

APPENDIX 3

**OFFICE OF SURFACE MINING
PERMIT AND UNDERGROUND MINE CRITIQUE AND CHRONOLOGY**

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**OFFICE OF SURFACE MINING (OSM)
PERMIT AND UNDERGROUND MINE CRITIQUE AND CHRONOLOGY**

**PREPARED IN RESPONSE TO THE OCTOBER 11, 2000,
IMPOUNDMENT BREAKTHROUGH**

**AT
MARTIN COUNTY COAL CORPORATION (MCCC)
BIG BRANCH SLURRY IMPOUNDMENT**

This report was prepared by OSM as a part of its review of the MCCC 2000 breakthrough. This report addresses the MCCC impoundment permit and adjacent underground mines.

Note that this report contains references to two coal seams: the Coalburg (also known as the Peach Orchard) and the Stockton (also known as the Broas). The documents referenced in this report variously refer to the coal seams as either the 1) Coalburg and Stockton, or 2) Peach Orchard and Broas. In order to avoid confusion, this report refers to the coal seams as the Coalburg and Stockton.

- 10/71 MCCC, 1-C Mine, Coalburg coal seam--Department of Mines and Minerals (DMM) file number 10291.1, and Mine Safety and Health Administration (MSHA) identification number 15-03752. Underground works opened at North Mains Portal (portal near prep plant).
- 1971 & 1972 MCCC, 1-S Mine, Stockton coal seam--DMM file number 10291.3 and MSHA identification number 15-18019. Underground works opened 1971 and abandoned November 1972. Elevation about 1,070 feet mean sea level (msl); mining height about 52 inches. Works located north of prep plant and at the east side of the impoundment.
- 1972 to 1975 Slurry was pumped into the Big Branch impoundment until 1975. At that time, MESA (predecessor to MSHA), issued an order that deactivated the impoundment until remedial modifications could be made. The impoundment had upstream and downstream dams to contain the slurry. The dams crossed Big Branch. A 48-inch diameter pipe conveyed the upvalley stream flow beneath the impoundment. The current embankment has covered the upstream dam.
- 2/20/76 Aerial photo. The photo shows the Big Branch slurry impoundment and a surface mine northwest of and outside the Big Branch drainage area. The photo does not show any of the slurry cells on the mountaintop as shown on the current maps.
- 6/14/78 Aerial photo. The Big Branch slurry impoundment appears about the same as in the February 20, 1976, photo. The surface mine has been regraded, and much of it

is revegetated. The photo shows slurry cells on the mountaintop, including the cell over the underground mine panel associated with the 2000 breakthrough. The cells appear to contain slurry. There is not a cell over the panel associated with the 1994 breakthrough.

- 3/29/79 280-8002, 79-acre interim permit application for existing coal processing facility. It extends to about 800 feet msl to the upstream end of the culvert in Big Branch.
- 4/26/79 280-8002, 79-acre interim permit issued. Covers the facilities existing at that time. Permit package prepared by Hill Engineering Company.
- 5/1/79 Non-compliance (NC) issued for failure to include the impoundment dam in the permit application.
- 10/2/79 Settlement agreement related to May 1, 1979, NC. MCCC was required to submit a plan for the permanent impoundment and dam.
- 10/15/79 280-8002 revision #1, to add 200 acres for total of 279 acres. Hill Engineering Company prepared the permit package. Under the revision, refuse will be placed in the abandoned slurry pond and raised to the top level of the pond. The permit package references a 1979 L. Robert Kimball & Associates engineering design for the refuse disposal, and portions of the permit contain information from the design. When refuse reaches 800 feet msl, the material will then be placed at the toe and placed in lifts. When the refuse reaches 960 feet msl, a wide bench will be placed there allowing for proper access to continue from the present road location next to the office. When refuse reaches 1,130 feet msl, the back face will be graded in such a manner that water is diverted into a series of sediment ponds. Refuse will be a combination of coarse refuse and material compressed and shredded from the megamat filter press recently installed at MCCC. Diversion channels will be constructed at about the 960 feet and 1,040 feet elevations. The Kimball report states "slurry was being pumped into abandoned mines and slurry ponds located northwest of the Big Branch area. Presently MCCC is implementing a megamat filter press that will compress slurry fines into 1 1/4" thick blocks." The permit does not address adjacent underground mining.
- 10/79 1-C Mine. One entry off the South Mains breaks out to the surface within the Big Branch refuse area. Hereinafter, this entry is referred to as a punchout.
- 12/3/79 280-8002 revision #2, to add 0.5 acres for total of 279.5 acres. Under the revision, a Division of Water approved dam will be constructed for water intake.
- 8/81 1-C Mine. Area adjacent to 2000 breakthrough mined. Mine floor elevation about 963 feet msl and about 10 feet mining height. (Slurry pool elevation about 1,060 feet msl before 2000 breakthrough.)

- 1/82 1-C Mine. Area adjacent to 1994 breakthrough mined. Mine floor elevation about 956 feet' msl and about 7 feet, 9 inches mining height. (Slurry pool elevation about 992 feet msl before 1994 breakthrough.)
- 7/15/82 280-8002 transition application (from Interim Program to Permanent Program Permit). Permit number 680-8002 assigned September 22, 1982.
- 5/1/84 Aerial photo. The slurry cell located over the panel associated with the 2000 breakthrough and shown on the 1978 aerial photo has been covered. The slurry impoundment shown in the 1976 and 1978 aerial photos no longer exists. It has been replaced with a coarse refuse fill. The coarse refuse fill extends up into the left and right branch of Big Branch. There are small pools at the head of each branch. The coarse refuse elevation is about 895 feet msl near the 1994 breakthrough location. The refuse and pools do not extend to the 2000 breakthrough location. A road/diversion ditch has been cut along the contour--elevation about 950 feet msl at the 2000 breakthrough location and about 935 feet msl at the 1994 breakthrough location. The surface above and below the road/ditch has been timbered in some locations and in other locations timbered and scalped. The underground entry punchout off the South Mains shows on this photo. It appears to be slightly above the road/diversion.
- 8/26/84 680-8002, 257-acre permanent program permit issued (the application was for the transition of the interim permit, 208-8002, into the permanent program). Permit package prepared by Hill Engineering Company. L. Robert Kimball & Associates prepared the engineering design for the refuse disposal (design dated 1979). The Kimball plan addresses abandoning the slurry pond, buttressing the freshwater impoundment, and making a 49.3 million cubic yard valley fill refuse embankment. The permit boundary for the refuse area is similar to the current impoundment area.
- Item 13, groundwater baseline. One monitoring well is located south of the prep plant. Drainage from the underground works is not discussed for baseline. The underground works are not discussed with respect to the description of the groundwater. The maps do not show the flow path for mine water.
 - Item 14.7, previous mining information. The response does not address underground mining. "This is an existing coal processing facility which has been active since 1974. No coal has been mined under this permit."
 - Item 18, map requirements. Mine openings and the extent of underground works are required. The permit maps do not show any openings. The permit maps do not show the extent of the underground works. The inspector's walk sheet notes that the permit works are

within 500 feet of underground mines. The inspector did not recommend that the permit maps be revised to show the underground works.

- Item 19.3, description of operation. The permit states that the permit receives its coal by underground belts. The refuse area is cleared and grubbed prior to deposition of refuse. Refuse from the plant is deposited in the Big Branch disposal area.
- Item 22.1, surface blasting. The permit states that no surface blasting is required for the continuation of the existing processing facilities.
- Item 23.2, sealing and managing mine openings. The permit states that there are no mine opens within the permit area to seal. The permit does not address how the punchout (see October 1979), off the South Mains will be sealed/managed. The punchout is in the refuse area.
- Item 24, surface disposal of excess spoil and waste plan. This item provides general information on the refuse design and states that the complete MSHA-approved plan is on file in the Prestonsburg DSMRE office. Fill limits are at about 1,130 feet msl.
- Item 26, protection of hydrologic systems. The permit does not address the underground works and whether their proximity to the refuse will have an effect on the ground and surface water. The permit does not propose any underground mine water monitoring to evaluate the impoundment effects on water quantity and quality. The groundwater monitoring point is located south of the prep plant. No groundwater monitoring is proposed at the underground mine portals. Water from the portals apparently flows through silt structures covered by other permits, but the Big Branch permit does not address a chemical analysis of these discharges to evaluate the effects of the refuse on the mine/groundwater.
- Item 26.11, 3 diversion ditches. Diversion ditches are designed at 990 feet-905 feet msl; 1,071 feet-981 feet msl; and 1,135 feet-1,047 feet msl.
- Item 34.1, disposal of coal processing waste in underground mines. The permit states that MCCC is presently processing an application with MSHA to do underground injection in some of the abandoned works.

When approvals are acquired, this permit will be revised to include this proposed plan. The permit covers the slurry cells located on the mountaintop.

- 1985 1-C Mine. Seals to underground panel associated with 2000 breakthrough are repaired/replaced. Slurry injected into the underground works developed a load on the seals and caused the damage. It was reported that slurry from this breakthrough entered the North Mains.
- 3/26/85 Aerial photo. An embankment has been built across Big Branch. The embankment extends to the south end of the surface area over the underground panel associated with the 2000 breakthrough. The pool elevation behind the embankment is about 900 feet msl. This photo is the base for the 100-scale contour/mine map attached to the August 8, 1994, impoundment sealing plan prepared by Ogden Environmental and Energy Services for MCCC. The underground entry punchout off the South Mains shows on this photo.
- As of 6/30/86 1-C Mine Map. Based on a review of the DMM map, all underground mine production west of the North Mains and south of the West #1 portals has been completed. The mine map shows that the North Mains are being ventilated (i.e., the mains are active). These underground works underlie the 680-8002 permit area including the area added by the July 30, 1986, permit amendment #1.
- 7/30/86 680-8002 amendment #1, 124.9 acres added for a total of 381.9 acres. Permit package prepared by Summit Engineering, Inc. Impoundment design prepared by Esmer & Associates Inc. The amendment: 1) changed the dry refuse structure to a slurry impoundment; 2) obtained approval to contour mine portions of the Coalburg and Stockton coal seams within the impoundment area; and 3) obtained approval to mountaintop mine the Richardson coal seam at three small areas (1,250 feet msl) above the refuse area. The amendment provides that 2,280 feet of the Coalburg coal seam will be mined along the east side of the impoundment at about 980 feet msl and the 13,000 feet of the Stockton coal seam will be mined around most of the impoundment at about 1,070 feet msl.
- The amendment does not assess breakthrough potential.
 - Item 13, groundwater baseline. One monitoring well is located south of the prep plant. Drainage from the underground works is not discussed for baseline. The underground works are not discussed with respect to the description of the groundwater. The amendment does not show the direction of mine water flow.
 - Item 14.7, previous mining information. The response does not address underground mining.
 - Item 18, map requirements. Mine openings and the extent of underground works are required. The permit maps do not show all of the openings to/from the underground works including but not limited

to: 1) punchout off the South Mains into the impoundment area and 2) portals/face-up 2,000 feet north of North Mains Portal in/near embankment area. The permit maps do not show the extent of the underground works in the Coalburg and Stockton coal seams. The inspector's walk sheet notes that the permit works are within 500 feet of underground mines. The inspector did not recommend that the permit maps be revised to show the underground works.

- Item 19.3 general plan of operations. This lists the impoundment, Coalburg and Stockton coal seams contour cuts, and the Richardson coal seam mountaintop mining. The contour cuts will be returned to approximate original contour (AOC), and an outcrop barrier will be retained. Excess spoil from the contour cuts will be used on the embankment for cover over the refuse. Spoil from the mountaintop works will be used to cover the refuse. For the impoundment phase designs, the permit references the Esmer and Associates design.
- Item 22.1, surface blasting. The permit states "Approval from MSHA and DMM will be obtained prior to blasting within 500 feet of an active underground mine." By letter dated April 10, 1986, Summit responded to a DSMRE deficiency letter and stated, "Since the mining may not occur for some time, the location of active underground mining will be different from now. MCCC has indicated they would rather wait until closer to the time mining will occur within 500 feet of the underground mining to submit an MSHA Blasting Approval Form." See "As of 6/30/86" chronology; coal extraction in the immediate areas appears to have been completed. The 1-C Mine North Mains continued to be ventilated (i.e., are active) until the 2000 breakthrough. An anticipated blast design (ABD) was not submitted with the permit. It should be noted that an ABD may be submitted after permit approval but is required prior to blasting within 500 feet of an underground mine.
- Item 23, backfilling and grading. AOC request for mountaintop mining area. Coalburg and Stockton coal seams will be mined near the end of impoundment phase III (approximately 13 years). Summit calculated 1.34 and 1.28 safety factors for the Coalburg and Stockton coal seam backfills, respectively. Summit used a 0.05 pore pressure ratio (i.e., 10 percent inundated) for the stability analysis even though the backfill will progressively become inundated as the embankment and slurry pool rise in elevation.
- Item 23.2, sealing and managing mine openings. The permit states, "No mine openings, bore holes, etc. are to be located within the permit area." The permit does not address how the punchout (see October 1979 date),

off the South Mains, will be sealed/managed. The punchout is in the impoundment area.

- Item 26, protection of hydrologic systems. The permit does not address the underground works and whether their proximity to the slurry pond will have an effect on the ground and surface water. The groundwater monitoring point is located south of the prep plant. No groundwater monitoring is proposed at the underground mine portals. Water from the portals apparently flows through silt structures covered by other permits, but the Big Branch permit does not address a chemical analysis of these discharges to evaluate the effects of the refuse on the mine/groundwater.
- Item 33, subsidence over the “seam to be mined.” The question relates only to underground mining to be conducted according to the permit. The permit states that no underground mining will be conducted. It should be noted that DSMRE’s current permit form has been revised by adding a question for surface mining permits, i.e., whether there are underground works under the proposed surface activities. The permit does not contain a pillar stability analyses for the portions of the embankment that laid over the abandoned portions of the 1-C and 1-S mines and the 1-C mine’s active mains.
- Item 34.1, disposal of coal processing waste in underground mines. The permit states that no coal processing waste will be stored in underground works.

7/23/84

Esmer & Associates design for impoundment structure. Submitted to MSHA and attached to 680-8002 amendment #1.

- Pgs. 14 and 15, “There have also been deep mining operations in this area.” Initially downstream construction; later stages will be upstream. Upstream toe on the existing stream bed at 838 feet msl; downstream toe on existing coal refuse at 810 feet msl; crest of the embankment at 1,200 feet msl. It should be noted that at the time of this submittal, coal refuse had already been placed on the existing streambed as permitted by October 15, 1979, permit revision. Per pages 37 and 38, the original embankment was from 710 feet msl to 800 feet msl at the crest with fine refuse at 790 feet msl. Slurry would be added to the impoundment for 41.5 years; combined refuse would be added for 4.1 years. Finally, the impoundment would be capped with combined refuse for 2.1 years for a total life of 48.1 years.
- Pg. 16, dry densities; coarse coal refuse 98.2 pounds per cubic foot (pcf), fine coal refuse 70 pcf.

- Pg. 18, structure classified as a high hazard Class C structure. The foundation of the proposed structure consists almost entirely of existing coal refuse.
- The Phase cross-sections do not show the underground mine works.
- Phase I embankment crest 940 feet msl (decant inlet at 921 feet msl).
- Phase II downstream construction to 960 feet msl (decant inlet at 921 feet msl).
- Phase III downstream construction to 1,100 feet msl (decant inlet at 989 feet msl). The maximum pool depth over the mine roof at the 1994 and 2000 breakthrough locations is about 19 feet.
- Phase IV will consist of the extension of the Phase III embankment in the downstream direction to 1,100 feet msl (decant inlet at 1,028 feet msl). The maximum pool depth over the mine roof at the 1994 and 2000 breakthrough locations is about 58 feet.
- Phase V upstream construction to 1,100 feet msl (decant inlet at 1,067 feet msl). The 1994 and 2000 breakthrough locations will be covered with coarse refuse to 1,076 feet msl and 1,060 feet msl; then with slurry to the decant inlet.
- Phase VI downstream construction (with coarse refuse overlying the Phase IV and V material) to 1,200 feet msl (decant inlet at 1,193 feet msl). The 1994 and 2000 breakthrough locations will be covered with coarse refuse to 1,230 feet msl and 1,100 feet msl. Then the 2000 breakthrough location will be covered with slurry to the decant inlet.
- There are underground mines in two coal seams around the perimeter of the impoundment site.
- Mine No. 1-S beneath the eastern edge of the site in the Stockton coal seam was abandoned on November 30, 1972. The Stockton coal seam outcrop is at 1,075 feet msl on the western perimeter of the site. A map shows the underground works. The map does not show the Stockton coal seam cropline adjacent to the works.
- Mine 1-C extends around the entire perimeter of the site in the Coalburg coal seam and is still in operation. The Coalburg coal seam outcrops between elevations 960 feet msl and 1,000 feet msl. A map shows the

underground works. The map also shows the Coalburg coal seam cropline adjacent to the works.

- “It is not anticipated that subsidence will be a problem, since the underground mines are situated only beneath the perimeter of the impoundment site and do not extend for any appreciable distance directly below the proposed structure.” The plan does not contain pillar stability analyses for the portions of the embankment that laid over the abandoned portions of the 1-C and 1-S mines and the 1-C mine’s active mains.
- Fifty-three test borings were made for the dam foundation and pool area. Drill holes intercepted the underground mines.
- Pg. 59, inspection and emergency procedures.

As of 6/87 Dam crest 967 feet msl; slurry delta 939 feet msl.

As of 6/30/87 1-C Mine. Based on a review of the DMM map, all underground mine areas west of the North Mains have been sealed and abandoned.

As of 2/88 Dam crest 970 feet msl; slurry delta 944 feet msl.

As of 6/30/88 1-C Mine. Based on a review of the DMM map, the First East Mains off North Mains sealed. End of production from the 1-C Mine out of the North Mains Portal.

8/9/88 680-8002 mid-term review. Blasting information was revised to conform to the new regulations. The permit reviewer requested an ABD if blasting is, or will be, conducted with 500 feet of an underground mine. An ABD was not included in the permit. It should be noted that the regulations do not require the ABD to be submitted during permit approval. Submittal is, however, required prior to blasting within 500 feet of the underground mine.

11/14/88 680-8002 major revision #1. This revision added point removals operations on both the Coalburg and Stockton coal seams. This will accommodate a refuse belt and related structures. Two of the point removal areas are within 200 to 300 feet of the active North Mains of the 1-C Mine. One of the point removal areas is within about 100 feet of the 1-S Mine. The permit maps do not show the underground works and states that blasting will not be conducted within 500 feet of active underground works.

As of 6/89 Dam crest 987 feet msl; slurry delta 958 feet msl.

6/1/89 DSMRE aerial video. Based on the annual certifications, the pool elevation is about 958 feet msl. The underground mine floor elevation is about 956 feet msl at the 1994 breakthrough location and about 963 feet msl at 2000 breakthrough location. Much of the area around the impoundment has been cleared and grubbed above the water line (in some cases possibly up to the Stockton coal seam). A road has been built around the impoundment. In most cases, the road is above the pool elevation. At the 1994 breakthrough location, the road appears to be about 10 feet above the pool and about 4 feet above the mine roof. At the 2000 breakthrough location, the road may be about 25 feet above the pool and about 10 feet above the mine roof. It should be noted that it is difficult to determine the precise location of the road and 2000 breakthrough from the videos, so the road elevation projections may not be accurate. The punchout off the South Mains does not show on the video.

10/16/89 680-8002 renewal. The action does not contain information pertinent to the breakthrough.

As of 6/90 Dam crest 991 feet msl; slurry delta 966 feet msl.

9/20/90 680-8002 minor revision #2. Revised silt control plan.

As of 7/91 Dam crest 1,007 feet msl; slurry delta 971 feet msl.

As of 7/92 Dam crest 1,012 feet msl; slurry delta 978 feet msl.

10/2/92 680-8002 mid-term. The action does not contain information pertinent to the breakthrough.

11/5/92 680-8002 minor revision #3. Revised silt dam #2.

As of 8/93 Dam crest 1,027 feet msl; slurry delta 983 feet msl.

11/20/93 Aerial photo. As compared to the 1985 aerial, the timbering/clearing has extended upslope. Also, the underground entry punchout (elevation about 950 feet msl) off the South Mains is covered with slurry.

5/22/94 680-8002 Big Branch slurry impoundment. The 1994 breakthrough occurred. The mine floor elevation is about 956 feet msl, and the mine roof is at about 964 feet msl. The slurry pond elevation prior to the breakthrough is about 992 feet msl. The pool dropped 6 feet during the breakthrough before being sealed. MSHA estimated that 6.5 to 8.7 million cubic feet (51 to 68 million gallons) of water/slurry drained into the underground works. The impoundment leaked into the 1-C Mine at the southwest side of the pool area. Drainage discharged from the

1-C Mine out of the South Mains Portal, Mill Branch Portals, and through a blowout at a contour cut along Big Branch Hollow.

- 7/5/94 680-8002 minor revision #4. Withdrawn.
- 8/4/94 680-8002 renewal. The action does not contain information pertinent to the breakthrough.
- 8/8/94 MCCC submitted "Impoundment Sealing Plan" to MSHA. The plan, dated 8/8/94, was prepared by Ogden Environmental and Energy Services. The plan relates to the 1994 breakthrough. For a critique of the plan, see OSM's report on the 2000 breakthrough.
- 8/18/94 MCCC submitted minor permit revision #5 (permit number 680-8002) to DSMRE. The revision was prepared by Summit Engineering, Inc. The revision contained the Impoundment Sealing Plan as well as other information required under the DSMRE permitting process. For a critique of the revision, see OSM's report on the 2000 breakthrough.
- As of 9/94 Dam crest 1,033 feet msl; slurry delta 992 feet msl.
- 10/20/94 MSHA approved the Impoundment Sealing Plan.
- 12/7/94 DSMRE approved minor permit revision #5.
- 1/13/95 MSHA approved a change in the plan for water seals at the South Mains Portal. One seal instead of two was approved. According to Ogden, one water seal would provide the safety of two. The MSHA correspondence file reviewed by OSM did not contain any calculations to support the Ogden conclusion. MCCC did not request DSMRE's approval of this change. (See October 20, 1994, for the original plan and September 29, 1995, for another change.)
- 1/95 to 7/95 The contour cut above the Stockton coal seam was blasted. The blasted material was used for the construction of the seepage barrier.
- As of 6/95 Dam crest 1,045 feet msl; slurry delta 1,006 feet msl.
- 9/29/95 MSHA approved a change in the plan for the water seal at the South Mains Portal. Instead of a water seal, the portal would be closed (for protection purposes) by a fence. MCCC did not request DSMRE's approval of this change. (See October 20, 1994, for the original plan and January 13, 1995, for another change.)

9/29/95 MSHA approved a change in the method of construction of the bulkheads adjacent to the North Mains. The original bulkhead was included in the Ogden sealing plan submitted to DSMRE as an attachment to permit revision #5. MCCC did not request DSMRE's approval of this change.

2&3/96 Bulkheads off North Mains were constructed.

As of 6/96 Dam crest 1,057 feet msl; slurry delta 1,019 feet msl.

8/22/96 DSMRE aerial video. Pool elevation about 1,018 feet msl based on the weekly inspection reports. Contour cut of the Stockton coal seam is completed. Bench and seepage barrier vegetated to varying degrees.

As of 6/97 Dam crest 1,070 feet msl; slurry delta 1,034 feet msl.

4/28/98 680-8002 mid-term. The action does not contain information pertinent to the breakthrough.

As of 6/98 Dam crest 1,095 feet msl; slurry delta 1,044 feet msl.

3/30/99 680-8002 minor field revision #2. Added a new mine management area. Nothing pertinent to the breakthrough.

As of 6/99 Dam crest 1,095 feet msl; slurry delta 1,051 feet msl.

7/26/99 680-8002 renewal. The action does not contain information pertinent to the breakthrough.

As of 1/1/00 Last map on file at DMM. This map, as well as the preceding DMM maps for the 1-C Mine, shows that the North Mains are ventilated (i.e., are active).

1/11/00 680-8002 amendment #2. The amendment, prepared by Summit Engineering, adds a coarse refuse hollowfill and additional mine areas, sediment ponds, and access roads. Item 35.3 of the permit asks if any portion of the proposed permit area has been undermined. If the response is yes, the applicant is required to describe the potential effects subsidence may have on the structure. The permit answers "no" to the question. Portions of the South Mains, including the entries to the South Mains Portal, appear to lie under the proposed coarse refuse hollowfill. Note that the underground mine works are not shown on the permit maps.

As of 6/00 Dam crest 1,096 feet msl; slurry delta 1,059 feet msl.

- 10/11/00 680-8002 Big Branch slurry impoundment. Impoundment breakthrough into 1-C Mine. The mine floor elevation is about 963 feet msl, and the mine roof is at about 973 feet msl. The slurry pond elevation prior to the 2000 breakthrough was about 1,060 feet msl. The pool dropped about 13.8 feet during the breakthrough before being sealed. An estimated 306 million gallons of water/slurry drained into the underground mine.
- 10/16/00 Aerial photo. The photo shows the contour cut at/near the Stockton coal seam. The photo also shows the lowered pool and the 2000 breakthrough area.

Notes:

- 1) DMM Mine Maps. In order to evaluate the relationship of the impoundment and the underground mine works, this review included an examination of MCCC's annual licensing maps submitted to DMM. The impoundment information shown on the DMM maps was also compared with the annual impoundment certifications and weekly inspection reports. DMM requires the maps to contain information for water pools above the underground mines. The review found that the impoundment reached the elevation of the underground mine about mid-1989; however, pool information was shown on only 5 of the 10 annual licensing maps submitted after mid-1989. The pool elevation information on three of those five maps did not compare with the elevations obtained from the certifications/reports.

Only the last three DMM maps showed the embankment. Consequently, prior to the last three maps, OSM could not use the DMM maps to determine the lateral extent of the pool with respect to the location of the mine works. Also, it is difficult to use the annual certification maps to determine the pool and mine relationship because the certification maps do not show the mine works.

- 2) MSHA and DSMRE Embankment Stage Approvals and Plan Changes. MSHA approved phase 1 of the Big Branch slurry impoundment on March 5, 1985. DSMRE approved the impoundment (permit amendment #1) on July 30, 1986. DSMRE approval did not "condition" the permit to limit construction to phase 1 activities as approved by MSHA. MSHA subsequently received and approved a number of impoundment plan revisions from MCCC. DSMRE's permit file for the most part does not contain the proposed revisions and approvals.
- 3) DSMRE Permit Maps. None of the permit maps for the various permitting actions (except the maps attached to the 1994 sealing plan) show the embankment and pool limits as the impoundment increased in elevations. In some cases, this information may be pertinent to the permitting action.

A side-by-side comparison of surface and underground maps is required to determine the relationship of surface and underground features. This method can result in inaccurate correlations. The 400-scale underground mine map attached to the 1994 sealing plan contains limited surface information to enable a reliable correlation of surface features with the underground works. The correlation of surface and underground maps is cumbersome even when the maps contain sufficient reference points. MCCC, as evidenced by the 100-scale surface/underground map attached to the 1994 sealing plan, has the ability to produce a 400-scale surface/underground map for the entire mine.