

## Module 22: Subsidence Control and Underground Mine Maps

**Instructions:** Information submitted under this Module must be certified by a licensed professional engineer or a licensed professional land surveyor.

**Note:** That at a minimum, the subsidence control plan shall address all areas within a 30-degree angle of draw of underground mining which will occur during the five (5)-year term of the permit.

### 22.1 Subsidence Control Plan.

- a. Describe the equipment to be used for development and retreat phases of mining.

The current underground mining operation has two working units consisting of one shuttle car unit and one continuous haulage unit. The number of mining units could increase or decrease depending on market and underground conditions. Coal will be transported along the main entry by conveyor. In the individual butt entries and rooms, either shuttle car haulage or continuous haulage will be used. Typical section equipment will include continuous miners, shuttle cars, continuous haulage, roof bolters, belt feeders, scoop tractor(s).

- b. State the range of proposed mining centers for entries and crosscuts within the mains, submains, butts, rooms, etc.

Entries in the mains, butts and rooms will be advanced on 40-foot to 100-foot centers with cross-cuts projected on 40-foot to 100-foot centers. Depending on mining conditions and equipment capabilities, these centers may be varied to meet specific situations and to provide better roof control.

Crosscut development will be at 60° and 90° angles to the entries where shuttle car or continuous haulage is used.

- c. State the average and maximum proposed entry and crosscut widths. These must be specific to the various entries and crosscuts to be used throughout the mine - such as mains, submains, butts, rooms, belt and track entries and any other areas in which the entry and crosscut width may vary.

In the mains and submains, the entry and cross cut widths are proposed to be a minimum of 16 feet, on average 18 feet, and a maximum of 20 feet in the belt entries. All other crosscuts and entries are a maximum of 20 feet wide. In the butts and rooms, the entry and crosscut widths are proposed to be a minimum of 16 feet and at a maximum of 20 feet.

- d. Provide a description including sketches, if necessary, indicating the method of secondary or retreat mining to be used. The description should address the following, as applicable:

- i. Method of mining (pillar recovery, slabbing, splitting, longwall, shortwall, etc.);

No retreat mining will be done as support will be left for the overlying surface features.

- ii. The sequence of pillar recovery;

None. Not applicable.

- iii. The sequence and widths of cuts, slabs, or splits;

None. Not applicable.

- iv. Configuration of remaining pillars, fenders, or stumps, etc.

None. Not applicable.

- v. The range of the length and width of the longwall panels.

None. Not applicable.

- e. State the proposed extraction percentages for mains, submains, butts, rooms, etc. for development and retreat phases.

No retreat mining is proposed with this operation. Typical extraction percentages for mains, submains, butts and rooms will range from 42.9% to 79% depending on depth of cover. Refer to the attached ARMPS calculations.

- f. Describe whether subsidence, if it is likely to occur, could cause material damage to any structure or could adversely affect any water supply.

Based on the proposed mining plan for this operation, it is unlikely that subsidence will occur, which could cause material damage to any overlying structures or water supplies.

- g. Describe in detail how mining activities will be planned and conducted to not cause material damage or reduce the reasonably foreseeable use of the following features as present within the subsidence control plan area:

- i. Noncommercial structures commonly used by the public such as churches, schools, and hospitals;

Stability Class I - In an area of greater than 100 feet of cover, coal pillars will be uniform in size and pattern and designed to achieve a safety factor of 2.0 and a maximum of 50% extraction, such that permanent coal support is provided. No mining will be performed in these areas at less than 100 feet of cover.

- ii. Public facilities such as government office buildings, police stations, prison complexes, municipal swimming pools, municipal utilities, public water lines, municipal airports, public park pavilions and maintenance facilities;

Stability Class I - In an area of greater than 100 feet of cover, coal pillars will be uniform in size and pattern and designed to achieve a safety factor of 2.0 and a maximum of 50% extraction, such that permanent coal support is provided. No mining will be performed in these areas at less than 100 feet of cover.

As demonstrated in CME's evaluation of Coal Pillar Strength Report dated 12/13/19, mining can be conducted in areas with more than 100 feet of cover at extraction ratios greater than 50% and still maintain permanent support with a minimum 2.0 safety factor for public water and sewer lines.

iii. Impoundments or other bodies of water with a storage capacity of 20 acre-feet or more;

An impoundment on property 585 has a potential storage capacity of 20 ac. ft. or greater.

Any impoundment which qualifies with a storage capacity of 20 acre-feet or more that exists on the site and mining beneath these structures will be Stability Class I - In an area of greater than 100 feet of cover, coal pillars will be uniform in size and pattern and designed to achieve a safety factor of 2.0 and a maximum of 50% extraction, such that permanent coal support is provided. No mining will be performed in these areas at less than 100 feet of cover.

iv. Bodies of water or aquifers that serve as significant sources of public water supply.

Spring S159 is a public water supply for the Caddy Shack "Snack Shack" building. Approximately 390 feet of interburden lie between the spring and the mining activity. Permanent coal support will be provided by pillars uniform in size and pattern and designed to achieve a safety factor of 2.0 and maximum of 50% extraction.

h. Describe the measures to be taken to minimize damage, destruction, or disruption of services to the following items as present within the subsidence control plan area or provide information showing that facilities will not be damaged. The description must address notification procedures, agreements and precautionary measures (at the land surface or in the mine).

i. Gas wells and oil wells;

Not applicable. No oil and gas wells are known to exist within the subsidence control plan area.

ii. Water wells (wells which penetrate the target coal seam must have a block of coal around them);

No wells have been impacted as a result of subsidence with the current operation. There are six (6) wells which penetrate the Lower Kittanning seam. Well 415 located on property ID 052, well W178 located on property ID 436, well W222 located on property ID 422, well 183 located on property 038, well 158A located on property 491, and well 662 located on property 409. A well protection barrier has been placed around these supplies. If they are affected, the operator is prepared to replace these wells.

a) *Water supply surveys.*

In order to minimize damage, destruction or disruption of services of water wells the following measures will be taken:

- For any water wells which penetrate the seam being mined, the mining plan will be altered to ensure that the well will be located within a stump of solid coal.
- The surface tract owner on which a water well is located will be notified by certified mail at least six (6) months prior to mining beneath the surface tract as per the requirements of Chapter 89.155(a). Note that the six (6) month notification period may be waived if the coal operator supplies to the Department a letter in which the surface tract owner acknowledges that they, (he), (she) is aware of the six (6) month provision and that they, (he), (she) wish to waive the requirement. The letter must be signed and notarized.

- (1) The operator shall conduct a premining survey and may conduct a mining survey of the quantity and quality of all water supplies within the permit and adjacent areas, except when the landowner denies the

operator access to the site to conduct a survey and the operator has complied with the notice procedure in this section. Premining surveys shall be conducted prior to mining within 1,000 feet (304.80 meters) of a water supply unless otherwise authorized or required by the Department based on site specific conditions. Survey information shall include the following information to the extent that it can be collected without extraordinary efforts or the expenditure of excessive sums of money:

- (i) The location and type of water supply.
  - (ii) The existing and reasonably foreseeable uses of the water supply.
  - (iii) The chemical and physical characteristics of the water, including, at a minimum, total dissolved solids or specific conductance corrected to 25°C, pH, total iron, total manganese, hardness, total coliform, acidity, alkalinity and sulfates. An operator who obtains water samples in a pre-mining or post-mining survey shall utilize a certified laboratory to analyze the samples.
  - (iv) The quantity of the water.
  - (v) The physical description of the water supply, including the depth and diameter of the well, length of casing and description of the treatment and distribution systems.
  - (vi) Hydrogeologic data such as the static water level and yield determination.
- (2) The operator shall submit copies of the results of the analyses, as well as the results of any quantitative analysis, to the Department and to the landowner within 30 days of their receipt by the operator.
- (3) If the operator cannot make a pre-mining or post-mining survey because the owner will not allow access to the site, the operator shall submit evidence to the Department of the following:
- (i) The operator notified the landowner by certified mail or personal service of the landowner's rights in sections 5.1 5.3 of The Bituminous Mine Subsidence and Land Conservation Act (52 P.S. §§ 1406.5a - 1406.5c), and the effect on the landowner of the landowner's denial to the operator of access to the site as described in section 5.2(d) of The Bituminous Mine Subsidence and Land Conservation Act.
  - (ii) The operator's attempt to conduct a survey.
  - (iii) The landowner failed to authorize access to the operator to conduct a survey within 10 days of receipt of the operator's notice of intent to conduct a survey.
- b) *Restoration or replacement of water supplies.* When underground mining activities conducted on or after August 21, 1994, affect a public or private water supply by contamination, diminution or interruption, the operator shall restore or replace the affected water supply with a permanent alternate source which adequately serves the pre-mining uses of the water supply or any reasonably foreseeable uses of the water supply.

The operator shall be relieved of any responsibility under The Bituminous Mine Subsidence and Land Conservation Act (52 P.S. §§ 1406.1 - 1406.21) to restore or replace a water supply if the operator demonstrates that one of the provisions of § 89.152 (relating to water supply replacement: relief from responsibility) relieves the operator of further responsibility. This subsection does not apply to water supplies affected by underground mining activities which are covered by Chapter 87 (relating to surface mining of coal).

- c) Within 24 hours of an operator's receipt of a claim of water supply contamination, diminution or interruption, their operator shall notify the Department of the claim.
- d) *Investigation and reporting of water supply damage complaints.* Upon receipt of notification that a water supply has been contaminated, diminished or interrupted and that the operator's underground mining activities may have caused the contamination, diminution or interruption, the operator shall diligently investigate the complaint and notify the Department in a timely manner of the results of the operator's investigation. This subsection does not apply to water supplies affected by underground mining activities which are governed by Chapter 87.
- e) *Temporary water supplies.*
  - (1) If the affected water supply is within the rebuttable presumption area and the rebuttable presumption applies and the landowner or water user is without a readily available alternate source, the operator shall provide a temporary water supply within 24 hours of being contacted by the landowner or water supply user or the Department, whichever occurs first.
  - (2) The temporary water supply provided under this subsection shall meet the requirements of paragraph (f)(2) and provide a sufficient amount of water to meet the water supply user's pre-mining needs.
- f) *Adequacy of permanently restored or replaced water supply.* A permanently restored or replaced water supply shall include any well, spring, municipal water supply system or other supply approved by the Department, which meets the criteria for adequacy as follows:
  - (1) *Reliability, cost, maintenance and control.* A restored or replaced water supply, at a minimum, shall:
    - (i) Be as reliable as the previous water supply.
    - (ii) Be as permanent as the previous water supply.
    - (iii) Not require excessive maintenance.
    - (iv) Provide the owner and the user with as much control and accessibility as exercised over previous water supply.
    - (v) Not result in more than a de minimis cost increase to operate and maintain. If the operating and maintenance costs of the restored or replaced water supply are more than a de minimis cost increase, the operator shall provide for the permanent payment of the increased operating and maintenance costs of the restored or replaced water supply.
  - (2) *Quality.* A restored or replaced water supply will be deemed adequate when it differs in quality from the premining water supply, if it

meets the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 750.1-750.20), or is comparable to the premining water supply when that water supply did not meet these standards.

- (3) *Adequate quantity.* A restored or replaced water supply will be deemed adequate in quantity if it meets one of the following:
  - (i) It delivers the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.
  - (ii) It is established through a connection to a public water supply system which is capable of delivering the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.
  - (iii) For purposes of this paragraph and with respect to agricultural water supplies, the term reasonably foreseeable uses includes the reasonable expansion of use where the water supply available prior to mining exceeded the farmer's actual use.
- (4) *Water source serviceability.* A replacement of water supply shall include the installation of any piping, pumping equipment and treatment equipment necessary to put the replaced water source into service.

iii. **Oil, gas, and coal slurry pipelines (if necessary mining is proposed, the type, use, pressure, composition, and approximate age of the gas pipeline must be included);**

There is one gas pipeline which lies within the subsidence control plan area. No oil or coal slurry pipelines are known to exist within the subsidence control plan area. There is one gas compressor station on property 587 which lies within the subsidence control plan area.

Since mining is proposed at the Rustic Ridge #1 mine as first mining only with a 2.0 safety factor, oil and gas lines, and the compressor station will be adequately supported.

To minimize damage or disruption to any oil and gas line, and to prevent imminent hazard to public safety, the operator will notify the owner of any oil and gas lines and compressor station by certified mail six (6) months prior to the mining operation as required by PA DEP Title 25, Chapter 89.155 or the applicable statute in place at the time. Copies of all utility letters will be filed with the Department after they are sent to the utilities.

Pipeline Company	Size	Use	Age	Composition	Pressure
Laurel Mountain Midstream LLC - Donegal Pipeline	12"	Gas Distribution	2011	Steel	1280 max psi

iv. **Rail lines;**

No rail lines exist inside of the subsidence control plan boundary.

v. **Electric and telephone lines; and**

The owner of the cell phone towers on properties 581 and 597 will be notified by certified mail prior to mining under the tower. Stability Class II - no mining will be conducted in areas where the cover is less than 100 feet. For

cover thickness greater than 100 feet, the operator will leave coal pillars which are designed to achieve stable coal support consisting of a safety factor of 2.0.

To minimize damage or disruption, and prevent the creation of an imminent hazard to human safety, the operator will notify the owner by certified mail six (6) months prior to the mining operation as required by PA DEP Title 25, Chapter 89.155 or the applicable statute in place at the time. Copies of all letters will be filed with the Department after they are sent to the owners.

vi. **Water and sewerage lines.**

Not applicable. No commercial or for profit water or sewage lines are under the underground permit area. Public water lines will be protected in accordance with module 22.1g.ii.

i. **Describe any applicable subsidence control measures required to satisfy the following statutes:**

i. **Act of December 22, 1959 (Act No. 729, Mining in Safety Zones);**

Not applicable. There are no safety zones within the underground permit boundary.

ii. **Oil and Gas Act (58P.S. §§601.101-601.605)**

Not applicable. No known oil or gas wells are known to exist within the underground permit boundary.

iii. **Section 419 of the State Highway Law (Act No. 428); and**

There are seven (7) state highways located where mining is projected to pass beneath. SR 0711, SR 2029, SR 2002, SR 0031, SR 1058, SR 2031, and SR 70/76 lie over the subsidence control plan. These roads will be protected by limiting mining to a minimum pillar safety factor of 2.0 or greater.

iv. **Act of June 1, 1933 (Act No. 296, State Mining Commissions).**

There are no agreements with State Mining Commissions.

j. **Describe how proposed mining will serve to maximize the stability of the workings that will remain when mining is complete. Discuss various scenarios of mining height, extraction percentage, and cover thickness as necessary to cover the range of conditions that will be encountered in the underground permit area. Describe the anticipated effects of planned subsidence.**

All mining in the subsidence control plan area will be conducted in accordance with the department's revised program guidance on mine stability document #563-2112-654, in the following manner. In Stability Class II, IV areas, mining will leave coal pillars which are uniform in size and pattern, and provide stable coal support everywhere by maintaining a minimum pillar safety factor of 2.0 or greater.

i. **For settings where pillars will be left in place, provide calculations to show their ability to provide continual support to the overlying strata; or the results of a geotechnical investigation of a previously mined area where equal or smaller pillars proved to be stable.**

Refer to the attached ARMPS calculations for various pillar sizes.

ii. **If mining will take place under less than 100 feet of cover, also provide assessment of roof stability.**

Not applicable. No mining is proposed with less than 100 feet of cover.

- iii. For settings where final mine stability will be achieved by removing enough coal to induce roof collapse, provide calculations to show that remaining stumps will lack the ability to support the overlying strata, or



the results of a geotechnical investigations showing that stumps of equal or larger size failed within a few years of mining. (If longwall mining will be conducted, simply state - "Longwall Mining" in response to this item.)

Not applicable. There will be no secondary or retreat mining.

- k. Describe the methods that will be used to mitigate subsidence damage that may occur (purchase, restoration, compensation, etc.). Provide a statement affirming that damaged structures will be repaired or replaced, or that the structure owner will be compensated for the cost of the repair or replacement. If secondary mining will occur beneath dwellings, barns, or silos, include a description of the measures to prevent irreparable damage to these structures if the structure owner does not concur to allow irreparable damage.

#### Structures

Structure damage caused by subsidence will be repaired, replaced, or compensated for in accordance with the requirements of Act 54. The methods that will be used to mitigate subsidence damage will include, but not be limited to the following:

- The damaged structure may be purchased from the owner
- The damaged structure will be restored as near as possible to pre-mining conditions based on the pre-mining survey.
- The structure owner may be compensated for damage caused from subsidence.

#### Water

Water supplies affected by the mining operation will be restored or replaced in accordance with the requirements of Act 54. The methods that will be used to restore or replace water supplies will include, but not be limited to the following:

- If damage is detected in a water well bore (i.e. caving, collapse) the well will be cleaned and a liner installed, if necessary.
  - If water diminution is detected in a water well, the existing well may be deepened or a new well will be drilled. If water diminution is detected at a spring, additional sources may be developed to add to the existing source or a water well may be drilled.
  - If water quality is degraded in a water well, the well casing may be extended to seal off the source of degradation, a water treatment system may be installed, or a new water well may be drilled. If water quality degradation is detected at a spring, a water treatment system may be installed or a new water well may be drilled.
- l. If an operator employs a mining technology that provides for planned subsidence in a predictable and controlled manner, describe the necessary and prudent measures that will be used to minimize material damage to the extent technologically and economically feasible to the structure(s).

Not applicable. Retreat mining is not proposed.

- m. If an operator employs a mining technology that does not result in planned subsidence in a predictable and controlled manner, describe the necessary and prudent measures that will be used to prevent subsidence and subsidence-related damage to the extent technologically and economically feasible to the structure(s), describe the measures that will be taken to prevent subsidence-related adverse impacts to places listed or eligible for listing, on the National Register of Historic Places and archaeological resources.

Not applicable. With pillars designed to provide stable support under structures, subsidence, planned or unplanned is not anticipated.

- i. For mining that is proposed beneath structures where the depth of overburden is less than 100 feet, include a description of the site characteristics and/or mining techniques, which will ensure stable mine workings and prevent irreparable damage to overlying structures. Describe the measures to be taken to maintain the value and reasonably foreseeable use of surface lands.

No mining is proposed beneath any structures where depth of overburden is less than 100 feet.

- ii. Describe the measures that will be used to correct any subsidence-related damage to surface lands. Describe the measures to be taken to maintain the value and reasonably foreseeable use of surface lands.

Any subsidence damage that occurs to surface lands due to mining at the Rustic Ridge #1 Mine is the responsibility of LCT Energy, LP (LCT). In these cases, LCT will compensate the landowner for any subsidence damage or repair the lands to the condition it was prior to the subsidence related damage in accordance with Act 54. However, if LCT determines that land damage is not the result of mining from the Rustic Ridge #1 Mine, it may appeal the order to repair damages to the PA DEP also in accordance with Act 54. Each incident will be considered on a case-by-case basis.

- iii. Indicate whether the mine has caused irreparable damage to any dwelling or agricultural structure listed under 89.142a or if it is likely to cause such damage. If irreparable damage is likely to occur, indicate the measures that will be used to prevent that level of damage should the structure owner not consent.

There was no irreparable damage caused to any structures associated with the current mining operation. Pillars are designed to a minimum safety factor of 2.0 below all structures. Therefore, damage to dwelling or agricultural structures listed in 89.142a is not anticipated.

- iv. Describe any monitoring that will be performed to prevent, reduce, identify, or correct subsidence-related damage.

LCT has been monitoring structures that have subsidence related damage (refer to Section 22.2 (c), iv below) by installing bubble levels attached to the foundation corners. The level will be plumbed on initial installation and show any movement of the foundation. The level doesn't require any special instruments to check for movement. Also, notification letters will be sent to property owners as required, and pre-mining surveys completed prior to the mine advancing to within 1000' of the property line to serve as a baseline of existing conditions.

## **22.2 Geologic Considerations**

- a. Describe the minimum, maximum, and average cover conditions within the subsidence control plan area.

The minimum cover within the subsidence control plan area is 176 feet and is located near the proposed surface site sediment pond SP-1. The maximum cover within the subsidence control plan area is 690 feet and is located on property 635. The average cover within the subsidence control plan area is 430 feet.

- b. Describe the minimum, maximum, and average mining height within the subsidence control plan boundary.

The mining height in the Lower Kittanning seam varies throughout the SCPA. The minimum mining height within the SCPA is 28 inches. The maximum mining height within the SCPA is 60 inches. The average mining height within the SCPA is 44 inches.

- c. Discuss the geologic factors which may serve to cause, prevent, or otherwise influence the following:

- i. Height and form of caving;

Based on previous deep mines in the area, mine roof caving on any regular basis is generally expected only during retreat mining. Occasionally unintentional local falls may occur during first mining, but can be expected to have no surface subsidence affects. The local falls generally range in height, above the coal seam, from 10 to 20 feet and have a dome shape starting at the coal rib and reaching maximum height in the middle of the entry.

**ii. Pillar failure;**

Pillars have been sized to maintain a minimum Factor of Safety of 2.0, as based on the Mark-Bieniawski equation used in the ARMPS design program. Pillars with a Stability Factor of 2.0 are able to provide stable support and should preclude the possibility of pillar failure.

**iii. Pillars punching into mine floor or roof; and**

Pillars punching into the mine roof has not been a problem in that the mine is overlain with either a shale or sandstone. The mine floor in the southeast mains, 3<sup>rd</sup> left, 4<sup>th</sup> left, 5<sup>th</sup> left, and 6<sup>th</sup> left consisted of a soft claystone and the pillars punched into the floor (see Module 22.2civ below).

**iv. Floor heave.**

As per standard industry practice, coal pillars are designed by utilizing NIOSH's ARMPS pillar design software to adequately support expected loading conditions. As per the approved PADEP permit, pillars were designed with an ARMPS Stability Factor (safety factor) of 2.0 or greater. This procedure was utilized at the onset of mine development up to and until the floor heave was experienced in Southeast Mains, 3<sup>rd</sup> through 6<sup>th</sup> Left rooms, which resulted in surface subsidence of 4 dwellings. After experiencing this event, LCT contracted with Barr Engineering (Barr), a consultant that specializes in ground control/mine stability issues to evaluate the floor heaving and to recommend changes to the mine plan to prevent future floor heave/subsidence from occurring. This report summarizes their findings and details the changes to the mine plan that LCT implemented and will continue to utilize for the remainder of the project:

Barr Engineering representatives visited the mine Monday November 2<sup>nd</sup>, 2020 to inspect current conditions of the entire mine to date, including Southeast Mains. The main discussion point and reason for the need to modify the existing mine plan was obviously the floor heave event in SE Mains. Based on Barr's findings:

The failure in SE Mains likely resulted from a combination of localized floor conditions and smaller pillars than elsewhere in the mine. Although these pillar sizes and the extraction ratio still met the required 2.0 Safety Factor stated above, the combination resulted in floor heave. As stated by Barr, designing pillars to a high safety factor for protection of subsidence (i.e., SF 2.0 or greater per PADEP guidance) have generally worked well, because:

- Empirically derived coal pillar strength formulas and related assumptions are based on data from coal seams that account for a myriad of conditions, including floor conditions.
- High Safety factors are well above what is necessary for operations and production and are intended to account for exceptional conditions and long-term degradation.

Even though these guidelines were followed, SE Mains experienced floor heave resulting in subsidence as previously mentioned. Therefore, Barr re-examined

the mining to date, and performed back calculations to determine the floor pressure being exerted by the mine plan at the time. Based on Pillar and Floor Stability Calculations performed by Barr, several key takeaways were determined:

- The floor geology was the main factor related to the floor heave/subsidence. Therefore, in SE Mains, and future areas of the mine that show similar floor conditions, floor stability is more critical than coal pillar stability.

Based on these findings, and to prevent future floor heave from occurring, the mine plan has been modified as follows:

All continuous core drill holes completed by LCT were re-examined to compare floor conditions to those found in SE Mains. The Rustic Ridge mine has very good drill hole spacing, however as mining advances into areas where more information is needed to predict expected floor conditions, additional holes will be drilled for analysis. At the recommendation of PADEP, LCT will attempt to keep drillhole spacing no greater than 1300'. Note that some areas may not be accessible due to PADEP barrier issues such as streams, roads, dwellings, etc., or simply because landowner denies permission for drilling.

- LCT continually evaluates the floor conditions in the active sections in order to adjust the mining plan if necessary (i.e., increase pillar sizes, decrease entry widths, reduce the number of entries and overall section width, or stop mining advance) to prevent floor heave.
  - The highest and average coal pillar safety factors used to date after the mining plan was revised is 4.01 & 2.75 respectively.
  - Mining centers have increase 10-20% since the mining plan was revised.
  - Extraction ratios generally decreased by 6-8% since the mining plan was revised.
- In areas where floor conditions are similar to SE Mains, pillars and extraction ratios are designed to ensure floor stability. These larger pillars and smaller extraction ratios result in SF greatly exceeding 2.0.
- Additionally, as part of the modified mine plan, LCT has taken an even more conservative approach when mining beneath occupied dwellings whether similar floor conditions to SE Mains exist or not by:
  - Designing pillars larger than deemed necessary based on floor stability calculations.
  - Increasing barrier pillar sizes between rooms
  - Or simply not mining beneath dwellings

The modified mining plan above is the plan that LCT will follow for the life of the mine. However, as part of the PADEP review/monitoring process, the detailed mining plan is submitted, reviewed, and approved every six months. If modifications or additional changes are required, these can be addressed with these submissions.

This plan has been implemented since the fall of 2020 to date, with no further floor heave/subsidence issues occurring.

- d. Describe any site-specific geologic conditions which are relevant to the likelihood or extent of subsidence related damage.

Refer to Module 22.2civ.

### **22.3 Index Map**

See the enclosed Exhibit 22.3 map.

Provide a 7.5 minute USGS map that shows the underground permit area and index to the six-month map series. Include a legend containing the map title, mine name, company name, coal seam, township, county, scale, engineer's (or surveyor's) signature, and seal. Show the following:

- a. Boundary of the underground permit area;
- b. Boundary of the subsidence control plan area;
- c. A sheet index for the six-month maps;
- d. A sheet index for the subsidence control maps (Module 22.4 map).

### **22.4 Subsidence Control Plan Map (see mapping standards in Module 22.9)**

See the enclosed exhibit 22.4 Subsidence Control Plan Map.

Provide a subsidence control plan map at a scale of 1 inch = 500 feet or larger, showing the information listed in this section. Include either a north arrow or coordinate grid system for orientation; and a legend containing the map title, mine name, company name, coal seam, township, county, scale, index sheet number, engineer's (or surveyor's) signature and seal. The map must include all areas where structures or perennial streams may be impacted by underground mining activities. At a minimum, the map must cover the area determined by projecting a plane along a 30-degree angle upward and outward from the limits of the planned coal extraction area. However, all adjacent underground mine workings within 1,000 feet of the proposed mine must be shown.

- a. The boundaries of the underground permit area and subsidence control plan area.
- b. Coal barriers to be maintained around the perimeter of the underground permit area.
- c. A mining forecast showing the size and sequence of incremental mining areas over the life of the operation.
  - i. For areas within the subsidence control plan boundary, the forecast must be in yearly increments (i.e., Year 1, Year 2, etc.) with single line projections indicating proposed main, submain, and butt headings, gate entries and longwall panels.
  - ii. For areas outside the subsidence control plan boundary, the remaining parts of the mine plan may be shown by outlining proposed mining areas in increments of five (5) years or less. Mine life must be consistent with Module 10.1a.
- d. Structures, features and resources relevant to subsidence control plan development, including:
  - i. The boundaries of lands and names of current surface and coal owners of record. (Key to Module 5.)
  - ii. Dwellings, public buildings and facilities, churches, schools, hospitals and impoundments with a storage capacity of 20 acre-feet, identified by numerical reference.
  - iii. Buildings that are accessible to the public including, but not limited to commercial, industrial and recreational buildings and all permanently affixed appurtenant structures identified by numerical reference.
  - iv. Noncommercial buildings that are customarily used by the public, and not listed in Item iii, identified by numerical reference.
  - v. Dwellings that are used for human habitation and permanently affixed appurtenant structures and improvements. (Identify any improvements that are not subject to repair requirements because they were not in place on August 21, 1994 or on the date of first publication of the most recent permit or permit renewal application.)
  - vi. Barns and silos identified by numerical reference.

- vii. Permanently affixed structures of 500 or more square feet in area that are used for raising livestock, poultry or agricultural products, for storage of animal waste or for the processing or retail marketing of agricultural products on the farm on which the structures are located identified by numerical reference.
- viii. Public parks and historic structures.
- ix. Structures which are entitled to support by law or agreement, identified by numerical reference.
- x. Water supply wells identified by numerical reference.
- xi. Water supply springs identified by numerical reference.
- xii. Major electric transmission lines, including identification by name or numerical reference.
- xiii. Public roads by route number, and railroads.
- xiv. Oil, gas and coal slurry pipelines larger than four inches in diameter, including identification by name or numerical reference.
- xv. Water and sewer mains and transmission lines, including identification by name or numerical reference.
- xvi. Surface water bodies, including perennial streams, lakes, ponds, dams and impoundments with a volume of 20 acre-feet or more, indicating by numerical reference those perennial streams and other bodies of water which are a significant source for a public water supply system.
- xvii. Coal refuse disposal areas, solid and hazardous waste disposal areas, and other air and water pollution control facilities, all identified by name or numerical reference.
- xviii. Gas, oil and water wells.
- xix. Surface sites and facilities associated with the underground permit application.
- xx. Political subdivisions.
- xxi. Landslide prone areas.
- xxii. Areas over the proposed mine where the overburden is 100 feet or less.
- xxiii. Coal seam contours.
- xxiv. All historical or existing sealed mine openings (including boreholes), as well as all proposed mine openings within the permit area.
- e. Identify in a distinguishing manner those structures, features and facilities that must be protected against material damage or reduction in reasonably foreseeable use in accordance with 89.142a(c), including:
  - i. Churches, schools and hospitals.
  - ii. Public buildings, facilities, and water lines.
  - iii. Impoundments with a storage capacity of 20 acre-feet or more.
  - iv. Bodies of water with a volume of 20 acre-feet or more.
  - v. Bodies of water or aquifers that serve as significant sources to a public water supply system.
  - vi. Perennial streams that serve as significant sources to a public water supply system.

## **22.5 Public Notice (89.144)**

Provide examples of notification letters that will be sent to property owners, residents, and local government offices. A copy of each notice will be required at a later date to coincide with six-month map reviews. (Note: transfer applicants must re-notify parties who have yet to be undermined even though they were notified by the previous permittee.)

An example of the notification letters that will be used to notify property owners, residents and local government offices has been enclosed. All relative notices will be submitted with the six-month map reviews. Refer to Attachment 22.5 for example notification letter.

## **22.6 Six-Month Projection Maps (see mapping standards in Module 22.9)**

Six-month maps are not required with this initial application but will be submitted at a later date prior to the commencement of mining activity.

Six-Month Projection Maps and the Index Map (Module 22.3) must be submitted to and accepted by the Department before underground mining begins. However, these maps need not be submitted with the initial permit application. The six-month maps must be on a scale of not less than 1 inch = 200 feet and must include, at a minimum, the information listed in Modules 22.4.d and 22.4.e.

The following information must also be included on six-month maps where an applicant chooses to submit "combined maps" that will satisfy mapping the requirements under the Bituminous Coal Mine Act as provided for under the Department's Technical Guidance 563-2000-610:

- a. All openings, excavations, shafts, slopes, drifts, tunnels, planes, main entries, cross entries and rooms and the name or number of each;
- b. The direction of air currents, indicated by arrows, with each split numbered and suitably designated;
- c. Elevations of the top and bottom of each shaft and slope, of all drifts, tunnels, planes and of the faces of entries including the number of last survey station and the date of such survey;
- d. Location and elevation of any body of water dammed in the mine, or held back in any portion of the mine.

(Note: Gas wells are required to be shown on Six-Month Projection Maps, therefore, the applicant is reminded to contact the appropriate regional Oil and Gas Management office to obtain this information).

## **22.7 Structure Inventory**

Provide a list of all surface owners and structures, facilities and features identified by numerical reference located within the subsidence control plan boundary and within a 30-degree angle of draw projected from that boundary. List properties and structures in order of their identification numbers and provide the following information:

Refer to the attached Exhibit 22.7/22.8.

- a. Surface owner name and address;
- b. Parcel number or tax identification number associated with each surface (use a period "." to separate the parcel number or tax identification number (ex. "12.345.5678").
- c. A unique structure identification number;
- d. Type or use of structure;
- e. Identify each structure to which damage must be prevented; and
- f. Map sheet (1 inch = 100 feet or 1 inch = 200 feet map set) on which structure appears.

## **22.8 Property Assessment Data**

Provide the total tax assessment value of all properties within the subsidence control plan boundary and within a 30-degree angle of draw projected from that boundary.

Refer to the attached Exhibit 22.7/22.8.

## **22.9 Mine Map Standards**

It is extremely beneficial for all mining operations in a given area to be tied into the same standardized coordinate system. This minimizes problems along boundaries and at mine connections. Additionally, this system must be tied into and made part of the state grid system. Therefore, the following minimum standards shall be adhered to for mine maps:

- a. Minimum angular and coordinate ties for raw data would be an angular tie of less than 00°01'00" (1 minute) and a coordinate tie of greater than 1:10,000 (1 foot in 10,000 feet) for any given closed loop survey.

- b. A closed loop survey is required to be at the next to last open crosscut of the mining section, but not more than 100 feet from the final face of a mining section.
- c. Elevation closure of +/- 0.01 feet per 5,000 feet.
- d. Vertical elevation shall be based on mean sea level (USGS elevation).
- e. Preferred datum is the Pennsylvania State Plane coordinate system (NAD83 Datum).
- f. Where applicable, appropriate coordinate transformation equation(s) should be placed on the map.

The Rustic Ridge #1 Mine will adhere to the following minimum standards:

- 1) Minimum angular and coordinate ties for raw data would be an angular tie of less than 00° 01' 00" and coordinate tie of greater than 1:10,000 for any given closed loop survey.
- 2) A closed loop survey shall be at the next to last open crosscut of the mining section, but not more than 100 feet from the final face of a mining section.
- 3) Elevation closure of 1:5,000 with elevations based on Mean Sea Level.
- 4) Mapping will use NAD83 datum.

## 22.10 Adjacent Mine Working(s)

Refer to the attached Module 22.10 Adjacent Mine Working(s).

Utilize any and all sources necessary to accurately determine the full extent and location of adjacent abandoned mine workings. Document the types of sources used on the attached Form 22.10 which provides a check list of potential sources. Document any additional sources utilized in the form's blank spaces.

Provide a narrative summary of all information used and the steps taken to obtain that information. At a minimum, the summary should address the following types of information:

- a. Identification of all data sources used to verify and validate mine maps as documented on Form 22.10;
- b. Listing of all mine map repositories searched during the research process;
- c. Procedures used to orient and locate nearby abandoned mine workings with respect to the proposed mine;
- d. A description of and results of field reconnaissance used to delineate mine workings;
- e. Identification of all maps found in the search and relied upon to map abandoned mine workings, including ID or catalog numbers, archive location, scale, and condition;
- f. Local gas well or water well drill logs that may indicate the presence of absence of mine voids;
- g. Underground mine inspection records;
- h. Annual coal production report data, including mine opening date and last coal extraction;
- i. Permit information cross-checks with the Bureau of Mining and Reclamation;
- j. Mechanical, geologic, or geophysical testing used to verify the mine workings, such as vertical or horizontal drilling or geophysical surveying;
- k. An operational history of each adjacent abandoned mine including all ownership changes, dates of operation, dates when the mine was idle, date of mine closure, mine name changes, coal company name changes, and all permit identification numbers including an explanation showing that the map corresponds to the data found in the history;
- l. An explanation of how mine pool elevation data for each abandoned mine was determined;
- m. A discussion of any disparities between sources of information including site-specific details provided by local residents



### Form 22.10 Recommended Sources of Mine Map Information

In order to validate mine void location information provided to the Department, an applicant for an underground mine permit should use all sources necessary to accurately ascertain the full extent and location of adjacent abandoned mine workings. Potential sources of useful information are listed on the following checklist. Additional space is provided to add additional sources as needed.

Information Source	Place a check (✓) next to each information source relied upon to validate location of mine workings	Date that Source Review was Completed	Reviewer's Initials
Coal production records	<input checked="" type="checkbox"/>	3-2013	BRC
Tax records	<input type="checkbox"/>		
Local Driller's logs (gas and water)	<input checked="" type="checkbox"/>	3-2013	BRC
Worker's compensation records	<input type="checkbox"/>		
County property records	<input type="checkbox"/>		
Employment records	<input type="checkbox"/>		
Newspaper accounts	<input type="checkbox"/>		
Public mine map archives (Pennsylvania Geologic Survey, OSM, Pa. Deep Mine Safety, Pa. District Mining Operations)	<input checked="" type="checkbox"/>	3-2013	BRC
Private mine map archives (local coal companies, museums and universities)	<input type="checkbox"/>		
Museums	<input type="checkbox"/>		
Local citizens	<input type="checkbox"/>		
Field reconnaissance	<input type="checkbox"/>		
Universities	<input type="checkbox"/>		
Libraries	<input type="checkbox"/>		
State Mine Inspector's records	<input type="checkbox"/>		
Federal Mine Inspector's records	<input type="checkbox"/>		
Operational histories of local mining companies	<input checked="" type="checkbox"/>	3-2013	BRC
Survey data – notes, traverse books, sheets, etc...	<input type="checkbox"/>		
	<input type="checkbox"/>		
	<input type="checkbox"/>		

Applicant's Signature Mark Leach

Date 01/31/23

Key to Pillar Sizes Due to Cover and Maximum Mining Height by ARMPS v. 5.1.22							
Entry Height (FT)	Percent Extraction	Crosscut Angle (Degrees)	Entry Width (FT)	Crosscut Spacing (FT)	Entry Centers (FT)	Maximum Overburden (FT)	Stability Factor
5.0	75.0	90	20	40	40	205	2.03
5.0	72.2	90	20	45	40	245	2.02
5.0	70.0	90	20	50	40	275	2.02
5.0	64.0	90	20	50	50	400	2.02
5.0	61.8	90	20	50	55	450	2.01
5.0	60.0	90	20	50	60	490	2.00
5.0	57.6	90	20	55	60	560	2.01
5.0	55.6	90	20	60	60	625	2.00
5.0	53.8	90	20	60	65	680	2.00
5.0	49.0	90	20	70	70	865	2.00
5.0	42.9	90	20	100	70	200	10.96

Key to Pillar Sizes Due to Cover and Average Mining Height by ARMPS v. 5.1.22							
Entry Height (FT)	Percent Extraction	Crosscut Angle (Degrees)	Entry Width (FT)	Crosscut Spacing (FT)	Entry Centers (FT)	Maximum Overburden (FT)	Stability Factor
3.7	75.0	90	20	40	40	255	2.03
3.7	72.2	90	20	45	40	305	2.03
3.7	70.0	90	20	50	40	350	2.00
3.7	64.0	90	20	50	50	510	2.01
3.7	61.8	90	20	50	55	575	2.00
3.7	60.0	90	20	50	60	625	2.01
3.7	57.6	90	20	55	60	720	2.01
3.7	55.6	90	20	60	60	805	2.00
3.7	53.8	90	20	60	65	875	2.00
3.7	49.0	90	20	70	70	1125	2.00
3.7	42.9	90	20	100	70	250	17.50

Key to Pillar Sizes Due to Cover and Maximum Mining Height by ARMPS v. 5.1.22							
Entry Height (FT)	Percent Extraction	Crosscut Angle (Degrees)	Entry Width (FT)	Crosscut Spacing (FT)	Entry Centers (FT)	Maximum Overburden (FT)	Stability Factor
5.0	78.9	60	20	40	40	155	2.06
5.0	75.7	60	20	45	40	205	2.02
5.0	73.1	60	20	50	40	240	2.03
5.0	67.7	60	20	50	50	335	2.00
5.0	65.2	60	20	55	50	390	2.02
5.0	63.1	60	20	60	50	440	2.01
5.0	61.3	60	20	65	50	480	2.00
5.0	59.8	60	20	70	50	510	2.01
5.0	63.1	60	20	55	55	435	2.00
5.0	60.9	60	20	60	55	495	2.01
5.0	59.0	60	20	60	60	540	2.00
5.0	57.0	60	20	65	60	605	2.01
5.0	55.3	60	20	70	60	665	2.01
5.0	55.4	60	20	65	65	650	2.00
5.0	53.6	60	20	70	65	720	2.00
5.0	52.1	60	20	70	70	765	2.00
5.0	49.2	60	20	80	70	905	2.00

Key to Pillar Sizes Due to Cover and Average Mining Height by ARMPS v. 5.1.22							
Entry Height (FT)	Percent Extraction	Crosscut Angle (Degrees)	Entry Width (FT)	Crosscut Spacing (FT)	Entry Centers (FT)	Maximum Overburden (FT)	Stability Factor
3.7	78.9	60	20	40	40	195	2.02
3.7	75.7	60	20	45	40	255	2.02
3.7	73.1	60	20	50	40	305	2.00
3.7	67.7	60	20	50	50	420	2.02
3.7	65.2	60	20	55	50	500	2.01
3.7	63.1	60	20	60	50	565	2.00
3.7	61.3	60	20	65	50	615	2.00
3.7	59.8	60	20	70	50	655	2.01
3.7	63.1	60	20	55	55	555	2.00
3.7	60.9	60	20	60	55	635	2.01
3.7	59.0	60	20	60	60	695	2.00
3.7	57.0	60	20	65	60	780	2.01
3.7	55.3	60	20	70	60	855	2.01
3.7	55.4	60	20	65	65	840	2.00
3.7	53.6	60	20	70	65	930	2.00
3.7	52.1	60	20	70	70	990	2.00
3.7	49.2	60	20	80	70	1175	2.00

Attachment 22.5

SAMPLE NOTIFICATION LETTER TO PROPERTY OWNERS

[Send to landowner and resident if they are different. Send at least six months, but not more than five years before mining beneath the property. Send DEP a copy of each letter and each return receipt or a copy of each unaccepted or undeliverable letter.]

**A. NOTICE OF INTENT TO MINE**

**and**

**B. NOTICE OF INTENT TO CONDUCT PRE-MINING SURVEYS – RESPONSE REQUESTED**

[DATE]

VIA CERTIFIED MAIL

RETURN RECEIPT REQUESTED

CERTIFIED MAIL NO. XXXX XXXX XXXX XXXX XXXX

[LANDOWNER NAME]

[MAILING ADDRESS]

RE: LCT Energy, LP  
Rustic Ridge #1 Mine  
CMAP No. 65131301  
CME Map ID No. [XX]  
Parcel Tax Map No. [XX-XX-XX-X-XXX]

Dear Landowner,

**A. NOTICE OF INTENT TO MINE**

The PA Department of Environmental Protection has issued a Coal Mining Activity Permit #65131301, operated by LCT Energy, LP (LCT) and known as the Rustic Ridge #1 Mine. On behalf of LCT, CME Engineering LP (CME) is sending ***Notice of Intent to Mine*** relative to the Pennsylvania Bituminous Mine Subsidence and Land Conservation Act (Subsidence Act), and the regulations of the Department of Environmental Protection (Department) at 25 Pa. Code Chapter 89.

LCT is authorized to conduct underground mining on the Lower Kittanning seam of coal. The mining area is located within Donegal and Saltlick Townships, Westmoreland and Fayette Counties. Your property has been identified as being located above the projected mining area. Mining operations beneath your property, as above referenced, will occur no sooner than six (6) months, but not more than five (5) years from the date of this notice. In accordance with the Subsidence Act, LCT shall prepare and update maps showing the projected mine workings every six-months. These “*Six-month Maps*” are typically prepared in March and September of each year and are available for inspection and copying by the public at the following locations:

Westmoreland County  
Office of Recorder of Deeds  
40 N Pennsylvania Ave  
Greensburg, PA 15601  
(724) 830-3518

Fayette County  
Office of Recorder of Deeds  
61 East Main Street  
Uniontown, PA 15401  
(724) 430-1238

California District Mining Office  
25 California Technology Park  
Coal Center, PA 15243  
(724) 769- 1100  
**By Appointment Only**

LCT Energy, LP  
983 Mt. Airy Dr.  
Johnstown, PA 15904  
(814) 254-4065  
**By Appointment Only**

Copies of the mining permit application for the Rustic Ridge #1 Mine are also kept in those same locations. These documents describe the procedures LCT normally follows in minimizing damage to structures, repairing or compensating for structure damage and restoring or replacing water supplies negatively affected by underground mining.

**B. NOTICE OF INTENT TO CONDUCT PRE-MINING SURVEYS**

This letter also serves as notice of LCT's request to conduct pre-mining surveys of your structure(s) and water supplies. You are afforded a pre-mine survey by the Bituminous Mine Subsidence and Land Conservation Act as amended in 1994. Refer to the web address links below for more information on the Subsidence Act, Water Source Surveys, and Structure Surveys. Please complete the attached form, then sign and return using the self-addressed envelope to the address listed on the attached form to schedule a survey. Your prompt attention to this request is required. Should you have any questions please call the California District Mining Office at the number listed above.

(Subsidence Act) [http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC\\_Act%2054.pdf](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC_Act%2054.pdf)

(Water Source Surveys) [http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC\\_Act%2054.pdf#page=7](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC_Act%2054.pdf#page=7)

(Structure Surveys) [http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC\\_Act%2054.pdf#page=11](http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-72110/BMSLC_Act%2054.pdf#page=11)

Sincerely,

CME Management LLC,  
general partner of CME Engineering LP

cc: LCT Energy, LP

**PRE-MINE SURVEY FORM**

Operator: LCT Energy, LP  
Operation: Rustic Ridge #1 Mine (CMAF No. 65131301)  
Municipality: Donegal & Saltlick Townships, Westmoreland & Fayette Counties, PA

Property Owner: [LANDOWNER NAME]  
[MAILING ADDRESS]

Map ID No. [XX]  
Parcel Tax Map No. [XX-XX-XX-X-XXX]

☐ **YES**, I request a pre-mine survey of my property. Accordingly, I am providing telephone numbers where I can be reached in order to schedule this survey.

Home phone number: \_\_\_\_\_

Cell phone number: \_\_\_\_\_

Best time to be contacted: \_\_\_\_\_

Best time to conduct pre-mine survey inspection: \_\_\_\_\_

\_\_\_\_\_

☐ **NO**, I do not request a pre-mine survey inspection of my property and structures. I hereby acknowledge receipt of the notification from CME Engineering, LP explaining my right to a pre-blast structural survey under State and Federal Laws.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Please return this form to: CME Engineering, LP  
165 East Union Street, Suite 100  
Somerset, PA 15501