

FLWSHEET MINING COMPANY (A flowsheet of a mine; n.

Technologisches Schema eines Bergwerk; p. Schema technologique de l'entreprise miniere; and. Esquema tecnologica de empresa minera) - a set of basic and auxiliary production processes, coupled with the necessary for their perform excavations, means of mechanization and automation, which provides for the rational organization of work safe and efficient development of the field. basis of the technological scheme of mining companies - the interconnected issues of opening, [the mine field training](#), systems development and mechanization [of clearing works](#), transport, recovery, ventilation, electricity, [drainage](#). In connection with this flowsheet mining enterprise is implemented as a series circuit of the processes, which includes a number of units - basic, just generating the flow of [natural resources](#), and support to ensure its functioning in a given mode. Processes (and their components) as well as links to a number of technological schemes of mining companies may be the same (method [of breaking](#), [shipping](#), transport, recovery, storage and overflow production, energy and sewage systems, etc.). The implementation of support processes (ventilation, electricity and drainage) largely related to the same generation, in which the basic processes are carried out. The main factors determining the formation of the technological scheme of the mining companies: the shape, size and depth of the mineral formations, the presence of minerals of various kinds and varieties, [the production capacity of the mine \(mine\)](#), the parameters of cutter units, type of equipment used, the sequence of development of individual sections of the field, especially the use of [out space](#). Other factors influence the formation of a basic process scheme. For example, the [strength](#) and [stability of ore](#) - a type of equipment used and the parameters of cutter units (combine harvester, or blasting, the height of batter layer, etc.), reserves - through the production capacity of mining companies and so on ore [mines](#) thin horizontal reservoir determine areal development of mining operations (like in the volume of a single stage) with a horizontal rudopotokami within the entire working area of the field of [recovery](#) and restoration of reserves excavation units. With increasing angle of inclination or capacity in the reservoir begins to grow rudopotokah vertical component, and they take a step form. For steep, as well as powerful and gentle especially heavy-duty multi-stage deposits are rudopotoki. rudopotokov view, the predominant direction of their development - one of the main distinguishing features (characteristics) of the technological scheme of ore mines. Another important feature - a way of breaking minerals, and the third - the way the mechanization of the main production processes of field. In connection with this technological scheme of ore mines can be classified according to: the general direction of rudopotokov - single-stage (horizontal) and multi-stage, breaking methods and mechanization of the main production processes - with a mechanical breaking and technique of continuous operation, the mechanical breaking of the cyclical and technology; from blasting and machinery cyclical action, with blasting, followed by mechanical [crushing](#) and conveyor delivery. In the main, can be identified and additional features: the number of rudopotokov and [horizons](#) for transportation of ore, the presence of stowing operations, the location of drilling sites, deliverable in respect of works to transport the horizon, etc. Single-(horizontal) flow charts mining company (Fig. 1, Fig. 2, Fig. 3) are characteristic of the ore mines, developing reservoir and horizontal tabular deposits and ore deposits are flat with a small depth distribution. main distinguishing feature of these schemes - long (for the duration of mining the reserves or part of) the life of the main transport and ventilation of horizontal workings and development [of the front of mining](#)

operations and the vast movement of the rock mass and loads on the horizontal . Primarily, these include the development of the scheme most deposits of potash and manganese ores , characterized large areas of distribution, relative abundance mature elements, significant mineral resources within the same horizon. Multi-circuit (Fig. 4, Fig. 5, Fig. 6, Figure . 7, Fig. 8) characteristic of the ore mines, developing steeply dipping, oblique and sloping with great depth distribution of the ore body . main distinguishing feature of the technological schemes of mining companies - the constant lowering of the level of mining operations, the relatively small reserves of minerals within a single horizon. Cleaning seizure is usually carried out simultaneously by 2-3 layers or more. As with single-and multi-technological schemes for mining enterprise can be applied technique of continuous and cyclical action. Technological scheme of mining companies with the equipment of continuous operation is most common in the development of horizontal ore deposits of a small fortress, in particular potassium and manganese. Opening the mine fields produced by vertical and inclined shafts or adits, and their combination. Preparations for the treatment plant is carrying out excavation of the main drifts panel haulage and ventilation drifts, dividing the mine field into separate panels . Extraction of ore in the panels produced cameras, lava , or stope . Its continuity is achieved by using excavation combine in a complex with telescopic (or self-propelled), belt conveyors , and lavas - sewage systems , including the shearer, face conveyor and powered roof supports , in conjunction with conveyor transport to the rest of the workings (including an inclined shaft). Possible combination of technology and continuous cyclic action: the potash mines in the excavation chamber of combine delivery of ore to wagons , and drilling and blasting for excavation on the loading and shipping the ore used for loading and delivering cars, loading machines with self-propelled cars , scraper installed in conjunction with the scraper conveyor . For the extraction of ore from drilling and blasting hard breaking in most cases, apply the technological scheme of mining companies using the technique of cyclic actions. At the loading and delivery of used excavators , vibrating feeders, loaders , loading and delivering cars to run pneumatic, dump, scraper installation, transportation of ore - locomotive or car. The latter is effective in developing the depth of no more than 300 m, where the ore is transported directly, without overloading the surface. Application of self-propelled equipment in the technological scheme of mining enterprise requires first and foremost address the issue of delivery to the working face. The most feasible option - the construction of a special trunk cargo, which is simultaneously used for the descent-ascent of large equipment, and as the primary production or inclined vozduhopodayushey Congress, which provides communication between aquifers and surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division rudopritokov on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the tab-out space and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or pipeline , laid in one of the barrels, with the subsequent delivery of dry bookmarks (waste) pipelines or

transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating "bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.) Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the opening of training, the parameters of flow and cyclic- [flow technology](#) using self-propelled equipment, vibroustanovok and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point [of production of ore](#) from the ratio of time spent in loading the transport unit at the time of its movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise rudopotokov determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#) . One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#) , beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#) , conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#) , [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining

companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#) , as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#) , presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the preparations](#) are fixed anchors. Office of [rock pressure](#) is through regular leaving pillars of coal. Obscheshahntny transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation, coal transport, delivery of materials and equipment, movement of people (Fig. 10) . Technological scheme of mining companies with short lava characterized by a high level of [productivity](#) and low recovery of coal from the [bowels](#) . Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of [dip](#) used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnuyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased [safety](#) for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel [oil shale](#) or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of [gassy mines](#) and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to [crosscut](#) , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of 10 ° - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock

pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous [strain](#) the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the [floor](#) (with a steep dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom [slaughter](#) (thin layers), combines in a straight bottom-magazine- [ledge](#) or less without it. It is used as a development system for the drop bars with a notch coal [units](#) with hydroficated bolting. Within the working face batted [coal](#) is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and [hydroficated powered roof supports](#) , as well as protecting the grid system for the development of [sublevel caving](#) , and without separation into layers using a [shield lining](#) . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. In shallow reservoirs during flowsheets mnogogorizontnyh mining companies use a panel or pogorizontnuyu training and development system mostly long poles along strike and dip. The solid system and combined have a limited distribution. important parameter of the technological scheme of mining companies - mining the order of layers in the suite, excavation of fields and areas within the reservoir. Decisive role in his choice of plays geomechanical factor. In the majority of technological schemes of coal mines provide a top-down sequence of the interdependent layers in the suite, except in cases of advanced within the floor working out [the protective layers](#) , including lying stratigraphically above the [outburst](#) or in the middle of both developed reservoirs. In shallow layers panel bremsbergovoy part of the field are developing in a direction away from the trunk to the boundaries of the mine field, the emphasis - from the borders of the trunk. Within the panel [tiers](#) work out in descending order, sequentially or through one layer, followed by intermediate groove. On a heavily watered strata practiced preliminary working out of the lower tier of the panel for partial [dewatering](#) of overlying. In thin sections of steep seams in the floor of the excavation work out in the direction away from the trunk (the main crosscut) to the borders of the mine field. In the middle layers of power and power is preferable reverse sequence of the excavation sites, which in the case of [spontaneous combustion](#) of coal or dangerous heating can provide a more reliable isolation of developed space on the network of existing mine workings. special place in the practical development [of coal deposits](#) occupy the technological scheme of the hydraulic mining of coal. In a similar in a constructive relationship with the usual technological schemes of mining companies circuit [hydraulic mine](#) workings differ in their position with respect to transport items of bedding layer, providing a mixture of gravity displacement "coal - water" within the field of excavation or the entire mine. There are varieties of



technological schemes of mining hydraulic mines: short-pollution control slaughter and the destruction of coal breaking hydraulic, mechanical, hydraulic and vzryvogidravlicheskimi ways and with long working face where coal is breaking mechanical-hydraulic means. in treatment and training faces using special types of harvesters K56MG and "Ural-38". Obschshahtny vehicles - Hydraulic pressure and gravity, and the conveyor (dewatered coal). To lift [the slurry](#) on the trunk using [coal pumps](#) and air lift. In ore [mines](#) horizontal thin deposits determine areal development of mining operations (like in the volume of a single stage) with a horizontal rudopotokami within the entire working area of the field of [recovery](#) and restoration of reserves excavation units. With increasing angle of inclination or capacity in the reservoir begins to grow rudopotokah vertical component, and they take a step form. For steep, as well as powerful and gentle especially heavy-duty multi-stage deposits are rudopotoki. rudopotokov view, the predominant direction of their development - one of the main distinguishing features (characteristics) of the technological scheme of ore mines. Another important feature - a way of breaking minerals, and the third - the way the mechanization of the main production processes of field. In connection with this technological scheme of ore mines can be classified according to: the general direction of rudopotokov - single-stage (horizontal) and multi-stage, breaking methods and mechanization of the main production processes - with a mechanical breaking and technique of continuous operation, the mechanical breaking of the cyclical and technology; from blasting and machinery cyclical action, with blasting, followed by mechanical [crushing](#) and conveyor delivery. In the main, can be identified and additional features: the number of rudopotokov and [horizons](#) for transportation of ore, the presence of stowing operations, the location of drilling sites, deliverable in respect of works to transport the horizon, etc. Single-(horizontal) flow charts mining company (Fig. 1, Fig. 2, Fig. 3) are characteristic of the ore mines, developing reservoir and horizontal tabular deposits and ore deposits are flat with a small depth distribution . main distinguishing feature of these schemes - long (for the duration of mining the reserves or part of) the life of the main transport and ventilation of horizontal workings and development [of the front of mining operations](#) and the vast movement of [the rock mass](#) and loads on the [horizontal](#) . Primarily, these include the development of the scheme most deposits of potash and [manganese ores](#) , characterized large areas of distribution, relative abundance mature elements, significant [mineral resources](#) within the same horizon. Multi-circuit (Fig. 4, Fig. 5, Fig. 6, Figure . 7, Fig. 8) characteristic of the ore mines, developing steeply dipping, oblique and sloping with great depth distribution of [the ore body](#) . main distinguishing feature of the technological schemes of mining companies - the constant lowering of the level of mining operations, the relatively small reserves of minerals within a single horizon. [Cleaning seizure](#) is usually carried out simultaneously by 2-3 layers or more. As with single-and multi-technological schemes for mining enterprise can be applied technique of continuous and cyclical action. Technological scheme of mining companies with the equipment of continuous operation is most common in the development of horizontal ore deposits of a small fortress, in particular potassium and manganese. Opening the [mine fields](#) produced by vertical and inclined shafts or adits, and their combination. Preparations for the treatment plant is carrying out excavation of the main [drifts](#) panel haulage and ventilation drifts, dividing the mine field into separate [panels](#) . Extraction of ore in the panels produced cameras, [lava](#) , or [stope](#) . Its continuity is achieved by using excavation combine in a complex with telescopic (or self-propelled), [belt conveyors](#) , and lavas - [sewage systems](#) , including the shearer, [face conveyor](#) and [powered roof supports](#) , in conjunction with [conveyor transport](#) to the rest of the workings (including an inclined shaft). Possible combination of technology and continuous cyclic action: the potash mines in the excavation chamber of combine delivery of ore to [wagons](#) , and drilling and blasting for excavation on the loading and shipping the ore used for loading and delivering cars, [loading machines](#) with self-propelled [cars](#) , scraper installed in conjunction with the [scraper conveyor](#) . For the extraction of ore from drilling and blasting hard breaking in most cases, apply the technological scheme of mining companies using the technique of cyclic actions. At the loading and delivery of used [excavators](#) , vibrating

feeders, [loaders](#) , loading and delivering cars to run pneumatic, dump, scraper installation, transportation of ore - locomotive or car. The latter is effective in developing the depth of no more than 300 m, where the ore is transported directly, without overloading the surface. Application of [self-propelled equipment](#) in the technological scheme of mining enterprise requires first and foremost address the issue of delivery to the working face. The most feasible option - the construction of a special trunk cargo, which is simultaneously used for the descent-ascent of large equipment, and as the primary production or inclined *vozduhopodayushey* Congress, which provides communication between aquifers and surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division *rudopritokov* on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the [tab-out space](#) and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or [pipeline](#) , laid in one of the barrels, with the subsequent delivery of dry bookmarks (waste) pipelines or transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating "bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.) Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the opening of training, the parameters of flow and cyclic- [flow technology](#) using self-propelled equipment, *vibroustanovok* and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point [of production of ore](#) from the ratio of time spent in loading the transport unit at the time of its movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise *rudopotokov* determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality

at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#). One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#), beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#), conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#), [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#), as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#), presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the preparations](#) are fixed anchors. Office of [rock pressure](#) is through regular leaving pillars of coal. Obscheshahntny transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation, coal transport, delivery of materials and equipment, movement of people (Fig. 10). Technological scheme of mining companies with short lava characterized by a high level of [productivity](#) and low recovery of coal from the [bowels](#). Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of [dip](#) used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnuyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and



up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased [safety](#) for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel [oil shale](#) or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of [gassy mines](#) and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to [crosscut](#) , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of 10 ° - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous [strain](#) the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the [floor](#) (with a steep dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom [slaughter](#) (thin layers), combines in a straight bottom-magazine- [ledge](#) or less without it. It is used as a development system for the drop bars with a notch coal [units](#) with hydroficated bolting. Within the working face batted [coal](#) is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and [hydroficated powered roof supports](#) , as well as protecting the grid system for the development of [sublevel](#)

**caving** , and without separation into layers using a **shield lining** . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. In shallow reservoirs during flowsheets mnogogorizontnyh mining companies use a panel or pogorizontnuyu training and development system mostly long poles along strike and dip. The solid system and combined have a limited distribution. important parameter of the technological scheme of mining companies - mining the order of layers in the suite, excavation of fields and areas within the reservoir. Decisive role in his choice of plays geomechanical factor. In the majority of technological schemes of coal mines provide a top-down sequence of the interdependent layers in the suite, except in cases of advanced within the floor working out **the protective layers** , including lying stratigraphically above the **outburst** or in the middle of both developed reservoirs. In shallow layers panel bremsbergovoy part of the field are developing in a direction away from the trunk to the boundaries of the mine field, the emphasis - from the borders of the trunk. Within the panel **tiers** work out in descending order, sequentially or through one layer, followed by intermediate groove. On a heavily watered strata practiced preliminary working out of the lower tier of the panel for partial **dewatering** of overlying. In thin sections of steep seams in the floor of the excavation work out in the direction away from the trunk (the main crosscut) to the borders of the mine field. In the middle layers of power and power is preferable reverse sequence of the excavation sites, which in the case of **spontaneous combustion** of coal or dangerous heating can provide a more reliable isolation of developed space on the network of existing mine workings. special place in the practical development **of coal deposits** occupy the technological scheme of the hydraulic mining of coal. In a similar in a constructive relationship with the usual technological schemes of mining companies circuit **hydraulic mine** workings differ in their position with respect to transport items of bedding layer, providing a mixture of gravity displacement "coal - water" within the field of excavation or the entire mine. There are varieties of technological schemes of mining hydraulic mines: short-pollution control slaughter and the destruction of coal breaking hydraulic, mechanical, hydraulic and vzryvogidravlichesкими ways and with long working face where coal is breaking mechanical-hydraulic means. in treatment and training faces using special types of harvesters K56MG and "Ural-38". Obscheshahtny vehicles - Hydraulic pressure and gravity, and the conveyor (dewatered coal). To lift **the slurry** on the trunk using **coal pumps** and air lift. In ore **mines** horizontal thin deposits determine areal development of mining operations (like in the volume of a single stage) with a horizontal rudopotokami within the entire working area of the field of **recovery** and restoration of reserves excavation units. With increasing angle of inclination or capacity in the reservoir begins to grow rudopotokah vertical component, and they take a step form. For steep, as well as powerful and gentle especially heavy-duty multi-stage deposits are rudopotoki. rudopotokov view, the predominant direction of their development - one of the main distinguishing features (characteristics) of the technological scheme of ore mines. Another important feature - a way of breaking minerals, and the third - the way the mechanization of the main production processes of field. In connection with this technological scheme of ore mines can be classified according to: the general direction of rudopotokov - single-stage (horizontal) and multi-stage, breaking methods and mechanization of the main production processes - with a mechanical breaking and technique of continuous operation, the mechanical breaking of the cyclical and technology; from blasting and machinery cyclical action, with blasting, followed by mechanical **crushing** and conveyor delivery. In the main, can be identified and additional features: the number of rudopotokov and **horizons** for transportation of ore, the presence of stowing operations, the location of drilling sites, deliverable in respect of works to transport the horizon, etc. Single-(horizontal) flow charts mining company (Fig. 1, Fig. 2, Fig. 3) are characteristic of the ore mines, developing reservoir and horizontal tabular deposits and ore deposits are flat with a small depth distribution . main distinguishing feature of these schemes - long (for the duration of mining the reserves or part of) the life of the main transport and ventilation of horizontal workings

and development of the front of mining operations and the vast movement of the rock mass and loads on the horizontal . Primarily, these include the development of the scheme most deposits of potash and manganese ores , characterized large areas of distribution, relative abundance mature elements, significant mineral resources within the same horizon. Multi-circuit (Fig. 4, Fig. 5, Fig. 6, Figure . 7, Fig. 8) characteristic of the ore mines, developing steeply dipping, oblique and sloping with great depth distribution of the ore body . main distinguishing feature of the technological schemes of mining companies - the constant lowering of the level of mining operations, the relatively small reserves of minerals within a single horizon. Cleaning seizure is usually carried out simultaneously by 2-3 layers or more. As with single-and multi-technological schemes for mining enterprise can be applied technique of continuous and cyclical action. Technological scheme of mining companies with the equipment of continuous operation is most common in the development of horizontal ore deposits of a small fortress, in particular potassium and manganese. Opening the mine fields produced by vertical and inclined shafts or adits, and their combination. Preparations for the treatment plant is carrying out excavation of the main drifts panel haulage and ventilation drifts, dividing the mine field into separate panels . Extraction of ore in the panels produced cameras, lava , or stope . Its continuity is achieved by using excavation combine in a complex with telescopic (or self-propelled), belt conveyors , and lavas -sewage systems , including the shearer, face conveyor and powered roof supports , in conjunction with conveyor transport to the rest of the workings (including an inclined shaft). Possible combination of technology and continuous cyclic action: the potash mines in the excavation chamber of combine delivery of ore to wagons , and drilling and blasting for excavation on the loading and shipping the ore used for loading and delivering cars, loading machines with self-propelled cars , scraper installed in conjunction with the scraper conveyor . For the extraction of ore from drilling and blasting hard breaking in most cases, apply the technological scheme of mining companies using the technique of cyclic actions. At the loading and delivery of used excavators , vibrating feeders, loaders , loading and delivering cars to run pneumatic, dump, scraper installation, transportation of ore - locomotive or car. The latter is effective in developing the depth of no more than 300 m, where the ore is transported directly, without overloading the surface. Application of self-propelled equipment in the technological scheme of mining enterprise requires first and foremost address the issue of delivery to the working face. The most feasible option - the construction of a special trunk cargo, which is simultaneously used for the descent-ascent of large equipment, and as the primary production or inclined vozduhopodayushey Congress, which provides communication between aquifers and surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division rudopritokov on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the tab-out space and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or pipeline , laid in one of the barrels, with the subsequent delivery of dry bookmarks

(waste) pipelines or transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating "bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.) Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the opening of training, the parameters of flow and cyclic- [flow technology](#) using self-propelled equipment, vibroustanovok and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point of [production of ore](#) from the ratio of time spent in loading the transport unit at the time of its movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise rudopotokov determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#). One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#), beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#), conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#), [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining

companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#) , as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#) , presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the preparations](#) are fixed anchors. Office of [rock pressure](#) is through regular leaving pillars of coal. Obscheshahntny transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation, coal transport, delivery of materials and equipment, movement of people (Fig. 10) . Technological scheme of mining companies with short lava characterized by a high level of [productivity](#) and low recovery of coal from the [bowels](#) . Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of [dip](#) used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnuyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased [safety](#) for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel [oil shale](#) or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of [gassy mines](#) and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to [crosscut](#) , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of 10 ° - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock



pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous [strain](#) the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the [floor](#) (with a steep dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom [slaughter](#) (thin layers), combines in a straight bottom-magazine- [ledge](#) or less without it. It is used as a development system for the drop bars with a notch coal [units](#) with hydroficated bolting. Within the working face batted [coal](#) is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and [hydroficated powered roof supports](#) , as well as protecting the grid system for the development of [sublevel caving](#) , and without separation into layers using a [shield lining](#) . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. In shallow reservoirs during flowsheets mnogogorizontnyh mining companies use a panel or pogorizontnuyu training and development system mostly long poles along strike and dip. The solid system and combined have a limited distribution. important parameter of the technological scheme of mining companies - mining the order of layers in the suite, excavation of fields and areas within the reservoir. Decisive role in his choice of plays geomechanical factor. In the majority of technological schemes of coal mines provide a top-down sequence of the interdependent layers in the suite, except in cases of advanced within the floor working out [the protective layers](#) , including lying stratigraphically above the [outburst](#) or in the middle of both developed reservoirs. In shallow layers panel bremsbergovoy part of the field are developing in a direction away from the trunk to the boundaries of the mine field, the emphasis - from the borders of the trunk. Within the panel [tiers](#) work out in descending order, sequentially or through one layer, followed by intermediate groove. On a heavily watered strata practiced preliminary working out of the lower tier of the panel for partial [dewatering](#) of overlying. In thin sections of steep seams in the floor of the excavation work out in the direction away from the trunk (the main crosscut) to the borders of the mine field. In the middle layers of power and power is preferable reverse sequence of the excavation sites, which in the case of [spontaneous combustion](#) of coal or dangerous heating can provide a more reliable isolation of developed space on the network of existing mine workings. special place in the practical development [of coal deposits](#) occupy the technological scheme of the hydraulic mining of coal. In a similar in a constructive relationship with the usual technological schemes of mining companies circuit [hydraulic mine](#) workings differ in their position with respect to transport items of bedding layer, providing a mixture of gravity displacement "coal - water" within the field of excavation or the entire mine. There are varieties of

technological schemes of mining hydraulic mines: short-pollution control slaughter and the destruction of coal breaking hydraulic, mechanical, hydraulic and vzryvogidravlichesкими ways and with long working face where coal is breaking mechanical-hydraulic means. in treatment and training faces using special types of harvesters K56MG and "Ural-38". Obschshahtny vehicles - Hydraulic pressure and gravity, and the conveyor (dewatered coal). To lift [the slurry](#) on the trunk using [coal pumps](#) and air lift. [loading machine](#) with a self-propelled [cars](#) , scraper installed in conjunction with the [scraper conveyor](#) . For the extraction of ore from drilling and blasting hard breaking in most cases, apply the technological scheme of mining companies using the technique of cyclic action. At the loading and delivery of used [excavators](#) , vibrating feeders, [loaders](#) , loading and delivering cars to run pneumatic, dump, scraper installation, transportation of ore - locomotive or car. The latter is effective in developing the depth of no more than 300 m, where the ore is transported directly, without overloading the surface. Application of [self-propelled equipment](#) in the technological scheme of mining enterprise requires first and foremost address the issue of delivery to the working face. The most feasible option - the construction of a special trunk cargo, which is simultaneously used for the descent-ascent of large equipment, and as the primary production or inclined vozduhopodayushey Congress, which provides communication between aquifers and surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division rudopritokov on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the [tab-out space](#) and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or [pipeline](#) , laid in one of the barrels, with the subsequent delivery of dry bookmarks (waste) pipelines or transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating "bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.) Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the opening of training, the parameters of flow and cyclic- [flow technology](#) using self-propelled equipment, vibroustanovok and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point [of production of ore](#) from the ratio of time spent in loading the transport unit at the time of its

movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise rudopotokov determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#). One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#), beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#), conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#), [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#), as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#), presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the preparations](#) are fixed anchors. Office of [rock pressure](#) is through regular leaving pillars of coal. Obscheshahtny transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation, coal transport, delivery of materials and equipment, movement of people (Fig. 10). Technological scheme of mining companies with short lava characterized by a high level of [productivity](#) and low recovery of coal from the [bowels](#). Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up

technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of dip used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnuyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased safety for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel oil shale or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of gassy mines and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to crosscut , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of 10 ° - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous strain the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the floor (with a steep dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing

on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom [slaughter](#) (thin layers), combines in a straight bottom-magazine- [ledge](#) or less without it. It is used as a development system for the drop bars with a notch coal [units](#) with hydroficated bolting. Within the working face batted [coal](#) is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and [hydroficated powered roof supports](#) , as well as protecting the grid system for the development of [sublevel caving](#) , and without separation into layers using a [shield lining](#) . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. [loading machine](#) with a self-propelled [cars](#) , scraper installed in conjunction with the [scraper conveyor](#) . For the extraction of ore from drilling and blasting hard breaking in most cases, apply the technological scheme of mining companies using the technique of cyclic action. At the loading and delivery of used [excavators](#) , vibrating feeders, [loaders](#) , loading and delivering cars to run pneumatic, dump, scraper installation, transportation of ore - locomotive or car. The latter is effective in developing the depth of no more than 300 m, where the ore is transported directly, without overloading the surface. Application of [self-propelled equipment](#) in the technological scheme of mining enterprise requires first and foremost address the issue of delivery to the working face. The most feasible option - the construction of a special trunk cargo, which is simultaneously used for the descent-ascent of large equipment, and as the primary production or inclined vozduhopodayushey Congress, which provides communication between aquifers and surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division rudopritokov on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the [tab-out space](#) and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or [pipeline](#) , laid in one of the barrels, with the subsequent delivery of dry bookmarks (waste) pipelines or transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating



"bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.) Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the opening of training, the parameters of flow and cyclic- [flow technology](#) using self-propelled equipment, vibroustanovok and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point [of production of ore](#) from the ratio of time spent in loading the transport unit at the time of its movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise rudopotokov determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#). One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#), beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#), conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#), [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#), as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#), presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the](#)

preparations are fixed anchors. Office of rock pressure is through regular leaving pillars of coal. Obscheshahntny transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation, coal transport, delivery of materials and equipment, movement of people (Fig. 10) . Technological scheme of mining companies with short lava characterized by a high level of productivity and low recovery of coal from the bowels . Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of dip used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnuyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased safety for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel oil shale or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of gassy mines and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to crosscut , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of  $10^\circ$  - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous strain the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the floor (with a steep

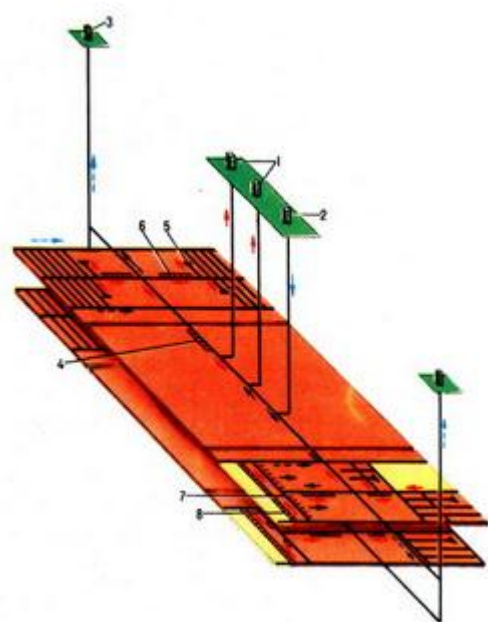
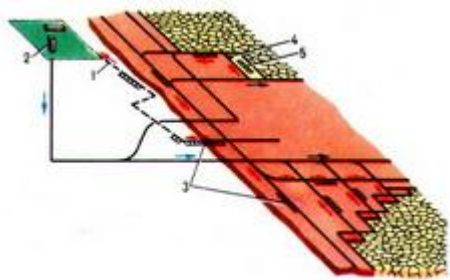
dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom [slaughter](#) (thin layers), combines in a straight bottom-magazine- [ledge](#) or less without it. It is used as a development system for the drop bars with a notch coal [units](#) with hydroficated bolting. Within the working face batted [coal](#) is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and [hydroficated powered roof supports](#) , as well as protecting the grid system for the development of [sublevel caving](#) , and without separation into layers using a [shield lining](#) . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. which provides a connection between the aquifers and the surface, including vehicles to travel under its own power to the surface for periodic maintenance. Italic Congress can also be used to transport people, materials and equipment. As with single-and multi-stage process wastewater treatment schemes, mining companies can be cut, or focus on one horizon, or is dispersed vertically. Cargo-haul generation, designed to move the minerals within the excavation area may be on a par with or above the horizon transport it. In the first case, the ore coming from the working faces, directly loaded directly onto the conveyor, or in cars, in the second - through a system of ore passes. The presence of accumulating ore passes reduces downtime due to outages, respectively, control equipment or vehicles. For this purpose, high-performance circuits with direct loading of the development of stratified deposits create the intermediate district underground warehouses, from which the ore is loaded on the main transport. In multi-technological schemes are possible options for the mining companies with combined brown-loading and transport, with a combined cargo transport and intermediate haul drilling and horizons. If necessary, the division rudopritokov on grades and types of ores provided some ore passes in the vicinity of ore bodies, separate transport and lifting . in the technological scheme of mining companies with the [tab-out space](#) and utilization of waste products can be applied to mechanical ("machine") or hydraulic mode of transport and waste favorites. Feed bookmarks or dry waste from the surface is carried out or directly into the goaf wells and to rise up, or [pipeline](#) , laid in one of the barrels, with the subsequent delivery of dry bookmarks (waste) pipelines or transport locomotive. The lining of the working and backup lines to feed into the shaft or hydraulic hardening is carried out as favorites by wells or one of the trunks. In exceptional cases, held a special stowing the barrel, which also is used for ventilation. Flow chart of mining company implemented and evaluated on the basis of conditions to ensure the installed production capacity of enterprise-based solutions which are used for main and auxiliary production processes. Its rationale as a whole is based on the software: the uniform delivery of products, the division of the entire production process into individual business processes performed by specialized units, combined in some way over time, redundancy, of the whole process scheme in accordance with the ramp as a single production units, the effective functioning of the entire process flowsheet by eliminating "bottlenecks" (even at the expense of activities that are not cost-effective for each link separately.)Construction and calculation of the technological scheme of mining companies based on the results of diverse research questions breaking, production and [secondary crushing](#) ore structures bottoms of blocks, circuits, and the

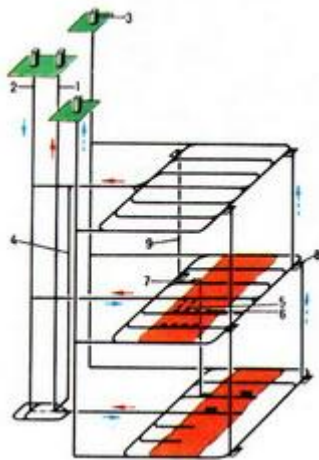
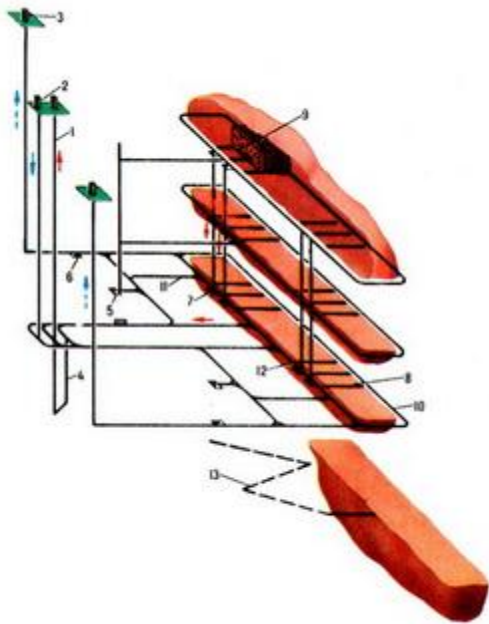
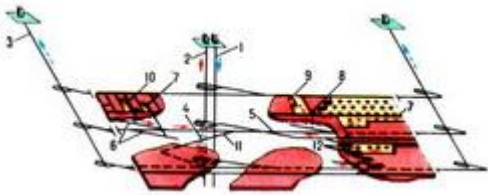
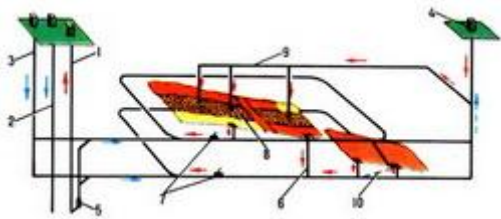
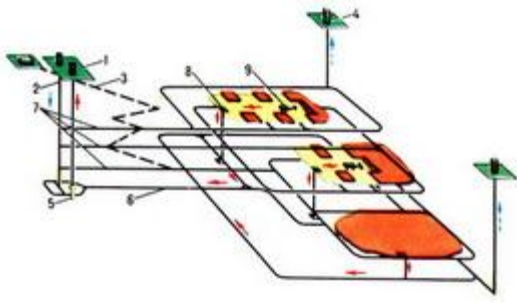
opening of training, the parameters of flow and cyclic-[flow technology](#) using self-propelled equipment, vibrostanovok and conveyor systems. The basis of calculation of flow diagrams ore mines are based employment point [of production of ore](#) from the ratio of time spent in loading the transport unit at the time of its movement and unloading of the relation of the form, features, and the number of vehicles to the number of points of release and [lumpiness](#) of the ore mass, the ratio of transport delays to the number of longwall faces and the accumulating tank mines. For the formation and evaluation of the technological scheme of the system as a mining enterprise rudopotokov determine the power of technological units - the number and performance of wastewater treatment and development faces, the number and capacity of transport units, sizes of equipment underground crushing and bunker complex, productivity growth. The power level of each process is understood as the highest possible performance for its lack of interference from other units, and the power of the existing ore mines in this technological scheme of mining companies - the maximum [extraction of minerals](#) specified quality at a time when the fullest use of resources and capabilities of the organization production. Prospects for technological scheme of the mining company primarily associated with the schemes with vertical ore-and auxiliary shafts located in the center on a common platform and vent - on the flanks of the mine field. With the development of deposits occurring at depths of 500-600 m, the most appropriate scheme with a vertical ore-barrel, in combination with an inclined Congress for the self-propelled equipment, and at great depths - in conjunction with a cargo of vertical shafts, equipped with cable-crane for launching a self-propelled and bulk stationary equipment without disassembly. May be an effective scheme with conveyor transport of ore on inclined trunk directly to the [processing plant](#). One of the possible directions - the development of the technological scheme of mining companies with the issuance of the rock mass on the surface of the inclined stem [trolleyvozami](#) capacity of 40-50 tons, as well as schemes with prior enrichment of ore underground. Receives widespread technological scheme of mining enterprises with hardening and hydraulic laying out space, including [waste mining](#), beneficiation and metallurgical processing. Reducing the cost of the bookmark expands the effective application of these schemes on refinement of the ordinary cost and low-grade ores. In the vertical technological schemes has tended to move to flat bottom and end production. When combined (open-underground) working out of uniform fields is possible to use flow diagrams mining enterprise. For breaking career drills used for loading - [hydraulic excavators](#), conveyor lift to the common stem, filling the voids overburden. at coal mines flowsheet mining enterprise is characterized by a high level of [comprehensive mechanization of](#) cleaning and preparatory work, extensive use of conveyor transport of coal and productive means of a wheel transport, an efficient ventilation openings, the use of mechanization and automation of auxiliary processes and to ensure safe and comfortable working conditions. Delivery people, materials and equipment to jobs is wheeled or monorail transportation. In the coal mines [of the USSR](#), [China](#) and the countries [of Europe](#) have become widespread technological schemes of mining companies with a long stope, equipped combines flanking actions or plows, mechanized or rack bolting, scraper conveyors. [Office of rock pressure](#), as a rule, complete [collapse](#) of the roof rocks. Tab-out space is used for the development of powerful steep [seams](#), presented spontaneously flammable coals, and to protect the objects on the earth's surface. Preparation of working faces made with single or paired excavations, redeemable after the stope, or re-used when developing the next lava. Horizontal main production is carried out as single or paired, often field, inclined - at 2-3 in the [box cutter](#) (Fig. 9). In the mines, the U.S., [Canada](#) and [Australia](#) are widely used technological scheme of mining companies with short working face. When sewage excavation of coal and mines used during the self-propelled equipment, telescoping conveyors, cleaning and [making the preparations](#) are fixed anchors. Office of [rock pressure](#) is through regular leaving pillars of coal. Obscheshahnty transport conveyor or wheel. In preparation for the operation of extraction field delineate the workings groups (4-6 per group) carried out, usually without podryvki rocks apart and used for technological purposes: ventilation,

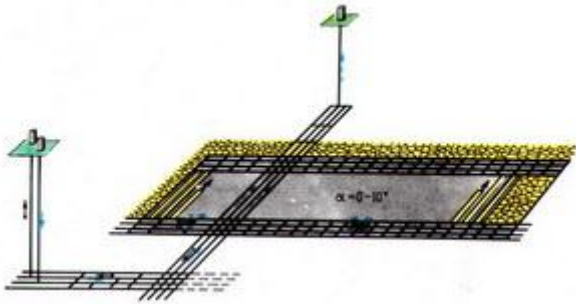
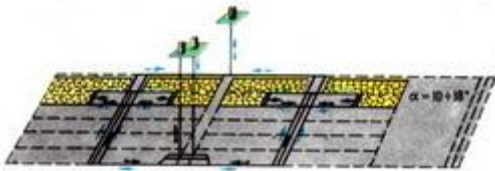
coal transport, delivery of materials and equipment, movement of people (Fig. 10) . Technological scheme of mining companies with short lava characterized by a high level of [productivity](#) and low recovery of coal from the [bowels](#) . Field of the most effective use of these schemes - flat and horizontal layers of average power. In addition to clean-up technology to the most characteristic features of technological schemes of coal mines in determining the constructive embodiment of the scheme and the general direction of forming uglepotoka include opening and preparing the scheme. These features stand out technological schemes of mining companies to mine field division into blocks, and without division, odnogorizontnye (single stage) and mnogogorizontnye (multi-) in conjunction with the condominium, and the panel pogorizontnoy training. With variable angles of [dip](#) used a combination preparation, such as in bremsbergovoy storey part of the field, and a panel pogorizontnyu or - in the slope. Flow chart of mining company with a mine field division into blocks is used in large scale mine field along strike (up to 10-16 km). Size of blocks along strike from 2.5-3 km in the recess formations along strike and up to 4-4.5 km in the recess of the fall or rebellion. The optimal number of blocks in a single horizon of 6.4 and 3-4 in the division of a mine field at the two horizons. Each block is opened by two shafts, preferably center-twin. On the horizon haul units combine common transport route (usually the field drifts) with the main trunk, passed in the center of the mine field (Fig. 11). flowsheet mining enterprise is characterized by an independent and, as a rule, at the same time working off blocks, and their separate and combined ventilation transport system. The use of flow diagrams divided into blocks allows for intensive development of resources, good technical and economic performance, increased [safety](#) for large scale production. Odnogorizontnye scheme typical for mines, developing single horizontal and sloping beds of coal and fuel [oil shale](#) or a suite of 2-4 layers when the size of mine fields in the fall of up to 3 km. The main transport and ventilation are making a long service life (for the duration of mining stocks, or a mine field for a period of working out major parts of it - bremsbergovoy, bias, or the wing of the field). Uglepotoki from all areas of mine field concentrated in a single vehicle and head for the horizon of the main trunk for the issue to the surface (Fig. 12). Mine Field opened by vertical shafts, and at shallow dip - inclined. Load the barrel is placed, usually in the center of the mine field, air guns have a central location, centrally or otherwise provided flank. The last two arrangements of ventilation shafts are characteristic of [gassy mines](#) and mining cases, extended along the strike of the mine fields. In the development of a mine reservoir will address the major development of immediately adjacent to the main workings of the transport and ventilation horizon (Fig. 9). When working out at the same time 4.2 strata revealing the basic production can adjoin to [crosscut](#) , revealing layers of transport and ventilation levels (Fig. 12). When odnogorizontnyh flowsheets mining company most widely used panel circuit training and development system with long poles along strike and at the seams with dip angles of  $10^\circ$  - pogorizontnaya circuit training and a system of long poles to fall off the coal to drop a notch or rebellion. In the stope extraction of coal produced by combines and plows, shipping coal - scraper conveyors. Powered roof supports are widely used. Office of rock pressure in most cases carried out by the complete collapse of the roof rocks. Tab-out space is used only to prevent dangerous [strain](#) the earth's surface. Mnogogorizontnye flow diagrams are characteristic of the mines, developing suites of steep and inclined seams (Fig. 13), and flat beds with size of mine fields along the dip of more than 2.5-3 km and considerable power in the event mezhduplastya dip close to the horizontal. Mnogogorizontnye technological schemes of mining companies are also used in the development of shallow single beds or suites, divided within the mine field major tectonic disturbances with amplitudes of tens of meters into blocks with significant reserves of coal. When mnogogorizontnyh flowsheets developed mining company formations reveal vertical shafts and capital crosscut who share mine field on the [floor](#) (with a steep dip) or step (with a gentle dip and oblique). The vertical stems are from the surface, usually before the first working horizon, and then as the exhaustion of reserves in the ground floor or level to deepen until the next business horizon. With a gentle and inclined dip often, instead of operating uglubki trunks pass from the surface

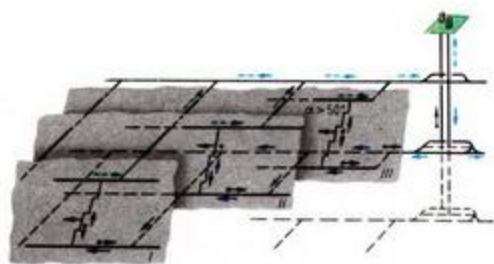


of new stems, attributed the fall down the seams. On the steep fall storey scheme is used to prepare the suite developed by the division of layers into groups and conduct group transport and ventilation drifts, usually on the footwall rocks of the lower reservoir in the group. Layers in the group reveal intermediate crosscut, decomposing on the floor working areas that can not support the development of reservoir for the entire length of the floor. We are both 2-3 floors, one of which is being prepared for operation. Thin and medium-sized steep seams develop the system, "the lava-floor" or long poles to strike a hollow carbon jackhammers in potolkoustupnom slaughter (thin layers), combines in a straight bottom-magazine- ledge or less without it. It is used as a development system for the drop bars with a notch coal units with hydroficated bolting. Within the working face batted coal is transported by gravity to a horizontal workings - wheeled transport. Powerful steep layers develop as the division into layers (horizontal, oblique and cross-slope) with rack-mount, shield and hydroficated powered roof supports , as well as protecting the grid system for the development of sublevel caving , and without separation into layers using a shield lining . Breaking of coal is produced primarily drilling and blasting method, the management of rock pressure - a complete collapse of roof rock or laying out space. From the excavation area to stem coal transported by wheeled transport. In shallow reservoirs during flowsheets mnogogorizontnyh mining companies use a panel or pogorizontnuyu training and development system mostly long poles along strike and dip. The solid system and combined have a limited distribution. important parameter of the technological scheme of mining companies - mining the order of layers in the suite, excavation of fields and areas within the reservoir. Decisive role in his choice of plays geomechanical factor. In the majority of technological schemes of coal mines provide a top-down sequence of the interdependent layers in the suite, except in cases of advanced within the floor working out the protective layers , including lying stratigraphically above the outburst or in the middle of both developed reservoirs. In shallow layers panel bremsbergovoy part of the field are developing in a direction away from the trunk to the boundaries of the mine field, the emphasis - from the borders of the trunk. Within the panel tiers work out in descending order, sequentially or through one layer, followed by intermediate groove. On a heavily watered strata practiced preliminary working out of the lower tier of the panel for partial dewatering of overlying. In thin sections of steep seams in the floor of the excavation work out in the direction away from the trunk (the main crosscut) to the borders of the mine field. In the middle layers of power and power is preferable reverse sequence of the excavation sites, which in the case of spontaneous combustion of coal or dangerous heating can provide a more reliable isolation of developed space on the network of existing mine workings. special place in the practical development of coal deposits occupy the technological scheme of the hydraulic mining of coal. In a similar in a constructive relationship with the usual technological schemes of mining companies circuit hydraulic mine workings differ in their position with respect to transport items of bedding layer, providing a mixture of gravity displacement "coal - water" within the field of excavation or the entire mine. There are varieties of technological schemes of mining hydraulic mines: short-pollution control slaughter and the destruction of coal breaking hydraulic, mechanical, hydraulic and vzryvogidravlichesкими ways and with long working face where coal is breaking mechanical-hydraulic means. in treatment and training faces using special types of harvesters K56MG and "Ural-38". Obscheshahitny vehicles - Hydraulic pressure and gravity, and the conveyor (dewatered coal). To lift the slurry on the trunk using coal pumps and air lift.









Обсудить [на форуме](#).