Zhengzhou, Qingdao and other cities issued policy implementation opinions, proposed to add overall cost of epidemic prevention and control into project cost; Zhejiang Provincial Department of Housing and Urban-rural Development issued the "Notice on Doing Good Practice in Epidemic Prevention and Control and Supporting Enterprise Development", proposed that if the price of labor and materials changes significantly due to epidemic prevention and control, and there is no agreed provisions in the contract, according to the actual situation, "the price risk of labor and individual materials within 5% shall be borne by the contractor, and the excess part shall be borne by the employer".

Wuxi City of Jiangsu province proposed that "The labor unit price may be changeable due to policy, and the risk shall be borne by the employer. If the contract cannot be adjusted, the employer and the contractor shall sign a supplementary agreement according to the actual

situation and the principle of change of circumstances”. In addition, many places in China have issued policies to specify that COVID-19 can be set as force majeure listed in "Construction Engineering Contract" and "Contract Law". According to the principle of force majeure stipulated in Article 9.10 of the "Code of Valuation Specification of Construction Engineering Quantity List" (GB50500-2013), the construction period delay caused by force majeure shall be exempt from the contractor's liability for breach of contract. The introduction of the above-mentioned policies partially eased the cost and expense pressure of local construction projects.

Shaanxi Provincial Department of Housing and Urban-Rural Development issued a notice on the pricing of construction projects during epidemic prevention and control, clarified that projects that have not been resumed during epidemic prevention and control period should be postponed. The extended construction period is calculated from the date when Shaanxi provincial government decides to start level I response to major public health emergencies (January 25th, 2020) to the date of termination; For projects that have been resumed, both parties of the construction contract shall reasonably determine the extension of construction period based on actual conditions. For projects that have not been resumed, the cost adjustment shall be in accordance with laws, regulations and contract terms, and the loss shall be reasonably shared in accordance with the relevant provisions and agreements of force majeure. If a construction project does require work resumption, protective

measures should be strengthened to ensure the safety of personnel and prevent the spread of COVID-19. The construction enterprise must organize construction in strict accordance with the local government's regulations on epidemic prevention and control. For projects that urgently need resumption during the period of epidemic prevention and control, the cost shall be calculated separately, and the calculation methods shall be clarified as well. If the construction unit needs to use special fund of epidemic prevention, it must earmark the fund for its specified purpose only, earnestly do a good job of health protection for frontline construction personnel, and put epidemic prevention work first to ensure the health and safety of construction personnel.

2. Shaanxi strictly implements real-name management of construction labors and grants subsidies

The Department of Housing and Urban-Rural Development of Shaanxi Province proposed that the administrative departments of housing and urban-rural construction across the province should guide enterprises to start and resume work in an orderly manner, strictly implement real-name management of construction labors, and guide both contractors and employers to legally and reasonably share the losses caused by epidemic prevention and control. It is strictly forbidden to blindly restrict enterprises from resuming work, and policies should be formulated according to specific conditions. Subsidies shall be provided to construction enterprises that resume work during the epidemic prevention and control (level I emergency response) period, and construction enterprises that apply for

work resumption should be subsidized in accordance with the project cost. For construction enterprises that undertake key epidemic prevention and control projects such as Xi'an Public Health Center determined by the provincial and municipal epidemic response leadership groups, subsidies shall be provided at a standard of 100 yuan per person per day for on-site construction workers. The subsidy funds must be earmarked for special purposes, and mainly used by enterprises to purchase drugs, medical supplies, protective equipment and other necessary protection expenditures for employees during epidemic prevention and control period. The required expenses shall be disbursed from the balance of labor insurance premiums over the years, and specific items shall be controlled by coordination agencies of each city(district). Labor insurance premiums for large and key projects can be postponed and paid in batches.

3. The Shanghai Banking and Insurance Regulatory Bureau guides banking and insurance institutions in Shanghai to provide risk protection for work resumption of enterprises.

In February 2020, the Shanghai Banking and Insurance Regulatory Bureau instructed bank assurance institutions in Shanghai to adopt measures such as separating credit plans, appropriately lowering loan interest rates, reducing or exempting handling fees, improving the loan renewal policy arrangements and supply innovative insurance product for industries and enterprises that largely affected by COVID-19. These measures reduce the burden of entity enterprises, which also support work resumption.

What is worth highlighting is the supply of innovative insurance products, which provides risk protection for work resumption of enterprises.

Various entity companies face many risks and uncertainties in the process of work resumption. The Shanghai Banking and Insurance Regulatory Bureau guided insurance institutions in Shanghai to actively innovate the supply of insurance products and provide a variety of risk protection. A number of insurance companies in Shanghai have innovatively launched a series of additional insurance products related to COVID-19 to reduce the pressure of work resumption of enterprises. On one hand, for work safety liability insurance, employer liability insurance, business interruption insurance and other insurance types that involve the work safety responsibilities of enterprises, the insurance items newly cover COVID-19 free of charge, which provide insurance protection for employees who may suffer from COVID-19 during work resumption. For enterprises that cease operations during COVID-19, the protection period of engineering insurance should be extended free of charge.

Case III: Establish and improve the epidemic prevention and control system for work resumption sites

In February 2020, the Shenzhen Municipal Construction and Public Works Administration issued the “Ten Major Measures for Epidemic Prevention and Control and Work Safety of Work Resumption after Spring

Festival”. It is pointed out that safe work resumption shall be ensured through the implementation of closed management of the construction sites, implementation of safety measures, formulation and improvement of work plans and guidelines, and implementation of reporting and review system of work resumption.

The Chengdu Municipal Housing and Urban-Rural Development Bureau of Sichuan Province issued a notice on incorporating epidemic prevention and control into the credit evaluation management of market entities in the housing and urban-rural construction sectors, clearly included the epidemic prevention and control work of various companies of the housing and urban-rural construction sectors into credit evaluation management, and implemented corporate responsibility contract system for epidemic prevention and control. If the employers violate regulations on epidemic prevention and control, including failing to carry out comprehensive investigations on personnel as required, falsely reporting and concealing, deliberately misreporting epidemic prevention and control information, resuming work without authorization and failing to meet the standards such as carrying out daily disinfection, failing to carry out qualified emergency respond after epidemic outbreak and resume work without authorization. If serious consequences such as epidemic spread were generated due to the above situation, the housing and urban-rural construction authorities shall refer to the "Code of Work Safety Accident Reporting and Investigation" to implement credit penalties.

The Housing and Urban-Rural Development Bureau of Jinan City,

Shandong Province issued three articles, namely the "Notice of the Jinan Housing and Urban-Rural Construction Bureau on Further Doing a Good Job in Epidemic Prevention and Control and Promoting Work Resumption in Construction Projects", "Notice of Jinan Housing and Urban-Rural Construction Bureau on Supporting Enterprises to Promote Work Resumption of Construction Projects", and "Notice of Jinan Housing and Urban-Rural Development Bureau on Doing a Good Job in Work Resumption of Real Estate and Construction Enterprises in the Area". These three notices, combining various factors, fully carry out work resumption of construction projects in Jinan City, implement "one report per day", "one enterprise one policy", improve the government-enterprise linkage service mechanism, collect, sort out and solve problems in the first time, ensure quick and safe project resumption.

Chapter III: Enterprise Practice Cases

As the epidemic prevention and control work has entered into a critical stage, the peak of work resumption is coming. The construction industry is a labor-intensive industry. In the crucial stage of epidemic prevention and control, how to keep abreast of the real-time status of returning personnel and effectively prevent the risk of secondary infection while resuming work had become a difficult problem for enterprises. Work resumption is to ensure employment, and production resumption is to stabilize the economy.

Here are five cases of work resumption and work safety of Chinese

construction enterprises under epidemic prevention and control, covering mature experience in strict management of overseas Chinese enterprises, new practice in the design, monitoring, construction and safety management of China's construction industry with the help of high technology, as well as the unique skill of PICC in using work safety liability insurance to help China's construction industry fight COVID-19 and ensure work safety. These valuable explorations are 'Chinese wisdom and experience' in solving difficulty and complicated problems of the industry, that is, solution to safely resume work under the situation of epidemic prevention and control, which can also be used for reference by enterprise peers all over the world.

Section I: Work safety measures in the process of work resumption

The work safety in the construction industry is as important as epidemic prevention and control. We must not neglect work safety while work resumption.

In the process of work resumption, it is necessary to strictly abide by the "Guideline" issued by the Ministry of Housing and Urban-Rural Development (for details of the "Guidelines", please refer to Chapter II, Section I and the Appendix), and accelerate the establishment of all-round safety management system. For the hidden dangers found at the construction site during work resumption, the construction unit should

specifically list the hidden dangers, and formulate reliable rectification plans in accordance with relevant standards and regulations, and take effective measures in time to eliminate safety hazards.

In the process of work resumption, it is particularly important to do an all-round safety management on the construction site. For example, the most direct way to prevent strike accidents on construction site is to take fixed measures that prevent objects from falling, strengthen on-site safety management, avoid man-made throws, and strictly abide by safety procedures during operation.

At the stage of work resumption, we must calmly face the tense pressure brought by the construction period and output value. First, strengthen the awareness of work safety, closely adhere to the principle of "safety first", and reasonably arrange the construction process with high sensitivity. Second, do a good job in safety education for all kinds of personnel, focusing on the three-level education and assessment of personnel entering the site. Personnel who fail to pass the assessment are strictly prohibited from entering the site. Meanwhile, carry out personnel differentiation management, and strengthen the training to new entrants, high-altitude operations and older personnel. Third, reasonably use the dual prevention mechanism, which is hierarchical safety risk control and hidden danger investigation and treatment, to minimize the on-site safety risk level and effectively do a good job in the safety management of dangerous and large projects. Fourth, do a solid job in emergency management, improve the emergency rescue plan and organize personnel

drills to ensure that the on-site emergency rescue measures can play a role in a timely and appropriate manner and improve their own emergency response ability.

Section II: Practices of Enterprises Work Resumption and Work Safety

Case I: Textbook-style work safety experience——China Three Gorges Group Guinea project case in epidemic prevention and control, work resumption and work safety

In this case, the Guinea project department of the Three Gorges Group coordinates work safety and work resumption under the epidemic prevention and control, strictly investigates hidden dangers of work safety, manages safety risks, and actively does emergency management. The essence is to prevent the situation from getting worse and strictly manage it, on one hand, pay attention to epidemic prevention and control, on the other hand, keep stringent in work safety, ensure that the project is completed on schedule and safe. It is a vivid practice of Chinese construction enterprises in full accordance with the guidance of the Ministry of Housing and Urban-Rural Development's "Guidelines for Work Resumption of Housing and Municipal Engineering". It is also recommended Chinese experience in safe work resumption under epidemic prevention and control.

1. Basic situation of the project

China Three Gorges Group Co., Ltd. China Water Conservancy and Electric Power External Co., Ltd. is currently undertaking construction of the Suapiti Water Conservancy Project in Guinea.



The Suapiti Water Conservancy Project is a second-level hydropower project developed by cascade on the Konkure River in the Republic of Guinea, West Africa. The site is about 135km away from the capital

Conakry. The total storage capacity of the reservoir is 7.489 billion cubic meters, which is a type I large (1) project. It is equipped with 4 vertical Francis turbine generator set with a single unit output of 112.5MW, with a total installed capacity of 450MW. In addition, there are access roads, permanent traffic bridges, and water regime and water regulation automation systems established for the construction and operation periods of the project. The latest construction period of Suapiti Hydropower Station is 65 months, and all 4 units have been put into operation on March 25th, 2021.

2. Arrangement for project resumption

Since the outbreak of COVID-19 in Guinea, the project department has taken various prevention and control measures in a timely manner to protect the health and life safety of project employees to the greatest extent, and reduce the economic losses and adverse effects of COVID-19 on the project's operation. On October 12th, 2020, considering the situation of the epidemic situation tends to be stable, the project department planned the resumption of work in advance while conscientiously implementing the work of epidemic prevention and control. The project department convened all parties to carry out summary of epidemic prevention and control and work resumption conference. After detailed discussion by all parties, it was unanimously confirmed that the infection risk had been basically eliminated, and the investigation of potential safety hazards on

construction site had been comprehensively carried out. The project has the conditions for gradual resumption of work.

The project department organized and carried out education and training focusing on epidemic prevention and control and safety management for project management personnel and migrant workers, especially new arrivals and transferred personnel. Meanwhile, the “five musts” must be strictly implemented, that is, the construction unit must hold regular safety meetings, the construction unit must have safety management measures in place, the project department must have safety inspections in place, project personnel must have safety education in place, and the supervision unit must perform safety responsibilities.

With the efforts of various parties, the project department overcomes various adverse effects brought about by COVID-19, ensured work safety while speedily resuming production. On March 25th, 2021, the key objectives of putting all four units into operation for power generation were completed. Now, under the background of normalization of epidemic prevention and control, the project department and all participating units implement safety responsibilities and promote safety development, so as to provide strong support for the project to successfully pass the provisional completion acceptance by the end of June 2021.

3. Project epidemic prevention and control measures

(1) Closed management on the project site.

In order to ensure the health and safety of personnel on the construction site of Suapiti Project, and to ensure the smooth progress of the project, reduce the possibility of the spread of COVID-19, after consultation with the owner, the project department implemented closed management on construction site from April 3rd, 2020. Specific management measures and regulations are as follows:

A. Large-scale closed management measures.

(a) The location of the closed point. According to the actual situation of the site, sentry boxes were set on both banks of the dam to close the construction site, with police and gendarmerie on guard. The roads near the camps were closed, mainly aim for vehicles and related personnel who may enter the site.

(b) Vehicle management. All social vehicles were forbidden to enter the closed area, guarded by police and gendarmerie at two sentry boxes. For commuter and official vehicles, after approved by the project department, they can get pass card issued by the health department on behalf of the owner. People in the vehicle can enter the closed area after receiving temperature detection and hand disinfection at the closed point. Vehicles should be escorted by Chinese personnel as much as possible to avoid unnecessary contact between the driver and the external environment.

For production materials vehicles (transporter vehicles), the Equipment and Materials Department will notify the Comprehensive Affairs Department of the license number in advance. The Comprehensive Affairs Department is responsible for notifying the guards in sentry boxes.

People in the vehicle can pass after receiving temperature detection and hand disinfection. Relevant units shall immediately discharge the cargo to ensure the vehicles leave the site as soon as possible. Personnel should take protective measures during this period, and supervise other onboard personnel to comply with epidemic prevention measures on site.

The living and office vehicles of the project owner and consulting engineers are also strictly controlled by the above-mentioned measures. The project department and all sentry boxes shall do a good job in supervision.

The access of motorcycles to villages in the closed area shall be prohibited as far as possible. If the motorcycle reenters the closed area, it shall again accept temperature detection and hand disinfection. The head of the village shall confirm that it is the personnel of the village before entering, otherwise it is prohibited to enter. The project department and the owner shall publicize and implement the epidemic prevention and control in each village and community, and advocate villagers to avoid going out as much as possible

(c) Personnel management. Strictly control the going out of the Chinese personnel of the project department, and all participating units shall establish and improve the exit approval procedures. Meanwhile, strengthen the management of employees of several parties to ensure no man going out or leave the site during epidemic control period. Each unit shall be responsible for the management of its local employees and formulate supervision and handling measures.

Pay attention to the publicity and education for villagers in enclosed areas. The project department should cooperate with the owner to carry out publicity of epidemic prevention and control, mobilize villagers not to go out and require them not to stay in the construction area.

Project owners, consulting engineers and their employees should strictly enforce the regulation on cancellation of vacation and leaving, strengthen internal approval management, and strictly prohibit going out without permission. The project department and all sentry boxes should do a good job in supervision.

The gendarmerie and police personnel at the scene should cancel vacations and work shift, and strictly prohibited from going out without permission. The project department and construction units shall do a good job in internal supervision and management.

B. Joint Epidemic Prevention and Control Team. On March 30th, 2020, the Suapiti Project Department and the Owner's Project Department jointly established an epidemic prevention and control working group to jointly do a good job in the epidemic prevention and control of the project.

C. Small-scale closed management measures on the construction site.

Under the implementation of the above-mentioned large-scale closed management measures, in order to ensure the health and safety of Chinese and employees from other countries or parties in the construction area, and avoid contact with surrounding environments, the project department and the owner agreed to adopt small-scale closed management measures in the construction area, which is, set up two sentry boxes at the fork of the left

bank to the local employee camp, and the fork of the dam on the right bank to the B1 road to strictly control the entry and exit of personnel and vehicles into the construction area, to enhance the effectiveness of closed management.

(2) Management of on-site office

Closed management was implemented by project department from April 3rd, 2020. The on-site office of the Suapiti project had formulated the following management measures:

A. The entry management of vehicles and personnel.

(a) Vehicles

Only vehicles of the project department are allowed into the on-site office area. All other vehicles should be parked outside the courtyard. Off-site office vehicles should be disinfected every time when entering the camp. The maximum carrying capacity of each vehicle is 3 persons.

Vegetable trucks that enter the camp shall be disinfected. The unloading personnel shall keep a distance from drivers of vegetable trucks. After that, the drivers will be arranged to stay in single rooms, and required to keep a distance from other employees and take personal protection.

If no necessity, it is required to reduce business dealings with personnel and vehicles from the capital city.

(b) Personnel.

Only on-site office personnel, local employees of the project department and security are allowed to enter the site. Other owners, consulting engineers, or outsiders from other parties must be waiting

outside the door, and can only enter the site after confirming with the department with which they have business. Relevant business shall be carried out at the gate or in the office lobby and cannot be inside the office. All personnel entering the site should register with their real names, receive temperature detection and hand disinfection.

The outing of the project department personnel in the site must be strictly approved by the person or leader in charge, and vehicles can only be arranged after reporting to the general affairs Department. Outing personnel and drivers must wear masks throughout the journey.

B. On-site meeting management.

(a) Cancel unnecessary meetings. Necessary meetings shall be held online such as QQ group chat, enterprise wechat or Tencent conference.

(b) Regular meetings can be cancelled or held online as appropriate.

(c) All large-scale non-online meetings that must be held must be approved by the supervisor or general manager. All meetings can only be held in large conference rooms. The maximum number of participants is 15 and the meeting time shall not exceed 1 hour. Participants must wear masks and keep distance. The meeting room should be ventilated and disinfected regularly.

(d) For technical exchanges with foreign parties, all participants must wear masks, keep distance, and do post-conference disinfection.

C. On-site meal management.

(a) Avoid peak gathering during lunch and dinner hours.

(b) Individuals in close contact with external environment shall eat isolated. The general management personnel take lunch and dinner separately. The project department prepares dinner plates for local employees, requires them to eat alone.

D. Management measures to avoid gathering of people.

(a) Office staff must keep distance from each other. In view of the excessive staff in several offices, the general affairs department shall make adjustment as soon as possible

(b) General affairs department should reserve 4-5 dormitories as isolation rooms; adjust triple rooms into double rooms.

(c) When exercising in the site, everyone should keep a distance. It also applies in face-to-face business dealings. Online or phone communication is suggested. If one does need facial communication or report, he must wear masks.

(3) Implementation of grid management measures in some divisions of the project.

On the basis of the existed prevention and control measures, in view of potential risks, the project department formulated grid management, which is zoning and classification management system for the entire construction site. Key areas are as follows:

A. Canteen. In addition to maintaining the existing measures, the purchased frozen dishes must be placed in a designated location for 30 minutes of ultraviolet disinfection, and then placed in the freezer. After the

second nucleic acid test was negative, the kitchen helper can be arranged to enter the site for accommodation and cut off contact with local personnel.

B. Dormitory. There is a maximum of two dormitories for Chinese personnel, and a maximum of three for local employees. High-risk personnel (persons who have close contact with local personnel, such as the General Affairs Department, Safety and Environmental Protection Department, etc.) should be arranged in single dormitory.

C. Office. At present, except that the office of the operation and maintenance preparatory personnel is relatively tight (one room for six people), other departments are relatively loose. Thus one extra office shall be prepared for the operation and maintenance preparatory personnel.

Daily disinfection must be held at the office area. There is no need of wearing masks in single-person offices. If there are people visiting, both parties must wear masks. For offices with more than two people, masks must be worn.

D. Outdoor area. Except for existing measures, a supervision squad must be established to strengthen inspection.

4. Risk investigation and control measures on work safety

The project department had systematically identified and analyzed the safety risks of the project, formulated and implemented effective control measures, and ensured that the safety risks were under control.

(1) Risk of personal injury or death.

The Suapiti project in Guinea is in the final stage of construction. According to analysis, the project department believes that there are four types of safety risks, including lifting operations, high-altitude operations, temporary electricity use, and road traffic.

A. Safety risks of lifting operations. At present, the dam lifting and hoisting operations of the Suapiti Project may cause serious casualties or major property losses due to illegal operations, equipment failures, and falling objects from heights.

The control measures have been taken as follows:

(a) The project department formulated and issued the "Suapiti Project Mechanical and Electrical Equipment Installation Safety Management Regulations", " On-site Emergency Rescue Plan on Work Safety and Environmental Management of Suapiti Project" and "Site Contingency Plan on Special Equipment Accident " to standardize the safety monitoring management and accident site contingency plan during the installation and hoisting of large parts such as mechanical and electrical equipment. The project department has strictly abided by the "Special Equipment Safety Supervision Regulations", implemented special safety plans and measures for installation operations, carried out safety operation technical disclosures, and arranged for qualified third parties to carry out safety inspections on lifting equipment regularly.

(b) Conscientiously implement the "Ten No Lifting" safety regulations for lifting operations.

(c) Before lifting operations, do a good job on pre-shift safety training, check the safety performance of lifting equipment and facilities. There must be professional staff to be responsible for organizing the lifting operations, special equipment operators with certificates, guard isolation set up in lifting operations area and commissioner on duty. Additionally, irrelevant personnel are not allowed to enter the area.

(d) Regularly inspect and maintain the lifting equipment.

B. Safety risk of high altitude and edge operation.

The maximum height of the hoist room at the discharge bottom outlet of the project is 22.6m, and there are high-altitude and edge operations in the construction of plant decoration, which may cause major casualties or major property loss accidents due to non-standard scaffold erection, illegal operation of operators, incorrect use of safety belts and falling objects.

The control measures have been taken as follows:

(a) The project department has formulated and issued the regulations on safety management of scaffold erection, demolition and use of Suapiti project and the site emergency rescue disposal plan for accidents caused by falling from height and object strike of Suapiti project to carry out process safety monitoring and safety management for the erection, demolition and use of scaffolds for project construction. Scaffolds must undergo safety acceptance before listing for use. The demolition shall be supervised by a specially assigned person to ensure the safety of high-altitude

operation.

(b) Special construction scheme and safety guarantee measures shall be prepared for high-altitude operation with high risk, such as special construction scheme for dam crest hoist room of discharge bottom outlet dam section.

(c) Before the construction of high-altitude operation projects with high risk, construction workers should be organized to conduct technical safety disclosure and the information should be recorded. During the construction, the construction shall be carried out in strict accordance with the special scheme, and special personnel shall be arranged for safety supervision.

(d) Operators must correctly use personal safety protection equipment, and those who violate regulations, such as not wearing helmet belt, not hanging on the back of safety belt, hanging high the low equipment, shall be fined. A working platform or hanging basket shall be set on the working platform with high falling risk.

C. Safety risk of temporary electricity use.

The 4 units of Suapiti project have been officially put into operation, all kinds of instruments and meters have been operated with power, and all tests are under way. The plant decoration is under construction as planned. However, there are numerous operating units and overlapping business, which may cause major casualties or major property losses due to randomly opening and

closing electric switches by operators, illegal power wiring, construction tools touching live equipment, etc.

The control measures have been taken as follows:

(a) The rule for construction of hydropower station in Suapiti has been formulated and issued. Power consumption for plant decoration should adopt the rule of permission. The application should be submitted before construction, and the rule should be strictly implemented. Safety supervision must be carried out.

(b) Isolation belts shall be pulled around all live equipment for isolation. Safety warning signs (live signs, no operation signs, etc.) shall be hung at the switch positions of various electric gates and valves. Special personnel shall be arranged to supervise every day.

(c) Post-job safety education should be strengthened and safety disclosure should be conducted.

(d) The safety inspection of construction-use electricity should be organized by the Safety and Environment Department of the project every week. Professional electricians are required to participate in the inspection and the lines, switches, leakage protection devices, grounding and other aspects should be inspected to ensure the safety of electricity use.

(e) Equipment protection shall be carried out to prevent decoration items from damaging, polluting and colliding with equipment and facilities.

(f) The emergency rescue and disposal plan for on-site electric

shock accident has been formulated and issued.

D. The safety risk of road traffic.

Shuttle bus are used for the Suapiti project every day, and there are many construction personnel on the vehicles. Mass casualties and losses may occur due to the large number of workers on the bus, the illegal operation of drivers, overload, vehicle failure, etc.

The control measures have been taken as follows:

(a) Road safety management regulations of Suapiti project, on-site emergency rescue plan for safety production and environmental management of Suapiti project and on-site disposal plan for traffic accidents have been formulated and issued, and strictly implemented.

(b) Drivers must work with certificates. They must pass the joint practical test and safety education of the comprehensive affairs department and the safety and environment department, and can only be allowed to drive on the road after being officially issued and confirmed by the comprehensive affairs department.

(c) The maintenance of the vehicle should be conducted regularly, focusing on the inspection of braking and steering systems.

(d) The driver shall conduct self-inspection of the vehicle before departure, during driving and after receiving the vehicle.

(e) Warning signs such as speed limit shall be set in bad areas

of the construction site, road traffic safety inspection shall be conducted irregularly, and illegal behaviors such as unlicensed driving, speeding, fatigue driving and drunk driving are strictly prohibited.

(2). The risk of major equipment damage.

At present, the installation of mechanical and electrical equipment of the project has not been completed. The plant decoration is still underway. Due to the number of operating units and overlapping business, it is impossible to completely isolate the equipment that has been put into operation. During construction, it is easy to fall from height and damage the equipment. The construction tools may touch the equipment and cause damages, electric shock, and illegal opening and closing of electric valves may occur, resulting in safety risks such as casualties or property losses.

The control measures have been taken as follows:

(a) The rule for construction of hydropower station in Suapiti has been formulated and issued. The work permit access system of power consumption for plant decoration has been adopted. The application should be submitted before construction. It should be strictly implemented after approval, and safety supervision should be conducted.

(b) Isolation zone shall be set around all electrical equipment.

Safety warning signs (live signs, no operation signs, etc.) shall be hung at the switch positions of various electric gates and valves, and special personnel shall be arranged to patrol and supervision should be conducted every day.

(c) Post-job safety education should be strengthened and safety disclosure should be conducted.

(d) The Safety and Environment Department of the project shall organize power safety inspection every week. During the inspection, the licensed professional electrician shall inspect the lines, switches, leakage protection devices, grounding and other aspects at the same time to ensure power safety.

(e) Equipment protection shall be carried out to prevent decoration items from damaging, polluting and crashing with equipment and facilities.

(f) The emergency rescue and disposal plan for electric shock on site has been formulated and issued.

5. Emergency management

A sound emergency management system has been created, all kinds of emergency plans have been formulated and distributed, the leading unit of emergency management and responsibilities of related departments have been defined by the project department. Currently, the project department has prepared 2 comprehensive

emergency plans, 15 special emergency plans and 6 on-site disposal plans, covering the area of public health, accident and disaster, social security and natural disasters. Meanwhile, the department has carried out the preparation, review, release, filing, training and revision of emergency plans accordingly.

At the same time, an emergency organization shall be established, which is composed of emergency linkage center, central office, units and expert groups of the project department, professional groups, on-site emergency rescue headquarters, emergency rescue institutions and teams of participating units, etc. According to the annual work plan on emergency drill of the project department, the project department organizes emergency drills for different types of subjects every year, including various emergency drills such as liquid ammonia leakage, firefighting, flood control, mechanical injury accidents, special equipment accidents, electric shock accidents, sudden diseases, poisoning and suffocation accidents, sudden outbreak of the pandemic. The drill is rigorous and serious, aiming to improve the emergency response ability of on-site personnel during emergencies.

Five emergency rescue teams, including liquid ammonia emergency rescue team, road traffic emergency rescue team, firefighting team, flood control and rescue team, COVID-19 response team, have been set up and been formulated as emergency

rescue force with Guinea military police. The emergency rescue teams had been well trained. The project department is equipped with emergency disposal equipment such as maritime satellite telephone, medical ambulance, fire truck, sprinkler, emergency vehicle and construction machinery and equipment. The type and quantity of emergency materials and equipment have been equipped properly and the inspection and maintenance of emergency equipment and the replenishment and updating of emergency materials have been carried out in line with requirements.

The hydrology measuring and forecasting system has been established at Suapiti to timely grasp the water and rainfall information in the area. In case of emergency, the information of floods and dangerous situations shall be transmitted by a comprehensive series of approaches such as mobile phone, fixed-line phone, short message and manual transmission. Relevant regulations on duty, the system of government officials providing on-site guidance and 24-hour on duty at critical positions have been strictly implemented. No person on duty has been out of position and the contact and information exchange has been smooth.

Emergency response plans have been formulated by the epidemic prevention and control department including special emergency plans on epidemic prevention and control, on-site response plan on sudden outbreak of the pandemic, on-site response plan for the procurement and transportation of medical and

epidemic prevention materials, the response plan for medical and quarantine supplies and materials. Emergency response team has been created and received professional training from local health commission and disease control departments. Emergency materials has been provided and distributed properly. The epidemic prevention and control department has been cooperated with local health commission and disease control departments to carry out epidemiological investigation, medical observation and comprehensive disinfection of the site. The overall and accurate information of epidemic prevention and control has been submitted to relevant authorities on time according to the requirements of the upper departments.

Section III: Information technology and artificial intelligence shines

Case II: “Digital Brain” to quarantine virus

With the rapid development of science and technology, information technology has already penetrated into all fields of people's life compared with the year of 2003 since the outbreak of SARS. In the fight against COVID-19, information technology has also played a critical role. Science and technology will also be a key factor to support the resumption of work and production. With the support of digital technology, digital construction, which is

advanced, coordinated, inclusive, systematic, and organic, will help to address emergencies and serve as an engine to drive the digital transformation for construction enterprises.

Established in 1998, Glodon Company Limited was listed on A-share market in 2010 (abbreviated as Glodon) in China. Glodon has provided two digital solutions to support the resumption of work and production for construction sector during the pandemic: utilizing IOT and BIM technology to integrate system and hardware into a unified platform to quickly achieve personnel temperature measurement, live video monitoring without dead corner, on-site violations identification and early warning. Distant communication can be realized through video conference to create a digital brain for team management to track the data of employee, fully grasp the production process and effectively reduce the epidemic-related risk of the project.

In 2020, the most severe order on resumption of work and production in history has been issued nationwide and Department of Housing and Urban-Rural Development and cities have refined the paper to promote the resumption of work and production in line with the requirements. Glodon has summarized the similarities and compulsory rules with the help of AI analysis. Requirements of resumption of work and production nationwide includes the following measures: to create a real-name registration system through scanning, conduct temperature detection, wear mask,

spread the knowledge of epidemic prevention and control, control the entry and exit of vehicles, conduct epidemic prevention and defection, conduct closed management of construction site, conduct isolation and observation and report daily epidemic condition, etc. Data on the temperature and details of personnel must be reported via contactless technology according to the local condition. Glodon has provided solutions: through thermal imaging temperature detection, AI intelligent monitoring, intelligent broadcasting to register entry and exit of vehicles, conduct early warning in closed areas in terms of epidemic and ensure real-time mask wearing to avoid personnel gathering and illegal break-in. All the measures help to improve the safety awareness of epidemic prevention and control, ensure the life safety of workers, avoid illegal operation and cross infection of on-site personnel.

How to perfectly manage the project to meet the requirements of epidemic prevention and control and efficiently promote the resumption of work and production under the premise of less contact, completely cutting off the route of infection, implementation of full coverage control, collection, retention and transmission of real and accurate data? To ensure efficient, coordinated and smooth production during the pandemic, the epidemic prevention and control system invented by Glodon is capable to facilitate communication between enterprises and projects, support cooperation between different parties, ensure

contactless working, profile sharing and transmission of data through online management and multiparty cooperation.

In addition, apart from epidemic prevention and control system designed for the first-line construction workers, a number of specialized platforms including intelligent bid opening platform without meeting in person subordinated to Glodon, intelligent remote bid evaluation platform, online quota interpretation platform and quota dispute handling platform, construction cost cloud management platform, platform providing material price and data service (<https://www.gldjc.com>), building materials trading service platform (<https://www.m².com.cn>), digital consulting productivity platform and other professional platforms will give full play to the advantage of remote contactless communication, reduce the risk of virus cross-infection and support the resumption of work and production during the pandemic.

Case III: Eye-cloud of online epidemic fighting

The administrator can timely grasp the data such as personnel epidemic prevention information, procurement and application of epidemic prevention materials without going to the site, and the construction personnel can quickly report personal epidemic prevention information anytime and anywhere.

On 10th, February, 2020, the "epidemic prevention and control system for construction project" featured fast and convenient use,

detailed and traceable information query was promoted and launched in all departments of China Tiesiju Civil Engineering Group (hereinafter referred to as "China Tiesiju "). Technologies such as big data, artificial intelligence and cloud computing are used in the system to comprehensively and effectively manage the health of employee and management of the project in harsh times. There are 3 main functions: supporting the resumption of work and production, strengthening the monitoring of personnel returning to work and supervision of daily epidemic prevention and control to ensure accurate prevention and control of units, individuals, equipment and facilities, etc.





In terms of epidemic prevention and control and the resumption of work and production, the input path of necessary materials such as "application for approval of resumption of work and production/ plan of start and resumption of work/ epidemic prevention and control system/ emergency plan/ establishment document of a leading group for epidemic prevention and control and the setup of quarantine room" has been set up to remind all personnel to prepare relevant procedures before resumption of work. At the same time, the system also has the function of the reserve and management of materials for the resumption of work. In particular, key words of protective articles such as protective masks and disinfection supplies, so as to facilitate the project department to timely and quickly record the "procurement, internal allocation and application" of materials.

In terms of information collection for personnel in epidemic prevention and control, the personnel entry information registration

can be quickly completed through the ID identifier to record the "time of returning to work, place the personnel come from, route of return, transportation, health status, whether there is patient contact history" and other contents, and the personnel screening report including the detailed information of personnel entering the site and the detection records of personnel with abnormal body temperature can be automatically generated. In this way, accurate prevention and control of the project department can be realized.

In terms of equipment and facilities, an intelligent temperature measurement personnel channel can be established by installing intelligent temperature detection equipment on gate attendance system to bind personnel information with temperature information, rapid confirmation of personnel information, voice alarm of abnormal conditions and so on.

The big data of epidemic prevention and control can be gradually improved with the continued use of the system. It will provide the most precise and timely reference for the administrator to grasp the information and fight against the pandemic. A new type of management pattern featuring online working without meeting each other is achieved. Meanwhile, repetitive information reporting from multi-level and multi departments such as subsidiaries, branches and project departments can be avoided and the phenomenon of "combating the epidemic through filling the forms" can be put to an end. At present, the system has been applied in 446

projects of China Tiesiju. Online epidemic fighting and scientific and technological empowerment is providing strong support for the resumption of project.

Case IV: “Cloud-monitoring” of smart site platform

Early warning through facial recognition and screening, and the query of QR code healthy information have been put into place by southeast branch of CSCEC Xinjiang Construction & Engineering (Group) Co. Ltd in the green project and safety management of Yunxiang Mountain program in Dali. Intelligent management has been conducted on the operating personnel, large construction facilities and on-site safety equipment through smart site platform, laying solid foundation to ensure work safety. The process of construction can be monitored at any time and any places on smartphones, laptop, and on-site cameras via the cloud monitoring platform. The facial recognition monitoring system has been created to carry out real-name management on all personnel and monitor the number of on-site workers in real-time when necessary through biometric identification. Safety QR code has been created on all kinds of main production facilities including tower crane, distribution box, reinforcement waste pool, fire extinguisher and safety data of the enterprise, and so on so that information like inspection reports of facilities and equipment,

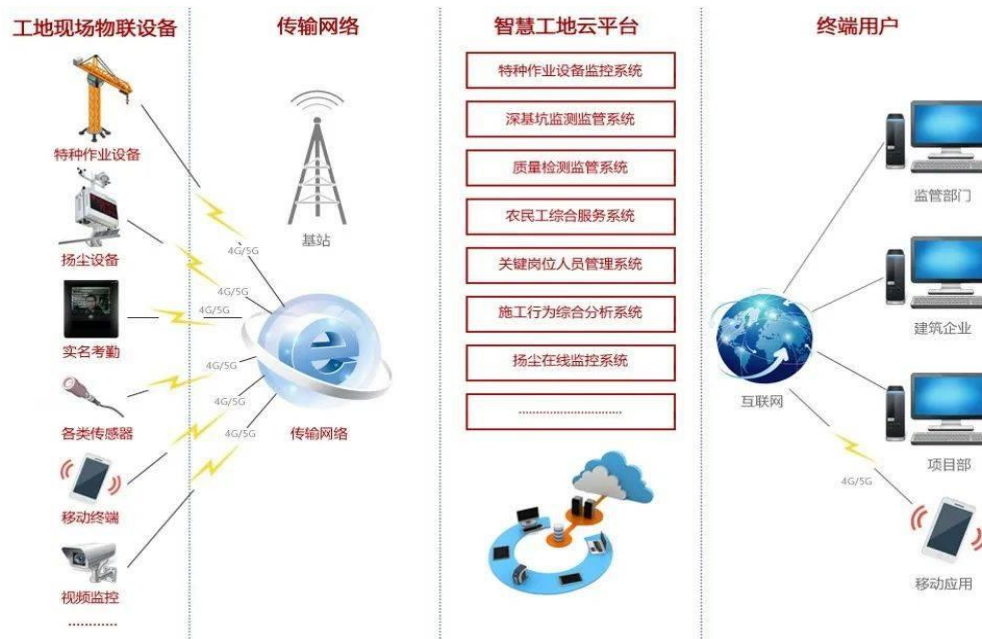
maintenance records, accountable personnel can be traced by scanning the code, which is convenient, fast, safe and liable. The "tower crane early warning nut" is designed to effectively prevent the safety problems caused by the loosening of the tower crane nut due to the strong local wind.

Case V: New approaches and technologies to improve the level of work safety

The concept of technicians operating machines and automation improves effectiveness has been fully implemented in the new approaches and technologies of the construction sector. This is an important step to improve work safety. The following 2 cases are the vivid examples of the adoption of new approaches and technologies in the construction sector.

Zhonghai Left Bank Lanting Project of China Construction Fourth Engineering Division Corp. Ltd is located in the north of the Asian Games Avenue, Shilou Town, Panyu District, Guangzhou, with a total construction area of about 123,000 square meters. The new approach and technology of climbing frame, aluminum coating and assembly has been adopted in the project to spread the new concept and standardized management so as to create a leading project in the sector. Here are some examples. First, the solar wireless infrared alarm is used in the elevator shaft and arranged in

the dangerous area on the site. When someone approaches the dangerous area, the audible and visual alarm will start immediately. Second, the tower crane safety monitoring and early warning system is installed on the large tower crane to monitor the boom elevation, return angle and load data of the tower crane in real time. The data can be seen on the cloud





platform to provide real-time early warning for the collision between tower cranes, and automatically carry out braking control. Third, sensors and driver monitoring system are installed in the construction elevator to monitor the operation of the construction elevator in real time to collect construction elevator personnel statistics, conduct face recognition management on elevator driver and so on. Fourth, the tower crane bolt alarm is installed at the standard section of the tower crane. When the tower crane bolt is disconnected, the alarm will light up and prompt, and feed back to the project department in time to realize visual control.

The Tianxi high speed construction No.1 Department of China Gezhouba Group No.1 Engineering Co., Ltd has used 2 tools: welding robot and crawler drill. The cap beam bone welding robot has been used in the reinforcement processing plant to replace the traditional welder operation so as to improve the

operation efficiency and reduce the safety risk. The Tianxi high speed construction No.2 Department has used Computer Numerical Control (CNC) steel cage roller welder and automatic mesh welding machine, which greatly reduces accidents such as mechanical injury and electric shock during operation, and further promotes the implementation of the concept of technicians operating machines and automatization improves effectiveness with the least operating personnel. Tianxi high speed construction No.1 Department has adopted crawler drill to cope with the challenges including the large volume and high risk of high slope construction and the mismatch between slope support and earthwork excavation progress. The crawler drill is equipped with a safe operation platform, which has high hole forming rate and good safety performance. It has replaced the previous process of erecting bent and laying operation platform. At the same time, it speeds up the slope support rate, ensures the timely follow-up of slope support, and greatly reduces the safety risk of high slope support construction. **Unmanned Aerial Vehicle (UAV) and advanced geological exploration have been put into use.** UAV has been used in Tianxi expressway project to draw the topographic map of geological disaster section and monitor the stability of mountains during excavation to ensure the safety of excavation and support of high slope. In terms of advanced geological prediction technology of tunnel, geological prediction has been conducted in 3 stages of long-term, medium-term and

short-term to ensure accurate geological prediction and avoid tunnel collapse and other accidents caused by detection problems.

Case VI: Liability insurance of work safety supports scientific epidemic prevention and work safety for enterprises

All walks of life are actively returning to work and production when epidemic prevention and control has reached a turning point. In the process of resumption of work and production, enterprises may face many challenges, such as the risk of mechanical failure while restarting the equipment, the risk of epidemic prevention and control of personnel, and the financial pressure caused by the epidemic. In China, construction is one of the eight statutory high-risk industries that must be insured with production safety liability insurance (production and business units in high-risk industries including non-coal mines, hazardous chemicals, fireworks and firecrackers, transportation, construction, civil explosives, metal smelting and fishery production, shall be insured with liability insurance of work safety). In the following case, the experience of the People's Insurance Company of China (PICC, hereinafter referred to as PICC) in helping construction enterprises with scientific epidemic prevention and safe production with the support of liability insurance of work safety has been illustrated.

Liability insurance of work safety is a type of property

insurance. It refers to the commercial insurance in which the insurance institution compensates for the casualties and relevant economic losses caused by the work safety accidents of the insured production and business operation unit. The insurance also provides the insured production and business operation unit with prevention services.

PICC has launched 10 initiatives of liability insurance of work safety to support resumption of work and production for enterprises. It aims to help enterprises do a good job in work safety and epidemic prevention and control. In particular, it will help enterprises, especially SMEs, to tide over business difficulties and return to normal work and production in an orderly manner. The initiatives cover more than 400,000 enterprises insured with liability insurance of work safety (including a large number of construction enterprises).

Initiative 1: To expand the scope of protection and make the responsibility of infectious diseases free of charge

For enterprises that have been insured with liability insurance of work safety, the insurance liability of the enterprise will be extended free of charge and the coverage of protection will be expanded since the resumption of work. In the course of operation, the insured personnel died due to COVID-19 will be paid according to the standard of 100,000 RMB per person. The liability limits of the original insurance contract remain unchanged. This liability

extension is automatically extended under the original insurance policy without application of enterprise, and compensation is made after the accident.

Initiative 2: To protect the rights and interests of enterprises and extend the insurance period free of charge

If the enterprise needs to stop work and production due to epidemic prevention and control work, the insurance period of liability insurance of work safety will be appropriately extended for the enterprise that have been insured with it free of charge. The extension period shall be determined according to the actual shutdown time.

Initiative 3: Appropriately postpone the payment of insurance premiums to ease the pressure on enterprises

During the period of epidemic prevention and control, the insurance premium payment method of enterprises renewing liability insurance of work safety shall be handled flexibly. Enterprises are allowed to pay in installments. For small, medium-sized and micro enterprises with less than 100 employees, the down payment of liability insurance of work safety can be postponed for a maximum period of no more than 3 months.

Initiative 4: To support online insurance and ensure smooth financial services

During the period of epidemic prevention and control, the insurance procedures will be simplified to facilitate the new

insurance customers to apply for liability insurance of work safety online. The company will successively open PICC APP, PICC E-Link and other online insurance platforms. The newly insured customers will automatically get the relevant protection against COVID-19 or get personalized insurance plan according to their needs.

Initiative 5: To strengthen the investigation of hidden dangers and resolve the risks of resumption of work and production

To organize teams of experts and technicians to provide technical support for epidemic prevention and control and safety management of the resumption of work and production, including investigation of common safety hazards, investigation of key equipment safety hazards and safety device failure etc. In this way, we can effectively help enterprises return to work in an orderly manner, gradually restore production order and ensure stable operation.

Initiative 6: To strengthen the work of prevention and expand the scope of prevention expenses

With the approval of the local emergency management department, the scope of application of the prevention expenses of liability insurance of work safety at local levels are encouraged to be further expanded. In response to the application of insured enterprises, the prevention expenses of liability insurance of work safety can be given priority to the epidemic prevention and control

of the insured enterprises according to their application.

Initiative 7: To upgrade the service mode and carry out online training

During the period of epidemic prevention and control, free online training services on the knowledge of epidemic prevention and work safety are provided in accordance with the actual situation of COVID-19 prevention work. The training content includes risk warning education of work safety, laws and regulations, standards and specifications of work safety, operation procedures and accident emergency measures, etc.

Initiative 8: To innovate approaches of service to help enterprises in fight against the epidemic

To meet the needs of epidemic prevention and control, the epidemic prevention and management services are launched to help enterprises carry out the initial screening of the disease and provide free value-added services such as online medical consultation to help enterprises to fight against the epidemic.

Initiative 9: To open a green channel and pay insurance compensation funds in time

During the period of epidemic prevention and control, the green channel for claims settlement of liability insurance of work safety was opened, the claim settlement procedures and processes were simplified, special affairs claims were handled quickly so as to ensure the smooth compensation service.

Initiative 10: To provide financing services to ease the financial pressure of enterprises

In order to effectively alleviate the financial difficulties of small and medium-sized enterprises affected by the epidemic, comprehensive insurance and financial services for the insured enterprises of liability insurance of work safety are provided to give full play to the financing functions of trade credit insurance, guarantee insurance and other products in order to help to ease the financial burden on enterprises.

Chapter IV: Predictions and Suggestions: Actions under the Background of Normalized Epidemic Prevention and Control

The construction industry has been severely hit by the sudden outbreak of the pandemic. The pandemic has now become a new normal, and it must be handled in a scientific and sustainable way to ensure workplace safety in construction enterprises.

The scientific epidemic prevention and control measures have been carried out as follows:

1. To intensify the screening of personnel in the construction site. Close attention should be paid to the domestic epidemic situation and real-time screenings of personnel at construction sites should be conducted based on the classification of medium and high-risk areas. Special personnel should be assigned in charge of

the screening to carry out precise organization so as to ensure that everyone is tested and no dead ends are left. Report must be submitted as soon as possible once the person with a history of living in a medium-to-high-risk area and an abnormal health code is found. Actions must be taken resolutely to investigate the case, quarantine the personnel and conduct nucleic acid testing.

2. To step up efforts of vaccination for personnel on the construction site. Vaccination, an effective tool to stop the spread of the virus, is a crucial way in epidemic prevention and control. All construction enterprises should do their best to promote vaccination rate and enhance immunization. Personnel in key positions on the construction site, such as chefs, security guards, cleaner, etc., should be given priority to get immunization. Those who does not get immunization are not allowed to work on key positions. Positive guidance should be given on vaccination to encourage new builders to get vaccinated to ensure that all personnel can get vaccinated and stay safe.

3. The control of the entry and exit of personnel on the construction site should be tightened. The construction site is managed by the general contractor, and closed management of the site should be strictly implemented. The construction unit, supervision unit, and subcontractor must obey the management of the general contractor. No outsiders are allowed to stay in the living area of the construction site. Personnel living in a centralized way

at the construction site should follow the principle of “not going out unless necessary” to reduce unnecessary flow of people on the construction site to the largest extent and minimize the risk of epidemic transmission and cross-infection. Health code and itinerary code should be examined for all personnel entering the construction site, and their temperature must be measured and information recorded. Delivery personnel are not allowed to enter the construction site, living and working areas. It is suggested that builders not to send a parcel or order takeaway food unless necessary to reduce the risk of virus spreading. A special storage area should be created to reduce the contact among personnel and the goods should be disinfected.

4. To improve employees' awareness of personal protection. Training and education of epidemic prevention and control for workers at construction sites should be enhanced to improve their awareness and capacity of epidemic prevention and control. Good habits of washing hands, frequent ventilation, wearing masks scientifically should be cultivated. Pre-post epidemic prevention and control measures should be strictly implemented to ensure safety and health of every employee at all positions.

COVID-19 is a test of capacities of construction enterprises. The rule of survival of the fittest can be confirmed during the test. The construction enterprises with innovation ability, adaptation to the changes and good teamwork will outshine in the end. Since the

outbreak of the pandemic, the vast majority of Chinese construction companies have demonstrated their responsibilities and accountabilities. They strictly adjusted the time for the resumption of work and production and paid close attention to the situation of the epidemic. While actively doing a good job in epidemic prevention and control of the enterprise, they are always ready to contribute to the fight against the epidemic.

Appendix: Guidelines for work resumption of municipal housing projects

1. General Principles

1.1 To better prevent and control COVID-19 pandemic and ensure quality and safety of construction work, the Guidelines was formulated in accordance with the Joint Prevention and Control Mechanism of the State Council to provide guidance for construction enterprise to promote the resumption of work and production in a steady and orderly manner. The actual situation has also been taken into account in the Guidelines.

1.2 The Guidelines is applicable to the resumption of work for operation and management of municipal engineering construction site.

1.3 Person in charge of each participating unit (including the field of buildings, construction, supervision, etc.) is the first person responsible for epidemic prevention and control and resumption of work and production. According to the requirements of "the one that employs and manages is responsible", enterprises should strictly implement the measures to ensure

epidemic prevention and control and ensure quality and safety of the project.

1.4 Local departments of Housing and Urban-Rural Development at all levels and relevant units shall, under the unified leadership of the local Party Committee and the government, actively guide and help construction enterprises to return to work and production in different areas and at different times. Precise supervision should be conducted at different regions and levels and differentiated strategies according to the risk level of epidemic prevention and control should be carried out. We should carry out supervision and inspection of epidemic prevention and control, quality and safety, handle emergencies timely and properly, and resolutely prevent the occurrence of clustered infectious events and safety accidents.

2. Conditions for resumption of work and production

2.1 Prevention and control mechanism

The epidemic prevention and control working group has been set up to coordinate and guide the epidemic prevention and control and supervise quality and safety of the project and a report hotline for suspicious symptom has been opened. To ensure the smooth flow of information channels, responsible personnel to contact with the government, streets, communities and designated hospitals has been assigned to regularly submit relevant information according to the local management requirements.

2.2 Special plan

The epidemic prevention and control plan and organization plan for

the resumption of work and production of the project, and the letter of commitment for the implementation of epidemic prevention and control responsibility of the project shall be formulated to arrange on-site management, personnel control, material reserve and emergency disposal. Specific requirements and measures shall be specified, and all personnel of the project shall be required to implement them seriously.

2.3 Health management of personnel

2.3.1 A special person to be responsible for the health management of personnel must be assigned. "One person with one file" system shall be established to effectively grasp the flow of personnel, and carry out health management for all personnel employed according to the requirements of epidemic prevention and control.

2.3.2 Strengthen communication with migrant workers, strictly implement local personnel control requirements where the project was conducted, and eradicate the situation of returning to work and production of those who do not meet the requirements. Strengthen the management of personnel returning from different places, properly arrange the itinerary of personnel back to work, encourage and coordinate or help the personnel in the same area to return by chartered bus from hometown directly to the city of workplace.

2.4 Preparation at Construction site

2.4.1 The construction site adopts closed-off management. The "four areas", including construction area, material processing and storage area, office area and living area, should be strictly quarantined. Isolation area

and standard isolation room should also be set up. If the site does not have the conditions, it should be set in different places in line with the standard.

2.4.2 Under the guidance of professional departments in health and disease control, comprehensive disinfection and sterilization for all places on the construction site should be conducted comprehensively.

2.4.3 The epidemic prevention and control materials such as thermometer, mask and disinfectant should be reasonably equipped according to the scale of the project and the number of migrant workers.

2.4.4 Person responsible for civilized construction and sanitation should be designated to set up epidemic prevention waste (waste masks, etc.), domestic waste and construction waste collection devices according to relevant regulations.

2.5 Quality and safety inspection

2.5.1 In principle, people in charge of the project leaders and key personnel of the construction unit and the supervision unit shall perform their duties.

2.5.2 Education and training focusing on epidemic prevention and control knowledge and project quality and safety management shall be organized for construction management personnel and migrant workers, especially new builders and workers who have transferred their jobs here.

2.5.3 The "Five Musts" should be strictly implemented: the construction unit must hold regular safety meeting and put safety management measures in place, the project department must take safety inspection in place, the project personnel must be educated for safety

measures, and the supervision unit must strictly perform safety supervision duties.

2.5.4 Before the resumption of the project, it is necessary to comprehensively carry out the investigation of potential safety hazards on the construction site, particularly the inspection of whether the scaffold, high formwork and other formwork support system is firm, whether the lifting machinery is maintained before use, and whether the deformation monitoring of deep foundation pit exceeds the alarm value. If the hidden danger of quality and safety has not been eliminated or the rectification does not meet the requirements, it is not allowed to resume work and production.

3. On-site epidemic prevention and control

3.1 Personnel registration

3.1.1 The registration and inspection system by the guard should be strictly implemented. The real name attendance, registration and verification of personnel entering the construction site should be carried out through real name management system of the site. Irrelevant personnel are prohibited to enter the site. All personnel entering the site must wear masks.

3.1.2 Temperature monitoring points shall be set up at the entrance and exit of the construction site to detect and register the temperature of all personnel entering the site, and the temperature measurement shall not be less than twice a day. Those with fever, dry cough and other symptoms should be prevented from entering, timely reported and properly handled.

3.1.3 Establish the real name list of all kinds of personnel in building, construction, supervision and other units, and establish the health card after checking the physical condition of all personnel, and record the information of personnel faithfully, such as name, age, home address, contact number, entry and exit time, health, etc..

3.2 Organization of construction

3.2.1 To revise and improve the construction organization design, special construction scheme and emergency plan, increase the requirements and measures of epidemic prevention and control, and provide the materials, personnel and funds required for epidemic prevention and control in accordance with relevant requirements of epidemic prevention and control.

3.2.2 The construction plan and organization should be optimized and priority of entering the site should be given to the arrangement of machinery. Construction work with intensive employees and limited space should be reasonably arranged to eliminate the aggregation of personnel.

3.2.3 Ensure the normal use of hand washing facilities in construction area, living area and office area, and provide soap or hand sanitizer.

3.3 Publicity and education

3.3.1 To organize and carry out publicity and education on epidemic prevention and control knowledge, use on-site display boards, networks, mobile phone terminals and other means to urge on-site personnel to do a good job in self-protection, to wash hands and ventilate frequently, wear masks, reduce personnel aggregation, and increase self-protection

awareness.

3.3.2 To carry out pre-post education on health and epidemic prevention for the on-site personnel every day. Publicity and education should be conducted in an open and well-ventilated place in batches with an interval of no less than 1 meter.

3.4 Management of operation area

3.4.1 To disinfect the site that has long been in operation in confined spaces such as cab and operating room of the lifting machinery in the construction site, and to record the information and establish an account. Before putting into use, the inspection shall be organized on lifting machinery, and whether the cab and operation room are disinfected should be supervised.

3.4.2 Regular inspection should be strengthened to check whether the working environment meets the requirements of epidemic prevention, and whether the protective and epidemic prevention measures of constructors are in place. If problems are found, they should be rectified in time to eliminate the hidden danger of epidemic prevention as soon as possible.

3.5 Management of office and living place

3.5.1 The office, meeting room and dormitory on the site shall be ventilated at least three times a day with no less than 30 minutes.

3.5.2 Dormitory staff should be arranged in half to reduce the aggregation, and it is strictly forbidden to use a wide bed for a number of people. The tracing management of local migrant workers after work should be strengthened.

3.5.3 The canteen on the construction site shall strictly implement the hygiene and epidemic prevention regulations, and it is forbidden to raise, kill and eat wild animals in the construction area. Food supplies should be bought through regular channels to ensure food safety. It is strictly forbidden to dump garbage, and do a good job in garbage storage and transportation, sewage treatment, dredging and disinfection of ditches and sewers.

3.5.4 Canteen dining should avoid gathering and take meals at different time period and at scattered places, etc.

3.5.5 Dormitories, canteens, washrooms, toilets and other key places should be disinfected regularly, and the cleaning and disinfection management of recycling tableware should be strengthened. The tool should be disinfected once it has been used by one person for one time.

4. Quality and safety management

4.1 Investigation of hidden danger

4.1.1 The safety condition of the project with high risk should be investigated. The formulation, update and implementation of the special construction scheme should be carefully checked. Illegal behavior of not formulating and implementing the special construction scheme should be prohibited.

4.1.2 The safety status of scaffold, high formwork and other formwork support systems should be checked. The foundation, wall connecting parts, diagonal bracing and cross bracing, fastener bolt and other key parts of the structure connection of the scaffold, high formwork and other formwork

support system should be checked to ensure the stability of rod fastening and frame foundation.

4.1.3 The safety status of lifting machinery and equipment should be checked. To carefully check the foundation of lifting machinery, the connection and fixation between machinery and foundation, insurance and limit device and other key parts to ensure that the equipment remains stable, sensitive, reliable and firm.

4.1.4 The safety condition of deep foundation pit engineering should be checked. To carefully check the deep foundation pit engineering (including manual digging pile) to see whether there is deformation, ventilate before operation, removal of residual gas and circulation of air.

4.1.5 The construction safety of urban rail transit project should be checked. The open cut method, hidden cut method, shield and viaduct of urban rail transit project should be carefully checked to ensure safety conditions.

4.1.6 For the identified problems, a list of safety and quality problems (defects) and hidden dangers shall be listed, and reliable rectification scheme shall be formulated according to relevant standards and specifications, and effective measures shall be taken to eliminate hidden dangers in time.

4.2 Risk control

4.2.1 To strictly control the quality and safety of materials and equipment entering the site. It is strictly forbidden to use the equipment with potential safety hazard in construction and unqualified materials in

engineering.

4.2.2 To strengthen the project quality and safety management, resolutely put an end to blindly rush the construction period, and curb the occurrence of quality and safety accidents. If it is necessary to adjust the construction period, it should be proved by experts to ensure the construction safety.

4.2.3 To strengthen the quality and safety acceptance management of projects by different parts and items, and prohibit the unqualified projects from entering the next process after approval of qualified projects. Before the construction of key nodes of urban rail transit project, the condition verification system should be implemented to improve the ability of risk prevention and control.

5. Emergency management

5.1 Emergency preparedness

We should establish an emergency team, provide sufficient emergency materials, receive professional training from local health and disease control departments, and formulate emergency plans for epidemic prevention and control.

5.2 Emergency response

5.2.1 In case of epidemic situation, report should be provided to the relevant departments, the emergency plan should be started, shutdown measures should be taken and the site should be closed as soon as possible.

5.2.2 In accordance with the emergency plan and relevant regulations, we should deal with the epidemic in advance, arrange the epidemic related

personnel to the quarantine observation area to separate with other personnel on the scene, and arrange special personnel to be responsible for the entry guidance of the prevention and control professionals of health and disease control departments, so as to ensure the smooth emergency access.

5.2.3 To actively cooperate with health, disease control and other departments to do a good job in epidemiological investigation and medical observation, and disinfect the site comprehensively.

5.2.4 Comprehensive and accurate information on epidemic prevention and control should be submitted to relevant departments according to the territorial requirements on time.

6. Supervision and management

6.1 To strengthen the supervision and inspection of epidemic prevention and control and project quality and safety during the resumption of work and production, and strictly track and urge the relevant responsible units and personnel to rectify the epidemic prevention and control that has not been in place, and correct construction safety hazards and problems of project quality.

6.2 During the supervision and inspection, if it is found that the conditions for returning to work are not up to the requirements and the performance of duties is not in place, resulting in the spread of the epidemic situation or engineering quality and safety accidents, the work shall be stopped for rectification, and the responsibilities of relevant units and personnel shall be investigated according to law.

7. Supporting measures

7.1 If the construction period is delayed due to the epidemic, the building unit can negotiate with the construction unit to properly extend the contract period according to the actual situation. The increased expenses caused by the suspension of work or delay of construction period shall be addressed by both parties through negotiation in accordance with relevant provisions.

7.2 The cost of epidemic prevention and control triggered by anti-epidemic measures can be included in the project cost. For the cost of labor and building materials caused by the epidemic, both parties should strengthen negotiation and communication, and adjust the contract price according to the price adjustment method agreed in the contract.

7.3 It is strictly forbidden for government and state-owned investment projects to require construction units to contract with funds in various ways. The construction unit shall pay the project funds in full and on time in accordance with the contract, and shall not default.

7.4 The government and state-owned investment projects shall not take the audit conclusions of audit institutions as the basis for project settlement, and the construction units shall not refuse or delay the settlement and payment of project funds on the ground of incomplete final accounts audit.

7.5 To strictly implement the relevant provisions of the deposit in the field of engineering construction, and the deposit shall be returned in time when it is due. If the deposit is not returned according to the provisions or the contract, the deposit receiver shall pay the enterprise liquidated

damages for overdue return. During the period of epidemic prevention and control, the wage deposit of migrant workers may not be collected for the new construction projects. The bid security, project quality security and other security can be guaranteed by bank guarantee or deferred payment according to the actual local situation.

7.6 Local authorities in charge of housing and urban-rural development at all levels and relevant departments should actively study and implement the policy, strengthen understanding, refinement and implementation of the supporting policies for the resumption of work and production. The authorities should publicize, explain and implement the policies to enterprises, support enterprises to enjoy preferential policies such as tax, cost, finance and insurance in accordance with the law, and faithfully implement the policy, which is the most critical part of its formulation. If the supply shortage of materials and equipment affects the resumption of the project, we should actively coordinate with the relevant departments to address the problem, so that the enterprise can enjoy benefits, get incentives and build solid confidence in the resumption of the project.