

**REPORT OF THE  
SPECIAL RECLAMATION FUND  
ADVISORY COUNCIL**

February 7, 2020



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## EXECUTIVE SUMMARY

The Special Reclamation Fund Advisory Council (the “SRFAC”) was established by the Legislature in 2001 in order to ensure the effective, efficient and financially stable operation of the Special Reclamation Fund (the Fund). (W.Va. Code § 22-1-17). According to W.Va. Code § 22-1-17 the SRFAC shall consist of eight members, including the Secretary of the West Virginia Department of Environmental Protection (WVDEP) or his or her designee, the Treasurer of the State of West Virginia or his or her designee, the Director of the National Mine Land Reclamation Center at West Virginia university and five members to be appointed by the governor with the advice and consent of the Senate.

The Fund is designated by the Legislature for the reclamation and rehabilitation of lands subject to permitted surface mining operations and abandoned after 1977, where the bond posted is insufficient to cover the cost of reclamation. The Fund is presently funded by a tax of 27.9 cents per ton of clean coal mined in West Virginia. From this revenue, funds based on a tax rate of 15 cents per ton are being paid into the Special Reclamation Water Trust Fund (SRWTF), while coal tax revenues based on 12.9 cents per ton are being paid into the Fund. According to W.Va. Code § 22-3-11, “Beginning with the tax period commencing on July 1, 2009, and every two years thereafter, the special reclamation tax shall be reviewed by the Legislature to determine whether the tax should be continued: *Provided*, That the tax may not be reduced until the Fund and SRWTF have sufficient moneys to meet the reclamation responsibilities of the state established in this section.”

The SRWTF was created “for the purpose of assuring a reliable source of capital to construct, operate, and maintain water treatment systems on forfeited sites.” (W.Va. Code § 22-3-11).

The Secretary of the WVDEP is required to conduct formal actuarial studies every two years and conduct informal reviews annually on the Fund and SRWTF. The SRFAC is also required to make a report to the Legislature every year on the financial condition of the Fund. (W.Va. Code § 22-1-17). The report is to include: “A recommendation as to whether or not any adjustments to the special reclamation tax should be made considering the cost, timeliness and adequacy of bond forfeiture reclamation, including water treatment [and] a discussion of the SRFAC 's required study issues.”

In accordance with the statutory requirements, the SRFAC submits the following:

**1. Recommendation:**

Based upon conclusions drawn from information included in this report, the SRFAC makes the following recommendations to the Legislature:

The SRFAC recommends that the present 12.9 cent per ton tax dedicated to the Fund remain in force and that the tax dedicated to the SRWTF remain at 15 cents per ton. It was previously established by the Council that the Fund would cover all costs for both land reclamation and water treatment through June 2018. Then starting in July 2018, the SRWTF would begin covering the cost for water treatment—both water capital costs and ongoing water treatment costs. Following reviews of the financial status and investment earnings of both funds it was the consensus of the Council, this year, to continue paying for all reclamation cost out of the Fund to allow the SRWTF to continue building assets while earning higher yields. It was also agreed that fund transfers from the SRWTF to the Fund would occur, as needed, to maintain a fund balance of \$10,000,000.

The SRFAC further recommends that the State Legislature form a panel to examine the elements of our State code that result in uncontrolled liabilities, how other states deal with such issues and finally to propose a State legislative initiative to rationalize water quality regulation to meet the conditions of the Federal Clean Water Act while adding rationality and certainty to the process.

The SRFAC recommends that the Legislature continue to examine the implications of the recent court rulings and subsequent lawsuit settlements on the Special Reclamation Fund, Abandoned Mine Lands, and voluntary efforts by citizen-led watershed groups to address historic mining-reclamation related liabilities. The SRFAC further recommends that the Legislature examine the mine reclamation and bonding programs of other states and, as implemented in Tennessee, by the federal Office of Surface Mining in order to determine whether the statute and regulations creating the Fund and SRWTF in West Virginia have inappropriately interpreted SMCRA to require long-term CWA liabilities. The SRFAC further recommends the Legislature examine the separate and distinct authorities of the Clean Water Act (CWA) in assessing the eligibility of future forfeitures for transfer of liabilities to the SRWTF. The SRFAC is concerned about default transfer of water treatment liability to the SRWTF when opportunities exist to pursue responsible parties under the CWA per the requirements of an NPDES (CWA Section 402) permit.

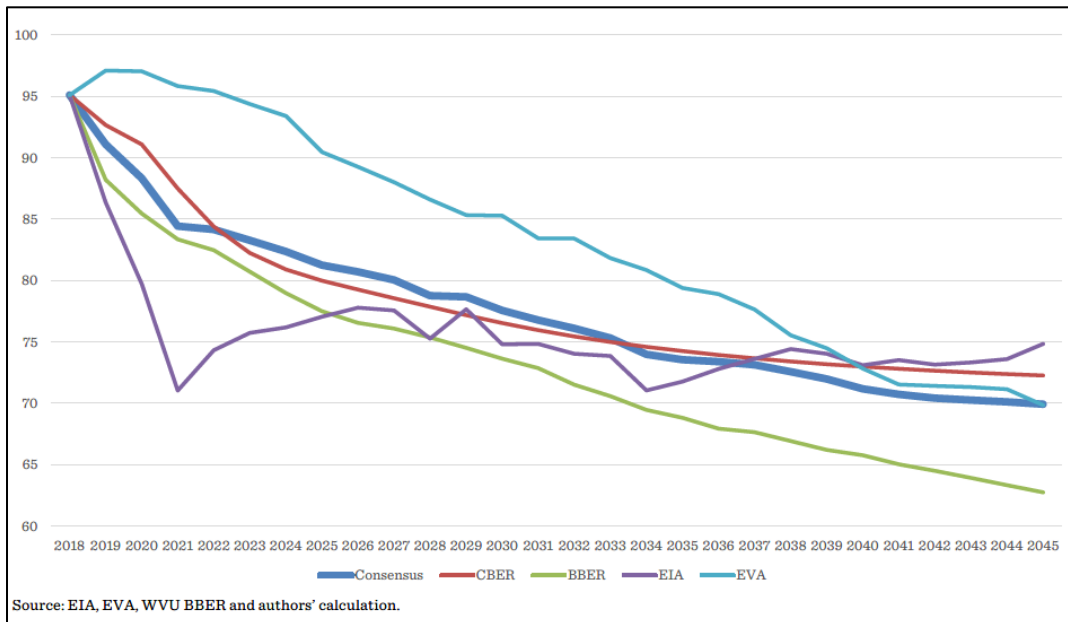
**2019 Study issues:**

**1. Consensus Coal Production Forecast for West Virginia –** Conducted by Marshall University, Center for Business and Economic Research.

The West Virginia Consensus Coal Production Forecast is a combined production forecast comprised of four component forecasts; Energy Information Administration (EIA), Energy Ventures Analysis (EVA), Marshall University Center for Business and Economic Research (CBER), and West Virginia University Bureau for Business and Economic Research (BBER). A consensus approach to forecasting seeks the wisdom of the crowd in producing an expectation for output from the coal industry. The Consensus Forecast is used to provide the best expectation of tax revenues to be collected for mandatory reclamation activities conducted through the Special Reclamation Fund and the Special Reclamation Water Trust Fund.

The report describes recent historical coal production trends for the State of West Virginia including the individual industries that comprise the major segments of demand for coal produced in West Virginia. Each of the component forecasts used to form the Consensus Forecast is described, with information about assumptions and resulting projected levels of production for West Virginia. The process used to produce the Consensus is also described, including the weightings applied to each of the component forecasts. The West Virginia Consensus Coal Production Forecast is calculated for the years 2019 through 2045.

As can be seen in Figure 1, the consensus forecast projects that West Virginia will experience a reduction in coal production in the next two decades. The full report can be found in Appendix B.



**Figure 1 Consensus and Component Forecasts 2019 (million tons)**

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2. **Actuarial Analysis** – Conducted by Taylor & Mulder, Property and Casualty Consulting Actuaries.

Taylor & Mulder’s projections of revenues and expenses to the Funds imply that the Funds will be solvent on a cash basis through 2039. Figure 2 shows a simplified cash flow projection for the Fund and SRWTF combined over the next 20 years. It should be noted that the projections assume that the SRWTF transfers money to the Fund in order to maintain a fund balance of \$10,000,000. The full report can be found in Appendix C.

Fiscal Year Ending 6/30	Total Expenditures	Total Revenues	Beginning Balance		WTF to SRF Transfers	Ending Balance	
			SRF	WTF		SRF	WTF
Prior			62,943,947	110,359,898		62,943,947	110,359,898
2020	57,544,445	37,482,687	62,943,947	110,359,898	-	24,362,908	128,879,180
2021	76,119,387	30,679,619	24,362,908	128,879,180	49,425,622	10,000,000	97,802,320
2022	32,711,796	27,369,924	10,000,000	97,802,320	21,418,914	10,000,000	92,460,447
2023	29,176,948	25,897,670	10,000,000	92,460,447	18,447,368	10,000,000	89,181,168
2024	25,428,775	24,898,861	10,000,000	89,181,168	14,924,915	10,000,000	88,651,254
2025	14,055,828	23,970,879	10,000,000	88,651,254	3,893,259	10,000,000	98,566,305
2026	14,603,196	23,060,609	10,000,000	98,566,305	5,422,883	10,000,000	107,023,718
2027	19,791,383	22,547,966	10,000,000	107,023,718	11,127,150	10,000,000	109,780,301
2028	16,579,068	22,006,975	10,000,000	109,780,301	8,135,571	10,000,000	115,208,208
2029	16,408,814	21,809,641	10,000,000	115,208,208	8,118,342	10,000,000	120,609,036
2030	15,725,111	21,252,367	10,000,000	120,609,036	7,875,678	10,000,000	126,136,292
2031	19,016,670	20,392,548	10,000,000	126,136,292	11,968,735	10,000,000	127,512,171
2032	18,635,132	19,946,872	10,000,000	127,512,171	11,783,087	10,000,000	128,823,910
2033	16,883,595	19,876,492	10,000,000	128,823,910	9,859,736	10,000,000	131,816,808
2034	16,051,282	19,993,676	10,000,000	131,816,808	8,737,461	10,000,000	135,759,201
2035	16,289,266	20,666,774	10,000,000	135,759,201	8,258,762	10,000,000	140,136,710
2036	18,934,094	21,688,144	10,000,000	140,136,710	9,904,018	10,000,000	142,890,759
2037	21,343,612	19,209,062	10,000,000	142,890,759	14,725,163	10,000,000	140,756,209
2038	24,942,105	18,679,786	10,000,000	140,756,209	18,523,178	10,000,000	134,493,891
2039	26,462,843	18,405,200	10,000,000	134,493,891	19,773,968	10,000,000	126,436,248

Figure 2 Cash flow projection for the SRF and WTF combined over the next 20 years.

**Membership Status of the Special Reclamation Fund Advisory Council**

Currently Mike Sheehan serves as the member representing the Cabinet Secretary of the WVDEP. Carolyn Atkinson, who served faithfully for many years, retired in May 2019 and was replaced with Abigail Campbell to serve as the member representing the Treasurer of the State of West Virginia. Dr. Paul Ziemkiewicz serves as the member representing the Director of the National Mine Land Reclamation Center at West Virginia University.

Christine Risch, Marshall University, Center for Business and Economic Research, serves as the Actuary/Economist member. Bill Raney serves as the member representing the interests of the coal industry. John Morgan serves as the member representing the interest of environmental protection organizations. Ronald Pauley serves as the member representing the interests of coal miners. Christopher Pence serves as the member representing the interests of the general public.

#### **BACKGROUND ON THE SPECIAL RECLAMATION FUND**

In 2001 the legislation establishing the SRFAC also increased the tax on clean coal mined in West Virginia, from three to seven cents per ton (the “Continuing Tax”), and levied an additional seven cents per ton (the “Temporary Tax”), to be deposited into the Fund. The revenues of the Fund were designated to pay for reclamation on post-1977 bond-forfeited sites.

The 2001 legislation provided for the Temporary Tax to be in effect for thirty-nine months. As a result of a 2005 actuarial report finding that the expiration of the Temporary Tax would result in nearly immediate insolvency of the Fund, the Temporary Tax was extended by the Legislature in 2005, for an additional eighteen months. A 2007 actuarial study commissioned by the SRFAC found that the failure to extend the Temporary Tax again would result in insolvency of the Fund. Accordingly, in 2008 the Legislature, through SB 751, created the SRWTF and enacted a temporary, twelve-month tax of 7.4 cents which was to be allocated between the Fund and a SRWTF. Twelve and nine-tenths cents was dedicated to the Fund and 1.5 cents was deposited into the SRWTF. An updated actuarial study in 2008 concluded that terminating the temporary tax would result in insolvency within a few years. In response, in the 2009 legislative session, the Legislature amended W.Va. Code § 22-3-11 to remove the expiration date for the Temporary Tax and provided instead for biennial review of the Tax by the Legislature. (Acts of the Legislature 2009, chapter 216).

Based upon projections under the 2011 Actuarial Analysis performed by Pinnacle Actuarial Resources, Inc. the Fund was found to be sufficiently funded under the existing 12.9 cent tax. However, the SRFAC was concerned that as the SRWTF began making payments for water capital and ongoing water treatment in Fiscal Year 2019, as projected, the SRWTF would fall into a deficit position in the second year of operation-2020. (2011 Actuarial Valuation, page 3). Declining coal production projected by the 2011 Consensus Coal Production Forecast and the significant increase in water treatment costs resulting from court rulings in two cases were

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contributing factors in the projected insolvency of the SRWTF. Accordingly, in 2012 the Legislature increased the special reclamation tax to 27.9 cents per ton, 15 cents of which was to be deposited into the SRWTF.

Based upon projections under the 2013 Actuarial Analysis performed by Pinnacle Actuarial Resources, Inc. the Fund was projected to be over 100 percent funded using a 20-year cash flow basis and 95.7 percent funded using a 35-year cash flow basis. The SRWTF was (and is today) accumulating 15 cents per ton coal tax revenue and interest and was projected by the 2013 Actuarial Valuation to be 150.4 percent funded using a 20-year cash flow basis and 89.9 percent funded using a 35-year cash flow basis.

Based on the 2015 Actuarial Analysis conducted by Taylor & Mulder, the Fund was projected to fall to a low of \$51.5 million in 2018. This was due to paying for all reclamation cost for both land and water as well as operation and maintenance cost associated with water treatment. The Fund was projected to then slowly recover to \$187.5 million by the end of the twenty-year study period, at which point an \$8.2 million liability would remain. The SRWTF was expected to accumulate approximately \$120 million by 2018 before beginning to support water reclamation costs in 2019 (*However, it should be noted that as of December 31, 2017 the balance in the SRWTF had only reached \$104 million*). Afterwards, the SRWTF was projected to show gains, reaching \$289.8 million by the end of the twenty-year study period with a \$110.5 million liability remaining. Both funds combined were projected to total approximately \$477.3 million at the end of the twenty-year study period with a total remaining liability of \$118.7 million.

Based on the 2017 Actuarial Analysis conducted by Pinnacle Actuarial Resources, Inc, the results indicated that on a present value basis the Fund is 97.3% funded over a twenty-year projection and 93.6% funded over a thirty five-year projection period but indicated that the fund would go into a negative balance in 2021. The SRWTF is 162.6% funded over a twenty-year projection, 151.4% funded over a thirty five-year projection period and is fully funded throughout the entire projection period. Combined the two funds are 123.4% and 115.8% funded over twenty and thirty five-year projections respectively, and fully funded throughout the entire projection period. Pinnacle determined that a transfer of \$38 million in assets from the SRWTF to the Fund would keep the Fund in a positive balance position throughout the projection period without causing the SRWTF to move into a negative balance.



## **FINANCES OF THE SPECIAL RECLAMATION FUND & THE SRWTF**

This section of the Report to the Legislature outlines the financial status of the Fund and the SRWTF for calendar year 2019 and provides comments regarding the future financial position of both. The three key factors that have the most effect on the adequacy of the Fund are the coal production levels in West Virginia, the risk of future forfeitures, and the cost of reclaiming existing and future bond-forfeited sites.

The WVDEP acknowledges that future forfeitures and any water management costs associated with them could affect funding needs of the Fund and the SRWTF. WVDEP is currently working to compile water management and treatment costs on active (still permitted) and revoked sites in order to better inform the actuaries and policy makers in prediction of future water management and treatment costs associated with revoked sites. Additionally, the SRFAC is continuously looking for ways to improve upon the ability to project future forfeitures, which will be a focal point of the SRFAC through 2020. The Office of Surface Mining Reclamation and Enforcement (OSMRE) supports WVDEP's efforts to improve the active mine pollutional inventory to ensure the accuracy of future forfeiture cost projections.

To summarize the data and analysis that follow, it should be noted that the Fund will continue to pay for all costs for both land reclamation and water treatment. Money transfers from the SRWTF to the Fund will occur as needed in order to maintain a fund balance of \$10,000,000.

As of December 31, 2019, the Fund has accumulated assets of \$61.6 million while the SRWTF has accumulated \$112.4 million in assets, a 7.95% increase over 2017 SRWTF values. Increased revenues for the SRWTF are attributed to the tax increase in 2012 as well as the improved investment strategy which was initiated in 2013 as described below.

In May of 2013, following numerous discussions between WVDEP personnel and members of the Investment Management Board and the Board of Treasury Investments, the SRFAC was updated on various investment options and made the following recommendations:

The first recommendation was in two parts:

1. That the current balance of the Water Quality (WQ) Trust Fund and all additional revenue of the WQ Trust Fund through Fiscal Year 2018 be invested in the Investment Management Board (IMB) Fixed Income Pool until FY 2019.
2. That WVDEP develops plans to maximize the return on investment for future WQ Trust revenue.

The second recommendation was also in two parts:

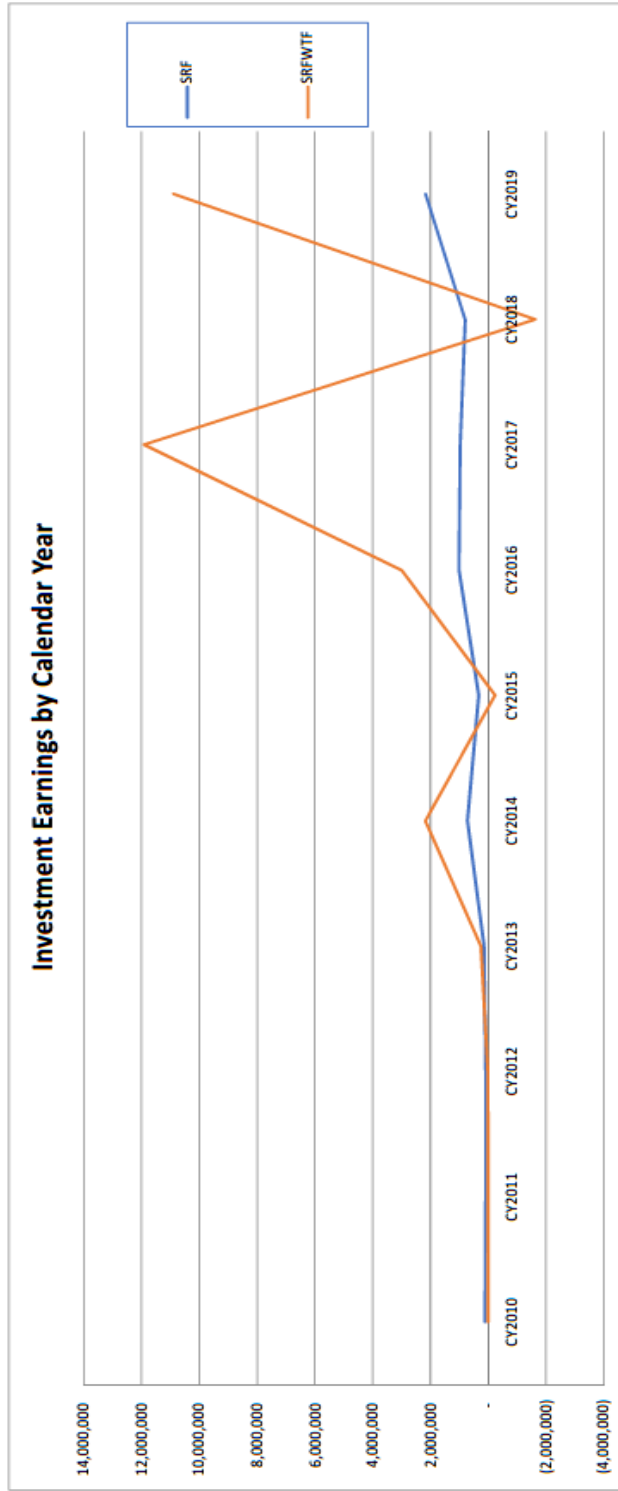
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1. That the current balance of the Special Reclamation Fund be invested in the Board of Treasury Investments West Virginia Short Term Bond Pool with the exception of \$5 million, which should remain in the West Virginia Money Market Pool.
2. That WVDEP develops plans to maximize the return on investment for future SR Fund revenue.

In October of 2013 the balance of \$28 million from the SRWTF was transferred to the Investment Management Board Fixed Income Pool.

In June of 2013, with the exception of \$5 million, the balance of the Fund was transferred to the West Virginia Short Term Bond Pool. The following chart depicts the investment earnings for the previous six years prior to the new investment strategies and results of the new strategy leading up to the current year.

**Department of Environmental Protection**  
**Special Reclamation Fund and Special Reclamation Water Trust Fund**  
**Investment Earnings by Calendar Year**  
**For Ten Full Calendar Years 2010 - 2019**



**Figure 3**

Since 2001, despite a very aggressive reclamation schedule, the Fund has been serving the people of West Virginia well through providing for the reclamation of bond-forfeited sites. At the time of the initial legislation in 2001, there were 392 forfeited permits requiring reclamation, including 122 requiring water treatment. Since passage of that legislation, an additional 216 permits have forfeited as well, bringing the total to 608 permits requiring reclamation. Of those, work has been completed on 504 permits. With regard to water treatment, the Fund is treating water at 146 sites and has an additional 47 sites under review or construction. As of December 31, 2019, the Fund has accumulated cash and investments totaling \$61.6 million, while the SRWTF had accumulated \$112.4 million.

A complete inventory of all bond forfeiture sites can be found in Appendix C, along with bond forfeiture sites that have mine drainage related problems, and a prioritized order in which they will be addressed

Graphic summaries of the status of the Funds are outlined in the following figures.

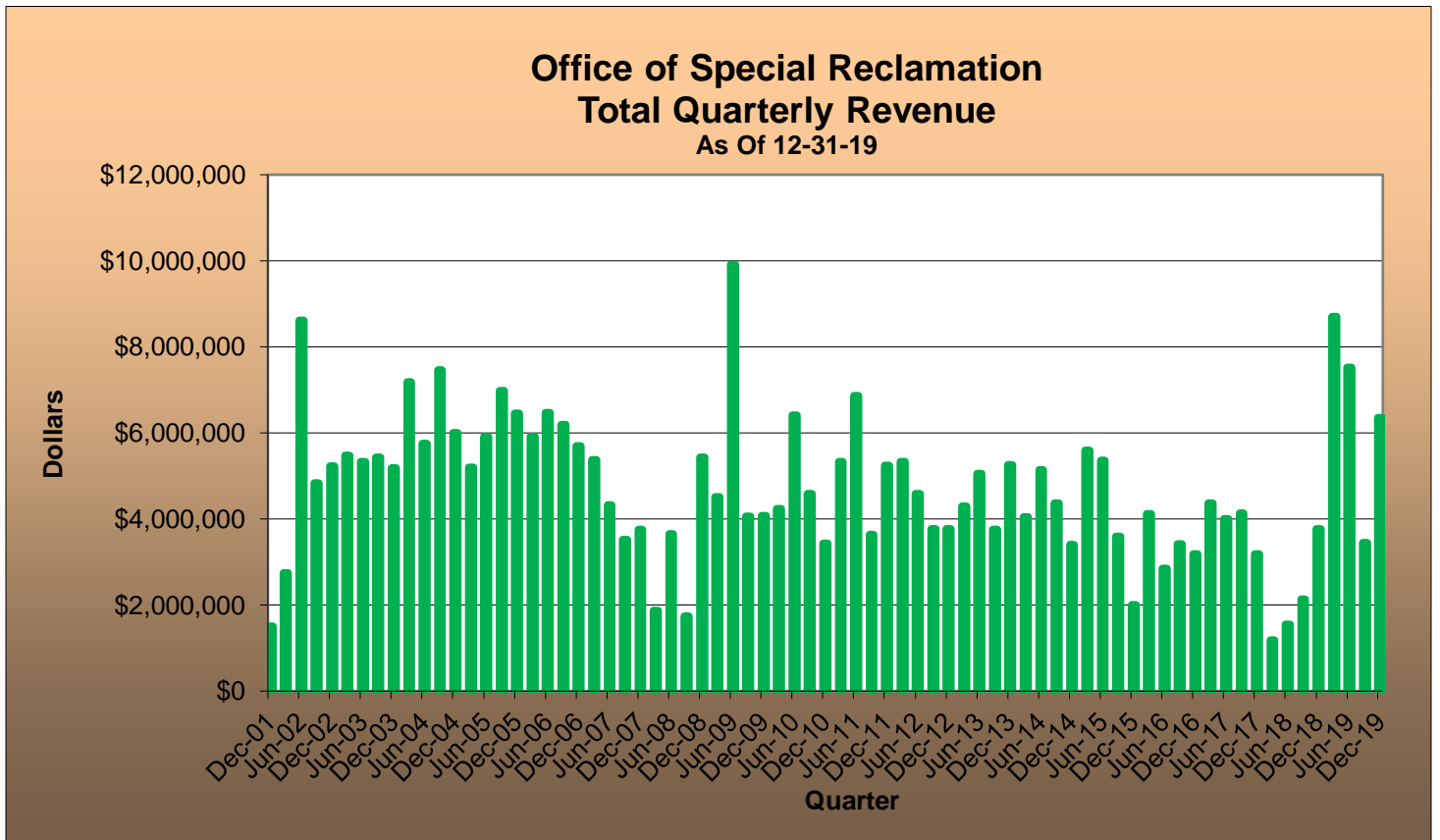


Figure 4

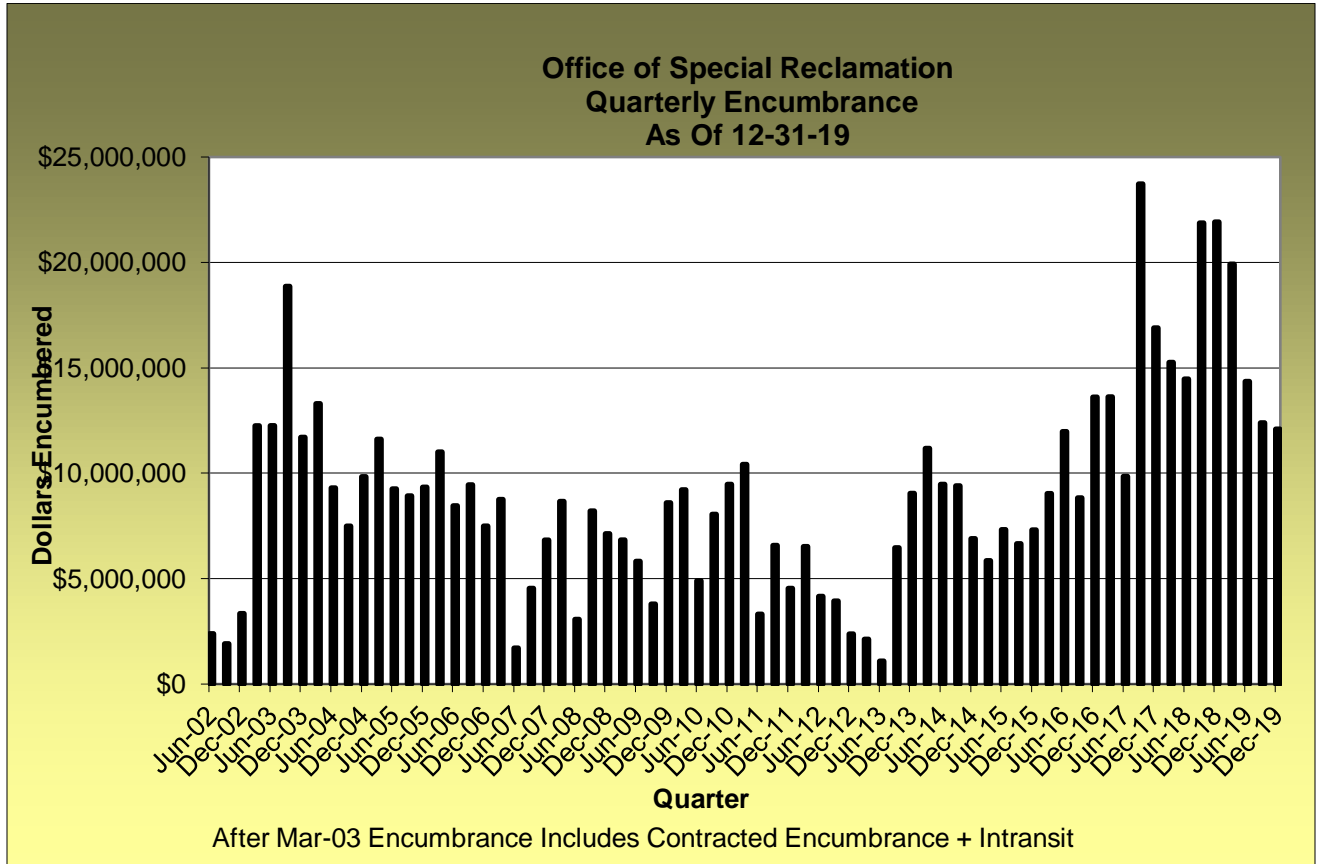


Figure 5

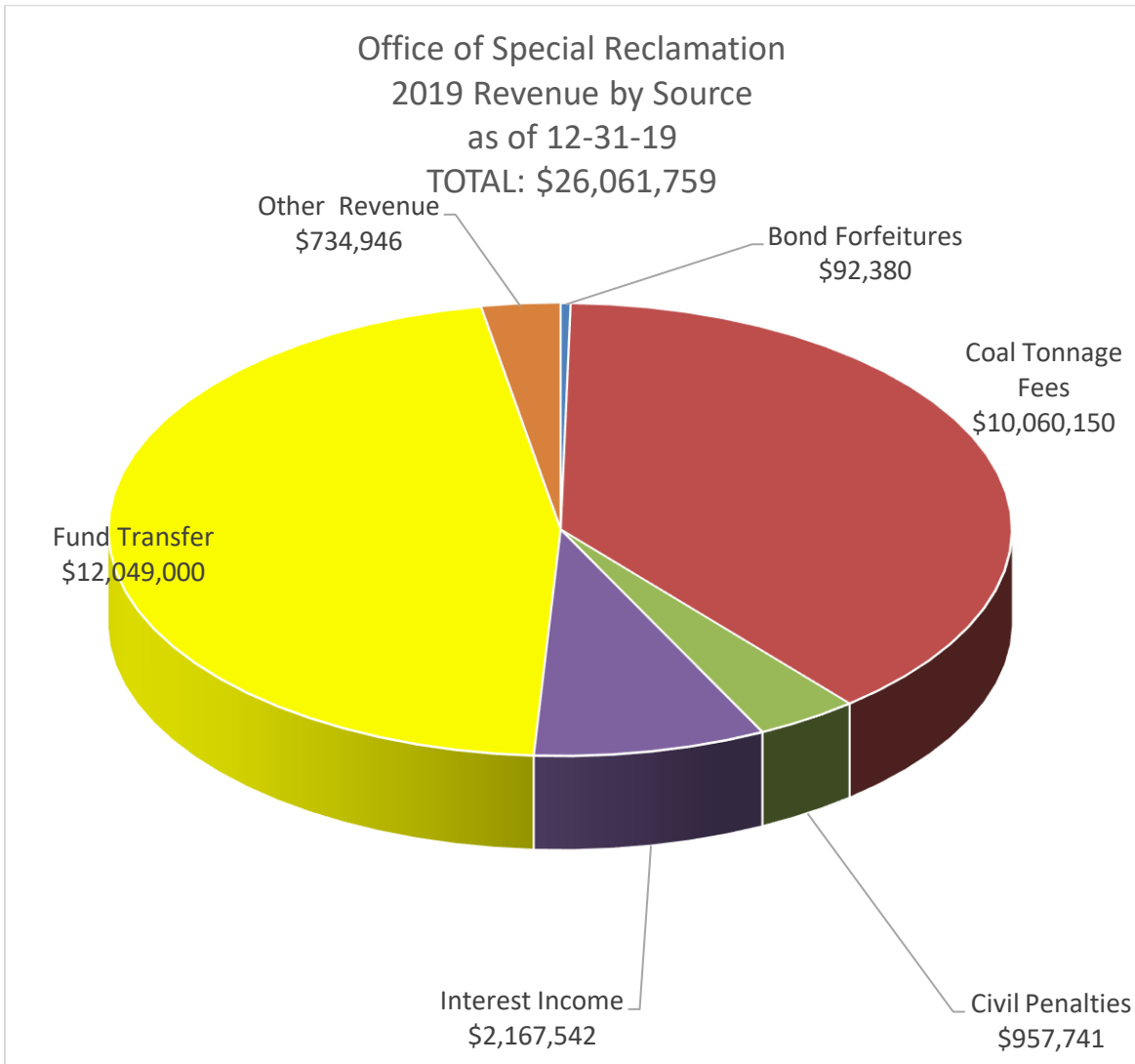


Figure 6

### Water Treatment Funding

A complete inventory of bond forfeiture sites that are producing mine drainage which violate effluent limitations or applicable water quality standards, along with associated cost estimates for long-term treatment of these sites, can be found in Appendix D.

The current main funding mechanism for bond-forfeited sites is the 27.9 cent tax per ton of clean coal mined, of which fifteen cents is dedicated to the SRWTF.

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In 2008, the Legislature authorized, but did not separately fund, the SRWTF. In reliance on the SRWTF statutory authorization, beginning in July 2008, coal tax revenues based on a tax rate of 1.5 cents per ton were being paid into the SRWTF. In addition, coal tax revenues based on 12.9 cents per ton were being paid into the Fund. In 2012 the Legislature increased the amount dedicated to the SRWTF to 15 cents per ton; but based on the funded status of the Fund at the time the Fund remained at 12.9 cents per ton.

The average yearly revenue, fees and investment earnings for the past five years has exceeded eighteen million dollars (\$18 M/year). The current balance in the SRWTF is \$123,168,527 as of December 31, 2019. The SRFAC is continuing to look at alternatives for water treatment funding.

Increased water capital cost and water treatment cost are the result of two identical lawsuits filed against the WVDEP. In 2011 and 2012 the WVDEP entered into separate consent decrees with the northern and southern district courts respectively. As will be discussed later in this report, the WVDEP was required to apply for and obtain NPDES permits for all the sites included in Attachment A of the consent decrees plus an additional 21 sites which were included in an earlier lawsuit, for a total of 192 sites. The WVDEP estimated that it will cost approximately \$35.5 million to bring bond forfeiture sites into compliance with the more stringent water quality-based effluent limits. Additionally, WVDEP estimated that it will cost approximately \$6.7 million to operate and maintain these treatment systems on an annual basis.

WVDEP has fulfilled the requirements of the Consent Decree by obtaining all NPDES permits.

### **Additional Charges to the Fund Due to NPDES Requirements**

Due to NPDES requirements, the WVDEP has been faced with charging more expenditures to the Fund. These include:

- Realty – Land and/or easement purchases have been necessary to expand existing or new water treatment sites outside permit boundaries. Surveying and appraisal costs are included in these purchases.

Increased staff – As a result of having to apply for and obtain NPDES permits at all bond forfeiture sites now and into the future, the WVDEP has found it necessary to incorporate an NPDES permitting section into the Office of Special Reclamation (OSR - The office responsible for reclamation of land and waters for bond forfeited sites). Five new staff members consisting of one

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(1) Program Manager and four (4) Environmental Resource Specialist have been added to fulfil the NPDES requirements for the WVDEP. Additionally, to reduce surveying cost associated with reality needs and design, a licensed surveyor was hired.

Also, two (2) land agents were hired in 2018 to address reality needs, although the responsibilities and salaries are split between OSR and the Office of Abandoned Mine Lands.

- NPDES permitting fees:
  - Application fees - \$1,000/application
  - Modification fees - \$500/mod.
  - Annual fees - \$1000/permit.
- Additional water sampling related to permit applications
- The WVDEP entered into a grant agreement with the West Virginia Land Stewardship Corporation (WVLSC) to provide contractual services in the areas of design, construction, and project oversight. The purpose of the agreement was to enhance the capacity of WVDEP professional staff to meet reclamation deadlines. It is estimated that project cost increase by 10 to 15% for contractual services and another 1% for indirect cost associated with managing the grant.

The WVLSC was created by state legislation in 2013 to lessen the burdens of government when government identifies a need for WVLSC to assist with land stewardship and the remediation of properties with known environmental issues, including former mining sites.

A pilot grant agreement, known as the LaRosa Fuels site (Permit Number S-1051-86), was approved in 2016 to evaluate the efficiency and benefits of a work-sharing partnership.

WVDEP approved a grant amendment in 2017 and provided additional funds, as well as additional permits to be reclaimed. The grant was structured as an up-front payment to provide the WVLSC with the funds needed to cover the level of liability inherent in multiple reclamation projects, which requires engaging multiple engineering and construction firms simultaneously. Having the resources to cover at least the original liability estimates provided by WVDEP gave the WVLSC Board the level of certainty it needed to take on the project.

The WVLSC invested the grant funds so that they could earn interest that could be used on the project. In 2018, when it was identified that WVDEP investments were gaining a higher rate of



return, the grant funds were returned to the WVDEP to maximize investment earnings. The WVLSC invoices the WVDEP when expenditures regularly occur. WVLSC have three remaining projects to fulfill the grant agreement; therefore, completion is anticipated by June 30, 2021.

### **WVDEP Policy Relevant to the Fund**

Effective May 21, 2014 the WVDEP has implemented a new policy establishing a standard procedure the WVDEP will follow to terminate the State's jurisdiction over bond-forfeited former mining sites (Special Reclamation Sites). With a decision that the Special Reclamation Site has satisfied the applicable performance standards, WVDEP will terminate jurisdiction over the subject Special Reclamation Site. The policy limits the vulnerability of the State, and consequently the Fund, by reducing the possibility of lawsuits pertaining to damages unrelated to former mining practices or reclamation practices, i.e. due to recreation, timbering, oil & gas, etc., as well as any changes to environmental laws taking effect after reclamation of the subject Special Reclamation Site. The WVDEP will retain jurisdiction of Special Reclamation Sites, or portions thereof, that are necessary for the effective treatment of mine discharges emanating from the subject Site.

### **Litigation**

1. The Fund through FY 2018 and the SRWTF starting in FY 2019 has acquired liability for additional water treatment as a result of lawsuits filed against the WVDEP, as described below.

Identical complaints were filed in the Northern and Southern District Courts, Civil Actions No. 07-cv-87 (the "Northern District Case") and No. 2:07-0410 (the "Southern District Case"), assigned to Judge Irene Keeley and Judge John T. Copenhaver, Jr., respectively. Both cases were styled *West Virginia Highland Conservancy and West Virginia Rivers Coalition v. Randy C. Huffman, Secretary, West Virginia*

*Department of Environmental Protection.*

The two suits alleged that the West Virginia Department of Environmental Protection (WVDEP) had violated, and continues to violate, the federal Clean Water Act (the Act) by failing to obtain West Virginia National Pollutant Discharge Elimination System (WV/NPDES) permits when the WVDEP reclaims and treats water at bond forfeited sites as directed by state law. The Northern District Case named 18 specific bond forfeited sites and the Southern District Case named 3 sites.

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On March 26, 2009, the Northern District Court entered summary judgment in favor of Plaintiffs in the Northern District Case and granted a permanent injunction. The injunction requires WVDEP to apply for, process, and issue WV/NPDES permits to itself for the discharge into waters and streams of pollutants from the eighteen bond-forfeited, coal mining sites at issue in the case, whose reclamation the agency is required to manage. WVDEP appealed this decision to the United States Court of Appeals for the Fourth Circuit (“Fourth Circuit Court of Appeals”). By order dated November 8, 2010, the Fourth Circuit Court of Appeals affirmed the Northern District Court’s ruling.

Similarly, a motion for summary judgment in the Southern District Case was granted by Order dated August 24, 2009. The Southern District Court found that the Secretary of the WVDEP was “in violation of the National Pollutant Discharge Elimination System permitting requirements of the Clean Water Act.” The Southern District Court ordered the Secretary to “apply for, and obtain, NPDES permits for all sites at issue in this action,” and the parties subsequently submitted a joint stipulation agreeing to the same injunctive relief and timeframes for compliance set forth in the Northern District litigation. The Southern District Court entered final judgment August 31, 2010.

On January 11, 2010, the same Plaintiffs (West Virginia Highlands Conservancy and West Virginia Rivers Coalition) and the Sierra Club submitted a letter giving WVDEP notice of their intent to sue WVDEP regarding discharges from 131 additional bond forfeited sites on the same legal basis as the previous suits. Based on the outcome of the previous litigation, WVDEP engaged in settlement negotiations with the Plaintiffs and reached agreement regarding the permitting of the 21 sites in the previous litigation and the additional 131 sites. In August 2011, the Plaintiffs filed two new suits regarding the additional sites, *West Virginia Rivers Coalition, et al v. Huffman*, Civil Action No. 1:11-cv-118 (N.D. W.Va.), and *West Virginia Rivers Coalition, et al v. Huffman*, Civil Action No. 2:11-cv-524 (S.D. W.Va.), and lodged a proposed Consent Decree with both courts. The Northern District Court entered the Consent Decree on October 12, 2011. The Southern District Court entered the Consent Decree February 10, 2012. A list of all bond forfeited sites at issue in all four suits is attached to the Consent Decree as Attachment A. As required by the Consent Decree on July 2, 2012 WVDEP submitted a Final Treatment Cost Report to Plaintiffs and SRFAC, in which WVDEP determined the capital cost and annual operating and maintenance costs for water discharges from each bond forfeiture site to meet applicable water quality-based effluent limitations. The WVDEP estimated that these costs will amount to \$35.5 million for one-time capital construction costs and over \$6 million in annual operations and maintenance costs.

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The Consent Decree resolves all four suits filed by the Plaintiffs regarding bond forfeited sites. The Consent Decree required WVDEP to obtain WV/NPDES permits for all 21 bond forfeiture sites cited in the initial litigation by September 1, 2011. Thereafter, WVDEP issued draft WV/NPDES permits for 50 additional sites by the end of each calendar year, beginning in 2012. By December 31, 2015 the Consent Decree required WVDEP to issue draft WV/NPDES permits for all bond forfeited sites listed in Attachment A of the Consent Decree and for sites that were in existence on the date the Decree was executed. Thereafter, the WVDEP shall exercise its best judgment on the timing of issuance of draft permits for sites forfeited after the execution of the consent decree.

*Note: The final draft permit was issued December 10, 2015.*

2. A third case presents potential for future litigation, should the legislature not adequately fund the Fund and SRWTF. *West Virginia Highlands Conservancy v. Secretary Salazar, DOI*, Civil Action No. 2:00-1062 (S.D. W.Va.). The West Virginia Highlands Conservancy (WVHC) had filed a motion with the U.S. District Court for the Southern District of West Virginia to reopen the case and schedule further proceedings on the grounds that the recommendations of the SRFAC were not being followed with regard to funding the Special Reclamation Fund. Based upon the Legislature's extension of funding through the Continuing and Temporary taxes, the case was placed on the court's inactive docket as of May 2008; however, the court allowed the possibility of a renewed motion if the Legislature does not continue to provide sufficient monies for the Fund to remain solvent.

In March 2011, the WVHC moved once again to have the litigation reopened alleging continuing problems with the Fund. A status conference was held on August 5, and the court ordered the filing of a joint status report. On August 25, 2011, the WVHC and the Defendants filed a joint status report with the court. The WVHC stated that the court should not delay reopening the case until the new actuarial report and SRFAC recommendations are issued, whereas the Defendants recommended that it was premature for the court to reopen this matter prior to the close of the 2012 legislative session.

On March 30, 2012, a status conference call was conducted by the Court. In light of the enactment of Senate Bill 579 that increased the special reclamation tax from 14.4 cents to 27.9 cents per ton of clean coal mined, the Plaintiff acknowledged that it would move to withdraw its Second Motion to reopen and refile it to address the changed circumstances that have occurred since the filing of its motion to reopen.

## 2019 SRF Advisory Council Annual Report

On April 2, 2012, the WVHC filed its Motion to withdraw its Second Motion to reopen this case with the Court. On August 5, 2012, the Court issued an Order granting the Plaintiff's Motion to withdraw its Second Motion. In addition, the Court granted the WVHC leave to file an additional motion to explain deficiencies that remain, notwithstanding the recent revenue increase in the Special Reclamation Fund.

This case remains open, so the District Court can address any issue that may arise regarding the State's ABS (alternative bonding system).

3. On or about April 20, 2016, the West Virginia Highlands Conservancy, West Virginia Rivers Coalition, and Sierra Club sued the West Virginia Department of Environmental Protection's (WVWVDEP) Special Reclamation Program alleging it was in violation of seven West Virginia National Pollution Discharge Elimination System (WVNPDES) permits issued for sites controlled by the Special Reclamation Program, four in the United States District Court for the Northern District of West Virginia<sup>1</sup> and three in the Southern District<sup>2</sup>. The lawsuits allege that the WVWVDEP had discharged and continued to discharge quantities of aluminum, iron, nitrogen ammonia, and suspended solids in excess of the effluent limitations in those permits. The lawsuits further allege discharges of effluent with pH outside of the permit range. On December 12, 2016, the parties met at WVWVDEP's headquarters in Charleston. The WVWVDEP explained to the Plaintiffs that a timetable for achieving compliance had already been established and were included in a corrective action plan required under the enforcement actions being carried out by the WVWVDEP's Division of Mining and Reclamation. On July 10, 2017, the parties filed a consent decree in the Northern District action. On April 25, 2018, the parties filed a consent decree in the Southern District. The compliance requirements found in these consent decrees are based on the schedule that the WVWVDEP had prepared for inclusion in the corrective action plan; no new or different requirements were added as a result of the litigation.

1. *West Virginia Highlands Conservancy, et al. v. Austin Caperton, Secretary, West Virginia Department of Environmental Protection,*

United States District Court for the Northern District of West Virginia, Civil Action No. 1:16-cv-70

2. *West Virginia Highlands Conservancy, et al. v. Austin Caperton, Secretary, West Virginia Department of Environmental Protection,*

United States District Court for the Southern District of West Virginia, Civil Action No. 2:16-cv-03769

## 2020 SRFAC Study Issues

- Review of the current investment strategy
- Continue review of DMR database and improvement to functionality. A priority addition is to include a data field that indicates whether an active permit is treating AMD, or other water pollutants, as part of the effort to compile water management and treatment costs on active sites.
- Continue to improve upon the active mine pollutorial inventory

The SRFAC is continuously looking for ways to improve the ability to project future forfeitures. The DMR database of open permits is the primary source of information used for the biennial actuarial analysis of the SRF and SRWTF. The analysis also relies heavily on information obtained from forfeited permits and applied to current permits to project future forfeitures.

The SRFAC would like to explore options to increase the linkages of data from past forfeitures to open permits, to improve the predictive power of historical data. Some pieces of data that may be available in the permit databases that have not been previously utilized include:

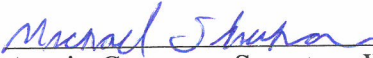
- length of time a permit had a particular status
- number of times a permit changed status
- groupings with other permits (proximity or use), including Parent Company level of existing permits
- annual coal production associated with a permit or group of permits

The SRFAC recognizes that not all these pieces of data are available, even in open permits, and may no longer be available for permits that forfeited many years ago, but would like to explore the ability to enhance the information available that can help quantify risk. The database will need to be cleaned and augmented prior to future in depth study.

*The SRFAC would like to recognize the WVDEP for their conscientious management of the Fund and the SRWTF and their efforts in minimizing the impacts of bankruptcies to the Funds.*

2019 SRF Advisory Council Annual Report

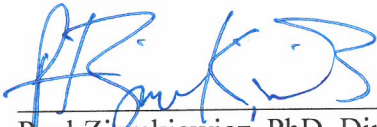
Special Reclamation Fund Advisory Council  
Annual Report to the Legislature  
February 7, 2020



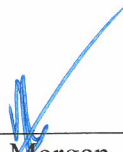
Austin Caperton, Secretary WVDEP  
Ex Officio  
Designee: Michael Sheehan  
WVDEP Deputy Director, Div. of Land Restoration  
601 57<sup>th</sup> Street  
Charleston, WV 25304



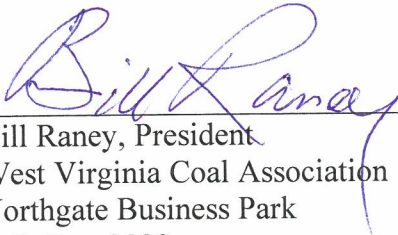
John D. Perdue, Treasurer  
Designee: Abigail Campbell  
Receipts Manager for Unclaimed Property  
WV State Treasurer's Office  
1900 Kanawha Blvd  
Capital Complex Bld 1, Room E-145  
Charleston, WV 25305



Paul Ziemkiewicz, PhD, Director  
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WVU – NRCCE Building  
P.O. Box 6064  
Morgantown, WV 26506



John S. L. Morgan  
Morgan Worldwide  
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Lexington, Ky. 40508



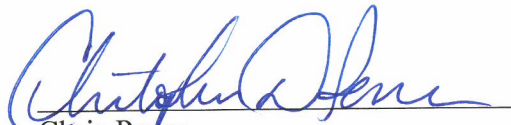
Bill Raney, President  
West Virginia Coal Association  
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P.O. Box 3923  
Charleston, WV 25339



Ronald Pauley  
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Sumerco, WV 25567



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Huntington, WV 25755-0003



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500 Lee Street East Suite 701  
Charleston, WV 25301

Appendices for 2019 SRFAC Annual Report  
(All Appendices as of 12-31-19)

**A. WVDEP Graphs:**

Land and Water Permits Scheduled by Quarter and Projects Completed

Land Permits To Be Contracted

Land Liabilities To Be Contracted

Permits Forfeited Since 6-30-01

Reclamation Projects Started Since 6-30-01

Contract Dollars Encumbered

Cash Balance

Total Revenue

Revenue Collected by Source: Bonds, Civil Penalties, Tax

**B. Consensus Coal Forecast Final Report**

**C. Actuarial Study Final Report**

**D. Bond Forfeiture Inventories**

a. **Total Forfeiture Inventory**

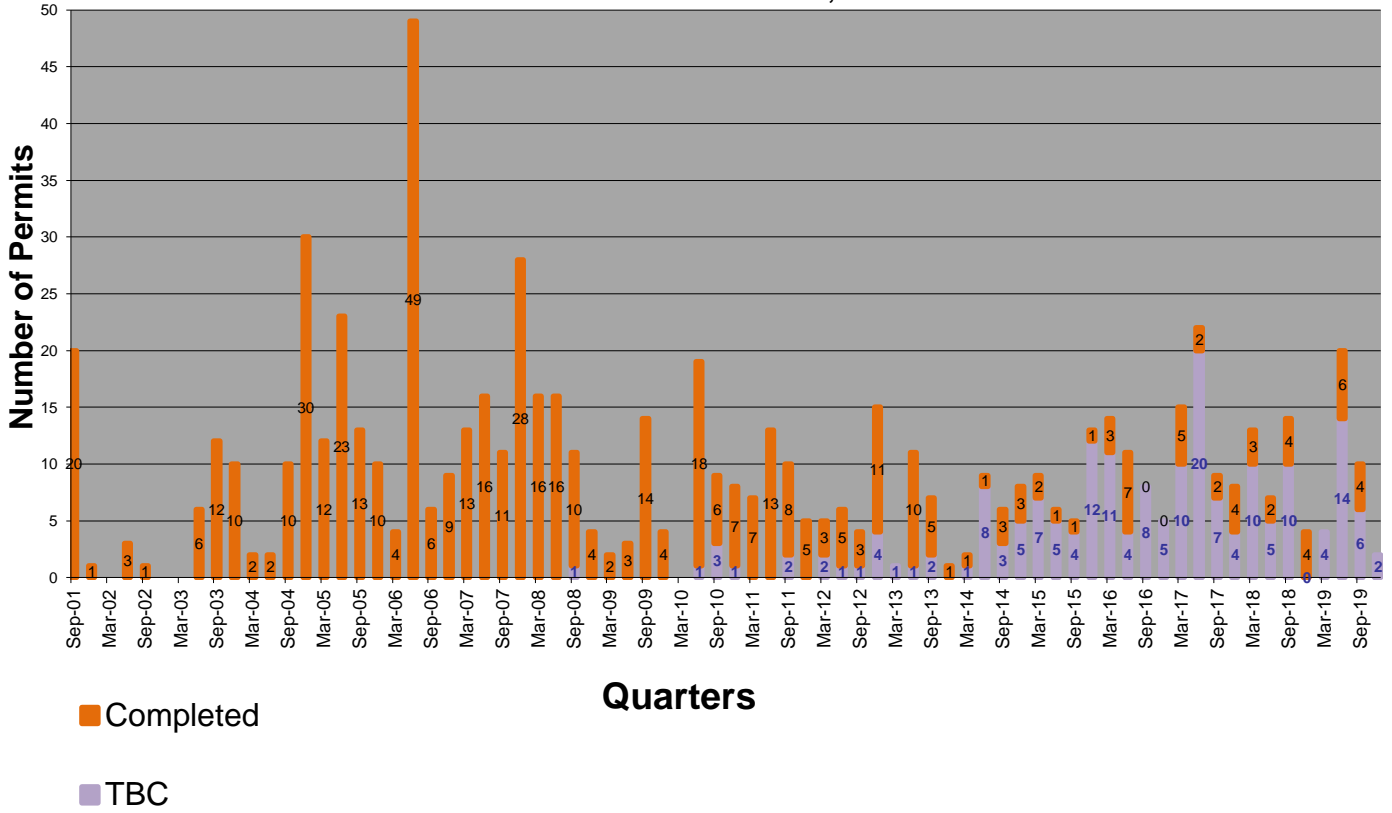
b. **Acid Mine Drainage Inventory**

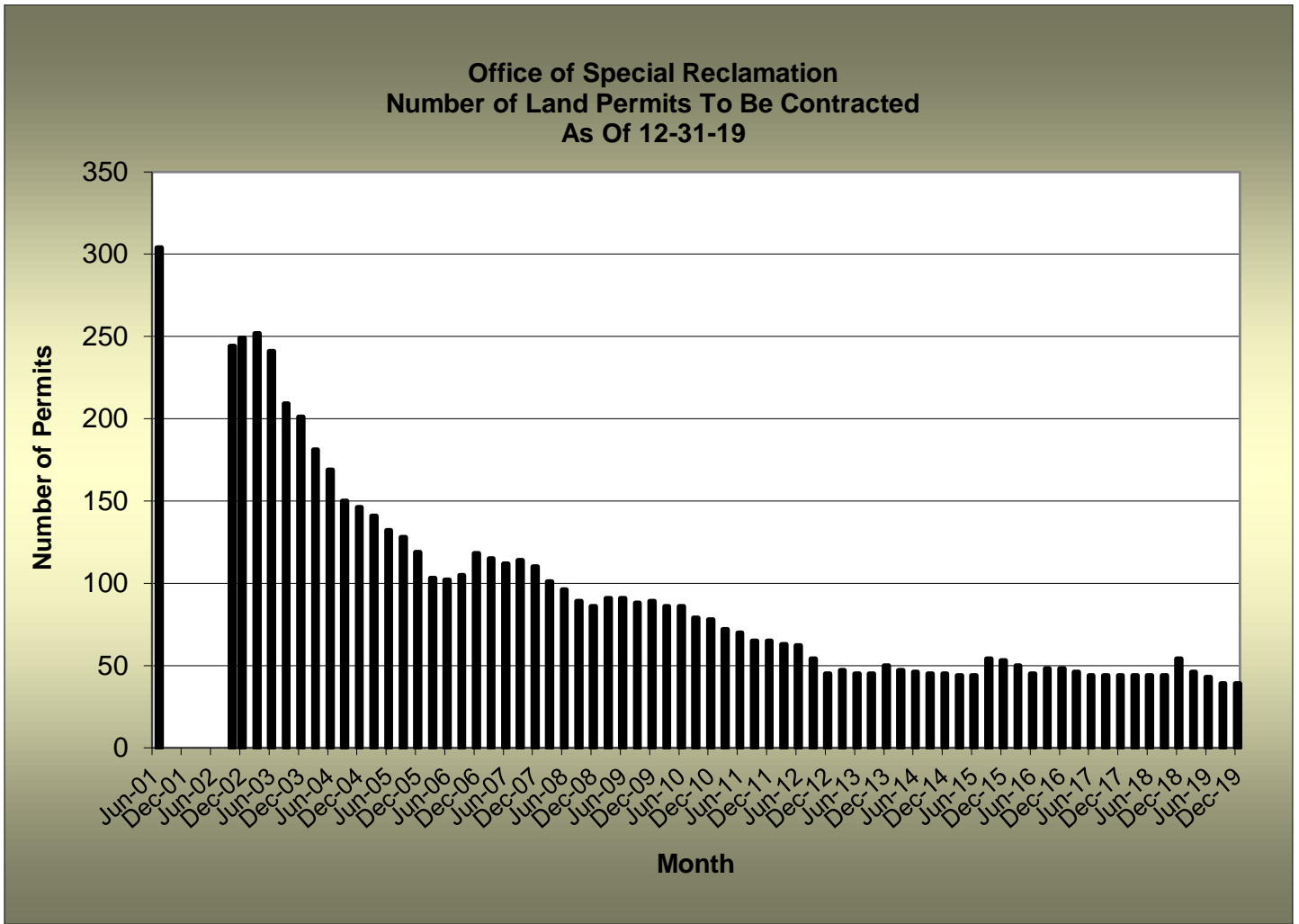
c. **Mine Drainage Treatment Prioritization**

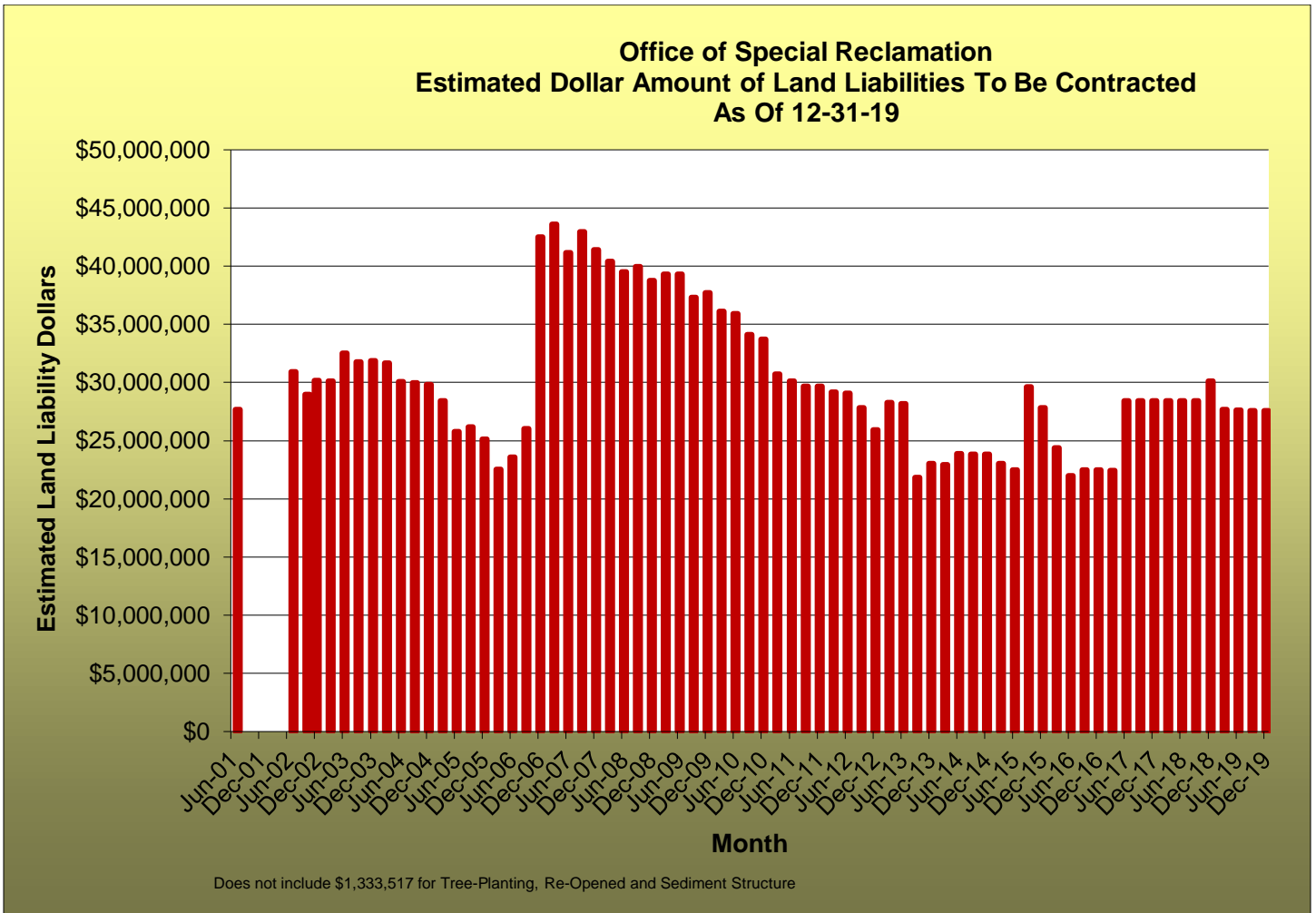
## **Appendix A**



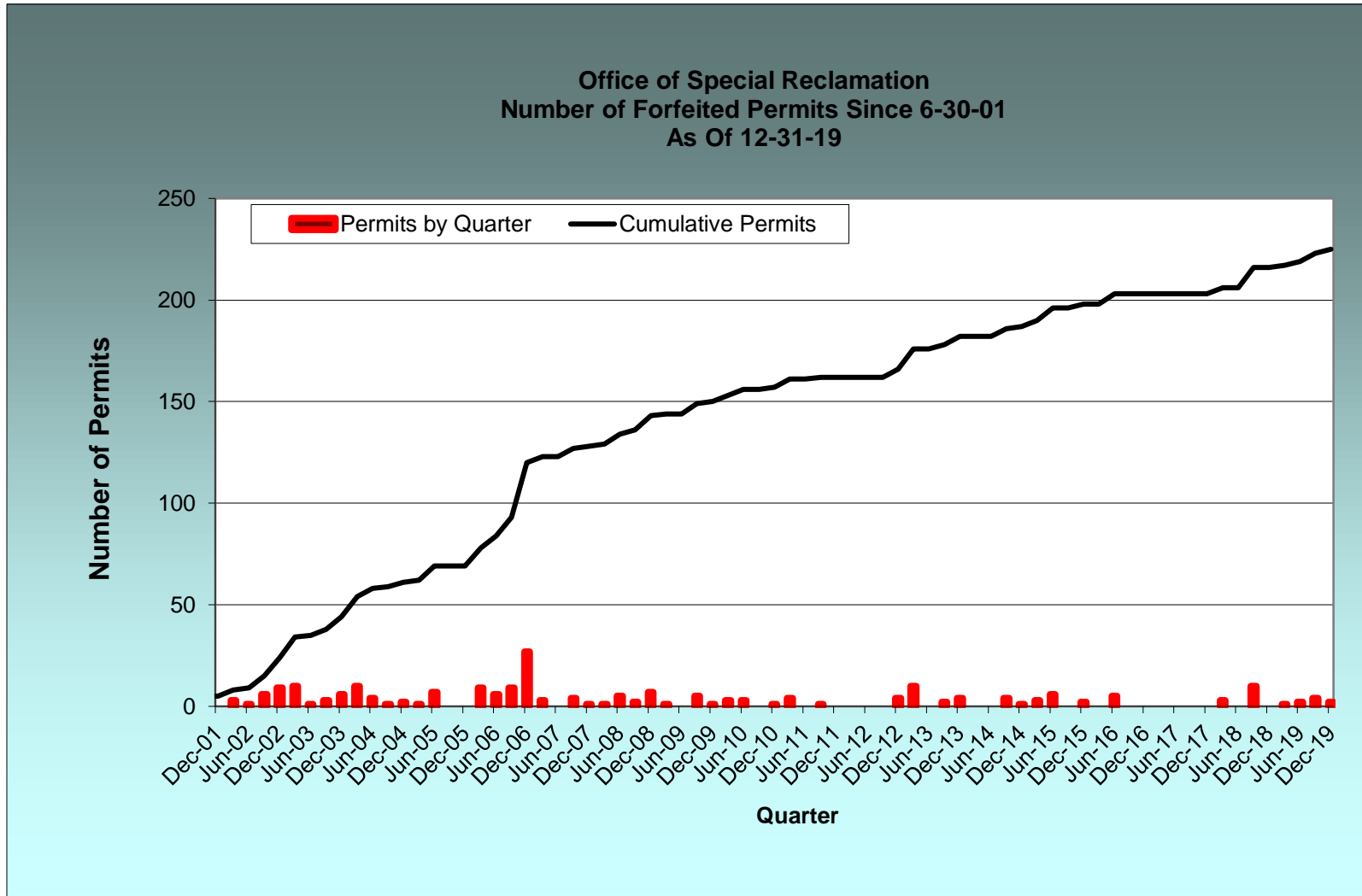
**Land and Water Permits  
TBC -Scheduled by Quarter  
and Projects Completed**  
As Of December 31, 2019



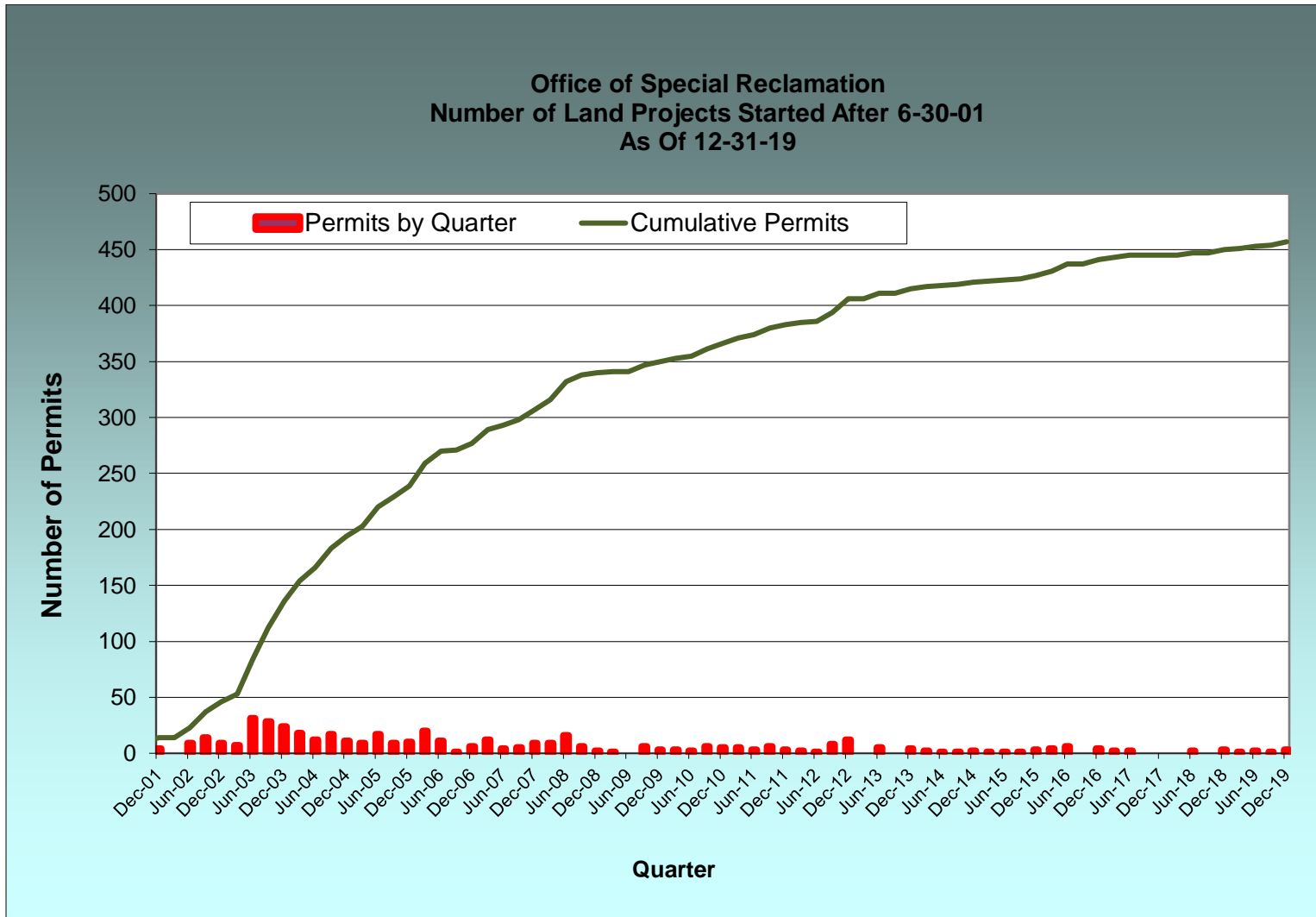




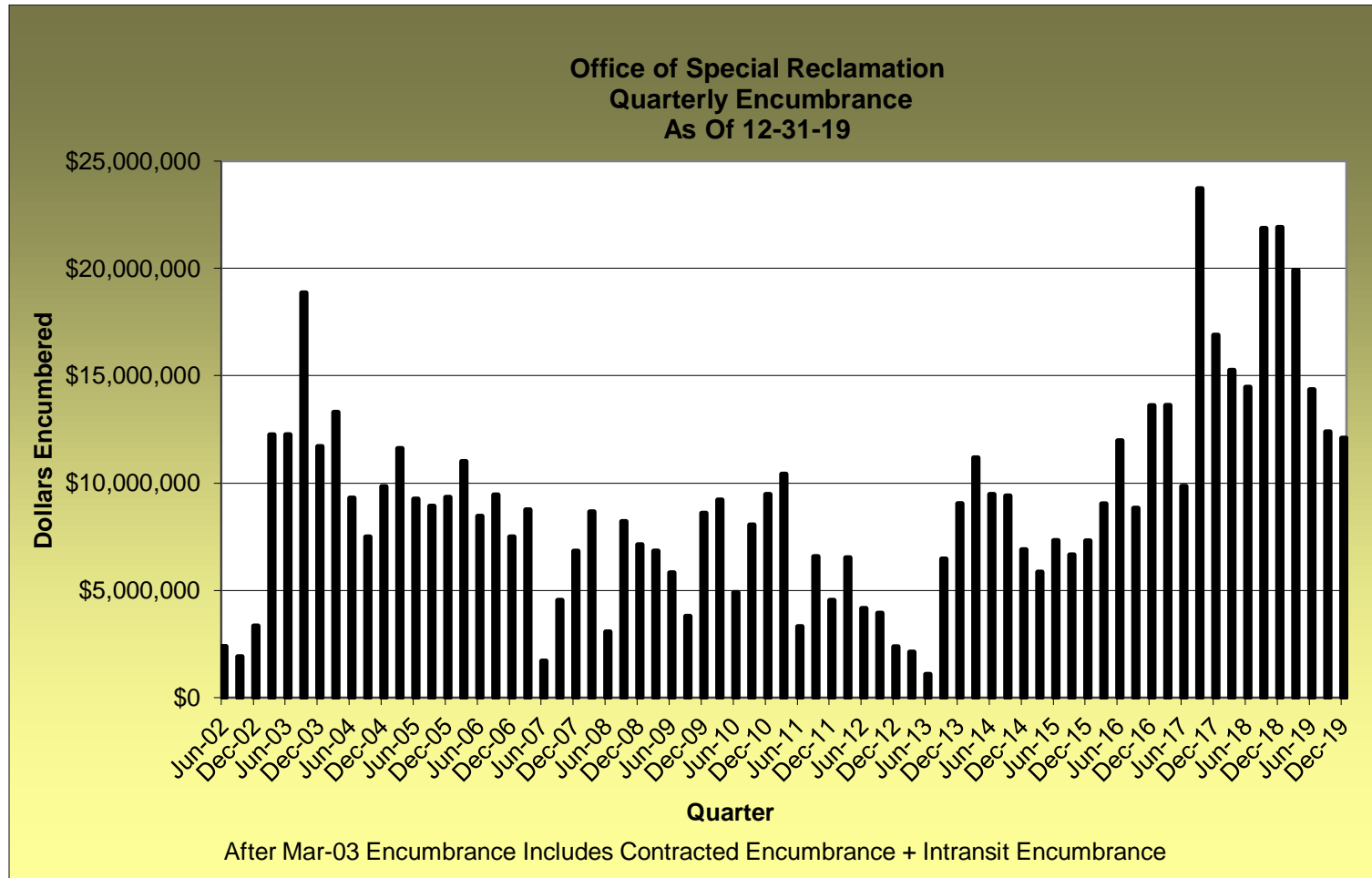
2019 SRF Advisory Council Annual Report



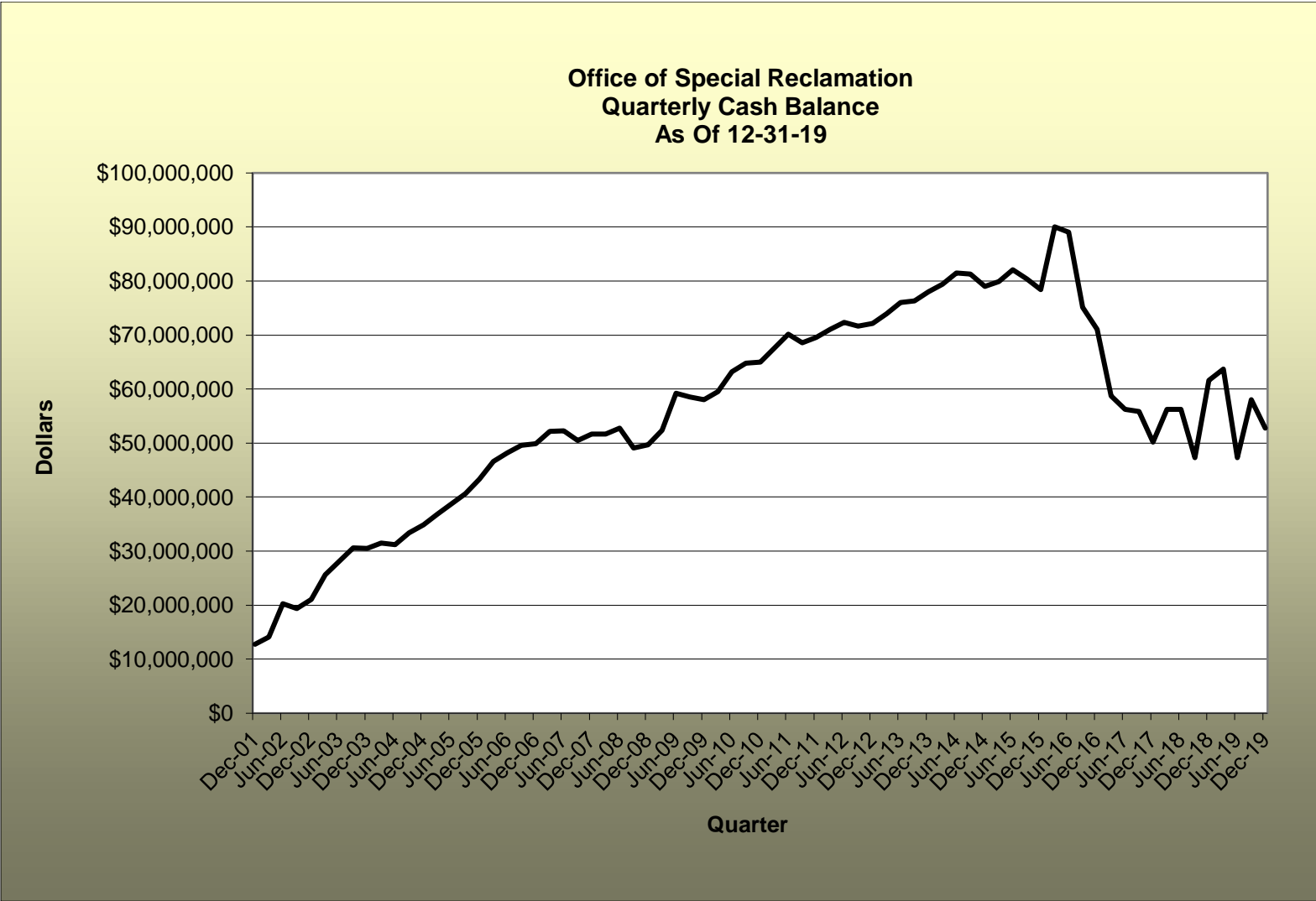
2019 SRF Advisory Council Annual Report

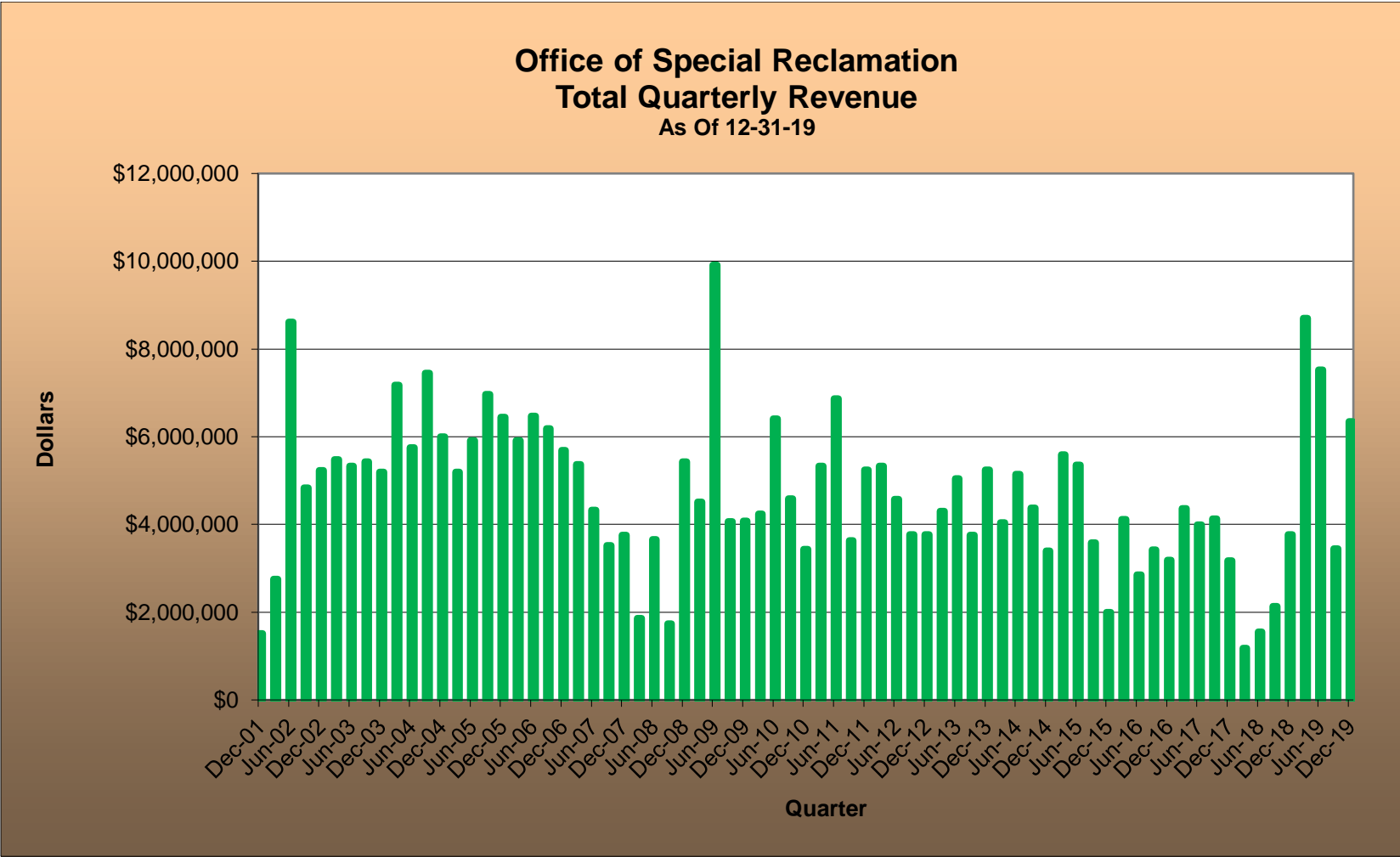


2019 SRF Advisory Council Annual Report



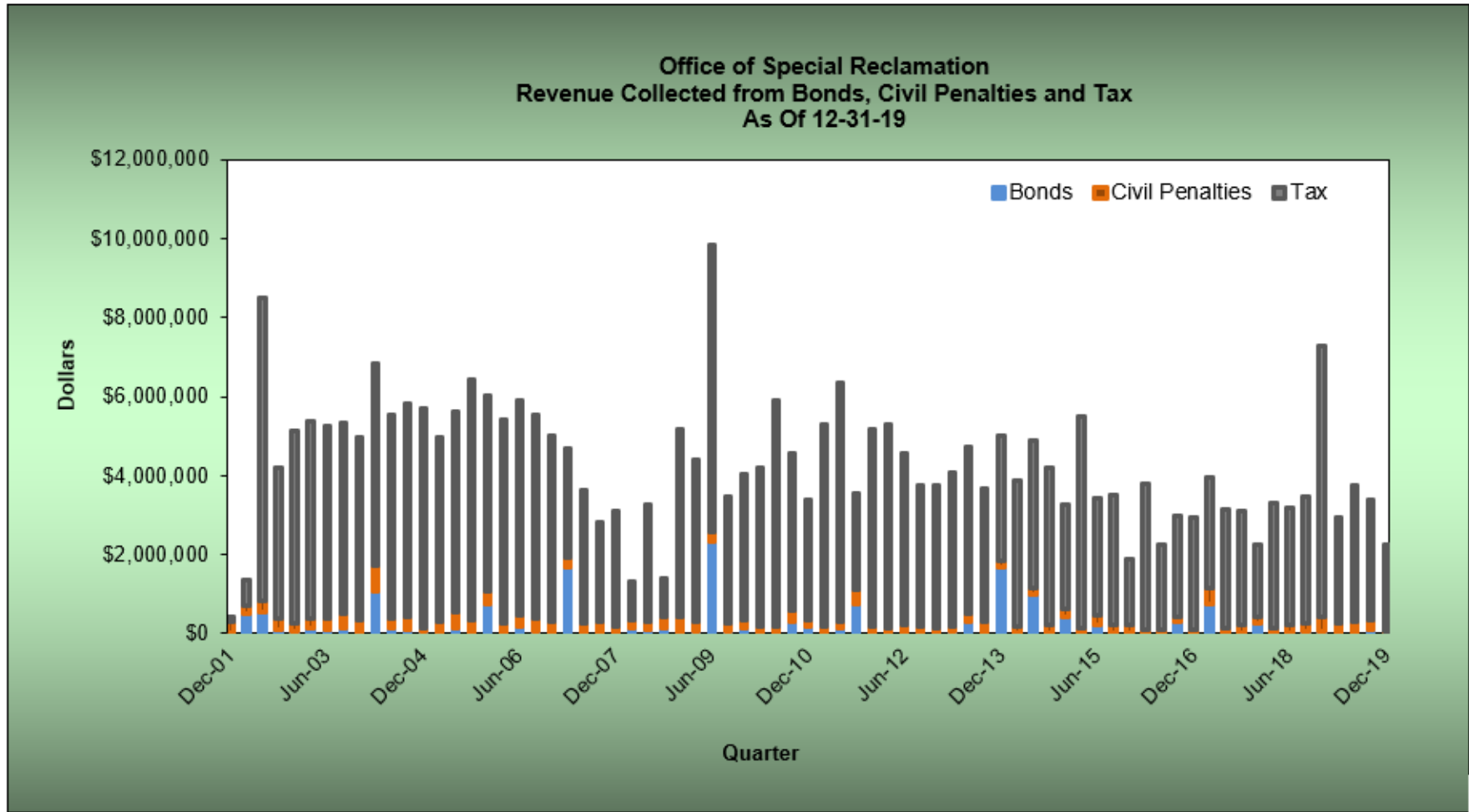
2019 SRF Advisory Council Annual Report







2019 SRF Advisory Council Annual Report



## **Appendix B**

# Consensus Coal Production Forecast for West Virginia: 2019

Prepared for:

Special Reclamation Fund Advisory Council,  
West Virginia Department of Environmental Protection

Date:

July 19, 2019



Center for Business and  
Economic Research

## Consensus Coal Production Forecast for West Virginia: 2019

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### **Disclaimer:**

The contents of this report reflect the views of the authors who are responsible for the accuracy of the data presented herein. The views expressed in this report are those of the authors and do not reflect the official policy or position of Marshall University or its governing bodies. The use of trade names, if applicable, does not signify endorsement.

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# Consensus Coal Production Forecast for West Virginia: 2019

## Introduction

The West Virginia Consensus Coal Production Forecast is a combined production forecast comprised of four component forecasts. A consensus approach to forecasting seeks the wisdom of the crowd in producing an expectation for output from the coal industry. The Consensus Forecast is used to provide the best expectation of tax revenues to be collected for mandatory reclamation activities conducted through the Special Reclamation Fund and the Special Reclamation Water Trust Fund.

This report describes recent historical coal production trends for the State of West Virginia including the individual industries that comprise the major segments of demand for coal produced in West Virginia. Each of the component forecasts used to form the Consensus Forecast is described, with information about assumptions and resulting projected levels of production for West Virginia. The process used to produce the Consensus is also described, including the weightings applied to each of the component forecasts. The West Virginia Consensus Coal Production Forecast is calculated for the years 2019 through 2045.

## Overview

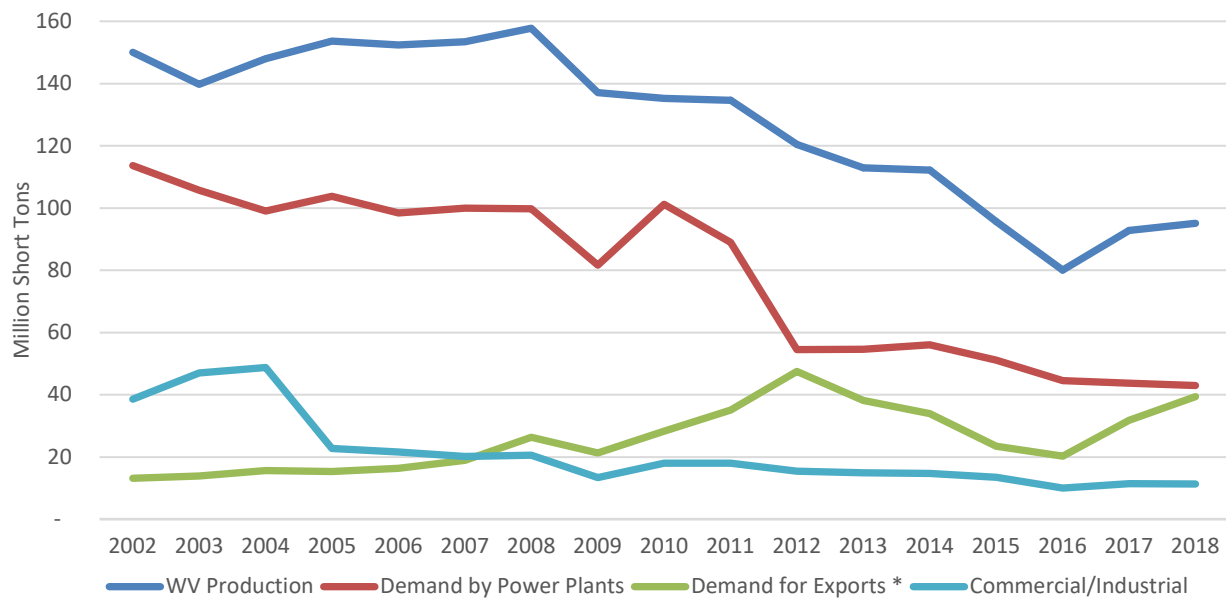
West Virginia coal production for 2018 was 95.1 million tons (EIA 2019),<sup>1</sup> an increase of 2.5 percent from the 92.8 million tons produced in 2017. This increase reflects various trends and events within the coal industry's primary markets: power generation, exports and industrial demand as well as expectations regarding environmental policy. Demand for West Virginia coal increased by about eight percent from 2017 levels, led by an increase in demand for exports.

Future demand for West Virginia coal depends on several variables. These include the capacity of gas-fired electrical generators in the region and the price paid for gas by those generators, the lifespan and generation levels of the coal-fired power plants that will continue to burn coal from the State, exchange rates and the rate of economic growth of countries that import West Virginia coal, and the nature of compliance with environmental regulations. Recent demand trends with preliminary and estimated sector-level data for 2018 are shown in Figure 1.

---

<sup>1</sup>92.8 million tons is the Energy Information Administration's revised 2017 production value based on the final 2017 value published by MSHA (clean coal production reported on MSHA Form 7000-2). The West Virginia Office of Miner's Health, Safety and Training (WVOMHST) reports 2017 production of 105,034,815 tons, but this is not exclusively clean coal, which is the final production volume. WVOMHST reports 104,969,188 tons for 2018.

Figure 1. Historical West Virginia Coal Production and Components of Demand



Source: EIA. Asterisked (\*) 2018 volumes estimated by MU CBER. Other 2018 figures are preliminary by EIA.

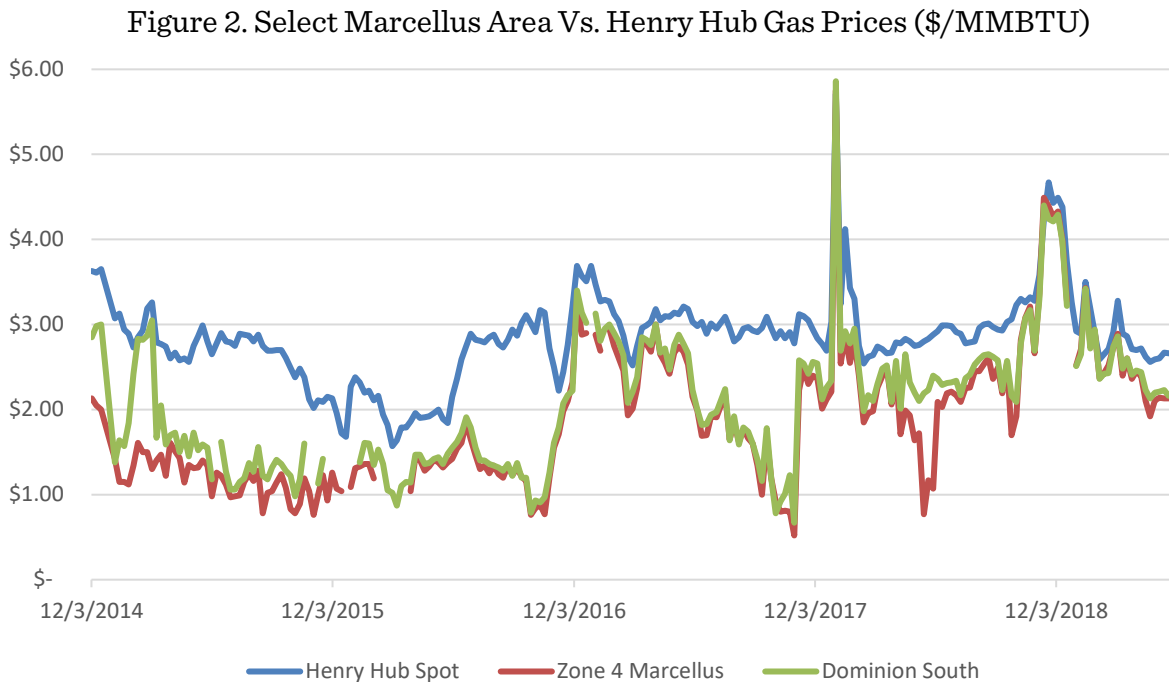
### The Electricity Sector

Preliminary coal distribution data for 2018, published by the U.S. Energy Information Administration (EIA), indicate that demand for West Virginia-produced coal by the electricity sector fell slightly in 2018, to about 43.0 million tons, compared to 43.8 million tons in 2017 (EIA 2019). This was a decline of 1.8 percent, between 2017 and 2018, while total coal distribution to the electric power industry fell by about 6.7 percent during the same time (EIA 2019).

### Natural Gas Prices

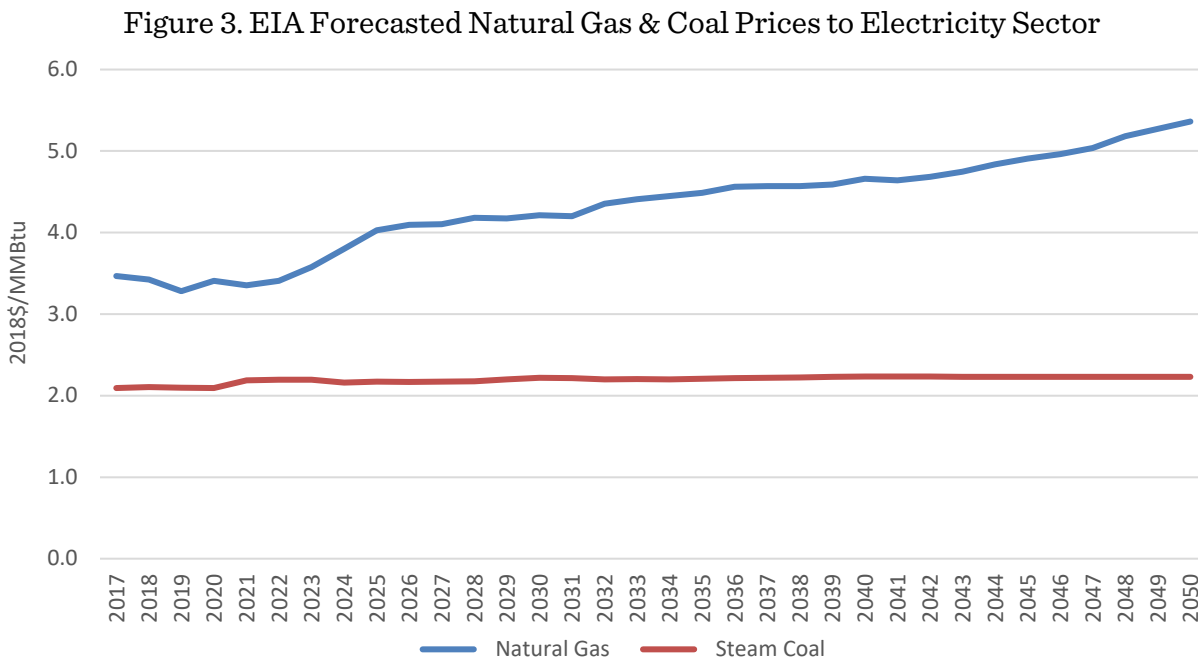
In previous years, a large contributor to reduced coal demand was the price of natural gas. For 2017 and 2018, the average U.S. price of gas delivered to the electric power sector was fairly constant, averaging \$3.52/mcf in 2017 (nominal dollars) and \$3.67/mcf in 2018 (EIA 2017). Coal has been somewhat more competitive than in 2016, when delivered gas prices averaged \$2.99/mcf.

For several years, abundant gas production from the Marcellus play, combined with relatively low takeaway capacity, has resulted in especially low gas prices in a primary region in which West Virginia coal competes. However, that differential is diminishing, as shown in the following chart of weekly prices at the two primary Marcellus area price hubs vs. the Henry Hub (Figure 2).



Source: EIA, Natural Gas Weekly.

In its Annual Energy Outlook (AEO) 2019 Reference Case analysis, the EIA continues to project real natural gas prices delivered to the power generation sector to increase at a faster rate than coal prices (Figure 3), which should moderate declining coal demand (EIA 2019).



Source: EIA, AEO 2019.



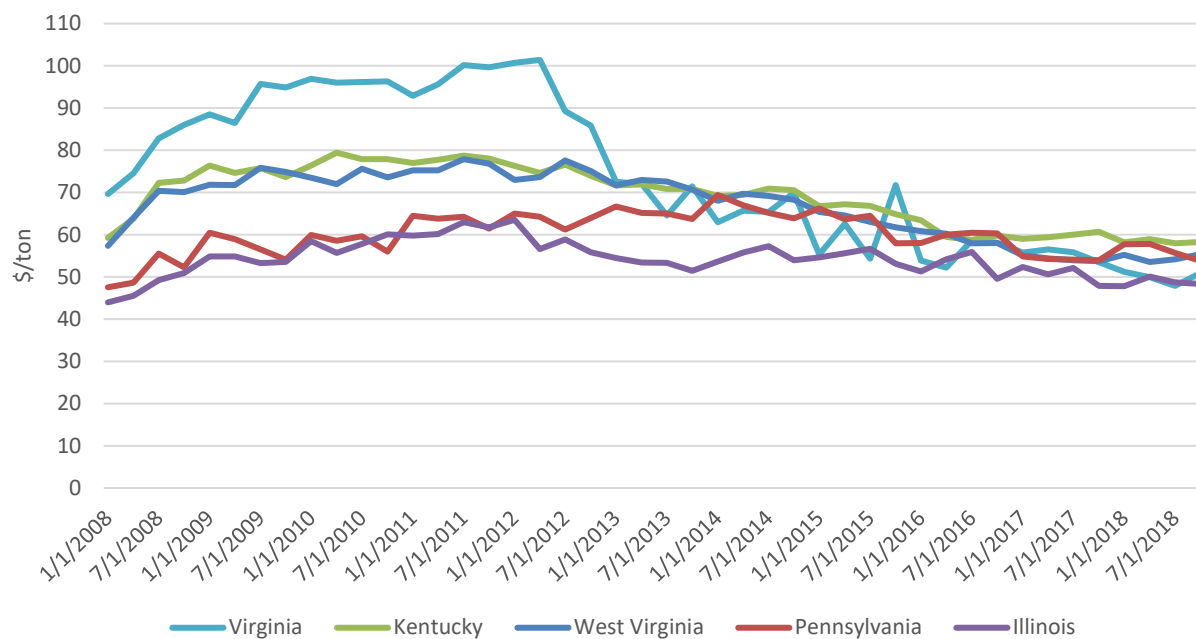
*Coal-Fired Power Plant Retirements*

Since 2015 no additional units at coal-fired power plants in West Virginia have closed. However, several other plants that have utilized West Virginia coal retired in 2018. These include the CP Crane plant in Maryland and two plants owned by Dayton Power & Light, J M Stuart and Killen, in Ohio (EIA 2019).

*Prices of Coal Delivered to the Electricity Industry*

The price of West Virginia-produced coal delivered to power plants has been falling since around 2012. Average prices for regional coal producing states are much closer than in previous decades. Prior to 2013 West Virginia, Virginia and Kentucky producers commanded a premium over coal produced from Pennsylvania and Illinois. That premium has largely disappeared, even for Virginia coal, which previously maintained prices 50 to 70 percent higher than IL and PA, and 20 to 30 percent above West Virginia coal (Figure 4).

Figure 4. Coal Prices to the Electricity Industry by Mine State



Source: EIA, Quarterly Coal Report.

*Environmental Regulation*

Recent regulatory changes have generally been in favor of coal production. In June 2019, the U.S. Environmental Protection Agency finalized the Affordable Clean Energy rule, and officially repealed the Clean Power Plan (EPA 2019). The new rule establishes emissions guidelines for states to use when developing plans to limit CO<sub>2</sub> from existing coal-fired power plants under the authority of Clean Air Act (CAA) section 111(d). A primary feature of the new rule is that it establishes heat rate improvement as the best system of emissions reduction for CO<sub>2</sub> from coal-fired generators (EPA 2019).

The Stream Protection Rule, issued by the U.S. Interior Department in 2016, was nullified in February 2017 (Office of Surface Mining Reclamation and Enforcement 2017). This rule would have increased the cost of mining coal by limiting the distance from a water body that coal mining can occur, inclusive of broad categories of water. A new version of the rule was published in the Federal Register on February 14, 2019. The new proposed rule revises the definition of “waters of the United States” by limiting protection to six categories of water: traditional navigable waters, their tributaries, certain ditches, some lake and ponds, some impoundment of covered waters, and wetlands next to covered waters. The proposal would exclude ephemeral streams (EPA 2019).

### **The Industrial Sector**

As shown previously in Figure 1, demand for West Virginia coal by the industrial sector (coke plants and self-generating manufacturers, including coal-fired combined heat and power plants) was essentially the same for 2017 and 2018, with demand up about 14 percent from 2016. This increase was almost entirely at coke plants, which represent annual demand of 10 million tons. This corresponds with a six percent increase in total U.S. steel production, to 86.8 million metric tons, up from 81.6 million metric tons in 2017 (International Trade Administration 2019).

In 2018, the U.S. imported 30.8 million metric tons of steel, an 11% decrease from 34.5 million metric tons in 2017. In 2018, the U.S. steel trade deficit amounted to 23.0 million metric tons, a 6% decrease from 24.4 million metric tons (ITA 2019). Imports from Turkey (-47%) showed the largest volume decline in 2018, followed by South Korea (-26%), Japan (-20%), Russia (-18%) and Taiwan (-15%) (ITA 2019).

### **Exports**

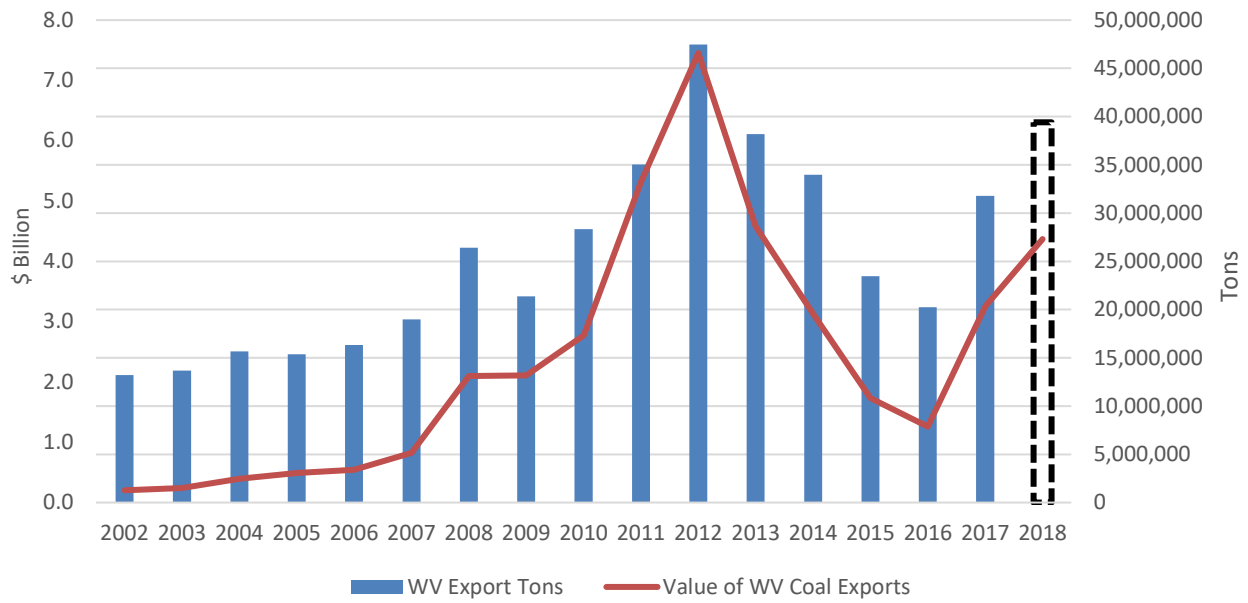
The nation’s coal exports rose in 2017 and 2018, to 97 million short tons in 2017 and 116 million tons in 2018, up from about 60 million short tons in 2016.<sup>2</sup>

The value of coal exports from West Virginia rose to \$4.4 billion in 2018, up from \$3.3 billion in 2017. The State maintained exports to many countries in North America, Europe, South America, Africa and Asia. The top five importing countries by value were India, Ukraine, the Netherlands, Brazil and Canada (ITA 2019). The following figure (Figure 5) shows the value of West Virginia-based coal exports and associated tonnage from 2002 to 2018.

---

<sup>2</sup> 2018 data for coal export tonnage by U.S. state of origin has not yet been released. CBER estimates West Virginia’s exports based on historical shares of total exports and the value of coal exports from the state.

Figure 5. Value and Tonnage of West Virginia Coal Exports, 2002-2018



Source: EIA, ITA; 2018 export tonnage estimated by CBER.

## Component Forecasts

### Energy Information Administration (EIA)

Publication: Annual Energy Outlook 2019  
Date: January 2019  
Forecast Horizon: 2019-2050  
Region(s): Northern Appalachia, Central Appalachia

The EIA provides a forecast of coal production by region in its 2019 Annual Energy Outlook, projecting through 2050. This projection is generated using the National Energy Modeling System (NEMS). NEMS uses a market-based approach that balances energy supply and demand while considering regulations and industry standards. NEMS is a modular system, with modules that represent each of the fuel supply markets, conversion sectors, and end-use consumption sectors of the energy system (EIA 2019).

Only the EIA Reference Case figures are used for the Consensus forecast, which represents EIA's 'best assessment of how U.S. and world energy markets will operate through 2050.' This projection assumes improvement in known energy production, delivery, and consumption technology trends (EIA 2019).

The EIA's forecasts for Appalachia are used to forecast West Virginia coal production. The method used to produce a West Virginia coal production forecast is described in Appendix A.

#### *Key Assumptions:*

Macroeconomic Issues: Real GDP growth averages 1.9% per year from 2016 to 2050.

Coal Prices: EIA projects minemouth prices for Appalachian coal to be about \$62/ton in 2019 (2018\$) and to remain between \$58 and \$64 through 2050.

Natural Gas Prices: Henry Hub<sup>3</sup> spot prices for natural gas averaged \$3.08 per million Btu in 2017 and \$2.99 per million Btu in 2018 in real \$2018. Prices are expected to be about \$3.00 in 2019 and rise thereafter at an annual rate of 1.5 percent, resulting in an average expected price of \$4.90 per million Btu in 2050.

---

<sup>3</sup> The Henry Hub in Louisiana is the delivery point for the natural gas futures contract on the New York Mercantile Exchange.

Electricity: U.S. use of coal for production of electricity is expected to decline by 0.8% annually through 2050. Coal-fired generating capacity is expected to decrease at a rate of 1.5 percent per year through 2050. By comparison, combined-cycle (natural gas) capacity and renewable capacity are both projected to increase by 2.3 percent per year. Combined cycle capacity is projected to surpass coal-fired capacity in 2019.

Industrial/Commercial: Industrial self-generators (CHP plants, power plants with a non-regulatory status, and small on-site generating systems) are expected to see a very slight decline in coal consumption of 0.1 percent per year through 2050. Metallurgical coal use in coke plants is projected to decrease by 0.4 percent per year. The commercial sector is expected to maintain flat coal consumption of one million tons per year.

Exports: The NEMS Coal Market Module projects steam and metallurgical coal trade flows from 17 coal-exporting regions of the world to 20 import regions for both steam and metallurgical coal, including five U.S. export regions and four U.S. import regions. U.S. coal exports are projected have peaked in 2018 and to fall throughout the forecast period to 63 million tons in 2050.

Environmental: The AEO2019 includes the effects of current legislation, environmental regulations, and international protocols including recent government actions for which implementing regulations were available as of the end of September 2018. This includes the Mercury and Air Toxics Standards (MATS) and the Cross-State Air Pollution Rule (CSAPR). A number of state-level policies are modeled, including the Illinois Future Energy Jobs Act, the New York Clean Energy Standard, and the Maryland Clean Energy Jobs Act, as well as regional initiatives such as the Regional Greenhouse Gas Initiative. The Clean Power Plan is not included (EIA 2019).

## Energy Ventures Analysis (EVA)

Publication: EVA Long-Term Forecast

Date: June 2019

Forecast Horizon: 2019-2045

Region(s): West Virginia

The forecast of West Virginia coal production is tied to power sector demand for coal. To determine power sector demand, EVA utilizes the AURORAxmp 24/7 dispatch model (which EVA licenses) to calculate electricity generation by plant. EVA converts the generation into demand by fuel type based upon each plant's location, plant configuration, and environmental controls. The forecast reflects the least cost dispatch solution consistent with the operating parameters of individual units. Existing generation and announced retirements are reflected. In addition, the model adds and retires capacity in an economic manner and as required by law (Energy Ventures Analysis 2019).

Commodity prices, which are inputs into the AURORAxmp, reflect analysis of supply and demand in each non-power sector, i.e. industrial/commercial demand, domestic metallurgical demand, and export steam and metallurgical demand. Prices are calibrated based upon AURORAxmp results to reflect market balances based upon demand.

### *Key Assumptions:*

Macroeconomic Issues: GDP growth is expected to average just over 2% per year.

Coal Prices: Coal prices for both Northern and Central Appalachia were relatively strong in 2018 as a result of the strong global market. In 2019, prices are expected to fall about 10% due to some softening in demand. By 2045, prices from both regions are expected to return to the 2019 levels in the \$45-70 per ton range in real 2019 dollars and \$74-115 per ton range in nominal dollars. The relatively wide range reflects the range in qualities from lower Btu, high sulfur steam coal to high quality metallurgical coals. Pricing can also be volatile due to unexpected changes in the market caused by weather, political events, and supply-side disruptions.

Natural Gas Prices: Gas prices are expected to increase through 2045 resulting in a price of \$4.00 per MMBtu (2019\$) in 2045.

Electricity: Growth in electricity demand is expected to average 0.5% per year which is a continuation of the relatively low growth that has been occurring as a result of lower

industrial activity, demand-side management, and behind the meter generation. While this rate could be lower or higher, the primary factor that could cause an increase in this rate is electric vehicle penetration. The modeled growth in electricity demand is expected to reduce demand for Northern and Central Appalachian coal by the power sector by 31% between 2019 and 2045 largely due to coal plant retirements. Further, with the retrofit of technologies on power plants, coal supply has become fungible meaning demand can switch between coal supply regions (e.g., Northern Appalachia and Illinois Basin) based upon the relative competitiveness of each.

**Industrial/Commercial:** Non-coke industrial demand for Northern and Central Appalachian coal is projected to fall by about 35% between 2019 and 2045. This reflects the gradual switch-out of industrial boilers to gas. Demand for metallurgical coal from Northern and Central Appalachia during this same period is projected to fall by 27% as older coke ovens are expected to be closed and not replaced.

**Exports:** The level of exports is affected by global demand for coal and global supply. U.S. export levels are a function of the competitiveness of U.S. coals in the global market which in turn is affected by the relative strength of the U.S. dollar particularly with respect to the Australian dollar as global coal trade is U.S. dollar denominated and Australia is the largest exporter of bituminous coals. Both steam and metallurgical coals are exported from the U.S. In recent years, metallurgical exports accounted for most of the exports. Steam coal exports have caught up and are expected to account for most exports going forward. U.S. metallurgical coal exports exclusively originate in Appalachia. U.S. steam coals originate throughout the U.S. with the origin a function of coal quality, transportation logistics, and cost. Steam and met coal export forecasts are exogenously determined through an analysis of global supply and demand. The resulting price forecast, however, affects domestic pricing and therefore utility coal demand.

Steam coal exports from Northern and Central Appalachia were fairly strong in 2018 at almost 50 million tons. The strength reflected a strong global market, strong pricing, and supply issues from some of the traditional global suppliers. Going forward, exports are expected to decline over time. Exports from Northern Appalachia are expected to be stronger than exports from Central Appalachia due to Central Appalachia's higher cost structure. Steam coal exports overall could increase if one or more announced export terminals are built in the Pacific Northwest allowing competitive delivery of Powder River Basin coals into the Pacific market. In 2018, met coal exports from Northern Appalachia and Central and Southern Appalachia also benefited from the strong global market and strong pricing. Metallurgical coal exports from Northern and Central Appalachia are expected to remain strong through the forecast period in part because of the addition of a second mine at Arch's Leer mine complex in West Virginia. With China one of the two

largest global importers of coal, global coal markets can be affected significantly by changes in coal-related policies within China which cannot always be predicted.

Environmental: Phase I of the Cross-State Air Pollution Rule (CSAPR) went into effect January 1, 2015; Phase II went into effect January 1, 2017. The Mercury and Air Toxics Standards (MATS) went into effect in April 2015 with a liberal one-year extension. Section 316(b) of the Clean Water Act goes into effect with 2020 compliance for minor intake modifications and 2022 compliance for those requiring cooling towers. Coal Combustion Residuals (CCR) goes into effect by 2020. Conversion to dry ash handling is assumed by 2020 and use of lined landfills is assumed for subsequent ash disposal. Effluent Limitation Guidelines (ELGs) assumes FGD wastewater treatment compliance by 2023. National Ambient Air Quality Standards (NAAQS) revisions will include fine particulate and ozone standards. Regional haze compliance using Best Available Retrofit Technology will go into effect in 2020 excepting any announced settlements. Greenhouse Gas New Source Performance Standard is assumed to limit the ability to add new coal-fired generation absent partial carbon capture and sequestration or co-firing with gas. The modeling also assumes the Affordable Clean Energy Rule with the proposed NSR process changes. Regional CO<sub>2</sub> programs (i.e., RGGI and AB32) are assumed to continue.



**Marshall University Center for Business and Economic Research (CBER)**

Publication: CBER West Virginia Coal Production Forecast 2019

Date: June 2019

Forecast Horizon: 2019-2045

Region(s): West Virginia

CBER forecasted West Virginia total coal production from 2019 to 2045 by using a Vector Autoregression (VAR) model with seasonality adjustment using quarterly data from 2008-2018.

*Key Assumptions:*

This VAR model is a demand-based model. It forecasts coal production using several prices and demand related variables (Table 1). All variables (both impulse and response) were considered endogenous and modeled as first order Autoregressive Process (AR1).

The CBER forecast does not impose any macro- or micro-economic assumptions that may be subject to exogenous shocks in the future.

Table 1. Variable Description and Data Source

<b>Variable</b>	<b>Source</b>
WV Total Coal Production	EIA
Total WV Coal Delivered to the Electricity Industry	EIA
Delivered Coal Prices for Power Generation	EIA
U.S. Coal Export Price	EIA
Producer Price Index (Coal Selling Price)	BLS
Euro/Dollar Exchange Rate	Macrotrends

**West Virginia University Bureau for Business and Economic Research (BBER)**

Publication: WVU BBER Coal Production Forecast 2018

Date: July 2018 (modified in June 2019)

Forecast Horizon: 2019-2045

Region: Northern West Virginia and Southern West Virginia

The WVU Bureau of Business and Economic Research Coal Production Forecast is an econometric model based upon changes in factors that affect the demand and price for coal sourced from mines in Northern and Southern West Virginia between 1985 and 2017. Historical data on coal prices, production and other energy-related data are obtained from a variety of Energy Information Administration reports. Forecasts for the model's US-specific explanatory variables were taken from the IHS May 2018 Long-Term Forecast and the 2018 Annual Energy Outlook from the Energy Information Administration (West Virginia University 2018).

## Consensus Forecast

The four long-term forecasts produced by EIA, EVA, CBER and BBER are combined to create the Consensus Forecast for West Virginia Coal Production. Three different approaches were used to derive the best consensus forecast.

1. Weighted Average and Simple Average. Historical accuracy rates<sup>4</sup> of four forecasts were used as weights for this year's consensus forecast. However, results using weighted average were not significantly different from that using simple average (difference <3%). A simple average was then used to calculate consensus forecast for simplicity.<sup>5</sup>
2. "Midrange Value". This alternative approach first finds each year's maximum and minimum numbers from four forecasts, and then calculate the midrange value using  $\text{midrange} = (\text{max} + \text{min}) / 2$ . The forecasted coal production, however, is not significantly different from that using simple average (difference <3%).
3. "Minimum Distance". The midrange value calculated in the 2<sup>nd</sup> approach of each year was compared with four forecasted numbers in that year, and the number with shortest "distance" (or smallest difference) to the midrange value is the consensus forecast. Again, forecasted coal production is not significantly different from that using simple average (difference <3%).

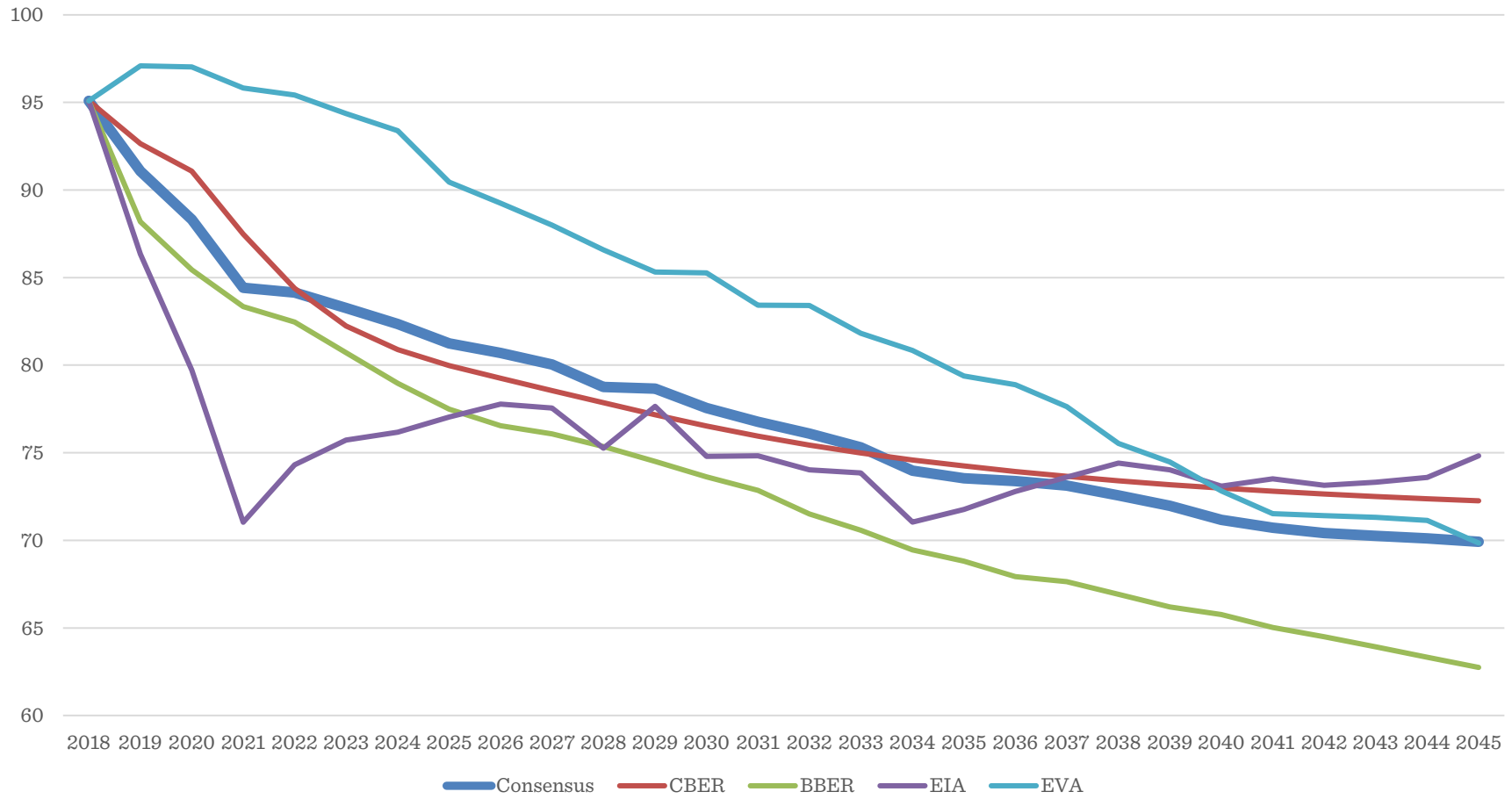
Thus, the consensus forecast was calculated using the simple average of EIA, EVA, CBER and BBER (Figure 6 and Table 2). The coal production in West Virginia is likely to decline from 91 million tons in 2019 to slightly below 70 million tons in 2045. There might be temporary increments in coal production due to exogenous shocks unforeseen by all four forecasts (see Appendix B for coal production forecast in case of a looming recession). The declining trend is unlikely to be reversed in the long run.

---

<sup>4</sup> Approaches to calculate historical accuracy rate can be very different as some may value short term accuracy more, while others may favor long term accuracy. A simple average of 1-year rates to 5-year rates was used in our approach, as accuracy rates longer than 5 years were not available.

<sup>5</sup> Due to the subjective nature of weight selection, a simple average approach (with same weight for all four forecasts) would generate a very similar forecast as the weighted average but does not require additional (often unrealistic) assumptions to estimate accuracy rate of historical forecasts.

Figure 6: Consensus and Component Forecasts 2019 (million tons)



Source: EIA, EVA, WVU BBER and authors' calculation.

Table 2: Consensus Forecast for West Virginia Coal Production 2019 (million tons)

Year	Historical	2019 Forecasting Group				2019 Consensus	2017 Consensus	2016 Consensus	2015 Consensus	2014 Consensus
		EIA	EVA	CBER	BBER*					
2014	111.9								112.4	
2015	95.5							107.2	106.9	
2016	80.1						79.5	103.4	101.4	
2017	92.8					86.8	76.9	101.7	103.0	
2018	95.1					83.6	74.7	102.7	103.3	
2019		86.4	97.1	92.7	88.2	91.1	84.1	76.7	104.8	102.4
2020		79.7	97.0	91.1	85.4	88.3	87.1	80.1	104.9	101.5
2021		71.0	95.8	81.1	83.4	84.4	86.1	78.6	104.4	100.9
2022		74.3	95.4	82.6	82.5	84.1	85.9	75.7	103.4	100.7
2023		75.7	94.4	82.2	80.7	83.3	84.7	73.1	102.8	100.0
2024		76.2	93.4	80.9	79.0	82.3	82.8	70.3	102.8	99.9
2025		77.0	90.4	80.0	77.5	81.2	81.5	69.1	102.4	99.2
2026		77.8	89.2	79.2	76.5	80.7	80.2	67.9	102.2	98.2
2027		77.5	88.0	78.6	76.1	80.0	79.3	66.2	101.7	98.1
2028		75.3	86.6	77.9	75.4	78.8	77.7	64.5	101.2	97.1
2029		77.6	85.3	77.2	74.5	78.7	76.8	63.0	100.9	97.1
2030		74.8	85.3	76.5	73.6	77.6	76.3	61.7	100.9	96.5
2031		74.8	83.4	75.9	72.9	76.8	76.1	62.1	100.5	96.3
2032		74.0	83.4	75.4	71.5	76.1	76.0	62.9	100.9	95.1
2033		73.8	81.8	75.0	70.6	75.3	76.6	63.3	99.8	94.2
2034		71.0	80.8	74.6	69.5	74.0	76.7	63.1	98.3	93.7
2035		71.8	79.4	74.2	68.8	73.5	76.6	62.5	97.3	91.6
2036		72.8	78.9	73.9	67.9	73.4	76.5	62.3		
2037		73.6	77.6	73.7	67.6	73.1	76.1	60.4		
2038		74.4	75.5	73.4	66.9	72.6	75.6	59.7		
2039		74.0	74.5	73.2	66.2	72.0	75.8	58.6		
2040		73.1	72.8	73.0	65.8	71.2	75.3	57.1		
2041		73.5	71.5	72.8	65.0	70.7				
2042		73.1	71.4	72.6	64.5	70.4				
2043		73.3	71.3	72.5	63.9	70.3				
2044		73.6	71.1	72.4	63.3	70.1				
2045		74.8	69.8	72.3	62.7	69.9				

Source: EIA, EVA, WVU BBER and authors' calculation. Asterisk (\*) BBER Forecast is a 2018 forecast. The other forecasts were produced in 2019.

## Summary

The four component models incorporate a range of possible levels of West Virginia coal production over the next 26 years, with varying forecasts that illustrate the impact of primary supply and demand variables and uncertainty over the continuation of recent trends. The consensus reduces uncertainty by combining the forecasts into one aggregate projection. Despite a possible short-term increase in coal production, the consensus forecast suggests West Virginia is more likely to experience a reduction in coal production in the next two decades.

Through 2032, with the exception of current year production, the 2019 West Virginia Consensus Coal Forecast figures are very similar to the most recent Consensus Forecast produced in 2017. After 2032, the forecast is for slightly lower production than previously projected. However, aggregate production for 2019 through 2040 is only one percent lower than forecast in 2017.

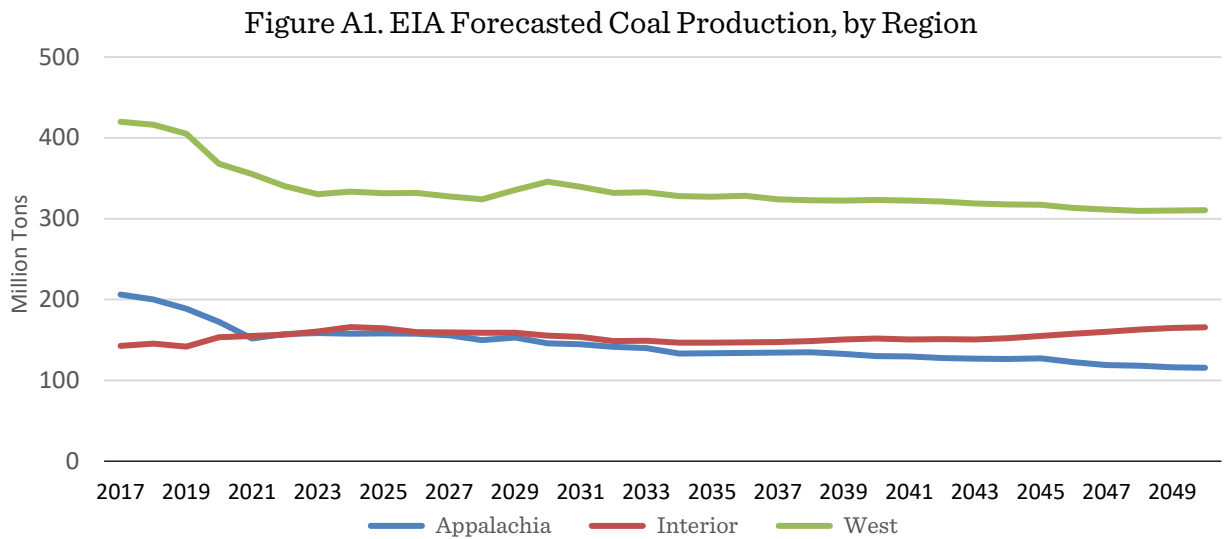
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## Appendix A: EIA Forecast for West Virginia

The EIA’s 2019 AEO forecasts Appalachian coal production to decline steadily through 2050, with some stability from 2022 to 2027. As shown below (Figure A1), Interior<sup>6</sup> production is projected to surpass Appalachian production in 2024.

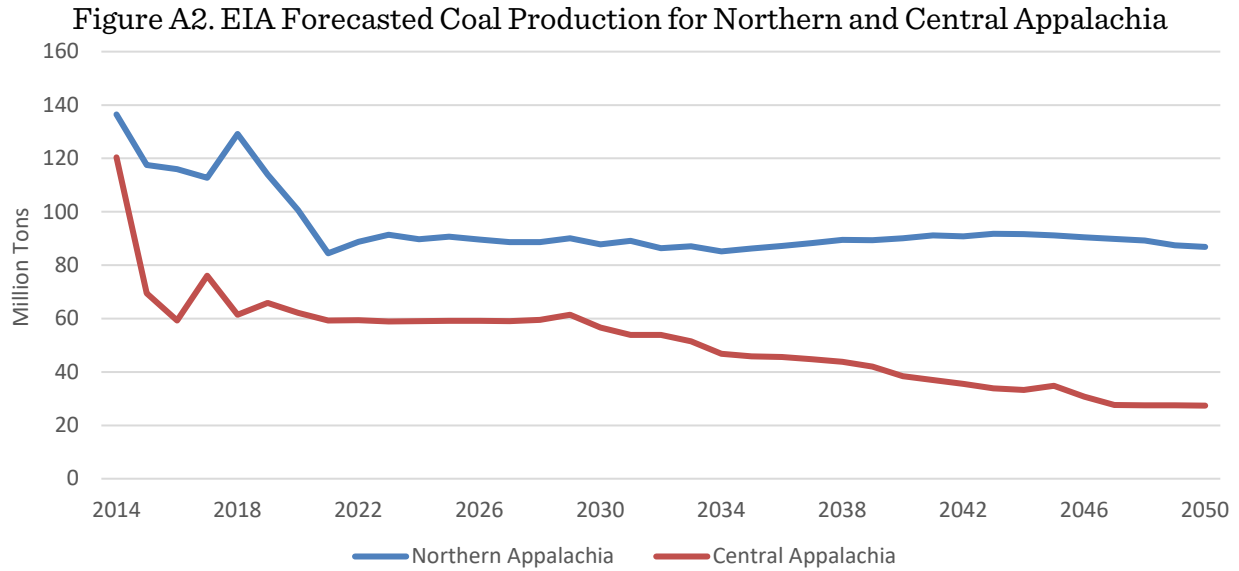
Northern Appalachia includes Pennsylvania, Maryland, Ohio, and Northern West Virginia. Central Appalachia includes Virginia, Eastern Kentucky, Northern Tennessee, and Southern West Virginia (Figure A2).



Source: EIA

<sup>6</sup> Arkansas, Illinois, Indiana, Iowa, Kansas, W. Kentucky, Louisiana, Mississippi, Missouri, Oklahoma and Texas.



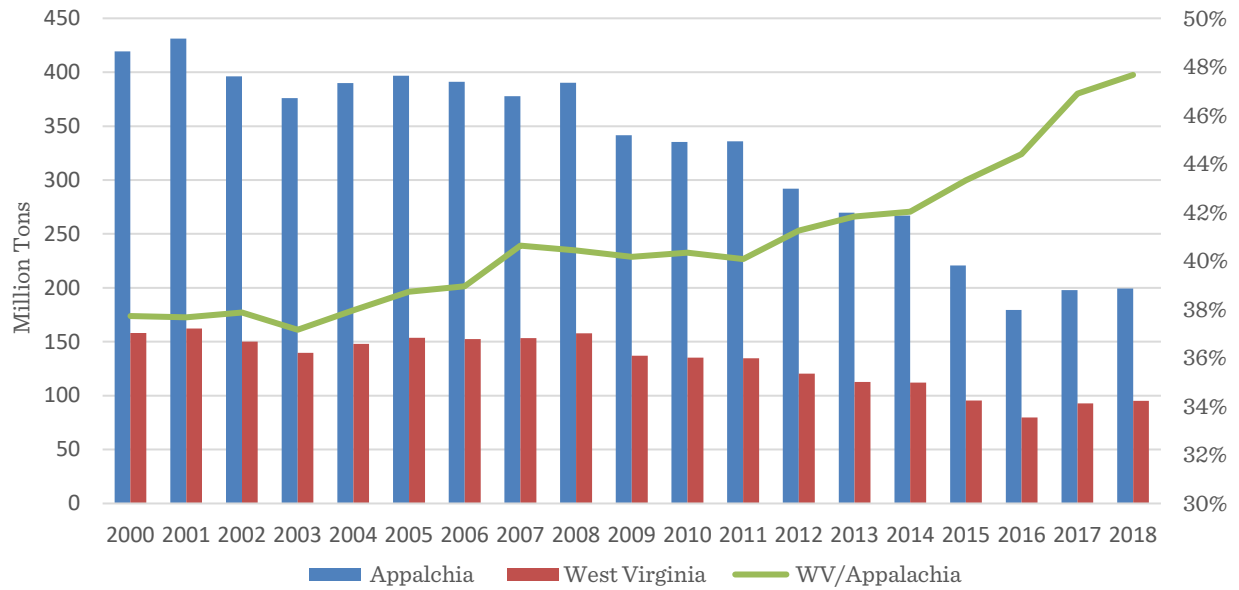


Source: EIA

The EIA forecast for WV coal production is derived from EIA’s forecast for the Appalachia region, as the agency does not publish forecasts for individual states. The WV forecast was calculated using year-adjusted WV/Appalachia coal production ratios times each year’s Appalachia forecast. As shown in Figure A3, there is a clear trend in the WV/Appalachia ratio (green line) over time. Thus, year-adjusted ratios for 2019-2045 were estimated using econometric techniques<sup>7</sup> assuming the upward trend will remain in the future.

<sup>7</sup> Alternative variables (e.g., Northern and Central Appalachia production) and measures (e.g., Annual Coal Production) were also used, and results are very close to the ones in Figure 5 or Table 2 which were chosen due to smaller measurement error.

Figure A3. EIA Appalachian Forecasts Applied to West Virginia Coal Production



Source: EIA and CBER calculations for West Virginia production.

## Appendix B. Coal Production Under Economic Recession

The U.S. economy has been in the longest economic expansion in history since 2008. There are growing concerns over whether the current expansion will end in the next two years. In addition to regular forecasts (Figure 6 and Table 2) which mostly assume “business as usual”, CBER forecasts also explore the impact of a possible economic recession in 2020 on WV coal production.

Table B1 shows U.S. coal production growth rates after each economic recession in post-WWII era. Total coal production tends to react spontaneously to economic downfall in history, but the trend ended after 1980 when declines in coal production often lagged the start of recession by one year but no longer than two years.<sup>8</sup> This shift may have been caused by structural changes in the U.S. macroeconomy that no longer largely rely on coal as a source of energy. Thus, if the economy experienced another recession similar to The Great Recession in 2008, it is reasonable to assume WV coal production would suffer an additional -17% reduction in year 2021, and the original decline rate in 2022 (Figure B1) would be corrected upward by 12%.<sup>9</sup> The direct impact of recession is assumed to disappear after 2022.<sup>10</sup>

Table B1. U.S. Coal Production Growth/Decline During Recent Recessions.

	1945	1948	1953	1957	1960	1969	1973	1980	1990	2001	2008
T	-7.9%	-3%	-7%	0%	2%	-4%	-6%	8%	13%	3%	4%
T+1	-5.2%	-27%	-14%	-23%	-7%	3%	-12%	-7%	-3%	-6%	-13%
T+2	20.6%	18%	21%	2%	5%	-17%	7%	14%	-2%	-11%	-1%
Diff (T, T+1)	3%	-24%	-7%	-23%	-9%	7%	-6%	-15%	-15%	-10%	-17%
Diff (T+1, T+2)	26%	46%	36%	25%	12%	-20%	19%	21%	1%	-5%	12%

Source: EIA and authors' calculation. T represents the year when recession started, while T+1 and T+2 represent one year and two years after the recession.

Comparing with the original forecast (Figure B1), the new one with a possible recession in 2020 (Figure B2) shows that WV coal production would further decline by another 15.5 million tons in 2021 and 6.3 million tons in 2022. Afterwards, the speed of decline would return to the level of the original forecast, but the output would remain lower in long-term.

<sup>8</sup> The U.S. coal production reacted to most recent recession a little different, as it kept declining after 2010.

<sup>9</sup> The average of growth rate change between year T and year T-1 for most recent three recessions (1990, 2001 and 2008).

<sup>10</sup> After 2022, the declining rate will return to the level of the original forecast.

Figure B1. WV Coal Production Forecast without Economic Recession in 2020

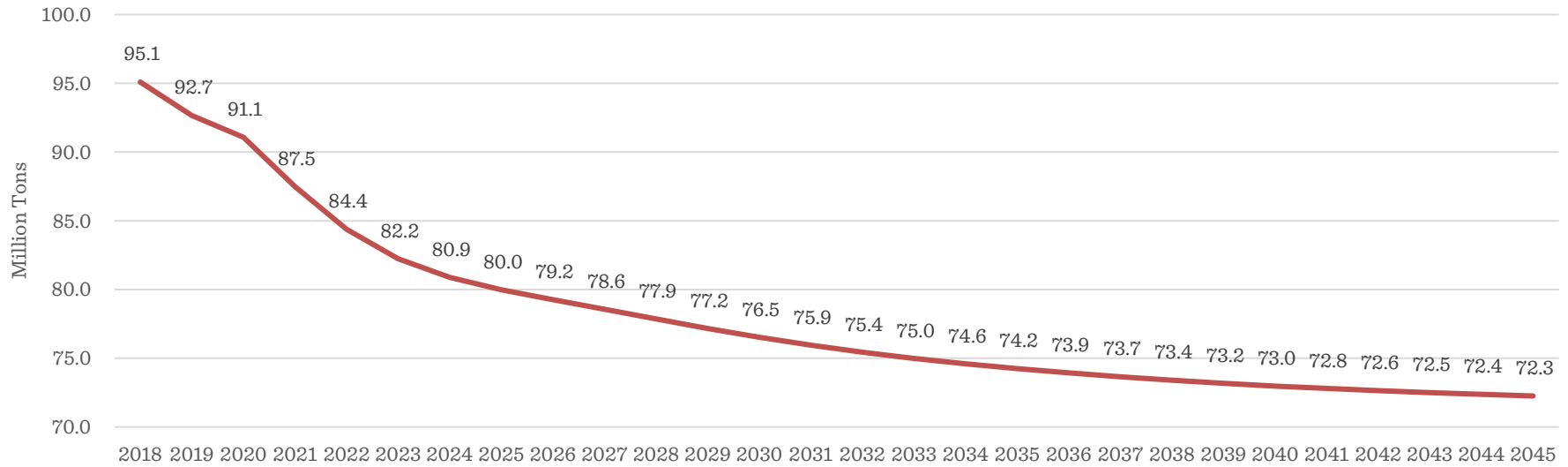
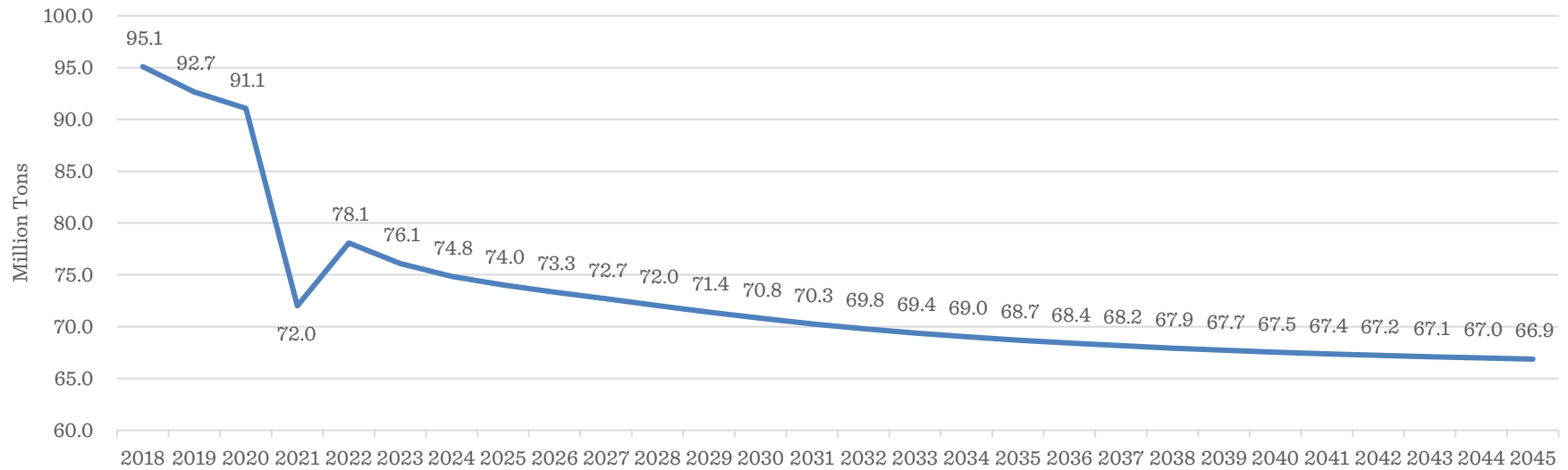


Figure B2. WV Coal Production Forecast with Potential Economic Recession in 2020



## **Appendix C**



**Taylor & Mulder**  
Property and Casualty Consulting Actuaries

**West Virginia Office of Special Reclamation  
Actuarial Reserve Study as of June 30, 2019**

**November 2019**



**Taylor & Mulder**  
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November 19, 2019

Mr. Michael Sheehan  
Deputy Director  
Division of Land Reclamation  
West Virginia Department of Environmental Protection  
Office of Special Reclamation  
47 School Street Suite 301  
Phillipi, WV 26416  
[Michael.P.Sheehan@wv.gov](mailto:Michael.P.Sheehan@wv.gov)

Dear Mr. Sheehan,

Enclosed is the actuarial review of the West Virginia Department of Environmental Protection (“WVDEP”) Special Reclamation Fund and Water Trust Fund (“SRF” and “WTF”, respectively, or collectively “the Funds”) as of June 30, 2019.

The first section in the text of our report is the *Executive Summary*. This section presents our conclusions and recommendations. It also describes the purpose and scope of our report, explains the distribution and use of our report, and provides the conditions and limitations underlying our work. This section of our report also includes the Background section which provides information about the Fund history.

The next section of the text of our report is the *Actuarial Analysis* that describes the sources of data, our overall methodology, the selection of factors and specific methodologies and considerations by line of business. It also describes the selection of ultimate losses. The *Exhibits* section of our report follows the text of the report and includes all of our analyses.

Please feel free to call if you have any questions regarding any aspect of our report.

Sincerely,

Daniel W. Lupton, FCAS, MAAA, CSPA, MBA

Evelyn Toni Mulder, FCAS, MAAA, FCA

Bobby J. Jaegers

Enclosures

# West Virginia Office of Special Reclamation

## Actuarial Reserve Study as of June 30, 2019

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## Executive Summary

### Purpose and Scope

Taylor & Mulder, Incorporated (“T&M”) was requested by the West Virginia Department of Environmental Protection (“WVDEP”) to conduct an actuarial review of its loss reserves as of June 30, 2019. This report contains our summary and conclusions along with a description of the analysis underlying our conclusions.

Specifically, T&M was asked by the WVDEP to conduct an actuarial analysis to include within its scope the following tasks:

- A valuation in accordance with applicable actuarial standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries that will determine the Program’s fiscal soundness;
- An evaluation of the present assets and liabilities of the Special Reclamation Program for a minimum of 20 years, including an annual table illustrating those assets and liabilities for underground versus surface mine permits, small versus large permits (based on bond amounts or acreage) and permits for tipples, preparation plants, and impoundments and illustrating land and water liabilities separately;
- An evaluation of the prospective assets and liabilities of the Special Reclamation Program for a minimum of 20 years, including a table illustrating estimates of underground versus surface mine permits, small versus large permits (based on bond amounts or acreage) and permits for tipples, preparation plants, and impoundments and illustrating land and water liabilities separately, including the funded status of the Water Trust Fund (“WTF”) as well as the Special Reclamation Fund (“SRF”);
- A table that combines the findings of the two previous tasks;
- An analysis and discussion of the ability of the Program to support long term and/or perpetual liabilities; and,
- A one-page executive summary of conclusions with references to the body of the report.

*Note: This is a “closed” valuation of the Funds’ liabilities insofar as it considers only liabilities arising from permits that have already been issued. The estimated liabilities account for current*

*known reclamation projects as well as anticipated permit revocations on permits issued prior to June 30, 2019. Anticipated income is also linked to permits issued by June 30, 2019 without regard to future permits issued.*

This report presents the results of those analyses. This report was prepared by:

- Daniel W. Lupton, FCAS, MAAA, CSPA, MBA, Vice President and Consulting Actuary,
- Evelyn Toni Mulder, FCAS, MAAA, FCA, Principal and Consulting Actuary,
- Bobby J. Jaegers, Consulting Actuary

In accordance with the requirements of the Actuarial Standards of Practice in making statements of actuarial opinion, I provide the following statement:

*I, Daniel W. Lupton, am Vice President and Consulting Actuary in the firm of Taylor & Mulder, Inc. I am a Fellow of the Casualty Actuarial Society in good standing and qualified to issue a Statement of Actuarial Opinion. I am also a Member of the American Academy of Actuaries.*

## Conclusions

### Overall Fund Liabilities

The following chart shows the projected undiscounted liabilities for land reclamation costs, water capital costs, maintenance and operations costs, and administrative expenses for the next 20 years:

<b>West Virginia Office of Special Reclamation Actuarial Reserve Study as of June 30, 2019 Special Reclamation Fund and Water Trust Fund Combined Undiscounted Liabilities</b>			
<b>Expense Category</b>	<b>Current Forfeitures</b>	<b>Prospective Forfeitures</b>	<b>Total Liability</b>
Land Reclamation Costs	35,571,340	53,152,239	88,723,579
Water Capital Costs	117,541,582	62,929,909	180,471,492
O&M Costs*	150,349,147	17,716,402	168,065,548
Administrative Expense			59,442,730
<b>Total Liability</b>	<b>303,462,069</b>	<b>133,798,550</b>	<b>496,703,348</b>

\*O&M Costs are Operation and Maintenance Costs

It should be noted that because this is a “closed” study, the above table does not include anticipated liabilities arising from permits issued after June 30, 2019.

Administrative expenses in the above table include employee benefits, contractual obligations, personnel services, and unclassified expenses other than reclamation costs. Relative to the previous analysis performed for the Funds, the administrative expense is substantially lower. This is due to an adjustment in how administrative expense is calculated. In the prior study, administrative expenses were considered as one lump sum that increased each year without regard for the number of permits. In this study, we reduced the administrative expenses commensurate with the reduction in in-force permits among the current active cohort of permits. For example, it is anticipated that in 2036, only 49% of permits in force in 2019 will be remaining. For this reason, we only considered 49% of the total administrative expense costs from that year, given the “closed” nature of the study. By comparison, the total undiscounted administrative expenses for all permits, including permits issued after June 30, 2019, expected over the next 20 years is \$95,898,056, which is roughly 61% higher than the \$59.4 million in the table above.

The following table shows the estimated total liability from all forfeitures (current and projected) for the next 20 years, as well as a comparison to the same values projected as of the previous study:

**West Virginia Office of Special Reclamation  
Actuarial Reserve Study as of June 30, 2019  
Special Reclamation Fund and Water Trust Fund Combined  
Undiscounted Liabilities (000s)**

<b>Expense Category</b>	<b>Current Study</b>	<b>Prior Study</b>	<b>Difference</b>
Land Reclamation	88,724	86,196	2,527
Water Capital	180,471	204,394	(23,923)
Water O&M	168,066	157,306	10,759
Administrative*	59,443	56,030	3,412
<b>Total</b>	<b>496,703</b>	<b>538,290</b>	<b>(7,224)</b>

\*Administrative costs from prior study have been adjusted to reflect in-force permits only

Relative to the prior study, the current study anticipates lower expenses in the near term overall, with significantly lower water capital costs and significantly higher operations & maintenance costs.

A detailed breakdown of these liability cash flows is provided in Exhibits E-6 through E-9.

### **Funds' Assets**

In addition to projecting the Funds' liabilities, we also projected the Funds' assets. This was performed in the context of modeling future fiscal year cash flows. The following chart shows anticipated revenues over the next 20 years:

<b>West Virginia Office of Special Reclamation Actuarial Reserve Study as of June 30, 2019 Projected Revenues for SRF and WTF</b>	
<b>Revenue Category</b>	<b>20 Years</b>
Bond Forfeitures	33,360,753
Civil Penalties	12,380,840
SRF Coal Fees	130,929,020
WTF Coal Fees	152,243,046
SRF Investment Yield	4,764,979
WTF Investment Yield	126,157,114
<b>Total</b>	<b>459,835,752</b>

Note that due to the closed nature of the study, the revenues in the table above only reflect projected revenues associated with currently in-force permits. The actual anticipated revenues over that time period are considerably higher.

Relatedly, it should be noted that the actual investment yield will vary based on the rate at which funds must be transferred from the WTF to the SRF to pay for liabilities. Because the WTF earns a higher investment yield than the SRF, additional revenues in the SRF (for example, from coal tonnage fees associated with new permits that are outside the scope of our study) will have a significant positive impact on total investment yield over time.

Technical details regarding how each revenue category was projected are provided in **Appendix A**, below. Revenue projection details are provided in Exhibits E-3 through E-5.

### **Financial Projections**

Our projections of revenues and expenses to the Funds imply that the Funds will be solvent on a cash basis through 2039.

The chart on the following page shows a simplified cash flow projection for the SRF and WTF combined over the next 20 years.

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Financial Projection

Fiscal Year Ending 6/30	Total Expenditures	Total Revenues	Beginning Balance		WTF to SRF Transfers	Ending Balance	
			SRF	WTF		SRF	WTF
Prior						62,943,947	110,359,898
2020	57,544,445	37,482,687	62,943,947	110,359,898	-	24,362,908	128,879,180
2021	76,119,387	30,679,619	24,362,908	128,879,180	49,425,622	10,000,000	97,802,320
2022	32,711,796	27,369,924	10,000,000	97,802,320	21,418,914	10,000,000	92,460,447
2023	29,176,948	25,897,670	10,000,000	92,460,447	18,447,368	10,000,000	89,181,168
2024	25,428,775	24,898,861	10,000,000	89,181,168	14,924,915	10,000,000	88,651,254
2025	14,055,828	23,970,879	10,000,000	88,651,254	3,893,259	10,000,000	98,566,305
2026	14,603,196	23,060,609	10,000,000	98,566,305	5,422,883	10,000,000	107,023,718
2027	19,791,383	22,547,966	10,000,000	107,023,718	11,127,150	10,000,000	109,780,301
2028	16,579,068	22,006,975	10,000,000	109,780,301	8,135,571	10,000,000	115,208,208
2029	16,408,814	21,809,641	10,000,000	115,208,208	8,118,342	10,000,000	120,609,036
2030	15,725,111	21,252,367	10,000,000	120,609,036	7,875,678	10,000,000	126,136,292
2031	19,016,670	20,392,548	10,000,000	126,136,292	11,968,735	10,000,000	127,512,171
2032	18,635,132	19,946,872	10,000,000	127,512,171	11,783,087	10,000,000	128,823,910
2033	16,883,595	19,876,492	10,000,000	128,823,910	9,859,736	10,000,000	131,816,808
2034	16,051,282	19,993,676	10,000,000	131,816,808	8,737,461	10,000,000	135,759,201
2035	16,289,266	20,666,774	10,000,000	135,759,201	8,258,762	10,000,000	140,136,710
2036	18,934,094	21,688,144	10,000,000	140,136,710	9,904,018	10,000,000	142,890,759
2037	21,343,612	19,209,062	10,000,000	142,890,759	14,725,163	10,000,000	140,756,209
2038	24,942,105	18,679,786	10,000,000	140,756,209	18,523,178	10,000,000	134,493,891
2039	26,462,843	18,405,200	10,000,000	134,493,891	19,773,968	10,000,000	126,436,248

Note that these projections assume that the Water Trust Fund transfers money to the Special Reclamation Fund in order to maintain a fund balance of \$10,000,000.

A detailed version of this financial projection is provided in Exhibit E-2, which shows the breakdown by type of undiscounted expenditure and revenue item.

### **Recommendations**

**Expanded Study Scope:** Because of the closed nature of the study, financial projections over a long term are challenging. This is because the additional assets arising from new permits (particularly coal tonnage fees) allow funds to remain invested for longer periods of time in the higher-earning Water Trust Fund, leading to substantially different financial results. We therefore recommend that future studies should consider liabilities and assets associated with permits that are issued subsequent to the study date.

**Permit Status History:** Permit databases were provided evaluated as of a specific date. However, because this study estimates anticipated changes in permit status over time, it is necessary to make assumptions about how permit statuses change in order to develop forfeiture models. If records exist, it could be possible to produce more accurate models if a full history of each permit (including all status changes over time and dates when status changes occurred) were available.

### **Background**

On August 3, 1977, Congress enacted the Surface Mining Control and Reclamation Act of 1977 (“the SMCRA”) to encourage the reclamation of mined areas and return land and water resources to beneficial use. The SMCRA established a program for the regulation of mining permits and a program for reclaiming bond forfeiture sites. In West Virginia, reclamation of abandoned mine lands is performed by the West Virginia Department of Environmental Protection (“WVDEP”) Office of Special Reclamation.

Funding for the reclamation of mined areas comes from bond forfeitures, coal tonnage fees, civil penalties, and interest income. The largest of these funding sources is coal tonnage fees. Coal tonnage fees of \$0.15 per ton of coal mined are deposited in the Water Trust Fund (“WTF”) and

\$0.129 per ton are deposited in the Special Reclamation Fund (“SRF”). Amounts from bond forfeitures go to the SRF.

Currently, all reclamation activities, including water treatment, are paid through the SRF, with amounts being transferred to the SRF from the WTF to fund payment of certain costs. Financial projections assume that funds will be transferred to the SRF to maintain a certain minimum balance of working capital, and that the remaining amounts will be left in the WTF to achieve a higher average investment yield.

### **Report Distribution and Use**

This report has been prepared for internal use by the management of the WVDEP and its board, its accountants, auditors, and attorneys, and the West Virginia legislature. The WVDEP is not authorized to include this report in any marketing or request for proposal solicitations. In addition, it should be understood that T&M consultants are available to respond to any questions by authorized third parties with respect to this report.

### **Conditions and Limitations**

The analyses contained in this report were performed using accepted loss and loss adjustment expense reserving methods adjusted to the special needs of the WVDEP and in conformance with sound actuarial standards and principles. T&M introduced assumptions and judgments that we considered appropriate in the circumstances.

With regard to projections of ultimate values, it should be understood that the emergence and settlement of claims are subject to uncertainty. While we have used our best professional judgment in all instances, projections of future ultimate losses and loss expenses are inherently uncertain because of the random nature of claims occurrences. They are also dependent upon future contingent events and are affected by many additional factors.

WVDEP claim reserving procedures, current and perceived social and economic inflation, current and future court and jury attitudes, legislative changes affecting the WVDEP, improvements in



technology, and many other economic, legal, political, legislative and social factors all can have significant effects on ultimate claim costs. Therefore, we cannot warrant that actual developments will not differ from current projections. Such differences could be upward or downward and could be significant.

In summary, the ultimate loss and loss adjustment expense levels estimated in this report are subject to potential variations in estimation due to:

- (1) the fact that the ultimate liability of WVDEP is subject to the outcome of events yet to occur;
- (2) the unanticipated changes in the legal, economic, legislative or claims adjudication environments;
- (3) statistical fluctuation in losses around the estimated or expected values when all other factors remain constant; and
- (4) the fact that the actual future loss and loss payment and reporting patterns may differ from those applied in the determination of the expected losses or there may be unanticipated changes in the loss and expense loss and expense payment and reporting patterns;

Accordingly, no assurance can be given that future loss emergence will not deviate from the estimated ultimate loss and loss adjustment expenses. However, the ultimate loss and loss adjustment expense estimates were based on a reasonable application of generally accepted actuarial procedures and techniques applied to the information available.

We reviewed the information for overall reasonableness and consistency.

T&M relied without audit or verification on historical loss, loss adjustment expense, exposure data, and other information provided by the WVDEP and its employees. T&M has relied upon the data provided and on the oral and/or written statements made regarding the quality, accuracy, and completeness of the data and information supplied. Any inaccuracies or inconsistencies in the data could have a significant effect on the conclusions drawn.

Should any inaccuracies be found in the data, T&M should be notified immediately so that the analysis can be adjusted accordingly.

With regard to projections of estimated revenues, it should be understood that the revenue streams are subject to uncertainty similar to that experienced in modeling loss projections. While we have used our best professional judgment in all instances, projections of future revenues are inherently uncertain due to potential changes in technology, the implementation of environmental requirements, the introduction of and/or enhanced use of alternative fuels, and changes in the economy among others. While T&M has used its best judgment in selecting values and trends for each category of revenue, actual revenue collected is dependent upon unknown future events and may be affected by additional factors outside of WVDEP control.

This report is limited in scope to the estimate of the level of reserve adequacy at the evaluation date of the report. It also includes projections regarding cash flow of the operations of the WVDEP under certain narrow assumptions and conditions.

This report was prepared for use by persons technically competent in insurance financial matters. Persons receiving this report should be made aware of the availability of T&M personnel to answer questions and/or amplify on any matter addressed therein.

## Appendix A: Actuarial Analysis

### Sources of Data

The data underlying our analysis was compiled from several sources. The following are the primary sources from which data was taken and how each data source was used:

- Special Reclamation Database: This database was provided by Michael Sheehan, Deputy Director, Division of Land Reclamation. The database includes information pertaining to historical and ongoing reclamation projects in the state, including site characteristics, land use information, anticipated and actual land and water reclamation costs (both individual capital expenditures and ongoing costs), and administrative costs.
- Permits database: This database was provided by Amy Crouser, Assistant Director for the WVDEP Division of Mining and Reclamation. This database includes data on permits issued between 1961 and June 30, 2019, including the permit status, permit location and type, bond amount, and bonded acres.
- 2019 Consensus Coal Forecast was used for coal market history and projections.
- Special Reclamation Fund Expenditures: This database was provided by Scott Fairchild, Financial Reporting Specialist (II) for the WVDEP. This database included SRF and WTF expenditures from July 1, 2005 to June 30, 2019.
- Revenues for WTF and SRF were also provided by Scott Fairchild. These databases include all revenues to the Special Reclamation Fund and Water Trust Fund from July 1, 2005 to June 30, 2019.
- Prior Actuarial Reports: These were provided by Mr. Sheehan to provide additional context for our projections.
- Coal Production Decline Rates, including an analysis of anticipated coal production decline rates, was provided by John Morgan, indicating the anticipated rate at which coal production will decline from currently in-force permits.
- SRF and WTF Investment Allocations: These were provided by Mr. Sheehan, and were used to project anticipated SRF and WTF investment revenues based on the allocation of funds to money market, short term bonds, and IMB fund.

## Overall Methodology

### Loss Projections

Losses were projected using two models: a traditional deterministic model and a stochastic generalized linear model, described in greater detail below.

Based on the results of these methods, we selected anticipated payment amounts in each future fiscal year. A three-year delay was added to these payment patterns to account for the delay between a permit revocation and the commencement of reclamation activities at the site.

Current cost estimates on active reclamation activities were adjusted for historical variances between cost estimates and the final costs. These costs were then spread out over time, assuming 50% of costs will be incurred in the year that work is scheduled to commence and 50% of costs will be incurred in the following year for land reclamation and water capital costs. Water operations & maintenance costs were projected to continue each year according to current estimated annual costs subject to an annual attenuation factor of 98% starting in 2031. This is due to the fact that annual O&M costs associated with currently active reclamations are projected to show modest declines after 10 years.

All costs are then adjusted to nominal dollars using an inflation factor of 2.5%.

### *Deterministic Loss Model*

The traditional deterministic model projects anticipated bond forfeiture and permit release rates based on historical data triangles. Permits are arranged into cohorts by year of permit issuance based on the assumption that permit releases and bond forfeitures vary based on the age of permit. From these data triangles, overall release and forfeiture rates are selected for each age of permit, then adjusted to reflect anticipated differences in rates for permits based on current status (active, inactive, or phased release). These release and forfeiture rates are applied to currently open permits, separately for surface, underground, and other mine types and separately by permit status types. A final adjustment is made based on bond size, whereby

permits backed by smaller bonds (less than \$500,000) are anticipated to be forfeited at a rate that is higher than permits backed by large bonds (greater than \$500,000.)

These adjusted forfeiture and release rates are applied to currently open permits or bonded acres to determine the number of permits and acres expected to be released or forfeited each year in the future. We then apply anticipated average costs per forfeited acre to determine future costs by year for the anticipated land reclamation costs, water capital costs, and water operations & maintenance costs.

### *Stochastic Loss Model*

The stochastic model uses advanced statistical techniques to project future anticipated forfeiture and release rates.

The stochastic model is formally based on a kind of generalized linear model, specifically a multinomial logistic regression model. The model uses historical data about forfeited and released bonds to predict the probability that open permits will experience forfeiture or release each year in the future. In addition, the stochastic model considers the parent companies of each permit and simulates bankruptcies from parent companies. When a parent company experiences bankruptcy, we project that the probability of forfeiture for the company's permits is increased by 30% for the year following. This is based on the understanding that although parent company bankruptcies can lead to forfeitures, the permits are often sold as assets to other companies as a way of preventing further forfeitures.

Technical details of the stochastic model are provided as **Appendix B** of the report.

### *Comparison of Deterministic and Stochastic Models*

The deterministic and stochastic loss models have unique advantages and disadvantages that we considered carefully as part of our projections.

The deterministic model has the advantage that patterns of releases and forfeitures can be easily visualized. As a result, it is possible to make selections of anticipated release and forfeiture rates that explicitly anticipate recent or future changes in rates that could affect loss projections. For example, the most recent ten years have generally experienced lower forfeiture rates than the preceding ten. It is straightforward to account for this change when selecting anticipated future forfeiture rates. By comparison, the stochastic model is less intuitive, and it can be challenging to make manual adjustments to fitted model results.

However, there are several drawbacks to the deterministic model that prompted the development of the stochastic model. First, the method assumes that future forfeitures and releases are roughly statistically independent. This assumption may be incorrect. Recent years have seen increasing consolidation in coal industry. As a result, permits are controlled by a smaller set of companies. For this reason, a single bankruptcy could lead to a large number of simultaneous forfeitures. This key issue was accounted for explicitly in the stochastic model.

Relatedly, the deterministic model makes a simplifying assumption about the number of bonds that will be forfeited or released in a year. For example, for a given age, the deterministic model may project that 0.93% of a particular kind of bond will be forfeited. Realistically, this means that a given bond will be forfeited with probability 0.93% or not forfeited with probability 99.07%. However, the deterministic model projects that 0.93% of all bonds will be forfeited. That is, for a given bond of 100 acres, the deterministic model might project that 0.93 acres will be forfeited in that year, where in actuality either 0 acres or 100 acres will be forfeited. This assumption may result in excessive confidence about the accuracy of the central estimate, particularly with respect to the timing and amount of cash flows. The stochastic model, by comparison, simulates individual permit behavior directly and thereby avoids using this assumption.

A final advantage of the stochastic model is that the use of a statistical framework enables the use of model validation tools that are not generally available for traditional models. This makes it possible to directly assess the extent to which different assumptions impact model predictive performance and deliver a model that is optimized to provide the most accurate predictions

possible. In the deterministic model, predictions are assumed to be accurate, and model validation is, at best, implicit in the extent to which forfeiture or release rates are selected to mirror or diverge from historical rates.

### Revenue Projections

Anticipated coal tonnage fees were modeled by considering the anticipated change in Appalachian coal production per year from the consensus coal forecast as well as the effect of the “runoff” of permits. The runoff of permits is comprised of two separate factors:

1. A factor representing the reduction in number of active permits among the current cohort of open permits. This factor was projected as part of the loss models.
2. A factor representing the reduced coal production over time among the permits that remain open. This factor was determined judgmentally based on discussions with the Board and based on analysis provided by John Morgan, as discussed above.

With respect to the second point, we assumed the following rates of decline in coal production:

	<b>Northern Mines</b>	<b>Southern Mines</b>
<b>Underground Mines</b>	2.5%	5.0%
<b>Surface Mines</b>	25.0%	10.0%

Bond forfeitures revenues were determined based on the loss models. The deterministic loss model tracked the anticipated bond dollars forfeited in each period. The stochastic loss model considered the bond dollars forfeited across different simulated scenarios. These projections were combined to select a central estimate of bond forfeiture revenues.

Civil penalties were anticipated to decline in a manner commensurate with the decline in production on the current cohort of permits.

Investment returns were projected based on historical average returns. Both the SRF and WTF experienced historically high investment returns on short-term bonds in 2019. It is anticipated that these short-term bond returns will drift back to historical average returns over the next several years.

### **Administrative Expense Calculations**

Historical administrative expenses were provided to us for the years 2006 through June 30, 2019. Administrative expenses are defined as the sum of employee benefits, contractual obligations, personnel services, and other unclassified expenses.

Administrative expenses associated with the current cohort of permits were projected assuming 3% inflation each year and discounted based on the projected number of remaining permits in force from the cohort of open permits as of June 30, 2019.



## Appendix B: Technical Details of the Stochastic Loss Model

### Data Pre-Processing

The model was fitted on closed permits. However, the permit database only reflects the current status of the permits and the date that this status was set. Therefore, to determine the probability that a permit stays open in a given year, it was necessary to reconstruct historical permit data reflecting the fact that a permit with certain attributes was open in a given year.

For example, if a permit was issued in 1990 and released in 2000, the permit database reflects a single entry of “released” with a status year of 2000. However, inherent in that entry is an implied 10 years in which the permit had “open” status (during 1990, 1991, ... 1999).

### Model Form

The stochastic loss model is a multinomial logistic model with four outcomes: “Open,” “Forfeited,” “Release,” and “Terminated.” It predicts, based on a linear predictor, the log-odds of each outcome. The model was fitted using a neural network as part of the “nnet” package in R.

The linear predictor of the model is of the following form:

$$\text{Permit Type} \times NS + \text{Permits} \times \text{Permit Years} + \text{Poly}(\text{Log}(\text{Cohort Acres}),2) + NS \times B \\ - \text{Spline}(\text{Status Year}, 5) + B - \text{Spline}(\text{Age}, 5) + B - \text{spline}(\text{Issue Year}, 5)$$

Where the variables used are described as follows:

Variable	Description
Permit Type	Notes whether a permit is a surface mine, underground mine, prospect, or other
NS	Notes whether a mine is in a northern or southern county
Permits	Counts the number of permits held by the permittee
Permit Years	Counts the sum of the ages of all permits held by permittee
Cohort Acres	Sum of acres held by all permits issued in the same year as a given permit
Poly(Log(Cohort Acres),2)	A 2 <sup>nd</sup> degree polynomial of the natural logarithm of Cohort Acres
Status Year	The year that a given permit last had its status updated
Age	The length of time that a permit has been in force
Issue Year	The year that a permit was issued

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**B-Spline(Variable, N)**

A B-spline function of a given variable with N-1 knots. This is a piecewise function of 3<sup>rd</sup> degree polynomials with N different “pieces.”

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B-splines were used after initial testing revealed that high-order polynomials produced superior fit (as measured by the AIC and by cross entropy error, discussed below) but failed to provide useful results when extrapolating beyond the training dataset. We determined that this was due to the inherent instability of high-order polynomials. We determined that spline functions produced similarly good fit over the training data and test set but generalized more robustly over the set of open permits.

### **Variable Selection and Model Validation**

The closed permits were split randomly into 80% training data and 20% test data. After the model form was determined, the model was re-fit on the entire dataset. Model predictions were carried out on the set of open permits.

Variables tested included size of bonds, specific county, permit status, specific permit type, and bonded acres. These variables were generally rejected either because of missing data or because they resulted in over-fitting the model. The same is true of many variable interactions that were tested.

Variables were selected based on the extent to which they improved the Akaike Information Criterion (AIC) of the model over the full training data or the extent to which they improved the cross-entropy error in the test dataset. This is a measure of the degree to which the model properly categorizes permits as being open, forfeited, released, or terminated.

The model was additionally validated using plots of actual and fitted permit forfeitures and by reviewing model statistics such as t-statistics.

## Simulation

The final simulation was carried out in two steps. First, the baseline “status probabilities” (i.e., the probability that a permit remains open, is forfeited, etc.) were determined for each open permit for each of the 20 years in the future. Then, for each of 5,000 simulations, we carried out the following procedure:

1. Simulate whether each of the ultimate parent companies goes bankrupt in a given year using a Bernoulli probability distribution with probability 0.5%. This probability is based on default probability for high-grade credit ratings from major credit rating agencies.
2. Augment the baseline status probabilities with the simulated bankruptcies by adding 30% to the unnormalized log-odds of a permit being forfeited. This means that if a permit previously had a 10% probability of being forfeited, following the bankruptcy it would have a  $(10\% + 30\%) / 130\% = 30.8\%$  probability of being forfeited. The 30% probability was based on discussion with the Board and judgment.
3. For each year in the future, the status of each permit was simulated until the permit status was no longer “open.”
4. The results of this simulation were stored, and then the process was repeated for the next simulation, starting at step 1.

## Exhibits

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Executive Summary

	(1)	(2)	(3)	(4)	(5)
<u>Expense Category</u>	<u>Undiscounted Liabilities Arising From...</u>		<u>Total Liability</u>	<u>Previous Study</u>	<u>Difference</u>
	<u>Current Forfeitures</u>	<u>Future Forfeitures</u>			
Land Capital	35,571,340	53,152,239	<b>88,723,579</b>	86,196,322	2,527,257
Water Capital	117,541,582	62,929,909	<b>180,471,492</b>	204,394,019	(23,922,527)
Ongoing Water Treatment Administration	150,349,147	17,716,402	<b>168,065,548</b>	157,306,397	10,759,151
			<b>59,442,730</b>	90,393,116	(30,950,386)
<b>Total</b>	<b>303,462,069</b>	<b>133,798,550</b>	<b>496,703,348</b>	538,289,854	(41,586,506)

Notes:

- Col (1) - (2) from Exhibits E-6 to E-8, Cols (6) and (7)
- Col (3) Administration Expense from Exhibit E-9, Col (3)
- Col (4) from Prior Study
- Col (5) = (3) - (4)

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Financial Projection

Fiscal Year Ending 6/30	Expenditures					Revenues						Beginning Balance		WTF to SRF	Ending Balance		
	Land	Water Capital	Water Op/Maint	Admin	Total	SRF Coal Fees	WTF Coal Fees	Bond Forfeitures	Civil Penalties	SRF Investments	WTF Investments	SRF	WTF	Transfers	SRF	WTF	
Prior																	
2020	15,004,274	33,999,256	5,358,494	3,182,420	57,544,445	10,817,288	12,578,242	5,226,009	1,022,899	1,897,210	5,941,040	62,943,947	110,359,898	-	24,362,908	128,879,180	
2021	16,941,522	49,813,510	6,184,338	3,180,017	76,119,387	9,831,358	11,431,812	956,834	929,668	612,997	6,916,950	24,362,908	128,879,180	49,425,622	10,000,000	97,802,320	
2022	2,594,063	20,369,323	6,556,791	3,191,619	32,711,796	9,325,803	10,843,957	883,409	881,862	201,809	5,233,084	10,000,000	97,802,320	21,418,914	10,000,000	92,460,447	
2023	5,046,431	14,128,990	6,862,969	3,138,559	29,176,948	8,802,899	10,235,929	942,259	832,415	152,007	4,932,161	10,000,000	92,460,447	18,447,368	10,000,000	89,181,168	
2024	4,988,009	10,129,898	7,208,051	3,102,817	25,428,775	8,296,829	9,647,475	1,303,661	784,560	118,810	4,747,526	10,000,000	89,181,168	14,924,915	10,000,000	88,651,254	
2025	1,695,540	1,840,842	7,442,686	3,076,761	14,055,828	7,816,534	9,088,993	1,488,083	739,143	118,810	4,719,316	10,000,000	88,651,254	3,893,259	10,000,000	98,566,305	
2026	1,834,932	2,027,075	7,688,077	3,053,112	14,603,196	7,424,514	8,633,156	934,916	702,073	118,810	5,247,140	10,000,000	98,566,305	5,422,883	10,000,000	107,023,718	
2027	3,937,709	4,552,895	8,259,457	3,041,321	19,791,383	7,040,275	8,186,366	839,410	665,739	118,810	5,697,367	10,000,000	107,023,718	11,127,150	10,000,000	109,780,301	
2028	2,447,064	2,824,926	8,293,307	3,013,770	16,579,068	6,638,655	7,719,366	1,058,272	627,761	118,810	5,844,113	10,000,000	109,780,301	8,135,571	10,000,000	115,208,208	
2029	2,257,908	2,594,497	8,574,962	2,981,447	16,408,814	6,352,050	7,386,104	1,218,953	600,659	118,810	6,133,065	10,000,000	115,208,208	8,118,342	10,000,000	120,609,036	
2030	1,834,373	2,068,782	8,848,384	2,973,572	15,725,111	6,004,828	6,982,358	1,157,969	567,825	118,810	6,420,576	10,000,000	120,609,036	7,875,678	10,000,000	126,136,292	
2031	3,208,595	3,810,384	9,014,529	2,983,162	19,016,670	5,701,625	6,629,796	688,345	539,154	118,810	6,714,818	10,000,000	126,136,292	11,968,735	10,000,000	127,512,171	
2032	2,965,001	3,511,814	9,175,413	2,982,905	18,635,132	5,423,817	6,306,763	796,536	512,884	118,810	6,788,062	10,000,000	127,512,171	11,783,087	10,000,000	128,823,910	
2033	2,142,279	2,479,608	9,308,752	2,952,957	16,883,595	5,155,478	5,994,742	1,262,061	487,510	118,810	6,857,892	10,000,000	128,823,910	9,859,736	10,000,000	131,816,808	
2034	1,737,902	1,974,737	9,429,007	2,909,636	16,051,282	4,869,867	5,662,636	1,864,642	460,502	118,810	7,017,218	10,000,000	131,816,808	8,737,461	10,000,000	135,759,201	
2035	1,819,220	2,085,806	9,553,701	2,830,539	16,289,266	4,651,895	5,409,180	2,819,909	439,890	118,810	7,227,090	10,000,000	135,759,201	8,258,762	10,000,000	140,136,710	
2036	2,936,178	3,500,060	9,720,177	2,777,679	18,934,094	4,470,231	5,197,943	4,018,324	422,712	118,810	7,460,125	10,000,000	140,136,710	9,904,018	10,000,000	142,890,759	
2037	3,916,769	4,742,187	9,924,610	2,760,046	21,343,612	4,286,135	4,983,878	1,808,201	405,303	118,810	7,606,736	10,000,000	142,890,759	14,725,163	10,000,000	140,756,209	
2038	5,423,115	6,647,232	10,186,971	2,684,786	24,942,105	4,100,270	4,767,756	1,812,119	387,728	118,810	7,493,104	10,000,000	140,756,209	18,523,178	10,000,000	134,493,891	
2039	5,992,696	7,369,670	10,474,871	2,625,606	26,462,843	3,918,670	4,556,593	2,280,840	370,555	118,810	7,159,731	10,000,000	134,493,891	19,773,968	10,000,000	126,436,248	

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Coal Tonnage Fees and Civil Penalties Projections

Fiscal Year Ending 6/30	(1) - (5) Coal Production in Million Tons					(6) - (9) % Coal Production From In-Force Permits				(10) Total In-Force Production	(11) - (13) Coal Tonnage Fees from In-Force Permits			(14) Civil Penalties
	Northern		Southern		Total	Northern		Southern			SRF	WTF	Total	
	Surface	Underground	Surface	Underground		Surface	Underground	Surface	Underground					
2006	6.3	36.1	61.4	48.6	152.4	100%	100%	100%	100%	152.4	21,659,819	-	21,659,819	1,199,276
2007	6.1	36.1	62.5	48.8	153.5	100%	100%	100%	100%	153.5	16,073,851	-	16,073,851	1,059,319
2008	7.0	34.1	62.4	54.3	157.8	100%	100%	100%	100%	157.8	9,415,063	-	9,415,063	855,750
2009	5.2	33.1	51.0	47.7	137.1	100%	100%	100%	100%	137.1	17,098,738	1,850,648	18,949,386	1,151,628
2010	4.0	37.3	46.7	47.2	135.2	100%	100%	100%	100%	135.2	16,639,204	1,924,569	18,563,773	688,062
2011	3.3	38.6	48.0	44.8	134.7	100%	100%	100%	100%	134.7	18,168,515	2,100,436	20,268,951	805,018
2012	2.0	39.4	37.9	41.0	120.4	100%	100%	100%	100%	120.4	16,876,736	1,963,409	18,840,145	940,571
2013	1.5	40.9	32.4	37.9	112.8	100%	100%	100%	100%	112.8	15,277,933	14,605,229	29,883,163	677,771
2014	1.3	47.4	29.1	34.0	111.9	100%	100%	100%	100%	111.9	13,949,645	16,210,221	30,159,866	734,975
2015	0.9	46.9	19.4	28.4	95.6	100%	100%	100%	100%	95.6	14,936,957	17,369,799	32,306,756	2,551,755
2016	0.2	43.3	15.5	20.8	79.8	100%	100%	100%	100%	79.8	10,774,387	12,530,157	23,304,544	612,182
2017	0.1	46.6	20.1	25.9	92.8	100%	100%	100%	100%	92.8	11,174,041	12,994,938	24,168,979	822,617
2018	0.7	46.1	21.1	27.3	95.1	100%	100%	100%	100%	95.1	11,831,011	13,758,966	25,589,977	716,346
2019	0.6	44.1	20.2	26.2	91.1	100%	100%	100%	100%	91.1	12,138,331	14,116,367	26,254,698	976,343
2020	0.6	42.8	19.5	25.4	88.3	75%	98%	90%	95%	83.9	10,817,288	12,578,242	23,395,530	1,022,899
2021	0.6	40.9	18.7	24.2	84.4	56%	95%	81%	90%	76.2	9,831,358	11,431,812	21,263,170	929,668
2022	0.6	40.7	18.6	24.2	84.1	42%	93%	73%	86%	72.3	9,325,803	10,843,957	20,169,759	881,862
2023	0.6	40.4	18.4	23.9	83.3	32%	90%	66%	81%	68.2	8,802,899	10,235,929	19,038,828	832,415
2024	0.6	39.9	18.2	23.6	82.3	24%	88%	59%	77%	64.3	8,296,829	9,647,475	17,944,304	784,560
2025	0.6	39.3	18.0	23.3	81.2	18%	86%	53%	74%	60.6	7,816,534	9,088,993	16,905,527	739,143
2026	0.6	39.1	17.9	23.2	80.7	13%	84%	48%	70%	57.6	7,424,514	8,633,156	16,057,670	702,073
2027	0.6	38.8	17.7	23.0	80	10%	82%	43%	66%	54.6	7,040,275	8,186,366	15,226,641	665,739
2028	0.5	38.2	17.4	22.6	78.8	8%	80%	39%	63%	51.5	6,638,655	7,719,366	14,358,020	627,761
2029	0.5	38.1	17.4	22.6	78.7	6%	78%	35%	60%	49.2	6,352,050	7,386,104	13,738,154	600,659
2030	0.5	37.6	17.2	22.3	77.6	4%	76%	31%	57%	46.5	6,004,828	6,982,358	12,987,186	567,825
2031	0.5	37.2	17.0	22.1	76.8	3%	74%	28%	54%	44.2	5,701,625	6,629,796	12,331,421	539,154
2032	0.5	36.9	16.8	21.9	76.1	2%	72%	25%	51%	42.0	5,423,817	6,306,763	11,730,580	512,884
2033	0.5	36.5	16.7	21.6	75.3	2%	70%	23%	49%	40.0	5,155,478	5,994,742	11,150,220	487,510
2034	0.5	35.9	16.4	21.3	74	1%	68%	21%	46%	37.8	4,869,867	5,662,636	10,532,504	460,502
2035	0.5	35.6	16.3	21.1	73.5	1%	67%	19%	44%	36.1	4,651,895	5,409,180	10,061,075	439,890
2036	0.5	35.6	16.2	21.1	73.4	1%	65%	17%	42%	34.7	4,470,231	5,197,943	9,668,174	422,712
2037	0.5	35.4	16.2	21.0	73.1	1%	63%	15%	40%	33.2	4,286,135	4,983,878	9,270,012	405,303
2038	0.5	35.2	16.1	20.8	72.6	0%	62%	14%	38%	31.8	4,100,270	4,767,756	8,868,026	387,728
2039	0.5	34.9	15.9	20.7	72	0%	60%	12%	36%	30.4	3,918,670	4,556,593	8,475,264	370,555

Notes: Cols (1) - (4) for 2006 - 2017 from USEIA; 2018-2039 based on Col (5) allocated out by mine and location type  
 Col (5) for 2006 - 2017 from USEIA; 2018 - 2045 from 2019 Consensus Coal Forecast, 2046-2054 extrapolated from 2019 Consensus Coal Forecast  
 Col (6) - (7) from Exhibit E-70, Cols (6) and (7)  
 Cols (6) through (9) based on decline rates of 25%, 2.5%, 10%, and 5%, respectively; based on analysis provided by John Morgan  
 Col (10) = Sum Product of Cols (1) - (4) and Cols (6) - (9)  
 Col (11) = (10) × 1,000,000 × \$0.129  
 Col (12) = (10) × 1,000,000 × \$0.150  
 Col (13) = (11) + (12)  
 Col (14) from client data for 2019 and prior; 2020 and subsequent = average of 2006-2019 trended out based on Col (13)

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Coal Tonnage Fees Detail

Fiscal Year Ending 6/30	(1) Coal Tonnage Fees from Permits In Force As of June 30, 2019			(2) Total Coal Tonnage Fees			(3) Coal Tonnage Fees from New Permits			(4) Total Civil	(5) New Permit Civil
	SRF	WTF	Total	SRF	WTF	Total	SRF	WTF	Total	Penalties	Penalties
2006	21,659,819	-	21,659,819	21,659,819	-	21,659,819				1,199,276	
2007	16,073,851	-	16,073,851	16,073,851	-	16,073,851				1,059,319	
2008	9,415,063	-	9,415,063	9,415,063	-	9,415,063				855,750	
2009	17,098,738	1,850,648	18,949,386	17,098,738	1,850,648	18,949,386				1,151,628	
2010	16,639,204	1,924,569	18,563,773	16,639,204	1,924,569	18,563,773				688,062	
2011	18,168,515	2,100,436	20,268,951	18,168,515	2,100,436	20,268,951				805,018	
2012	16,876,736	1,963,409	18,840,145	16,876,736	1,963,409	18,840,145				940,571	
2013	15,277,933	14,605,229	29,883,163	15,277,933	14,605,229	29,883,163				677,771	
2014	13,949,645	16,210,221	30,159,866	13,949,645	16,210,221	30,159,866				734,975	
2015	14,936,957	17,369,799	32,306,756	14,936,957	17,369,799	32,306,756				2,551,755	
2016	10,774,387	12,530,157	23,304,544	10,774,387	12,530,157	23,304,544				612,182	
2017	11,174,041	12,994,938	24,168,979	11,174,041	12,994,938	24,168,979				822,617	
2018	11,831,011	13,758,966	25,589,977	11,831,011	13,758,966	25,589,977				716,346	
2019	12,138,331	14,116,367	26,254,698	12,138,331	14,116,367	26,254,698				976,343	
2020	10,817,288	12,578,242	23,395,530	11,390,700	13,245,000	24,635,700	573,412	666,758	1,240,170	1,077,121	54,223
2021	9,831,358	11,431,812	21,263,170	10,887,600	12,660,000	23,547,600	1,056,242	1,228,188	2,284,430	1,029,547	99,880
2022	9,325,803	10,843,957	20,169,759	10,848,900	12,615,000	23,463,900	1,523,097	1,771,043	3,294,141	1,025,888	144,026
2023	8,802,899	10,235,929	19,038,828	10,745,700	12,495,000	23,240,700	1,942,801	2,259,071	4,201,872	1,016,129	183,714
2024	8,296,829	9,647,475	17,944,304	10,616,700	12,345,000	22,961,700	2,319,871	2,697,525	5,017,396	1,003,931	219,370
2025	7,816,534	9,088,993	16,905,527	10,474,800	12,180,000	22,654,800	2,658,266	3,091,007	5,749,273	990,512	251,370
2026	7,424,514	8,633,156	16,057,670	10,410,300	12,105,000	22,515,300	2,985,786	3,471,844	6,457,630	984,413	282,340
2027	7,040,275	8,186,366	15,226,641	10,320,000	12,000,000	22,320,000	3,279,725	3,813,634	7,093,359	975,874	310,136
2028	6,638,655	7,719,366	14,358,020	10,165,200	11,820,000	21,985,200	3,526,545	4,100,634	7,627,180	961,236	333,475
2029	6,352,050	7,386,104	13,738,154	10,152,300	11,805,000	21,957,300	3,800,250	4,418,896	8,219,146	960,016	359,357
2030	6,004,828	6,982,358	12,987,186	10,010,400	11,640,000	21,650,400	4,005,572	4,657,642	8,663,214	946,598	378,773
2031	5,701,625	6,629,796	12,331,421	9,907,200	11,520,000	21,427,200	4,205,575	4,890,204	9,095,779	936,839	397,685
2032	5,423,817	6,306,763	11,730,580	9,816,900	11,415,000	21,231,900	4,393,083	5,108,237	9,501,320	928,300	415,416
2033	5,155,478	5,994,742	11,150,220	9,713,700	11,295,000	21,008,700	4,558,222	5,300,258	9,858,480	918,542	431,032
2034	4,869,867	5,662,636	10,532,504	9,546,000	11,100,000	20,646,000	4,676,133	5,437,364	10,113,496	902,684	442,182
2035	4,651,895	5,409,180	10,061,075	9,481,500	11,025,000	20,506,500	4,829,605	5,615,820	10,445,425	896,585	456,695
2036	4,470,231	5,197,943	9,668,174	9,468,600	11,010,000	20,478,600	4,998,369	5,812,057	10,810,426	895,365	472,653
2037	4,286,135	4,983,878	9,270,012	9,429,900	10,965,000	20,394,900	5,143,765	5,981,122	11,124,888	891,705	486,402
2038	4,100,270	4,767,756	8,868,026	9,365,400	10,890,000	20,255,400	5,265,130	6,122,244	11,387,374	885,606	497,878
2039	3,918,670	4,556,593	8,475,264	9,288,000	10,800,000	20,088,000	5,369,330	6,243,407	11,612,736	878,287	507,732



West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Investment Return Calculations

Fiscal Year <u>Ending 6/30</u>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Investment Rates					Discount Factor for	
	<u>Money</u> <u>Market</u>	<u>Short Term</u> <u>Bond</u>	<u>SRF</u> <u>Blend</u>	<u>IMB</u> <u>Yield</u>	<u>SRWTF</u> <u>Selection</u>	<u>SRF</u>	<u>WTF</u>
2019	0.6%	4.5%	3.0%	5.5%	5.4%	97.1%	94.9%
2020	0.6%	3.7%	2.5%	5.5%	5.4%	94.7%	90.1%
2021	0.6%	2.9%	2.0%	5.5%	5.4%	92.8%	85.5%
2022	0.6%	2.1%	1.5%	5.5%	5.3%	91.4%	81.2%
2023	0.6%	1.5%	1.2%	5.5%	5.3%	90.4%	77.1%
2024	0.6%	1.5%	1.2%	5.5%	5.3%	89.3%	73.2%
2025	0.6%	1.5%	1.2%	5.5%	5.3%	88.2%	69.5%
2026	0.6%	1.5%	1.2%	5.5%	5.3%	87.2%	66.0%
2027	0.6%	1.5%	1.2%	5.5%	5.3%	86.2%	62.6%
2028	0.6%	1.5%	1.2%	5.5%	5.3%	85.2%	59.5%
2029	0.6%	1.5%	1.2%	5.5%	5.3%	84.2%	56.4%
2030	0.6%	1.5%	1.2%	5.5%	5.3%	83.2%	53.6%
2031	0.6%	1.5%	1.2%	5.5%	5.3%	82.2%	50.9%
2032	0.6%	1.5%	1.2%	5.5%	5.3%	81.2%	48.3%
2033	0.6%	1.5%	1.2%	5.5%	5.3%	80.3%	45.9%
2034	0.6%	1.5%	1.2%	5.5%	5.3%	79.3%	43.6%
2035	0.6%	1.5%	1.2%	5.5%	5.3%	78.4%	41.4%
2036	0.6%	1.5%	1.2%	5.5%	5.3%	77.5%	39.3%
2037	0.6%	1.5%	1.2%	5.5%	5.3%	76.6%	37.3%
2038	0.6%	1.5%	1.2%	5.5%	5.3%	75.7%	35.4%
2039	0.6%	1.5%	1.2%	5.5%	5.3%	74.8%	33.6%

Notes:

- Col (1) Based on average annual money market returns
- Col (2) based on average annual change in returns, returning to long-run average over time
- Col (3) = Col (1) × 39% + Col (2) × 61%; percents based on current allocations
- Col (4) from West Virginia Investment Management Board 2018 Report, Returns Capped at 5.5%
- Col (5) = Col (1) × 2% + Col (2) × 2% + Col (4) × 96%; percents based on current allocations
- Col (6) = 1.0 / [1 + (3)] × Prior Year Discount
- Col (7) = 1.0 / [1 + (5)] × Prior Year Discount

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Special Reclamation Fund  
 Payout of Land Liabilities

Fiscal Year Ending 6/30	(1)	(2)	(3) Unadjusted Costs			(6) Inflated Cost at 2.50% Annual Inflation		
	Curr. Scheduled Liabilities	Payout Pattern	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total
Prior	6,358,266							
2020	21,853,828	50%	14,106,047	-	14,106,047	15,004,274	-	15,004,274
2021	2,865,606	50%	15,538,850	-	15,538,850	16,941,522	-	16,941,522
2022	1,776,907		2,321,257	-	2,321,257	2,594,063	-	2,594,063
2023	11,890		894,398	3,511,181	4,405,580	1,024,501	4,021,930	5,046,431
2024	-		5,945	4,242,423	4,248,368	6,980	4,981,029	4,988,009
2025	-		-	1,408,896	1,408,896	-	1,695,540	1,695,540
2026	-		-	1,487,534	1,487,534	-	1,834,932	1,834,932
2027	-		-	3,114,346	3,114,346	-	3,937,709	3,937,709
2028	-		-	1,888,186	1,888,186	-	2,447,064	2,447,064
2029	-		-	1,699,737	1,699,737	-	2,257,908	2,257,908
2030	-		-	1,347,223	1,347,223	-	1,834,373	1,834,373
2031	-		-	2,299,020	2,299,020	-	3,208,595	3,208,595
2032	-		-	2,072,663	2,072,663	-	2,965,001	2,965,001
2033	-		-	1,461,020	1,461,020	-	2,142,279	2,142,279
2034	-		-	1,156,329	1,156,329	-	1,737,902	1,737,902
2035	-		-	1,180,912	1,180,912	-	1,819,220	1,819,220
2036	-		-	1,859,477	1,859,477	-	2,936,178	2,936,178
2037	-		-	2,419,985	2,419,985	-	3,916,769	3,916,769
2038	-		-	3,268,960	3,268,960	-	5,423,115	5,423,115
2039	-		-	3,524,189	3,524,189	-	5,992,696	5,992,696
<b>Total</b>	<b>32,866,498</b>		<b>32,866,498</b>	<b>37,942,081</b>	<b>70,808,578</b>	<b>35,571,340</b>	<b>53,152,239</b>	<b>88,723,579</b>

West Virginia Department of Environmental Protection Office of Special Reclamation  
Actuarial Reserve Study as of June 30, 2019  
Water Trust Fund  
Payout of Water Capital Liabilities

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Unadjusted Costs			Inflated Cost at 2.50% Annual Inflation				
	Curr. Scheduled Liabilities	Payout Pattern	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total
Prior	36,477,184							
2020	27,450,615	50%	31,963,899	-	31,963,899	33,999,256	-	33,999,256
2021	27,450,615	50%	45,689,207	-	45,689,207	49,813,510	-	49,813,510
2022	9,003,722		18,227,168	-	18,227,168	20,369,323	-	20,369,323
2023	7,072,688		8,038,205	4,296,531	12,334,736	9,207,471	4,921,519	14,128,990
2024	-		3,536,344	5,091,454	8,627,798	4,152,022	5,977,876	10,129,898
2025	-		-	1,529,634	1,529,634	-	1,840,842	1,840,842
2026	-		-	1,643,301	1,643,301	-	2,027,075	2,027,075
2027				3,600,899	3,600,899	-	4,552,895	4,552,895
2028				2,179,749	2,179,749	-	2,824,926	2,824,926
2029				1,953,119	1,953,119	-	2,594,497	2,594,497
2030				1,519,380	1,519,380	-	2,068,782	2,068,782
2031				2,730,213	2,730,213	-	3,810,384	3,810,384
2032				2,454,909	2,454,909	-	3,511,814	3,511,814
2033				1,691,076	1,691,076	-	2,479,608	2,479,608
2034				1,313,910	1,313,910	-	1,974,737	1,974,737
2035				1,353,961	1,353,961	-	2,085,806	2,085,806
2036				2,216,583	2,216,583	-	3,500,060	3,500,060
2037				2,929,971	2,929,971	-	4,742,187	4,742,187
2038				4,006,836	4,006,836	-	6,647,232	6,647,232
2039				4,333,960	4,333,960	-	7,369,670	7,369,670
<b>Total</b>	<b>107,454,824</b>		<b>107,454,824</b>	<b>44,845,485</b>	<b>152,300,308</b>	<b>117,541,582</b>	<b>62,929,909</b>	<b>180,471,492</b>

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water Trust Fund  
 Payout of Water Operations & Maintenance Liabilities

Fiscal Year Ending 6/30	(1)	(2)	(3) Unadjusted Costs			(6) Inflated Cost at 2.50% Annual Inflation		
	Curr. Scheduled Liabilities	Payout Pattern	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total	Proj. Payout of Current Liabilities	Proj. Payout of Future Liabilities	Total
Prior	4,149,498							
2020	5,037,709	n/a	5,037,709	-	5,037,709	5,358,494	-	5,358,494
2021	5,672,306		5,672,306	-	5,672,306	6,184,338	-	6,184,338
2022	5,867,241		5,867,241	-	5,867,241	6,556,791	-	6,556,791
2023	5,867,241		5,867,241	124,193	5,991,434	6,720,711	142,258	6,862,969
2024	5,867,241		5,867,241	271,972	6,139,213	6,888,728	319,322	7,208,051
2025	5,867,241		5,867,241	317,203	6,184,444	7,060,947	381,739	7,442,686
2026	5,867,241		5,867,241	365,296	6,232,537	7,237,470	450,607	7,688,077
2027	5,867,241.09		5,867,241	665,189	6,532,431	7,418,407	841,050	8,259,457
2028	5,867,241.09		5,867,241	531,981	6,399,222	7,603,867	689,440	8,293,307
2029	5,867,241.09		5,867,241	587,930	6,455,171	7,793,964	780,998	8,574,962
2030	5,867,241.09		5,867,241	631,297	6,498,538	7,988,813	859,571	8,848,384
2031	5,749,896.268		5,749,896	709,187	6,459,083	8,024,763	989,767	9,014,529
2032	5,634,898.343		5,634,898	779,111	6,414,009	8,060,874	1,114,539	9,175,413
2033	5,522,200.376		5,522,200	826,306	6,348,506	8,097,148	1,211,604	9,308,752
2034	5,411,756.368		5,411,756	861,921	6,273,678	8,133,585	1,295,422	9,429,007
2035	5,303,521.241		5,303,521	898,082	6,201,604	8,170,186	1,383,515	9,553,701
2036	5,197,450.816		5,197,451	958,323	6,155,774	8,206,952	1,513,225	9,720,177
2037	5,093,501.8		5,093,502	1,038,441	6,131,943	8,243,883	1,680,727	9,924,610
2038	4,991,631.764		4,991,632	1,148,898	6,140,530	8,280,981	1,905,990	10,186,971
2039	4,891,799.129		4,891,799	1,268,270	6,160,069	8,318,245	2,156,626	10,474,871
<b>Total</b>	<b>115,461,339</b>		<b>111,311,841</b>	<b>11,983,600</b>	<b>123,295,441</b>	<b>150,349,147</b>	<b>17,716,402</b>	<b>168,065,548</b>

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Administrative Expense Projection

Fiscal Year <u>Ending 6/30</u>	(1) Total Admin <u>Expense</u>	(2) Remaining <u>Permits</u>	(3) Admin Expense <u>On In-Force Permits</u>
2020	3,568,914	89%	3,182,420
2021	3,675,981	87%	3,180,017
2022	3,786,261	84%	3,191,619
2023	3,899,849	80%	3,138,559
2024	4,016,844	77%	3,102,817
2025	4,137,349	74%	3,076,761
2026	4,261,470	72%	3,053,112
2027	4,389,314	69%	3,041,321
2028	4,520,993	67%	3,013,770
2029	4,656,623	64%	2,981,447
2030	4,796,322	62%	2,973,572
2031	4,940,212	60%	2,983,162
2032	5,088,418	59%	2,982,905
2033	5,241,071	56%	2,952,957
2034	5,398,303	54%	2,909,636
2035	5,560,252	51%	2,830,539
2036	5,727,059	49%	2,777,679
2037	5,898,871	47%	2,760,046
2038	6,075,837	44%	2,684,786
2039	6,258,112	42%	2,625,606
<b>Total</b>	<b>95,898,056</b>		<b>59,442,730</b>

Notes: Col (1) from client data, trended at 3% per year.  
 Col (2) from Exhibit E-17, Col (5)  
 Col (3) = (1) × (2)

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Average Reclamation Expenses - Land

	<u>Surface</u>	<u>Underground</u>	<u>Other</u>
(1) Total reclamation expenditure in 2019 dollars (i.e., inflated)	146,848,599	57,736,032	45,861,088
(2) Total disturbed acreage	37,148	3,892	4,501
(3) Average cost per disturbed acre in 2019 dollars	3,953	14,834	10,190
(4) Percent of permitted acreage that is disturbed	69.99%	73.34%	79.46%
(5) Cost per permitted acre in 2019 dollars	2,767	10,880	8,097
(6) Selected cost per acre	2,765	10,880	8,095
Previous Selection	3,200	13,800	9,100

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Average Reclamation Expenses - Water Capital

	<u>Surface</u>	<u>Underground</u>	<u>Other</u>
(1) Total expenditure in 2019 Dollars (i.e., inflated)	152,877,929	28,213,486	41,230,314
(2) Total disturbed acreage under permits with water issues	11,702	614	1,317
(3) Average cost per disturbed acre in 2019 dollars	13,064	45,955	31,305
(4) Percent of permitted acreage that is disturbed under permits with water	70.34%	87.67%	81.66%
(5) Cost Per Permitted Acre in 2019 dollars	9,190	40,287	25,563
(6) Percent of forfeited acres with water issues	31.34%	13.20%	28.48%
(7) Cost Per Disturbed Acre in 2019 dollars with water issues	4,095	6,065	8,914
(8) Cost Per Permitted Acre in 2019 dollars with water issues	2,880	5,317	7,279
(9) Selected Cost Per Acre with water issues	3,490	5,690	8,095
Previous Selection	4,500	14,400	5,200

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Average Reclamation Expenses - Water O&M

	<u>Surface</u>	<u>Underground</u>	<u>Other</u>
(1) Total Annual Expenditure in Actual Dollars for Water Forfeited Permits	4,417,623	726,928	722,689
(2) Total disturbed acreage under permits with water issues	11,702	614	1,317
(3) Total cost per disturbed acre for water issue sites	378	1,184	549
(4) Percent of permitted acreage that is disturbed under permits with water	70.34%	87.67%	81.66%
(5) Valuation Cost Per Permitted Acre	266	1,038	448
(6) Percent of forfeited acres with water issues	31.34%	13.20%	28.48%
(7) Valuation Cost Per Disturbed Acre with water issues	118	156	156
(8) Valuation Cost Per Permitted Acre with water issues	83	137	128
(9) Selected Valuation Cost Per Acre with water issues	100	145	140
Previous Selection	140	260	200



West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Bond Size Adjustment Factor Calculation

<u>Bond Category</u>	<u>Bond Value</u>	(1) Previous Selected Factor	(2) 2015 Active + Inactive Permits	(3) 2015-19 Revoked Permits	(4) Forfeiture Probability	(5) Relativity	(6) 2019 Selected Factor
Small	Less than \$100,000	1.25	987	7	0.71%	1.47	1.50
Medium	Between \$100,000 and \$500,000	1.00	448	1	0.22%	0.46	0.50
Large	Above \$500,000	0.25	434	1	0.23%	0.48	0.50
<b>Total</b>			<b>1,869</b>	<b>9</b>	<b>0.48%</b>	<b>1.00</b>	

Notes: Col (1) from previous analysis, selected by Special Reclamation Advisory Council to reflect likelihood of bond forfeiture as a function of size  
 Cols (2) and (3) from client data  
 Col (4) = (3) / (2)  
 Col (5) = (4) / (4 Total)

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Release and Forfeiture Probability Relativities by Status

	(1)	(2)	(3)	(4)	(5)
<u>Status</u>	<u>Total Permits 2015</u>	<u>Total Forfeitures 2015-19</u>	<u>Probability</u>	<u>Relativity</u>	<u>Selected</u>
Active	1,277	4	0.31%	0.62	0.50
Inactive	261	1	0.38%	0.76	0.75
Phased Release	255	4	1.57%	3.13	3.00
Overall	1,793	9	0.50%		

<u>Status</u>	<u>Total Permits 2015</u>	<u>Total Releases 2015-19</u>	<u>Probability</u>	<u>Relativity</u>	<u>Selected</u>
Active	1,277	94	7.36%	0.80	0.80
Inactive	261	13	4.98%	0.54	0.55
Phased Release	255	59	23.14%	2.50	2.50
Overall	1,793	166	9.26%		

Notes: Cols (1) and (2) from client data  
 Col (3) = (2) / (1)  
 Col (4) = (3) / (3 Total)

**Triangle Data on Number of Permits, Forfeitures, Releases, and Terminations  
By Permit Type and Issue Year**

Surface  
Total Permits

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
1965	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	10	9	9	9	9	9	9	9	8	8	8	8	8	8	7	7	7	5	5
1969	11	11	11	10	10	10	10	10	10	10	10	10	10	9	8	7	7	5	5
1970	13	13	12	12	12	12	12	12	12	12	12	12	12	12	10	10	8	7	5
1971	20	20	19	19	19	19	19	18	18	18	18	18	18	18	14	13	11	7	7
1972	22	22	22	21	21	21	21	21	21	21	21	21	19	11	7	4	1	1	1
1973	22	22	22	22	22	22	22	22	22	22	22	19	16	11	10	10	8	7	6
1974	41	41	41	41	41	41	41	41	39	39	37	26	22	20	16	14	12	12	12
1975	103	103	103	103	103	101	100	98	95	89	67	47	38	30	25	24	22	20	16
1976	92	92	90	90	85	84	83	81	74	55	40	35	30	27	26	20	18	18	17
1977	118	116	114	107	106	105	104	96	76	54	45	35	32	27	25	22	21	18	17
1978	166	164	162	158	155	152	142	114	86	77	62	49	47	44	39	38	33	30	27
1979	81	81	80	78	77	73	63	52	44	42	40	36	36	31	29	24	19	17	15
1980	115	115	115	113	110	102	97	92	85	79	73	64	55	45	42	37	31	30	29
1981	165	165	162	153	146	139	130	126	118	111	107	100	91	85	76	72	59	53	47
1982	93	93	89	81	72	69	65	59	56	51	43	33	26	20	15	14	10	8	6
1983	190	188	180	157	147	133	125	113	105	93	72	63	54	49	43	40	34	28	24
1984	107	106	101	92	90	86	81	76	64	54	46	37	33	26	23	19	16	15	14
1985	133	128	121	120	118	116	112	104	93	81	68	60	46	38	31	27	25	25	24
1986	128	119	114	109	106	104	99	90	78	64	60	54	49	43	38	32	29	26	24
1987	140	138	131	127	124	115	103	92	81	69	58	53	45	35	29	22	20	19	19
1988	115	113	109	107	99	91	88	78	69	59	48	44	40	32	29	29	28	27	27
1989	134	125	123	120	115	110	103	97	86	74	62	52	47	40	37	35	33	31	28
1990	92	92	86	81	74	71	67	59	57	47	39	34	33	32	31	31	30	28	27
1991	74	72	69	67	66	65	64	56	50	42	35	31	31	29	27	25	23	19	19
1992	52	51	48	47	44	43	41	39	31	22	20	16	16	14	13	11	10	9	9
1993	59	58	52	49	49	48	45	42	37	32	29	27	26	24	20	19	16	16	16
1994	42	41	39	39	38	34	30	28	28	24	23	21	21	18	18	18	15	14	14
1995	40	40	40	39	39	37	34	30	28	28	26	25	24	23	23	22	22	21	20
1996	29	29	29	29	29	29	29	29	27	26	26	26	25	24	22	22	22	21	19
1997	47	45	44	44	42	42	42	40	38	37	36	36	34	31	30	29	28	27	27
1998	36	36	35	35	35	34	33	33	31	30	30	28	28	27	27	27	27	26	26
1999	17	17	14	14	14	12	12	11	11	10	10	9	8	7	7	7	7	7	7
2000	19	19	19	19	17	16	14	13	12	12	12	11	11	11	9	9	8	8	7
2001	26	26	26	26	26	26	26	25	25	25	25	25	25	25	24	24	24	24	24
2002	23	23	22	22	22	22	22	21	21	21	20	20	20	19	19	19	19	19	19
2003	29	29	29	28	28	27	25	24	24	23	22	22	21	21	21	21	21	21	21
2004	33	33	32	32	32	31	31	31	31	31	31	31	31	31	31	31	31	31	31
2005	19	19	19	19	18	18	18	18	18	18	18	17	17	17	17	17	17	17	17
2006	16	16	16	15	15	15	15	15	15	14	13	13	13	13	13	13	13	13	13
2007	31	31	31	31	30	30	30	30	28	26	26	26	25	25	25	25	25	25	25
2008	24	24	24	24	24	24	24	24	23	22	21	21	21	21	21	21	21	21	21
2009	25	25	25	25	25	25	25	24	24	24	23	23	23	23	23	23	23	23	23
2010	15	15	15	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14
2011	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
2012	26	26	26	25	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
2013	25	25	24	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
2014	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
2015	16	16	15	15	15	15	15	15	15	14	13	13	13	13	13	13	13	13	13
2016	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
2017	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
2018	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
2019	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Surface  
Total Permits

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	3	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0
1969	4	4	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	4	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	6	4	4	4	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1
1972	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1973	5	5	3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
1974	12	10	10	10	7	5	4	3	3	2	2	2	2	2	2	2	2	2	2
1975	15	11	9	8	6	6	5	4	4	4	4	4	4	4	4	4	3	2	2
1976	15	15	14	14	13	11	10	10	10	10	10	10	10	10	9	9	8	8	8
1977	14	14	13	12	12	8	8	8	8	8	8	8	8	8	8	8	8	8	8
1978	22	19	17	17	16	15	13	13	11	11	11	11	9	8	8	8	8	8	8
1979	13	11	11	11	10	8	8	7	6	6	5	5	5	5	5	5	5	5	4
1980	28	24	19	18	15	14	12	12	11	11	7	7	7	7	7	7	7	6	6
1981	43	39	38	36	34	32	30	29	27	26	24	23	23	22	21	21	21	20	19
1982	5	5	5	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3
1983	22	20	16	16	15	15	14	13	12	11	11	11	9	9	9	9	9	9	9
1984	14	13	12	12	11	11	10	9	9	8	8	8	8	7	7	6	6		
1985	18	16	16	16	13	10	10	10	10	8	8	8	8	7	7	7	7		
1986	23	22	22	21	18	17	17	15	15	15	14	14	14	14	14				
1987	19	18	18	16	13	12	12	12	12	12	12	11	10	9					
1988	26	24	23	20	18	16	15	15	15	15	15	15	14						
1989	25	22	21	21	20	19	17	17	17	17	15	15							
1990	27	26	24	22	21	19	19	19	18	17	17								
1991	19	16	15	15	15	15	14	14	14	14									
1992	9	9	9	9	9	8	8	7	7										
1993	16	14	13	13	13	13	13	13											
1994	14	14	14	13	13	13	13												
1995	20	20	19	19	19	19													
1996	19	19	18	18	18														
1997	27	26	26	26															
1998	25	24	23																
1999	7	7																	
2000	7																		
2001																			
2002																			
2003																			
2004																			
2005																			
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2009																			
2010																			
2011																			
2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			

Surface  
Total Permits

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0
1975	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0
1976	7	7	7	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0
1977	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0
1978	8	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0	0	0
1979	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0
1980	6	6	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0
1981	19	19	19	19	19	19	19	19	0	0	0	0	0	0	0	0	0	0	0
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Surface  
Total Releases

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2	0
1969	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0
1970	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	2
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	2	0
1972	0	0	0	1	0	0	0	0	0	0	0	0	1	8	4	3	3	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	3	3	5	1	0	2	0	1
1974	0	0	0	0	0	0	0	0	0	1	11	4	2	4	2	1	0	0	0
1975	0	0	0	0	0	0	0	1	0	4	22	17	8	7	4	1	2	2	4
1976	0	0	0	0	0	0	0	1	6	18	13	5	4	2	1	6	1	0	1
1977	0	0	0	1	0	0	0	8	20	20	8	10	3	3	2	3	1	2	1
1978	0	0	0	0	0	0	6	23	22	7	14	12	1	2	3	1	4	2	2
1979	0	0	0	0	0	3	9	9	7	2	2	3	0	4	2	3	3	1	2
1980	0	0	0	0	3	6	4	5	7	6	5	6	5	8	2	3	6	1	1
1981	0	0	0	7	4	6	9	4	6	6	4	5	7	4	6	1	11	6	6
1982	0	0	3	6	7	3	3	6	3	5	4	7	5	6	4	0	4	2	1
1983	0	1	6	18	7	13	4	10	8	8	14	4	7	2	4	3	6	4	1
1984	0	1	0	4	1	3	3	5	9	5	7	8	4	7	2	4	0	1	1
1985	0	4	4	1	0	1	3	4	8	9	11	7	10	8	7	4	2	0	1
1986	1	7	2	2	0	1	3	3	6	9	4	5	4	4	3	5	3	2	2
1987	1	2	3	2	1	2	7	5	6	11	10	5	7	6	5	7	2	0	0
1988	1	2	0	1	3	3	0	6	8	7	9	4	4	7	2	0	0	1	0
1989	0	3	1	1	1	1	3	5	11	8	12	5	4	7	3	1	2	2	3
1990	0	0	0	0	4	1	3	6	2	10	7	3	1	1	0	0	1	2	1
1991	0	0	1	0	0	0	1	8	5	8	7	4	0	2	1	2	1	3	0
1992	0	0	0	0	3	1	1	1	8	7	2	4	0	2	1	2	1	0	0
1993	0	1	1	2	0	1	1	3	5	4	3	1	1	2	4	0	1	0	0
1994	0	1	1	0	0	4	1	1	0	4	1	2	0	3	0	0	3	1	0
1995	0	0	0	1	0	1	3	4	2	0	2	1	1	0	0	1	0	1	1
1996	0	0	0	0	0	0	0	0	2	1	0	0	1	0	2	0	0	1	1
1997	0	2	1	0	2	0	0	2	2	1	1	0	1	2	1	1	1	0	0
1998	0	0	0	0	0	0	1	0	2	1	0	2	0	1	0	0	0	0	0
1999	0	0	3	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0
2000	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	1	0	1
2001	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0
2004	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
2005	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Total Releases

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
1969	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
1970	1	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	1	2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	1	0	2	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1974	0	2	0	0	3	2	1	1	0	1	0	0	0	0	0	0	0	0	0
1975	1	4	2	1	2	0	1	0	0	0	0	0	0	0	0	0	1	1	0
1976	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0
1977	3	0	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	5	3	2	0	1	1	2	0	1	0	0	0	1	1	0	0	0	0	0
1979	2	2	0	0	1	2	0	1	1	0	1	0	0	0	0	0	0	0	1
1980	1	4	3	1	3	1	2	0	1	0	1	0	0	0	0	0	0	1	0
1981	3	2	1	2	2	2	2	1	0	0	1	1	1	0	1	1	0	1	1
1982	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1983	1	2	3	0	1	0	1	1	1	1	0	0	2	0	0	0	0	0	0
1984	0	1	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0
1985	4	2	0	0	3	1	0	0	0	2	0	0	1	0	0	0	0	0	0
1986	1	0	0	1	0	1	0	2	0	0	1	0	0	0	0	0	0	0	0
1987	0	1	0	1	2	1	0	0	0	0	0	1	1	1	0	0	0	0	0
1988	1	1	0	3	1	2	1	0	0	0	0	0	1	0	0	0	0	0	0
1989	2	2	1	0	0	0	2	0	0	2	0	0	2	0	0	0	0	0	0
1990	0	1	2	2	1	2	0	0	1	1	0	0	0	0	0	0	0	0	0
1991	0	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
1993	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
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Surface  
Total Releases

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Total Forfeitures

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
1974	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0
1975	0	0	0	0	0	2	1	1	3	2	0	3	1	1	1	0	0	0	0
1976	0	0	2	0	5	1	1	1	1	2	0	1	1	1	0	0	1	0	0
1977	0	2	2	6	1	1	1	0	2	1	0	0	2	0	0	0	0	1	0
1978	0	2	2	4	3	3	4	5	6	2	1	1	1	1	2	0	1	1	1
1979	0	0	1	2	1	1	1	2	1	0	0	1	0	1	0	2	2	1	0
1980	0	0	0	2	0	2	1	0	0	1	3	4	2	1	2	0	0	0	0
1981	0	0	3	2	3	1	0	0	2	1	0	2	2	3	3	2	0	0	0
1982	0	0	1	2	2	0	1	0	0	4	3	2	0	1	1	0	0	1	0
1983	0	1	2	5	3	1	4	2	0	4	7	5	2	3	2	0	0	2	3
1984	0	0	5	5	1	1	2	0	3	5	1	1	0	0	1	0	3	0	0
1985	0	1	3	0	2	1	1	4	3	3	2	1	4	0	0	0	0	0	0
1986	0	2	3	3	3	1	2	6	6	5	0	1	1	2	2	1	0	1	0
1987	0	0	4	2	2	7	5	6	5	1	1	0	1	4	1	0	0	1	0
1988	0	0	4	1	5	5	3	4	1	3	2	0	0	1	1	0	1	0	0
1989	0	6	1	2	4	4	4	1	0	4	0	5	1	0	0	1	0	0	0
1990	0	0	6	5	3	2	1	2	0	0	1	2	0	0	1	0	0	0	0
1991	0	2	2	2	1	1	0	0	1	0	0	0	0	0	1	0	1	1	0
1992	0	1	3	1	0	0	1	1	0	2	0	0	0	0	0	0	0	1	0
1993	0	0	5	1	0	0	2	0	0	1	0	1	0	0	0	1	2	0	0
1994	0	0	1	0	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1997	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
1998	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
1999	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	1	1	2	0	1	0	0	0	0	0	1	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
2003	0	0	0	1	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2006	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Total Forfeitures

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	2	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
1981	1	2	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
1985	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
2002																			
2003																			
2004																			
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2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			

Surface  
Total Forfeitures

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Misc Terminations

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Misc Terminations

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Surface  
Misc Terminations

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0







Surface  
Percent Forfeited

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1964	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1965	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1966	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1967	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1968	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1969	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1970	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1971	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1972	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1973	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1974	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1975	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1976	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1977	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1978	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1979	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1980	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1981	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
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2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			
Wtd Avg																			
5 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Avg Rolling	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Linear Smoothed	0.32%	0.30%	0.29%	0.27%	0.25%	0.24%	0.22%	0.20%	0.19%	0.17%	0.15%	0.14%	0.12%	0.10%	0.09%	0.07%	0.06%	0.04%	0.02%
Prior Sel	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Selected	0.32%	0.30%	0.29%	0.27%	0.25%	0.24%	0.22%	0.20%	0.19%	0.17%	0.15%	0.14%	0.12%	0.10%	0.09%	0.07%	0.06%	0.04%	0.02%
Active	0.16%	0.15%	0.14%	0.13%	0.13%	0.12%	0.11%	0.10%	0.09%	0.09%	0.08%	0.07%	0.06%	0.05%	0.04%	0.04%	0.03%	0.02%	0.01%
Inactive	0.24%	0.23%	0.21%	0.20%	0.19%	0.18%	0.17%	0.15%	0.14%	0.13%	0.12%	0.10%	0.09%	0.08%	0.07%	0.05%	0.04%	0.03%	0.02%
Phased Release	0.96%	0.91%	0.86%	0.81%	0.76%	0.71%	0.66%	0.61%	0.56%	0.51%	0.46%	0.41%	0.36%	0.31%	0.27%	0.22%	0.17%	0.12%	0.07%





Surface  
Percent Released

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1964	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1965	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1966	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1967	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1968	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1969	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1970	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1971	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1972	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1973	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1974	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1975	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1976	12.50%	0.00%	0.00%	14.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1977	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1978	0.00%	12.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1979	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1980	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1981	0.00%																		
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2017																			
2018																			
2019																			
Wtd Avg																			
5 Yr	0.00%	3.03%	0.00%	3.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Yr	1.72%	2.63%	0.00%	3.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Yr	1.72%	2.63%	0.00%	3.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Yr	1.72%	2.63%	0.00%	3.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Avg Rolling	3.24%	2.79%	1.34%	2.16%	1.25%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Linear Smoothed	2.15%	2.09%	2.04%	1.98%	1.92%	1.86%	1.80%	1.74%	1.69%	1.63%	1.57%	1.51%	1.45%	1.39%	1.34%	1.28%	1.22%	1.16%	1.10%
Prior Sel	5.00%	5.00%	5.00%	5.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Selected	2.15%	2.09%	2.04%	1.98%	1.92%	1.86%	1.80%	1.74%	1.69%	1.63%	1.57%	1.51%	1.45%	1.39%	1.34%	1.28%	1.22%	1.16%	1.10%
Active	1.72%	1.68%	1.63%	1.58%	1.54%	1.49%	1.44%	1.40%	1.35%	1.30%	1.26%	1.21%	1.16%	1.11%	1.07%	1.02%	0.97%	0.93%	0.88%
Inactive	1.18%	1.15%	1.12%	1.09%	1.06%	1.02%	0.99%	0.96%	0.93%	0.90%	0.86%	0.83%	0.80%	0.77%	0.73%	0.70%	0.67%	0.64%	0.61%
Phased Release	5.38%	5.24%	5.09%	4.94%	4.80%	4.65%	4.51%	4.36%	4.21%	4.07%	3.92%	3.78%	3.63%	3.48%	3.34%	3.19%	3.05%	2.90%	2.75%

Underground  
Total Permits

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1
1977	36	36	35	33	32	30	28	28	19	16	14	14	11	9	9	8	8	8	8
1978	103	102	99	94	91	86	75	55	49	41	38	38	35	32	32	29	28	26	24
1979	71	70	65	64	63	58	47	40	36	36	35	35	35	35	34	34	33	32	29
1980	107	107	107	106	92	78	72	67	65	61	60	60	59	57	56	53	46	45	42
1981	178	178	177	172	157	149	148	142	138	136	133	131	129	127	124	113	99	90	83
1982	102	102	100	97	93	90	86	84	83	82	78	77	74	69	54	44	36	34	29
1983	306	303	286	276	256	232	219	214	204	185	172	163	150	134	126	118	108	95	84
1984	191	187	181	171	152	131	124	119	112	106	99	90	88	77	73	58	55	46	46
1985	90	87	83	78	72	66	61	60	58	57	49	42	34	34	32	28	25	23	19
1986	96	95	90	87	84	81	78	76	74	69	57	49	44	38	30	24	24	22	20
1987	107	104	101	96	94	89	88	84	76	71	65	61	56	41	36	33	29	28	28
1988	175	170	163	156	139	126	115	97	87	83	71	65	52	44	38	33	31	28	28
1989	130	128	124	112	105	92	86	77	69	65	56	47	42	39	32	31	28	25	25
1990	52	50	48	47	43	41	39	38	32	31	27	25	24	22	18	17	16	16	15
1991	47	43	41	41	37	37	31	31	31	28	25	25	21	20	19	19	19	19	18
1992	49	49	49	45	45	44	43	42	41	35	32	31	31	28	28	26	25	24	22
1993	56	53	46	45	42	40	39	39	37	37	35	32	30	30	29	26	25	25	24
1994	56	55	54	54	51	48	47	45	45	44	43	39	38	36	34	33	31	30	29
1995	43	43	41	40	38	36	35	33	33	32	32	30	28	25	24	24	21	21	21
1996	45	44	44	44	40	37	37	36	36	34	34	31	30	29	29	28	27	27	25
1997	43	42	42	42	41	41	38	37	37	37	33	32	31	31	29	29	29	29	29
1998	37	37	37	37	34	32	30	29	29	28	25	24	24	23	23	22	19	19	19
1999	35	35	34	34	33	31	31	31	31	31	30	29	29	29	29	28	27	24	23
2000	31	31	31	31	30	30	30	27	27	27	26	25	25	24	24	24	23	20	19
2001	20	20	20	20	20	20	18	18	18	17	17	16	16	16	16	16	16	12	12
2002	26	26	26	26	26	24	24	24	22	22	20	20	19	19	18	16	16	15	15
2003	31	31	30	30	29	28	28	28	26	26	25	24	24	23	23	22	22		
2004	23	22	21	21	19	19	19	18	18	16	15	15	15	15	13	13			
2005	18	18	18	18	18	17	17	17	16	15	15	15	15	14	14				
2006	20	20	20	19	19	19	18	18	18	18	17	17	17	16					
2007	22	22	22	22	21	21	21	21	20	20	16	16	16						
2008	21	21	18	18	17	16	16	16	16	15	15	15							
2009	19	19	19	19	19	19	19	19	17	17	17								
2010	26	26	26	24	24	24	22	20	20	20									
2011	18	18	17	17	17	17	16	16	16										
2012	17	17	15	14	13	10	10	10											
2013	19	18	18	17	17	17	17												
2014	29	29	29	24	23	23													
2015	9	8	8	8	8														
2016	7	7	7	7															
2017	7	7	7																
2018	5	5																	
2019	4																		

Underground  
Total Permits

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1977	7	6	5	5	4	4	4	4	4	4	3	2	2	2	2	2	2	2	2
1978	21	20	19	15	14	12	11	11	11	10	9	9	8	8	7	7	7	7	7
1979	28	25	25	21	21	19	19	18	18	17	16	14	14	13	11	10	10	10	10
1980	40	36	34	30	26	25	18	15	14	14	14	12	12	12	11	11	11	10	10
1981	79	66	61	55	50	45	45	42	38	38	36	36	35	35	31	31	30	30	30
1982	24	23	23	21	18	16	16	15	15	14	13	12	12	11	10	10	10	10	9
1983	79	75	73	68	63	59	52	51	51	49	49	44	44	44	44	44	44	44	43
1984	41	41	41	38	34	32	31	30	28	27	24	24	23	22	22	20	20		
1985	19	19	17	15	13	11	11	11	11	10	10	10	10	9	8	8			
1986	19	15	15	14	12	10	10	9	9	9	9	9	9	9	9				
1987	26	22	20	16	16	16	15	15	15	13	12	11	11						
1988	26	25	25	24	23	22	20	19	18	18	18	17	17						
1989	25	23	21	21	20	19	19	19	19	19	19	18	18						
1990	13	13	12	12	11	11	10	10	10	10	10								
1991	17	16	14	14	14	14	14	14	13	12	11								
1992	22	22	21	21	19	18	17	16	16										
1993	23	19	19	19	19	19	18	18											
1994	27	26	25	24	24	17	17												
1995	20	20	20	20	19	18													
1996	23	23	20	18	18														
1997	29	28	27	26															
1998	18	17	16																
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Underground  
Total Permits

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	1	1	1	1	1	1													
1977	2	2	2	1	1														
1978	7	6	6	6															
1979	10	10	10																
1980	10	10																	
1981	30																		
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2018																			
2019																			



Underground  
Total Releases

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	1	0	0	6	2	2	0	3	0	1	0	1	0	0
1978	0	0	0	0	0	0	8	15	3	7	3	0	2	2	0	1	0	1	1
1979	0	1	0	0	0	3	8	3	4	0	0	0	0	0	1	0	1	1	2
1980	0	0	0	0	7	7	3	3	2	4	1	0	1	1	1	2	6	1	2
1981	0	0	0	3	10	4	1	6	4	1	3	1	1	1	0	9	11	8	6
1982	0	0	2	2	3	3	4	2	1	1	4	1	1	3	11	9	7	2	4
1983	0	1	16	6	16	21	12	3	9	13	11	3	8	11	6	8	8	10	10
1984	0	1	3	6	10	18	2	4	6	3	5	5	1	8	2	15	3	8	0
1985	0	3	1	5	3	2	3	0	0	1	5	6	5	0	2	2	2	2	3
1986	0	1	2	2	2	2	2	1	1	1	9	6	5	6	7	5	0	1	2
1987	1	2	1	3	2	4	1	1	5	3	5	2	5	12	3	3	3	1	0
1988	4	4	3	5	15	5	8	7	7	3	6	5	9	7	6	3	1	2	0
1989	0	0	4	9	3	9	4	9	5	3	7	7	3	2	4	0	1	2	3
1990	0	1	1	0	3	2	0	0	5	1	3	2	0	2	4	1	0	1	1
1991	0	1	1	0	2	0	2	0	0	3	3	0	4	1	1	0	0	0	1
1992	0	0	0	1	0	0	1	0	1	6	2	0	0	3	0	2	1	1	2
1993	0	3	1	1	1	1	1	0	1	0	1	3	2	0	1	3	1	0	1
1994	0	0	0	0	2	3	1	2	0	1	1	4	1	2	2	1	2	1	1
1995	1	0	1	1	1	2	0	2	0	1	0	2	2	3	0	0	3	0	0
1996	0	1	0	0	2	3	0	1	0	2	0	2	1	1	0	1	1	0	1
1997	0	1	0	0	1	0	2	1	0	0	4	1	1	0	2	0	0	0	0
1998	0	0	0	0	3	1	2	1	0	1	3	0	0	1	0	1	3	0	0
1999	0	0	1	0	0	2	0	0	0	0	1	1	0	0	0	1	1	3	1
2000	0	0	0	0	1	0	0	3	0	0	1	1	0	1	0	0	1	3	1
2001	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	4	0	0
2002	0	0	0	0	0	2	0	0	2	0	2	0	1	0	1	2	0	1	0
2003	0	0	0	0	1	1	0	0	2	0	1	1	0	1	0	1	0	0	0
2004	0	1	1	0	2	0	0	1	0	2	1	0	0	0	2	0	0	0	0
2005	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0
2006	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0
2007	0	0	0	0	1	0	0	0	1	0	4	0	0	0	0	0	0	0	0
2008	0	0	3	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	2	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underground  
Total Releases

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	1	1	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
1978	3	1	1	4	1	2	0	0	0	1	0	1	1	0	1	0	0	0	0
1979	0	1	0	4	0	2	0	1	0	1	1	1	0	1	2	1	0	0	0
1980	2	4	2	4	4	1	7	3	1	0	0	2	0	0	0	0	0	1	0
1981	4	12	5	5	5	5	0	3	4	0	2	0	1	0	4	0	1	0	0
1982	5	1	0	1	3	2	0	1	0	0	1	1	0	1	1	0	0	0	1
1983	2	3	2	4	5	3	7	0	0	2	0	2	0	0	0	0	0	0	1
1984	4	0	0	2	4	2	1	0	2	1	3	0	1	1	0	2	0	0	0
1985	0	0	1	2	2	2	0	0	0	0	0	0	0	1	1	0	0	0	0
1986	1	1	0	1	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0
1987	1	4	2	3	0	0	1	0	0	0	2	1	1	0	0	0	0	0	0
1988	2	1	0	0	1	1	2	1	0	0	0	1	0	0	0	0	0	0	0
1989	0	2	2	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0
1990	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	1	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
1992	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1993	1	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1994	2	1	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	2	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
2002																			
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2016																			
2017																			
2018																			
2019																			

Underground  
Total Releases

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underground  
Total Forfeitures

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	1	2	1	1	2	0	3	1	0	0	0	0	1	0	0	0	0
1978	0	1	3	5	3	5	3	5	3	1	0	0	1	1	0	2	1	1	1
1979	0	0	5	1	1	2	3	4	0	0	1	0	0	0	0	0	0	0	1
1980	0	0	0	1	7	7	3	2	0	0	0	0	1	0	1	1	0	1	1
1981	0	0	1	2	5	4	0	0	1	0	1	1	1	1	3	2	3	1	1
1982	0	0	0	1	1	0	0	0	0	0	0	2	2	2	4	1	1	0	1
1983	0	2	1	4	4	3	1	2	1	6	2	6	5	5	2	0	2	3	1
1984	0	3	3	4	9	3	5	1	1	3	2	4	1	3	2	0	0	1	0
1985	0	0	3	0	3	4	2	1	2	0	3	1	3	0	0	2	1	0	1
1986	0	0	3	1	1	1	1	1	1	4	3	2	0	0	1	1	0	1	0
1987	0	1	2	2	0	1	0	3	3	2	1	2	0	3	2	0	1	0	0
1988	0	1	4	2	2	8	3	11	3	1	6	1	4	1	0	2	1	1	0
1989	0	2	0	3	4	4	2	0	3	1	2	2	2	1	3	0	0	1	0
1990	0	1	1	1	1	0	2	1	1	0	1	0	1	0	0	0	0	0	0
1991	0	3	1	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	3	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0
1993	0	0	6	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0
1994	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0
1996	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1997	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
1999	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underground  
Total Forfeitures

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
1979	1	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1981	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
1983	2	1	0	1	0	1	0	1	0	0	0	3	0	0	0	0	0	0	0
1984	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1986	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
2002																			
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2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			

Underground  
Total Forfeitures

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underground  
Misc Terminations

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underground  
Misc Terminations

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
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2015																			
2016																			
2017																			
2018																			
2019																			



Underground  
Misc Terminations

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0





Underground  
Percent Forfeited

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1964	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1965	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1966	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1967	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1968	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1969	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1970	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1971	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1972	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1973	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1974	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1975	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1976	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1977	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1978	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1979	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1980	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1981	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1982																			
1983																			
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2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			
Wtd Avg																			
5 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Yr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Avg Rolling	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Linear Smoothed	0.25%	0.24%	0.23%	0.23%	0.22%	0.22%	0.21%	0.21%	0.20%	0.19%	0.19%	0.18%	0.18%	0.17%	0.16%	0.16%	0.15%	0.15%	0.14%
Prior Sel	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Selected	0.25%	0.24%	0.23%	0.23%	0.22%	0.22%	0.21%	0.21%	0.20%	0.19%	0.19%	0.18%	0.18%	0.17%	0.16%	0.16%	0.15%	0.15%	0.14%
Active	0.12%	0.12%	0.12%	0.11%	0.11%	0.11%	0.11%	0.10%	0.10%	0.10%	0.09%	0.09%	0.09%	0.08%	0.08%	0.08%	0.08%	0.07%	0.07%
Inactive	0.19%	0.18%	0.18%	0.17%	0.17%	0.16%	0.16%	0.15%	0.15%	0.15%	0.14%	0.14%	0.13%	0.13%	0.12%	0.12%	0.11%	0.11%	0.11%
Phased Release	0.74%	0.72%	0.70%	0.69%	0.67%	0.65%	0.63%	0.62%	0.60%	0.58%	0.56%	0.55%	0.53%	0.51%	0.49%	0.47%	0.46%	0.44%	0.42%





Underground  
Percent Released

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1964	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1965	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1966	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1967	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1968	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1969	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1970	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1971	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1972	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1973	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1974	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1975	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1976	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1977	0.00%	0.00%	0.00%	50.00%	0.00%														
1978	0.00%	14.29%	0.00%	0.00%															
1979	0.00%	0.00%	0.00%																
1980	0.00%	0.00%																	
1981	0.00%																		
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2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			
Wtd Avg																			
5 Yr	0.00%	3.33%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Yr	0.00%	3.33%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Yr	0.00%	3.33%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Yr	0.00%	3.33%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Avg Rolling	1.08%	1.59%	1.11%	4.81%	3.70%	3.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Linear Smoothed	2.38%	2.26%	2.15%	2.03%	1.91%	1.79%	1.67%	1.55%	1.43%	1.31%	1.19%	1.07%	0.95%	0.83%	0.72%	0.60%	0.48%	0.36%	0.24%
Prior Sel	5.00%	5.00%	5.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Selected	2.38%	2.26%	2.15%	2.03%	1.91%	1.79%	1.67%	1.55%	1.43%	1.31%	1.19%	1.07%	0.95%	0.83%	0.72%	0.60%	0.48%	0.36%	0.24%
Active	1.91%	1.81%	1.72%	1.62%	1.53%	1.43%	1.33%	1.24%	1.14%	1.05%	0.95%	0.86%	0.76%	0.67%	0.57%	0.48%	0.38%	0.29%	0.19%
Inactive	1.31%	1.25%	1.18%	1.11%	1.05%	0.98%	0.92%	0.85%	0.79%	0.72%	0.66%	0.59%	0.52%	0.46%	0.39%	0.33%	0.26%	0.20%	0.13%
Phased Release	5.96%	5.66%	5.36%	5.06%	4.77%	4.47%	4.17%	3.87%	3.58%	3.28%	2.98%	2.68%	2.38%	2.09%	1.79%	1.49%	1.19%	0.90%	0.60%

Other  
Total Permits

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1969	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1970	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1971	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3
1972	7	7	7	7	7	7	7	7	6	6	6	6	6	5	4	4	4	4	4
1973	7	7	7	7	7	7	7	7	7	7	7	7	6	5	5	5	5	5	4
1974	16	16	16	16	14	14	14	13	13	13	13	11	8	7	7	6	5	5	5
1975	26	26	26	25	24	24	24	23	23	23	19	13	12	6	5	4	4	4	4
1976	23	23	23	22	22	22	22	22	21	19	14	11	9	9	7	7	7	7	7
1977	23	23	23	21	20	20	19	19	16	15	11	11	11	11	11	11	11	11	10
1978	25	25	23	22	17	17	17	16	12	11	10	10	10	10	10	10	10	9	9
1979	21	21	21	20	19	19	17	15	13	12	12	11	11	11	11	11	11	11	8
1980	38	38	37	35	34	33	31	27	24	23	23	23	22	22	22	22	21	19	19
1981	122	122	122	122	120	116	115	113	112	112	109	109	105	104	101	98	95	91	89
1982	70	70	69	65	62	61	57	56	53	50	50	46	45	41	39	34	31	29	28
1983	220	220	215	208	198	181	167	161	159	156	144	136	119	113	110	101	97	96	88
1984	133	133	131	124	117	112	104	101	99	95	90	79	77	74	69	65	64	58	57
1985	78	78	77	71	67	65	62	62	57	49	46	38	37	33	32	31	27	26	24
1986	81	80	73	67	64	62	60	51	44	37	33	31	28	21	21	21	21	21	21
1987	89	89	83	78	71	67	54	44	38	31	26	21	19	18	16	16	16	16	16
1988	127	124	117	111	108	95	74	60	43	35	35	29	24	22	20	18	16	16	15
1989	138	137	130	127	103	79	61	45	31	29	27	24	20	19	17	14	14	14	14
1990	148	148	143	102	66	40	20	13	12	11	11	11	10	10	10	9	9	9	8
1991	199	199	159	104	67	41	24	23	19	17	17	17	16	16	16	15	14	14	11
1992	172	170	131	98	57	38	33	25	25	22	22	21	20	20	20	19	19	17	17
1993	171	169	146	91	49	39	34	29	27	27	24	23	23	21	20	19	19	19	17
1994	117	114	83	48	33	27	23	22	22	21	20	20	20	19	18	18	18	16	16
1995	156	150	118	65	38	22	15	15	13	13	13	12	11	11	11	11	11	10	10
1996	134	130	86	53	27	17	9	9	8	8	6	6	6	5	5	5	4	4	4
1997	168	162	129	82	50	34	31	30	25	20	19	19	19	18	18	16	15	15	15
1998	173	161	111	58	32	18	16	11	10	7	7	6	6	6	6	6	6	6	6
1999	155	140	110	68	45	33	19	14	8	8	7	7	7	7	7	7	7	7	7
2000	121	117	94	66	38	23	15	11	9	7	5	5	5	4	3	3	3	3	3
2001	131	125	91	66	35	23	17	13	9	8	7	7	7	7	7	7	7	7	6
2002	116	110	96	57	37	24	20	14	12	11	11	10	9	9	9	9	8		
2003	83	80	65	47	24	18	10	9	9	9	8	8	7	7	7	7			
2004	136	127	99	76	36	20	14	14	12	12	12	12	12	12	12				
2005	134	128	115	69	30	19	13	10	8	5	5	5	4	3	3				
2006	204	198	166	86	30	22	19	12	10	10	9	9	8	7					
2007	191	183	139	80	41	28	18	13	9	9	9	7							
2008	195	191	161	102	49	27	17	14	13	12	11	11							
2009	181	176	140	79	41	20	12	11	10	9	8								
2010	147	143	124	63	32	23	20	16	13	13									
2011	172	171	157	96	45	32	18	14	8										
2012	162	162	141	75	44	29	24	15											
2013	135	132	107	72	40	32	22												
2014	87	84	67	34	23	14													
2015	70	67	52	33	17														
2016	32	30	24	14															
2017	46	43	37																
2018	58	57																	
2019	65																		



Other  
Total Permits

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1969	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
1971	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2
1972	4	4	4	4	4	4	4	3	2	2	1	1	1	1	1	1	1	1	1
1973	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3
1974	4	4	4	4	4	3	2	2	2	2	2	2	2	1	1	1	1	1	1
1975	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	2
1976	7	7	7	7	6	6	6	6	6	5	5	5	5	5	4	4	4	4	4
1977	10	9	9	7	6	6	6	5	4	4	4	4	4	4	4	4	4	4	4
1978	9	8	6	6	6	4	4	3	3	3	3	3	3	3	3	3	3	3	2
1979	7	7	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
1980	19	19	19	19	18	17	17	16	16	16	16	16	15	15	15	12	11	11	11
1981	90	87	82	80	76	74	71	68	68	67	67	65	64	64	62	61	60	59	58
1982	23	21	20	20	20	19	19	18	17	17	17	17	16	15	15	14	11	11	11
1983	83	80	76	74	73	69	67	63	61	59	58	57	56	56	55	55	53	51	
1984	53	52	51	50	50	49	49	49	48	48	47	47	46	44	44	44			
1985	24	23	23	23	22	22	22	21	21	20	20	19	19	19	19				
1986	21	20	20	18	18	18	18	18	18	17	17	17	16	14					
1987	16	16	15	15	14	13	13	13	13	12	12	12	12						
1988	15	15	14	14	14	13	13	11	11	11	11	11	11						
1989	14	14	14	14	14	14	14	14	14	14	14	14	14						
1990	8	8	8	8	8	8	8	8	8	8	8								
1991	11	10	10	9	9	9	8	8	8	8									
1992	17	16	16	16	16	16	16	16	16										
1993	16	16	15	15	15	14	14	14											
1994	16	16	16	16	16	16	16												
1995	10	10	10	10	10	10													
1996	4	4	4	4	4														
1997	15	15	14	14															
1998	5	5	5																
1999	6	6																	
2000	3																		
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2017																			
2018																			
2019																			

Other  
Total Permits

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1973	3	3	3	3	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0
1974	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1975	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0
1976	4	4	4	4	4	4	4	1	0	0	0	0	0	0	0	0	0	0	0
1977	4	4	4	4	4	4	4	1	0	0	0	0	0	0	0	0	0	0	0
1978	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1979	5	5	5																
1980	11	11																	
1981	58																		
1982																			
1983																			
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2014																			
2015																			
2016																			
2017																			
2018																			
2019																			

Other  
Total Releases

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
1974	0	0	0	0	0	0	0	0	0	0	2	3	1	0	1	1	0	0	1
1975	0	0	0	0	0	0	0	0	0	4	5	1	5	1	1	0	0	0	0
1976	0	0	0	0	0	0	0	0	1	5	3	2	0	2	0	0	0	0	0
1977	0	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	1	0
1978	0	0	0	0	0	0	1	4	1	1	0	0	0	0	0	0	1	0	0
1979	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	3	1
1980	0	0	0	0	1	2	2	3	0	0	0	0	1	0	0	1	2	0	0
1981	0	0	0	2	1	1	2	1	0	0	3	0	4	0	1	1	3	4	1
1982	0	0	1	0	1	2	1	1	2	0	4	0	1	2	3	3	1	1	3
1983	0	4	4	8	12	12	4	1	2	9	5	13	3	1	9	3	1	4	4
1984	0	2	2	5	5	7	2	1	4	4	7	2	2	2	3	1	4	1	4
1985	0	0	3	2	2	2	0	5	5	3	6	1	4	0	1	2	0	2	0
1986	0	2	2	2	0	2	7	5	5	3	2	2	5	0	0	0	0	0	0
1987	0	2	5	4	3	11	7	6	6	4	4	2	1	1	0	0	0	0	0
1988	2	5	4	3	12	19	9	17	7	0	5	5	1	1	2	1	0	1	0
1989	0	1	0	24	24	16	13	12	2	2	3	1	1	2	1	0	0	0	0
1990	0	2	40	33	23	19	7	1	1	0	0	1	0	0	0	1	0	1	0
1991	0	40	55	36	25	15	1	4	1	0	0	1	0	0	1	1	0	0	0
1992	2	39	33	37	18	4	8	0	3	0	1	1	0	0	1	0	2	0	0
1993	2	23	49	41	10	5	5	1	0	3	1	0	2	1	1	0	0	2	1
1994	3	31	35	14	6	4	1	0	1	0	0	0	1	1	0	0	1	0	0
1995	6	32	52	27	16	7	0	2	0	0	0	1	1	0	0	0	1	0	0
1996	4	44	33	25	10	8	0	0	0	2	0	0	0	0	0	0	1	0	0
1997	6	33	47	31	16	3	1	5	5	0	1	0	0	1	0	1	1	0	0
1998	12	50	53	25	13	2	3	1	3	0	1	0	0	0	0	0	0	0	1
1999	15	30	42	23	12	13	5	6	0	1	0	0	0	0	0	0	0	0	1
2000	4	23	28	27	15	8	4	2	1	2	0	0	0	0	0	0	0	0	0
2001	6	34	25	31	11	4	4	4	1	0	0	0	0	0	0	0	0	1	0
2002	6	14	38	20	13	4	6	2	1	0	1	1	0	0	0	0	0	0	0
2003	3	15	18	23	6	8	0	0	0	0	1	0	0	0	0	0	0	0	0
2004	9	28	23	40	16	6	0	2	0	0	0	0	0	0	0	2	1	0	0
2005	6	13	45	39	11	6	3	2	3	0	0	1	1	0	0	0	0	0	0
2006	6	32	80	55	8	3	7	2	0	1	0	1	1	0	0	0	0	0	0
2007	8	44	59	39	13	10	4	3	0	0	0	2	0	0	0	0	0	0	0
2008	4	29	59	52	22	9	3	1	1	1	0	0	0	0	0	0	0	0	0
2009	5	36	61	38	20	8	0	1	1	0	0	0	0	0	0	0	0	0	0
2010	4	19	61	31	9	3	4	3	0	1	0	0	0	0	0	0	0	0	0
2011	1	14	61	51	13	14	4	6	1	0	0	0	0	0	0	0	0	0	0
2012	0	21	66	29	15	5	9	2	0	0	0	0	0	0	0	0	0	0	0
2013	3	25	35	32	8	10	1	0	0	0	0	0	0	0	0	0	0	0	0
2014	3	17	33	11	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	3	15	19	16	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	2	6	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	3	6	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	1	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Other  
Total Releases

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1969	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0
1975	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
1976	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
1977	1	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1978	1	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0
1979	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	1	1	0	1	0	0	0	0	1	0	0	3	1	0	0	0
1981	2	4	2	4	1	1	3	0	1	0	2	1	0	1	1	1	1	1	0
1982	2	1	0	0	1	0	1	1	0	0	0	1	0	0	1	3	0	0	1
1983	3	4	2	1	4	2	4	2	0	1	1	1	0	1	0	2	2	1	0
1984	1	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
1985	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
1986	1	0	2	0	0	0	0	0	0	1	0	0	1	2	0	1	0	0	0
1987	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001																			
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Other  
Total Releases

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Other  
Total Forfeitures

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	1	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0
1976	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
1977	0	0	2	1	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0
1978	0	2	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	1	1	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0
1980	0	1	2	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	3	0	0	0	0	0	0	0	0	1	2	2	0	0	0
1982	0	1	3	3	0	2	0	2	1	0	0	1	3	0	2	0	1	0	2
1983	0	1	3	2	5	2	2	1	1	3	3	4	3	2	0	1	0	3	2
1984	0	0	5	2	0	1	1	1	0	1	4	0	1	3	1	0	2	0	0
1985	0	1	3	2	0	1	0	0	3	0	2	0	0	1	0	2	1	0	0
1986	1	5	4	1	2	0	2	2	2	1	0	1	2	0	0	0	0	0	0
1987	0	4	0	3	1	2	3	0	1	1	1	0	0	1	0	0	0	0	0
1988	1	2	2	0	1	2	5	0	1	0	1	0	1	1	0	1	0	0	0
1989	1	6	3	0	0	2	3	2	0	0	0	3	0	0	2	0	0	0	0
1990	0	3	1	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	1	1	2	0	0	1	0	0	0	0	0	0	0	0	3	0
1992	0	0	0	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	6	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
1995	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
1997	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0
2001	0	0	0	0	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0
2002	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2003	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
2005	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0
2008	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
2009	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Other  
Total Forfeitures

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	1	1	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
1984	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0
1985	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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2019																			

Other  
Total Forfeitures

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Other  
Misc Terminations

Issue Year	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Other  
Misc Terminations

Issue Year	240	252	264	276	288	300	312	324	336	348	360	372	384	396	408	420	432	444	456
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Other  
Misc Terminations

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0













Other  
Percent Released

Issue Year	468	480	492	504	516	528	540	552	564	576	588	600	612	624	636	648	660	672	684
1963	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1964	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1965	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1966	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1967	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1968	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1969	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1970	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1971	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1972	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1973	0.00%	0.00%	0.00%	33.33%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1974	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1975	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1976	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1977	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1978	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1979	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1980	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1981	1.72%																		
1982																			
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2018																			
2019																			
Wtd Avg																			
5 Yr	1.25%	0.00%	5.88%	0.00%	0.00%	10.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Yr	1.10%	0.00%	4.55%	5.88%	0.00%	10.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Yr	1.10%	0.00%	4.55%	5.88%	0.00%	10.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Yr	1.10%	0.00%	4.55%	5.88%	0.00%	10.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
All Avg Rolling	1.46%	0.71%	2.01%	3.10%	3.10%	4.80%	3.33%	11.67%	8.33%	8.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Linear Smoothed	2.47%	2.58%	2.69%	2.79%	2.90%	3.01%	3.12%	3.22%	3.33%	3.44%	3.55%	3.65%	3.76%	3.87%	3.98%	4.08%	4.19%	4.30%	4.41%
Prior Sel	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Selected	2.47%	2.58%	2.69%	2.79%	2.90%	3.01%	3.12%	3.22%	3.33%	3.44%	3.55%	3.65%	3.76%	3.87%	3.98%	4.08%	4.19%	4.30%	4.41%
Active	1.98%	2.06%	2.15%	2.24%	2.32%	2.41%	2.49%	2.58%	2.67%	2.75%	2.84%	2.92%	3.01%	3.10%	3.18%	3.27%	3.35%	3.44%	3.53%
Inactive	1.36%	1.42%	1.48%	1.54%	1.60%	1.66%	1.71%	1.77%	1.83%	1.89%	1.95%	2.01%	2.07%	2.13%	2.19%	2.25%	2.31%	2.36%	2.42%
Phased Release	6.18%	6.45%	6.72%	6.99%	7.26%	7.52%	7.79%	8.06%	8.33%	8.60%	8.87%	9.14%	9.41%	9.67%	9.94%	10.21%	10.48%	10.75%	11.02%

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Remaining Acres Projections  
 All Mine Types

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Deterministic Model	Stochastic Mean	Stochastic Median	Selected	% Remaining In Force		
					Total	Surface	Underground
2019	287,091	287,091	287,091	287,091	100%	100%	100%
2020	278,495	233,278	233,506	256,001	89%	89%	89%
2021	270,371	225,920	226,342	248,357	87%	86%	86%
2022	262,686	220,695	221,319	242,003	84%	84%	84%
2023	255,387	205,955	206,709	231,048	80%	80%	80%
2024	248,446	194,259	195,082	221,764	77%	77%	77%
2025	241,830	184,259	185,163	213,497	74%	74%	74%
2026	235,504	174,947	175,866	205,685	72%	71%	71%
2027	229,461	167,470	168,385	198,923	69%	69%	69%
2028	223,694	158,117	159,065	191,380	67%	66%	67%
2029	218,199	148,460	149,427	183,813	64%	64%	64%
2030	212,952	142,029	143,023	177,988	62%	61%	62%
2031	207,949	137,781	138,772	173,361	60%	60%	61%
2032	203,185	132,409	133,409	168,297	59%	58%	59%
2033	198,639	123,930	124,870	161,755	56%	56%	57%
2034	194,300	114,269	115,179	154,739	54%	53%	55%
2035	190,158	101,307	102,139	146,148	51%	50%	52%
2036	186,201	91,528	92,283	139,242	49%	48%	50%
2037	182,417	85,519	86,239	134,328	47%	46%	49%
2038	178,799	74,339	74,920	126,860	44%	44%	46%
2039	175,337	65,080	65,562	120,450	42%	42%	44%

Notes: Col (1) from Exhibit E-86, Col (20), (35), (50), etc.  
 Col (2) from Exhibit E-139, Col (16)  
 Col (3) from Exhibit E-139, Col (14)  
 Col (5) = Col (4) / [Col (4) 2019 Total]  
 Col (6) and (7) based on Col (5), Distributed according to Exhibit E-86

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Bond Forfeiture Projections  
 All Mine Types

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)
	Bond Forfeiture Recoveries			
	Deterministic Model	Stochastic Mean	Stochastic Median	Selected
2020	1,927,220	9,521,137	8,524,798	5,226,009
2021	1,841,428	1,222,352	72,240	956,834
2022	1,755,139	1,019,508	11,680	883,409
2023	1,680,599	1,335,514	203,920	942,259
2024	1,604,492	2,145,183	1,002,830	1,303,661
2025	1,528,465	2,164,053	1,447,700	1,488,083
2026	1,451,688	1,476,072	418,144	934,916
2027	1,380,820	1,396,269	298,000	839,410
2028	1,307,322	2,260,545	809,221	1,058,272
2029	1,242,442	2,038,967	1,195,464	1,218,953
2030	1,181,855	2,109,085	1,134,084	1,157,969
2031	1,119,531	874,186	257,160	688,345
2032	1,061,271	1,581,312	531,800	796,536
2033	1,005,536	2,366,220	1,518,587	1,262,061
2034	951,105	3,407,496	2,778,180	1,864,642
2035	903,468	6,859,171	4,736,350	2,819,909
2036	858,437	7,414,980	7,178,211	4,018,324
2037	815,522	4,025,374	2,800,880	1,808,201
2038	774,520	4,860,080	2,849,718	1,812,119
2039	737,277	4,701,565	3,824,404	2,280,840
<b>Total</b>	<b>25,128,136</b>	<b>62,779,069</b>	<b>41,593,370</b>	<b>33,360,753</b>

Notes: Col (1) from Exhibit E-77, Col (17), (32), etc.  
 Col (2) from Exhibit E-139, Col (8)  
 Col (3) from Exhibit E-139, Col (6)

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Cost Projections  
 All Mine Types

Fiscal Year Ending 6/30	(1) (2) (3) (4) (5) Land Reclamation Costs					(6) (7) (8) (9) (10) Water Capital Costs					(11) (12) (13) (14) (15) Water O&M Costs				
	Deterministic		Stochastic		Three-Year	Deterministic		Stochastic		Three-Year	Deterministic		Stochastic		Three-Year
	Model	Mean	Median	Selected	Delay	Model	Mean	Median	Selected	Delay	Model	Mean	Median	Selected	Delay
2020	3,432,270	9,185,918	8,448,900	7,022,363	0	3,520,408	11,594,522	10,664,253	8,593,061	0	107,370	332,221	305,566	248,386	0
2021	3,239,687	1,042,941	104,821	1,462,483	0	3,320,827	1,316,406	132,306	1,589,846	0	207,377	369,941	309,357	295,558	0
2022	3,038,647	956,442	70,839	1,355,309	0	3,111,624	1,207,227	89,414	1,469,421	0	300,095	404,532	311,919	338,848	0
2023	2,849,532	1,481,508	528,239	1,619,760	3,511,181	2,914,825	1,869,968	666,747	1,817,180	4,296,531	386,095	458,112	331,023	391,744	124,193
2024	2,697,123	2,442,750	1,773,526	2,304,467	4,242,423	2,755,115	3,083,254	2,238,556	2,692,309	5,091,454	466,330	546,458	395,165	469,318	271,972
2025	2,523,363	1,886,037	1,255,158	1,888,186	1,408,896	2,574,413	2,380,567	1,584,268	2,179,749	1,529,634	540,713	614,669	440,560	531,981	317,203
2026	2,369,595	1,725,119	1,004,497	1,487,534	1,487,534	2,414,018	2,177,456	1,267,882	1,953,119	1,643,301	609,840	677,060	476,889	587,930	365,296
2027	2,217,392	1,348,129	476,147	1,347,223	3,114,346	2,255,527	1,701,617	600,995	1,519,380	3,600,899	673,963	725,817	494,109	631,297	665,189
2028	2,086,337	2,651,298	2,159,424	2,299,020	1,888,186	2,118,518	3,346,484	2,725,638	2,730,213	2,179,749	733,648	821,705	572,208	709,187	531,981
2029	1,945,871	2,378,923	1,893,195	2,072,663	1,699,737	1,972,433	3,002,692	2,389,603	2,454,909	1,953,119	788,913	907,742	640,678	779,111	587,930
2030	1,832,066	1,590,791	960,202	1,461,020	1,347,223	1,853,349	2,007,907	1,211,972	1,691,076	1,519,380	838,237	965,275	675,405	826,306	631,297
2031	1,728,091	1,393,377	347,519	1,156,329	2,299,020	1,744,361	1,758,729	438,641	1,313,910	2,730,213	882,122	1,015,668	687,973	861,921	709,187
2032	1,606,873	1,418,421	517,442	1,180,912	2,072,663	1,618,425	1,790,340	653,119	1,353,961	2,454,909	920,592	1,066,968	706,687	898,082	779,111
2033	1,519,737	2,274,993	1,783,702	1,859,477	1,461,020	1,526,840	2,871,510	2,251,399	2,216,583	1,691,076	954,526	1,149,246	771,197	958,323	826,306
2034	1,436,374	3,101,464	2,722,115	2,419,985	1,156,329	1,439,355	3,914,687	3,435,870	2,929,971	1,313,910	984,261	1,261,414	869,646	1,038,441	861,921
2035	1,361,202	4,681,462	3,764,216	3,268,960	1,180,912	1,360,323	5,908,970	4,751,216	4,006,836	1,353,961	1,010,183	1,430,726	1,005,784	1,148,898	898,082
2036	1,290,712	4,765,807	4,516,047	3,524,189	1,859,477	1,286,267	6,015,431	5,700,182	4,333,960	2,216,583	1,032,609	1,603,088	1,169,113	1,268,270	958,323
2037	1,223,217	2,724,949	2,363,522	2,103,896	2,419,985	1,215,277	3,439,448	2,983,252	2,545,992	2,929,971	1,051,795	1,701,639	1,254,593	1,336,009	1,038,441
2038	1,159,633	3,800,496	2,400,158	2,453,429	3,268,960	1,148,392	4,797,009	3,029,495	2,991,632	4,006,836	1,068,005	1,839,090	1,341,398	1,416,164	1,148,898
2039	1,102,471	3,021,836	2,685,645	2,269,984	3,524,189	1,088,095	3,814,180	3,389,837	2,764,038	4,333,960	1,081,550	1,948,378	1,438,528	1,489,486	1,268,270
Total	40,660,193	53,872,661	39,775,313	44,769,389	37,942,081	41,238,390	67,998,404	50,204,645	53,147,146	44,845,485	14,638,225	19,839,749	14,197,804	16,225,259	11,983,600

Notes: Col (1) from Exhibit E-73, Col (4)  
 Col (2) from Exhibit E-142, Col (16)  
 Col (3) from Exhibit E-142, Col (14)  
 Col (6) from Exhibit E-95, Col (4)  
 Col (7) from Exhibit E-143, Col (16)  
 Col (8) from Exhibit E-143, Col (14)  
 Col (11) from Exhibit E-117, Col (12)  
 Col (12) from Exhibit E-144, Col (16)  
 Col (13) from Exhibit E-144, Col (14)  
 Cols (5), (10), and (15) based on (4), (9), and (14), respectively, with a three-year delay on payments

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Land Reclamation Cost Projection - Deterministic Model  
 Land Total - All Mine Types

Fiscal Year Ending 6/30	(1) Gross Liability				(2) Gross Liability - Three Year Delay				(3) Net Liability				(4) Net Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	2,296,827	460,435	675,008	3,432,270	0	0	0	0	860,911	215,440	428,700	1,505,050	0	0	0	0
2021	2,202,291	438,665	598,731	3,239,687	0	0	0	0	828,064	203,842	366,352	1,398,258	0	0	0	0
2022	2,088,308	419,177	531,162	3,038,647	0	0	0	0	780,080	191,174	312,254	1,283,508	0	0	0	0
2023	1,971,079	406,903	471,550	2,849,532	1,148,413	230,218	337,504	1,716,135	717,254	184,699	266,980	1,168,933	430,455	107,720	214,350	752,525
2024	1,883,854	394,443	418,827	2,697,123	2,249,559	449,550	636,869	3,335,978	685,666	178,215	228,749	1,092,631	844,488	209,641	397,526	1,451,654
2025	1,769,916	381,261	372,186	2,523,363	2,145,300	428,921	564,946	3,139,167	627,862	171,156	195,881	994,898	804,072	197,508	339,303	1,340,883
2026	1,671,714	367,043	330,838	2,369,595	2,029,693	413,040	501,356	2,944,089	587,523	163,103	167,281	917,907	748,667	187,937	289,617	1,226,220
2027	1,568,712	354,590	294,091	2,217,392	2,869,393	597,894	654,602	4,121,889	537,627	156,529	142,417	836,573	1,044,293	270,565	362,240	1,677,098
2028	1,482,218	342,738	261,381	2,086,337	1,769,916	381,261	372,186	2,523,363	507,473	150,303	121,240	779,015	627,862	171,156	195,881	994,898
2029	1,384,728	328,927	232,217	1,945,871	1,671,714	367,043	330,838	2,369,595	458,300	142,293	102,837	703,430	587,523	163,103	167,281	917,907
2030	1,308,496	317,437	206,132	1,832,066	1,568,712	354,590	294,091	2,217,392	427,104	136,154	86,954	650,211	537,627	156,529	142,417	836,573
2031	1,239,296	306,018	182,778	1,728,091	1,482,218	342,738	261,381	2,086,337	404,204	130,408	73,949	608,561	507,473	150,303	121,240	779,015
2032	1,150,942	293,992	161,938	1,606,873	1,384,728	328,927	232,217	1,945,871	359,106	123,630	62,866	545,602	458,300	142,293	102,837	703,430
2033	1,091,955	284,538	143,244	1,519,737	1,308,496	317,437	206,132	1,832,066	342,167	118,839	53,195	514,201	427,104	136,154	86,954	650,211
2034	1,034,232	275,396	126,746	1,436,374	1,239,296	306,018	182,778	1,728,091	325,959	114,193	45,118	485,270	404,204	130,408	73,949	608,561
2035	982,846	266,472	111,884	1,361,202	1,150,942	293,992	161,938	1,606,873	309,989	109,639	38,106	457,734	359,106	123,630	62,866	545,602
2036	934,181	257,756	98,775	1,290,712	1,091,955	284,538	143,244	1,519,737	294,718	105,174	32,384	432,275	342,167	118,839	53,195	514,201
2037	886,867	249,239	87,111	1,223,217	1,034,232	275,396	126,746	1,436,374	279,328	100,793	27,574	407,695	325,959	114,193	45,118	485,270
2038	841,824	240,908	76,900	1,159,633	982,846	266,472	111,884	1,361,202	265,076	96,491	23,546	385,112	309,989	109,639	38,106	457,734
2039	801,444	232,794	68,232	1,102,471	934,181	257,756	98,775	1,290,712	252,850	92,296	20,047	365,194	294,718	105,174	32,384	432,275

Notes: Col (1) - (3) from Exhibit E-77, Col (15), (30), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (9) - (11) from Exhibit E-77, Col (18), (33), etc.  
 Col (12) = (9) + (10) + (11)  
 Col (5) - (8) and (13) - (16) based on (1) - (4) and (9) - (12), with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Land Reclamation Cost Projection - Deterministic Model  
 Surface Mines

Fiscal Year Ending 6/30	(1) Gross Liability				(2) Gross Liability - Three Year Delay				(3) Net Liability				(4) Net Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
	2020	1,071,802	122,139	457,760	1,651,701	0	0	0	0	25,688	2,547	248,394	276,628	0	0	0
2021	1,027,665	116,849	404,243	1,548,757	0	0	0	0	21,747	2,204	207,784	231,735	0	0	0	0
2022	975,797	111,674	356,862	1,444,333	0	0	0	0	19,192	1,892	172,881	193,965	0	0	0	0
2023	925,625	106,637	315,108	1,347,369	535,901	61,069	228,880	825,850	17,048	1,611	144,498	163,157	12,844	1,273	124,197	138,314
2024	877,160	101,697	278,190	1,257,047	1,049,733	119,494	431,001	1,600,229	15,073	1,350	121,132	137,555	23,717	2,375	228,089	254,181
2025	830,329	96,895	245,565	1,172,789	1,001,731	114,262	380,552	1,496,545	13,257	1,203	101,362	115,822	20,469	2,048	190,332	212,850
2026	785,033	92,242	216,673	1,093,948	950,711	109,156	335,985	1,395,851	11,588	1,077	84,328	96,993	18,120	1,752	158,689	178,561
2027	741,450	87,708	191,020	1,020,178	1,339,972	155,015	435,744	1,930,732	10,064	959	69,689	80,711	23,598	2,155	193,380	219,133
2028	699,580	83,331	168,216	951,127	830,329	96,895	245,565	1,172,789	8,688	847	57,571	67,106	13,257	1,203	101,362	115,822
2029	659,475	79,115	147,898	886,488	785,033	92,242	216,673	1,093,948	7,456	742	47,189	55,387	11,588	1,077	84,328	96,993
2030	621,225	75,051	129,753	826,029	741,450	87,708	191,020	1,020,178	6,508	642	38,440	45,591	10,064	959	69,689	80,711
2031	584,576	71,133	113,507	769,215	699,580	83,331	168,216	951,127	5,645	549	31,759	37,953	8,688	847	57,571	67,106
2032	549,549	67,351	99,043	715,943	659,475	79,115	147,898	886,488	4,861	461	26,285	31,607	7,456	742	47,189	55,387
2033	516,108	63,701	86,073	665,882	621,225	75,051	129,753	826,029	4,150	378	21,527	26,055	6,508	642	38,440	45,591
2034	484,157	60,240	74,720	619,117	584,576	71,133	113,507	769,215	3,510	340	17,643	21,493	5,645	549	31,759	37,953
2035	453,854	56,896	64,485	575,235	549,549	67,351	99,043	715,943	2,947	305	14,284	17,536	4,861	461	26,285	31,607
2036	425,088	53,662	55,523	534,273	516,108	63,701	86,073	665,882	2,512	274	11,719	14,505	4,150	378	21,527	26,055
2037	397,582	50,532	47,549	495,663	484,157	60,240	74,720	619,117	2,140	246	9,671	12,057	3,510	340	17,643	21,493
2038	371,321	47,502	40,601	459,424	453,854	56,896	64,485	575,235	1,827	222	7,997	10,045	2,947	305	14,284	17,536
2039	346,429	44,566	34,820	425,815	425,088	53,662	55,523	534,273	1,548	199	6,541	8,289	2,512	274	11,719	14,505

Notes: Col (1) - (3) from Exhibit E-77, Col (15), (30), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (9) - (11) from Exhibit E-77, Col (18), (33), etc.  
 Col (12) = (9) + (10) + (11)  
 Col (5) - (8) and (13) - (16) based on (1) - (4) and (9) - (12), with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Land Reclamation Cost Projection - Deterministic Model  
 Underground Mines

Fiscal Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Gross Liability				Gross Liability - Three Year Delay				Net Liability				Net Liability - Three Year Delay			
	Ending 6/30	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released
2020	447,237	123,747	152,143	723,128	0	0	0	0	287,236	81,406	124,667	493,309	0	0	0	0
2021	428,308	118,897	134,008	681,213	0	0	0	0	271,458	77,577	107,443	456,479	0	0	0	0
2022	408,479	114,194	118,252	640,926	0	0	0	0	255,535	73,876	92,572	421,983	0	0	0	0
2023	389,476	109,631	104,628	603,735	223,619	61,874	76,072	361,564	240,403	70,293	79,807	390,503	143,618	40,703	62,334	246,655
2024	371,323	105,220	92,851	569,394	437,773	121,322	143,075	702,170	226,111	66,842	68,864	361,816	279,347	79,492	116,055	474,894
2025	354,028	100,950	82,656	537,634	418,394	116,545	126,130	661,069	212,600	63,514	59,479	335,592	263,497	75,727	100,008	439,231
2026	337,555	96,827	73,806	508,188	398,978	111,913	111,440	622,331	199,839	60,314	51,417	311,571	247,969	72,084	86,190	406,243
2027	321,862	92,852	66,107	480,821	566,061	160,035	145,165	871,261	187,792	57,247	44,484	289,523	346,312	101,988	108,768	557,068
2028	306,936	89,027	59,385	455,348	354,028	100,950	82,656	537,634	176,449	54,314	38,507	269,270	212,600	63,514	59,479	335,592
2029	292,734	85,350	53,512	431,596	337,555	96,827	73,806	508,188	165,773	51,512	33,359	250,644	199,839	60,314	51,417	311,571
2030	279,228	81,813	48,389	409,430	321,862	92,852	66,107	480,821	155,738	48,837	28,942	233,516	187,792	57,247	44,484	289,523
2031	266,380	78,424	43,907	388,711	306,936	89,027	59,385	455,348	146,309	46,307	25,146	217,763	176,449	54,314	38,507	269,270
2032	254,157	75,188	39,972	369,317	292,734	85,350	53,512	431,596	137,458	43,926	21,882	203,265	165,773	51,512	33,359	250,644
2033	242,521	72,097	36,509	351,128	279,228	81,813	48,389	409,430	129,150	41,675	19,126	189,952	155,738	48,837	28,942	233,516
2034	231,444	69,168	33,451	334,064	266,380	78,424	43,907	388,711	121,358	39,565	16,908	177,831	146,309	46,307	25,146	217,763
2035	220,923	66,369	30,744	318,035	254,157	75,188	39,972	369,317	114,078	37,572	14,987	166,637	137,458	43,926	21,882	203,265
2036	210,946	63,691	28,357	302,994	242,521	72,097	36,509	351,128	107,300	35,687	13,374	156,361	129,150	41,675	19,126	189,952
2037	201,693	61,129	26,275	289,098	231,444	69,168	33,451	334,064	101,048	33,905	11,997	146,950	121,358	39,565	16,908	177,831
2038	192,948	58,673	24,477	276,097	220,923	66,369	30,744	318,035	95,256	32,217	10,849	138,322	114,078	37,572	14,987	166,637
2039	184,924	56,353	22,917	264,194	210,946	63,691	28,357	302,994	89,975	30,648	9,898	130,521	107,300	35,687	13,374	156,361

Notes: Col (1) - (3) from Exhibit E-77, Col (15), (30), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (9) - (11) from Exhibit E-77, Col (18), (33), etc.  
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West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Other

Fiscal Year Ending 6/30	(1) - (4) Gross Liability				(5) - (8) Gross Liability - Three Year Delay				(9) - (12) Net Liability				(13) - (16) Net Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	777,787	214,549	65,105	1,057,442	0	0	0	0	547,987	131,487	55,638	735,113	0	0	0	0
2021	746,318	202,919	60,480	1,009,717	0	0	0	0	534,860	124,060	51,124	710,044	0	0	0	0
2022	704,032	193,309	56,048	953,388	0	0	0	0	505,353	115,406	46,801	667,560	0	0	0	0
2023	655,978	190,635	51,814	898,427	388,894	107,275	32,553	528,721	459,803	112,795	42,675	615,274	273,994	65,744	27,819	367,556
2024	635,371	187,526	47,785	870,683	762,053	208,734	62,793	1,033,579	444,482	110,024	38,754	593,260	541,423	127,774	53,381	722,578
2025	585,558	183,416	43,966	812,940	725,175	198,114	58,264	981,553	402,005	106,439	35,040	543,484	520,106	119,733	48,963	688,802
2026	549,126	177,974	40,358	767,459	680,005	191,972	53,931	925,907	376,096	101,711	31,536	509,343	482,578	114,101	44,738	641,417
2027	505,400	174,030	36,963	716,393	963,360	282,844	73,692	1,319,896	339,771	98,324	28,244	466,339	674,384	166,422	60,091	900,897
2028	475,703	170,380	33,780	679,862	585,558	183,416	43,966	812,940	322,335	95,142	25,162	442,639	402,005	106,439	35,040	543,484
2029	432,518	164,462	30,806	627,787	549,126	177,974	40,358	767,459	285,071	90,039	22,288	397,398	376,096	101,711	31,536	509,343
2030	408,043	160,573	27,990	596,607	505,400	174,030	36,963	716,393	264,858	86,674	19,572	371,104	339,771	98,324	28,244	466,339
2031	388,340	156,461	25,364	570,165	475,703	170,380	33,780	679,862	252,250	83,552	17,043	352,845	322,335	95,142	25,162	442,639
2032	347,237	151,453	22,923	521,613	432,518	164,462	30,806	627,787	216,787	79,244	14,699	310,730	285,071	90,039	22,288	397,398
2033	333,325	148,740	20,662	502,727	408,043	160,573	27,990	596,607	208,867	76,785	12,542	298,194	264,858	86,674	19,572	371,104
2034	318,631	145,988	18,575	483,193	388,340	156,461	25,364	570,165	201,091	74,288	10,567	285,945	252,250	83,552	17,043	352,845
2035	308,069	143,207	16,655	467,932	347,237	151,453	22,923	521,613	192,964	71,762	8,835	273,561	216,787	79,244	14,699	310,730
2036	298,147	140,403	14,895	453,445	333,325	148,740	20,662	502,727	184,906	69,212	7,290	261,409	208,867	76,785	12,542	298,194
2037	287,592	137,578	13,287	438,456	318,631	145,988	18,575	483,193	176,140	66,642	5,906	248,688	201,091	74,288	10,567	285,945
2038	277,555	134,733	11,823	424,111	308,069	143,207	16,655	467,932	167,994	64,052	4,700	236,746	192,964	71,762	8,835	273,561
2039	270,091	131,875	10,495	412,461	298,147	140,403	14,895	453,445	161,327	61,448	3,608	226,383	184,906	69,212	7,290	261,409

Notes: Col (1) - (3) from Exhibit E-77, Col (15), (30), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (9) - (11) from Exhibit E-77, Col (18), (33), etc.  
 Col (12) = (9) + (10) + (11)  
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West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Land Reclamation Cost Projection - Deterministic Model

Permit Issue Year	Mine Type	Mine Status	Permit Count (4)	Adjustment Factor				Forfeited Permit Count (9)	Released Permit Count (10)	Forfeited Acres (11)	Released Acres (12)	Avg Recl Cost per Acre (13)	Adjustment Factor		Gross Cost (15)	Current Security Amount (16)	Forfeited Security Amount (17)	Net Cost (18)
				Bonded Acres (5)	Forfeiture Rate (6)	Permit Bond Size (7)	Release Rate (8)						Permit Status (14)	Permit Status (14)				
1963	Surface	Inactive	-	-	0.017%	0.00	0.606%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1964	Surface	Inactive	-	-	0.029%	0.00	0.638%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1965	Surface	Inactive	-	-	0.042%	0.00	0.670%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1966	Surface	Inactive	-	-	0.054%	0.00	0.702%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1967	Surface	Inactive	-	-	0.066%	0.00	0.734%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1968	Surface	Inactive	-	-	0.079%	0.00	0.766%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1969	Surface	Inactive	-	-	0.091%	0.00	0.799%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1970	Surface	Inactive	-	-	0.103%	0.00	0.831%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1971	Surface	Inactive	-	-	0.116%	0.00	0.863%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1972	Surface	Inactive	-	-	0.128%	0.00	0.895%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1973	Surface	Inactive	-	-	0.141%	0.00	0.927%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1974	Surface	Inactive	-	-	0.153%	0.00	0.959%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1975	Surface	Inactive	-	-	0.165%	0.00	0.991%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1976	Surface	Inactive	1	438.80	0.178%	0.50	1.024%	0.00	0.01	0.39	4.49	2,765.00	1.00	1,077.60	442,000.00	392.57	685.03	
1977	Surface	Inactive	-	-	0.190%	0.00	1.056%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1978	Surface	Inactive	-	-	0.202%	0.00	1.088%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1979	Surface	Inactive	-	-	0.215%	0.00	1.120%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1980	Surface	Inactive	-	-	0.227%	0.00	1.152%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1981	Surface	Inactive	-	-	0.239%	0.00	1.184%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1982	Surface	Inactive	-	-	0.252%	0.00	1.216%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1983	Surface	Inactive	-	-	0.264%	0.00	1.249%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1984	Surface	Inactive	-	-	0.277%	0.00	1.281%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1985	Surface	Inactive	-	-	0.289%	0.00	1.313%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1986	Surface	Inactive	1	224.46	0.301%	0.50	1.345%	0.00	0.01	0.34	3.02	2,765.00	1.00	935.06	759,360.00	1,144.07	-	
1987	Surface	Inactive	2	327.57	0.314%	0.50	1.377%	0.01	0.03	0.51	4.51	2,765.00	1.00	1,420.61	1,218,200.00	1,910.71	-	
1988	Surface	Inactive	1	1,135.24	0.326%	0.50	1.409%	0.00	0.01	1.85	16.00	2,765.00	1.00	5,117.46	3,589,760.00	5,852.44	-	
1989	Surface	Inactive	2	273.00	0.338%	1.00	1.441%	0.01	0.03	0.92	3.94	2,765.00	1.00	2,554.64	577,400.00	1,954.11	600.53	
1990	Surface	Inactive	2	228.27	0.351%	0.50	1.474%	0.01	0.03	0.40	3.36	2,765.00	1.00	1,107.07	474,203.73	831.76	275.31	
1991	Surface	Inactive	-	-	0.363%	0.00	1.506%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1992	Surface	Inactive	-	-	0.376%	0.00	1.538%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1993	Surface	Inactive	-	-	0.388%	0.00	1.570%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1994	Surface	Inactive	1	578.94	0.400%	0.50	1.602%	0.00	0.02	1.16	9.28	2,765.00	1.00	3,203.76	2,316,000.00	4,635.21	-	
1995	Surface	Inactive	2	2,009.82	0.413%	0.50	1.634%	0.01	0.03	4.15	32.85	2,765.00	1.00	11,465.70	7,211,120.00	14,878.22	-	
1996	Surface	Inactive	3	1,639.13	0.425%	0.50	1.666%	0.01	0.05	3.48	27.32	2,765.00	1.00	9,631.27	5,826,934.00	12,382.69	-	
1997	Surface	Inactive	-	-	0.437%	0.00	1.699%	-	-	-	-	2,765.00	1.00	-	-	-	-	
1998	Surface	Inactive	1	846.89	0.450%	0.50	1.731%	0.00	0.02	1.90	14.66	2,765.00	1.00	5,265.83	4,109,160.00	9,240.55	-	
1999	Surface	Inactive	1	519.96	0.462%	0.50	1.763%	0.00	0.02	1.20	9.17	2,765.00	1.00	3,321.95	2,605,000.00	6,019.15	-	
2000	Surface	Inactive	-	-	0.474%	0.00	1.795%	-	-	-	-	2,765.00	1.00	-	-	-	-	
2001	Surface	Inactive	1	571.94	0.487%	0.50	1.827%	0.00	0.02	1.39	10.45	2,765.00	1.00	3,849.65	1,955,000.00	4,759.07	-	
2002	Surface	Inactive	3	1,304.87	0.499%	0.50	1.859%	0.01	0.06	3.26	24.26	2,765.00	1.00	9,006.03	7,564,320.00	18,881.69	-	
2003	Surface	Inactive	2	1,948.57	0.512%	0.50	1.891%	0.01	0.04	4.98	36.86	2,765.00	1.00	13,781.97	11,163,242.00	28,555.54	-	
2004	Surface	Inactive	1	898.15	0.524%	0.50	1.924%	0.01	0.02	2.35	17.28	2,765.00	1.00	6,506.08	4,993,320.00	13,081.71	-	
2005	Surface	Inactive	1	25.99	0.536%	1.50	1.956%	0.01	0.02	0.21	0.51	2,765.00	1.00	578.14	26,000.00	209.17	368.97	
2006	Surface	Inactive	1	244.34	0.549%	0.50	1.988%	0.01	0.02	0.67	4.86	2,765.00	1.00	1,853.53	823,360.00	2,258.92	-	
2007	Surface	Inactive	1	111.49	0.561%	0.50	2.020%	0.01	0.02	0.31	2.25	2,765.00	1.00	864.81	298,320.00	836.90	27.91	
2008	Surface	Inactive	2	441.20	0.573%	1.00	2.052%	0.01	0.04	2.53	9.05	2,765.00	1.00	6,995.56	1,122,968.69	6,434.45	561.11	
2009	Surface	Inactive	3	578.55	0.586%	0.50	2.085%	0.02	0.04	1.69	8.39	2,765.00	1.00	4,685.61	1,762,440.00	5,162.31	-	
2010	Surface	Inactive	1	5.11	0.598%	1.50	2.127%	0.01	0.01	0.05	0.07	2,765.00	1.00	126.78	11,040.00	99.06	27.72	
2011	Surface	Inactive	5	1,256.17	0.611%	0.50	2.170%	0.03	0.06	3.83	13.90	2,765.00	1.00	10,603.19	5,008,760.00	15,290.56	-	
2012	Surface	Inactive	2	452.53	0.623%	0.50	2.212%	0.01	0.02	1.41	4.23	2,765.00	1.00	3,897.14	1,705,920.00	5,313.27	-	
2013	Surface	Inactive	1	246.68	0.635%	0.50	2.254%	0.01	0.01	0.78	1.88	2,765.00	1.00	2,166.56	1,057,160.00	3,358.02	-	
2014	Surface	Inactive	3	1,081.42	0.648%	0.50	2.296%	0.02	0.02	3.50	6.39	2,765.00	1.00	9,682.92	4,406,940.00	14,268.07	-	
2015	Surface	Inactive	1	246.00	0.660%	0.50	2.338%	0.01	0.00	0.81	1.03	2,765.00	1.00	2,244.72	1,230,000.00	4,059.18	-	
2016	Surface	Inactive	1	7.00	0.672%	1.50	2.380%	0.01	0.00	0.07	0.02	2,765.00	1.00	195.21	29,400.00	296.53	-	
2017	Surface	Inactive	-	-	0.685%	0.00	2.422%	-	-	-	-	2,765.00	1.00	-	-	-	-	
2018	Surface	Inactive	-	-	0.697%	0.00	2.464%	-	-	-	-	2,765.00	1.00	-	-	-	-	
2019	Surface	Inactive	-	-	0.000%	0.00	2.506%	-	-	-	-	2,765.00	1.00	-	-	-	-	







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Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Permit Count (4)	2020								Avg Recl Cost per Acre (13)	Adjustment			Net Cost (18)	
				Current Bonded Acres (5)	Forfeiture Rate (6)	Adjustment Factor Permit Bond Size (7)	Release Rate (8)	Forfeited Permit Count (9)	Released Permit Count (10)	Forfeited Acres (11)	Released Acres (12)		Permit Status (14)	Gross Cost (15)	Current Security Amount (16)		Forfeited Security Amount (17)
1963	Underground	Phased Released	-	-	0.421%	0.00	0.598%	-	-	-	-	10,880.00	0.50	-	-	-	-
1964	Underground	Phased Released	-	-	0.439%	0.00	0.896%	-	-	-	-	10,880.00	0.50	-	-	-	-
1965	Underground	Phased Released	-	-	0.456%	-	1.194%	-	-	-	-	10,880.00	0.50	-	-	-	-
1966	Underground	Phased Released	-	-	0.474%	-	1.492%	-	-	-	-	10,880.00	0.50	-	-	-	-
1967	Underground	Phased Released	-	-	0.492%	-	1.789%	-	-	-	-	10,880.00	0.50	-	-	-	-
1968	Underground	Phased Released	-	-	0.510%	-	2.087%	-	-	-	-	10,880.00	0.50	-	-	-	-
1969	Underground	Phased Released	-	-	0.527%	-	2.385%	-	-	-	-	10,880.00	0.50	-	-	-	-
1970	Underground	Phased Released	-	-	0.545%	-	2.683%	-	-	-	-	10,880.00	0.50	-	-	-	-
1971	Underground	Phased Released	-	-	0.563%	-	2.980%	-	-	-	-	10,880.00	0.50	-	-	-	-
1972	Underground	Phased Released	-	-	0.581%	-	3.278%	-	-	-	-	10,880.00	0.50	-	-	-	-
1973	Underground	Phased Released	-	-	0.598%	-	3.576%	-	-	-	-	10,880.00	0.50	-	-	-	-
1974	Underground	Phased Released	-	-	0.616%	-	3.874%	-	-	-	-	10,880.00	0.50	-	-	-	-
1975	Underground	Phased Released	-	-	0.634%	-	4.171%	-	-	-	-	10,880.00	0.50	-	-	-	-
1976	Underground	Phased Released	-	-	0.652%	-	4.469%	-	-	-	-	10,880.00	0.50	-	-	-	-
1977	Underground	Phased Released	-	-	0.669%	-	4.767%	-	-	-	-	10,880.00	0.50	-	-	-	-
1978	Underground	Phased Released	4	23.13	0.687%	1.50	5.065%	0.03	0.20	0.24	1.17	10,880.00	0.50	1,297.08	38,588.00	397.78	899.30
1979	Underground	Phased Released	2	59.68	0.705%	1.50	5.363%	0.01	0.11	0.63	3.20	10,880.00	0.50	3,433.18	101,728.00	1,075.74	2,357.43
1980	Underground	Phased Released	5	87.19	0.723%	1.50	5.660%	0.04	0.28	0.95	4.94	10,880.00	0.50	5,142.02	50,000.00	542.05	4,599.97
1981	Underground	Phased Released	8	85.14	0.740%	1.38	5.958%	0.06	0.48	0.87	5.07	10,880.00	0.50	4,715.73	212,120.00	2,159.72	2,556.01
1982	Underground	Phased Released	4	199.06	0.758%	1.50	6.256%	0.03	0.25	2.26	12.45	10,880.00	0.50	12,316.17	90,296.00	1,026.98	11,289.20
1983	Underground	Phased Released	5	97.63	0.776%	1.50	6.554%	0.04	0.33	1.14	6.40	10,880.00	0.50	6,181.94	81,440.00	947.94	5,234.00
1984	Underground	Phased Released	1	15.00	0.794%	1.50	6.851%	0.01	0.07	0.18	1.03	10,880.00	0.50	971.53	10,000.00	119.06	852.47
1985	Underground	Phased Released	3	32.59	0.811%	1.50	7.149%	0.02	0.21	0.40	2.33	10,880.00	0.50	2,158.01	30,720.00	373.93	1,784.08
1986	Underground	Phased Released	2	98.80	0.829%	1.50	7.447%	0.02	0.15	1.23	7.36	10,880.00	0.50	6,685.33	107,280.00	1,334.40	5,350.93
1987	Underground	Phased Released	5	111.49	0.847%	1.50	7.745%	0.04	0.39	1.42	8.63	10,880.00	0.50	7,705.49	106,360.00	1,351.28	6,354.22
1988	Underground	Phased Released	5	129.44	0.865%	1.50	8.042%	0.04	0.40	1.68	10.41	10,880.00	0.50	9,133.57	165,576.00	2,147.68	6,985.88
1989	Underground	Phased Released	7	146.44	0.882%	1.50	8.340%	0.06	0.58	1.94	12.21	10,880.00	0.50	10,545.23	103,096.00	1,364.71	9,180.52
1990	Underground	Phased Released	2	18.31	0.900%	1.50	8.638%	0.02	0.17	0.25	1.58	10,880.00	0.50	1,345.03	20,000.00	270.07	1,074.96
1991	Underground	Phased Released	4	40.12	0.918%	1.50	8.936%	0.04	0.36	0.55	3.59	10,880.00	0.50	3,005.29	40,000.00	550.79	2,454.50
1992	Underground	Phased Released	1	24.27	0.936%	1.50	9.234%	0.01	0.09	0.34	2.24	10,880.00	0.50	1,853.16	16,640.00	233.56	1,619.60
1993	Underground	Phased Released	3	29.46	0.953%	1.50	9.531%	0.03	0.29	0.42	2.81	10,880.00	0.50	2,292.11	31,548.00	451.21	1,840.91
1994	Underground	Phased Released	3	26.14	0.971%	1.50	9.829%	0.03	0.29	0.38	2.57	10,880.00	0.50	2,071.66	30,624.00	446.15	1,625.52
1995	Underground	Phased Released	5	67.71	0.989%	1.50	10.127%	0.05	0.51	1.00	6.86	10,880.00	0.50	5,464.27	83,832.00	1,243.63	4,220.64
1996	Underground	Phased Released	5	141.07	1.007%	1.50	10.425%	0.05	0.52	2.13	14.71	10,880.00	0.50	11,588.83	105,442.00	1,592.28	9,996.55
1997	Underground	Phased Released	5	149.46	1.024%	1.50	10.722%	0.05	0.54	2.30	16.03	10,880.00	0.50	12,494.54	115,842.75	1,780.19	10,714.36
1998	Underground	Phased Released	3	70.67	1.042%	1.50	11.020%	0.03	0.33	1.10	7.79	10,880.00	0.50	6,010.22	75,384.00	1,178.52	4,831.71
1999	Underground	Phased Released	1	10.68	1.060%	1.50	11.318%	0.01	0.11	0.17	1.21	10,880.00	0.50	923.76	10,000.00	159.00	764.77
2000	Underground	Phased Released	2	59.65	1.078%	1.50	11.616%	0.02	0.23	0.96	6.93	10,880.00	0.50	5,245.81	49,536.19	800.80	4,445.01
2001	Underground	Phased Released	4	36.60	1.095%	1.50	11.913%	0.04	0.48	0.60	4.36	10,880.00	0.50	3,271.73	52,072.00	855.66	2,416.07
2002	Underground	Phased Released	3	116.87	1.113%	1.50	12.210%	0.03	0.33	1.95	12.83	10,880.00	0.50	10,616.47	92,530.00	1,545.11	9,071.35
2003	Underground	Phased Released	1	47.15	1.131%	1.50	12.508%	0.01	0.11	0.80	4.97	10,880.00	0.50	4,351.40	60,200.00	1,021.28	3,330.12
2004	Underground	Phased Released	1	16.25	1.149%	1.50	12.806%	0.01	0.10	0.28	1.64	10,880.00	0.50	1,523.22	20,160.00	347.38	1,175.85
2005	Underground	Phased Released	-	-	1.166%	-	9.648%	-	-	-	-	10,880.00	0.50	-	-	-	-
2006	Underground	Phased Released	-	-	1.184%	-	9.205%	-	-	-	-	10,880.00	0.50	-	-	-	-
2007	Underground	Phased Released	-	-	1.202%	-	8.761%	-	-	-	-	10,880.00	0.50	-	-	-	-
2008	Underground	Phased Released	2	43.07	1.220%	1.50	8.317%	0.02	0.17	0.79	3.58	10,880.00	0.50	4,286.78	44,304.00	810.59	3,476.19
2009	Underground	Phased Released	2	54.60	1.237%	1.50	7.873%	0.02	0.16	1.01	4.30	10,880.00	0.50	5,513.45	72,624.00	1,348.07	4,165.38
2010	Underground	Phased Released	-	-	1.255%	-	7.429%	-	-	-	-	10,880.00	0.50	-	-	-	-
2011	Underground	Phased Released	-	-	1.273%	-	6.985%	-	-	-	-	10,880.00	0.50	-	-	-	-
2012	Underground	Phased Released	-	-	1.291%	-	6.541%	-	-	-	-	10,880.00	0.50	-	-	-	-
2013	Underground	Phased Released	-	-	1.308%	-	6.097%	-	-	-	-	10,880.00	0.50	-	-	-	-
2014	Underground	Phased Released	-	-	1.326%	-	5.653%	-	-	-	-	10,880.00	0.50	-	-	-	-
2015	Underground	Phased Released	-	-	1.344%	-	5.210%	-	-	-	-	10,880.00	0.50	-	-	-	-
2016	Underground	Phased Released	-	-	1.362%	-	4.766%	-	-	-	-	10,880.00	0.50	-	-	-	-
2017	Underground	Phased Released	-	-	1.379%	-	4.322%	-	-	-	-	10,880.00	0.50	-	-	-	-
2018	Underground	Phased Released	-	-	1.397%	-	3.878%	-	-	-	-	10,880.00	0.50	-	-	-	-
2019	Underground	Phased Released	-	-	0.000%	-	3.434%	-	-	-	-	10,880.00	0.50	-	-	-	-

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Permit Issue Year	Mine Type	Mine Status	Permit Count (4)	Current Bonded Acres (5)	Forfeiture Rate (6)	Adjustment Factor				Avg Recl Cost per Acre (13)	Current Security Amount (16)	Forfeited Security Amount (17)	Net Cost (18)		
						Permit Bond Size (7)	Release Rate (8)	Forfeited Permit Count (9)	Released Permit Count (10)					Forfeited Acres (11)	Released Acres (12)
1963	Other	Active	-	-	0.157%	0.00	3.526%	-	-	-	8,095.00	1.00	-	-	
1964	Other	Active	-	-	0.157%	0.00	3.440%	-	-	-	8,095.00	1.00	-	-	
1965	Other	Active	-	-	0.157%	-	3.354%	-	-	-	8,095.00	1.00	-	-	
1966	Other	Active	-	-	0.157%	-	3.268%	-	-	-	8,095.00	1.00	-	-	
1967	Other	Active	-	-	0.157%	-	3.182%	-	-	-	8,095.00	1.00	-	-	
1968	Other	Active	-	-	0.157%	-	3.096%	-	-	-	8,095.00	1.00	-	-	
1969	Other	Active	-	-	0.157%	-	3.010%	-	-	-	8,095.00	1.00	-	-	
1970	Other	Active	-	-	0.157%	-	2.924%	-	-	-	8,095.00	1.00	-	-	
1971	Other	Active	-	-	0.157%	-	2.838%	-	-	-	8,095.00	1.00	-	-	
1972	Other	Active	1	20.00	0.157%	1.50	2.752%	0.00	0.03	0.05	0.55	8,095.00	1.00	381.87	381.87
1973	Other	Active	-	-	0.157%	-	2.666%	-	-	-	8,095.00	1.00	-	-	
1974	Other	Active	1	28.52	0.157%	1.50	2.580%	0.00	0.03	0.07	0.74	8,095.00	1.00	544.55	24.77
1975	Other	Active	1	6.20	0.157%	1.50	2.494%	0.00	0.02	0.01	0.15	8,095.00	1.00	118.38	176.90
1976	Other	Active	1	75.00	0.157%	1.50	2.408%	0.00	0.02	0.18	1.81	8,095.00	1.00	1,432.03	308,000.00
1977	Other	Active	2	307.70	0.157%	1.00	2.322%	0.00	0.05	0.48	7.14	8,095.00	1.00	3,916.75	18,200.00
1978	Other	Active	1	12.76	0.157%	1.50	2.236%	0.00	0.02	0.03	0.29	8,095.00	1.00	243.64	65,000.00
1979	Other	Active	1	65.00	0.157%	1.50	2.150%	0.00	0.02	0.15	1.40	8,095.00	1.00	1,241.09	530,240.00
1980	Other	Active	9	410.00	0.157%	1.28	2.064%	0.01	0.19	0.82	8.46	8,095.00	1.00	6,668.64	20,503,795.00
1981	Other	Active	42	4,174.64	0.157%	0.93	1.978%	0.07	0.83	6.10	82.56	8,095.00	1.00	49,343.80	1,973,080.00
1982	Other	Active	5	635.64	0.157%	0.70	1.892%	0.01	0.09	0.70	12.02	8,095.00	1.00	5,663.79	12,036,424.00
1983	Other	Active	42	3,946.44	0.157%	0.90	1.806%	0.07	0.76	5.61	71.26	8,095.00	1.00	45,450.44	12,667,940.00
1984	Other	Active	33	4,353.00	0.157%	0.68	1.720%	0.05	0.57	4.67	74.86	8,095.00	1.00	37,779.44	4,711,104.00
1985	Other	Active	11	1,743.70	0.157%	1.14	1.634%	0.02	0.18	3.12	28.49	8,095.00	1.00	25,222.45	4,958,480.00
1986	Other	Active	12	1,399.63	0.157%	0.92	1.548%	0.02	0.19	2.02	21.66	8,095.00	1.00	16,331.38	1,074,720.00
1987	Other	Active	6	354.22	0.157%	1.17	1.462%	0.01	0.09	0.65	5.18	8,095.00	1.00	5,260.39	1,050,280.00
1988	Other	Active	7	479.98	0.157%	1.21	1.376%	0.01	0.10	0.92	6.60	8,095.00	1.00	7,418.95	1,137,800.00
1989	Other	Active	11	627.05	0.157%	1.23	1.290%	0.02	0.14	1.21	8.09	8,095.00	1.00	9,795.84	294,600.00
1990	Other	Active	4	218.99	0.157%	1.25	1.204%	0.01	0.05	0.43	2.64	8,095.00	1.00	3,484.44	55,000.00
1991	Other	Active	3	49.45	0.157%	1.50	1.067%	0.00	0.02	0.12	0.33	8,095.00	1.00	944.18	1,594,600.00
1992	Other	Active	10	552.48	0.157%	1.20	0.811%	0.02	0.08	1.04	4.48	8,095.00	1.00	8,439.10	1,674,360.00
1993	Other	Active	9	929.29	0.157%	0.94	0.954%	0.01	0.09	1.38	8.87	8,095.00	1.00	11,171.87	5,372,060.00
1994	Other	Active	12	1,761.56	0.157%	0.83	1.098%	0.02	0.13	2.31	19.34	8,095.00	1.00	18,685.92	3,965,472.00
1995	Other	Active	6	644.11	0.157%	1.00	1.241%	0.01	0.07	1.01	7.99	8,095.00	1.00	8,198.95	10,134,530.00
1996	Other	Active	3	1,965.82	0.157%	0.50	1.385%	0.00	0.04	1.55	27.22	8,095.00	1.00	12,511.58	2,562,640.00
1997	Other	Active	11	1,299.08	0.157%	1.05	1.538%	0.02	0.17	2.14	19.85	8,095.00	1.00	17,287.78	3,491,120.00
1998	Other	Active	4	1,171.67	0.157%	0.75	1.672%	0.01	0.07	1.38	19.59	8,095.00	1.00	11,185.74	960,360.00
1999	Other	Active	5	404.41	0.157%	1.10	1.815%	0.01	0.09	0.70	7.34	8,095.00	1.00	5,622.56	33,000.00
2000	Other	Active	1	32.60	0.157%	1.50	1.959%	0.00	0.02	0.08	0.64	8,095.00	1.00	622.45	803,360.00
2001	Other	Active	4	313.35	0.157%	1.00	2.102%	0.01	0.08	0.49	6.59	8,095.00	1.00	3,988.67	1,688,586.66
2002	Other	Active	6	432.89	0.157%	1.17	2.246%	0.03	0.13	2.88	9.72	8,095.00	1.00	23,333.27	4,537,054.00
2003	Other	Active	3	810.10	0.618%	0.83	2.389%	0.02	0.07	4.17	19.36	8,095.00	1.00	33,774.47	3,605,872.00
2004	Other	Active	9	942.77	0.665%	1.06	2.533%	0.06	0.23	6.62	23.88	8,095.00	1.00	53,597.73	238,600.00
2005	Other	Active	3	74.21	0.713%	1.17	2.676%	0.02	0.08	0.62	1.99	8,095.00	1.00	4,994.55	1,338,300.00
2006	Other	Active	7	713.66	0.760%	1.07	2.820%	0.05	0.20	5.81	20.13	8,095.00	1.00	47,038.35	1,056,480.00
2007	Other	Active	5	367.37	0.807%	1.10	2.964%	0.04	0.15	3.26	10.89	8,095.00	1.00	26,406.94	1,650,520.00
2008	Other	Active	9	603.61	0.855%	1.28	3.107%	0.08	0.28	6.59	18.75	8,095.00	1.00	53,353.64	468,600.00
2009	Other	Active	7	272.19	0.902%	1.21	4.163%	0.06	0.29	2.98	11.33	8,095.00	1.00	24,129.21	4,295,120.00
2010	Other	Active	10	923.53	0.794%	1.20	4.675%	0.08	0.65	8.79	59.80	8,095.00	1.00	71,193.92	491,500.00
2011	Other	Active	4	383.01	0.684%	1.00	8.787%	0.03	0.35	2.62	33.66	8,095.00	1.00	21,194.08	146,500.00
2012	Other	Active	10	134.61	0.574%	1.50	11.099%	0.06	1.11	1.16	14.94	8,095.00	1.00	9,374.99	3,844,980.00
2013	Other	Active	20	1,679.00	0.464%	1.10	13.411%	0.09	2.68	8.56	225.17	8,095.00	1.00	69,305.29	659,352.25
2014	Other	Active	10	201.21	0.354%	1.40	15.723%	0.04	1.57	1.00	31.64	8,095.00	1.00	8,062.08	1,201,580.00
2015	Other	Active	11	429.51	0.244%	1.23	21.792%	0.03	2.40	1.28	99.60	8,095.00	1.00	10,992.19	6,558,600.00
2016	Other	Active	9	162.86	0.134%	1.28	17.154%	0.01	1.54	0.28	27.94	8,095.00	1.00	2,249.47	262,620.00
2017	Other	Active	17	142.24	0.024%	1.44	12.515%	0.00	2.13	0.05	17.80	8,095.00	1.00	390.40	149,500.00
2018	Other	Active	42	256.03	0.000%	1.50	7.876%	-	3.31	-	20.17	8,095.00	1.00	-	151,500.00
2019	Other	Active	61	256.31	0.000%	1.50	3.238%	-	1.97	-	8.30	8,095.00	1.00	-	197,260.00

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Permit Issue Year	Mine Type	Mine Status	Permit Count (4)	Adjustment Factor				Forfeited Permit Count (9)	Released Permit Count (10)	Forfeited Acres (11)	Released Acres (12)	Avg Recl Cost per Acre (13)	Adjustment Factor		Gross Cost (15)	Current Security Amount (16)	Forfeited Security Amount (17)	Net Cost (18)
				Current Bonded Acres (5)	Forfeiture Rate (6)	Permit Bond Size (7)	Release Rate (8)						Permit Status (14)	Permit Status (14)				
1963	Other	Inactive	-	-	0.236%	0.00	2.424%	-	-	-	-	8,095.00	1.00	-	50	-	-	
1964	Other	Inactive	-	-	0.236%	0.00	2.365%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1965	Other	Inactive	-	-	0.236%	-	2.306%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1966	Other	Inactive	-	-	0.236%	-	2.247%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1967	Other	Inactive	-	-	0.236%	-	2.187%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1968	Other	Inactive	-	-	0.236%	-	2.128%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1969	Other	Inactive	-	-	0.236%	-	2.069%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1970	Other	Inactive	-	-	0.236%	-	2.010%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1971	Other	Inactive	-	-	0.236%	-	1.951%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1972	Other	Inactive	-	-	0.236%	-	1.892%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1973	Other	Inactive	-	-	0.236%	-	1.833%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1974	Other	Inactive	-	-	0.236%	-	1.774%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1975	Other	Inactive	-	-	0.236%	-	1.714%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1976	Other	Inactive	1	14.48	0.236%	1.50	1.655%	0.00	0.02	0.05	0.24	8,095.00	1.00	414.71	15,000.00	53.07	361.64	
1977	Other	Inactive	2	61.00	0.236%	1.50	1.596%	0.00	0.03	0.22	0.97	8,095.00	1.00	1,747.07	62,000.00	219.36	1,527.71	
1978	Other	Inactive	-	-	0.236%	-	1.537%	-	-	-	-	8,095.00	1.00	-	-	-	-	
1979	Other	Inactive	1	9.75	0.236%	1.50	1.478%	0.00	0.01	0.03	0.14	8,095.00	1.00	279.24	10,000.00	35.38	243.86	
1980	Other	Inactive	1	114.75	0.236%	0.50	1.419%	0.00	0.01	0.14	1.63	8,095.00	1.00	1,095.50	340,400.00	401.45	694.05	
1981	Other	Inactive	11	1,249.51	0.236%	0.95	1.360%	0.03	0.15	2.81	16.99	8,095.00	1.00	22,773.29	3,551,200.00	7,995.48	14,777.82	
1982	Other	Inactive	2	67.50	0.236%	1.50	1.301%	0.00	0.03	0.24	0.88	8,095.00	1.00	1,933.23	68,000.00	240.59	1,692.65	
1983	Other	Inactive	6	1,314.44	0.236%	0.83	1.241%	0.01	0.07	2.58	16.32	8,095.00	1.00	20,914.57	6,709,953.00	13,188.97	7,725.60	
1984	Other	Inactive	6	319.44	0.236%	1.00	1.182%	0.01	0.07	0.75	3.78	8,095.00	1.00	6,099.28	6,695,522.00	15,792.73	-	
1985	Other	Inactive	6	918.71	0.236%	0.83	1.123%	0.01	0.07	1.81	10.32	8,095.00	1.00	14,617.96	3,391,820.00	6,666.90	7,951.05	
1986	Other	Inactive	1	2.80	0.236%	1.50	1.064%	0.00	0.01	0.01	0.03	8,095.00	1.00	80.19	10,000.00	35.38	44.81	
1987	Other	Inactive	3	834.21	0.236%	0.50	1.005%	0.01	0.03	0.98	8.38	8,095.00	1.00	7,964.07	3,433,360.00	4,049.13	3,914.93	
1988	Other	Inactive	4	181.75	0.236%	1.25	0.946%	0.01	0.04	0.54	1.72	8,095.00	1.00	4,337.84	183,000.00	539.55	3,798.29	
1989	Other	Inactive	1	49.24	0.236%	0.50	0.887%	0.00	0.01	0.06	0.44	8,095.00	1.00	470.09	176,000.00	207.57	262.52	
1990	Other	Inactive	4	528.47	0.236%	1.25	0.828%	0.01	0.03	1.56	4.37	8,095.00	1.00	12,613.04	1,961,360.00	5,782.82	6,830.22	
1991	Other	Inactive	5	414.61	0.236%	1.30	0.769%	0.01	0.02	1.27	1.90	8,095.00	1.00	10,251.36	1,298,480.00	3,981.54	6,309.81	
1992	Other	Inactive	5	417.60	0.236%	1.10	0.557%	0.01	0.03	1.08	2.33	8,095.00	1.00	8,770.87	1,239,200.00	3,215.19	5,555.68	
1993	Other	Inactive	5	787.92	0.236%	0.90	0.656%	0.01	0.03	1.67	5.17	8,095.00	1.00	13,539.86	2,854,375.45	6,059.35	7,480.51	
1994	Other	Inactive	4	545.08	0.236%	1.00	0.755%	0.01	0.03	1.29	4.11	8,095.00	1.00	10,407.58	1,111,360.00	2,621.36	7,786.22	
1995	Other	Inactive	4	915.43	0.236%	1.00	0.853%	0.01	0.03	2.16	7.81	8,095.00	1.00	17,478.92	3,222,200.00	7,600.20	9,878.72	
1996	Other	Inactive	1	130.14	0.236%	0.50	0.952%	0.00	0.01	0.15	1.24	8,095.00	1.00	1,242.43	508,280.00	599.44	642.99	
1997	Other	Inactive	3	158.04	0.236%	0.83	1.051%	0.01	0.03	0.31	1.66	8,095.00	1.00	2,514.64	338,000.00	664.37	1,850.27	
1998	Other	Inactive	1	89.20	0.236%	1.50	1.149%	0.00	0.01	0.32	1.03	8,095.00	1.00	2,554.73	90,000.00	318.42	2,236.31	
1999	Other	Inactive	-	-	0.236%	-	1.248%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2000	Other	Inactive	2	339.23	0.236%	0.50	1.347%	0.00	0.03	0.40	4.57	8,095.00	1.00	3,238.57	1,044,680.00	1,232.04	2,006.53	
2001	Other	Inactive	2	284.00	0.236%	1.00	1.445%	0.00	0.03	0.67	4.10	8,095.00	1.00	5,422.60	284,000.00	669.87	4,752.73	
2002	Other	Inactive	2	184.32	0.856%	1.00	1.544%	0.02	0.03	1.58	2.85	8,095.00	1.00	12,773.65	682,700.00	5,844.61	6,929.04	
2003	Other	Inactive	3	98.29	0.927%	1.50	1.643%	0.03	0.05	1.37	1.61	8,095.00	1.00	11,064.28	104,000.00	1,446.21	9,618.07	
2004	Other	Inactive	-	-	0.998%	-	1.741%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2005	Other	Inactive	-	-	1.069%	-	1.840%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2006	Other	Inactive	-	-	1.140%	-	1.939%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2007	Other	Inactive	1	26.00	1.211%	1.50	2.037%	0.01	0.02	0.47	0.53	8,095.00	1.00	3,822.77	26,000.00	472.24	3,350.53	
2008	Other	Inactive	1	4.11	1.282%	1.50	2.136%	0.01	0.02	0.08	0.09	8,095.00	1.00	639.70	10,000.00	192.27	447.43	
2009	Other	Inactive	-	-	1.353%	-	2.262%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2010	Other	Inactive	1	133.81	1.190%	0.50	4.452%	0.01	0.04	0.80	5.96	8,095.00	1.00	6,447.04	134,000.00	797.55	5,649.49	
2011	Other	Inactive	1	15.10	1.025%	1.50	6.041%	0.01	0.06	0.23	0.91	8,095.00	1.00	1,880.03	16,000.00	246.09	1,633.94	
2012	Other	Inactive	1	66.26	0.860%	0.50	7.631%	0.01	0.08	0.29	5.06	8,095.00	1.00	2,307.36	230,480.00	991.47	1,315.89	
2013	Other	Inactive	1	57.00	0.695%	1.50	9.220%	0.01	0.09	0.59	5.26	8,095.00	1.00	4,812.61	57,000.00	594.52	4,218.09	
2014	Other	Inactive	-	-	0.530%	-	10.810%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2015	Other	Inactive	-	-	0.365%	-	14.582%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2016	Other	Inactive	-	-	0.200%	-	11.793%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2017	Other	Inactive	-	-	0.035%	-	8.604%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2018	Other	Inactive	-	-	0.000%	-	5.415%	-	-	-	-	8,095.00	1.00	-	-	-	-	
2019	Other	Inactive	-	-	0.000%	-	2.226%	-	-	-	-	8,095.00	1.00	-	-	-	-	



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Permit Issue Year	Mine Type	Mine Status	Permit Count (4)	Current				Adjustment				Avg Recl Cost per Acre (13)	Adjustment				
				Bonded Acres (5)	Forfeiture Rate (6)	Permit Bond Size (7)	Release Rate (8)	Forfeited Permit Count (9)	Released Permit Count (10)	Forfeited Acres (11)	Released Acres (12)		Permit Status (14)	Gross Cost (15)	Current Security Amount (16)	Forfeited Security Amount (17)	Net Cost (18)
1963	Other	Phased Released	-	-	0.943%	0.00	11.018%	-	-	-	-	8,095.00	0.50	-	-	-	-
1964	Other	Phased Released	-	-	0.943%	0.00	10.749%	-	-	-	-	8,095.00	0.50	-	-	-	-
1965	Other	Phased Released	-	-	0.943%	0.00	10.480%	-	-	-	-	8,095.00	0.50	-	-	-	-
1966	Other	Phased Released	-	-	0.943%	0.00	10.212%	-	-	-	-	8,095.00	0.50	-	-	-	-
1967	Other	Phased Released	-	-	0.943%	0.00	9.943%	-	-	-	-	8,095.00	0.50	-	-	-	-
1968	Other	Phased Released	-	-	0.943%	0.00	9.674%	-	-	-	-	8,095.00	0.50	-	-	-	-
1969	Other	Phased Released	-	-	0.943%	0.00	9.405%	-	-	-	-	8,095.00	0.50	-	-	-	-
1970	Other	Phased Released	-	-	0.943%	0.00	9.137%	-	-	-	-	8,095.00	0.50	-	-	-	-
1971	Other	Phased Released	-	-	0.943%	0.00	8.868%	-	-	-	-	8,095.00	0.50	-	-	-	-
1972	Other	Phased Released	-	-	0.943%	0.00	8.599%	-	-	-	-	8,095.00	0.50	-	-	-	-
1973	Other	Phased Released	1	9.00	0.943%	1.50	8.330%	0.01	0.08	0.13	0.75	8,095.00	0.50	515.53	10,000.00	141.52	374.01
1974	Other	Phased Released	-	-	0.943%	0.00	8.062%	-	-	-	-	8,095.00	0.50	-	-	-	-
1975	Other	Phased Released	-	-	0.943%	0.00	7.793%	-	-	-	-	8,095.00	0.50	-	-	-	-
1976	Other	Phased Released	2	27.88	0.943%	1.50	7.524%	0.02	0.15	0.39	2.10	8,095.00	0.50	1,596.99	10,000.00	141.52	1,455.47
1977	Other	Phased Released	-	-	0.943%	0.00	7.255%	-	-	-	-	8,095.00	0.50	-	-	-	-
1978	Other	Phased Released	-	-	0.943%	0.00	6.987%	-	-	-	-	8,095.00	0.50	-	-	-	-
1979	Other	Phased Released	3	68.69	0.943%	1.50	6.718%	0.03	0.20	0.97	4.61	8,095.00	0.50	3,934.63	58,000.00	820.83	3,113.81
1980	Other	Phased Released	1	7.91	0.943%	1.50	6.449%	0.01	0.06	0.11	0.51	8,095.00	0.50	453.09	10,000.00	141.52	311.57
1981	Other	Phased Released	4	475.54	0.943%	1.25	6.180%	0.04	0.25	5.61	29.39	8,095.00	0.50	22,699.51	204,860.00	2,416.02	20,283.50
1982	Other	Phased Released	3	205.26	0.943%	1.50	5.912%	0.03	0.18	2.90	12.13	8,095.00	0.50	11,757.50	69,200.00	979.33	10,778.17
1983	Other	Phased Released	2	106.90	0.943%	1.00	5.643%	0.02	0.11	1.01	6.03	8,095.00	0.50	4,082.23	141,200.00	1,332.19	2,750.03
1984	Other	Phased Released	5	108.69	0.943%	1.50	5.374%	0.05	0.27	1.54	5.84	8,095.00	0.50	6,225.87	84,200.00	1,191.62	5,034.26
1985	Other	Phased Released	1	43.00	0.943%	1.50	5.105%	0.01	0.05	0.61	2.20	8,095.00	0.50	2,463.08	17,200.00	243.42	2,219.67
1986	Other	Phased Released	1	38.00	0.943%	1.50	4.837%	0.01	0.05	0.54	1.84	8,095.00	0.50	2,176.68	10,000.00	141.52	2,035.16
1987	Other	Phased Released	2	100.95	0.943%	1.50	4.568%	0.02	0.09	1.43	4.61	8,095.00	0.50	5,782.52	52,300.00	740.16	5,042.36
1988	Other	Phased Released	-	-	0.943%	0.00	4.299%	-	-	-	-	8,095.00	0.50	-	-	-	-
1989	Other	Phased Released	2	-	0.943%	1.50	4.030%	0.02	0.08	-	-	8,095.00	0.50	-	-	-	-
1990	Other	Phased Released	-	-	0.943%	0.00	3.762%	-	-	-	-	8,095.00	0.50	-	-	-	-
1991	Other	Phased Released	-	-	0.943%	0.00	3.493%	-	-	-	-	8,095.00	0.50	-	-	-	-
1992	Other	Phased Released	-	-	0.943%	0.00	3.224%	-	-	-	-	8,095.00	0.50	-	-	-	-
1993	Other	Phased Released	-	-	0.943%	0.00	2.955%	-	-	-	-	8,095.00	0.50	-	-	-	-
1994	Other	Phased Released	-	-	0.943%	0.00	2.686%	-	-	-	-	8,095.00	0.50	-	-	-	-
1995	Other	Phased Released	-	-	0.943%	0.00	2.417%	-	-	-	-	8,095.00	0.50	-	-	-	-
1996	Other	Phased Released	-	-	0.943%	0.00	2.148%	-	-	-	-	8,095.00	0.50	-	-	-	-
1997	Other	Phased Released	-	-	0.943%	0.00	1.879%	-	-	-	-	8,095.00	0.50	-	-	-	-
1998	Other	Phased Released	-	-	0.943%	0.00	1.610%	-	-	-	-	8,095.00	0.50	-	-	-	-
1999	Other	Phased Released	1	179.00	0.943%	0.50	1.341%	0.01	0.06	0.84	10.15	8,095.00	0.50	3,417.77	249,600.00	1,177.46	2,240.30
2000	Other	Phased Released	-	-	0.943%	0.00	1.072%	-	-	-	-	8,095.00	0.50	-	-	-	-
2001	Other	Phased Released	-	-	0.943%	0.00	0.803%	-	-	-	-	8,095.00	0.50	-	-	-	-
2002	Other	Phased Released	-	-	0.943%	0.00	0.534%	-	-	-	-	8,095.00	0.50	-	-	-	-
2003	Other	Phased Released	-	-	0.943%	0.00	0.265%	-	-	-	-	8,095.00	0.50	-	-	-	-
2004	Other	Phased Released	-	-	0.943%	0.00	0.000%	-	-	-	-	8,095.00	0.50	-	-	-	-
2005	Other	Phased Released	-	-	4.276%	0.00	8.364%	-	-	-	-	8,095.00	0.50	-	-	-	-
2006	Other	Phased Released	-	-	4.560%	0.00	8.812%	-	-	-	-	8,095.00	0.50	-	-	-	-
2007	Other	Phased Released	-	-	4.843%	0.00	9.261%	-	-	-	-	8,095.00	0.50	-	-	-	-
2008	Other	Phased Released	-	-	5.127%	0.00	9.710%	-	-	-	-	8,095.00	0.50	-	-	-	-
2009	Other	Phased Released	-	-	5.411%	0.00	13.009%	-	-	-	-	8,095.00	0.50	-	-	-	-
2010	Other	Phased Released	-	-	4.762%	0.00	20.234%	-	-	-	-	8,095.00	0.50	-	-	-	-
2011	Other	Phased Released	-	-	4.101%	0.00	27.459%	-	-	-	-	8,095.00	0.50	-	-	-	-
2012	Other	Phased Released	-	-	3.441%	0.00	34.685%	-	-	-	-	8,095.00	0.50	-	-	-	-
2013	Other	Phased Released	-	-	2.781%	0.00	41.910%	-	-	-	-	8,095.00	0.50	-	-	-	-
2014	Other	Phased Released	-	-	2.121%	0.00	49.135%	-	-	-	-	8,095.00	0.50	-	-	-	-
2015	Other	Phased Released	-	-	1.461%	0.00	68.102%	-	-	-	-	8,095.00	0.50	-	-	-	-
2016	Other	Phased Released	-	-	0.801%	0.00	53.606%	-	-	-	-	8,095.00	0.50	-	-	-	-
2017	Other	Phased Released	-	-	0.141%	0.00	39.110%	-	-	-	-	8,095.00	0.50	-	-	-	-
2018	Other	Phased Released	-	-	0.000%	0.00	24.614%	-	-	-	-	8,095.00	0.50	-	-	-	-
2019	Other	Phased Released	-	-	0.000%	0.00	10.118%	-	-	-	-	8,095.00	0.50	-	-	-	-



















2021

Permit Issue Year	Mine Type	Mine Status	Permit Count	Adjustment													Gross Cost	Adjustment Current Security Amount	Forfeited Security Amount	Net Cost	Adjusted Permit Count
				Current Bonded Acres	Adjusted Permit Count	Adjusted Acres	Forfeiture Rate	Permit Bond Size	Release Rate	Forfeited Permit Count	Released Permit Count	Forfeited Acres	Released Acres	Avg recl Cost per Acre	Permit Status						
(1)	(2)	(3)	(4)	(5)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	
1963	Other	Phased Released	-	-	-	-	0.94%	-	11.02%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1964	Other	Phased Released	-	-	-	-	0.94%	-	11.02%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1965	Other	Phased Released	-	-	-	-	0.94%	-	10.75%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1966	Other	Phased Released	-	-	-	-	0.94%	-	10.48%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1967	Other	Phased Released	-	-	-	-	0.94%	-	10.21%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1968	Other	Phased Released	-	-	-	-	0.94%	-	9.94%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1969	Other	Phased Released	-	-	-	-	0.94%	-	9.67%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1970	Other	Phased Released	-	-	-	-	0.94%	-	9.41%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1971	Other	Phased Released	-	-	-	-	0.94%	-	9.14%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1972	Other	Phased Released	-	-	-	-	0.94%	-	8.87%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1973	Other	Phased Released	1	9.00	0.91	8.12	0.94%	1.50	8.60%	0.01	0.08	0.11	0.70	8,095.00	0.5	465.29	9,858.48	139,5191	325.77	0.82	
1974	Other	Phased Released	-	-	-	-	0.94%	-	8.33%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1975	Other	Phased Released	-	-	-	-	0.94%	-	8.06%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1976	Other	Phased Released	2	27.88	1.83	25.39	0.94%	1.50	7.79%	0.02	0.14	0.36	1.98	8,095.00	0.5	1,454.23	9,858.48	139,5191	1,314.72	1.67	
1977	Other	Phased Released	-	-	-	-	0.94%	-	7.52%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1978	Other	Phased Released	-	-	-	-	0.94%	-	7.26%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1979	Other	Phased Released	3	68.69	2.77	63.10	0.94%	1.50	6.99%	0.03	0.19	0.89	4.41	8,095.00	0.5	3,614.63	57,179.17	809,211	2,805.42	2.55	
1980	Other	Phased Released	1	7.91	0.93	7.29	0.94%	1.50	6.72%	0.01	0.06	0.10	0.49	8,095.00	0.5	417.46	9,858.48	139,5191	277.94	0.86	
1981	Other	Phased Released	4	475.54	3.72	440.54	0.94%	1.25	6.45%	0.04	0.24	5.20	28.41	8,095.00	0.5	21,028.90	202,443.98	2387,523	18,641.38	3.44	
1982	Other	Phased Released	3	205.26	2.79	190.22	0.94%	1.50	6.18%	0.03	0.17	2.69	11.76	8,095.00	0.5	10,896.05	68,220.67	965,4724	9,930.58	2.60	
1983	Other	Phased Released	2	106.90	1.87	99.86	0.94%	1.00	5.91%	0.02	0.11	0.94	5.90	8,095.00	0.5	3,813.36	139,867.81	1319,625	2,493.73	1.74	
1984	Other	Phased Released	5	108.69	4.68	101.31	0.94%	1.50	5.64%	0.04	0.26	1.43	5.72	8,095.00	0.5	5,803.18	83,008.38	1174,751	4,628.43	4.38	
1985	Other	Phased Released	1	43.00	0.94	40.20	0.94%	1.50	5.37%	0.01	0.05	0.57	2.16	8,095.00	0.5	2,302.48	16,956.58	239,9729	2,062.50	0.88	
1986	Other	Phased Released	1	38.00	0.94	35.62	0.94%	1.50	5.11%	0.01	0.05	0.50	1.82	8,095.00	0.5	2,040.60	9,858.48	139,5191	1,901.08	0.89	
1987	Other	Phased Released	2	100.95	1.89	94.91	0.94%	1.50	4.84%	0.02	0.09	1.34	4.59	8,095.00	0.5	5,436.55	51,559.84	729,6851	4,706.86	1.78	
1988	Other	Phased Released	-	-	-	-	0.94%	-	4.57%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1989	Other	Phased Released	2	-	1.90	-	0.94%	1.50	4.30%	0.02	0.08	-	-	-	8,095.00	0.5	-	0	-	1.80	
1990	Other	Phased Released	-	-	-	-	0.94%	-	4.03%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1991	Other	Phased Released	-	-	-	-	0.94%	-	3.76%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1992	Other	Phased Released	-	-	-	-	0.94%	-	2.08%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1993	Other	Phased Released	-	-	-	-	0.94%	-	2.53%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1994	Other	Phased Released	-	-	-	-	0.94%	-	2.98%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1995	Other	Phased Released	-	-	-	-	0.94%	-	3.43%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1996	Other	Phased Released	-	-	-	-	0.94%	-	3.88%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1997	Other	Phased Released	-	-	-	-	0.94%	-	4.33%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1998	Other	Phased Released	-	-	-	-	0.94%	-	4.78%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
1999	Other	Phased Released	1	179.00	0.93	168.00	0.94%	0.50	5.22%	0.01	0.05	0.79	8.78	8,095.00	0.5	3,207.76	248,422.54	1171,908	2,035.85	0.88	
2000	Other	Phased Released	-	-	-	-	0.94%	-	5.67%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2001	Other	Phased Released	-	-	-	-	0.94%	-	6.12%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2002	Other	Phased Released	-	-	-	-	0.94%	-	6.57%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2003	Other	Phased Released	-	-	-	-	0.94%	-	7.02%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2004	Other	Phased Released	-	-	-	-	0.94%	-	7.47%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2005	Other	Phased Released	-	-	-	-	0.94%	-	7.92%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2006	Other	Phased Released	-	-	-	-	0.94%	-	8.36%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2007	Other	Phased Released	-	-	-	-	0.94%	-	8.81%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2008	Other	Phased Released	-	-	-	-	0.94%	-	9.26%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2009	Other	Phased Released	-	-	-	-	0.94%	-	9.71%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2010	Other	Phased Released	-	-	-	-	0.94%	-	13.01%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2011	Other	Phased Released	-	-	-	-	0.94%	-	20.23%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2012	Other	Phased Released	-	-	-	-	0.94%	-	27.46%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2013	Other	Phased Released	-	-	-	-	0.94%	-	34.68%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2014	Other	Phased Released	-	-	-	-	0.94%	-	41.91%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2015	Other	Phased Released	-	-	-	-	0.94%	-	49.13%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2016	Other	Phased Released	-	-	-	-	0.94%	-	68.10%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2017	Other	Phased Released	-	-	-	-	0.94%	-	53.61%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2018	Other	Phased Released	-	-	-	-	0.94%	-	39.11%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	
2019	Other	Phased Released	-	-	-	-	0.94%	-	24.61%	-	-	-	-	-	8,095.00	0.5	-	0	-	-	

West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Water Capital Cost Projection - Deterministic Model  
 Water Capital Total - All Mine Types

Fiscal Year Ending 6/30	Gross Liability				Gross Liability - Three Year Delay			
	(1) Active	(2) Inactive	(3) Phase Released	(4) Total	(5) Active	(6) Inactive	(7) Phase Released	(8) Total
2020	2,364,518	433,431	722,460	3,520,408	0	0	0	0
2021	2,267,439	412,587	640,801	3,320,827	0	0	0	0
2022	2,149,314	393,986	568,324	3,111,624	0	0	0	0
2023	2,027,994	382,568	504,263	2,914,825	1,182,259	216,715	361,230	1,760,204
2024	1,936,721	370,916	447,478	2,755,115	2,315,978	423,009	681,630	3,420,617
2025	1,818,754	358,512	397,146	2,574,413	2,208,376	403,286	604,563	3,216,225
2026	1,716,534	345,041	352,444	2,414,018	2,088,654	388,277	536,294	3,013,224
2027	1,609,590	333,295	312,643	2,255,527	2,950,719	562,200	699,609	4,212,528
2028	1,519,237	322,120	277,160	2,118,518	1,818,754	358,512	397,146	2,574,413
2029	1,418,005	308,958	245,470	1,972,433	1,716,534	345,041	352,444	2,414,018
2030	1,338,187	298,090	217,071	1,853,349	1,609,590	333,295	312,643	2,255,527
2031	1,265,506	287,259	191,595	1,744,361	1,519,237	322,120	277,160	2,118,518
2032	1,173,799	275,786	168,840	1,618,425	1,418,005	308,958	245,470	1,972,433
2033	1,111,593	266,849	148,398	1,526,840	1,338,187	298,090	217,071	1,853,349
2034	1,050,777	258,197	130,381	1,439,355	1,265,506	287,259	191,595	1,744,361
2035	996,465	249,731	114,127	1,360,323	1,173,799	275,786	168,840	1,618,425
2036	945,016	241,444	99,807	1,286,267	1,111,593	266,849	148,398	1,526,840
2037	894,903	233,329	87,044	1,215,277	1,050,777	258,197	130,381	1,439,355
2038	847,146	225,376	75,870	1,148,392	996,465	249,731	114,127	1,360,323
2039	804,067	217,598	66,430	1,088,095	945,016	241,444	99,807	1,286,267

Notes: Cols (1) - (3) from Exhibit E-99, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Cols (5) - (8) based on (1) - (4) with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Water Capital Cost Projection - Deterministic Model  
 Surface Mines

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Gross Liability				Gross Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	1,352,835	154,164	577,787	2,084,787	0	0	0	0
2021	1,297,124	147,488	510,238	1,954,850	0	0	0	0
2022	1,231,657	140,955	450,433	1,823,045	0	0	0	0
2023	1,168,329	134,598	397,731	1,700,658	676,418	77,082	288,893	1,042,393
2024	1,107,157	128,362	351,133	1,586,652	1,324,980	150,826	544,012	2,019,818
2025	1,048,047	122,302	309,953	1,480,302	1,264,391	144,222	480,335	1,888,948
2026	990,874	116,428	273,486	1,380,788	1,199,993	137,777	424,082	1,761,852
2027	935,863	110,705	241,107	1,287,676	1,691,321	195,661	549,999	2,436,981
2028	883,014	105,181	212,323	1,200,518	1,048,047	122,302	309,953	1,480,302
2029	832,393	99,859	186,678	1,118,931	990,874	116,428	273,486	1,380,788
2030	784,114	94,730	163,774	1,042,618	935,863	110,705	241,107	1,287,676
2031	737,855	89,784	143,269	970,908	883,014	105,181	212,323	1,200,518
2032	693,644	85,011	125,012	903,668	832,393	99,859	186,678	1,118,931
2033	651,435	80,403	108,642	840,480	784,114	94,730	163,774	1,042,618
2034	611,106	76,035	94,312	781,454	737,855	89,784	143,269	970,908
2035	572,858	71,814	81,394	726,066	693,644	85,011	125,012	903,668
2036	536,549	67,732	70,082	674,363	651,435	80,403	108,642	840,480
2037	501,830	63,782	60,016	625,629	611,106	76,035	94,312	781,454
2038	468,684	59,958	51,246	579,888	572,858	71,814	81,394	726,066
2039	437,265	56,251	43,951	537,467	536,549	67,732	70,082	674,363

Notes: Cols (1) - (3) from Exhibit E-99, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Cols (5) - (8) based on (1) - (4) with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
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 Water Capital Cost Projection - Deterministic Model  
 Underground Mines

Fiscal Year <u>Ending 6/30</u>	<u>Gross Liability</u>				<u>Gross Liability - Three Year Delay</u>			
	<u>Active</u>	<u>Inactive</u>	<u>Phase Released</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Phase Released</u>	<u>Total</u>
2020	233,895	64,717	79,567	378,180	0	0	0	0
2021	223,996	62,180	70,083	356,259	0	0	0	0
2022	213,626	59,721	61,843	335,190	0	0	0	0
2023	203,687	57,335	54,718	315,740	116,948	32,359	39,784	189,090
2024	194,194	55,028	48,559	297,780	228,946	63,449	74,825	367,219
2025	185,149	52,795	43,227	281,171	218,811	60,951	65,963	345,725
2026	176,534	50,638	38,599	265,771	208,657	58,528	58,281	325,465
2027	168,327	48,560	34,573	251,459	296,037	83,695	75,918	455,651
2028	160,521	46,559	31,057	238,137	185,149	52,795	43,227	281,171
2029	153,094	44,636	27,986	225,715	176,534	50,638	38,599	265,771
2030	146,030	42,786	25,307	214,123	168,327	48,560	34,573	251,459
2031	139,311	41,014	22,962	203,287	160,521	46,559	31,057	238,137
2032	132,918	39,322	20,905	193,145	153,094	44,636	27,986	225,715
2033	126,833	37,705	19,093	183,632	146,030	42,786	25,307	214,123
2034	121,040	36,174	17,494	174,708	139,311	41,014	22,962	203,287
2035	115,538	34,710	16,078	166,325	132,918	39,322	20,905	193,145
2036	110,320	33,309	14,830	158,459	126,833	37,705	19,093	183,632
2037	105,481	31,969	13,741	151,192	121,040	36,174	17,494	174,708
2038	100,908	30,685	12,801	144,393	115,538	34,710	16,078	166,325
2039	96,711	29,472	11,985	138,168	110,320	33,309	14,830	158,459

Notes: Cols (1) - (3) from Exhibit E-99, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Cols (5) - (8) based on (1) - (4) with a three-year delay

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 Other

Fiscal Year Ending 6/30	(1) (2) (3) (4) Gross Liability				(5) (6) (7) (8) Gross Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	777,787	214,549	65,105	1,057,442	0	0	0	0
2021	746,318	202,919	60,480	1,009,717	0	0	0	0
2022	704,032	193,309	56,048	953,388	0	0	0	0
2023	655,978	190,635	51,814	898,427	388,894	107,275	32,553	528,721
2024	635,371	187,526	47,785	870,683	762,053	208,734	62,793	1,033,579
2025	585,558	183,416	43,966	812,940	725,175	198,114	58,264	981,553
2026	549,126	177,974	40,358	767,459	680,005	191,972	53,931	925,907
2027	505,400	174,030	36,963	716,393	963,360	282,844	73,692	1,319,896
2028	475,703	170,380	33,780	679,862	585,558	183,416	43,966	812,940
2029	432,518	164,462	30,806	627,787	549,126	177,974	40,358	767,459
2030	408,043	160,573	27,990	596,607	505,400	174,030	36,963	716,393
2031	388,340	156,461	25,364	570,165	475,703	170,380	33,780	679,862
2032	347,237	151,453	22,923	521,613	432,518	164,462	30,806	627,787
2033	333,325	148,740	20,662	502,727	408,043	160,573	27,990	596,607
2034	318,631	145,988	18,575	483,193	388,340	156,461	25,364	570,165
2035	308,069	143,207	16,655	467,932	347,237	151,453	22,923	521,613
2036	298,147	140,403	14,895	453,445	333,325	148,740	20,662	502,727
2037	287,592	137,578	13,287	438,456	318,631	145,988	18,575	483,193
2038	277,555	134,733	11,823	424,111	308,069	143,207	16,655	467,932
2039	270,091	131,875	10,495	412,461	298,147	140,403	14,895	453,445

Notes: Cols (1) - (3) from Exhibit E-99, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Cols (5) - (8) based on (1) - (4) with a three-year delay

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Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	2020						Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
				Forfeiture Rate	Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Adjustment Factor			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Surface	Active	-	0.011%	0.00	0.881%	-	-	3,490.00	1.00	-	
1964	Surface	Active	-	0.019%	0.00	0.928%	-	-	3,490.00	1.00	-	
1965	Surface	Active	-	0.028%	0.00	0.975%	-	-	3,490.00	1.00	-	
1966	Surface	Active	-	0.036%	0.00	1.021%	-	-	3,490.00	1.00	-	
1967	Surface	Active	-	0.044%	0.00	1.068%	-	-	3,490.00	1.00	-	
1968	Surface	Active	-	0.052%	0.00	1.115%	-	-	3,490.00	1.00	-	
1969	Surface	Active	-	0.061%	0.00	1.162%	-	-	3,490.00	1.00	-	
1970	Surface	Active	-	0.069%	0.00	1.208%	-	-	3,490.00	1.00	-	
1971	Surface	Active	-	0.077%	0.00	1.255%	-	-	3,490.00	1.00	-	
1972	Surface	Active	400.00	0.085%	1.50	1.302%	0.51	5.21	3,490.00	1.00	1,789.07	
1973	Surface	Active	-	0.094%	0.00	1.349%	-	-	3,490.00	1.00	-	
1974	Surface	Active	-	0.102%	0.00	1.395%	-	-	3,490.00	1.00	-	
1975	Surface	Active	-	0.110%	0.00	1.442%	-	-	3,490.00	1.00	-	
1976	Surface	Active	-	0.118%	0.00	1.489%	-	-	3,490.00	1.00	-	
1977	Surface	Active	1,973.04	0.127%	0.67	1.536%	1.67	30.30	3,490.00	1.00	5,814.85	
1978	Surface	Active	2,430.48	0.135%	0.50	1.582%	1.64	38.46	3,490.00	1.00	5,721.98	
1979	Surface	Active	180.00	0.143%	1.00	1.629%	0.26	2.93	3,490.00	1.00	899.33	
1980	Surface	Active	1,036.66	0.151%	0.50	1.676%	0.78	17.37	3,490.00	1.00	2,738.90	
1981	Surface	Active	2,056.10	0.160%	0.80	1.723%	2.63	35.42	3,490.00	1.00	9,165.07	
1982	Surface	Active	807.96	0.168%	0.83	1.769%	1.13	14.30	3,490.00	1.00	3,945.31	
1983	Surface	Active	1,911.88	0.176%	0.50	1.816%	1.68	34.72	3,490.00	1.00	5,876.60	
1984	Surface	Active	380.49	0.184%	0.50	1.863%	0.35	7.09	3,490.00	1.00	1,224.27	
1985	Surface	Active	3,048.91	0.193%	0.67	1.910%	3.92	58.22	3,490.00	1.00	13,665.28	
1986	Surface	Active	2,331.92	0.201%	0.93	1.956%	4.35	45.62	3,490.00	1.00	15,180.91	
1987	Surface	Active	1,136.12	0.209%	0.83	2.003%	1.98	22.76	3,490.00	1.00	6,910.08	
1988	Surface	Active	1,898.10	0.217%	0.88	2.050%	3.61	38.91	3,490.00	1.00	12,599.77	
1989	Surface	Active	2,524.74	0.226%	0.64	2.097%	3.66	52.93	3,490.00	1.00	12,780.17	
1990	Surface	Active	2,764.18	0.234%	0.77	2.143%	5.00	59.25	3,490.00	1.00	17,433.62	
1991	Surface	Active	2,039.50	0.242%	0.83	2.190%	4.11	44.67	3,490.00	1.00	14,361.07	
1992	Surface	Active	5,324.50	0.250%	0.50	2.237%	6.67	119.10	3,490.00	1.00	23,261.53	
1993	Surface	Active	4,234.80	0.259%	0.83	2.284%	9.13	96.71	3,490.00	1.00	31,850.40	
1994	Surface	Active	2,051.59	0.267%	0.50	2.330%	2.74	47.81	3,490.00	1.00	9,553.35	
1995	Surface	Active	6,823.51	0.275%	0.90	2.377%	16.89	162.21	3,490.00	1.00	58,960.71	
1996	Surface	Active	4,574.89	0.283%	0.90	2.424%	11.67	110.89	3,490.00	1.00	40,715.73	
1997	Surface	Active	14,023.76	0.292%	0.75	2.471%	30.67	346.48	3,490.00	1.00	107,034.44	
1998	Surface	Active	10,267.14	0.300%	0.61	2.517%	18.63	258.47	3,490.00	1.00	65,028.36	
1999	Surface	Active	2,042.00	0.308%	0.67	2.564%	4.19	52.36	3,490.00	1.00	14,637.14	
2000	Surface	Active	4,526.19	0.316%	0.50	2.611%	7.16	118.17	3,490.00	1.00	24,984.23	
2001	Surface	Active	8,365.95	0.325%	0.70	2.658%	19.01	222.34	3,490.00	1.00	66,336.51	
2002	Surface	Active	5,939.08	0.333%	0.63	2.704%	12.52	160.62	3,490.00	1.00	43,690.46	
2003	Surface	Active	9,153.56	0.341%	0.72	2.751%	22.55	251.83	3,490.00	1.00	78,691.00	
2004	Surface	Active	12,208.29	0.349%	0.75	2.798%	31.98	341.58	3,490.00	1.00	111,623.45	
2005	Surface	Active	5,344.96	0.358%	0.83	2.845%	15.93	152.05	3,490.00	1.00	55,582.19	
2006	Surface	Active	3,906.10	0.366%	0.86	2.891%	12.34	112.94	3,490.00	1.00	43,067.41	
2007	Surface	Active	5,222.12	0.374%	0.79	2.938%	15.46	153.43	3,490.00	1.00	53,969.07	
2008	Surface	Active	5,368.62	0.382%	0.56	2.985%	11.47	160.25	3,490.00	1.00	40,027.94	
2009	Surface	Active	5,218.95	0.391%	0.75	2.110%	15.29	110.10	3,490.00	1.00	53,350.48	
2010	Surface	Active	2,480.78	0.399%	0.88	1.860%	8.75	46.14	3,490.00	1.00	30,542.96	
2011	Surface	Active	2,143.55	0.407%	0.79	1.610%	6.86	34.51	3,490.00	1.00	23,925.18	
2012	Surface	Active	3,191.42	0.415%	0.82	1.360%	10.84	43.40	3,490.00	1.00	37,844.36	
2013	Surface	Active	5,238.48	0.424%	0.86	1.110%	19.16	58.15	3,490.00	1.00	66,871.75	
2014	Surface	Active	3,650.67	0.432%	0.72	0.860%	11.38	31.40	3,490.00	1.00	39,730.53	
2015	Surface	Active	3,527.20	0.440%	0.71	0.610%	11.09	21.52	3,490.00	1.00	38,690.02	
2016	Surface	Active	2,150.64	0.448%	0.60	0.360%	5.78	7.75	3,490.00	1.00	20,187.35	
2017	Surface	Active	826.69	0.457%	1.00	0.110%	3.77	0.91	3,490.00	1.00	13,171.03	
2018	Surface	Active	2,175.19	0.465%	0.83	0.096%	8.42	2.10	3,490.00	1.00	29,401.37	
2019	Surface	Active	849.88	0.000%	0.83	0.082%	-	0.70	3,490.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded	Forfeiture Rate	Adjustment Factor		Released	Forfeited	Released			
			Acres (4)	Rate (5)	Bond Size (6)	Rate (7)	Acres (8)	Acres (9)	Acres (10)			
1963	Surface	Inactive	-	0.017%	0.00	0.606%	-	-	3,490.00	1.00	-	
1964	Surface	Inactive	-	0.029%	0.00	0.638%	-	-	3,490.00	1.00	-	
1965	Surface	Inactive	-	0.042%	0.00	0.670%	-	-	3,490.00	1.00	-	
1966	Surface	Inactive	-	0.054%	0.00	0.702%	-	-	3,490.00	1.00	-	
1967	Surface	Inactive	-	0.066%	0.00	0.734%	-	-	3,490.00	1.00	-	
1968	Surface	Inactive	-	0.079%	0.00	0.766%	-	-	3,490.00	1.00	-	
1969	Surface	Inactive	-	0.091%	0.00	0.799%	-	-	3,490.00	1.00	-	
1970	Surface	Inactive	-	0.103%	0.00	0.831%	-	-	3,490.00	1.00	-	
1971	Surface	Inactive	-	0.116%	0.00	0.863%	-	-	3,490.00	1.00	-	
1972	Surface	Inactive	-	0.128%	0.00	0.895%	-	-	3,490.00	1.00	-	
1973	Surface	Inactive	-	0.141%	0.00	0.927%	-	-	3,490.00	1.00	-	
1974	Surface	Inactive	-	0.153%	0.00	0.959%	-	-	3,490.00	1.00	-	
1975	Surface	Inactive	-	0.165%	0.00	0.991%	-	-	3,490.00	1.00	-	
1976	Surface	Inactive	438.80	0.178%	0.50	1.024%	0.39	4.49	3,490.00	1.00	1,360.15	
1977	Surface	Inactive	-	0.190%	0.00	1.056%	-	-	3,490.00	1.00	-	
1978	Surface	Inactive	-	0.202%	0.00	1.088%	-	-	3,490.00	1.00	-	
1979	Surface	Inactive	-	0.215%	0.00	1.120%	-	-	3,490.00	1.00	-	
1980	Surface	Inactive	-	0.227%	0.00	1.152%	-	-	3,490.00	1.00	-	
1981	Surface	Inactive	-	0.239%	0.00	1.184%	-	-	3,490.00	1.00	-	
1982	Surface	Inactive	-	0.252%	0.00	1.216%	-	-	3,490.00	1.00	-	
1983	Surface	Inactive	-	0.264%	0.00	1.249%	-	-	3,490.00	1.00	-	
1984	Surface	Inactive	-	0.277%	0.00	1.281%	-	-	3,490.00	1.00	-	
1985	Surface	Inactive	-	0.289%	0.00	1.313%	-	-	3,490.00	1.00	-	
1986	Surface	Inactive	224.46	0.301%	0.50	1.345%	0.34	3.02	3,490.00	1.00	1,180.24	
1987	Surface	Inactive	327.57	0.314%	0.50	1.377%	0.51	4.51	3,490.00	1.00	1,793.10	
1988	Surface	Inactive	1,135.24	0.326%	0.50	1.409%	1.85	16.00	3,490.00	1.00	6,459.28	
1989	Surface	Inactive	273.00	0.338%	1.00	1.441%	0.92	3.94	3,490.00	1.00	3,224.48	
1990	Surface	Inactive	228.27	0.351%	0.50	1.474%	0.40	3.36	3,490.00	1.00	1,397.35	
1991	Surface	Inactive	-	0.363%	0.00	1.506%	-	-	3,490.00	1.00	-	
1992	Surface	Inactive	-	0.376%	0.00	1.538%	-	-	3,490.00	1.00	-	
1993	Surface	Inactive	-	0.388%	0.00	1.570%	-	-	3,490.00	1.00	-	
1994	Surface	Inactive	578.94	0.400%	0.50	1.602%	1.16	9.28	3,490.00	1.00	4,043.80	
1995	Surface	Inactive	2,009.82	0.413%	0.50	1.634%	4.15	32.85	3,490.00	1.00	14,472.08	
1996	Surface	Inactive	1,639.13	0.425%	0.50	1.666%	3.48	27.32	3,490.00	1.00	12,156.65	
1997	Surface	Inactive	-	0.437%	0.00	1.699%	-	-	3,490.00	1.00	-	
1998	Surface	Inactive	846.89	0.450%	0.50	1.731%	1.90	14.66	3,490.00	1.00	6,646.57	
1999	Surface	Inactive	519.96	0.462%	0.50	1.763%	1.20	9.17	3,490.00	1.00	4,192.98	
2000	Surface	Inactive	-	0.474%	0.00	1.795%	-	-	3,490.00	1.00	-	
2001	Surface	Inactive	571.94	0.487%	0.50	1.827%	1.39	10.45	3,490.00	1.00	4,859.05	
2002	Surface	Inactive	1,304.87	0.499%	0.50	1.859%	3.26	24.26	3,490.00	1.00	11,367.46	
2003	Surface	Inactive	1,948.57	0.512%	0.50	1.891%	4.98	36.86	3,490.00	1.00	17,395.68	
2004	Surface	Inactive	898.15	0.524%	0.50	1.924%	2.35	17.28	3,490.00	1.00	8,212.01	
2005	Surface	Inactive	25.99	0.536%	1.50	1.956%	0.21	0.51	3,490.00	1.00	729.73	
2006	Surface	Inactive	244.34	0.549%	0.50	1.988%	0.67	4.86	3,490.00	1.00	2,339.54	
2007	Surface	Inactive	111.49	0.561%	0.50	2.020%	0.31	2.25	3,490.00	1.00	1,091.57	
2008	Surface	Inactive	441.20	0.573%	1.00	2.052%	2.53	9.05	3,490.00	1.00	8,829.84	
2009	Surface	Inactive	578.55	0.586%	0.50	1.450%	1.69	8.39	3,490.00	1.00	5,914.20	
2010	Surface	Inactive	5.11	0.598%	1.50	1.279%	0.05	0.07	3,490.00	1.00	160.02	
2011	Surface	Inactive	1,256.17	0.611%	0.50	1.107%	3.83	13.90	3,490.00	1.00	13,383.41	
2012	Surface	Inactive	452.53	0.623%	0.50	0.935%	1.41	4.23	3,490.00	1.00	4,918.99	
2013	Surface	Inactive	246.68	0.635%	0.50	0.763%	0.78	1.88	3,490.00	1.00	2,734.65	
2014	Surface	Inactive	1,081.42	0.648%	0.50	0.591%	3.50	6.39	3,490.00	1.00	12,221.84	
2015	Surface	Inactive	246.00	0.660%	0.50	0.420%	0.81	1.03	3,490.00	1.00	2,833.31	
2016	Surface	Inactive	7.00	0.672%	1.50	0.248%	0.07	0.02	3,490.00	1.00	246.40	
2017	Surface	Inactive	-	0.685%	0.00	0.076%	-	-	3,490.00	1.00	-	
2018	Surface	Inactive	-	0.697%	0.00	0.066%	-	-	3,490.00	1.00	-	
2019	Surface	Inactive	-	0.000%	0.00	0.057%	-	-	3,490.00	1.00	-	



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Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	2020						Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
				Forfeiture Rate	Factor Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Adjustment Factor			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Surface	Phased Released	-	0.067%	0.00	2.753%	-	-	3,490.00	0.50	-	
1964	Surface	Phased Released	-	0.117%	0.00	2.900%	-	-	3,490.00	0.50	-	
1965	Surface	Phased Released	-	0.166%	0.00	3.046%	-	-	3,490.00	0.50	-	
1966	Surface	Phased Released	-	0.216%	0.00	3.192%	-	-	3,490.00	0.50	-	
1967	Surface	Phased Released	-	0.265%	0.00	3.338%	-	-	3,490.00	0.50	-	
1968	Surface	Phased Released	-	0.315%	0.00	3.484%	-	-	3,490.00	0.50	-	
1969	Surface	Phased Released	-	0.364%	0.00	3.630%	-	-	3,490.00	0.50	-	
1970	Surface	Phased Released	-	0.414%	0.00	3.776%	-	-	3,490.00	0.50	-	
1971	Surface	Phased Released	-	0.463%	0.00	3.922%	-	-	3,490.00	0.50	-	
1972	Surface	Phased Released	-	0.513%	0.00	4.068%	-	-	3,490.00	0.50	-	
1973	Surface	Phased Released	-	0.562%	0.00	4.214%	-	-	3,490.00	0.50	-	
1974	Surface	Phased Released	189.60	0.612%	1.50	4.361%	1.74	8.27	3,490.00	0.50	3,035.14	
1975	Surface	Phased Released	75.30	0.661%	1.50	4.507%	0.75	3.39	3,490.00	0.50	1,302.93	
1976	Surface	Phased Released	626.17	0.711%	1.50	4.653%	6.67	29.13	3,490.00	0.50	11,645.66	
1977	Surface	Phased Released	48.00	0.760%	1.50	4.799%	0.55	2.30	3,490.00	0.50	954.88	
1978	Surface	Phased Released	642.27	0.809%	1.50	4.945%	7.80	31.76	3,490.00	0.50	13,608.62	
1979	Surface	Phased Released	358.00	0.859%	1.50	5.091%	4.61	18.23	3,490.00	0.50	8,049.05	
1980	Surface	Phased Released	857.15	0.908%	1.25	5.237%	9.73	44.89	3,490.00	0.50	16,984.72	
1981	Surface	Phased Released	1,738.41	0.958%	1.17	5.383%	19.43	93.58	3,490.00	0.50	33,901.74	
1982	Surface	Phased Released	-	1.007%	0.00	5.529%	-	-	3,490.00	0.50	-	
1983	Surface	Phased Released	612.11	1.057%	1.50	5.675%	9.70	34.74	3,490.00	0.50	16,933.14	
1984	Surface	Phased Released	2,777.39	1.106%	1.10	5.822%	33.80	161.69	3,490.00	0.50	58,981.50	
1985	Surface	Phased Released	627.29	1.156%	1.50	5.968%	10.88	37.43	3,490.00	0.50	18,977.81	
1986	Surface	Phased Released	1,225.56	1.205%	1.17	6.114%	17.23	74.93	3,490.00	0.50	30,072.63	
1987	Surface	Phased Released	760.81	1.255%	1.00	6.260%	9.55	47.63	3,490.00	0.50	16,658.56	
1988	Surface	Phased Released	505.00	1.304%	1.50	6.406%	9.88	32.35	3,490.00	0.50	17,240.08	
1989	Surface	Phased Released	1,650.04	1.354%	1.17	6.552%	26.06	108.11	3,490.00	0.50	45,474.51	
1990	Surface	Phased Released	1,502.96	1.403%	1.25	6.698%	26.36	100.67	3,490.00	0.50	46,001.68	
1991	Surface	Phased Released	979.45	1.453%	1.10	6.844%	15.65	67.04	3,490.00	0.50	27,311.18	
1992	Surface	Phased Released	73.00	1.502%	1.50	6.990%	1.64	5.10	3,490.00	0.50	2,870.28	
1993	Surface	Phased Released	562.59	1.552%	1.50	7.136%	13.09	40.15	3,490.00	0.50	22,849.03	
1994	Surface	Phased Released	2,272.45	1.601%	0.70	7.283%	25.47	165.49	3,490.00	0.50	44,443.57	
1995	Surface	Phased Released	436.30	1.651%	1.00	7.429%	7.20	32.41	3,490.00	0.50	12,566.63	
1996	Surface	Phased Released	613.01	1.700%	1.10	7.575%	11.46	46.43	3,490.00	0.50	20,004.17	
1997	Surface	Phased Released	1,168.05	1.750%	1.00	7.721%	20.44	90.18	3,490.00	0.50	35,659.93	
1998	Surface	Phased Released	511.73	1.799%	0.83	7.867%	7.67	40.26	3,490.00	0.50	13,387.21	
1999	Surface	Phased Released	-	1.848%	0.00	8.013%	-	-	3,490.00	0.50	-	
2000	Surface	Phased Released	-	1.898%	1.50	8.159%	-	-	3,490.00	0.50	-	
2001	Surface	Phased Released	462.58	1.947%	1.17	8.305%	10.51	38.42	3,490.00	0.50	18,339.78	
2002	Surface	Phased Released	106.29	1.997%	1.50	8.451%	3.18	8.98	3,490.00	0.50	5,555.72	
2003	Surface	Phased Released	-	2.046%	1.50	8.597%	-	-	3,490.00	0.50	-	
2004	Surface	Phased Released	183.99	2.096%	0.50	8.743%	1.93	16.09	3,490.00	0.50	3,364.53	
2005	Surface	Phased Released	51.50	2.145%	1.50	8.890%	1.66	4.58	3,490.00	0.50	2,891.96	
2006	Surface	Phased Released	60.78	2.195%	1.50	9.036%	2.00	5.49	3,490.00	0.50	3,491.79	
2007	Surface	Phased Released	-	2.244%	0.00	9.182%	-	-	3,490.00	0.50	-	
2008	Surface	Phased Released	124.65	2.294%	1.00	9.328%	2.86	11.63	3,490.00	0.50	4,989.30	
2009	Surface	Phased Released	262.02	2.343%	1.25	6.593%	7.67	17.27	3,490.00	0.50	13,392.44	
2010	Surface	Phased Released	-	2.393%	0.00	5.812%	-	-	3,490.00	0.50	-	
2011	Surface	Phased Released	77.50	2.442%	1.50	5.031%	2.84	3.90	3,490.00	0.50	4,954.17	
2012	Surface	Phased Released	-	2.492%	0.00	4.250%	-	-	3,490.00	0.50	-	
2013	Surface	Phased Released	-	2.541%	0.00	3.469%	-	-	3,490.00	0.50	-	
2014	Surface	Phased Released	27.91	2.591%	1.50	2.688%	1.08	0.75	3,490.00	0.50	1,892.58	
2015	Surface	Phased Released	-	2.640%	0.00	1.907%	-	-	3,490.00	0.50	-	
2016	Surface	Phased Released	-	2.690%	0.00	1.126%	-	-	3,490.00	0.50	-	
2017	Surface	Phased Released	-	2.739%	0.00	0.345%	-	-	3,490.00	0.50	-	
2018	Surface	Phased Released	-	2.789%	0.00	0.301%	-	-	3,490.00	0.50	-	
2019	Surface	Phased Released	-	0.000%	0.00	0.257%	-	-	3,490.00	0.50	-	

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water Capital Cost Projection - Deterministic Model

Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded	Forfeiture Rate	Adjustment Factor		Released	Forfeited	Released			
			Acres (4)	Rate (5)	Permit Bond Size (6)	Release Rate (7)	Acres (8)	Acres (9)	Acres (10)			
1963	Underground	Active	-	0.070%	0.00	0.191%	-	-	5,690.00	1.00	-	
1964	Underground	Active	-	0.073%	0.00	0.287%	-	-	5,690.00	1.00	-	
1965	Underground	Active	-	0.076%	0.00	0.382%	-	-	5,690.00	1.00	-	
1966	Underground	Active	-	0.079%	0.00	0.477%	-	-	5,690.00	1.00	-	
1967	Underground	Active	-	0.082%	0.00	0.573%	-	-	5,690.00	1.00	-	
1968	Underground	Active	-	0.085%	0.00	0.668%	-	-	5,690.00	1.00	-	
1969	Underground	Active	-	0.088%	0.00	0.763%	-	-	5,690.00	1.00	-	
1970	Underground	Active	-	0.091%	0.00	0.858%	-	-	5,690.00	1.00	-	
1971	Underground	Active	-	0.094%	0.00	0.954%	-	-	5,690.00	1.00	-	
1972	Underground	Active	-	0.097%	0.00	1.049%	-	-	5,690.00	1.00	-	
1973	Underground	Active	-	0.100%	0.00	1.144%	-	-	5,690.00	1.00	-	
1974	Underground	Active	-	0.103%	0.00	1.240%	-	-	5,690.00	1.00	-	
1975	Underground	Active	-	0.106%	0.00	1.335%	-	-	5,690.00	1.00	-	
1976	Underground	Active	-	0.109%	0.00	1.430%	-	-	5,690.00	1.00	-	
1977	Underground	Active	22.53	0.112%	1.50	1.525%	0.04	0.34	5,690.00	1.00	214.56	
1978	Underground	Active	117.89	0.115%	1.00	1.621%	0.14	1.91	5,690.00	1.00	768.32	
1979	Underground	Active	739.73	0.117%	1.21	1.716%	1.06	12.69	5,690.00	1.00	6,005.27	
1980	Underground	Active	222.16	0.120%	1.10	1.811%	0.29	4.02	5,690.00	1.00	1,674.93	
1981	Underground	Active	1,054.16	0.123%	1.15	1.907%	1.50	20.10	5,690.00	1.00	8,512.94	
1982	Underground	Active	37.93	0.126%	1.17	2.002%	0.06	0.76	5,690.00	1.00	318.19	
1983	Underground	Active	6,931.45	0.129%	0.87	2.097%	7.77	145.36	5,690.00	1.00	44,206.74	
1984	Underground	Active	3,035.00	0.132%	1.00	2.192%	4.01	66.54	5,690.00	1.00	22,845.12	
1985	Underground	Active	50.69	0.135%	1.50	2.288%	0.10	1.16	5,690.00	1.00	585.13	
1986	Underground	Active	280.37	0.138%	1.17	2.383%	0.45	6.68	5,690.00	1.00	2,572.26	
1987	Underground	Active	198.36	0.141%	1.10	2.478%	0.31	4.92	5,690.00	1.00	1,752.60	
1988	Underground	Active	215.95	0.144%	1.17	2.574%	0.36	5.56	5,690.00	1.00	2,066.06	
1989	Underground	Active	260.68	0.147%	1.40	2.669%	0.54	6.96	5,690.00	1.00	3,054.24	
1990	Underground	Active	162.46	0.150%	1.17	2.764%	0.28	4.49	5,690.00	1.00	1,618.11	
1991	Underground	Active	223.30	0.153%	1.25	2.859%	0.43	6.39	5,690.00	1.00	2,429.93	
1992	Underground	Active	1,081.93	0.156%	1.07	2.955%	1.81	31.97	5,690.00	1.00	10,286.68	
1993	Underground	Active	935.11	0.159%	1.05	3.050%	1.55	28.52	5,690.00	1.00	8,839.79	
1994	Underground	Active	613.35	0.162%	1.04	3.145%	1.03	19.29	5,690.00	1.00	5,866.56	
1995	Underground	Active	194.98	0.165%	1.00	3.241%	0.32	6.32	5,690.00	1.00	1,828.69	
1996	Underground	Active	117.87	0.168%	1.38	3.336%	0.27	3.93	5,690.00	1.00	1,547.33	
1997	Underground	Active	467.81	0.171%	1.26	3.431%	1.01	16.05	5,690.00	1.00	5,748.11	
1998	Underground	Active	578.22	0.174%	0.90	3.526%	0.90	20.39	5,690.00	1.00	5,143.54	
1999	Underground	Active	803.93	0.177%	1.29	3.622%	1.83	29.12	5,690.00	1.00	10,390.18	
2000	Underground	Active	587.54	0.180%	0.80	3.717%	0.84	21.84	5,690.00	1.00	4,803.97	
2001	Underground	Active	189.73	0.183%	0.90	3.812%	0.31	7.23	5,690.00	1.00	1,773.97	
2002	Underground	Active	309.16	0.186%	1.41	3.514%	0.81	10.86	5,690.00	1.00	4,599.07	
2003	Underground	Active	994.29	0.188%	1.30	3.72%	2.44	33.52	5,690.00	1.00	13,863.55	
2004	Underground	Active	890.05	0.191%	1.05	3.230%	1.78	28.74	5,690.00	1.00	10,136.79	
2005	Underground	Active	327.69	0.194%	1.07	3.088%	0.68	10.12	5,690.00	1.00	3,883.89	
2006	Underground	Active	427.71	0.197%	0.83	2.945%	0.70	12.60	5,690.00	1.00	4,002.83	
2007	Underground	Active	527.87	0.200%	1.20	2.803%	1.27	14.80	5,690.00	1.00	7,220.52	
2008	Underground	Active	159.18	0.203%	1.50	2.661%	0.49	4.24	5,690.00	1.00	2,761.89	
2009	Underground	Active	307.40	0.206%	1.17	2.519%	0.74	7.74	5,690.00	1.00	4,208.74	
2010	Underground	Active	156.43	0.209%	1.42	2.377%	0.46	3.72	5,690.00	1.00	2,638.00	
2011	Underground	Active	199.42	0.212%	1.33	2.235%	0.56	4.46	5,690.00	1.00	3,209.91	
2012	Underground	Active	217.12	0.215%	1.13	2.093%	0.53	4.54	5,690.00	1.00	2,989.86	
2013	Underground	Active	278.12	0.218%	1.43	1.951%	0.87	5.43	5,690.00	1.00	4,946.64	
2014	Underground	Active	477.33	0.221%	1.24	1.809%	1.31	8.64	5,690.00	1.00	7,439.06	
2015	Underground	Active	146.07	0.224%	1.50	1.667%	0.49	2.44	5,690.00	1.00	2,792.60	
2016	Underground	Active	134.19	0.227%	1.50	1.525%	0.46	2.05	5,690.00	1.00	2,599.36	
2017	Underground	Active	53.20	0.230%	1.50	1.383%	0.18	0.74	5,690.00	1.00	1,043.96	
2018	Underground	Active	35.49	0.233%	1.50	1.241%	0.12	0.44	5,690.00	1.00	705.39	
2019	Underground	Active	45.89	0.000%	1.50	1.099%	-	0.50	5,690.00	1.00	-	

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water Capital Cost Projection - Deterministic Model

Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded Acres	Forfeiture Rate	Adjustment Factor		Forfeited Acres	Released Acres	Adjustment Factor			
			(4)	(5)	Permit Bond Size	Release Rate	(8)	(9)	(11)			
(1)	(2)	(3)			(6)	(7)			(10)		(12)	
1963	Underground	Inactive	-	0.105%	0.00	0.132%	-	-	5,690.00	1.00	-	
1964	Underground	Inactive	-	0.110%	0.00	0.197%	-	-	5,690.00	1.00	-	
1965	Underground	Inactive	-	0.114%	0.00	0.263%	-	-	5,690.00	1.00	-	
1966	Underground	Inactive	-	0.119%	0.00	0.328%	-	-	5,690.00	1.00	-	
1967	Underground	Inactive	-	0.123%	0.00	0.394%	-	-	5,690.00	1.00	-	
1968	Underground	Inactive	-	0.127%	0.00	0.459%	-	-	5,690.00	1.00	-	
1969	Underground	Inactive	-	0.132%	0.00	0.525%	-	-	5,690.00	1.00	-	
1970	Underground	Inactive	-	0.136%	0.00	0.590%	-	-	5,690.00	1.00	-	
1971	Underground	Inactive	-	0.141%	0.00	0.656%	-	-	5,690.00	1.00	-	
1972	Underground	Inactive	-	0.145%	0.00	0.721%	-	-	5,690.00	1.00	-	
1973	Underground	Inactive	-	0.150%	0.00	0.787%	-	-	5,690.00	1.00	-	
1974	Underground	Inactive	-	0.154%	0.00	0.852%	-	-	5,690.00	1.00	-	
1975	Underground	Inactive	-	0.158%	0.00	0.918%	-	-	5,690.00	1.00	-	
1976	Underground	Inactive	103.30	0.163%	0.50	0.983%	0.08	1.02	5,690.00	1.00	478.84	
1977	Underground	Inactive	-	0.167%	0.00	1.049%	-	-	5,690.00	1.00	-	
1978	Underground	Inactive	-	0.172%	0.00	1.114%	-	-	5,690.00	1.00	-	
1979	Underground	Inactive	6.60	0.176%	0.50	1.180%	0.01	0.08	5,690.00	1.00	33.09	
1980	Underground	Inactive	-	0.181%	0.00	1.245%	-	-	5,690.00	1.00	-	
1981	Underground	Inactive	86.84	0.185%	1.00	1.311%	0.16	1.14	5,690.00	1.00	914.72	
1982	Underground	Inactive	128.47	0.190%	0.50	1.376%	0.12	1.77	5,690.00	1.00	692.83	
1983	Underground	Inactive	461.99	0.194%	0.88	1.442%	0.78	6.66	5,690.00	1.00	4,462.15	
1984	Underground	Inactive	80.60	0.198%	0.50	1.507%	0.08	1.21	5,690.00	1.00	455.02	
1985	Underground	Inactive	230.46	0.203%	1.00	1.573%	0.47	3.62	5,690.00	1.00	2,660.28	
1986	Underground	Inactive	43.54	0.207%	0.50	1.638%	0.05	0.71	5,690.00	1.00	256.80	
1987	Underground	Inactive	40.89	0.212%	1.50	1.704%	0.13	0.70	5,690.00	1.00	738.98	
1988	Underground	Inactive	145.69	0.216%	1.17	1.769%	0.37	2.58	5,690.00	1.00	2,090.79	
1989	Underground	Inactive	56.90	0.221%	0.50	1.835%	0.06	1.04	5,690.00	1.00	357.14	
1990	Underground	Inactive	31.94	0.225%	1.50	1.900%	0.11	0.61	5,690.00	1.00	613.53	
1991	Underground	Inactive	146.44	0.229%	1.17	1.966%	0.39	2.88	5,690.00	1.00	2,230.97	
1992	Underground	Inactive	9.00	0.234%	1.50	2.031%	0.03	0.18	5,690.00	1.00	179.70	
1993	Underground	Inactive	73.56	0.238%	1.25	2.097%	0.22	1.54	5,690.00	1.00	1,247.15	
1994	Underground	Inactive	247.11	0.243%	0.50	2.162%	0.30	5.34	5,690.00	1.00	1,707.01	
1995	Underground	Inactive	253.81	0.247%	1.17	2.228%	0.73	5.65	5,690.00	1.00	4,165.79	
1996	Underground	Inactive	177.16	0.252%	0.90	2.293%	0.40	4.06	5,690.00	1.00	2,283.36	
1997	Underground	Inactive	58.94	0.256%	1.25	2.359%	0.19	1.39	5,690.00	1.00	1,073.69	
1998	Underground	Inactive	75.86	0.261%	1.17	2.424%	0.23	1.84	5,690.00	1.00	1,312.13	
1999	Underground	Inactive	178.02	0.265%	1.17	2.490%	0.55	4.43	5,690.00	1.00	3,131.61	
2000	Underground	Inactive	79.39	0.269%	1.50	2.555%	0.32	2.03	5,690.00	1.00	1,825.67	
2001	Underground	Inactive	93.58	0.274%	1.17	2.621%	0.30	2.45	5,690.00	1.00	1,701.33	
2002	Underground	Inactive	47.21	0.278%	0.50	2.416%	0.07	1.14	5,690.00	1.00	373.80	
2003	Underground	Inactive	230.42	0.283%	1.00	2.318%	0.65	5.34	5,690.00	1.00	3,707.06	
2004	Underground	Inactive	31.38	0.287%	0.50	2.220%	0.05	0.70	5,690.00	1.00	256.39	
2005	Underground	Inactive	134.53	0.292%	1.50	2.123%	0.59	2.86	5,690.00	1.00	3,348.44	
2006	Underground	Inactive	151.61	0.296%	1.21	2.025%	0.55	3.07	5,690.00	1.00	3,101.27	
2007	Underground	Inactive	130.13	0.300%	1.17	1.927%	0.46	2.51	5,690.00	1.00	2,595.83	
2008	Underground	Inactive	78.55	0.305%	1.50	1.830%	0.36	1.44	5,690.00	1.00	2,044.35	
2009	Underground	Inactive	103.13	0.309%	1.33	1.732%	0.43	1.79	5,690.00	1.00	2,420.56	
2010	Underground	Inactive	258.26	0.314%	1.25	1.634%	1.01	4.22	5,690.00	1.00	5,764.28	
2011	Underground	Inactive	145.23	0.318%	1.50	1.537%	0.69	2.23	5,690.00	1.00	3,944.79	
2012	Underground	Inactive	41.32	0.323%	1.50	1.439%	0.20	0.59	5,690.00	1.00	1,138.00	
2013	Underground	Inactive	22.73	0.327%	1.50	1.341%	0.11	0.30	5,690.00	1.00	634.62	
2014	Underground	Inactive	-	0.332%	0.00	1.244%	-	-	5,690.00	1.00	-	
2015	Underground	Inactive	-	0.336%	0.00	1.146%	-	-	5,690.00	1.00	-	
2016	Underground	Inactive	-	0.340%	0.00	1.048%	-	-	5,690.00	1.00	-	
2017	Underground	Inactive	-	0.345%	0.00	0.951%	-	-	5,690.00	1.00	-	
2018	Underground	Inactive	26.00	0.349%	1.50	0.853%	0.14	0.22	5,690.00	1.00	775.15	
2019	Underground	Inactive	-	0.000%	0.00	0.755%	-	-	5,690.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	2020						Avg Recl Cost per Acres	Adjustment Factor Permit Status	Gross Cost
				Adjustment		Adjustment		Forfeited Acres	Released Acres			
				Forfeiture Rate	Permit Bond Size	Release Rate	Factor					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Underground	Phased Released	-	0.421%	0.00	0.598%	-	-	5,690.00	0.50	-	
1964	Underground	Phased Released	-	0.439%	0.00	0.896%	-	-	5,690.00	0.50	-	
1965	Underground	Phased Released	-	0.456%	0.00	1.194%	-	-	5,690.00	0.50	-	
1966	Underground	Phased Released	-	0.474%	0.00	1.492%	-	-	5,690.00	0.50	-	
1967	Underground	Phased Released	-	0.492%	0.00	1.789%	-	-	5,690.00	0.50	-	
1968	Underground	Phased Released	-	0.510%	0.00	2.087%	-	-	5,690.00	0.50	-	
1969	Underground	Phased Released	-	0.527%	0.00	2.385%	-	-	5,690.00	0.50	-	
1970	Underground	Phased Released	-	0.545%	0.00	2.683%	-	-	5,690.00	0.50	-	
1971	Underground	Phased Released	-	0.563%	0.00	2.980%	-	-	5,690.00	0.50	-	
1972	Underground	Phased Released	-	0.581%	0.00	3.278%	-	-	5,690.00	0.50	-	
1973	Underground	Phased Released	-	0.598%	0.00	3.576%	-	-	5,690.00	0.50	-	
1974	Underground	Phased Released	-	0.616%	0.00	3.874%	-	-	5,690.00	0.50	-	
1975	Underground	Phased Released	-	0.634%	0.00	4.171%	-	-	5,690.00	0.50	-	
1976	Underground	Phased Released	-	0.652%	0.00	4.469%	-	-	5,690.00	0.50	-	
1977	Underground	Phased Released	-	0.669%	0.00	4.767%	-	-	5,690.00	0.50	-	
1978	Underground	Phased Released	23.13	0.687%	1.50	5.065%	0.24	1.17	5,690.00	0.50	678.35	
1979	Underground	Phased Released	59.68	0.705%	1.50	5.363%	0.63	3.20	5,690.00	0.50	1,795.48	
1980	Underground	Phased Released	87.19	0.723%	1.50	5.660%	0.95	4.94	5,690.00	0.50	2,689.16	
1981	Underground	Phased Released	85.14	0.740%	1.38	5.958%	0.87	5.07	5,690.00	0.50	2,466.22	
1982	Underground	Phased Released	199.06	0.758%	1.50	6.256%	2.26	12.45	5,690.00	0.50	6,441.09	
1983	Underground	Phased Released	97.63	0.776%	1.50	6.554%	1.14	6.40	5,690.00	0.50	3,233.02	
1984	Underground	Phased Released	15.00	0.794%	1.50	6.851%	0.18	1.03	5,690.00	0.50	508.09	
1985	Underground	Phased Released	32.59	0.811%	1.50	7.149%	0.40	2.33	5,690.00	0.50	1,128.59	
1986	Underground	Phased Released	98.80	0.829%	1.50	7.447%	1.23	7.36	5,690.00	0.50	3,496.28	
1987	Underground	Phased Released	111.49	0.847%	1.50	7.745%	1.42	8.63	5,690.00	0.50	4,029.80	
1988	Underground	Phased Released	129.44	0.865%	1.50	8.042%	1.68	10.41	5,690.00	0.50	4,776.65	
1989	Underground	Phased Released	146.44	0.882%	1.50	8.340%	1.94	12.21	5,690.00	0.50	5,514.92	
1990	Underground	Phased Released	18.31	0.900%	1.50	8.638%	0.25	1.58	5,690.00	0.50	703.42	
1991	Underground	Phased Released	40.12	0.918%	1.50	8.936%	0.55	3.59	5,690.00	0.50	1,571.70	
1992	Underground	Phased Released	24.27	0.936%	1.50	9.234%	0.34	2.24	5,690.00	0.50	969.16	
1993	Underground	Phased Released	29.46	0.953%	1.50	9.531%	0.42	2.81	5,690.00	0.50	1,198.72	
1994	Underground	Phased Released	26.14	0.971%	1.50	9.829%	0.38	2.57	5,690.00	0.50	1,083.43	
1995	Underground	Phased Released	67.71	0.989%	1.50	10.127%	1.00	6.86	5,690.00	0.50	2,857.69	
1996	Underground	Phased Released	141.07	1.007%	1.50	10.425%	2.13	14.71	5,690.00	0.50	6,060.70	
1997	Underground	Phased Released	149.46	1.024%	1.50	10.722%	2.30	16.03	5,690.00	0.50	6,534.37	
1998	Underground	Phased Released	70.67	1.042%	1.50	11.020%	1.10	7.79	5,690.00	0.50	3,143.21	
1999	Underground	Phased Released	10.68	1.060%	1.50	11.318%	0.17	1.21	5,690.00	0.50	483.11	
2000	Underground	Phased Released	59.65	1.078%	1.50	11.616%	0.96	6.93	5,690.00	0.50	2,743.44	
2001	Underground	Phased Released	36.60	1.095%	1.50	11.913%	0.60	4.36	5,690.00	0.50	1,711.04	
2002	Underground	Phased Released	116.87	1.113%	1.50	10.980%	1.95	12.83	5,690.00	0.50	5,552.18	
2003	Underground	Phased Released	47.15	1.131%	1.50	10.536%	0.80	4.97	5,690.00	0.50	2,275.69	
2004	Underground	Phased Released	16.25	1.149%	1.50	10.092%	0.28	1.64	5,690.00	0.50	796.61	
2005	Underground	Phased Released	-	1.166%	0.00	9.648%	-	-	5,690.00	0.50	-	
2006	Underground	Phased Released	-	1.184%	0.00	9.205%	-	-	5,690.00	0.50	-	
2007	Underground	Phased Released	-	1.202%	0.00	8.761%	-	-	5,690.00	0.50	-	
2008	Underground	Phased Released	43.07	1.220%	1.50	8.317%	0.79	3.58	5,690.00	0.50	2,241.89	
2009	Underground	Phased Released	54.60	1.237%	1.50	7.873%	1.01	4.30	5,690.00	0.50	2,883.41	
2010	Underground	Phased Released	-	1.255%	0.00	7.429%	-	-	5,690.00	0.50	-	
2011	Underground	Phased Released	-	1.273%	0.00	6.985%	-	-	5,690.00	0.50	-	
2012	Underground	Phased Released	-	1.291%	0.00	6.541%	-	-	5,690.00	0.50	-	
2013	Underground	Phased Released	-	1.308%	0.00	6.097%	-	-	5,690.00	0.50	-	
2014	Underground	Phased Released	-	1.326%	0.00	5.653%	-	-	5,690.00	0.50	-	
2015	Underground	Phased Released	-	1.344%	0.00	5.210%	-	-	5,690.00	0.50	-	
2016	Underground	Phased Released	-	1.362%	0.00	4.766%	-	-	5,690.00	0.50	-	
2017	Underground	Phased Released	-	1.379%	0.00	4.322%	-	-	5,690.00	0.50	-	
2018	Underground	Phased Released	-	1.397%	0.00	3.878%	-	-	5,690.00	0.50	-	
2019	Underground	Phased Released	-	0.000%	0.00	3.434%	-	-	5,690.00	0.50	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded	Forfeiture Rate	Adjustment Factor		Released	Forfeited	Released			
			Acres (4)	Rate (5)	Permit Bond Size (6)	Release Rate (7)	Acres (8)	Acres (9)	Acres (10)			
1963	Other	Active	-	0.157%	0.00	3.526%	-	-	8,095.00	1.00	-	
1964	Other	Active	-	0.157%	0.00	3.440%	-	-	8,095.00	1.00	-	
1965	Other	Active	-	0.157%	0.00	3.354%	-	-	8,095.00	1.00	-	
1966	Other	Active	-	0.157%	0.00	3.268%	-	-	8,095.00	1.00	-	
1967	Other	Active	-	0.157%	0.00	3.182%	-	-	8,095.00	1.00	-	
1968	Other	Active	-	0.157%	0.00	3.096%	-	-	8,095.00	1.00	-	
1969	Other	Active	-	0.157%	0.00	3.010%	-	-	8,095.00	1.00	-	
1970	Other	Active	-	0.157%	0.00	2.924%	-	-	8,095.00	1.00	-	
1971	Other	Active	-	0.157%	0.00	2.838%	-	-	8,095.00	1.00	-	
1972	Other	Active	20.00	0.157%	1.50	2.752%	0.05	0.55	8,095.00	1.00	381.87	
1973	Other	Active	-	0.157%	0.00	2.666%	-	-	8,095.00	1.00	-	
1974	Other	Active	28.52	0.157%	1.50	2.580%	0.07	0.74	8,095.00	1.00	544.55	
1975	Other	Active	6.20	0.157%	1.50	2.494%	0.01	0.15	8,095.00	1.00	118.38	
1976	Other	Active	75.00	0.157%	1.50	2.408%	0.18	1.81	8,095.00	1.00	1,432.03	
1977	Other	Active	307.70	0.157%	1.00	2.322%	0.48	7.14	8,095.00	1.00	3,916.75	
1978	Other	Active	12.76	0.157%	1.50	2.236%	0.03	0.29	8,095.00	1.00	243.64	
1979	Other	Active	65.00	0.157%	1.50	2.150%	0.15	1.40	8,095.00	1.00	1,241.09	
1980	Other	Active	410.00	0.157%	1.28	2.064%	0.82	8.46	8,095.00	1.00	6,668.64	
1981	Other	Active	4,174.64	0.157%	0.93	1.978%	6.10	82.56	8,095.00	1.00	49,343.80	
1982	Other	Active	635.64	0.157%	0.70	1.892%	0.70	12.02	8,095.00	1.00	5,663.79	
1983	Other	Active	3,946.44	0.157%	0.90	1.806%	5.61	71.26	8,095.00	1.00	45,450.44	
1984	Other	Active	4,353.00	0.157%	0.68	1.720%	4.67	74.86	8,095.00	1.00	37,779.44	
1985	Other	Active	1,743.70	0.157%	1.14	1.634%	3.12	28.49	8,095.00	1.00	25,222.45	
1986	Other	Active	1,399.63	0.157%	0.92	1.548%	2.02	21.66	8,095.00	1.00	16,331.38	
1987	Other	Active	354.22	0.157%	1.17	1.462%	0.65	5.18	8,095.00	1.00	5,260.39	
1988	Other	Active	479.98	0.157%	1.21	1.376%	0.92	6.60	8,095.00	1.00	7,418.95	
1989	Other	Active	627.05	0.157%	1.23	1.290%	1.21	8.09	8,095.00	1.00	9,795.84	
1990	Other	Active	218.99	0.157%	1.25	1.204%	0.43	2.64	8,095.00	1.00	3,484.44	
1991	Other	Active	49.45	0.157%	1.50	0.667%	0.12	0.33	8,095.00	1.00	944.18	
1992	Other	Active	552.48	0.157%	1.20	0.811%	1.04	4.48	8,095.00	1.00	8,439.10	
1993	Other	Active	929.29	0.157%	0.94	0.954%	1.38	8.87	8,095.00	1.00	11,171.87	
1994	Other	Active	1,761.56	0.157%	0.83	1.098%	2.31	19.34	8,095.00	1.00	18,685.92	
1995	Other	Active	644.11	0.157%	1.00	1.241%	1.01	7.99	8,095.00	1.00	8,198.95	
1996	Other	Active	1,965.82	0.157%	0.50	1.385%	1.55	27.22	8,095.00	1.00	12,511.58	
1997	Other	Active	1,299.08	0.157%	1.05	1.528%	2.14	19.85	8,095.00	1.00	17,287.78	
1998	Other	Active	1,171.67	0.157%	0.75	1.672%	1.38	19.59	8,095.00	1.00	11,185.74	
1999	Other	Active	404.41	0.157%	1.10	1.815%	0.70	7.34	8,095.00	1.00	5,662.56	
2000	Other	Active	32.60	0.157%	1.50	1.959%	0.08	0.64	8,095.00	1.00	622.45	
2001	Other	Active	313.35	0.157%	1.00	2.102%	0.49	6.59	8,095.00	1.00	3,988.67	
2002	Other	Active	432.89	0.571%	1.17	2.246%	2.88	9.72	8,095.00	1.00	23,333.27	
2003	Other	Active	810.10	0.618%	0.83	2.389%	4.17	19.36	8,095.00	1.00	33,774.47	
2004	Other	Active	942.77	0.665%	1.06	2.533%	6.62	23.88	8,095.00	1.00	53,597.73	
2005	Other	Active	74.21	0.713%	1.17	2.676%	0.62	1.99	8,095.00	1.00	4,994.55	
2006	Other	Active	713.66	0.760%	1.07	2.820%	5.81	20.13	8,095.00	1.00	47,038.35	
2007	Other	Active	367.37	0.807%	1.10	2.964%	3.26	10.89	8,095.00	1.00	26,406.94	
2008	Other	Active	603.61	0.855%	1.28	3.107%	6.59	18.75	8,095.00	1.00	53,353.64	
2009	Other	Active	272.19	0.902%	1.21	4.163%	2.98	11.33	8,095.00	1.00	24,129.21	
2010	Other	Active	923.53	0.794%	1.20	6.475%	8.79	59.80	8,095.00	1.00	71,193.92	
2011	Other	Active	383.01	0.684%	1.00	8.787%	2.62	33.66	8,095.00	1.00	21,194.08	
2012	Other	Active	134.61	0.574%	1.50	11.099%	1.16	14.94	8,095.00	1.00	9,374.99	
2013	Other	Active	1,679.00	0.464%	1.10	13.411%	8.56	225.17	8,095.00	1.00	69,305.29	
2014	Other	Active	201.21	0.354%	1.40	15.723%	1.00	31.64	8,095.00	1.00	8,062.08	
2015	Other	Active	429.51	0.244%	1.23	21.792%	1.28	93.60	8,095.00	1.00	10,392.19	
2016	Other	Active	162.86	0.134%	1.28	17.154%	0.28	27.94	8,095.00	1.00	2,249.47	
2017	Other	Active	142.24	0.024%	1.44	12.515%	0.05	17.80	8,095.00	1.00	390.40	
2018	Other	Active	256.03	0.000%	1.50	7.876%	-	20.17	8,095.00	1.00	-	
2019	Other	Active	256.31	0.000%	1.50	3.238%	-	8.30	8,095.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded Acres	Forfeiture Rate	Adjustment Factor Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Adjustment Factor			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Other	Inactive	-	0.236%	0.00	2.424%	-	-	8,095.00	1.00	-	
1964	Other	Inactive	-	0.236%	0.00	2.365%	-	-	8,095.00	1.00	-	
1965	Other	Inactive	-	0.236%	0.00	2.306%	-	-	8,095.00	1.00	-	
1966	Other	Inactive	-	0.236%	0.00	2.247%	-	-	8,095.00	1.00	-	
1967	Other	Inactive	-	0.236%	0.00	2.187%	-	-	8,095.00	1.00	-	
1968	Other	Inactive	-	0.236%	0.00	2.128%	-	-	8,095.00	1.00	-	
1969	Other	Inactive	-	0.236%	0.00	2.069%	-	-	8,095.00	1.00	-	
1970	Other	Inactive	-	0.236%	0.00	2.010%	-	-	8,095.00	1.00	-	
1971	Other	Inactive	-	0.236%	0.00	1.951%	-	-	8,095.00	1.00	-	
1972	Other	Inactive	-	0.236%	0.00	1.892%	-	-	8,095.00	1.00	-	
1973	Other	Inactive	-	0.236%	0.00	1.833%	-	-	8,095.00	1.00	-	
1974	Other	Inactive	-	0.236%	0.00	1.774%	-	-	8,095.00	1.00	-	
1975	Other	Inactive	-	0.236%	0.00	1.714%	-	-	8,095.00	1.00	-	
1976	Other	Inactive	14.48	0.236%	1.50	1.655%	0.05	0.24	8,095.00	1.00	414.71	
1977	Other	Inactive	61.00	0.236%	1.50	1.596%	0.22	0.97	8,095.00	1.00	1,747.07	
1978	Other	Inactive	-	0.236%	0.00	1.537%	-	-	8,095.00	1.00	-	
1979	Other	Inactive	9.75	0.236%	1.50	1.478%	0.03	0.14	8,095.00	1.00	279.24	
1980	Other	Inactive	114.75	0.236%	0.50	1.419%	0.14	1.63	8,095.00	1.00	1,095.50	
1981	Other	Inactive	1,249.51	0.236%	0.95	1.360%	2.81	16.99	8,095.00	1.00	22,773.29	
1982	Other	Inactive	67.50	0.236%	1.50	1.301%	0.24	0.88	8,095.00	1.00	1,933.23	
1983	Other	Inactive	1,314.44	0.236%	0.83	1.241%	2.58	16.32	8,095.00	1.00	20,914.57	
1984	Other	Inactive	319.44	0.236%	1.00	1.182%	0.75	3.78	8,095.00	1.00	6,099.28	
1985	Other	Inactive	918.71	0.236%	0.83	1.123%	1.81	10.32	8,095.00	1.00	14,617.96	
1986	Other	Inactive	2.80	0.236%	1.50	1.064%	0.01	0.03	8,095.00	1.00	80.19	
1987	Other	Inactive	834.21	0.236%	0.50	1.005%	0.98	8.38	8,095.00	1.00	7,964.07	
1988	Other	Inactive	181.75	0.236%	1.25	0.946%	0.54	1.72	8,095.00	1.00	4,337.84	
1989	Other	Inactive	49.24	0.236%	0.50	0.887%	0.06	0.44	8,095.00	1.00	470.09	
1990	Other	Inactive	528.47	0.236%	1.25	0.828%	1.56	4.37	8,095.00	1.00	12,613.04	
1991	Other	Inactive	414.61	0.236%	1.30	0.459%	1.27	1.90	8,095.00	1.00	10,291.36	
1992	Other	Inactive	417.60	0.236%	1.10	0.557%	1.08	2.33	8,095.00	1.00	8,770.87	
1993	Other	Inactive	787.92	0.236%	0.90	0.656%	1.67	5.17	8,095.00	1.00	13,539.86	
1994	Other	Inactive	545.08	0.236%	1.00	0.755%	1.29	4.11	8,095.00	1.00	10,407.58	
1995	Other	Inactive	915.43	0.236%	1.00	0.853%	2.16	7.81	8,095.00	1.00	17,478.92	
1996	Other	Inactive	130.14	0.236%	0.50	0.952%	0.15	1.24	8,095.00	1.00	1,242.43	
1997	Other	Inactive	158.04	0.236%	0.83	1.051%	0.31	1.66	8,095.00	1.00	2,514.64	
1998	Other	Inactive	89.20	0.236%	1.50	1.149%	0.32	1.03	8,095.00	1.00	2,554.73	
1999	Other	Inactive	-	0.236%	0.00	1.248%	-	-	8,095.00	1.00	-	
2000	Other	Inactive	339.23	0.236%	0.50	1.347%	0.40	4.57	8,095.00	1.00	3,238.57	
2001	Other	Inactive	284.00	0.236%	1.00	1.445%	0.67	4.10	8,095.00	1.00	5,422.60	
2002	Other	Inactive	184.32	0.856%	1.00	1.544%	1.58	2.85	8,095.00	1.00	12,773.65	
2003	Other	Inactive	98.29	0.927%	1.50	1.643%	1.37	1.61	8,095.00	1.00	11,064.28	
2004	Other	Inactive	-	0.998%	0.00	1.741%	-	-	8,095.00	1.00	-	
2005	Other	Inactive	-	1.069%	0.00	1.840%	-	-	8,095.00	1.00	-	
2006	Other	Inactive	-	1.140%	0.00	1.939%	-	-	8,095.00	1.00	-	
2007	Other	Inactive	26.00	1.211%	1.50	2.037%	0.47	0.53	8,095.00	1.00	3,822.77	
2008	Other	Inactive	4.11	1.282%	1.50	2.136%	0.08	0.09	8,095.00	1.00	639.70	
2009	Other	Inactive	-	1.353%	0.00	2.862%	-	-	8,095.00	1.00	-	
2010	Other	Inactive	133.81	1.190%	0.50	4.452%	0.80	5.96	8,095.00	1.00	6,447.04	
2011	Other	Inactive	15.10	1.025%	1.50	6.041%	0.23	0.91	8,095.00	1.00	1,880.03	
2012	Other	Inactive	66.26	0.860%	0.50	7.631%	0.29	5.06	8,095.00	1.00	2,307.36	
2013	Other	Inactive	57.00	0.695%	1.50	9.220%	0.59	5.26	8,095.00	1.00	4,812.61	
2014	Other	Inactive	-	0.530%	0.00	10.810%	-	-	8,095.00	1.00	-	
2015	Other	Inactive	-	0.365%	0.00	14.982%	-	-	8,095.00	1.00	-	
2016	Other	Inactive	-	0.200%	0.00	11.793%	-	-	8,095.00	1.00	-	
2017	Other	Inactive	-	0.035%	0.00	8.604%	-	-	8,095.00	1.00	-	
2018	Other	Inactive	-	0.000%	0.00	5.415%	-	-	8,095.00	1.00	-	
2019	Other	Inactive	-	0.000%	0.00	2.226%	-	-	8,095.00	1.00	-	

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water Capital Cost Projection - Deterministic Model

Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded Acres	Forfeiture Rate	Adjustment Factor		Released Acres	Released Acres				
			(4)	(5)	Permit Bond Size	Release Rate	(8)	(9)	(10)			
1963	Other	Phased Released	-	0.943%	0.00	11.018%	-	-	8,095.00	0.50	-	
1964	Other	Phased Released	-	0.943%	0.00	10.749%	-	-	8,095.00	0.50	-	
1965	Other	Phased Released	-	0.943%	0.00	10.480%	-	-	8,095.00	0.50	-	
1966	Other	Phased Released	-	0.943%	0.00	10.212%	-	-	8,095.00	0.50	-	
1967	Other	Phased Released	-	0.943%	0.00	9.943%	-	-	8,095.00	0.50	-	
1968	Other	Phased Released	-	0.943%	0.00	9.674%	-	-	8,095.00	0.50	-	
1969	Other	Phased Released	-	0.943%	0.00	9.405%	-	-	8,095.00	0.50	-	
1970	Other	Phased Released	-	0.943%	0.00	9.137%	-	-	8,095.00	0.50	-	
1971	Other	Phased Released	-	0.943%	0.00	8.868%	-	-	8,095.00	0.50	-	
1972	Other	Phased Released	-	0.943%	0.00	8.599%	-	-	8,095.00	0.50	-	
1973	Other	Phased Released	9.00	0.943%	1.50	8.330%	0.13	0.75	8,095.00	0.50	515.53	
1974	Other	Phased Released	-	0.943%	0.00	8.062%	-	-	8,095.00	0.50	-	
1975	Other	Phased Released	-	0.943%	0.00	7.793%	-	-	8,095.00	0.50	-	
1976	Other	Phased Released	27.88	0.943%	1.50	7.524%	0.39	2.10	8,095.00	0.50	1,596.99	
1977	Other	Phased Released	-	0.943%	0.00	7.255%	-	-	8,095.00	0.50	-	
1978	Other	Phased Released	-	0.943%	0.00	6.987%	-	-	8,095.00	0.50	-	
1979	Other	Phased Released	68.69	0.943%	1.50	6.718%	0.97	4.61	8,095.00	0.50	3,934.63	
1980	Other	Phased Released	7.91	0.943%	1.50	6.449%	0.11	0.51	8,095.00	0.50	453.09	
1981	Other	Phased Released	475.54	0.943%	1.25	6.180%	5.61	29.39	8,095.00	0.50	22,699.51	
1982	Other	Phased Released	205.26	0.943%	1.50	5.912%	2.90	12.13	8,095.00	0.50	11,757.50	
1983	Other	Phased Released	106.90	0.943%	1.00	5.643%	1.01	6.03	8,095.00	0.50	4,082.23	
1984	Other	Phased Released	108.69	0.943%	1.50	5.374%	1.54	5.84	8,095.00	0.50	6,225.87	
1985	Other	Phased Released	43.00	0.943%	1.50	5.105%	0.61	2.20	8,095.00	0.50	2,463.08	
1986	Other	Phased Released	38.00	0.943%	1.50	4.837%	0.54	1.84	8,095.00	0.50	2,176.68	
1987	Other	Phased Released	100.95	0.943%	1.50	4.568%	1.43	4.61	8,095.00	0.50	5,782.52	
1988	Other	Phased Released	-	0.943%	0.00	4.299%	-	-	8,095.00	0.50	-	
1989	Other	Phased Released	-	0.943%	1.50	4.030%	-	-	8,095.00	0.50	-	
1990	Other	Phased Released	-	0.943%	0.00	3.762%	-	-	8,095.00	0.50	-	
1991	Other	Phased Released	-	0.943%	0.00	2.085%	-	-	8,095.00	0.50	-	
1992	Other	Phased Released	-	0.943%	0.00	2.533%	-	-	8,095.00	0.50	-	
1993	Other	Phased Released	-	0.943%	0.00	2.982%	-	-	8,095.00	0.50	-	
1994	Other	Phased Released	-	0.943%	0.00	3.430%	-	-	8,095.00	0.50	-	
1995	Other	Phased Released	-	0.943%	0.00	3.879%	-	-	8,095.00	0.50	-	
1996	Other	Phased Released	-	0.943%	0.00	4.327%	-	-	8,095.00	0.50	-	
1997	Other	Phased Released	-	0.943%	0.00	4.776%	-	-	8,095.00	0.50	-	
1998	Other	Phased Released	-	0.943%	0.00	5.224%	-	-	8,095.00	0.50	-	
1999	Other	Phased Released	179.00	0.943%	0.50	5.673%	0.84	10.15	8,095.00	0.50	3,417.77	
2000	Other	Phased Released	-	0.943%	0.00	6.121%	-	-	8,095.00	0.50	-	
2001	Other	Phased Released	-	0.943%	0.00	6.570%	-	-	8,095.00	0.50	-	
2002	Other	Phased Released	-	3.424%	0.00	7.018%	-	-	8,095.00	0.50	-	
2003	Other	Phased Released	-	3.708%	0.00	7.467%	-	-	8,095.00	0.50	-	
2004	Other	Phased Released	-	3.992%	0.00	7.915%	-	-	8,095.00	0.50	-	
2005	Other	Phased Released	-	4.276%	0.00	8.364%	-	-	8,095.00	0.50	-	
2006	Other	Phased Released	-	4.560%	0.00	8.812%	-	-	8,095.00	0.50	-	
2007	Other	Phased Released	-	4.843%	0.00	9.261%	-	-	8,095.00	0.50	-	
2008	Other	Phased Released	-	5.127%	0.00	9.710%	-	-	8,095.00	0.50	-	
2009	Other	Phased Released	-	5.411%	0.00	13.009%	-	-	8,095.00	0.50	-	
2010	Other	Phased Released	-	4.762%	0.00	20.234%	-	-	8,095.00	0.50	-	
2011	Other	Phased Released	-	4.101%	0.00	27.459%	-	-	8,095.00	0.50	-	
2012	Other	Phased Released	-	3.441%	0.00	34.685%	-	-	8,095.00	0.50	-	
2013	Other	Phased Released	-	2.781%	0.00	41.910%	-	-	8,095.00	0.50	-	
2014	Other	Phased Released	-	2.121%	0.00	49.135%	-	-	8,095.00	0.50	-	
2015	Other	Phased Released	-	1.461%	0.00	68.102%	-	-	8,095.00	0.50	-	
2016	Other	Phased Released	-	0.801%	0.00	53.606%	-	-	8,095.00	0.50	-	
2017	Other	Phased Released	-	0.141%	0.00	39.110%	-	-	8,095.00	0.50	-	
2018	Other	Phased Released	-	0.000%	0.00	24.614%	-	-	8,095.00	0.50	-	
2019	Other	Phased Released	-	0.000%	0.00	10.118%	-	-	8,095.00	0.50	-	

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2021								Avg recl Cost per Acre (19)	Adjustment Factor Permit Status (20)	Gross Cost (21)	
			Current Bonded Acres (4)	Adjustment		Factor		Release		Forfeited				
			Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)						
1963	Surface	Active	-	-	0.01%	-	0.88%	-	-	3,490.00	1	-		
1964	Surface	Active	-	-	0.01%	-	0.88%	-	-	3,490.00	1	-		
1965	Surface	Active	-	-	0.02%	-	0.93%	-	-	3,490.00	1	-		
1966	Surface	Active	-	-	0.03%	-	0.97%	-	-	3,490.00	1	-		
1967	Surface	Active	-	-	0.04%	-	1.02%	-	-	3,490.00	1	-		
1968	Surface	Active	-	-	0.04%	-	1.07%	-	-	3,490.00	1	-		
1969	Surface	Active	-	-	0.05%	-	1.11%	-	-	3,490.00	1	-		
1970	Surface	Active	-	-	0.06%	-	1.16%	-	-	3,490.00	1	-		
1971	Surface	Active	-	-	0.07%	-	1.21%	-	-	3,490.00	1	-		
1972	Surface	Active	400.00	394.28	0.08%	1.50	1.26%	0.46	4.95	3,490.00	1	1,593.29		
1973	Surface	Active	-	-	0.09%	-	1.30%	-	-	3,490.00	1	-		
1974	Surface	Active	-	-	0.09%	-	1.35%	-	-	3,490.00	1	-		
1975	Surface	Active	-	-	0.10%	-	1.40%	-	-	3,490.00	1	-		
1976	Surface	Active	-	-	0.11%	-	1.44%	-	-	3,490.00	1	-		
1977	Surface	Active	1,973.04	1,941.08	0.12%	0.67	1.49%	1.53	28.90	3,490.00	1	5,348.23		
1978	Surface	Active	2,430.48	2,390.38	0.13%	0.50	1.54%	1.51	36.71	3,490.00	1	5,283.61		
1979	Surface	Active	180.00	176.81	0.13%	1.00	1.58%	0.24	2.80	3,490.00	1	832.51		
1980	Surface	Active	1,036.66	1,018.50	0.14%	0.50	1.63%	0.73	16.59	3,490.00	1	2,544.37		
1981	Surface	Active	2,056.10	2,018.05	0.15%	0.80	1.68%	2.44	33.82	3,490.00	1	8,530.87		
1982	Surface	Active	807.96	792.53	0.16%	0.83	1.72%	1.05	13.65	3,490.00	1	3,679.92		
1983	Surface	Active	1,911.88	1,875.47	0.17%	0.50	1.77%	1.57	33.18	3,490.00	1	5,494.83		
1984	Surface	Active	380.49	373.05	0.18%	0.50	1.82%	0.33	6.78	3,490.00	1	1,146.66		
1985	Surface	Active	3,048.91	2,986.77	0.18%	0.67	1.86%	3.67	55.64	3,490.00	1	12,813.73		
1986	Surface	Active	2,331.92	2,281.95	0.19%	0.93	1.91%	4.08	43.58	3,490.00	1	14,245.78		
1987	Surface	Active	1,136.12	1,111.38	0.20%	0.83	1.96%	1.86	21.74	3,490.00	1	6,493.08		
1988	Surface	Active	1,898.10	1,855.58	0.21%	0.88	2.00%	3.40	37.17	3,490.00	1	11,850.26		
1989	Surface	Active	2,524.74	2,468.14	0.22%	0.64	2.05%	3.45	50.59	3,490.00	1	12,037.06		
1990	Surface	Active	2,764.18	2,699.94	0.23%	0.77	2.10%	4.71	56.61	3,490.00	1	16,428.03		
1991	Surface	Active	2,039.50	1,990.72	0.23%	0.83	2.14%	3.88	42.67	3,490.00	1	13,540.14		
1992	Surface	Active	5,324.50	5,198.73	0.24%	0.50	2.19%	6.29	113.86	3,490.00	1	21,964.01		
1993	Surface	Active	4,234.80	4,128.97	0.25%	0.83	2.24%	8.61	92.36	3,490.00	1	30,064.19		
1994	Surface	Active	2,051.59	2,001.04	0.26%	0.50	2.28%	2.59	45.70	3,490.00	1	9,030.04		
1995	Surface	Active	6,823.51	6,644.41	0.27%	0.90	2.33%	15.96	154.84	3,490.00	1	55,692.18		
1996	Surface	Active	4,574.89	4,452.33	0.28%	0.90	2.38%	11.02	105.84	3,490.00	1	38,471.80		
1997	Surface	Active	14,023.76	13,646.61	0.28%	0.75	2.42%	29.00	330.78	3,490.00	1	101,210.42		
1998	Surface	Active	10,267.14	9,990.04	0.29%	0.61	2.47%	17.63	246.82	3,490.00	1	61,533.18		
1999	Surface	Active	2,042.00	1,985.45	0.30%	0.67	2.52%	3.97	49.98	3,490.00	1	13,850.83		
2000	Surface	Active	4,526.19	4,400.86	0.31%	0.50	2.56%	6.78	112.85	3,490.00	1	23,659.14		
2001	Surface	Active	8,365.95	8,124.60	0.32%	0.70	2.61%	17.99	212.13	3,490.00	1	62,786.08		
2002	Surface	Active	5,939.08	5,765.94	0.32%	0.63	2.66%	11.85	153.24	3,490.00	1	41,365.86		
2003	Surface	Active	9,153.56	8,879.18	0.33%	0.72	2.70%	21.34	240.13	3,490.00	1	74,486.74		
2004	Surface	Active	12,208.29	11,834.73	0.34%	0.75	2.75%	30.27	325.59	3,490.00	1	105,653.47		
2005	Surface	Active	5,344.96	5,176.99	0.35%	0.83	2.80%	15.07	144.85	3,490.00	1	52,593.88		
2006	Surface	Active	3,906.10	3,780.82	0.36%	0.86	2.84%	11.68	107.55	3,490.00	1	40,746.39		
2007	Surface	Active	5,222.12	5,053.22	0.37%	0.79	2.89%	14.63	146.11	3,490.00	1	51,072.26		
2008	Surface	Active	5,368.62	5,196.90	0.37%	0.56	2.94%	10.86	152.69	3,490.00	1	37,911.84		
2009	Surface	Active	5,218.95	5,093.56	0.38%	0.75	2.98%	14.60	152.04	3,490.00	1	50,969.32		
2010	Surface	Active	2,480.78	2,425.89	0.39%	0.88	2.11%	8.38	51.18	3,490.00	1	29,249.61		
2011	Surface	Active	2,143.55	2,102.19	0.40%	0.79	1.86%	6.59	39.09	3,490.00	1	22,988.17		
2012	Surface	Active	3,191.42	3,137.18	0.41%	0.82	1.61%	10.45	50.50	3,490.00	1	36,462.43		
2013	Surface	Active	5,238.48	5,161.17	0.42%	0.86	1.36%	18.51	70.19	3,490.00	1	64,602.07		
2014	Surface	Active	3,650.67	3,607.88	0.42%	0.72	1.11%	11.04	40.05	3,490.00	1	38,515.01		
2015	Surface	Active	3,527.20	3,494.59	0.43%	0.71	0.86%	10.78	30.06	3,490.00	1	37,613.96		
2016	Surface	Active	2,150.64	2,137.11	0.44%	0.60	0.61%	5.64	13.04	3,490.00	1	19,691.29		
2017	Surface	Active	826.69	822.00	0.45%	1.00	0.36%	3.68	2.96	3,490.00	1	12,859.79		
2018	Surface	Active	2,175.19	2,164.67	0.46%	0.83	0.11%	8.23	2.39	3,490.00	1	28,740.03		
2019	Surface	Active	849.88	849.18	0.46%	0.83	0.10%	3.29	0.82	3,490.00	1	11,478.10		



Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Current Bonded Acres (4)	Adjustment						Avg recl Cost per Acre (19)	Adjustment Factor Permit Status (20)	Gross Cost (21)
				Adjusted Acres (13)	Forfeiture Rate (14)	Factor Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)			
1963	Surface	Inactive	-	-	0.02%	-	0.61%	-	-	3,490.00	1	-
1964	Surface	Inactive	-	-	0.02%	-	0.61%	-	-	3,490.00	1	-
1965	Surface	Inactive	-	-	0.03%	-	0.64%	-	-	3,490.00	1	-
1966	Surface	Inactive	-	-	0.04%	-	0.67%	-	-	3,490.00	1	-
1967	Surface	Inactive	-	-	0.05%	-	0.70%	-	-	3,490.00	1	-
1968	Surface	Inactive	-	-	0.07%	-	0.73%	-	-	3,490.00	1	-
1969	Surface	Inactive	-	-	0.08%	-	0.77%	-	-	3,490.00	1	-
1970	Surface	Inactive	-	-	0.09%	-	0.80%	-	-	3,490.00	1	-
1971	Surface	Inactive	-	-	0.10%	-	0.83%	-	-	3,490.00	1	-
1972	Surface	Inactive	-	-	0.12%	-	0.86%	-	-	3,490.00	1	-
1973	Surface	Inactive	-	-	0.13%	-	0.90%	-	-	3,490.00	1	-
1974	Surface	Inactive	-	-	0.14%	-	0.93%	-	-	3,490.00	1	-
1975	Surface	Inactive	-	-	0.15%	-	0.96%	-	-	3,490.00	1	-
1976	Surface	Inactive	438.80	433.92	0.17%	0.50	0.99%	0.36	4.30	3,490.00	1	1,251.36
1977	Surface	Inactive	-	-	0.18%	-	1.02%	-	-	3,490.00	1	-
1978	Surface	Inactive	-	-	0.19%	-	1.06%	-	-	3,490.00	1	-
1979	Surface	Inactive	-	-	0.20%	-	1.09%	-	-	3,490.00	1	-
1980	Surface	Inactive	-	-	0.21%	-	1.12%	-	-	3,490.00	1	-
1981	Surface	Inactive	-	-	0.23%	-	1.15%	-	-	3,490.00	1	-
1982	Surface	Inactive	-	-	0.24%	-	1.18%	-	-	3,490.00	1	-
1983	Surface	Inactive	-	-	0.25%	-	1.22%	-	-	3,490.00	1	-
1984	Surface	Inactive	-	-	0.26%	-	1.25%	-	-	3,490.00	1	-
1985	Surface	Inactive	-	-	0.28%	-	1.28%	-	-	3,490.00	1	-
1986	Surface	Inactive	224.46	221.10	0.29%	0.50	1.31%	0.32	2.90	3,490.00	1	1,114.86
1987	Surface	Inactive	327.57	322.55	0.30%	0.50	1.35%	0.49	4.34	3,490.00	1	1,695.98
1988	Surface	Inactive	1,135.24	1,117.39	0.31%	0.50	1.38%	1.75	15.39	3,490.00	1	6,116.54
1989	Surface	Inactive	273.00	268.14	0.33%	1.00	1.41%	0.87	3.78	3,490.00	1	3,051.33
1990	Surface	Inactive	228.27	224.51	0.34%	0.50	1.44%	0.38	3.24	3,490.00	1	1,325.85
1991	Surface	Inactive	-	-	0.35%	-	1.47%	-	-	3,490.00	1	-
1992	Surface	Inactive	-	-	0.36%	-	1.51%	-	-	3,490.00	1	-
1993	Surface	Inactive	-	-	0.38%	-	1.54%	-	-	3,490.00	1	-
1994	Surface	Inactive	578.94	568.51	0.39%	0.50	1.57%	1.10	8.93	3,490.00	1	3,848.22
1995	Surface	Inactive	2,009.82	1,972.83	0.40%	0.50	1.60%	3.95	31.61	3,490.00	1	13,779.88
1996	Surface	Inactive	1,639.13	1,608.33	0.41%	0.50	1.63%	3.32	26.28	3,490.00	1	11,581.09
1997	Surface	Inactive	-	-	0.43%	-	1.67%	-	-	3,490.00	1	-
1998	Surface	Inactive	846.89	830.33	0.44%	0.50	1.70%	1.82	14.10	3,490.00	1	6,337.37
1999	Surface	Inactive	519.96	509.59	0.45%	0.50	1.73%	1.15	8.82	3,490.00	1	3,999.39
2000	Surface	Inactive	-	-	0.46%	-	1.76%	-	-	3,490.00	1	-
2001	Surface	Inactive	571.94	560.10	0.47%	0.50	1.80%	1.33	10.05	3,490.00	1	4,637.54
2002	Surface	Inactive	1,304.87	1,277.35	0.49%	0.50	1.83%	3.11	23.34	3,490.00	1	10,852.03
2003	Surface	Inactive	1,948.57	1,906.73	0.50%	0.50	1.86%	4.76	35.45	3,490.00	1	16,610.61
2004	Surface	Inactive	898.15	878.52	0.51%	0.50	1.89%	2.25	16.62	3,490.00	1	7,842.91
2005	Surface	Inactive	25.99	25.27	0.52%	1.50	1.92%	0.20	0.49	3,490.00	1	693.22
2006	Surface	Inactive	244.34	238.81	0.54%	0.50	1.96%	0.64	4.67	3,490.00	1	2,235.07
2007	Surface	Inactive	111.49	108.93	0.55%	0.50	1.99%	0.30	2.17	3,490.00	1	1,042.95
2008	Surface	Inactive	441.20	429.62	0.56%	1.00	2.02%	2.41	8.68	3,490.00	1	8,412.54
2009	Surface	Inactive	578.55	568.46	0.57%	0.50	2.05%	1.63	11.67	3,490.00	1	5,688.40
2010	Surface	Inactive	5.11	5.00	0.59%	1.50	1.45%	0.04	0.07	3,490.00	1	153.30
2011	Surface	Inactive	1,256.17	1,238.43	0.60%	0.50	1.28%	3.70	15.83	3,490.00	1	12,927.12
2012	Surface	Inactive	452.53	446.89	0.61%	0.50	1.11%	1.36	4.95	3,490.00	1	4,761.22
2013	Surface	Inactive	246.68	244.01	0.62%	0.50	0.93%	0.76	2.28	3,490.00	1	2,652.43
2014	Surface	Inactive	1,081.42	1,071.52	0.64%	0.50	0.76%	3.40	8.18	3,490.00	1	11,878.71
2015	Surface	Inactive	246.00	244.16	0.65%	0.50	0.59%	0.79	1.44	3,490.00	1	2,759.37
2016	Surface	Inactive	7.00	6.91	0.66%	1.50	0.42%	0.07	0.03	3,490.00	1	238.83
2017	Surface	Inactive	-	-	0.67%	-	0.25%	-	-	3,490.00	1	-
2018	Surface	Inactive	-	-	0.68%	-	0.08%	-	-	3,490.00	1	-
2019	Surface	Inactive	-	-	0.70%	-	0.07%	-	-	3,490.00	1	-

Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	Adjustment					Avg recl Cost per Acre	Adjustment		
				Adjusted Acres	Forfeiture Rate	Factor Permit Bond Size	Release Rate	Forfeited Acres		Released Acres	Factor Permit Status	Gross Cost
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1963	Surface	Phased Released	-	-	0.07%	-	2.75%	-	-	3,490.00	0.5	-
1964	Surface	Phased Released	-	-	0.07%	-	2.75%	-	-	3,490.00	0.5	-
1965	Surface	Phased Released	-	-	0.12%	-	2.90%	-	-	3,490.00	0.5	-
1966	Surface	Phased Released	-	-	0.17%	-	3.05%	-	-	3,490.00	0.5	-
1967	Surface	Phased Released	-	-	0.22%	-	3.19%	-	-	3,490.00	0.5	-
1968	Surface	Phased Released	-	-	0.27%	-	3.34%	-	-	3,490.00	0.5	-
1969	Surface	Phased Released	-	-	0.31%	-	3.48%	-	-	3,490.00	0.5	-
1970	Surface	Phased Released	-	-	0.36%	-	3.63%	-	-	3,490.00	0.5	-
1971	Surface	Phased Released	-	-	0.41%	-	3.78%	-	-	3,490.00	0.5	-
1972	Surface	Phased Released	-	-	0.46%	-	3.92%	-	-	3,490.00	0.5	-
1973	Surface	Phased Released	-	-	0.51%	-	4.07%	-	-	3,490.00	0.5	-
1974	Surface	Phased Released	189.60	179.59	0.56%	1.50	4.21%	1.51	7.57	3,490.00	0.5	2,642.37
1975	Surface	Phased Released	75.30	71.16	0.61%	1.50	4.36%	0.65	3.10	3,490.00	0.5	1,139.14
1976	Surface	Phased Released	626.17	590.36	0.66%	1.50	4.51%	5.85	26.61	3,490.00	0.5	10,215.15
1977	Surface	Phased Released	48.00	45.15	0.71%	1.50	4.65%	0.48	2.10	3,490.00	0.5	839.70
1978	Surface	Phased Released	642.27	602.71	0.76%	1.50	4.80%	6.87	28.92	3,490.00	0.5	11,989.91
1979	Surface	Phased Released	358.00	335.16	0.81%	1.50	4.94%	4.07	16.57	3,490.00	0.5	7,101.51
1980	Surface	Phased Released	857.15	802.53	0.86%	1.25	5.09%	8.62	40.86	3,490.00	0.5	15,036.25
1981	Surface	Phased Released	1,738.41	1,625.40	0.91%	1.17	5.24%	17.23	85.12	3,490.00	0.5	30,060.66
1982	Surface	Phased Released	-	-	0.96%	-	5.38%	-	-	3,490.00	0.5	-
1983	Surface	Phased Released	612.11	567.67	1.01%	1.50	5.53%	8.58	31.39	3,490.00	0.5	14,968.51
1984	Surface	Phased Released	2,777.39	2,581.90	1.06%	1.10	5.68%	30.02	146.53	3,490.00	0.5	52,378.04
1985	Surface	Phased Released	627.29	578.98	1.11%	1.50	5.82%	9.61	33.71	3,490.00	0.5	16,766.45
1986	Surface	Phased Released	1,225.56	1,133.40	1.16%	1.17	5.97%	15.28	67.64	3,490.00	0.5	26,669.57
1987	Surface	Phased Released	760.81	703.64	1.21%	1.00	6.11%	8.48	43.02	3,490.00	0.5	14,799.24
1988	Surface	Phased Released	505.00	462.77	1.25%	1.50	6.26%	8.71	28.97	3,490.00	0.5	15,199.11
1989	Surface	Phased Released	1,650.04	1,515.87	1.30%	1.17	6.41%	23.07	97.11	3,490.00	0.5	40,249.94
1990	Surface	Phased Released	1,502.96	1,375.93	1.35%	1.25	6.55%	23.28	90.15	3,490.00	0.5	40,628.66
1991	Surface	Phased Released	979.45	896.76	1.40%	1.10	6.70%	13.84	60.07	3,490.00	0.5	24,153.87
1992	Surface	Phased Released	73.00	66.25	1.45%	1.50	6.84%	1.44	4.53	3,490.00	0.5	2,519.17
1993	Surface	Phased Released	562.59	509.35	1.50%	1.50	6.99%	11.48	35.60	3,490.00	0.5	20,027.00
1994	Surface	Phased Released	2,272.45	2,081.49	1.55%	0.70	7.14%	22.61	148.54	3,490.00	0.5	39,450.89
1995	Surface	Phased Released	436.30	396.69	1.60%	1.00	7.28%	6.35	28.89	3,490.00	0.5	11,083.20
1996	Surface	Phased Released	613.01	555.11	1.65%	1.10	7.43%	10.08	41.24	3,490.00	0.5	17,587.63
1997	Surface	Phased Released	1,168.05	1,057.43	1.70%	1.00	7.57%	17.98	80.10	3,490.00	0.5	31,369.87
1998	Surface	Phased Released	511.73	463.80	1.75%	0.83	7.72%	6.76	35.81	3,490.00	0.5	11,799.66
1999	Surface	Phased Released	-	-	1.80%	-	7.87%	-	-	3,490.00	0.5	-
2000	Surface	Phased Released	-	-	1.85%	1.50	8.01%	-	-	3,490.00	0.5	-
2001	Surface	Phased Released	462.58	413.65	1.90%	1.17	8.16%	9.16	33.75	3,490.00	0.5	15,983.29
2002	Surface	Phased Released	106.29	94.12	1.95%	1.50	8.31%	2.75	7.82	3,490.00	0.5	4,797.88
2003	Surface	Phased Released	-	-	2.00%	1.50	8.45%	-	-	3,490.00	0.5	-
2004	Surface	Phased Released	183.99	165.97	2.05%	0.50	8.60%	1.70	14.27	3,490.00	0.5	2,963.45
2005	Surface	Phased Released	51.50	45.26	2.10%	1.50	8.74%	1.42	3.96	3,490.00	0.5	2,483.19
2006	Surface	Phased Released	60.78	53.29	2.15%	1.50	8.89%	1.71	4.74	3,490.00	0.5	2,992.31
2007	Surface	Phased Released	-	-	2.19%	-	9.04%	-	-	3,490.00	0.5	-
2008	Surface	Phased Released	124.65	110.16	2.24%	1.00	9.18%	2.47	10.11	3,490.00	0.5	4,314.35
2009	Surface	Phased Released	262.02	237.07	2.29%	1.25	9.33%	6.80	22.11	3,490.00	0.5	11,861.41
2010	Surface	Phased Released	-	-	2.34%	-	6.59%	-	-	3,490.00	0.5	-
2011	Surface	Phased Released	77.50	70.76	2.39%	1.50	5.81%	2.54	4.11	3,490.00	0.5	4,431.82
2012	Surface	Phased Released	-	-	2.44%	-	5.03%	-	-	3,490.00	0.5	-
2013	Surface	Phased Released	-	-	2.49%	-	4.25%	-	-	3,490.00	0.5	-
2014	Surface	Phased Released	27.91	26.08	2.54%	1.50	3.47%	0.99	0.90	3,490.00	0.5	1,734.39
2015	Surface	Phased Released	-	-	2.59%	-	2.69%	-	-	3,490.00	0.5	-
2016	Surface	Phased Released	-	-	2.64%	-	1.91%	-	-	3,490.00	0.5	-
2017	Surface	Phased Released	-	-	2.69%	-	1.13%	-	-	3,490.00	0.5	-
2018	Surface	Phased Released	-	-	2.74%	-	0.35%	-	-	3,490.00	0.5	-
2019	Surface	Phased Released	-	-	2.79%	-	0.30%	-	-	3,490.00	0.5	-

Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	Adjustment					Avg recl Cost per Acre	Adjustment		
				Adjusted Acres	Forfeiture Rate	Factor Permit Bond Size	Release Rate	Forfeited Acres		Released Acres	Factor Permit Status	Gross Cost
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1963	Underground	Active	-	-	0.07%	-	0.19%	-	-	5,690.00	1	-
1964	Underground	Active	-	-	0.07%	-	0.19%	-	-	5,690.00	1	-
1965	Underground	Active	-	-	0.07%	-	0.29%	-	-	5,690.00	1	-
1966	Underground	Active	-	-	0.08%	-	0.38%	-	-	5,690.00	1	-
1967	Underground	Active	-	-	0.08%	-	0.48%	-	-	5,690.00	1	-
1968	Underground	Active	-	-	0.08%	-	0.57%	-	-	5,690.00	1	-
1969	Underground	Active	-	-	0.08%	-	0.67%	-	-	5,690.00	1	-
1970	Underground	Active	-	-	0.09%	-	0.76%	-	-	5,690.00	1	-
1971	Underground	Active	-	-	0.09%	-	0.86%	-	-	5,690.00	1	-
1972	Underground	Active	-	-	0.09%	-	0.95%	-	-	5,690.00	1	-
1973	Underground	Active	-	-	0.10%	-	1.05%	-	-	5,690.00	1	-
1974	Underground	Active	-	-	0.10%	-	1.14%	-	-	5,690.00	1	-
1975	Underground	Active	-	-	0.10%	-	1.24%	-	-	5,690.00	1	-
1976	Underground	Active	-	-	0.11%	-	1.33%	-	-	5,690.00	1	-
1977	Underground	Active	22.53	22.15	0.11%	1.50	1.43%	0.04	0.32	5,690.00	1	205.34
1978	Underground	Active	117.89	115.84	0.11%	1.00	1.53%	0.13	1.77	5,690.00	1	735.48
1979	Underground	Active	739.73	725.98	0.11%	1.21	1.62%	1.01	11.77	5,690.00	1	5,745.26
1980	Underground	Active	222.16	217.84	0.12%	1.10	1.72%	0.28	3.74	5,690.00	1	1,602.03
1981	Underground	Active	1,054.16	1,032.57	0.12%	1.15	1.81%	1.43	18.70	5,690.00	1	8,138.66
1982	Underground	Active	37.93	37.11	0.12%	1.17	1.91%	0.05	0.71	5,690.00	1	304.07
1983	Underground	Active	6,931.45	6,778.32	0.13%	0.87	2.00%	7.42	135.69	5,690.00	1	42,241.24
1984	Underground	Active	3,035.00	2,964.44	0.13%	1.00	2.10%	3.83	62.17	5,690.00	1	21,815.02
1985	Underground	Active	50.69	49.43	0.13%	1.50	2.19%	0.10	1.08	5,690.00	1	558.08
1986	Underground	Active	280.37	273.24	0.14%	1.17	2.29%	0.43	6.25	5,690.00	1	2,453.16
1987	Underground	Active	198.36	193.14	0.14%	1.10	2.38%	0.29	4.60	5,690.00	1	1,670.68
1988	Underground	Active	215.95	210.03	0.14%	1.17	2.48%	0.35	5.21	5,690.00	1	1,968.17
1989	Underground	Active	260.68	253.19	0.14%	1.40	2.57%	0.51	6.52	5,690.00	1	2,906.77
1990	Underground	Active	162.46	157.68	0.15%	1.17	2.67%	0.27	4.21	5,690.00	1	1,539.59
1991	Underground	Active	223.30	216.49	0.15%	1.25	2.76%	0.41	5.98	5,690.00	1	2,310.25
1992	Underground	Active	1,081.93	1,048.15	0.15%	1.07	2.86%	1.72	29.97	5,690.00	1	9,776.51
1993	Underground	Active	935.11	905.04	0.16%	1.05	2.95%	1.48	26.74	5,690.00	1	8,396.22
1994	Underground	Active	613.35	593.03	0.16%	1.04	3.05%	0.98	18.09	5,690.00	1	5,568.51
1995	Underground	Active	194.98	188.34	0.16%	1.00	3.15%	0.30	5.92	5,690.00	1	1,734.71
1996	Underground	Active	117.87	113.67	0.16%	1.38	3.24%	0.26	3.68	5,690.00	1	1,465.83
1997	Underground	Active	467.81	450.75	0.17%	1.26	3.34%	0.96	15.04	5,690.00	1	5,442.51
1998	Underground	Active	578.22	556.93	0.17%	0.90	3.43%	0.86	19.11	5,690.00	1	4,869.74
1999	Underground	Active	803.93	772.99	0.17%	1.29	3.53%	1.73	27.26	5,690.00	1	9,822.99
2000	Underground	Active	587.54	564.86	0.18%	0.80	3.62%	0.80	20.46	5,690.00	1	4,542.44
2001	Underground	Active	189.73	182.19	0.18%	0.90	3.72%	0.29	6.77	5,690.00	1	1,675.82
2002	Underground	Active	309.16	297.49	0.18%	1.41	3.81%	0.77	11.34	5,690.00	1	4,354.89
2003	Underground	Active	994.29	958.33	0.19%	1.30	3.51%	2.31	33.67	5,690.00	1	13,152.44
2004	Underground	Active	890.05	859.52	0.19%	1.05	3.37%	1.69	28.98	5,690.00	1	9,637.87
2005	Underground	Active	327.69	316.89	0.19%	1.07	3.23%	0.65	10.23	5,690.00	1	3,698.73
2006	Underground	Active	427.71	414.41	0.19%	0.83	3.09%	0.67	12.79	5,690.00	1	3,820.21
2007	Underground	Active	527.87	511.80	0.20%	1.20	2.95%	1.21	15.07	5,690.00	1	6,897.36
2008	Underground	Active	159.18	154.46	0.20%	1.50	2.80%	0.46	4.33	5,690.00	1	2,640.97
2009	Underground	Active	307.40	298.92	0.20%	1.17	2.66%	0.71	7.96	5,690.00	1	4,033.88
2010	Underground	Active	156.43	152.25	0.21%	1.42	2.52%	0.44	3.84	5,690.00	1	2,531.16
2011	Underground	Active	199.42	194.40	0.21%	1.33	2.38%	0.54	4.62	5,690.00	1	3,085.45
2012	Underground	Active	217.12	212.05	0.21%	1.13	2.24%	0.51	4.74	5,690.00	1	2,879.89
2013	Underground	Active	278.12	271.82	0.22%	1.43	2.09%	0.84	5.69	5,690.00	1	4,769.07
2014	Underground	Active	477.33	467.39	0.22%	1.24	1.95%	1.26	9.12	5,690.00	1	7,186.61
2015	Underground	Active	146.07	143.14	0.22%	1.50	1.81%	0.47	2.59	5,690.00	1	2,700.52
2016	Underground	Active	134.19	131.69	0.22%	1.50	1.67%	0.44	2.20	5,690.00	1	2,517.62
2017	Underground	Active	53.20	52.28	0.23%	1.50	1.53%	0.18	0.80	5,690.00	1	1,012.72
2018	Underground	Active	35.49	34.93	0.23%	1.50	1.38%	0.12	0.48	5,690.00	1	685.35
2019	Underground	Active	45.89	45.39	0.23%	1.50	1.24%	0.16	0.56	5,690.00	1	902.07

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2021							Avg recl Cost per Acre (19)	Adjustment	
			Current Bonded Acres (4)	Adjustment					Factor Permit Bond Size (15)		Factor Permit Status (20)	Gross Cost (21)
			Adjusted Acres (13)	Forfeiture Rate (14)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Release Rate (16)	Forfeited Acres (17)		Released Acres (18)	
1963	Underground	Inactive	-	-	0.11%	-	0.13%	-	-	5,690.00	1	-
1964	Underground	Inactive	-	-	0.11%	-	0.13%	-	-	5,690.00	1	-
1965	Underground	Inactive	-	-	0.11%	-	0.20%	-	-	5,690.00	1	-
1966	Underground	Inactive	-	-	0.11%	-	0.26%	-	-	5,690.00	1	-
1967	Underground	Inactive	-	-	0.12%	-	0.33%	-	-	5,690.00	1	-
1968	Underground	Inactive	-	-	0.12%	-	0.39%	-	-	5,690.00	1	-
1969	Underground	Inactive	-	-	0.13%	-	0.46%	-	-	5,690.00	1	-
1970	Underground	Inactive	-	-	0.13%	-	0.52%	-	-	5,690.00	1	-
1971	Underground	Inactive	-	-	0.14%	-	0.59%	-	-	5,690.00	1	-
1972	Underground	Inactive	-	-	0.14%	-	0.66%	-	-	5,690.00	1	-
1973	Underground	Inactive	-	-	0.15%	-	0.72%	-	-	5,690.00	1	-
1974	Underground	Inactive	-	-	0.15%	-	0.79%	-	-	5,690.00	1	-
1975	Underground	Inactive	-	-	0.15%	-	0.85%	-	-	5,690.00	1	-
1976	Underground	Inactive	103.30	102.20	0.16%	0.50	0.92%	0.08	0.94	5,690.00	1	460.84
1977	Underground	Inactive	-	-	0.16%	-	0.98%	-	-	5,690.00	1	-
1978	Underground	Inactive	-	-	0.17%	-	1.05%	-	-	5,690.00	1	-
1979	Underground	Inactive	6.60	6.52	0.17%	0.50	1.11%	0.01	0.07	5,690.00	1	31.85
1980	Underground	Inactive	-	-	0.18%	-	1.18%	-	-	5,690.00	1	-
1981	Underground	Inactive	86.84	85.54	0.18%	1.00	1.25%	0.15	1.07	5,690.00	1	879.43
1982	Underground	Inactive	128.47	126.58	0.19%	0.50	1.31%	0.12	1.66	5,690.00	1	666.66
1983	Underground	Inactive	461.99	454.54	0.19%	0.88	1.38%	0.75	6.26	5,690.00	1	4,289.82
1984	Underground	Inactive	80.60	79.31	0.19%	0.50	1.44%	0.08	1.14	5,690.00	1	437.70
1985	Underground	Inactive	230.46	226.37	0.20%	1.00	1.51%	0.45	3.41	5,690.00	1	2,555.88
1986	Underground	Inactive	43.54	42.78	0.20%	0.50	1.57%	0.04	0.67	5,690.00	1	246.92
1987	Underground	Inactive	40.89	40.06	0.21%	1.50	1.64%	0.12	0.66	5,690.00	1	708.87
1988	Underground	Inactive	145.69	142.74	0.21%	1.17	1.70%	0.35	2.43	5,690.00	1	2,006.47
1989	Underground	Inactive	56.90	55.79	0.22%	0.50	1.77%	0.06	0.99	5,690.00	1	343.15
1990	Underground	Inactive	31.94	31.23	0.22%	1.50	1.83%	0.10	0.57	5,690.00	1	587.97
1991	Underground	Inactive	146.44	143.17	0.23%	1.17	1.90%	0.38	2.72	5,690.00	1	2,138.96
1992	Underground	Inactive	9.00	8.79	0.23%	1.50	1.97%	0.03	0.17	5,690.00	1	172.09
1993	Underground	Inactive	73.56	71.80	0.23%	1.25	2.03%	0.21	1.46	5,690.00	1	1,194.62
1994	Underground	Inactive	247.11	241.47	0.24%	0.50	2.10%	0.29	5.06	5,690.00	1	1,637.54
1995	Underground	Inactive	253.81	247.42	0.24%	1.17	2.16%	0.70	5.35	5,690.00	1	3,988.07
1996	Underground	Inactive	177.16	172.70	0.25%	0.90	2.23%	0.38	3.85	5,690.00	1	2,186.58
1997	Underground	Inactive	58.94	57.36	0.25%	1.25	2.29%	0.18	1.32	5,690.00	1	1,026.82
1998	Underground	Inactive	75.86	73.79	0.26%	1.17	2.36%	0.22	1.74	5,690.00	1	1,254.59
1999	Underground	Inactive	178.02	173.04	0.26%	1.17	2.42%	0.53	4.20	5,690.00	1	2,992.98
2000	Underground	Inactive	79.39	77.04	0.26%	1.50	2.49%	0.31	1.92	5,690.00	1	1,742.45
2001	Underground	Inactive	93.58	90.83	0.27%	1.17	2.56%	0.29	2.32	5,690.00	1	1,624.55
2002	Underground	Inactive	47.21	46.00	0.27%	0.50	2.62%	0.06	1.21	5,690.00	1	358.45
2003	Underground	Inactive	230.42	224.43	0.28%	1.00	2.42%	0.62	5.42	5,690.00	1	3,553.98
2004	Underground	Inactive	31.38	30.64	0.28%	0.50	2.32%	0.04	0.71	5,690.00	1	246.46
2005	Underground	Inactive	134.53	131.09	0.29%	1.50	2.22%	0.56	2.91	5,690.00	1	3,213.07
2006	Underground	Inactive	151.61	147.99	0.29%	1.21	2.12%	0.52	3.14	5,690.00	1	2,981.94
2007	Underground	Inactive	130.13	127.17	0.30%	1.17	2.03%	0.44	2.58	5,690.00	1	2,499.24
2008	Underground	Inactive	78.55	76.75	0.30%	1.50	1.93%	0.35	1.48	5,690.00	1	1,968.53
2009	Underground	Inactive	103.13	100.92	0.30%	1.33	1.83%	0.41	1.85	5,690.00	1	2,334.68
2010	Underground	Inactive	258.26	253.03	0.31%	1.25	1.73%	0.98	4.38	5,690.00	1	5,567.60
2011	Underground	Inactive	145.23	142.30	0.31%	1.50	1.63%	0.67	2.33	5,690.00	1	3,811.44
2012	Underground	Inactive	41.32	40.53	0.32%	1.50	1.54%	0.19	0.62	5,690.00	1	1,100.76
2013	Underground	Inactive	22.73	22.31	0.32%	1.50	1.44%	0.11	0.32	5,690.00	1	614.54
2014	Underground	Inactive	-	-	0.33%	-	1.34%	-	-	5,690.00	1	-
2015	Underground	Inactive	-	-	0.33%	-	1.24%	-	-	5,690.00	1	-
2016	Underground	Inactive	-	-	0.34%	-	1.15%	-	-	5,690.00	1	-
2017	Underground	Inactive	-	-	0.34%	-	1.05%	-	-	5,690.00	1	-
2018	Underground	Inactive	26.00	25.64	0.34%	1.50	0.95%	0.13	0.24	5,690.00	1	754.77
2019	Underground	Inactive	-	-	0.35%	-	0.85%	-	-	5,690.00	1	-

Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	Adjustment						Adjustment		Gross Cost
				Adjusted	Forfeiture	Factor	Release	Forfeited	Released	Avg recl	Factor	
				Acres	Rate	Permit	Rate	Acres	Acres	Cost per	Permit	
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1963	Underground	Phased Released	-	-	0.42%	-	0.60%	-	-	5,690.00	0.5	-
1964	Underground	Phased Released	-	-	0.42%	-	0.60%	-	-	5,690.00	0.5	-
1965	Underground	Phased Released	-	-	0.44%	-	0.90%	-	-	5,690.00	0.5	-
1966	Underground	Phased Released	-	-	0.46%	-	1.19%	-	-	5,690.00	0.5	-
1967	Underground	Phased Released	-	-	0.47%	-	1.49%	-	-	5,690.00	0.5	-
1968	Underground	Phased Released	-	-	0.49%	-	1.79%	-	-	5,690.00	0.5	-
1969	Underground	Phased Released	-	-	0.51%	-	2.09%	-	-	5,690.00	0.5	-
1970	Underground	Phased Released	-	-	0.53%	-	2.38%	-	-	5,690.00	0.5	-
1971	Underground	Phased Released	-	-	0.55%	-	2.68%	-	-	5,690.00	0.5	-
1972	Underground	Phased Released	-	-	0.56%	-	2.98%	-	-	5,690.00	0.5	-
1973	Underground	Phased Released	-	-	0.58%	-	3.28%	-	-	5,690.00	0.5	-
1974	Underground	Phased Released	-	-	0.60%	-	3.58%	-	-	5,690.00	0.5	-
1975	Underground	Phased Released	-	-	0.62%	-	3.87%	-	-	5,690.00	0.5	-
1976	Underground	Phased Released	-	-	0.63%	-	4.17%	-	-	5,690.00	0.5	-
1977	Underground	Phased Released	-	-	0.65%	-	4.47%	-	-	5,690.00	0.5	-
1978	Underground	Phased Released	23.13	21.72	0.67%	1.50	4.77%	0.22	1.04	5,690.00	0.5	620.54
1979	Underground	Phased Released	59.68	55.85	0.69%	1.50	5.06%	0.58	2.83	5,690.00	0.5	1,637.90
1980	Underground	Phased Released	87.19	81.31	0.70%	1.50	5.36%	0.86	4.36	5,690.00	0.5	2,446.20
1981	Underground	Phased Released	85.14	79.20	0.72%	1.38	5.66%	0.79	4.48	5,690.00	0.5	2,239.18
1982	Underground	Phased Released	199.06	184.34	0.74%	1.50	5.96%	2.05	10.98	5,690.00	0.5	5,825.25
1983	Underground	Phased Released	97.63	90.10	0.76%	1.50	6.26%	1.02	5.64	5,690.00	0.5	2,915.26
1984	Underground	Phased Released	15.00	13.79	0.78%	1.50	6.55%	0.16	0.90	5,690.00	0.5	456.78
1985	Underground	Phased Released	32.59	29.86	0.79%	1.50	6.85%	0.36	2.05	5,690.00	0.5	1,011.55
1986	Underground	Phased Released	98.80	90.21	0.81%	1.50	7.15%	1.10	6.45	5,690.00	0.5	3,124.09
1987	Underground	Phased Released	111.49	101.44	0.83%	1.50	7.45%	1.26	7.55	5,690.00	0.5	3,589.67
1988	Underground	Phased Released	129.44	117.35	0.85%	1.50	7.74%	1.49	9.09	5,690.00	0.5	4,241.64
1989	Underground	Phased Released	146.44	132.29	0.86%	1.50	8.04%	1.72	10.64	5,690.00	0.5	4,881.76
1990	Underground	Phased Released	18.31	16.48	0.88%	1.50	8.34%	0.22	1.37	5,690.00	0.5	620.68
1991	Underground	Phased Released	40.12	35.98	0.90%	1.50	8.64%	0.49	3.11	5,690.00	0.5	1,382.36
1992	Underground	Phased Released	24.27	21.69	0.92%	1.50	8.94%	0.30	1.94	5,690.00	0.5	849.64
1993	Underground	Phased Released	29.46	26.23	0.94%	1.50	9.23%	0.37	2.42	5,690.00	0.5	1,047.46
1994	Underground	Phased Released	26.14	23.19	0.95%	1.50	9.53%	0.33	2.21	5,690.00	0.5	943.59
1995	Underground	Phased Released	67.71	59.85	0.97%	1.50	9.83%	0.87	5.88	5,690.00	0.5	2,480.57
1996	Underground	Phased Released	141.07	124.23	0.99%	1.50	10.13%	1.84	12.58	5,690.00	0.5	5,243.27
1997	Underground	Phased Released	149.46	131.14	1.01%	1.50	10.42%	1.98	13.67	5,690.00	0.5	5,633.98
1998	Underground	Phased Released	70.67	61.78	1.02%	1.50	10.72%	0.95	6.62	5,690.00	0.5	2,700.89
1999	Underground	Phased Released	10.68	9.30	1.04%	1.50	11.02%	0.15	1.03	5,690.00	0.5	413.70
2000	Underground	Phased Released	59.65	51.76	1.06%	1.50	11.32%	0.82	5.86	5,690.00	0.5	2,341.22
2001	Underground	Phased Released	36.60	31.64	1.08%	1.50	11.62%	0.51	3.67	5,690.00	0.5	1,455.12
2002	Underground	Phased Released	116.87	102.09	1.10%	1.50	11.91%	1.68	12.16	5,690.00	0.5	4,772.50
2003	Underground	Phased Released	47.15	41.38	1.11%	1.50	10.98%	0.69	4.54	5,690.00	0.5	1,965.96
2004	Underground	Phased Released	16.25	14.33	1.13%	1.50	10.54%	0.24	1.51	5,690.00	0.5	691.63
2005	Underground	Phased Released	-	-	1.15%	-	10.09%	-	-	5,690.00	0.5	-
2006	Underground	Phased Released	-	-	1.17%	-	9.65%	-	-	5,690.00	0.5	-
2007	Underground	Phased Released	-	-	1.18%	-	9.20%	-	-	5,690.00	0.5	-
2008	Underground	Phased Released	43.07	38.70	1.20%	1.50	8.76%	0.70	3.39	5,690.00	0.5	1,985.10
2009	Underground	Phased Released	54.60	49.29	1.22%	1.50	8.32%	0.90	4.10	5,690.00	0.5	2,565.55
2010	Underground	Phased Released	-	-	1.24%	-	7.87%	-	-	5,690.00	0.5	-
2011	Underground	Phased Released	-	-	1.26%	-	7.43%	-	-	5,690.00	0.5	-
2012	Underground	Phased Released	-	-	1.27%	-	6.99%	-	-	5,690.00	0.5	-
2013	Underground	Phased Released	-	-	1.29%	-	6.54%	-	-	5,690.00	0.5	-
2014	Underground	Phased Released	-	-	1.31%	-	6.10%	-	-	5,690.00	0.5	-
2015	Underground	Phased Released	-	-	1.33%	-	5.65%	-	-	5,690.00	0.5	-
2016	Underground	Phased Released	-	-	1.34%	-	5.21%	-	-	5,690.00	0.5	-
2017	Underground	Phased Released	-	-	1.36%	-	4.77%	-	-	5,690.00	0.5	-
2018	Underground	Phased Released	-	-	1.38%	-	4.32%	-	-	5,690.00	0.5	-
2019	Underground	Phased Released	-	-	1.40%	-	3.88%	-	-	5,690.00	0.5	-

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Current Bonded Acres (4)	Adjustment					Avg recl Cost per Acre (19)	Adjustment		
				Adjusted Acres (13)	Forfeiture Rate (14)	Factor Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)		Released Acres (18)	Factor Permit Status (20)	Gross Cost (21)
1963	Other	Active	-	-	0.16%	-	3.53%	-	-	8,095.00	1	-
1964	Other	Active	-	-	0.16%	-	3.53%	-	-	8,095.00	1	-
1965	Other	Active	-	-	0.16%	-	3.44%	-	-	8,095.00	1	-
1966	Other	Active	-	-	0.16%	-	3.35%	-	-	8,095.00	1	-
1967	Other	Active	-	-	0.16%	-	3.27%	-	-	8,095.00	1	-
1968	Other	Active	-	-	0.16%	-	3.18%	-	-	8,095.00	1	-
1969	Other	Active	-	-	0.16%	-	3.10%	-	-	8,095.00	1	-
1970	Other	Active	-	-	0.16%	-	3.01%	-	-	8,095.00	1	-
1971	Other	Active	-	-	0.16%	-	2.92%	-	-	8,095.00	1	-
1972	Other	Active	20.00	19.40	0.16%	1.50	2.84%	0.05	0.55	8,095.00	1	370.46
1973	Other	Active	-	-	0.16%	-	2.75%	-	-	8,095.00	1	-
1974	Other	Active	28.52	27.72	0.16%	1.50	2.67%	0.07	0.74	8,095.00	1	529.22
1975	Other	Active	6.20	6.03	0.16%	1.50	2.58%	0.01	0.16	8,095.00	1	115.15
1976	Other	Active	75.00	73.02	0.16%	1.50	2.49%	0.17	1.82	8,095.00	1	1,394.17
1977	Other	Active	307.70	300.07	0.16%	1.00	2.41%	0.47	7.22	8,095.00	1	3,819.65
1978	Other	Active	12.76	12.44	0.16%	1.50	2.32%	0.03	0.29	8,095.00	1	237.61
1979	Other	Active	65.00	63.45	0.16%	1.50	2.24%	0.15	1.42	8,095.00	1	1,211.48
1980	Other	Active	410.00	400.72	0.16%	1.28	2.15%	0.81	8.61	8,095.00	1	6,517.62
1981	Other	Active	4,174.64	4,085.98	0.16%	0.93	2.06%	5.97	84.32	8,095.00	1	48,295.87
1982	Other	Active	635.64	622.92	0.16%	0.70	1.98%	0.69	12.32	8,095.00	1	5,550.42
1983	Other	Active	3,946.44	3,869.56	0.16%	0.90	1.89%	5.51	73.20	8,095.00	1	44,565.07
1984	Other	Active	4,353.00	4,273.47	0.16%	0.68	1.81%	4.58	77.17	8,095.00	1	37,089.24
1985	Other	Active	1,743.70	1,712.10	0.16%	1.14	1.72%	3.06	29.44	8,095.00	1	24,765.32
1986	Other	Active	1,399.63	1,375.95	0.16%	0.92	1.63%	1.98	22.48	8,095.00	1	16,055.08
1987	Other	Active	354.22	348.39	0.16%	1.17	1.55%	0.64	5.39	8,095.00	1	5,173.85
1988	Other	Active	479.98	472.46	0.16%	1.21	1.46%	0.90	6.91	8,095.00	1	7,302.72
1989	Other	Active	627.05	617.75	0.16%	1.23	1.38%	1.19	8.50	8,095.00	1	9,650.59
1990	Other	Active	218.99	215.92	0.16%	1.25	1.29%	0.42	2.78	8,095.00	1	3,435.64
1991	Other	Active	49.45	49.00	0.16%	1.50	1.20%	0.12	0.59	8,095.00	1	935.66
1992	Other	Active	552.48	546.96	0.16%	1.20	0.67%	1.03	3.65	8,095.00	1	8,354.76
1993	Other	Active	929.29	919.04	0.16%	0.94	0.81%	1.36	7.45	8,095.00	1	11,048.68
1994	Other	Active	1,761.56	1,739.92	0.16%	0.83	0.95%	2.28	16.60	8,095.00	1	18,456.32
1995	Other	Active	644.11	635.10	0.16%	1.00	1.10%	1.00	6.97	8,095.00	1	8,084.29
1996	Other	Active	1,965.82	1,937.05	0.16%	0.50	1.24%	1.52	24.04	8,095.00	1	12,328.49
1997	Other	Active	1,299.08	1,277.09	0.16%	1.05	1.38%	2.10	17.68	8,095.00	1	16,995.16
1998	Other	Active	1,171.67	1,150.70	0.16%	0.75	1.53%	1.36	17.59	8,095.00	1	10,985.55
1999	Other	Active	404.41	396.37	0.16%	1.10	1.67%	0.69	6.63	8,095.00	1	5,549.97
2000	Other	Active	32.60	31.88	0.16%	1.50	1.82%	0.08	0.58	8,095.00	1	608.79
2001	Other	Active	313.35	306.27	0.16%	1.00	1.96%	0.48	6.00	8,095.00	1	3,898.54
2002	Other	Active	432.89	420.29	0.16%	1.17	2.10%	0.77	8.84	8,095.00	1	6,241.50
2003	Other	Active	810.10	786.57	0.57%	0.83	2.25%	3.74	17.67	8,095.00	1	30,283.63
2004	Other	Active	942.77	912.27	0.62%	1.06	2.39%	5.95	21.80	8,095.00	1	48,176.49
2005	Other	Active	74.21	71.61	0.67%	1.17	2.53%	0.56	1.81	8,095.00	1	4,499.46
2006	Other	Active	713.66	687.72	0.71%	1.07	2.68%	5.25	18.41	8,095.00	1	42,507.42
2007	Other	Active	367.37	353.22	0.76%	1.10	2.82%	2.95	9.96	8,095.00	1	23,902.12
2008	Other	Active	603.61	578.26	0.81%	1.28	2.96%	5.96	17.14	8,095.00	1	48,284.05
2009	Other	Active	272.19	257.88	0.85%	1.21	3.11%	2.68	8.01	8,095.00	1	21,661.47
2010	Other	Active	923.53	854.94	0.90%	1.20	4.16%	9.25	35.59	8,095.00	1	74,897.21
2011	Other	Active	383.01	346.74	0.79%	1.00	6.47%	2.75	22.45	8,095.00	1	22,274.64
2012	Other	Active	134.61	118.51	0.68%	1.50	8.79%	1.22	10.41	8,095.00	1	9,836.85
2013	Other	Active	1,679.00	1,445.27	0.57%	1.10	11.10%	9.12	160.41	8,095.00	1	73,814.69
2014	Other	Active	201.21	168.58	0.46%	1.40	13.41%	1.09	22.61	8,095.00	1	8,856.27
2015	Other	Active	429.51	334.63	0.35%	1.23	15.72%	1.45	52.61	8,095.00	1	11,753.57
2016	Other	Active	162.86	134.65	0.24%	1.28	21.79%	0.42	29.34	8,095.00	1	3,391.88
2017	Other	Active	142.24	124.39	0.13%	1.44	17.15%	0.24	21.34	8,095.00	1	1,937.83
2018	Other	Active	256.03	235.86	0.02%	1.50	12.52%	0.08	29.52	8,095.00	1	673.79
2019	Other	Active	256.31	248.01	0.00%	1.50	7.88%	-	19.53	8,095.00	1	-

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Current Bonded Acres (4)	Adjustment					Avg recl Cost per Acre (19)	Adjustment Factor Permit Status (20)	Gross Cost (21)	
				Adjusted Acres (13)	Forfeiture Rate (14)	Factor Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)				Released Acres (18)
1963	Other	Inactive	-	-	0.24%	-	2.42%	-	-	8,095.00	1	-
1964	Other	Inactive	-	-	0.24%	-	2.42%	-	-	8,095.00	1	-
1965	Other	Inactive	-	-	0.24%	-	2.36%	-	-	8,095.00	1	-
1966	Other	Inactive	-	-	0.24%	-	2.31%	-	-	8,095.00	1	-
1967	Other	Inactive	-	-	0.24%	-	2.25%	-	-	8,095.00	1	-
1968	Other	Inactive	-	-	0.24%	-	2.19%	-	-	8,095.00	1	-
1969	Other	Inactive	-	-	0.24%	-	2.13%	-	-	8,095.00	1	-
1970	Other	Inactive	-	-	0.24%	-	2.07%	-	-	8,095.00	1	-
1971	Other	Inactive	-	-	0.24%	-	2.01%	-	-	8,095.00	1	-
1972	Other	Inactive	-	-	0.24%	-	1.95%	-	-	8,095.00	1	-
1973	Other	Inactive	-	-	0.24%	-	1.89%	-	-	8,095.00	1	-
1974	Other	Inactive	-	-	0.24%	-	1.83%	-	-	8,095.00	1	-
1975	Other	Inactive	-	-	0.24%	-	1.77%	-	-	8,095.00	1	-
1976	Other	Inactive	14.48	14.19	0.24%	1.50	1.71%	0.05	0.24	8,095.00	1	406.38
1977	Other	Inactive	61.00	59.81	0.24%	1.50	1.66%	0.21	0.99	8,095.00	1	1,713.00
1978	Other	Inactive	-	-	0.24%	-	1.60%	-	-	8,095.00	1	-
1979	Other	Inactive	9.75	9.57	0.24%	1.50	1.54%	0.03	0.15	8,095.00	1	274.13
1980	Other	Inactive	114.75	112.99	0.24%	0.50	1.48%	0.13	1.67	8,095.00	1	1,078.66
1981	Other	Inactive	1,249.51	1,229.71	0.24%	0.95	1.42%	2.77	17.45	8,095.00	1	22,412.38
1982	Other	Inactive	67.50	66.38	0.24%	1.50	1.36%	0.23	0.90	8,095.00	1	1,901.25
1983	Other	Inactive	1,314.44	1,295.54	0.24%	0.83	1.30%	2.55	16.85	8,095.00	1	20,613.83
1984	Other	Inactive	319.44	314.91	0.24%	1.00	1.24%	0.74	3.91	8,095.00	1	6,012.78
1985	Other	Inactive	918.71	906.59	0.24%	0.83	1.18%	1.78	10.72	8,095.00	1	14,425.04
1986	Other	Inactive	2.80	2.76	0.24%	1.50	1.12%	0.01	0.03	8,095.00	1	79.06
1987	Other	Inactive	834.21	824.84	0.24%	0.50	1.06%	0.97	8.78	8,095.00	1	7,874.64
1988	Other	Inactive	181.75	179.50	0.24%	1.25	1.00%	0.53	1.80	8,095.00	1	4,284.03
1989	Other	Inactive	49.24	48.75	0.24%	0.50	0.95%	0.06	0.46	8,095.00	1	465.36
1990	Other	Inactive	528.47	522.54	0.24%	1.25	0.89%	1.54	4.63	8,095.00	1	12,471.47
1991	Other	Inactive	414.61	411.44	0.24%	1.30	0.83%	1.26	3.40	8,095.00	1	10,212.60
1992	Other	Inactive	417.60	414.19	0.24%	1.10	0.46%	1.07	1.90	8,095.00	1	8,699.23
1993	Other	Inactive	787.92	781.08	0.24%	0.90	0.56%	1.66	4.35	8,095.00	1	13,422.30
1994	Other	Inactive	545.08	539.68	0.24%	1.00	0.66%	1.27	3.54	8,095.00	1	10,304.49
1995	Other	Inactive	915.43	905.46	0.24%	1.00	0.75%	2.14	6.83	8,095.00	1	17,288.54
1996	Other	Inactive	130.14	128.75	0.24%	0.50	0.85%	0.15	1.10	8,095.00	1	1,229.13
1997	Other	Inactive	158.04	156.07	0.24%	0.83	0.95%	0.31	1.49	8,095.00	1	2,483.27
1998	Other	Inactive	89.20	87.86	0.24%	1.50	1.05%	0.31	0.92	8,095.00	1	2,516.33
1999	Other	Inactive	-	-	0.24%	-	1.15%	-	-	8,095.00	1	-
2000	Other	Inactive	339.23	334.26	0.24%	0.50	1.25%	0.39	4.17	8,095.00	1	3,191.14
2001	Other	Inactive	284.00	279.23	0.24%	1.00	1.35%	0.66	3.76	8,095.00	1	5,331.44
2002	Other	Inactive	184.32	179.90	0.24%	1.00	1.45%	0.42	2.60	8,095.00	1	3,434.88
2003	Other	Inactive	98.29	95.31	0.86%	1.50	1.54%	1.22	1.47	8,095.00	1	9,907.54
2004	Other	Inactive	-	-	0.93%	-	1.64%	-	-	8,095.00	1	-
2005	Other	Inactive	-	-	1.00%	-	1.74%	-	-	8,095.00	1	-
2006	Other	Inactive	-	-	1.07%	-	1.84%	-	-	8,095.00	1	-
2007	Other	Inactive	26.00	25.00	1.14%	1.50	1.94%	0.43	0.48	8,095.00	1	3,460.08
2008	Other	Inactive	4.11	3.94	1.21%	1.50	2.04%	0.07	0.08	8,095.00	1	579.76
2009	Other	Inactive	-	-	1.28%	-	2.14%	-	-	8,095.00	1	-
2010	Other	Inactive	133.81	127.06	1.35%	0.50	2.86%	0.86	3.64	8,095.00	1	6,956.81
2011	Other	Inactive	15.10	13.96	1.19%	1.50	4.45%	0.25	0.62	8,095.00	1	2,017.16
2012	Other	Inactive	66.26	60.92	1.03%	0.50	6.04%	0.31	3.68	8,095.00	1	2,528.24
2013	Other	Inactive	57.00	51.15	0.86%	1.50	7.63%	0.66	3.90	8,095.00	1	5,343.56
2014	Other	Inactive	-	-	0.70%	-	9.22%	-	-	8,095.00	1	-
2015	Other	Inactive	-	-	0.53%	-	10.81%	-	-	8,095.00	1	-
2016	Other	Inactive	-	-	0.37%	-	14.98%	-	-	8,095.00	1	-
2017	Other	Inactive	-	-	0.20%	-	11.79%	-	-	8,095.00	1	-
2018	Other	Inactive	-	-	0.04%	-	8.60%	-	-	8,095.00	1	-
2019	Other	Inactive	-	-	0.00%	-	5.42%	-	-	8,095.00	1	-

Permit Issue Year	Mine Type	Mine Status	Current Bonded Acres	Adjustment						Avg recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
				Adjusted Acres	Forfeiture Rate	Factor Permit Bond Size	Release Rate	Forfeited Acres	Released Acres			
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1963	Other	Phased Released	-	-	0.94%	-	11.02%	-	-	8,095.00	0.5	-
1964	Other	Phased Released	-	-	0.94%	-	11.02%	-	-	8,095.00	0.5	-
1965	Other	Phased Released	-	-	0.94%	-	10.75%	-	-	8,095.00	0.5	-
1966	Other	Phased Released	-	-	0.94%	-	10.48%	-	-	8,095.00	0.5	-
1967	Other	Phased Released	-	-	0.94%	-	10.21%	-	-	8,095.00	0.5	-
1968	Other	Phased Released	-	-	0.94%	-	9.94%	-	-	8,095.00	0.5	-
1969	Other	Phased Released	-	-	0.94%	-	9.67%	-	-	8,095.00	0.5	-
1970	Other	Phased Released	-	-	0.94%	-	9.41%	-	-	8,095.00	0.5	-
1971	Other	Phased Released	-	-	0.94%	-	9.14%	-	-	8,095.00	0.5	-
1972	Other	Phased Released	-	-	0.94%	-	8.87%	-	-	8,095.00	0.5	-
1973	Other	Phased Released	9.00	8.12	0.94%	1.50	8.60%	0.11	0.70	8,095.00	0.5	465.29
1974	Other	Phased Released	-	-	0.94%	-	8.33%	-	-	8,095.00	0.5	-
1975	Other	Phased Released	-	-	0.94%	-	8.06%	-	-	8,095.00	0.5	-
1976	Other	Phased Released	27.88	25.39	0.94%	1.50	7.79%	0.36	1.98	8,095.00	0.5	1,454.23
1977	Other	Phased Released	-	-	0.94%	-	7.52%	-	-	8,095.00	0.5	-
1978	Other	Phased Released	-	-	0.94%	-	7.26%	-	-	8,095.00	0.5	-
1979	Other	Phased Released	68.69	63.10	0.94%	1.50	6.99%	0.89	4.41	8,095.00	0.5	3,614.63
1980	Other	Phased Released	7.91	7.29	0.94%	1.50	6.72%	0.10	0.49	8,095.00	0.5	417.46
1981	Other	Phased Released	475.54	440.54	0.94%	1.25	6.45%	5.20	28.41	8,095.00	0.5	21,028.90
1982	Other	Phased Released	205.26	190.22	0.94%	1.50	6.18%	2.69	11.76	8,095.00	0.5	10,896.05
1983	Other	Phased Released	106.90	99.86	0.94%	1.00	5.91%	0.94	5.90	8,095.00	0.5	3,813.36
1984	Other	Phased Released	108.69	101.31	0.94%	1.50	5.64%	1.43	5.72	8,095.00	0.5	5,803.18
1985	Other	Phased Released	43.00	40.20	0.94%	1.50	5.37%	0.57	2.16	8,095.00	0.5	2,302.48
1986	Other	Phased Released	38.00	35.62	0.94%	1.50	5.11%	0.50	1.82	8,095.00	0.5	2,040.60
1987	Other	Phased Released	100.95	94.91	0.94%	1.50	4.84%	1.34	4.59	8,095.00	0.5	5,436.55
1988	Other	Phased Released	-	-	0.94%	-	4.57%	-	-	8,095.00	0.5	-
1989	Other	Phased Released	-	-	0.94%	1.50	4.30%	-	-	8,095.00	0.5	-
1990	Other	Phased Released	-	-	0.94%	-	4.03%	-	-	8,095.00	0.5	-
1991	Other	Phased Released	-	-	0.94%	-	3.76%	-	-	8,095.00	0.5	-
1992	Other	Phased Released	-	-	0.94%	-	2.08%	-	-	8,095.00	0.5	-
1993	Other	Phased Released	-	-	0.94%	-	2.53%	-	-	8,095.00	0.5	-
1994	Other	Phased Released	-	-	0.94%	-	2.98%	-	-	8,095.00	0.5	-
1995	Other	Phased Released	-	-	0.94%	-	3.43%	-	-	8,095.00	0.5	-
1996	Other	Phased Released	-	-	0.94%	-	3.88%	-	-	8,095.00	0.5	-
1997	Other	Phased Released	-	-	0.94%	-	4.33%	-	-	8,095.00	0.5	-
1998	Other	Phased Released	-	-	0.94%	-	4.78%	-	-	8,095.00	0.5	-
1999	Other	Phased Released	179.00	168.00	0.94%	0.50	5.22%	0.79	8.78	8,095.00	0.5	3,207.76
2000	Other	Phased Released	-	-	0.94%	-	5.67%	-	-	8,095.00	0.5	-
2001	Other	Phased Released	-	-	0.94%	-	6.12%	-	-	8,095.00	0.5	-
2002	Other	Phased Released	-	-	0.94%	-	6.57%	-	-	8,095.00	0.5	-
2003	Other	Phased Released	-	-	3.42%	-	7.02%	-	-	8,095.00	0.5	-
2004	Other	Phased Released	-	-	3.71%	-	7.47%	-	-	8,095.00	0.5	-
2005	Other	Phased Released	-	-	3.99%	-	7.92%	-	-	8,095.00	0.5	-
2006	Other	Phased Released	-	-	4.28%	-	8.36%	-	-	8,095.00	0.5	-
2007	Other	Phased Released	-	-	4.56%	-	8.81%	-	-	8,095.00	0.5	-
2008	Other	Phased Released	-	-	4.84%	-	9.26%	-	-	8,095.00	0.5	-
2009	Other	Phased Released	-	-	5.13%	-	9.71%	-	-	8,095.00	0.5	-
2010	Other	Phased Released	-	-	5.41%	-	13.01%	-	-	8,095.00	0.5	-
2011	Other	Phased Released	-	-	4.76%	-	20.23%	-	-	8,095.00	0.5	-
2012	Other	Phased Released	-	-	4.10%	-	27.46%	-	-	8,095.00	0.5	-
2013	Other	Phased Released	-	-	3.44%	-	34.68%	-	-	8,095.00	0.5	-
2014	Other	Phased Released	-	-	2.78%	-	41.91%	-	-	8,095.00	0.5	-
2015	Other	Phased Released	-	-	2.12%	-	49.13%	-	-	8,095.00	0.5	-
2016	Other	Phased Released	-	-	1.46%	-	68.10%	-	-	8,095.00	0.5	-
2017	Other	Phased Released	-	-	0.80%	-	53.61%	-	-	8,095.00	0.5	-
2018	Other	Phased Released	-	-	0.14%	-	39.11%	-	-	8,095.00	0.5	-
2019	Other	Phased Released	-	-	0.00%	-	24.61%	-	-	8,095.00	0.5	-



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 Water O&M Cost Projection - Deterministic Model  
 Water O&M Total - All Mine Types

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Incremental Yearly Liability				Incremental Yearly Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	58,175	9,777	39,418	107,370	0	0	0	0
2021	55,782	9,320	34,904	100,006	0	0	0	0
2022	52,911	8,904	30,903	92,718	0	0	0	0
2023	50,012	8,615	27,374	86,000	29,088	4,889	19,709	53,685
2024	47,661	8,323	24,250	80,234	56,979	9,549	37,161	103,688
2025	44,875	8,022	21,486	74,383	54,347	9,112	32,904	96,362
2026	42,387	7,704	19,036	69,128	51,461	8,759	29,138	89,359
2027	39,846	7,419	16,858	64,123	72,667	12,631	37,937	123,235
2028	37,619	7,147	14,919	59,685	44,875	8,022	21,486	74,383
2029	35,232	6,843	13,190	55,265	42,387	7,704	19,036	69,128
2030	33,246	6,582	11,643	51,471	39,846	7,419	16,858	64,123
2031	31,408	6,324	10,258	47,990	37,619	7,147	14,919	59,685
2032	29,268	6,057	9,022	44,347	35,232	6,843	13,190	55,265
2033	27,663	5,837	7,914	41,413	33,246	6,582	11,643	51,471
2034	26,105	5,625	6,939	38,669	31,408	6,324	10,258	47,990
2035	24,686	5,419	6,060	36,165	29,268	6,057	9,022	44,347
2036	23,342	5,218	5,287	33,847	27,663	5,837	7,914	41,413
2037	22,041	5,022	4,599	31,662	26,105	5,625	6,939	38,669
2038	20,801	4,830	3,998	29,629	24,686	5,419	6,060	36,165
2039	19,665	4,644	3,492	27,801	23,342	5,218	5,287	33,847

Notes: Col (1) - (3) from Exhibit E-121, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (5) - (8) based on (1) - (4) with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water O&M Cost Projection - Deterministic Model  
 Surface Mines

Fiscal Year Ending 6/30	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Incremental Yearly Liability				Incremental Yearly Liability - Three Year Delay			
	Active	Inactive	Phase Released	Total	Active	Inactive	Phase Released	Total
2020	38,763	4,417	33,111	76,292	0	0	0	0
2021	37,167	4,226	29,240	70,633	0	0	0	0
2022	35,291	4,039	25,813	65,143	0	0	0	0
2023	33,476	3,857	22,793	60,126	19,382	2,209	16,555	38,146
2024	31,724	3,678	20,122	55,524	37,965	4,322	31,175	73,462
2025	30,030	3,504	17,762	51,297	36,229	4,132	27,526	67,888
2026	28,392	3,336	15,673	47,400	34,384	3,948	24,303	62,634
2027	26,816	3,172	13,817	43,805	48,462	5,606	31,519	85,587
2028	25,301	3,014	12,168	40,483	30,030	3,504	17,762	51,297
2029	23,851	2,861	10,698	37,410	28,392	3,336	15,673	47,400
2030	22,467	2,714	9,385	34,567	26,816	3,172	13,817	43,805
2031	21,142	2,573	8,210	31,925	25,301	3,014	12,168	40,483
2032	19,875	2,436	7,164	29,475	23,851	2,861	10,698	37,410
2033	18,666	2,304	6,226	27,195	22,467	2,714	9,385	34,567
2034	17,510	2,179	5,405	25,094	21,142	2,573	8,210	31,925
2035	16,414	2,058	4,664	23,136	19,875	2,436	7,164	29,475
2036	15,374	1,941	4,016	21,331	18,666	2,304	6,226	27,195
2037	14,379	1,828	3,439	19,646	17,510	2,179	5,405	25,094
2038	13,429	1,718	2,937	18,084	16,414	2,058	4,664	23,136
2039	12,529	1,612	2,519	16,660	15,374	1,941	4,016	21,331

Notes: Col (1) - (3) from Exhibit E-121, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (5) - (8) based on (1) - (4) with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water O&M Cost Projection - Deterministic Model  
 Underground Mines

Fiscal Year Ending 6/30	Incremental Yearly Liability				Incremental Yearly Liability - Three Year Delay			
	(1) Active	(2) Inactive	(3) Phase Released	(4) Total	(5) Active	(6) Inactive	(7) Phase Released	(8) Total
2020	5,960	1,649	4,055	11,665	0	0	0	0
2021	5,708	1,585	3,572	10,865	0	0	0	0
2022	5,444	1,522	3,152	10,118	0	0	0	0
2023	5,191	1,461	2,789	9,441	2,980	825	2,028	5,832
2024	4,949	1,402	2,475	8,826	5,834	1,617	3,814	11,265
2025	4,718	1,345	2,203	8,267	5,576	1,553	3,362	10,491
2026	4,499	1,290	1,967	7,756	5,317	1,491	2,970	9,779
2027	4,290	1,237	1,762	7,289	7,544	2,133	3,869	13,546
2028	4,091	1,186	1,583	6,860	4,718	1,345	2,203	8,267
2029	3,901	1,137	1,426	6,465	4,499	1,290	1,967	7,756
2030	3,721	1,090	1,290	6,101	4,290	1,237	1,762	7,289
2031	3,550	1,045	1,170	5,766	4,091	1,186	1,583	6,860
2032	3,387	1,002	1,065	5,455	3,901	1,137	1,426	6,465
2033	3,232	961	973	5,166	3,721	1,090	1,290	6,101
2034	3,085	922	892	4,898	3,550	1,045	1,170	5,766
2035	2,944	885	819	4,648	3,387	1,002	1,065	5,455
2036	2,811	849	756	4,416	3,232	961	973	5,166
2037	2,688	815	700	4,203	3,085	922	892	4,898
2038	2,571	782	652	4,006	2,944	885	819	4,648
2039	2,465	751	611	3,826	2,811	849	756	4,416

Notes: Col (1) - (3) from Exhibit E-121, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (5) - (8) based on (1) - (4) with a three-year delay

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water O&M Cost Projection - Deterministic Model  
 Other

Fiscal Year Ending 6/30	Incremental Yearly Liability				Incremental Yearly Liability - Three Year Delay			
	(1) Active	(2) Inactive	(3) Phase Released	(4) Total	(5) Active	(6) Inactive	(7) Phase Released	(8) Total
2020	13,452	3,711	2,252	19,414	0	0	0	0
2021	12,907	3,509	2,092	18,509	0	0	0	0
2022	12,176	3,343	1,939	17,458	0	0	0	0
2023	11,345	3,297	1,792	16,434	6,726	1,855	1,126	9,707
2024	10,989	3,243	1,653	15,885	13,179	3,610	2,172	18,961
2025	10,127	3,172	1,521	14,820	12,542	3,426	2,015	17,983
2026	9,497	3,078	1,396	13,971	11,760	3,320	1,865	16,946
2027	8,741	3,010	1,279	13,029	16,661	4,892	2,549	24,102
2028	8,227	2,947	1,168	12,342	10,127	3,172	1,521	14,820
2029	7,480	2,844	1,066	11,390	9,497	3,078	1,396	13,971
2030	7,057	2,777	968	10,802	8,741	3,010	1,279	13,029
2031	6,716	2,706	877	10,299	8,227	2,947	1,168	12,342
2032	6,005	2,619	793	9,418	7,480	2,844	1,066	11,390
2033	5,765	2,572	715	9,052	7,057	2,777	968	10,802
2034	5,511	2,525	642	8,678	6,716	2,706	877	10,299
2035	5,328	2,477	576	8,381	6,005	2,619	793	9,418
2036	5,156	2,428	515	8,100	5,765	2,572	715	9,052
2037	4,974	2,379	460	7,813	5,511	2,525	642	8,678
2038	4,800	2,330	409	7,539	5,328	2,477	576	8,381
2039	4,671	2,281	363	7,315	5,156	2,428	515	8,100

Notes: Col (1) - (3) from Exhibit E-121, Col (12), (21), etc.  
 Col (4) = (1) + (2) + (3)  
 Col (5) - (8) based on (1) - (4) with a three-year delay

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Forfeiture Rate	Adjustment		Released Acres	Released Acres	Avg Recl Cost per Acre			
			Bonded Acres		Permit Bond Size	Release Rate						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Surface	Active	-	0.011%	0.00	0.881%	-	-	100.00	1.00	-	
1964	Surface	Active	-	0.019%	0.00	0.928%	-	-	100.00	1.00	-	
1965	Surface	Active	-	0.028%	0.00	0.975%	-	-	100.00	1.00	-	
1966	Surface	Active	-	0.036%	0.00	1.021%	-	-	100.00	1.00	-	
1967	Surface	Active	-	0.044%	0.00	1.068%	-	-	100.00	1.00	-	
1968	Surface	Active	-	0.052%	0.00	1.115%	-	-	100.00	1.00	-	
1969	Surface	Active	-	0.061%	0.00	1.162%	-	-	100.00	1.00	-	
1970	Surface	Active	-	0.069%	0.00	1.208%	-	-	100.00	1.00	-	
1971	Surface	Active	-	0.077%	0.00	1.255%	-	-	100.00	1.00	-	
1972	Surface	Active	400.00	0.085%	1.50	1.302%	0.51	5.21	100.00	1.00	51.26	
1973	Surface	Active	-	0.094%	0.00	1.349%	-	-	100.00	1.00	-	
1974	Surface	Active	-	0.102%	0.00	1.395%	-	-	100.00	1.00	-	
1975	Surface	Active	-	0.110%	0.00	1.442%	-	-	100.00	1.00	-	
1976	Surface	Active	-	0.118%	0.00	1.489%	-	-	100.00	1.00	-	
1977	Surface	Active	1,973.04	0.127%	0.67	1.536%	1.67	30.30	100.00	1.00	166.61	
1978	Surface	Active	2,430.48	0.135%	0.50	1.582%	1.64	38.46	100.00	1.00	163.95	
1979	Surface	Active	180.00	0.143%	1.00	1.629%	0.26	2.93	100.00	1.00	25.77	
1980	Surface	Active	1,036.66	0.151%	0.50	1.676%	0.78	17.37	100.00	1.00	78.48	
1981	Surface	Active	2,056.10	0.160%	0.80	1.723%	2.63	35.42	100.00	1.00	262.61	
1982	Surface	Active	807.96	0.168%	0.83	1.769%	1.13	14.30	100.00	1.00	113.05	
1983	Surface	Active	1,911.88	0.176%	0.50	1.816%	1.68	34.72	100.00	1.00	168.38	
1984	Surface	Active	380.49	0.184%	0.50	1.863%	0.35	7.09	100.00	1.00	35.08	
1985	Surface	Active	3,048.91	0.193%	0.67	1.910%	3.92	58.22	100.00	1.00	391.56	
1986	Surface	Active	2,331.92	0.201%	0.93	1.956%	4.35	45.62	100.00	1.00	434.98	
1987	Surface	Active	1,136.12	0.209%	0.83	2.003%	1.98	22.76	100.00	1.00	198.00	
1988	Surface	Active	1,898.10	0.217%	0.88	2.050%	3.61	38.91	100.00	1.00	361.02	
1989	Surface	Active	2,524.74	0.226%	0.64	2.097%	3.66	52.93	100.00	1.00	366.19	
1990	Surface	Active	2,764.18	0.234%	0.77	2.143%	5.00	59.25	100.00	1.00	499.53	
1991	Surface	Active	2,039.50	0.242%	0.83	2.190%	4.11	44.67	100.00	1.00	411.49	
1992	Surface	Active	5,324.50	0.250%	0.50	2.237%	6.67	119.10	100.00	1.00	666.52	
1993	Surface	Active	4,234.80	0.259%	0.83	2.284%	9.13	96.71	100.00	1.00	912.62	
1994	Surface	Active	2,051.59	0.267%	0.50	2.330%	2.74	47.81	100.00	1.00	273.74	
1995	Surface	Active	6,823.51	0.275%	0.90	2.377%	16.89	162.21	100.00	1.00	1,689.42	
1996	Surface	Active	4,574.89	0.283%	0.90	2.424%	11.67	110.89	100.00	1.00	1,166.64	
1997	Surface	Active	14,023.76	0.292%	0.75	2.471%	30.67	346.48	100.00	1.00	3,066.89	
1998	Surface	Active	10,267.14	0.300%	0.61	2.517%	18.63	258.47	100.00	1.00	1,863.28	
1999	Surface	Active	2,042.00	0.308%	0.67	2.564%	4.19	52.36	100.00	1.00	419.40	
2000	Surface	Active	4,526.19	0.316%	0.50	2.611%	7.16	118.17	100.00	1.00	715.88	
2001	Surface	Active	8,365.95	0.325%	0.70	2.658%	19.01	222.34	100.00	1.00	1,900.76	
2002	Surface	Active	5,939.08	0.333%	0.63	2.704%	12.52	160.62	100.00	1.00	1,251.88	
2003	Surface	Active	9,153.56	0.341%	0.72	2.751%	22.55	251.83	100.00	1.00	2,254.76	
2004	Surface	Active	12,208.29	0.349%	0.75	2.798%	31.98	341.58	100.00	1.00	3,198.38	
2005	Surface	Active	5,344.96	0.358%	0.83	2.845%	15.93	152.05	100.00	1.00	1,592.61	
2006	Surface	Active	3,906.10	0.366%	0.86	2.891%	12.34	112.94	100.00	1.00	1,234.02	
2007	Surface	Active	5,222.12	0.374%	0.79	2.938%	15.46	153.43	100.00	1.00	1,546.39	
2008	Surface	Active	5,368.62	0.382%	0.56	2.985%	11.47	160.25	100.00	1.00	1,146.93	
2009	Surface	Active	5,218.95	0.391%	0.75	2.110%	15.29	110.10	100.00	1.00	1,528.67	
2010	Surface	Active	2,480.78	0.399%	0.88	1.860%	8.75	46.14	100.00	1.00	875.16	
2011	Surface	Active	2,143.55	0.407%	0.79	1.610%	6.86	34.51	100.00	1.00	685.54	
2012	Surface	Active	3,191.42	0.415%	0.82	1.360%	10.84	43.40	100.00	1.00	1,084.37	
2013	Surface	Active	5,238.48	0.424%	0.86	1.110%	19.16	58.15	100.00	1.00	1,916.10	
2014	Surface	Active	3,650.67	0.432%	0.72	0.860%	11.38	31.40	100.00	1.00	1,138.41	
2015	Surface	Active	3,527.20	0.440%	0.71	0.610%	11.09	21.52	100.00	1.00	1,108.60	
2016	Surface	Active	2,150.64	0.448%	0.60	0.360%	5.78	7.75	100.00	1.00	578.43	
2017	Surface	Active	826.69	0.457%	1.00	0.110%	3.77	0.91	100.00	1.00	377.39	
2018	Surface	Active	2,175.19	0.465%	0.83	0.096%	8.42	2.10	100.00	1.00	842.45	
2019	Surface	Active	849.88	0.000%	0.83	0.082%	-	0.70	100.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Forfeiture	Adjustment		Forfeited	Released	Released			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Acres	Acres	Acres			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Surface	Inactive	-	0.017%	0.00	0.606%	-	-	100.00	1.00	-	
1964	Surface	Inactive	-	0.029%	0.00	0.638%	-	-	100.00	1.00	-	
1965	Surface	Inactive	-	0.042%	0.00	0.670%	-	-	100.00	1.00	-	
1966	Surface	Inactive	-	0.054%	0.00	0.702%	-	-	100.00	1.00	-	
1967	Surface	Inactive	-	0.066%	0.00	0.734%	-	-	100.00	1.00	-	
1968	Surface	Inactive	-	0.079%	0.00	0.766%	-	-	100.00	1.00	-	
1969	Surface	Inactive	-	0.091%	0.00	0.799%	-	-	100.00	1.00	-	
1970	Surface	Inactive	-	0.103%	0.00	0.831%	-	-	100.00	1.00	-	
1971	Surface	Inactive	-	0.116%	0.00	0.863%	-	-	100.00	1.00	-	
1972	Surface	Inactive	-	0.128%	0.00	0.895%	-	-	100.00	1.00	-	
1973	Surface	Inactive	-	0.141%	0.00	0.927%	-	-	100.00	1.00	-	
1974	Surface	Inactive	-	0.153%	0.00	0.959%	-	-	100.00	1.00	-	
1975	Surface	Inactive	-	0.165%	0.00	0.991%	-	-	100.00	1.00	-	
1976	Surface	Inactive	438.80	0.178%	0.50	1.024%	0.39	4.49	100.00	1.00	38.97	
1977	Surface	Inactive	-	0.190%	0.00	1.056%	-	-	100.00	1.00	-	
1978	Surface	Inactive	-	0.202%	0.00	1.088%	-	-	100.00	1.00	-	
1979	Surface	Inactive	-	0.215%	0.00	1.120%	-	-	100.00	1.00	-	
1980	Surface	Inactive	-	0.227%	0.00	1.152%	-	-	100.00	1.00	-	
1981	Surface	Inactive	-	0.239%	0.00	1.184%	-	-	100.00	1.00	-	
1982	Surface	Inactive	-	0.252%	0.00	1.216%	-	-	100.00	1.00	-	
1983	Surface	Inactive	-	0.264%	0.00	1.249%	-	-	100.00	1.00	-	
1984	Surface	Inactive	-	0.277%	0.00	1.281%	-	-	100.00	1.00	-	
1985	Surface	Inactive	-	0.289%	0.00	1.313%	-	-	100.00	1.00	-	
1986	Surface	Inactive	224.46	0.301%	0.50	1.345%	0.34	3.02	100.00	1.00	33.82	
1987	Surface	Inactive	327.57	0.314%	0.50	1.377%	0.51	4.51	100.00	1.00	51.38	
1988	Surface	Inactive	1,135.24	0.326%	0.50	1.409%	1.85	16.00	100.00	1.00	185.08	
1989	Surface	Inactive	273.00	0.338%	1.00	1.441%	0.92	3.94	100.00	1.00	92.39	
1990	Surface	Inactive	228.27	0.351%	0.50	1.474%	0.40	3.36	100.00	1.00	40.04	
1991	Surface	Inactive	-	0.363%	0.00	1.506%	-	-	100.00	1.00	-	
1992	Surface	Inactive	-	0.376%	0.00	1.538%	-	-	100.00	1.00	-	
1993	Surface	Inactive	-	0.388%	0.00	1.570%	-	-	100.00	1.00	-	
1994	Surface	Inactive	578.94	0.400%	0.50	1.602%	1.16	9.28	100.00	1.00	115.87	
1995	Surface	Inactive	2,009.82	0.413%	0.50	1.634%	4.15	32.85	100.00	1.00	414.67	
1996	Surface	Inactive	1,639.13	0.425%	0.50	1.666%	3.48	27.32	100.00	1.00	348.33	
1997	Surface	Inactive	-	0.437%	0.00	1.699%	-	-	100.00	1.00	-	
1998	Surface	Inactive	846.89	0.450%	0.50	1.731%	1.90	14.66	100.00	1.00	190.45	
1999	Surface	Inactive	519.96	0.462%	0.50	1.763%	1.20	9.17	100.00	1.00	120.14	
2000	Surface	Inactive	-	0.474%	0.00	1.795%	-	-	100.00	1.00	-	
2001	Surface	Inactive	571.94	0.487%	0.50	1.827%	1.39	10.45	100.00	1.00	139.23	
2002	Surface	Inactive	1,304.87	0.499%	0.50	1.859%	3.26	24.26	100.00	1.00	325.72	
2003	Surface	Inactive	1,948.57	0.512%	0.50	1.891%	4.98	36.86	100.00	1.00	498.44	
2004	Surface	Inactive	898.15	0.524%	0.50	1.924%	2.35	17.28	100.00	1.00	235.30	
2005	Surface	Inactive	25.99	0.536%	1.50	1.956%	0.21	0.51	100.00	1.00	20.91	
2006	Surface	Inactive	244.34	0.549%	0.50	1.988%	0.67	4.86	100.00	1.00	67.04	
2007	Surface	Inactive	111.49	0.561%	0.50	2.020%	0.31	2.25	100.00	1.00	31.28	
2008	Surface	Inactive	441.20	0.573%	1.00	2.052%	2.53	9.05	100.00	1.00	253.00	
2009	Surface	Inactive	578.55	0.586%	0.50	1.450%	1.69	8.39	100.00	1.00	169.46	
2010	Surface	Inactive	5.11	0.598%	1.50	1.279%	0.05	0.07	100.00	1.00	4.59	
2011	Surface	Inactive	1,256.17	0.611%	0.50	1.107%	3.83	13.90	100.00	1.00	383.48	
2012	Surface	Inactive	452.53	0.623%	0.50	0.935%	1.41	4.23	100.00	1.00	140.95	
2013	Surface	Inactive	246.68	0.635%	0.50	0.763%	0.78	1.88	100.00	1.00	78.36	
2014	Surface	Inactive	1,081.42	0.648%	0.50	0.591%	3.50	6.39	100.00	1.00	350.20	
2015	Surface	Inactive	246.00	0.660%	0.50	0.420%	0.81	1.03	100.00	1.00	81.18	
2016	Surface	Inactive	7.00	0.672%	1.50	0.248%	0.07	0.02	100.00	1.00	7.06	
2017	Surface	Inactive	-	0.685%	0.00	0.076%	-	-	100.00	1.00	-	
2018	Surface	Inactive	-	0.697%	0.00	0.066%	-	-	100.00	1.00	-	
2019	Surface	Inactive	-	0.000%	0.00	0.057%	-	-	100.00	1.00	-	

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Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2020							Avg Recl Cost per Acre (10)	Adjustment Factor Permit Status (11)	Gross Cost (12)
			Current	Forfeiture	Adjustment		Adjustment		Factor			
			Bonded Acres (4)	Rate (5)	Permit Bond Size (6)	Release Rate (7)	Forfeited Acres (8)	Released Acres (9)	Permit Status (11)			
1963	Surface	Phased Released	-	0.067%	0.00	2.753%	-	-	100.00	1.00	-	
1964	Surface	Phased Released	-	0.117%	0.00	2.900%	-	-	100.00	1.00	-	
1965	Surface	Phased Released	-	0.166%	0.00	3.046%	-	-	100.00	1.00	-	
1966	Surface	Phased Released	-	0.216%	0.00	3.192%	-	-	100.00	1.00	-	
1967	Surface	Phased Released	-	0.265%	0.00	3.338%	-	-	100.00	1.00	-	
1968	Surface	Phased Released	-	0.315%	0.00	3.484%	-	-	100.00	1.00	-	
1969	Surface	Phased Released	-	0.364%	0.00	3.630%	-	-	100.00	1.00	-	
1970	Surface	Phased Released	-	0.414%	0.00	3.776%	-	-	100.00	1.00	-	
1971	Surface	Phased Released	-	0.463%	0.00	3.922%	-	-	100.00	1.00	-	
1972	Surface	Phased Released	-	0.513%	0.00	4.068%	-	-	100.00	1.00	-	
1973	Surface	Phased Released	-	0.562%	0.00	4.214%	-	-	100.00	1.00	-	
1974	Surface	Phased Released	189.60	0.612%	1.50	4.361%	1.74	8.27	100.00	1.00	173.93	
1975	Surface	Phased Released	75.30	0.661%	1.50	4.507%	0.75	3.39	100.00	1.00	74.67	
1976	Surface	Phased Released	626.17	0.711%	1.50	4.653%	6.67	29.13	100.00	1.00	667.37	
1977	Surface	Phased Released	48.00	0.760%	1.50	4.799%	0.55	2.30	100.00	1.00	54.72	
1978	Surface	Phased Released	642.27	0.809%	1.50	4.945%	7.80	31.76	100.00	1.00	779.86	
1979	Surface	Phased Released	358.00	0.859%	1.50	5.091%	4.61	18.23	100.00	1.00	461.26	
1980	Surface	Phased Released	857.15	0.908%	1.25	5.237%	9.73	44.89	100.00	1.00	973.34	
1981	Surface	Phased Released	1,738.41	0.958%	1.17	5.383%	19.43	93.58	100.00	1.00	1,942.79	
1982	Surface	Phased Released	-	1.007%	0.00	5.529%	-	-	100.00	1.00	-	
1983	Surface	Phased Released	612.11	1.057%	1.50	5.675%	9.70	34.74	100.00	1.00	970.38	
1984	Surface	Phased Released	2,777.39	1.106%	1.10	5.822%	33.80	161.69	100.00	1.00	3,380.03	
1985	Surface	Phased Released	627.29	1.156%	1.50	5.968%	10.88	37.43	100.00	1.00	1,087.55	
1986	Surface	Phased Released	1,225.56	1.205%	1.17	6.114%	17.23	74.93	100.00	1.00	1,723.36	
1987	Surface	Phased Released	760.81	1.255%	1.00	6.260%	9.55	47.63	100.00	1.00	954.65	
1988	Surface	Phased Released	505.00	1.304%	1.50	6.406%	9.88	32.35	100.00	1.00	987.97	
1989	Surface	Phased Released	1,650.04	1.354%	1.17	6.552%	26.06	108.11	100.00	1.00	2,605.99	
1990	Surface	Phased Released	1,502.96	1.403%	1.25	6.698%	26.36	100.67	100.00	1.00	2,636.20	
1991	Surface	Phased Released	979.45	1.453%	1.10	6.844%	15.65	67.04	100.00	1.00	1,565.11	
1992	Surface	Phased Released	73.00	1.502%	1.50	6.990%	1.64	5.10	100.00	1.00	164.49	
1993	Surface	Phased Released	562.59	1.552%	1.50	7.136%	13.09	40.15	100.00	1.00	1,309.40	
1994	Surface	Phased Released	2,272.45	1.601%	0.70	7.283%	25.47	165.49	100.00	1.00	2,546.91	
1995	Surface	Phased Released	436.30	1.651%	1.00	7.429%	7.20	32.41	100.00	1.00	720.15	
1996	Surface	Phased Released	613.01	1.700%	1.10	7.575%	11.46	46.43	100.00	1.00	1,146.37	
1997	Surface	Phased Released	1,168.05	1.750%	1.00	7.721%	20.44	90.18	100.00	1.00	2,043.55	
1998	Surface	Phased Released	511.73	1.799%	0.83	7.867%	7.67	40.26	100.00	1.00	767.18	
1999	Surface	Phased Released	-	1.848%	0.00	8.013%	-	-	100.00	1.00	-	
2000	Surface	Phased Released	-	1.898%	1.50	8.159%	-	-	100.00	1.00	-	
2001	Surface	Phased Released	462.58	1.947%	1.17	8.305%	10.51	38.42	100.00	1.00	1,050.99	
2002	Surface	Phased Released	106.29	1.997%	1.50	8.451%	3.18	8.98	100.00	1.00	318.38	
2003	Surface	Phased Released	-	2.046%	1.50	8.597%	-	-	100.00	1.00	-	
2004	Surface	Phased Released	183.99	2.096%	0.50	8.743%	1.93	16.09	100.00	1.00	192.81	
2005	Surface	Phased Released	51.50	2.145%	1.50	8.890%	1.66	4.58	100.00	1.00	165.73	
2006	Surface	Phased Released	60.78	2.195%	1.50	9.036%	2.00	5.49	100.00	1.00	200.10	
2007	Surface	Phased Released	-	2.244%	0.00	9.182%	-	-	100.00	1.00	-	
2008	Surface	Phased Released	124.65	2.294%	1.00	9.328%	2.86	11.63	100.00	1.00	285.92	
2009	Surface	Phased Released	262.02	2.343%	1.25	6.593%	7.67	17.27	100.00	1.00	767.47	
2010	Surface	Phased Released	-	2.393%	0.00	5.812%	-	-	100.00	1.00	-	
2011	Surface	Phased Released	77.50	2.442%	1.50	5.031%	2.84	3.90	100.00	1.00	283.91	
2012	Surface	Phased Released	-	2.492%	0.00	4.250%	-	-	100.00	1.00	-	
2013	Surface	Phased Released	-	2.541%	0.00	3.469%	-	-	100.00	1.00	-	
2014	Surface	Phased Released	27.91	2.591%	1.50	2.688%	1.08	0.75	100.00	1.00	108.46	
2015	Surface	Phased Released	-	2.640%	0.00	1.907%	-	-	100.00	1.00	-	
2016	Surface	Phased Released	-	2.690%	0.00	1.126%	-	-	100.00	1.00	-	
2017	Surface	Phased Released	-	2.739%	0.00	0.345%	-	-	100.00	1.00	-	
2018	Surface	Phased Released	-	2.789%	0.00	0.301%	-	-	100.00	1.00	-	
2019	Surface	Phased Released	-	0.000%	0.00	0.257%	-	-	100.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Forfeiture	Adjustment		Forfeited	Released	Factor			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Acres	Acres	Permit Status			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Underground	Active	-	0.070%	0.00	0.191%	-	-	145.00	1.00	-	
1964	Underground	Active	-	0.073%	0.00	0.287%	-	-	145.00	1.00	-	
1965	Underground	Active	-	0.076%	0.00	0.382%	-	-	145.00	1.00	-	
1966	Underground	Active	-	0.079%	0.00	0.477%	-	-	145.00	1.00	-	
1967	Underground	Active	-	0.082%	0.00	0.573%	-	-	145.00	1.00	-	
1968	Underground	Active	-	0.085%	0.00	0.668%	-	-	145.00	1.00	-	
1969	Underground	Active	-	0.088%	0.00	0.763%	-	-	145.00	1.00	-	
1970	Underground	Active	-	0.091%	0.00	0.858%	-	-	145.00	1.00	-	
1971	Underground	Active	-	0.094%	0.00	0.954%	-	-	145.00	1.00	-	
1972	Underground	Active	-	0.097%	0.00	1.049%	-	-	145.00	1.00	-	
1973	Underground	Active	-	0.100%	0.00	1.144%	-	-	145.00	1.00	-	
1974	Underground	Active	-	0.103%	0.00	1.240%	-	-	145.00	1.00	-	
1975	Underground	Active	-	0.106%	0.00	1.335%	-	-	145.00	1.00	-	
1976	Underground	Active	-	0.109%	0.00	1.430%	-	-	145.00	1.00	-	
1977	Underground	Active	22.53	0.112%	1.50	1.525%	0.04	0.34	145.00	1.00	5.47	
1978	Underground	Active	117.89	0.115%	1.00	1.621%	0.14	1.91	145.00	1.00	19.58	
1979	Underground	Active	739.73	0.117%	1.21	1.716%	1.06	12.69	145.00	1.00	153.03	
1980	Underground	Active	222.16	0.120%	1.10	1.811%	0.29	4.02	145.00	1.00	42.68	
1981	Underground	Active	1,054.16	0.123%	1.15	1.907%	1.50	20.10	145.00	1.00	216.94	
1982	Underground	Active	37.93	0.126%	1.17	2.002%	0.06	0.76	145.00	1.00	8.11	
1983	Underground	Active	6,931.45	0.129%	0.87	2.097%	7.77	145.36	145.00	1.00	1,126.53	
1984	Underground	Active	3,035.00	0.132%	1.00	2.192%	4.01	66.54	145.00	1.00	582.17	
1985	Underground	Active	50.69	0.135%	1.50	2.288%	0.10	1.16	145.00	1.00	14.91	
1986	Underground	Active	280.37	0.138%	1.17	2.383%	0.45	6.68	145.00	1.00	65.55	
1987	Underground	Active	198.36	0.141%	1.10	2.478%	0.31	4.92	145.00	1.00	44.66	
1988	Underground	Active	215.95	0.144%	1.17	2.574%	0.36	5.56	145.00	1.00	52.65	
1989	Underground	Active	260.68	0.147%	1.40	2.669%	0.54	6.96	145.00	1.00	77.83	
1990	Underground	Active	162.46	0.150%	1.17	2.764%	0.28	4.49	145.00	1.00	41.23	
1991	Underground	Active	223.30	0.153%	1.25	2.859%	0.43	6.39	145.00	1.00	61.92	
1992	Underground	Active	1,081.93	0.156%	1.07	2.955%	1.81	31.97	145.00	1.00	262.14	
1993	Underground	Active	935.11	0.159%	1.05	3.050%	1.55	28.52	145.00	1.00	225.27	
1994	Underground	Active	613.35	0.162%	1.04	3.145%	1.03	19.29	145.00	1.00	149.50	
1995	Underground	Active	194.98	0.165%	1.00	3.241%	0.32	6.32	145.00	1.00	46.60	
1996	Underground	Active	117.87	0.168%	1.38	3.336%	0.27	3.93	145.00	1.00	39.43	
1997	Underground	Active	467.81	0.171%	1.26	3.431%	1.01	16.05	145.00	1.00	146.48	
1998	Underground	Active	578.22	0.174%	0.90	3.526%	0.90	20.39	145.00	1.00	131.07	
1999	Underground	Active	803.93	0.177%	1.29	3.622%	1.83	29.12	145.00	1.00	264.78	
2000	Underground	Active	587.54	0.180%	0.80	3.717%	0.84	21.84	145.00	1.00	122.42	
2001	Underground	Active	189.73	0.183%	0.90	3.812%	0.31	7.23	145.00	1.00	45.21	
2002	Underground	Active	309.16	0.186%	1.41	3.514%	0.81	10.86	145.00	1.00	117.20	
2003	Underground	Active	994.29	0.188%	1.30	3.722%	2.44	33.52	145.00	1.00	353.29	
2004	Underground	Active	890.05	0.191%	1.05	3.230%	1.78	28.74	145.00	1.00	258.32	
2005	Underground	Active	327.69	0.194%	1.07	3.088%	0.68	10.12	145.00	1.00	98.97	
2006	Underground	Active	427.71	0.197%	0.83	2.945%	0.70	12.60	145.00	1.00	102.01	
2007	Underground	Active	527.87	0.200%	1.20	2.803%	1.27	14.80	145.00	1.00	184.00	
2008	Underground	Active	159.18	0.203%	1.50	2.661%	0.49	4.24	145.00	1.00	70.38	
2009	Underground	Active	307.40	0.206%	1.17	2.519%	0.74	7.74	145.00	1.00	107.25	
2010	Underground	Active	156.43	0.209%	1.42	2.377%	0.46	3.72	145.00	1.00	67.22	
2011	Underground	Active	199.42	0.212%	1.33	2.235%	0.56	4.46	145.00	1.00	81.80	
2012	Underground	Active	217.12	0.215%	1.13	2.093%	0.53	4.54	145.00	1.00	76.19	
2013	Underground	Active	278.12	0.218%	1.43	1.951%	0.87	5.43	145.00	1.00	126.06	
2014	Underground	Active	477.33	0.221%	1.24	1.809%	1.31	8.64	145.00	1.00	189.57	
2015	Underground	Active	146.07	0.224%	1.50	1.667%	0.49	2.44	145.00	1.00	71.16	
2016	Underground	Active	134.19	0.227%	1.50	1.525%	0.46	2.05	145.00	1.00	66.24	
2017	Underground	Active	53.20	0.230%	1.50	1.383%	0.18	0.74	145.00	1.00	26.60	
2018	Underground	Active	35.49	0.233%	1.50	1.241%	0.12	0.44	145.00	1.00	17.98	
2019	Underground	Active	45.89	0.000%	1.50	1.099%	-	0.50	145.00	1.00	-	



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			Current	Forfeiture	Adjustment		Forfeited	Released	Factor			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Acres	Acres	Permit Status			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Underground	Inactive	-	0.105%	0.00	0.132%	-	-	145.00	1.00	-	
1964	Underground	Inactive	-	0.110%	0.00	0.197%	-	-	145.00	1.00	-	
1965	Underground	Inactive	-	0.114%	0.00	0.263%	-	-	145.00	1.00	-	
1966	Underground	Inactive	-	0.119%	0.00	0.328%	-	-	145.00	1.00	-	
1967	Underground	Inactive	-	0.123%	0.00	0.394%	-	-	145.00	1.00	-	
1968	Underground	Inactive	-	0.127%	0.00	0.459%	-	-	145.00	1.00	-	
1969	Underground	Inactive	-	0.132%	0.00	0.525%	-	-	145.00	1.00	-	
1970	Underground	Inactive	-	0.136%	0.00	0.590%	-	-	145.00	1.00	-	
1971	Underground	Inactive	-	0.141%	0.00	0.656%	-	-	145.00	1.00	-	
1972	Underground	Inactive	-	0.145%	0.00	0.721%	-	-	145.00	1.00	-	
1973	Underground	Inactive	-	0.150%	0.00	0.787%	-	-	145.00	1.00	-	
1974	Underground	Inactive	-	0.154%	0.00	0.852%	-	-	145.00	1.00	-	
1975	Underground	Inactive	-	0.158%	0.00	0.918%	-	-	145.00	1.00	-	
1976	Underground	Inactive	103.30	0.163%	0.50	0.983%	0.08	1.02	145.00	1.00	12.20	
1977	Underground	Inactive	-	0.167%	0.00	1.049%	-	-	145.00	1.00	-	
1978	Underground	Inactive	-	0.172%	0.00	1.114%	-	-	145.00	1.00	-	
1979	Underground	Inactive	6.60	0.176%	0.50	1.180%	0.01	0.08	145.00	1.00	0.84	
1980	Underground	Inactive	-	0.181%	0.00	1.245%	-	-	145.00	1.00	-	
1981	Underground	Inactive	86.84	0.185%	1.00	1.311%	0.16	1.14	145.00	1.00	23.31	
1982	Underground	Inactive	128.47	0.190%	0.50	1.376%	0.12	1.77	145.00	1.00	17.66	
1983	Underground	Inactive	461.99	0.194%	0.88	1.442%	0.78	6.66	145.00	1.00	113.71	
1984	Underground	Inactive	80.60	0.198%	0.50	1.507%	0.08	1.21	145.00	1.00	11.60	
1985	Underground	Inactive	230.46	0.203%	1.00	1.573%	0.47	3.62	145.00	1.00	67.79	
1986	Underground	Inactive	43.54	0.207%	0.50	1.638%	0.05	0.71	145.00	1.00	6.54	
1987	Underground	Inactive	40.89	0.212%	1.50	1.704%	0.13	0.70	145.00	1.00	18.83	
1988	Underground	Inactive	145.69	0.216%	1.17	1.769%	0.37	2.58	145.00	1.00	53.28	
1989	Underground	Inactive	56.90	0.221%	0.50	1.835%	0.06	1.04	145.00	1.00	9.10	
1990	Underground	Inactive	31.94	0.225%	1.50	1.900%	0.11	0.61	145.00	1.00	15.63	
1991	Underground	Inactive	146.44	0.229%	1.17	1.966%	0.39	2.88	145.00	1.00	56.85	
1992	Underground	Inactive	9.00	0.234%	1.50	2.031%	0.03	0.18	145.00	1.00	4.58	
1993	Underground	Inactive	73.56	0.238%	1.25	2.097%	0.22	1.54	145.00	1.00	31.78	
1994	Underground	Inactive	247.11	0.243%	0.50	2.162%	0.30	5.34	145.00	1.00	43.50	
1995	Underground	Inactive	253.81	0.247%	1.17	2.228%	0.73	5.65	145.00	1.00	106.16	
1996	Underground	Inactive	177.16	0.252%	0.90	2.293%	0.40	4.06	145.00	1.00	58.19	
1997	Underground	Inactive	58.94	0.256%	1.25	2.359%	0.19	1.39	145.00	1.00	27.36	
1998	Underground	Inactive	75.86	0.261%	1.17	2.424%	0.23	1.84	145.00	1.00	33.44	
1999	Underground	Inactive	178.02	0.265%	1.17	2.490%	0.55	4.43	145.00	1.00	79.80	
2000	Underground	Inactive	79.39	0.269%	1.50	2.555%	0.32	2.03	145.00	1.00	46.52	
2001	Underground	Inactive	93.58	0.274%	1.17	2.621%	0.30	2.45	145.00	1.00	43.36	
2002	Underground	Inactive	47.21	0.278%	0.50	2.686%	0.07	1.14	145.00	1.00	9.53	
2003	Underground	Inactive	230.42	0.283%	1.00	2.751%	0.65	5.34	145.00	1.00	94.47	
2004	Underground	Inactive	31.38	0.287%	0.50	2.816%	0.05	0.70	145.00	1.00	6.53	
2005	Underground	Inactive	134.53	0.292%	1.50	2.881%	0.59	2.86	145.00	1.00	85.33	
2006	Underground	Inactive	151.61	0.296%	1.21	2.946%	0.55	3.07	145.00	1.00	79.03	
2007	Underground	Inactive	130.13	0.300%	1.17	3.011%	0.46	2.51	145.00	1.00	66.15	
2008	Underground	Inactive	78.55	0.305%	1.50	3.076%	0.36	1.44	145.00	1.00	52.10	
2009	Underground	Inactive	103.13	0.309%	1.33	3.141%	0.43	1.79	145.00	1.00	61.68	
2010	Underground	Inactive	258.26	0.314%	1.25	3.206%	1.01	4.22	145.00	1.00	146.89	
2011	Underground	Inactive	145.23	0.318%	1.50	3.271%	0.69	2.23	145.00	1.00	100.53	
2012	Underground	Inactive	41.32	0.323%	1.50	3.336%	0.20	0.59	145.00	1.00	29.00	
2013	Underground	Inactive	22.73	0.327%	1.50	3.401%	0.11	0.30	145.00	1.00	16.17	
2014	Underground	Inactive	-	0.332%	0.00	3.466%	-	-	145.00	1.00	-	
2015	Underground	Inactive	-	0.336%	0.00	3.531%	-	-	145.00	1.00	-	
2016	Underground	Inactive	-	0.340%	0.00	3.596%	-	-	145.00	1.00	-	
2017	Underground	Inactive	-	0.345%	0.00	3.661%	-	-	145.00	1.00	-	
2018	Underground	Inactive	26.00	0.349%	1.50	3.726%	0.14	0.22	145.00	1.00	19.75	
2019	Underground	Inactive	-	0.000%	0.00	3.791%	-	-	145.00	1.00	-	

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			Current	Forfeiture	Adjustment		Adjustment		Factor			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Permit Status			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Underground	Phased Released	-	0.421%	0.00	0.598%	-	-	145.00	1.00	-	
1964	Underground	Phased Released	-	0.439%	0.00	0.896%	-	-	145.00	1.00	-	
1965	Underground	Phased Released	-	0.456%	0.00	1.194%	-	-	145.00	1.00	-	
1966	Underground	Phased Released	-	0.474%	0.00	1.492%	-	-	145.00	1.00	-	
1967	Underground	Phased Released	-	0.492%	0.00	1.789%	-	-	145.00	1.00	-	
1968	Underground	Phased Released	-	0.510%	0.00	2.087%	-	-	145.00	1.00	-	
1969	Underground	Phased Released	-	0.527%	0.00	2.385%	-	-	145.00	1.00	-	
1970	Underground	Phased Released	-	0.545%	0.00	2.683%	-	-	145.00	1.00	-	
1971	Underground	Phased Released	-	0.563%	0.00	2.980%	-	-	145.00	1.00	-	
1972	Underground	Phased Released	-	0.581%	0.00	3.278%	-	-	145.00	1.00	-	
1973	Underground	Phased Released	-	0.598%	0.00	3.576%	-	-	145.00	1.00	-	
1974	Underground	Phased Released	-	0.616%	0.00	3.874%	-	-	145.00	1.00	-	
1975	Underground	Phased Released	-	0.634%	0.00	4.171%	-	-	145.00	1.00	-	
1976	Underground	Phased Released	-	0.652%	0.00	4.469%	-	-	145.00	1.00	-	
1977	Underground	Phased Released	-	0.669%	0.00	4.767%	-	-	145.00	1.00	-	
1978	Underground	Phased Released	23.13	0.687%	1.50	5.065%	0.24	1.17	145.00	1.00	34.57	
1979	Underground	Phased Released	59.68	0.705%	1.50	5.363%	0.63	3.20	145.00	1.00	91.51	
1980	Underground	Phased Released	87.19	0.723%	1.50	5.660%	0.95	4.94	145.00	1.00	137.06	
1981	Underground	Phased Released	85.14	0.740%	1.38	5.958%	0.87	5.07	145.00	1.00	125.70	
1982	Underground	Phased Released	199.06	0.758%	1.50	6.256%	2.26	12.45	145.00	1.00	328.28	
1983	Underground	Phased Released	97.63	0.776%	1.50	6.554%	1.14	6.40	145.00	1.00	164.78	
1984	Underground	Phased Released	15.00	0.794%	1.50	6.851%	0.18	1.03	145.00	1.00	25.90	
1985	Underground	Phased Released	32.59	0.811%	1.50	7.149%	0.40	2.33	145.00	1.00	57.52	
1986	Underground	Phased Released	98.80	0.829%	1.50	7.447%	1.23	7.36	145.00	1.00	178.19	
1987	Underground	Phased Released	111.49	0.847%	1.50	7.745%	1.42	8.63	145.00	1.00	205.39	
1988	Underground	Phased Released	129.44	0.865%	1.50	8.042%	1.68	10.41	145.00	1.00	243.45	
1989	Underground	Phased Released	146.44	0.882%	1.50	8.340%	1.94	12.21	145.00	1.00	281.08	
1990	Underground	Phased Released	18.31	0.900%	1.50	8.638%	0.25	1.58	145.00	1.00	35.85	
1991	Underground	Phased Released	40.12	0.918%	1.50	8.936%	0.55	3.59	145.00	1.00	80.10	
1992	Underground	Phased Released	24.27	0.936%	1.50	9.234%	0.34	2.24	145.00	1.00	49.39	
1993	Underground	Phased Released	29.46	0.953%	1.50	9.531%	0.42	2.81	145.00	1.00	61.09	
1994	Underground	Phased Released	26.14	0.971%	1.50	9.829%	0.38	2.57	145.00	1.00	55.22	
1995	Underground	Phased Released	67.71	0.989%	1.50	10.127%	1.00	6.86	145.00	1.00	145.65	
1996	Underground	Phased Released	141.07	1.007%	1.50	10.425%	2.13	14.71	145.00	1.00	308.89	
1997	Underground	Phased Released	149.46	1.024%	1.50	10.722%	2.30	16.03	145.00	1.00	333.03	
1998	Underground	Phased Released	70.67	1.042%	1.50	11.020%	1.10	7.79	145.00	1.00	160.20	
1999	Underground	Phased Released	10.68	1.060%	1.50	11.318%	0.17	1.21	145.00	1.00	24.62	
2000	Underground	Phased Released	59.65	1.078%	1.50	11.616%	0.96	6.93	145.00	1.00	139.82	
2001	Underground	Phased Released	36.60	1.095%	1.50	11.913%	0.60	4.36	145.00	1.00	87.21	
2002	Underground	Phased Released	116.87	1.113%	1.50	10.980%	1.95	12.83	145.00	1.00	282.98	
2003	Underground	Phased Released	47.15	1.131%	1.50	10.536%	0.80	4.97	145.00	1.00	115.98	
2004	Underground	Phased Released	16.25	1.149%	1.50	10.092%	0.28	1.64	145.00	1.00	40.60	
2005	Underground	Phased Released	-	1.166%	0.00	9.648%	-	-	145.00	1.00	-	
2006	Underground	Phased Released	-	1.184%	0.00	9.205%	-	-	145.00	1.00	-	
2007	Underground	Phased Released	-	1.202%	0.00	8.761%	-	-	145.00	1.00	-	
2008	Underground	Phased Released	43.07	1.220%	1.50	8.317%	0.79	3.58	145.00	1.00	114.26	
2009	Underground	Phased Released	54.60	1.237%	1.50	7.873%	1.01	4.30	145.00	1.00	146.96	
2010	Underground	Phased Released	-	1.255%	0.00	7.429%	-	-	145.00	1.00	-	
2011	Underground	Phased Released	-	1.273%	0.00	6.985%	-	-	145.00	1.00	-	
2012	Underground	Phased Released	-	1.291%	0.00	6.541%	-	-	145.00	1.00	-	
2013	Underground	Phased Released	-	1.308%	0.00	6.097%	-	-	145.00	1.00	-	
2014	Underground	Phased Released	-	1.326%	0.00	5.653%	-	-	145.00	1.00	-	
2015	Underground	Phased Released	-	1.344%	0.00	5.210%	-	-	145.00	1.00	-	
2016	Underground	Phased Released	-	1.362%	0.00	4.766%	-	-	145.00	1.00	-	
2017	Underground	Phased Released	-	1.379%	0.00	4.322%	-	-	145.00	1.00	-	
2018	Underground	Phased Released	-	1.397%	0.00	3.878%	-	-	145.00	1.00	-	
2019	Underground	Phased Released	-	0.000%	0.00	3.434%	-	-	145.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020								Gross Cost
			Current Bonded Acres	Forfeiture Rate	Adjustment		Adjustment		Avg Recl Cost per Acre	Factor Permit Status	
					Permit Bond Size	Release Rate	Forfeited Acres	Released Acres			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1963	Other	Active	-	0.157%	0.00	3.526%	-	-	140.00	1.00	-
1964	Other	Active	-	0.157%	0.00	3.440%	-	-	140.00	1.00	-
1965	Other	Active	-	0.157%	0.00	3.354%	-	-	140.00	1.00	-
1966	Other	Active	-	0.157%	0.00	3.268%	-	-	140.00	1.00	-
1967	Other	Active	-	0.157%	0.00	3.182%	-	-	140.00	1.00	-
1968	Other	Active	-	0.157%	0.00	3.096%	-	-	140.00	1.00	-
1969	Other	Active	-	0.157%	0.00	3.010%	-	-	140.00	1.00	-
1970	Other	Active	-	0.157%	0.00	2.924%	-	-	140.00	1.00	-
1971	Other	Active	-	0.157%	0.00	2.838%	-	-	140.00	1.00	-
1972	Other	Active	20.00	0.157%	1.50	2.752%	0.05	0.55	140.00	1.00	6.60
1973	Other	Active	-	0.157%	0.00	2.666%	-	-	140.00	1.00	-
1974	Other	Active	28.52	0.157%	1.50	2.580%	0.07	0.74	140.00	1.00	9.42
1975	Other	Active	6.20	0.157%	1.50	2.494%	0.01	0.15	140.00	1.00	2.05
1976	Other	Active	75.00	0.157%	1.50	2.408%	0.18	1.81	140.00	1.00	24.77
1977	Other	Active	307.70	0.157%	1.00	2.322%	0.48	7.14	140.00	1.00	67.74
1978	Other	Active	12.76	0.157%	1.50	2.236%	0.03	0.29	140.00	1.00	4.21
1979	Other	Active	65.00	0.157%	1.50	2.150%	0.15	1.40	140.00	1.00	21.46
1980	Other	Active	410.00	0.157%	1.28	2.064%	0.82	8.46	140.00	1.00	115.33
1981	Other	Active	4,174.64	0.157%	0.93	1.978%	6.10	82.56	140.00	1.00	853.38
1982	Other	Active	635.64	0.157%	0.70	1.892%	0.70	12.02	140.00	1.00	97.95
1983	Other	Active	3,946.44	0.157%	0.90	1.806%	5.61	71.26	140.00	1.00	786.05
1984	Other	Active	4,353.00	0.157%	0.68	1.720%	4.67	74.86	140.00	1.00	653.38
1985	Other	Active	1,743.70	0.157%	1.14	1.634%	3.12	28.49	140.00	1.00	436.21
1986	Other	Active	1,399.63	0.157%	0.92	1.548%	2.02	21.66	140.00	1.00	282.45
1987	Other	Active	354.22	0.157%	1.17	1.462%	0.65	5.18	140.00	1.00	90.98
1988	Other	Active	479.98	0.157%	1.21	1.376%	0.92	6.60	140.00	1.00	128.31
1989	Other	Active	627.05	0.157%	1.23	1.290%	1.21	8.09	140.00	1.00	169.42
1990	Other	Active	218.99	0.157%	1.25	1.204%	0.43	2.64	140.00	1.00	60.26
1991	Other	Active	49.45	0.157%	1.50	0.667%	0.12	0.33	140.00	1.00	16.33
1992	Other	Active	552.48	0.157%	1.20	0.811%	1.04	4.48	140.00	1.00	145.95
1993	Other	Active	929.29	0.157%	0.94	0.954%	1.38	8.87	140.00	1.00	193.21
1994	Other	Active	1,761.56	0.157%	0.83	1.098%	2.31	19.34	140.00	1.00	323.17
1995	Other	Active	644.11	0.157%	1.00	1.241%	1.01	7.99	140.00	1.00	141.80
1996	Other	Active	1,965.82	0.157%	0.50	1.385%	1.55	27.22	140.00	1.00	216.38
1997	Other	Active	1,299.08	0.157%	1.05	1.528%	2.14	19.85	140.00	1.00	298.99
1998	Other	Active	1,171.67	0.157%	0.75	1.672%	1.38	19.59	140.00	1.00	193.45
1999	Other	Active	404.41	0.157%	1.10	1.815%	0.70	7.34	140.00	1.00	97.93
2000	Other	Active	32.60	0.157%	1.50	1.959%	0.08	0.64	140.00	1.00	10.77
2001	Other	Active	313.35	0.157%	1.00	2.102%	0.49	6.59	140.00	1.00	68.98
2002	Other	Active	432.89	0.571%	1.17	2.246%	2.88	9.72	140.00	1.00	403.54
2003	Other	Active	810.10	0.618%	0.83	2.389%	4.17	19.36	140.00	1.00	584.12
2004	Other	Active	942.77	0.665%	1.06	2.533%	6.62	23.88	140.00	1.00	926.95
2005	Other	Active	74.21	0.713%	1.17	2.676%	0.62	1.99	140.00	1.00	86.38
2006	Other	Active	713.66	0.760%	1.07	2.820%	5.81	20.13	140.00	1.00	813.51
2007	Other	Active	367.37	0.807%	1.10	2.964%	3.26	10.89	140.00	1.00	456.70
2008	Other	Active	603.61	0.855%	1.28	3.107%	6.59	18.75	140.00	1.00	922.73
2009	Other	Active	272.19	0.902%	1.21	4.163%	2.98	11.33	140.00	1.00	417.31
2010	Other	Active	923.53	0.794%	1.20	6.475%	8.79	59.80	140.00	1.00	1,231.27
2011	Other	Active	383.01	0.684%	1.00	8.787%	2.62	33.66	140.00	1.00	366.54
2012	Other	Active	134.61	0.574%	1.50	11.099%	1.16	14.94	140.00	1.00	162.14
2013	Other	Active	1,679.00	0.464%	1.10	13.411%	8.56	225.17	140.00	1.00	1,198.61
2014	Other	Active	201.21	0.354%	1.40	15.723%	1.00	31.64	140.00	1.00	139.43
2015	Other	Active	429.51	0.244%	1.23	21.792%	1.28	93.60	140.00	1.00	179.73
2016	Other	Active	162.86	0.134%	1.28	17.154%	0.28	27.94	140.00	1.00	38.90
2017	Other	Active	142.24	0.024%	1.44	12.515%	0.05	17.80	140.00	1.00	6.75
2018	Other	Active	256.03	0.000%	1.50	7.876%	-	20.17	140.00	1.00	-
2019	Other	Active	256.31	0.000%	1.50	3.238%	-	8.30	140.00	1.00	-

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Forfeiture	Adjustment		Forfeited	Released	Factor			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Acres	Acres	Permit Status			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Other	Inactive	-	0.236%	0.00	2.424%	-	-	140.00	1.00	-	
1964	Other	Inactive	-	0.236%	0.00	2.365%	-	-	140.00	1.00	-	
1965	Other	Inactive	-	0.236%	0.00	2.306%	-	-	140.00	1.00	-	
1966	Other	Inactive	-	0.236%	0.00	2.247%	-	-	140.00	1.00	-	
1967	Other	Inactive	-	0.236%	0.00	2.187%	-	-	140.00	1.00	-	
1968	Other	Inactive	-	0.236%	0.00	2.128%	-	-	140.00	1.00	-	
1969	Other	Inactive	-	0.236%	0.00	2.069%	-	-	140.00	1.00	-	
1970	Other	Inactive	-	0.236%	0.00	2.010%	-	-	140.00	1.00	-	
1971	Other	Inactive	-	0.236%	0.00	1.951%	-	-	140.00	1.00	-	
1972	Other	Inactive	-	0.236%	0.00	1.892%	-	-	140.00	1.00	-	
1973	Other	Inactive	-	0.236%	0.00	1.833%	-	-	140.00	1.00	-	
1974	Other	Inactive	-	0.236%	0.00	1.774%	-	-	140.00	1.00	-	
1975	Other	Inactive	-	0.236%	0.00	1.714%	-	-	140.00	1.00	-	
1976	Other	Inactive	14.48	0.236%	1.50	1.655%	0.05	0.24	140.00	1.00	7.17	
1977	Other	Inactive	61.00	0.236%	1.50	1.596%	0.22	0.97	140.00	1.00	30.21	
1978	Other	Inactive	-	0.236%	0.00	1.537%	-	-	140.00	1.00	-	
1979	Other	Inactive	9.75	0.236%	1.50	1.478%	0.03	0.14	140.00	1.00	4.83	
1980	Other	Inactive	114.75	0.236%	0.50	1.419%	0.14	1.63	140.00	1.00	18.95	
1981	Other	Inactive	1,249.51	0.236%	0.95	1.360%	2.81	16.99	140.00	1.00	393.86	
1982	Other	Inactive	67.50	0.236%	1.50	1.301%	0.24	0.88	140.00	1.00	33.43	
1983	Other	Inactive	1,314.44	0.236%	0.83	1.241%	2.58	16.32	140.00	1.00	361.71	
1984	Other	Inactive	319.44	0.236%	1.00	1.182%	0.75	3.78	140.00	1.00	105.48	
1985	Other	Inactive	918.71	0.236%	0.83	1.123%	1.81	10.32	140.00	1.00	252.81	
1986	Other	Inactive	2.80	0.236%	1.50	1.064%	0.01	0.03	140.00	1.00	1.39	
1987	Other	Inactive	834.21	0.236%	0.50	1.005%	0.98	8.38	140.00	1.00	137.74	
1988	Other	Inactive	181.75	0.236%	1.25	0.946%	0.54	1.72	140.00	1.00	75.02	
1989	Other	Inactive	49.24	0.236%	0.50	0.887%	0.06	0.44	140.00	1.00	8.13	
1990	Other	Inactive	528.47	0.236%	1.25	0.828%	1.56	4.37	140.00	1.00	218.14	
1991	Other	Inactive	414.61	0.236%	1.30	0.459%	1.27	1.90	140.00	1.00	177.99	
1992	Other	Inactive	417.60	0.236%	1.10	0.557%	1.08	2.33	140.00	1.00	151.69	
1993	Other	Inactive	787.92	0.236%	0.90	0.656%	1.67	5.17	140.00	1.00	234.17	
1994	Other	Inactive	545.08	0.236%	1.00	0.755%	1.29	4.11	140.00	1.00	180.00	
1995	Other	Inactive	915.43	0.236%	1.00	0.853%	2.16	7.81	140.00	1.00	302.29	
1996	Other	Inactive	130.14	0.236%	0.50	0.952%	0.15	1.24	140.00	1.00	21.49	
1997	Other	Inactive	158.04	0.236%	0.83	1.051%	0.31	1.66	140.00	1.00	43.49	
1998	Other	Inactive	89.20	0.236%	1.50	1.149%	0.32	1.03	140.00	1.00	44.18	
1999	Other	Inactive	-	0.236%	0.00	1.248%	-	-	140.00	1.00	-	
2000	Other	Inactive	339.23	0.236%	0.50	1.347%	0.40	4.57	140.00	1.00	56.01	
2001	Other	Inactive	284.00	0.236%	1.00	1.445%	0.67	4.10	140.00	1.00	93.78	
2002	Other	Inactive	184.32	0.856%	1.00	1.544%	1.58	2.85	140.00	1.00	220.92	
2003	Other	Inactive	98.29	0.927%	1.50	1.643%	1.37	1.61	140.00	1.00	191.35	
2004	Other	Inactive	-	0.998%	0.00	1.741%	-	-	140.00	1.00	-	
2005	Other	Inactive	-	1.069%	0.00	1.840%	-	-	140.00	1.00	-	
2006	Other	Inactive	-	1.140%	0.00	1.939%	-	-	140.00	1.00	-	
2007	Other	Inactive	26.00	1.211%	1.50	2.037%	0.47	0.53	140.00	1.00	66.11	
2008	Other	Inactive	4.11	1.282%	1.50	2.136%	0.08	0.09	140.00	1.00	11.06	
2009	Other	Inactive	-	1.353%	0.00	2.862%	-	-	140.00	1.00	-	
2010	Other	Inactive	133.81	1.190%	0.50	4.452%	0.80	5.96	140.00	1.00	111.50	
2011	Other	Inactive	15.10	1.025%	1.50	6.041%	0.23	0.91	140.00	1.00	32.51	
2012	Other	Inactive	66.26	0.860%	0.50	7.631%	0.29	5.06	140.00	1.00	39.90	
2013	Other	Inactive	57.00	0.695%	1.50	9.220%	0.59	5.26	140.00	1.00	83.23	
2014	Other	Inactive	-	0.530%	0.00	10.810%	-	-	140.00	1.00	-	
2015	Other	Inactive	-	0.365%	0.00	14.982%	-	-	140.00	1.00	-	
2016	Other	Inactive	-	0.200%	0.00	11.793%	-	-	140.00	1.00	-	
2017	Other	Inactive	-	0.035%	0.00	8.604%	-	-	140.00	1.00	-	
2018	Other	Inactive	-	0.000%	0.00	5.415%	-	-	140.00	1.00	-	
2019	Other	Inactive	-	0.000%	0.00	2.226%	-	-	140.00	1.00	-	

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Permit Issue Year	Mine Type	Mine Status	2020							Avg Recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Forfeiture	Adjustment		Forfeited	Released	Adjustment			
			Bonded Acres	Rate	Permit Bond Size	Release Rate	Acres	Acres	Factor Permit Status			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
1963	Other	Phased Released	-	0.943%	0.00	11.018%	-	-	140.00	1.00	-	
1964	Other	Phased Released	-	0.943%	0.00	10.749%	-	-	140.00	1.00	-	
1965	Other	Phased Released	-	0.943%	0.00	10.480%	-	-	140.00	1.00	-	
1966	Other	Phased Released	-	0.943%	0.00	10.212%	-	-	140.00	1.00	-	
1967	Other	Phased Released	-	0.943%	0.00	9.943%	-	-	140.00	1.00	-	
1968	Other	Phased Released	-	0.943%	0.00	9.674%	-	-	140.00	1.00	-	
1969	Other	Phased Released	-	0.943%	0.00	9.405%	-	-	140.00	1.00	-	
1970	Other	Phased Released	-	0.943%	0.00	9.137%	-	-	140.00	1.00	-	
1971	Other	Phased Released	-	0.943%	0.00	8.868%	-	-	140.00	1.00	-	
1972	Other	Phased Released	-	0.943%	0.00	8.599%	-	-	140.00	1.00	-	
1973	Other	Phased Released	9.00	0.943%	1.50	8.330%	0.13	0.75	140.00	1.00	17.83	
1974	Other	Phased Released	-	0.943%	0.00	8.062%	-	-	140.00	1.00	-	
1975	Other	Phased Released	-	0.943%	0.00	7.793%	-	-	140.00	1.00	-	
1976	Other	Phased Released	27.88	0.943%	1.50	7.524%	0.39	2.10	140.00	1.00	55.24	
1977	Other	Phased Released	-	0.943%	0.00	7.255%	-	-	140.00	1.00	-	
1978	Other	Phased Released	-	0.943%	0.00	6.987%	-	-	140.00	1.00	-	
1979	Other	Phased Released	68.69	0.943%	1.50	6.718%	0.97	4.61	140.00	1.00	136.10	
1980	Other	Phased Released	7.91	0.943%	1.50	6.449%	0.11	0.51	140.00	1.00	15.67	
1981	Other	Phased Released	475.54	0.943%	1.25	6.180%	5.61	29.39	140.00	1.00	785.16	
1982	Other	Phased Released	205.26	0.943%	1.50	5.912%	2.90	12.13	140.00	1.00	406.68	
1983	Other	Phased Released	106.90	0.943%	1.00	5.643%	1.01	6.03	140.00	1.00	141.20	
1984	Other	Phased Released	108.69	0.943%	1.50	5.374%	1.54	5.84	140.00	1.00	215.35	
1985	Other	Phased Released	43.00	0.943%	1.50	5.105%	0.61	2.20	140.00	1.00	85.20	
1986	Other	Phased Released	38.00	0.943%	1.50	4.837%	0.54	1.84	140.00	1.00	75.29	
1987	Other	Phased Released	100.95	0.943%	1.50	4.568%	1.43	4.61	140.00	1.00	200.01	
1988	Other	Phased Released	-	0.943%	0.00	4.299%	-	-	140.00	1.00	-	
1989	Other	Phased Released	-	0.943%	1.50	4.030%	-	-	140.00	1.00	-	
1990	Other	Phased Released	-	0.943%	0.00	3.762%	-	-	140.00	1.00	-	
1991	Other	Phased Released	-	0.943%	0.00	2.085%	-	-	140.00	1.00	-	
1992	Other	Phased Released	-	0.943%	0.00	2.533%	-	-	140.00	1.00	-	
1993	Other	Phased Released	-	0.943%	0.00	2.982%	-	-	140.00	1.00	-	
1994	Other	Phased Released	-	0.943%	0.00	3.430%	-	-	140.00	1.00	-	
1995	Other	Phased Released	-	0.943%	0.00	3.879%	-	-	140.00	1.00	-	
1996	Other	Phased Released	-	0.943%	0.00	4.327%	-	-	140.00	1.00	-	
1997	Other	Phased Released	-	0.943%	0.00	4.776%	-	-	140.00	1.00	-	
1998	Other	Phased Released	-	0.943%	0.00	5.224%	-	-	140.00	1.00	-	
1999	Other	Phased Released	179.00	0.943%	0.50	5.673%	0.84	10.15	140.00	1.00	118.22	
2000	Other	Phased Released	-	0.943%	0.00	6.121%	-	-	140.00	1.00	-	
2001	Other	Phased Released	-	0.943%	0.00	6.570%	-	-	140.00	1.00	-	
2002	Other	Phased Released	-	3.424%	0.00	7.018%	-	-	140.00	1.00	-	
2003	Other	Phased Released	-	3.708%	0.00	7.467%	-	-	140.00	1.00	-	
2004	Other	Phased Released	-	3.992%	0.00	7.915%	-	-	140.00	1.00	-	
2005	Other	Phased Released	-	4.276%	0.00	8.364%	-	-	140.00	1.00	-	
2006	Other	Phased Released	-	4.560%	0.00	8.812%	-	-	140.00	1.00	-	
2007	Other	Phased Released	-	4.843%	0.00	9.261%	-	-	140.00	1.00	-	
2008	Other	Phased Released	-	5.127%	0.00	9.710%	-	-	140.00	1.00	-	
2009	Other	Phased Released	-	5.411%	0.00	13.009%	-	-	140.00	1.00	-	
2010	Other	Phased Released	-	4.762%	0.00	20.234%	-	-	140.00	1.00	-	
2011	Other	Phased Released	-	4.101%	0.00	27.459%	-	-	140.00	1.00	-	
2012	Other	Phased Released	-	3.441%	0.00	34.685%	-	-	140.00	1.00	-	
2013	Other	Phased Released	-	2.781%	0.00	41.910%	-	-	140.00	1.00	-	
2014	Other	Phased Released	-	2.121%	0.00	49.135%	-	-	140.00	1.00	-	
2015	Other	Phased Released	-	1.461%	0.00	68.102%	-	-	140.00	1.00	-	
2016	Other	Phased Released	-	0.801%	0.00	53.606%	-	-	140.00	1.00	-	
2017	Other	Phased Released	-	0.141%	0.00	39.110%	-	-	140.00	1.00	-	
2018	Other	Phased Released	-	0.000%	0.00	24.614%	-	-	140.00	1.00	-	
2019	Other	Phased Released	-	0.000%	0.00	10.118%	-	-	140.00	1.00	-	

Permit Issue Year	Mine Type	Mine Status	2021								Avg recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current Bonded Acres	Adjusted Acres	Forfeiture Rate	Adjustment Factor Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Released Acres			
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
1963	Surface	Active	-	-	0.01%	-	0.88%	-	-	100.00	1	-	
1964	Surface	Active	-	-	0.01%	-	0.88%	-	-	100.00	1	-	
1965	Surface	Active	-	-	0.02%	-	0.93%	-	-	100.00	1	-	
1966	Surface	Active	-	-	0.03%	-	0.97%	-	-	100.00	1	-	
1967	Surface	Active	-	-	0.04%	-	1.02%	-	-	100.00	1	-	
1968	Surface	Active	-	-	0.04%	-	1.07%	-	-	100.00	1	-	
1969	Surface	Active	-	-	0.05%	-	1.11%	-	-	100.00	1	-	
1970	Surface	Active	-	-	0.06%	-	1.16%	-	-	100.00	1	-	
1971	Surface	Active	-	-	0.07%	-	1.21%	-	-	100.00	1	-	
1972	Surface	Active	400.00	394.28	0.08%	1.50	1.26%	0.46	4.95	100.00	1	45.65	
1973	Surface	Active	-	-	0.09%	-	1.30%	-	-	100.00	1	-	
1974	Surface	Active	-	-	0.09%	-	1.35%	-	-	100.00	1	-	
1975	Surface	Active	-	-	0.10%	-	1.40%	-	-	100.00	1	-	
1976	Surface	Active	-	-	0.11%	-	1.44%	-	-	100.00	1	-	
1977	Surface	Active	1,973.04	1,941.08	0.12%	0.67	1.49%	1.53	28.90	100.00	1	153.24	
1978	Surface	Active	2,430.48	2,390.38	0.13%	0.50	1.54%	1.51	36.71	100.00	1	151.39	
1979	Surface	Active	180.00	176.81	0.13%	1.00	1.58%	0.24	2.80	100.00	1	23.85	
1980	Surface	Active	1,036.66	1,018.50	0.14%	0.50	1.63%	0.73	16.59	100.00	1	72.90	
1981	Surface	Active	2,056.10	2,018.05	0.15%	0.80	1.68%	2.44	33.82	100.00	1	244.44	
1982	Surface	Active	807.96	792.53	0.16%	0.83	1.72%	1.05	13.65	100.00	1	105.44	
1983	Surface	Active	1,911.88	1,875.47	0.17%	0.50	1.77%	1.57	33.18	100.00	1	157.44	
1984	Surface	Active	380.49	373.05	0.18%	0.50	1.82%	0.33	6.78	100.00	1	32.86	
1985	Surface	Active	3,048.91	2,986.77	0.18%	0.67	1.86%	3.67	55.64	100.00	1	367.16	
1986	Surface	Active	2,331.92	2,281.95	0.19%	0.93	1.91%	4.08	43.58	100.00	1	408.19	
1987	Surface	Active	1,136.12	1,111.38	0.20%	0.83	1.96%	1.86	21.74	100.00	1	186.05	
1988	Surface	Active	1,898.10	1,855.58	0.21%	0.88	2.00%	3.40	37.17	100.00	1	339.55	
1989	Surface	Active	2,524.74	2,468.14	0.22%	0.64	2.05%	3.45	50.59	100.00	1	344.90	
1990	Surface	Active	2,764.18	2,699.94	0.23%	0.77	2.10%	4.71	56.61	100.00	1	470.72	
1991	Surface	Active	2,039.50	1,990.72	0.23%	0.83	2.14%	3.88	42.67	100.00	1	387.97	
1992	Surface	Active	5,324.50	5,198.73	0.24%	0.50	2.19%	6.29	113.86	100.00	1	629.34	
1993	Surface	Active	4,234.80	4,128.97	0.25%	0.83	2.24%	8.61	92.36	100.00	1	861.44	
1994	Surface	Active	2,051.59	2,001.04	0.26%	0.50	2.28%	2.59	45.70	100.00	1	258.74	
1995	Surface	Active	6,823.51	6,644.41	0.27%	0.90	2.33%	15.96	154.84	100.00	1	1,595.76	
1996	Surface	Active	4,574.89	4,452.33	0.28%	0.90	2.38%	11.02	105.84	100.00	1	1,102.34	
1997	Surface	Active	14,023.76	13,646.61	0.28%	0.75	2.42%	29.00	330.78	100.00	1	2,900.01	
1998	Surface	Active	10,267.14	9,990.04	0.29%	0.61	2.47%	17.63	246.82	100.00	1	1,763.13	
1999	Surface	Active	2,042.00	1,985.45	0.30%	0.67	2.52%	3.97	49.98	100.00	1	396.87	
2000	Surface	Active	4,526.19	4,400.86	0.31%	0.50	2.56%	6.78	112.85	100.00	1	677.91	
2001	Surface	Active	8,365.95	8,124.60	0.32%	0.70	2.61%	17.99	212.13	100.00	1	1,799.03	
2002	Surface	Active	5,939.08	5,765.94	0.32%	0.63	2.66%	11.85	153.24	100.00	1	1,185.27	
2003	Surface	Active	9,153.56	8,879.18	0.33%	0.72	2.70%	21.34	240.13	100.00	1	2,134.29	
2004	Surface	Active	12,208.29	11,834.73	0.34%	0.75	2.75%	30.27	325.59	100.00	1	3,027.32	
2005	Surface	Active	5,344.96	5,176.99	0.35%	0.83	2.80%	15.07	144.85	100.00	1	1,506.99	
2006	Surface	Active	3,906.10	3,780.82	0.36%	0.86	2.84%	11.68	107.55	100.00	1	1,167.52	
2007	Surface	Active	5,222.12	5,053.22	0.37%	0.79	2.89%	14.63	146.11	100.00	1	1,463.39	
2008	Surface	Active	5,368.62	5,196.90	0.37%	0.56	2.94%	10.86	152.69	100.00	1	1,086.30	
2009	Surface	Active	5,218.95	5,093.56	0.38%	0.75	2.98%	14.60	152.04	100.00	1	1,460.44	
2010	Surface	Active	2,480.78	2,425.89	0.39%	0.88	2.11%	8.38	51.18	100.00	1	838.10	
2011	Surface	Active	2,143.55	2,102.19	0.40%	0.79	1.86%	6.59	39.09	100.00	1	658.69	
2012	Surface	Active	3,191.42	3,137.18	0.41%	0.82	1.61%	10.45	50.50	100.00	1	1,044.77	
2013	Surface	Active	5,238.48	5,161.17	0.42%	0.86	1.36%	18.51	70.19	100.00	1	1,851.06	
2014	Surface	Active	3,650.67	3,607.88	0.42%	0.72	1.11%	11.04	40.05	100.00	1	1,103.58	
2015	Surface	Active	3,527.20	3,494.59	0.43%	0.71	0.86%	10.78	30.06	100.00	1	1,077.76	
2016	Surface	Active	2,150.64	2,137.11	0.44%	0.60	0.61%	5.64	13.04	100.00	1	564.22	
2017	Surface	Active	826.69	822.00	0.45%	1.00	0.36%	3.68	2.96	100.00	1	368.48	
2018	Surface	Active	2,175.19	2,164.67	0.46%	0.83	0.11%	8.23	2.39	100.00	1	823.50	
2019	Surface	Active	849.88	849.18	0.46%	0.83	0.10%	3.29	0.82	100.00	1	328.89	

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2021								Avg recl Cost per Acre (19)	Adjustment Factor Permit Status (20)	Gross Cost (21)
			Current	Adjustment		Factor		Release		Released			
			Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)				
1963	Surface	Inactive	-	-	0.02%	-	0.61%	-	-	100.00	1	-	
1964	Surface	Inactive	-	-	0.02%	-	0.61%	-	-	100.00	1	-	
1965	Surface	Inactive	-	-	0.03%	-	0.64%	-	-	100.00	1	-	
1966	Surface	Inactive	-	-	0.04%	-	0.67%	-	-	100.00	1	-	
1967	Surface	Inactive	-	-	0.05%	-	0.70%	-	-	100.00	1	-	
1968	Surface	Inactive	-	-	0.07%	-	0.73%	-	-	100.00	1	-	
1969	Surface	Inactive	-	-	0.08%	-	0.77%	-	-	100.00	1	-	
1970	Surface	Inactive	-	-	0.09%	-	0.80%	-	-	100.00	1	-	
1971	Surface	Inactive	-	-	0.10%	-	0.83%	-	-	100.00	1	-	
1972	Surface	Inactive	-	-	0.12%	-	0.86%	-	-	100.00	1	-	
1973	Surface	Inactive	-	-	0.13%	-	0.90%	-	-	100.00	1	-	
1974	Surface	Inactive	-	-	0.14%	-	0.93%	-	-	100.00	1	-	
1975	Surface	Inactive	-	-	0.15%	-	0.96%	-	-	100.00	1	-	
1976	Surface	Inactive	438.80	433.92	0.17%	0.50	0.99%	0.36	4.30	100.00	1	35.86	
1977	Surface	Inactive	-	-	0.18%	-	1.02%	-	-	100.00	1	-	
1978	Surface	Inactive	-	-	0.19%	-	1.06%	-	-	100.00	1	-	
1979	Surface	Inactive	-	-	0.20%	-	1.09%	-	-	100.00	1	-	
1980	Surface	Inactive	-	-	0.21%	-	1.12%	-	-	100.00	1	-	
1981	Surface	Inactive	-	-	0.23%	-	1.15%	-	-	100.00	1	-	
1982	Surface	Inactive	-	-	0.24%	-	1.18%	-	-	100.00	1	-	
1983	Surface	Inactive	-	-	0.25%	-	1.22%	-	-	100.00	1	-	
1984	Surface	Inactive	-	-	0.26%	-	1.25%	-	-	100.00	1	-	
1985	Surface	Inactive	-	-	0.28%	-	1.28%	-	-	100.00	1	-	
1986	Surface	Inactive	224.46	221.10	0.29%	0.50	1.31%	0.32	2.90	100.00	1	31.94	
1987	Surface	Inactive	327.57	322.55	0.30%	0.50	1.35%	0.49	4.34	100.00	1	48.60	
1988	Surface	Inactive	1,135.24	1,117.39	0.31%	0.50	1.38%	1.75	15.39	100.00	1	175.26	
1989	Surface	Inactive	273.00	268.14	0.33%	1.00	1.41%	0.87	3.78	100.00	1	87.43	
1990	Surface	Inactive	228.27	224.51	0.34%	0.50	1.44%	0.38	3.24	100.00	1	37.99	
1991	Surface	Inactive	-	-	0.35%	-	1.47%	-	-	100.00	1	-	
1992	Surface	Inactive	-	-	0.36%	-	1.51%	-	-	100.00	1	-	
1993	Surface	Inactive	-	-	0.38%	-	1.54%	-	-	100.00	1	-	
1994	Surface	Inactive	578.94	568.51	0.39%	0.50	1.57%	1.10	8.93	100.00	1	110.26	
1995	Surface	Inactive	2,009.82	1,972.83	0.40%	0.50	1.60%	3.95	31.61	100.00	1	394.84	
1996	Surface	Inactive	1,639.13	1,608.33	0.41%	0.50	1.63%	3.32	26.28	100.00	1	331.84	
1997	Surface	Inactive	-	-	0.43%	-	1.67%	-	-	100.00	1	-	
1998	Surface	Inactive	846.89	830.33	0.44%	0.50	1.70%	1.82	14.10	100.00	1	181.59	
1999	Surface	Inactive	519.96	509.59	0.45%	0.50	1.73%	1.15	8.82	100.00	1	114.60	
2000	Surface	Inactive	-	-	0.46%	-	1.76%	-	-	100.00	1	-	
2001	Surface	Inactive	571.94	560.10	0.47%	0.50	1.80%	1.33	10.05	100.00	1	132.88	
2002	Surface	Inactive	1,304.87	1,277.35	0.49%	0.50	1.83%	3.11	23.34	100.00	1	310.95	
2003	Surface	Inactive	1,948.57	1,906.73	0.50%	0.50	1.86%	4.76	35.45	100.00	1	475.95	
2004	Surface	Inactive	898.15	878.52	0.51%	0.50	1.89%	2.25	16.62	100.00	1	224.73	
2005	Surface	Inactive	25.99	25.27	0.52%	1.50	1.92%	0.20	0.49	100.00	1	19.86	
2006	Surface	Inactive	244.34	238.81	0.54%	0.50	1.96%	0.64	4.67	100.00	1	64.04	
2007	Surface	Inactive	111.49	108.93	0.55%	0.50	1.99%	0.30	2.17	100.00	1	29.88	
2008	Surface	Inactive	441.20	429.62	0.56%	1.00	2.02%	2.41	8.68	100.00	1	241.05	
2009	Surface	Inactive	578.55	568.46	0.57%	0.50	2.05%	1.63	11.67	100.00	1	162.99	
2010	Surface	Inactive	5.11	5.00	0.59%	1.50	1.45%	0.04	0.07	100.00	1	4.39	
2011	Surface	Inactive	1,256.17	1,238.43	0.60%	0.50	1.28%	3.70	15.83	100.00	1	370.40	
2012	Surface	Inactive	452.53	446.89	0.61%	0.50	1.11%	1.36	4.95	100.00	1	136.42	
2013	Surface	Inactive	246.68	244.01	0.62%	0.50	0.93%	0.76	2.28	100.00	1	76.00	
2014	Surface	Inactive	1,081.42	1,071.52	0.64%	0.50	0.76%	3.40	8.18	100.00	1	340.36	
2015	Surface	Inactive	246.00	244.16	0.65%	0.50	0.59%	0.79	1.44	100.00	1	79.07	
2016	Surface	Inactive	7.00	6.91	0.66%	1.50	0.42%	0.07	0.03	100.00	1	6.84	
2017	Surface	Inactive	-	-	0.67%	-	0.25%	-	-	100.00	1	-	
2018	Surface	Inactive	-	-	0.68%	-	0.08%	-	-	100.00	1	-	
2019	Surface	Inactive	-	-	0.70%	-	0.07%	-	-	100.00	1	-	

Permit Issue Year	Mine Type	Mine Status	2021								Avg recl Cost per Acre	Adjustment	
			Current Bonded Acres	Adjusted Acres	Forfeiture Rate	Adjustment Factor Permit Bond Size	Release Rate	Forfeited Acres	Released Acres	Factor Permit Status		Gross Cost	
(1)	(2)	(3)	(4)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
1963	Surface	Phased Released	-	-	0.07%	-	2.75%	-	-	100.00	1	-	
1964	Surface	Phased Released	-	-	0.07%	-	2.75%	-	-	100.00	1	-	
1965	Surface	Phased Released	-	-	0.12%	-	2.90%	-	-	100.00	1	-	
1966	Surface	Phased Released	-	-	0.17%	-	3.05%	-	-	100.00	1	-	
1967	Surface	Phased Released	-	-	0.22%	-	3.19%	-	-	100.00	1	-	
1968	Surface	Phased Released	-	-	0.27%	-	3.34%	-	-	100.00	1	-	
1969	Surface	Phased Released	-	-	0.31%	-	3.48%	-	-	100.00	1	-	
1970	Surface	Phased Released	-	-	0.36%	-	3.63%	-	-	100.00	1	-	
1971	Surface	Phased Released	-	-	0.41%	-	3.78%	-	-	100.00	1	-	
1972	Surface	Phased Released	-	-	0.46%	-	3.92%	-	-	100.00	1	-	
1973	Surface	Phased Released	-	-	0.51%	-	4.07%	-	-	100.00	1	-	
1974	Surface	Phased Released	189.60	179.59	0.56%	1.50	4.21%	1.51	7.57	100.00	1	151.43	
1975	Surface	Phased Released	75.30	71.16	0.61%	1.50	4.36%	0.65	3.10	100.00	1	65.28	
1976	Surface	Phased Released	626.17	590.36	0.66%	1.50	4.51%	5.85	26.61	100.00	1	585.40	
1977	Surface	Phased Released	48.00	45.15	0.71%	1.50	4.65%	0.48	2.10	100.00	1	48.12	
1978	Surface	Phased Released	642.27	602.71	0.76%	1.50	4.80%	6.87	28.92	100.00	1	687.10	
1979	Surface	Phased Released	358.00	335.16	0.81%	1.50	4.94%	4.07	16.57	100.00	1	406.96	
1980	Surface	Phased Released	857.15	802.53	0.86%	1.25	5.09%	8.62	40.86	100.00	1	861.68	
1981	Surface	Phased Released	1,738.41	1,625.40	0.91%	1.17	5.24%	17.23	85.12	100.00	1	1,722.67	
1982	Surface	Phased Released	-	-	0.96%	-	5.38%	-	-	100.00	1	-	
1983	Surface	Phased Released	612.11	567.67	1.01%	1.50	5.53%	8.58	31.39	100.00	1	857.79	
1984	Surface	Phased Released	2,777.39	2,581.90	1.06%	1.10	5.68%	30.02	146.53	100.00	1	3,001.61	
1985	Surface	Phased Released	627.29	578.98	1.11%	1.50	5.82%	9.61	33.71	100.00	1	960.83	
1986	Surface	Phased Released	1,225.56	1,133.40	1.16%	1.17	5.97%	15.28	67.64	100.00	1	1,528.34	
1987	Surface	Phased Released	760.81	703.64	1.21%	1.00	6.11%	8.48	43.02	100.00	1	848.09	
1988	Surface	Phased Released	505.00	462.77	1.25%	1.50	6.26%	8.71	28.97	100.00	1	871.01	
1989	Surface	Phased Released	1,650.04	1,515.87	1.30%	1.17	6.41%	23.07	97.11	100.00	1	2,306.59	
1990	Surface	Phased Released	1,502.96	1,375.93	1.35%	1.25	6.55%	23.28	90.15	100.00	1	2,328.29	
1991	Surface	Phased Released	979.45	896.76	1.40%	1.10	6.70%	13.84	60.07	100.00	1	1,384.18	
1992	Surface	Phased Released	73.00	66.25	1.45%	1.50	6.84%	1.44	4.53	100.00	1	144.36	
1993	Surface	Phased Released	562.59	509.35	1.50%	1.50	6.99%	11.48	35.60	100.00	1	1,147.68	
1994	Surface	Phased Released	2,272.45	2,081.49	1.55%	0.70	7.14%	22.61	148.54	100.00	1	2,260.80	
1995	Surface	Phased Released	436.30	396.69	1.60%	1.00	7.28%	6.35	28.89	100.00	1	635.14	
1996	Surface	Phased Released	613.01	555.11	1.65%	1.10	7.43%	10.08	41.24	100.00	1	1,007.89	
1997	Surface	Phased Released	1,168.05	1,057.43	1.70%	1.00	7.57%	17.98	80.10	100.00	1	1,179.70	
1998	Surface	Phased Released	511.73	463.80	1.75%	0.83	7.72%	6.76	35.81	100.00	1	676.20	
1999	Surface	Phased Released	-	-	1.80%	-	7.87%	-	-	100.00	1	-	
2000	Surface	Phased Released	-	-	1.85%	1.50	8.01%	-	-	100.00	1	-	
2001	Surface	Phased Released	462.58	413.65	1.90%	1.17	8.16%	9.16	33.75	100.00	1	915.95	
2002	Surface	Phased Released	106.29	94.12	1.95%	1.50	8.31%	2.75	7.82	100.00	1	274.95	
2003	Surface	Phased Released	-	-	2.00%	1.50	8.45%	-	-	100.00	1	-	
2004	Surface	Phased Released	183.99	165.97	2.05%	0.50	8.60%	1.70	14.27	100.00	1	169.83	
2005	Surface	Phased Released	51.50	45.26	2.10%	1.50	8.74%	1.42	3.96	100.00	1	142.30	
2006	Surface	Phased Released	60.78	53.29	2.15%	1.50	8.89%	1.71	4.74	100.00	1	171.48	
2007	Surface	Phased Released	-	-	2.19%	-	9.04%	-	-	100.00	1	-	
2008	Surface	Phased Released	124.65	110.16	2.24%	1.00	9.18%	2.47	10.11	100.00	1	247.24	
2009	Surface	Phased Released	262.02	237.07	2.29%	1.25	9.33%	6.80	22.11	100.00	1	679.74	
2010	Surface	Phased Released	-	-	2.34%	-	6.59%	-	-	100.00	1	-	
2011	Surface	Phased Released	77.50	70.76	2.39%	1.50	5.81%	2.54	4.11	100.00	1	253.97	
2012	Surface	Phased Released	-	-	2.44%	-	5.03%	-	-	100.00	1	-	
2013	Surface	Phased Released	-	-	2.49%	-	4.25%	-	-	100.00	1	-	
2014	Surface	Phased Released	27.91	26.08	2.54%	1.50	3.47%	0.99	0.90	100.00	1	99.39	
2015	Surface	Phased Released	-	-	2.59%	-	2.69%	-	-	100.00	1	-	
2016	Surface	Phased Released	-	-	2.64%	-	1.91%	-	-	100.00	1	-	
2017	Surface	Phased Released	-	-	2.69%	-	1.13%	-	-	100.00	1	-	
2018	Surface	Phased Released	-	-	2.74%	-	0.35%	-	-	100.00	1	-	
2019	Surface	Phased Released	-	-	2.79%	-	0.30%	-	-	100.00	1	-	



2021													
Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Adjustment						Adjustment				
			Current Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Avg recl Cost per Acres (19)	Factor Permit Status (20)	Gross Cost (21)	
1963	Underground	Active	-	-	0.07%	-	-	0.19%	-	-	145.00	1	-
1964	Underground	Active	-	-	0.07%	-	-	0.19%	-	-	145.00	1	-
1965	Underground	Active	-	-	0.07%	-	-	0.29%	-	-	145.00	1	-
1966	Underground	Active	-	-	0.08%	-	-	0.38%	-	-	145.00	1	-
1967	Underground	Active	-	-	0.08%	-	-	0.48%	-	-	145.00	1	-
1968	Underground	Active	-	-	0.08%	-	-	0.57%	-	-	145.00	1	-
1969	Underground	Active	-	-	0.08%	-	-	0.67%	-	-	145.00	1	-
1970	Underground	Active	-	-	0.09%	-	-	0.76%	-	-	145.00	1	-
1971	Underground	Active	-	-	0.09%	-	-	0.86%	-	-	145.00	1	-
1972	Underground	Active	-	-	0.09%	-	-	0.95%	-	-	145.00	1	-
1973	Underground	Active	-	-	0.10%	-	-	1.05%	-	-	145.00	1	-
1974	Underground	Active	-	-	0.10%	-	-	1.14%	-	-	145.00	1	-
1975	Underground	Active	-	-	0.10%	-	-	1.24%	-	-	145.00	1	-
1976	Underground	Active	-	-	0.11%	-	-	1.33%	-	-	145.00	1	-
1977	Underground	Active	22.53	22.15	0.11%	1.50	1.43%	0.04	0.32	145.00	1	5.23	
1978	Underground	Active	117.89	115.84	0.11%	1.00	1.53%	0.13	1.77	145.00	1	18.74	
1979	Underground	Active	739.73	725.98	0.11%	1.21	1.62%	1.01	11.77	145.00	1	146.41	
1980	Underground	Active	222.16	217.84	0.12%	1.10	1.72%	0.28	3.74	145.00	1	40.83	
1981	Underground	Active	1,054.16	1,032.57	0.12%	1.15	1.81%	1.43	18.70	145.00	1	207.40	
1982	Underground	Active	37.93	37.11	0.12%	1.17	1.91%	0.05	0.71	145.00	1	7.75	
1983	Underground	Active	6,931.45	6,778.32	0.13%	0.87	2.00%	7.42	135.69	145.00	1	1,076.45	
1984	Underground	Active	3,035.00	2,964.44	0.13%	1.00	2.10%	3.83	62.17	145.00	1	555.92	
1985	Underground	Active	50.69	49.43	0.13%	1.50	2.19%	0.10	1.08	145.00	1	14.22	
1986	Underground	Active	280.37	273.24	0.14%	1.17	2.29%	0.43	6.25	145.00	1	62.51	
1987	Underground	Active	198.36	193.14	0.14%	1.10	2.38%	0.29	4.60	145.00	1	42.57	
1988	Underground	Active	215.95	210.03	0.14%	1.17	2.48%	0.35	5.21	145.00	1	50.16	
1989	Underground	Active	260.68	253.19	0.14%	1.40	2.57%	0.51	6.52	145.00	1	74.07	
1990	Underground	Active	162.46	157.68	0.15%	1.17	2.67%	0.27	4.21	145.00	1	39.23	
1991	Underground	Active	223.30	216.49	0.15%	1.25	2.76%	0.41	5.98	145.00	1	58.87	
1992	Underground	Active	1,081.93	1,048.15	0.15%	1.07	2.86%	1.72	29.97	145.00	1	249.14	
1993	Underground	Active	935.11	905.04	0.16%	1.05	2.95%	1.48	26.74	145.00	1	213.96	
1994	Underground	Active	613.35	593.03	0.16%	1.04	3.05%	0.98	18.09	145.00	1	141.90	
1995	Underground	Active	194.98	188.34	0.16%	1.00	3.15%	0.30	5.92	145.00	1	44.21	
1996	Underground	Active	117.87	113.67	0.16%	1.38	3.24%	0.26	3.68	145.00	1	37.35	
1997	Underground	Active	467.81	450.75	0.17%	1.26	3.34%	0.96	15.04	145.00	1	138.69	
1998	Underground	Active	578.22	556.93	0.17%	0.90	3.43%	0.86	19.11	145.00	1	124.10	
1999	Underground	Active	803.93	772.99	0.17%	1.29	3.53%	1.73	27.26	145.00	1	250.32	
2000	Underground	Active	587.54	564.86	0.18%	0.80	3.62%	0.80	20.46	145.00	1	115.76	
2001	Underground	Active	189.73	182.19	0.18%	0.90	3.72%	0.29	6.77	145.00	1	42.71	
2002	Underground	Active	309.16	297.49	0.18%	1.41	3.81%	0.77	11.34	145.00	1	110.98	
2003	Underground	Active	994.29	958.33	0.19%	1.30	3.51%	2.31	33.67	145.00	1	335.17	
2004	Underground	Active	890.05	859.52	0.19%	1.05	3.37%	1.69	28.98	145.00	1	245.60	
2005	Underground	Active	327.69	316.89	0.19%	1.07	3.23%	0.65	10.23	145.00	1	94.26	
2006	Underground	Active	427.71	414.41	0.19%	0.83	3.09%	0.67	12.79	145.00	1	97.35	
2007	Underground	Active	527.87	511.80	0.20%	1.20	2.95%	1.21	15.07	145.00	1	175.77	
2008	Underground	Active	159.18	154.46	0.20%	1.50	2.80%	0.46	4.33	145.00	1	67.30	
2009	Underground	Active	307.40	298.92	0.20%	1.17	2.66%	0.71	7.96	145.00	1	102.80	
2010	Underground	Active	156.43	152.25	0.21%	1.42	2.52%	0.44	3.84	145.00	1	64.50	
2011	Underground	Active	199.42	194.40	0.21%	1.33	2.38%	0.54	4.62	145.00	1	78.63	
2012	Underground	Active	217.12	212.05	0.21%	1.13	2.24%	0.51	4.74	145.00	1	73.39	
2013	Underground	Active	278.12	271.82	0.22%	1.43	2.09%	0.84	5.69	145.00	1	121.53	
2014	Underground	Active	477.33	467.39	0.22%	1.24	1.95%	1.26	9.12	145.00	1	183.14	
2015	Underground	Active	146.07	143.14	0.22%	1.50	1.81%	0.47	2.59	145.00	1	68.82	
2016	Underground	Active	134.19	131.69	0.22%	1.50	1.67%	0.44	2.20	145.00	1	64.16	
2017	Underground	Active	53.20	52.28	0.23%	1.50	1.53%	0.18	0.80	145.00	1	25.81	
2018	Underground	Active	35.49	34.93	0.23%	1.50	1.38%	0.12	0.48	145.00	1	17.47	
2019	Underground	Active	45.89	45.39	0.23%	1.50	1.24%	0.16	0.56	145.00	1	22.99	

Permit Issue Year	Mine Type	Mine Status	2021								Avg recl Cost per Acre	Adjustment Factor Permit Status	Gross Cost
			Current	Adjustment			Adjustment						
			Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Factor			
1963	Underground	Inactive	-	-	0.11%	-	-	0.13%	-	-	145.00	1	-
1964	Underground	Inactive	-	-	0.11%	-	-	0.13%	-	-	145.00	1	-
1965	Underground	Inactive	-	-	0.11%	-	-	0.20%	-	-	145.00	1	-
1966	Underground	Inactive	-	-	0.11%	-	-	0.26%	-	-	145.00	1	-
1967	Underground	Inactive	-	-	0.12%	-	-	0.33%	-	-	145.00	1	-
1968	Underground	Inactive	-	-	0.12%	-	-	0.39%	-	-	145.00	1	-
1969	Underground	Inactive	-	-	0.13%	-	-	0.46%	-	-	145.00	1	-
1970	Underground	Inactive	-	-	0.13%	-	-	0.52%	-	-	145.00	1	-
1971	Underground	Inactive	-	-	0.14%	-	-	0.59%	-	-	145.00	1	-
1972	Underground	Inactive	-	-	0.14%	-	-	0.66%	-	-	145.00	1	-
1973	Underground	Inactive	-	-	0.15%	-	-	0.72%	-	-	145.00	1	-
1974	Underground	Inactive	-	-	0.15%	-	-	0.79%	-	-	145.00	1	-
1975	Underground	Inactive	-	-	0.15%	-	-	0.85%	-	-	145.00	1	-
1976	Underground	Inactive	103.30	102.20	0.16%	0.50	-	0.92%	0.08	0.94	145.00	1	11.74
1977	Underground	Inactive	-	-	0.16%	-	-	0.98%	-	-	145.00	1	-
1978	Underground	Inactive	-	-	0.17%	-	-	1.05%	-	-	145.00	1	-
1979	Underground	Inactive	6.60	6.52	0.17%	0.50	-	1.11%	0.01	0.07	145.00	1	0.81
1980	Underground	Inactive	-	-	0.18%	-	-	1.18%	-	-	145.00	1	-
1981	Underground	Inactive	86.84	85.54	0.18%	1.00	-	1.25%	0.15	1.07	145.00	1	22.41
1982	Underground	Inactive	128.47	126.58	0.19%	0.50	-	1.31%	0.12	1.66	145.00	1	16.99
1983	Underground	Inactive	461.99	454.54	0.19%	0.88	-	1.38%	0.75	6.26	145.00	1	109.32
1984	Underground	Inactive	80.60	79.31	0.19%	0.50	-	1.44%	0.08	1.14	145.00	1	11.15
1985	Underground	Inactive	230.46	226.37	0.20%	1.00	-	1.51%	0.45	3.41	145.00	1	65.13
1986	Underground	Inactive	43.54	42.78	0.20%	0.50	-	1.57%	0.04	0.67	145.00	1	6.29
1987	Underground	Inactive	40.89	40.06	0.21%	1.50	-	1.64%	0.12	0.66	145.00	1	18.06
1988	Underground	Inactive	145.69	142.74	0.21%	1.17	-	1.70%	0.35	2.43	145.00	1	51.13
1989	Underground	Inactive	56.90	55.79	0.22%	0.50	-	1.77%	0.06	0.99	145.00	1	8.74
1990	Underground	Inactive	31.94	31.23	0.22%	1.50	-	1.83%	0.10	0.57	145.00	1	14.98
1991	Underground	Inactive	146.44	143.17	0.23%	1.17	-	1.90%	0.38	2.72	145.00	1	54.51
1992	Underground	Inactive	9.00	8.79	0.23%	1.50	-	1.97%	0.03	0.17	145.00	1	4.39
1993	Underground	Inactive	73.56	71.80	0.23%	1.25	-	2.03%	0.21	1.46	145.00	1	30.44
1994	Underground	Inactive	247.11	241.47	0.24%	0.50	-	2.10%	0.29	5.06	145.00	1	41.73
1995	Underground	Inactive	253.81	247.42	0.24%	1.17	-	2.16%	0.70	5.35	145.00	1	101.63
1996	Underground	Inactive	177.16	172.70	0.25%	0.90	-	2.23%	0.38	3.85	145.00	1	55.72
1997	Underground	Inactive	58.94	57.36	0.25%	1.25	-	2.29%	0.18	1.32	145.00	1	26.17
1998	Underground	Inactive	75.86	73.79	0.26%	1.17	-	2.36%	0.22	1.74	145.00	1	31.97
1999	Underground	Inactive	178.02	173.04	0.26%	1.17	-	2.42%	0.53	4.20	145.00	1	76.27
2000	Underground	Inactive	79.39	77.04	0.26%	1.50	-	2.49%	0.31	1.92	145.00	1	44.40
2001	Underground	Inactive	93.58	90.83	0.27%	1.17	-	2.56%	0.29	2.32	145.00	1	41.40
2002	Underground	Inactive	47.21	46.00	0.27%	0.50	-	2.62%	0.06	1.21	145.00	1	9.13
2003	Underground	Inactive	230.42	224.43	0.28%	1.00	-	2.42%	0.62	5.42	145.00	1	90.57
2004	Underground	Inactive	31.38	30.64	0.28%	0.50	-	2.32%	0.04	0.71	145.00	1	6.28
2005	Underground	Inactive	134.53	131.09	0.29%	1.50	-	2.22%	0.56	2.91	145.00	1	81.88
2006	Underground	Inactive	151.61	147.99	0.29%	1.21	-	2.12%	0.52	3.14	145.00	1	75.99
2007	Underground	Inactive	130.13	127.17	0.30%	1.17	-	2.03%	0.44	2.58	145.00	1	63.69
2008	Underground	Inactive	78.55	76.75	0.30%	1.50	-	1.93%	0.35	1.48	145.00	1	50.16
2009	Underground	Inactive	103.13	100.92	0.30%	1.33	-	1.83%	0.41	1.85	145.00	1	59.50
2010	Underground	Inactive	258.26	253.03	0.31%	1.25	-	1.73%	0.98	4.38	145.00	1	141.88
2011	Underground	Inactive	145.23	142.30	0.31%	1.50	-	1.63%	0.67	2.33	145.00	1	97.13
2012	Underground	Inactive	41.32	40.53	0.32%	1.50	-	1.54%	0.19	0.62	145.00	1	28.05
2013	Underground	Inactive	22.73	22.31	0.32%	1.50	-	1.44%	0.11	0.32	145.00	1	15.66
2014	Underground	Inactive	-	-	0.33%	-	-	1.34%	-	-	145.00	1	-
2015	Underground	Inactive	-	-	0.33%	-	-	1.24%	-	-	145.00	1	-
2016	Underground	Inactive	-	-	0.34%	-	-	1.15%	-	-	145.00	1	-
2017	Underground	Inactive	-	-	0.34%	-	-	1.05%	-	-	145.00	1	-
2018	Underground	Inactive	26.00	25.64	0.34%	1.50	-	0.95%	0.13	0.24	145.00	1	19.23
2019	Underground	Inactive	-	-	0.35%	-	-	0.85%	-	-	145.00	1	-

			2021									
Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Current Bonded Acres (4)	Adjustment Factor				Adjustment				Gross Cost (21)
				Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Avg recl Cost per Acres (19)	Factor Permit Status (20)	
1963	Underground	Phased Released	-	-	0.42%	-	0.60%	-	-	145.00	1	-
1964	Underground	Phased Released	-	-	0.42%	-	0.60%	-	-	145.00	1	-
1965	Underground	Phased Released	-	-	0.44%	-	0.90%	-	-	145.00	1	-
1966	Underground	Phased Released	-	-	0.46%	-	1.19%	-	-	145.00	1	-
1967	Underground	Phased Released	-	-	0.47%	-	1.49%	-	-	145.00	1	-
1968	Underground	Phased Released	-	-	0.49%	-	1.79%	-	-	145.00	1	-
1969	Underground	Phased Released	-	-	0.51%	-	2.09%	-	-	145.00	1	-
1970	Underground	Phased Released	-	-	0.53%	-	2.38%	-	-	145.00	1	-
1971	Underground	Phased Released	-	-	0.55%	-	2.68%	-	-	145.00	1	-
1972	Underground	Phased Released	-	-	0.56%	-	2.98%	-	-	145.00	1	-
1973	Underground	Phased Released	-	-	0.58%	-	3.28%	-	-	145.00	1	-
1974	Underground	Phased Released	-	-	0.60%	-	3.58%	-	-	145.00	1	-
1975	Underground	Phased Released	-	-	0.62%	-	3.87%	-	-	145.00	1	-
1976	Underground	Phased Released	-	-	0.63%	-	4.17%	-	-	145.00	1	-
1977	Underground	Phased Released	-	-	0.65%	-	4.47%	-	-	145.00	1	-
1978	Underground	Phased Released	23.13	21.72	0.67%	1.50	4.77%	0.22	1.04	145.00	1	31.63
1979	Underground	Phased Released	59.68	55.85	0.69%	1.50	5.06%	0.58	2.83	145.00	1	83.48
1980	Underground	Phased Released	87.19	81.31	0.70%	1.50	5.36%	0.86	4.36	145.00	1	124.67
1981	Underground	Phased Released	85.14	79.20	0.72%	1.38	5.66%	0.79	4.48	145.00	1	114.12
1982	Underground	Phased Released	199.06	184.34	0.74%	1.50	5.96%	2.05	10.98	145.00	1	296.89
1983	Underground	Phased Released	97.63	90.10	0.76%	1.50	6.26%	1.02	5.64	145.00	1	148.58
1984	Underground	Phased Released	15.00	13.79	0.78%	1.50	6.55%	0.16	0.90	145.00	1	23.28
1985	Underground	Phased Released	32.59	29.86	0.79%	1.50	6.85%	0.36	2.05	145.00	1	51.56
1986	Underground	Phased Released	98.80	90.21	0.81%	1.50	7.15%	1.10	6.45	145.00	1	159.22
1987	Underground	Phased Released	111.49	101.44	0.83%	1.50	7.45%	1.26	7.55	145.00	1	182.95
1988	Underground	Phased Released	129.44	117.35	0.85%	1.50	7.74%	1.49	9.09	145.00	1	216.18
1989	Underground	Phased Released	146.44	132.29	0.86%	1.50	8.04%	1.72	10.64	145.00	1	248.81
1990	Underground	Phased Released	18.31	16.48	0.88%	1.50	8.34%	0.22	1.37	145.00	1	31.63
1991	Underground	Phased Released	40.12	35.98	0.90%	1.50	8.64%	0.49	3.11	145.00	1	70.45
1992	Underground	Phased Released	24.27	21.69	0.92%	1.50	8.94%	0.30	1.94	145.00	1	43.30
1993	Underground	Phased Released	29.46	26.23	0.94%	1.50	9.23%	0.37	2.42	145.00	1	53.39
1994	Underground	Phased Released	26.14	23.19	0.95%	1.50	9.53%	0.33	2.21	145.00	1	48.09
1995	Underground	Phased Released	67.71	59.85	0.97%	1.50	9.83%	0.87	5.88	145.00	1	126.43
1996	Underground	Phased Released	141.07	124.23	0.99%	1.50	10.13%	1.84	12.58	145.00	1	267.23
1997	Underground	Phased Released	149.46	131.14	1.01%	1.50	10.42%	1.98	13.67	145.00	1	287.14
1998	Underground	Phased Released	70.67	61.78	1.02%	1.50	10.72%	0.95	6.62	145.00	1	137.66
1999	Underground	Phased Released	10.68	9.30	1.04%	1.50	11.02%	0.15	1.03	145.00	1	21.09
2000	Underground	Phased Released	59.65	51.76	1.06%	1.50	11.32%	0.82	5.86	145.00	1	119.32
2001	Underground	Phased Released	36.60	31.64	1.08%	1.50	11.62%	0.51	3.67	145.00	1	74.16
2002	Underground	Phased Released	116.87	102.09	1.10%	1.50	11.91%	1.68	12.16	145.00	1	243.24
2003	Underground	Phased Released	47.15	41.38	1.11%	1.50	10.98%	0.69	4.54	145.00	1	100.20
2004	Underground	Phased Released	16.25	14.33	1.13%	1.50	10.54%	0.24	1.51	145.00	1	35.25
2005	Underground	Phased Released	-	-	1.15%	-	10.09%	-	-	145.00	1	-
2006	Underground	Phased Released	-	-	1.17%	-	9.65%	-	-	145.00	1	-
2007	Underground	Phased Released	-	-	1.18%	-	9.20%	-	-	145.00	1	-
2008	Underground	Phased Released	43.07	38.70	1.20%	1.50	8.76%	0.70	3.39	145.00	1	101.17
2009	Underground	Phased Released	54.60	49.29	1.22%	1.50	8.32%	0.90	4.10	145.00	1	130.76
2010	Underground	Phased Released	-	-	1.24%	-	7.87%	-	-	145.00	1	-
2011	Underground	Phased Released	-	-	1.26%	-	7.43%	-	-	145.00	1	-
2012	Underground	Phased Released	-	-	1.27%	-	6.99%	-	-	145.00	1	-
2013	Underground	Phased Released	-	-	1.29%	-	6.54%	-	-	145.00	1	-
2014	Underground	Phased Released	-	-	1.31%	-	6.10%	-	-	145.00	1	-
2015	Underground	Phased Released	-	-	1.33%	-	5.65%	-	-	145.00	1	-
2016	Underground	Phased Released	-	-	1.34%	-	5.21%	-	-	145.00	1	-
2017	Underground	Phased Released	-	-	1.36%	-	4.77%	-	-	145.00	1	-
2018	Underground	Phased Released	-	-	1.38%	-	4.32%	-	-	145.00	1	-
2019	Underground	Phased Released	-	-	1.40%	-	3.88%	-	-	145.00	1	-

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2021								Avg recl Cost per Acre (19)	Adjustment	
			Current	Adjustment			Factor			Permit		Factor	Gross
			Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Status (20)		Cost (21)	
1963	Other	Active	-	-	0.16%	-	-	3.53%	-	-	140.00	1	-
1964	Other	Active	-	-	0.16%	-	-	3.53%	-	-	140.00	1	-
1965	Other	Active	-	-	0.16%	-	-	3.44%	-	-	140.00	1	-
1966	Other	Active	-	-	0.16%	-	-	3.35%	-	-	140.00	1	-
1967	Other	Active	-	-	0.16%	-	-	3.27%	-	-	140.00	1	-
1968	Other	Active	-	-	0.16%	-	-	3.18%	-	-	140.00	1	-
1969	Other	Active	-	-	0.16%	-	-	3.10%	-	-	140.00	1	-
1970	Other	Active	-	-	0.16%	-	-	3.01%	-	-	140.00	1	-
1971	Other	Active	-	-	0.16%	-	-	2.92%	-	-	140.00	1	-
1972	Other	Active	20.00	19.40	0.16%	1.50	-	2.84%	0.05	0.55	140.00	1	6.41
1973	Other	Active	-	-	0.16%	-	-	2.75%	-	-	140.00	1	-
1974	Other	Active	28.52	27.72	0.16%	1.50	-	2.67%	0.07	0.74	140.00	1	9.15
1975	Other	Active	6.20	6.03	0.16%	1.50	-	2.58%	0.01	0.16	140.00	1	1.99
1976	Other	Active	75.00	73.02	0.16%	1.50	-	2.49%	0.17	1.82	140.00	1	24.11
1977	Other	Active	307.70	300.07	0.16%	1.00	-	2.41%	0.47	7.22	140.00	1	66.06
1978	Other	Active	12.76	12.44	0.16%	1.50	-	2.32%	0.03	0.29	140.00	1	4.11
1979	Other	Active	65.00	63.45	0.16%	1.50	-	2.24%	0.15	1.42	140.00	1	20.95
1980	Other	Active	410.00	400.72	0.16%	1.28	-	2.15%	0.81	8.61	140.00	1	112.72
1981	Other	Active	4,174.64	4,085.98	0.16%	0.93	-	2.06%	5.97	84.32	140.00	1	835.26
1982	Other	Active	635.64	622.92	0.16%	0.70	-	1.98%	0.69	12.32	140.00	1	95.99
1983	Other	Active	3,946.44	3,869.56	0.16%	0.90	-	1.89%	5.51	73.20	140.00	1	770.74
1984	Other	Active	4,353.00	4,273.47	0.16%	0.68	-	1.81%	4.58	77.17	140.00	1	641.44
1985	Other	Active	1,743.70	1,712.10	0.16%	1.14	-	1.72%	3.06	29.44	140.00	1	428.31
1986	Other	Active	1,399.63	1,375.95	0.16%	0.92	-	1.63%	1.98	22.48	140.00	1	277.67
1987	Other	Active	354.22	348.39	0.16%	1.17	-	1.55%	0.64	5.39	140.00	1	89.48
1988	Other	Active	479.98	472.46	0.16%	1.21	-	1.46%	0.90	6.91	140.00	1	126.30
1989	Other	Active	627.05	617.75	0.16%	1.23	-	1.38%	1.19	8.50	140.00	1	166.90
1990	Other	Active	218.99	215.92	0.16%	1.25	-	1.29%	0.42	2.78	140.00	1	59.42
1991	Other	Active	49.45	49.00	0.16%	1.50	-	1.20%	0.12	0.59	140.00	1	16.18
1992	Other	Active	552.48	546.96	0.16%	1.20	-	0.67%	1.03	3.65	140.00	1	144.49
1993	Other	Active	929.29	919.04	0.16%	0.94	-	0.81%	1.36	7.45	140.00	1	191.08
1994	Other	Active	1,761.56	1,739.92	0.16%	0.83	-	0.95%	2.28	16.60	140.00	1	319.20
1995	Other	Active	644.11	635.10	0.16%	1.00	-	1.10%	1.00	6.97	140.00	1	139.81
1996	Other	Active	1,965.82	1,937.05	0.16%	0.50	-	1.24%	1.52	24.04	140.00	1	213.22
1997	Other	Active	1,299.08	1,277.09	0.16%	1.05	-	1.38%	2.10	17.68	140.00	1	293.92
1998	Other	Active	1,171.67	1,150.70	0.16%	0.75	-	1.53%	1.36	17.59	140.00	1	189.99
1999	Other	Active	404.41	396.37	0.16%	1.10	-	1.67%	0.69	6.63	140.00	1	95.98
2000	Other	Active	32.60	31.88	0.16%	1.50	-	1.82%	0.08	0.58	140.00	1	10.53
2001	Other	Active	313.35	306.27	0.16%	1.00	-	1.96%	0.48	6.00	140.00	1	67.42
2002	Other	Active	432.89	420.29	0.16%	1.17	-	2.10%	0.77	8.84	140.00	1	107.94
2003	Other	Active	810.10	786.57	0.57%	0.83	-	2.25%	3.74	17.67	140.00	1	523.74
2004	Other	Active	942.77	912.27	0.62%	1.06	-	2.39%	5.95	21.80	140.00	1	833.19
2005	Other	Active	74.21	71.61	0.67%	1.17	-	2.53%	0.56	1.81	140.00	1	77.82
2006	Other	Active	713.66	687.72	0.71%	1.07	-	2.68%	5.25	18.41	140.00	1	735.15
2007	Other	Active	367.37	353.22	0.76%	1.10	-	2.82%	2.95	9.96	140.00	1	413.38
2008	Other	Active	603.61	578.26	0.81%	1.28	-	2.96%	5.96	17.14	140.00	1	835.05
2009	Other	Active	272.19	257.88	0.85%	1.21	-	3.11%	2.68	8.01	140.00	1	374.63
2010	Other	Active	923.53	854.94	0.90%	1.20	-	4.16%	9.25	35.59	140.00	1	1,295.32
2011	Other	Active	383.01	346.74	0.79%	1.00	-	6.47%	2.75	22.45	140.00	1	385.23
2012	Other	Active	134.61	118.51	0.68%	1.50	-	8.79%	1.22	10.41	140.00	1	170.12
2013	Other	Active	1,679.00	1,445.27	0.57%	1.10	-	11.10%	9.12	160.41	140.00	1	1,276.60
2014	Other	Active	201.21	168.58	0.46%	1.40	-	13.41%	1.09	22.61	140.00	1	153.17
2015	Other	Active	429.51	334.63	0.35%	1.23	-	15.72%	1.45	52.61	140.00	1	203.27
2016	Other	Active	162.86	134.65	0.24%	1.28	-	21.79%	0.42	29.34	140.00	1	58.66
2017	Other	Active	142.24	124.39	0.13%	1.44	-	17.15%	0.24	21.34	140.00	1	33.51
2018	Other	Active	256.03	235.86	0.02%	1.50	-	12.52%	0.08	29.52	140.00	1	11.65
2019	Other	Active	256.31	248.01	0.00%	1.50	-	7.88%	-	19.53	140.00	1	-

			2021									
Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	Current		Adjustment Factor				Adjustment		Gross Cost (21)	
			Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)	Avg recl Cost per Acre (19)		Factor Permit Status (20)
1963	Other	Inactive	-	-	0.24%	-	2.42%	-	-	140.00	1	-
1964	Other	Inactive	-	-	0.24%	-	2.42%	-	-	140.00	1	-
1965	Other	Inactive	-	-	0.24%	-	2.36%	-	-	140.00	1	-
1966	Other	Inactive	-	-	0.24%	-	2.31%	-	-	140.00	1	-
1967	Other	Inactive	-	-	0.24%	-	2.25%	-	-	140.00	1	-
1968	Other	Inactive	-	-	0.24%	-	2.19%	-	-	140.00	1	-
1969	Other	Inactive	-	-	0.24%	-	2.13%	-	-	140.00	1	-
1970	Other	Inactive	-	-	0.24%	-	2.07%	-	-	140.00	1	-
1971	Other	Inactive	-	-	0.24%	-	2.01%	-	-	140.00	1	-
1972	Other	Inactive	-	-	0.24%	-	1.95%	-	-	140.00	1	-
1973	Other	Inactive	-	-	0.24%	-	1.89%	-	-	140.00	1	-
1974	Other	Inactive	-	-	0.24%	-	1.83%	-	-	140.00	1	-
1975	Other	Inactive	-	-	0.24%	-	1.77%	-	-	140.00	1	-
1976	Other	Inactive	14.48	14.19	0.24%	1.50	1.71%	0.05	0.24	140.00	1	7.03
1977	Other	Inactive	61.00	59.81	0.24%	1.50	1.66%	0.21	0.99	140.00	1	29.63
1978	Other	Inactive	-	-	0.24%	-	1.60%	-	-	140.00	1	-
1979	Other	Inactive	9.75	9.57	0.24%	1.50	1.54%	0.03	0.15	140.00	1	4.74
1980	Other	Inactive	114.75	112.99	0.24%	0.50	1.48%	0.13	1.67	140.00	1	18.66
1981	Other	Inactive	1,249.51	1,229.71	0.24%	0.95	1.42%	2.77	17.45	140.00	1	387.61
1982	Other	Inactive	67.50	66.38	0.24%	1.50	1.36%	0.23	0.90	140.00	1	32.88
1983	Other	Inactive	1,314.44	1,295.54	0.24%	0.83	1.30%	2.55	16.85	140.00	1	356.51
1984	Other	Inactive	319.44	314.91	0.24%	1.00	1.24%	0.74	3.91	140.00	1	103.99
1985	Other	Inactive	918.71	906.59	0.24%	0.83	1.18%	1.78	10.72	140.00	1	249.48
1986	Other	Inactive	2.80	2.76	0.24%	1.50	1.12%	0.01	0.03	140.00	1	1.37
1987	Other	Inactive	834.21	824.84	0.24%	0.50	1.06%	0.97	8.78	140.00	1	136.19
1988	Other	Inactive	181.75	179.50	0.24%	1.25	1.00%	0.53	1.80	140.00	1	74.09
1989	Other	Inactive	49.24	48.75	0.24%	0.50	0.95%	0.06	0.46	140.00	1	8.05
1990	Other	Inactive	528.47	522.54	0.24%	1.25	0.89%	1.54	4.63	140.00	1	215.69
1991	Other	Inactive	414.61	411.44	0.24%	1.30	0.83%	1.26	3.40	140.00	1	176.62
1992	Other	Inactive	417.60	414.19	0.24%	1.10	0.46%	1.07	1.90	140.00	1	150.45
1993	Other	Inactive	787.92	781.08	0.24%	0.90	0.56%	1.66	4.35	140.00	1	232.13
1994	Other	Inactive	545.08	539.68	0.24%	1.00	0.66%	1.27	3.54	140.00	1	178.21
1995	Other	Inactive	915.43	905.46	0.24%	1.00	0.75%	2.14	6.83	140.00	1	299.00
1996	Other	Inactive	130.14	128.75	0.24%	0.50	0.85%	0.15	1.10	140.00	1	21.26
1997	Other	Inactive	158.04	156.07	0.24%	0.83	0.95%	0.31	1.49	140.00	1	42.95
1998	Other	Inactive	89.20	87.86	0.24%	1.50	1.05%	0.31	0.92	140.00	1	43.52
1999	Other	Inactive	-	-	0.24%	-	1.15%	-	-	140.00	1	-
2000	Other	Inactive	339.23	334.26	0.24%	0.50	1.25%	0.39	4.17	140.00	1	55.19
2001	Other	Inactive	284.00	279.23	0.24%	1.00	1.35%	0.66	3.76	140.00	1	92.21
2002	Other	Inactive	184.32	179.90	0.24%	1.00	1.45%	0.42	2.60	140.00	1	59.40
2003	Other	Inactive	98.29	95.31	0.86%	1.50	1.54%	1.22	1.47	140.00	1	171.35
2004	Other	Inactive	-	-	0.93%	-	1.64%	-	-	140.00	1	-
2005	Other	Inactive	-	-	1.00%	-	1.74%	-	-	140.00	1	-
2006	Other	Inactive	-	-	1.07%	-	1.84%	-	-	140.00	1	-
2007	Other	Inactive	26.00	25.00	1.14%	1.50	1.94%	0.43	0.48	140.00	1	59.84
2008	Other	Inactive	4.11	3.94	1.21%	1.50	2.04%	0.07	0.08	140.00	1	10.03
2009	Other	Inactive	-	-	1.28%	-	2.14%	-	-	140.00	1	-
2010	Other	Inactive	133.81	127.06	1.35%	0.50	2.86%	0.86	3.64	140.00	1	120.32
2011	Other	Inactive	15.10	13.96	1.19%	1.50	4.45%	0.25	0.62	140.00	1	34.89
2012	Other	Inactive	66.26	60.92	1.03%	0.50	6.04%	0.31	3.68	140.00	1	43.72
2013	Other	Inactive	57.00	51.15	0.86%	1.50	7.63%	0.66	3.90	140.00	1	92.41
2014	Other	Inactive	-	-	0.70%	-	9.22%	-	-	140.00	1	-
2015	Other	Inactive	-	-	0.53%	-	10.81%	-	-	140.00	1	-
2016	Other	Inactive	-	-	0.37%	-	14.98%	-	-	140.00	1	-
2017	Other	Inactive	-	-	0.20%	-	11.79%	-	-	140.00	1	-
2018	Other	Inactive	-	-	0.04%	-	8.60%	-	-	140.00	1	-
2019	Other	Inactive	-	-	0.00%	-	5.42%	-	-	140.00	1	-

Permit Issue Year (1)	Mine Type (2)	Mine Status (3)	2021								Avg recl Cost per Acre (19)	Adjustment Factor Permit Status (20)	Gross Cost (21)
			Current	Adjustment			Adjustment						
			Bonded Acres (4)	Adjusted Acres (13)	Forfeiture Rate (14)	Permit Bond Size (15)	Release Rate (16)	Forfeited Acres (17)	Released Acres (18)				
1963	Other	Phased Released	-	-	0.94%	-	11.02%	-	-	140.00	1	-	
1964	Other	Phased Released	-	-	0.94%	-	11.02%	-	-	140.00	1	-	
1965	Other	Phased Released	-	-	0.94%	-	10.75%	-	-	140.00	1	-	
1966	Other	Phased Released	-	-	0.94%	-	10.48%	-	-	140.00	1	-	
1967	Other	Phased Released	-	-	0.94%	-	10.21%	-	-	140.00	1	-	
1968	Other	Phased Released	-	-	0.94%	-	9.94%	-	-	140.00	1	-	
1969	Other	Phased Released	-	-	0.94%	-	9.67%	-	-	140.00	1	-	
1970	Other	Phased Released	-	-	0.94%	-	9.41%	-	-	140.00	1	-	
1971	Other	Phased Released	-	-	0.94%	-	9.14%	-	-	140.00	1	-	
1972	Other	Phased Released	-	-	0.94%	-	8.87%	-	-	140.00	1	-	
1973	Other	Phased Released	9.00	8.12	0.94%	1.50	8.60%	0.11	0.70	140.00	1	16.09	
1974	Other	Phased Released	-	-	0.94%	-	8.33%	-	-	140.00	1	-	
1975	Other	Phased Released	-	-	0.94%	-	8.06%	-	-	140.00	1	-	
1976	Other	Phased Released	27.88	25.39	0.94%	1.50	7.79%	0.36	1.98	140.00	1	50.30	
1977	Other	Phased Released	-	-	0.94%	-	7.52%	-	-	140.00	1	-	
1978	Other	Phased Released	-	-	0.94%	-	7.26%	-	-	140.00	1	-	
1979	Other	Phased Released	68.69	63.10	0.94%	1.50	6.99%	0.89	4.41	140.00	1	125.03	
1980	Other	Phased Released	7.91	7.29	0.94%	1.50	6.72%	0.10	0.49	140.00	1	14.44	
1981	Other	Phased Released	475.54	440.54	0.94%	1.25	6.45%	5.20	28.41	140.00	1	727.37	
1982	Other	Phased Released	205.26	190.22	0.94%	1.50	6.18%	2.69	11.76	140.00	1	376.89	
1983	Other	Phased Released	106.90	99.86	0.94%	1.00	5.91%	0.94	5.90	140.00	1	131.90	
1984	Other	Phased Released	108.69	101.31	0.94%	1.50	5.64%	1.43	5.72	140.00	1	200.73	
1985	Other	Phased Released	43.00	40.20	0.94%	1.50	5.37%	0.57	2.16	140.00	1	79.64	
1986	Other	Phased Released	38.00	35.62	0.94%	1.50	5.11%	0.50	1.82	140.00	1	70.58	
1987	Other	Phased Released	100.95	94.91	0.94%	1.50	4.84%	1.34	4.59	140.00	1	188.05	
1988	Other	Phased Released	-	-	0.94%	-	4.57%	-	-	140.00	1	-	
1989	Other	Phased Released	-	-	0.94%	1.50	4.30%	-	-	140.00	1	-	
1990	Other	Phased Released	-	-	0.94%	-	4.03%	-	-	140.00	1	-	
1991	Other	Phased Released	-	-	0.94%	-	3.76%	-	-	140.00	1	-	
1992	Other	Phased Released	-	-	0.94%	-	2.08%	-	-	140.00	1	-	
1993	Other	Phased Released	-	-	0.94%	-	2.53%	-	-	140.00	1	-	
1994	Other	Phased Released	-	-	0.94%	-	2.98%	-	-	140.00	1	-	
1995	Other	Phased Released	-	-	0.94%	-	3.43%	-	-	140.00	1	-	
1996	Other	Phased Released	-	-	0.94%	-	3.88%	-	-	140.00	1	-	
1997	Other	Phased Released	-	-	0.94%	-	4.33%	-	-	140.00	1	-	
1998	Other	Phased Released	-	-	0.94%	-	4.78%	-	-	140.00	1	-	
1999	Other	Phased Released	179.00	168.00	0.94%	0.50	5.22%	0.79	8.78	140.00	1	110.95	
2000	Other	Phased Released	-	-	0.94%	-	5.67%	-	-	140.00	1	-	
2001	Other	Phased Released	-	-	0.94%	-	6.12%	-	-	140.00	1	-	
2002	Other	Phased Released	-	-	0.94%	-	6.57%	-	-	140.00	1	-	
2003	Other	Phased Released	-	-	3.42%	-	7.02%	-	-	140.00	1	-	
2004	Other	Phased Released	-	-	3.71%	-	7.47%	-	-	140.00	1	-	
2005	Other	Phased Released	-	-	3.99%	-	7.92%	-	-	140.00	1	-	
2006	Other	Phased Released	-	-	4.28%	-	8.36%	-	-	140.00	1	-	
2007	Other	Phased Released	-	-	4.56%	-	8.81%	-	-	140.00	1	-	
2008	Other	Phased Released	-	-	4.84%	-	9.26%	-	-	140.00	1	-	
2009	Other	Phased Released	-	-	5.13%	-	9.71%	-	-	140.00	1	-	
2010	Other	Phased Released	-	-	5.41%	-	13.01%	-	-	140.00	1	-	
2011	Other	Phased Released	-	-	4.76%	-	20.23%	-	-	140.00	1	-	
2012	Other	Phased Released	-	-	4.10%	-	27.46%	-	-	140.00	1	-	
2013	Other	Phased Released	-	-	3.44%	-	34.68%	-	-	140.00	1	-	
2014	Other	Phased Released	-	-	2.78%	-	41.91%	-	-	140.00	1	-	
2015	Other	Phased Released	-	-	2.12%	-	49.13%	-	-	140.00	1	-	
2016	Other	Phased Released	-	-	1.46%	-	68.10%	-	-	140.00	1	-	
2017	Other	Phased Released	-	-	0.80%	-	53.61%	-	-	140.00	1	-	
2018	Other	Phased Released	-	-	0.14%	-	39.11%	-	-	140.00	1	-	
2019	Other	Phased Released	-	-	0.00%	-	24.61%	-	-	140.00	1	-	

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Results of Stochastic Forfeiture Model Simulations

Year	(1) Forfeited Acres				(2) Forfeited Bond Dollars				(3) Forfeited Permits				(4) Remaining Permitted Acres			
	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean
2020	1,933	3,056	4,334	3,322	5,246,757	8,524,798	12,357,774	9,521,137	13	15	18	16	233,506	233,506	233,506	233,278
2021	-	38	409	377	-	72,240	1,216,580	1,222,352	-	1	2	2	226,242	226,342	226,342	225,920
2022	-	26	267	346	-	11,680	680,800	1,019,508	-	1	2	2	220,941	221,319	221,325	220,695
2023	65	191	593	536	57,000	203,920	1,410,560	1,335,514	1	2	4	3	206,132	206,709	206,741	205,955
2024	224	641	1,170	883	298,920	1,002,830	2,952,451	2,145,183	2	3	4	4	194,350	195,082	195,163	194,259
2025	190	454	877	682	380,240	1,447,700	2,806,741	2,164,053	3	4	5	4	184,297	185,163	185,286	184,259
2026	148	363	755	624	148,260	418,144	1,186,868	1,476,072	2	3	5	4	174,868	175,866	176,068	174,947
2027	40	172	640	488	44,160	298,000	1,902,760	1,396,269	1	2	3	2	167,277	168,385	168,686	167,470
2028	309	781	1,295	959	440,810	809,221	3,221,230	2,260,545	3	5	6	5	157,903	159,065	159,422	158,117
2029	131	685	1,213	860	155,970	1,195,464	2,835,310	2,038,967	2	3	5	4	148,163	149,427	149,817	148,460
2030	74	347	659	575	118,690	1,134,084	2,531,231	2,109,085	3	4	5	4	141,676	143,023	143,432	142,029
2031	26	126	433	504	85,320	257,160	803,200	874,186	1	2	3	2	137,329	138,772	139,238	137,781
2032	40	187	747	513	73,200	531,800	2,021,920	1,581,312	1	2	3	2	131,823	133,409	133,905	132,409
2033	258	645	1,136	823	301,490	1,518,587	3,409,115	2,366,220	2	3	5	4	123,300	124,870	125,402	123,930
2034	558	984	1,531	1,122	1,389,200	2,778,180	4,654,044	3,407,496	2	4	5	4	113,622	115,179	115,699	114,269
2035	672	1,361	2,604	1,693	1,882,480	4,736,350	11,456,435	6,859,171	4	5	7	6	100,756	102,139	102,629	101,307
2036	515	1,633	2,408	1,724	3,251,151	7,178,211	11,061,691	7,414,980	3	4	5	4	91,106	92,283	92,738	91,528
2037	27	855	1,485	986	47,000	2,800,880	6,637,610	4,025,374	1	2	3	2	85,154	86,239	86,711	85,519
2038	397	868	2,022	1,375	1,058,708	2,849,718	6,622,028	4,860,080	3	4	5	4	73,906	74,920	75,378	74,339
2039	254	971	1,579	1,093	780,920	3,824,404	6,945,341	4,701,565	2	3	4	3	64,674	65,562	65,999	65,080

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Comparison of Stochastic Simulation to Deterministic Model

Year	(1) (2) (3)			(4) (5) (6)			(7) (8) (9)		
	Forfeited Acres			Bond Revenue			Forfeited Permits		
	Simulated Mean	Simulated Median	Deterministic Mean	Simulated Mean	Simulated Median	Deterministic Mean	Simulated Mean	Simulated Median	Deterministic Mean
2020	3,322	3,056	982	9,521,137	8,524,798	1,927,220	16	15	7
2021	377	38	913	1,222,352	72,240	1,841,428	2	1	7
2022	346	26	846	1,019,508	11,680	1,755,139	2	1	6
2023	536	191	784	1,335,514	203,920	1,680,599	3	2	6
2024	883	641	730	2,145,183	1,002,830	1,604,492	4	3	5
2025	682	454	676	2,164,053	1,447,700	1,528,465	4	4	5
2026	624	363	627	1,476,072	418,144	1,451,688	4	3	5
2027	488	172	581	1,396,269	298,000	1,380,820	2	2	4
2028	959	781	540	2,260,545	809,221	1,307,322	5	5	4
2029	860	685	500	2,038,967	1,195,464	1,242,442	4	3	4
2030	575	347	465	2,109,085	1,134,084	1,181,855	4	4	4
2031	504	126	433	874,186	257,160	1,119,531	2	2	3
2032	513	187	400	1,581,312	531,800	1,061,271	2	2	3
2033	823	645	372	2,366,220	1,518,587	1,005,536	4	3	3
2034	1,122	984	347	3,407,496	2,778,180	951,105	4	4	3
2035	1,693	1,361	323	6,859,171	4,736,350	903,468	6	5	3
2036	1,724	1,633	302	7,414,980	7,178,211	858,437	4	4	2
2037	986	855	281	4,025,374	2,800,880	815,522	2	2	2
2038	1,375	868	262	4,860,080	2,849,718	774,520	4	4	2
2039	1,093	971	245	4,701,565	3,824,404	737,277	3	3	2
Total	19,484	14,385	10,609	62,779,069	41,593,370	25,128,136	80	72	80



West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Simulated Forfeited Acres by Type

Year	Surface				Underground				Other (Incl. Prospects)				Total			
	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean
2020	1,186	2,296	3,564	2,506	167	235	325	267	162	596	755	549	1,933	3,056	4,334	3,322
2021	0	0	156	275	0	0	0	18	0	0	9	84	0	38	409	377
2022	0	0	199	284	0	0	0	20	0	0	0	42	0	26	267	346
2023	0	98	486	429	0	11	36	33	0	21	88	74	65	191	593	536
2024	64	558	965	716	0	21	40	47	0	23	192	121	224	641	1,170	883
2025	63	284	731	508	9	48	183	134	0	0	34	40	190	454	877	682
2026	33	211	661	513	0	0	22	29	0	20	144	82	148	363	755	624
2027	0	52	609	395	0	13	57	41	0	0	11	51	40	172	640	488
2028	180	674	1,113	795	16	52	99	82	0	106	106	82	309	781	1,295	959
2029	34	627	1,128	778	0	25	42	37	0	12	40	46	131	685	1,213	860
2030	15	307	573	479	3	15	42	42	0	12	64	54	74	347	659	575
2031	0	0	289	426	0	26	70	51	0	0	0	26	26	126	433	504
2032	0	31	745	419	0	0	24	23	0	0	137	71	40	187	747	513
2033	110	533	991	693	0	10	56	42	0	0	98	88	258	645	1,136	823
2034	0	578	1,155	762	10	34	326	171	0	15	436	189	558	984	1,531	1,122
2035	240	952	2,162	1,249	119	167	237	195	25	138	432	249	672	1,361	2,604	1,693
2036	238	1,544	2,083	1,504	0	0	14	24	0	326	326	196	515	1,633	2,408	1,724
2037	0	0	855	476	0	0	14	19	0	25	1,169	490	27	855	1,485	986
2038	0	663	1,547	1,069	3	18	38	32	59	131	572	274	397	868	2,022	1,375
2039	106	752	1,378	919	0	82	219	112	0	6	35	62	254	971	1,579	1,093

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Land Reclamation Costs

Year	Surface				Underground				Other (Incl. Prospects)				Total			
	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean
2020	3,279,878	6,347,210	9,854,737	6,929,721	460,836	649,291	899,206	737,857	448,317	1,647,774	2,087,997	1,518,340	5,345,409	8,448,900	11,982,971	9,185,918
2021	0	0	430,566	761,470	0	0	0	49,879	0	0	23,938	231,592	0	104,821	1,131,846	1,042,941
2022	0	0	551,113	784,865	0	0	0	54,641	0	0	0	116,936	0	70,839	739,085	956,442
2023	0	270,942	1,343,237	1,186,507	0	30,028	99,540	90,655	0	58,590	243,486	204,345	179,725	528,239	1,640,654	1,481,508
2024	178,149	1,543,478	2,668,861	1,979,018	0	58,065	110,600	129,855	0	62,434	529,788	333,877	618,282	1,773,526	3,235,223	2,442,750
2025	173,919	785,260	2,020,247	1,404,736	26,212	131,420	505,553	370,562	0	0	94,204	110,739	524,355	1,255,158	2,424,670	1,886,037
2026	92,185	583,304	1,828,301	1,418,520	0	0	60,056	78,836	0	55,715	399,238	227,763	409,220	1,004,497	2,088,100	1,725,119
2027	0	144,250	1,684,991	1,091,798	0	34,563	156,776	114,540	0	0	30,415	141,791	109,217	476,147	1,770,761	1,348,129
2028	497,700	1,863,610	3,076,173	2,197,462	45,070	142,785	273,417	226,779	0	293,090	293,090	227,056	855,657	2,159,424	3,581,359	2,651,298
2029	94,093	1,732,411	3,118,505	2,150,357	0	69,733	117,098	101,405	0	33,180	110,379	127,161	362,333	1,893,195	3,354,277	2,378,923
2030	41,116	849,602	1,584,456	1,325,379	8,295	40,563	115,771	115,950	0	32,738	175,930	149,462	204,251	960,202	1,823,469	1,590,791
2031	0	0	798,014	1,179,137	0	72,167	192,638	142,116	0	0	0	72,124	72,166	347,519	1,196,498	1,393,377
2032	0	85,715	2,059,400	1,158,034	0	0	65,171	63,016	0	0	378,252	197,371	110,738	517,442	2,066,561	1,418,421
2033	304,150	1,473,303	2,739,949	1,916,652	0	28,438	154,176	116,134	0	0	271,800	242,207	713,349	1,783,702	3,139,934	2,274,993
2034	0	1,597,728	3,194,570	2,105,548	28,867	95,116	902,220	472,055	0	40,480	1,206,038	523,861	1,542,034	2,722,115	4,232,828	3,101,464
2035	662,300	2,632,446	5,977,571	3,453,194	327,929	461,119	655,056	539,449	68,641	381,570	1,193,927	688,819	1,858,052	3,764,216	7,201,221	4,681,462
2036	659,287	4,270,155	5,760,242	4,157,179	0	0	39,263	66,484	0	901,390	901,390	542,144	1,423,699	4,516,047	6,657,705	4,765,807
2037	0	0	2,363,522	1,317,331	0	0	37,328	53,249	0	67,743	3,231,345	1,354,369	73,549	2,363,522	4,105,693	2,724,949
2038	0	1,834,329	4,278,091	2,955,436	9,152	49,521	105,291	88,508	163,882	362,657	1,581,165	756,551	1,097,940	2,400,158	5,590,242	3,800,496
2039	293,118	2,080,110	3,811,248	2,540,863	0	226,868	605,535	310,863	0	17,143	97,052	170,110	702,587	2,685,645	4,366,854	3,021,836

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water Capital Costs

Year	Surface				Underground				Other (Incl. Prospects)				Total			
	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean
2020	4,139,882	8,011,487	12,438,709	8,746,737	581,670	819,539	1,134,983	931,327	565,869	2,079,831	2,635,482	1,916,458	6,747,008	10,664,253	15,124,979	11,594,522
2021	0	0	543,463	961,132	0	0	0	62,957	0	0	30,215	292,317	0	132,306	1,428,623	1,316,406
2022	0	0	695,618	990,661	0	0	0	68,968	0	0	0	147,598	0	89,414	932,877	1,207,227
2023	0	341,985	1,695,442	1,497,617	0	37,901	125,640	114,426	0	73,953	307,329	257,926	226,850	666,747	2,070,844	1,869,968
2024	224,861	1,948,188	3,368,653	2,497,929	0	73,290	139,600	163,904	0	78,804	668,701	421,421	780,399	2,238,556	4,083,518	3,083,254
2025	219,521	991,160	2,549,969	1,773,066	33,085	165,880	638,112	467,726	0	0	118,904	139,776	661,844	1,584,268	3,060,433	2,380,567
2026	116,357	736,250	2,307,693	1,790,465	0	0	75,803	99,507	0	70,324	503,921	287,484	516,520	1,267,882	2,635,613	2,177,456
2027	0	182,073	2,126,806	1,378,074	0	43,625	197,883	144,574	0	0	38,390	178,969	137,855	600,995	2,235,066	1,701,617
2028	628,200	2,352,260	3,882,765	2,773,651	56,887	180,224	345,109	286,242	0	369,940	369,940	286,592	1,080,015	2,725,638	4,520,414	3,346,484
2029	118,765	2,186,660	3,936,197	2,714,194	0	88,018	147,802	127,994	0	41,880	139,321	160,504	457,338	2,389,603	4,233,789	3,002,692
2030	51,896	1,072,372	1,999,910	1,672,902	10,470	51,198	146,126	146,353	0	41,322	222,060	188,652	257,806	1,211,972	2,301,594	2,007,907
2031	0	0	1,007,258	1,488,314	0	91,089	243,148	179,379	0	0	0	91,036	91,089	438,641	1,510,228	1,758,729
2032	0	108,190	2,599,387	1,461,678	0	0	82,259	79,539	0	0	477,432	249,123	139,774	653,119	2,608,426	1,790,340
2033	383,900	1,859,612	3,458,381	2,419,209	0	35,895	194,602	146,585	0	0	343,067	305,716	900,394	2,251,399	3,963,244	2,871,510
2034	0	2,016,662	4,032,206	2,657,636	36,436	120,056	1,138,787	595,831	0	51,094	1,522,268	661,220	1,946,364	3,435,870	5,342,701	3,914,687
2035	835,960	3,322,689	7,544,926	4,358,642	413,914	582,027	826,816	680,896	86,639	481,620	1,506,982	869,431	2,345,245	4,751,216	9,089,426	5,908,970
2036	832,156	5,389,816	7,270,612	5,247,217	0	0	49,558	83,916	0	1,137,740	1,137,740	684,298	1,797,001	5,700,182	8,403,397	6,015,431
2037	0	0	2,983,252	1,662,743	0	0	47,115	67,212	0	85,505	4,078,623	1,709,493	92,834	2,983,252	5,182,231	3,439,448
2038	0	2,315,301	5,399,833	3,730,370	11,552	62,506	132,899	111,716	206,852	457,748	1,995,757	954,924	1,385,827	3,029,495	7,056,038	4,797,009
2039	369,975	2,625,527	4,810,581	3,207,093	0	286,355	764,310	392,373	0	21,638	122,499	214,714	886,809	3,389,837	5,511,870	3,814,180

West Virginia Department of Environmental Protection Office of Special Reclamation  
 Actuarial Reserve Study as of June 30, 2019  
 Water O&M Costs

Year	Surface				Underground				Other (Incl. Prospects)				Total			
	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean	25%	50%	75%	Mean
2020	118,621	229,556	356,410	250,623	16,667	23,483	32,521	26,686	16,214	59,594	75,515	54,913	193,324	305,566	433,380	332,221
2021	118,621	229,556	371,982	278,162	16,667	23,483	32,521	28,490	16,214	59,594	76,381	63,289	193,324	309,357	474,315	369,941
2022	118,621	229,556	391,914	306,548	16,667	23,483	32,521	30,466	16,214	59,594	76,381	67,518	193,324	311,919	501,045	404,532
2023	118,621	239,355	440,494	349,460	16,667	24,569	36,121	33,744	16,214	61,713	85,187	74,908	199,824	331,023	560,382	458,112
2024	125,064	295,177	537,017	421,034	16,667	26,669	40,121	38,441	16,214	63,971	104,348	86,983	222,185	395,165	677,388	546,458
2025	131,354	323,577	610,082	471,838	17,615	31,422	58,405	51,843	16,214	63,971	107,755	90,988	241,149	440,560	765,079	614,669
2026	134,688	344,673	676,205	523,141	17,615	31,422	60,577	54,694	16,214	65,986	122,194	99,226	255,949	476,889	840,598	677,060
2027	134,688	349,890	737,145	562,627	17,615	32,672	66,247	58,836	16,214	65,986	123,294	104,354	259,899	494,109	904,640	725,817
2028	152,688	417,290	848,399	642,101	19,245	37,836	76,136	67,038	16,214	76,586	133,894	112,566	290,845	572,208	1,034,165	821,705
2029	156,091	479,945	961,184	719,872	19,245	40,358	80,371	70,706	16,214	77,786	137,886	117,165	303,949	640,678	1,155,477	907,742
2030	157,578	510,672	1,018,488	767,806	19,545	41,825	84,558	74,899	16,214	78,970	144,248	122,570	311,336	675,405	1,221,425	965,275
2031	157,578	510,672	1,047,349	810,451	19,545	44,435	91,525	80,039	16,214	78,970	144,248	125,179	313,946	687,973	1,264,698	1,015,668
2032	157,578	513,772	1,121,830	852,333	19,545	44,435	93,882	82,318	16,214	78,970	157,928	132,317	317,951	706,687	1,339,438	1,066,968
2033	168,578	567,056	1,220,924	921,651	19,545	45,463	99,458	86,518	16,214	78,970	167,758	141,077	343,750	771,197	1,452,998	1,149,246
2034	168,578	624,840	1,336,460	997,801	20,589	48,903	132,088	103,591	16,214	80,434	211,376	160,023	399,520	869,646	1,606,084	1,261,414
2035	192,531	720,046	1,552,647	1,122,691	32,449	65,580	155,779	123,101	18,697	94,234	254,556	184,935	466,719	1,005,784	1,866,526	1,430,726
2036	216,375	874,482	1,760,974	1,273,041	32,449	65,580	157,199	125,505	18,697	126,834	287,156	204,542	518,209	1,169,113	2,107,311	1,603,088
2037	216,375	874,482	1,846,454	1,320,684	32,449	65,580	158,549	127,431	18,697	129,284	404,022	253,525	520,869	1,254,593	2,255,799	1,701,639
2038	216,375	940,823	2,001,177	1,427,571	32,780	67,371	162,357	130,632	24,624	142,400	461,207	280,886	560,578	1,341,398	2,457,978	1,839,090
2039	226,976	1,016,053	2,139,016	1,519,465	32,780	75,576	184,257	141,875	24,624	143,020	464,717	287,039	585,988	1,438,528	2,615,911	1,948,378

## **Appendix D**

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
3-D COAL CO.	52-72	6/1/77	Mingo
SLAB FORK COAL CO.	U-10-83	3/1/84	Raleigh
SLAB FORK COAL COMPANY	UO-556	4/1/84	Raleigh
LOW ASH COAL CO.	UO-389	2/1/85	Wyoming
LOBO CAPITOL, INC.	UO-204	8/7/85	Preston
DLM COAL CO.	138-74	9/3/85	Upshur
DLM COAL CO.	2-80	9/13/85	Upshur
DLM COAL CO.	I-239	9/16/85	Upshur
DLM COAL CO.	P-426	9/16/85	Upshur
DLM COAL CO.	I-739	9/16/85	Upshur
DLM COAL CO.	187-77	9/16/85	Upshur
DLM COAL CO.	164-77	9/16/85	Upshur
DLM COAL CO.	UO-231	9/16/85	Upshur
DLM COAL CO.	135-78	9/16/85	Upshur
DLM COAL CO.	R-423	9/16/85	Upshur
DLM COAL CO.	1-78	9/16/85	Upshur
DLM COAL CO.	12-78	9/16/85	Upshur
DLM COAL CO.	58-77	9/16/85	Upshur
DLM COAL CO.	H-232	10/1/85	Upshur
DLM COAL CO.	23-76	10/1/85	Upshur
DLM COAL CO.	71-75	10/1/85	Upshur
RALEIGH COMMERCIAL DEVEVELOPMENT	S-23-77	1/16/87	Fayette
RALEIGH COMMERCIAL DEVEVELOPMENT	187-74	1/16/87	Fayette
RALEIGH COMMERCIAL DEVEVELOPMENT	149-79	1/21/87	Fayette
RALEIGH COMMERCIAL DEVEVELOPMENT	P-61-83	4/1/87	Fayette
PRINCESS CINDY MINING, INC.	30-79	5/26/87	Fayette
STAR INDUSTRIES, INC.	R-3-81	5/27/87	Raleigh
DUSTY COALS, INC.	S-119-85	8/10/87	Nicholas
SAN SUE COAL CO.	19-75	1/13/89	Nicholas
GREENDALE COALS, INC.	U-63-84	2/10/89	Clay
BLACK DIAMOND MINING CO.	13-79	4/1/89	Nicholas
X W CORP.	S-6013-87	4/20/89	Clay
F.G.M. ENERGY, INC.	S-5023-88	10/1/89	Logan
MCALPIN PROCESSING, INC.	S-3013-89	11/1/89	Raleigh
MCALPIN PROCESSING, INC.	R-3050-87	11/1/89	Raleigh
CATHERINE ENTERPRISES, INC.	I-544	11/14/89	Nicholas
AMERICAN MINERALS CORP.	S-6005-87	11/20/89	Kanawha
ROYAL COAL CO.	P-688	1/1/90	Fayette
BENHAM GROUP, LTD.	120-79	1/1/90	Boone
DAUGHERTY COAL COMPANY, INC.	40-73	3/9/90	Preston
E. J. & L. CO., INC.	P-3051-88	5/1/90	Raleigh
EAGLE ENERGY, INC.	U-200-83	5/1/90	Mingo
E. J. & L. CO., INC.	S-3041-87	5/9/90	Raleigh
METCO MINING CO.	P-730	5/23/90	Logan
METCO MINING CO.	UO-581	5/23/90	Logan
METCO MINING CO.	UO-463	5/23/90	Logan

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
LILLYBROOK COAL CO.	S-86-85	6/1/90	Raleigh
CANION COAL CO.	U-2-85	8/3/90	Clay
CAPPELLARI, INC.	S-78-78	2/21/91	Nicholas
ERLON COAL CO.	D-5-82	4/16/91	Fayette
JERICO CONSTR. AUGERING	S-4026-88	7/17/91	McDowell
GREAT MTN. COAL CO.	160-77	7/19/91	Fayette
GREAT MTN. COAL CO.	114-79	7/19/91	Fayette
JOHN GALT	O-40-82	8/29/91	Logan
JOHN GALT	O-45-82	8/29/91	Logan
JOHN GALT	D-76-82	8/29/91	Logan
KESSLER COALS, INC.	S-131-82	8/30/91	Boone
HARVEY ENERGY CORP.	S-3025-88	9/5/91	Fayette
HARVEY ENERGY CORP.	S-33-81	9/16/91	Fayette
HARVEY ENERGY CORP.	S-35-81	9/16/91	Fayette
HARVEY ENERGY CORP.	S-3030-89	9/16/91	Fayette
HARVEY ENERGY CORP.	S-3081-87	9/16/91	Fayette
HARVEY ENERGY CORP.	S-54-84	9/25/91	Fayette
ARARAT COAL CO.	U-4005-90	10/1/91	McDowell
G & L COAL CO.	S-86-83	10/1/91	Raleigh
C & D TRUCKING CO.	U-4017-89	11/1/91	McDowell
KESSLER COALS, INC.	U-36-85	11/1/91	Boone
KAYDEE CONSTRUCTION CO.	S-3019-87	11/11/91	Fayette
ZY COAL CO.	70-79	12/12/91	Clay
ZY COAL CO.	91-79	12/12/91	Clay
ZY COAL CO.	S-30-80	12/12/91	Clay
CRANE COAL CO., INC.	S-27-83	1/3/92	Preston
KESS COALS, INC.	O-39-85	2/1/92	Boone
MERIDAN OF VIRGINIA, INC.	S-4034-89	2/28/92	McDowell
MERIDAN OF VIRGINIA, INC.	S-4002-90	2/28/92	McDowell
MERIDAN OF VIRGINIA, INC.	S-4015-89	3/4/92	McDowell
NELLIS CORP.	U-5008-90	4/7/92	Boone
NELLIS CORP.	U-5009-90	4/7/92	Boone
F & M COAL CO.	S-1026-87	4/30/92	Preston
DAUGHERTY COAL COMPANY, INC.	188-75	5/19/92	Preston
KODIAK LAND CO., INC.	S-3052-87	5/19/92	Fayette
K-STEELE CORP.	S-6-83	5/19/92	Fayette
BULL RUN MINING COMPANY, INC.	EM-66	6/9/92	Preston
AMANDA NICOLE FUELS, INC.	S-1018-88	6/12/92	Preston
VALLEY MINING CO., INC.	S-64-83	6/12/92	Monongalia
INTERLAND RESOURCES, INC.	S-4009-91	7/8/92	McDowell
LAWSON ENTERPRISES	U-4011-90	7/10/92	McDowell
FIRST BIG MTN. MINING CO.	U-6017-88	7/27/92	Kanawha
K-STEELE CORP.	S-121-82	9/8/92	Fayette
MERIDAN OF VIRGINIA, INC.	S-4005-89	9/14/92	McDowell
MERIDAN OF VIRGINIA, INC.	S-4010-88	9/14/92	McDowell
HARVEY ENERGY CORP.	S-3070-86	9/16/92	Fayette

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
F & M COAL CO.	46-79	9/24/92	Preston
F & M COAL CO.	S-1006-88	9/24/92	Preston
CRADDOCK & SON COAL CO.	S-68-83	10/1/92	Nicholas
USE COAL, INC.	S-2016-86	10/2/92	Lewis
KELLEY COAL CO.	S-68-82	10/21/92	Harrison
INTERLAND RESOURCES, INC.	S-4016-90	10/26/92	McDowell
BEECH GROVE COAL CO.	U-85-83	10/28/92	McDowell
BEECH GROVE COAL CO.	UO-439	10/28/92	McDowell
ED-E DEVELOPMENT CO., INC.	S-10-81	1/23/93	Monongalia
ED-E DEVELOPMENT CO., INC.	S-1032-86	3/29/93	Preston
H & D COAL CO.	S-3033-87	4/28/93	Greenbrier
PROSPERITY ENERGY, INC.	S-6001-88	5/26/93	Clay
TERRA CONTRACTORS	P-1022-88	6/3/93	Marion
CRADDOCK & SON COAL CO.	S-3020-88	6/14/93	Fayette
GRINDSTONE MINING CORP.	U-3078-87	6/30/93	Fayette
51 SYSTEMS	O-22-83	6/30/93	Marion
H & D COAL COMPANY	U-69-85	7/2/93	Greenbrier
EASTERN ENERGY INVEST.	U-6030-86	7/29/93	Kanawha
BARRENSHE COAL CO.	UO-694	8/17/93	McDowell
LOGAN COAL & EXP.	D-122-82	8/18/93	Kanawha
ALGOMA A & S, INC.	S-4015-90	9/2/93	McDowell
CAPITOL FUELS, INC.	O-122-83	9/7/93	Kanawha
K & B COAL CO.	U-3054-86	11/15/93	Nicholas
HAWKS NEST MINING CO.	O-1-81	12/7/93	Kanawha
PRINCESS SUSAN COAL CO.	S-6-85	12/7/93	Kanawha
WINCHESTER COALS, INC.	O-52-83	12/7/93	Logan
WINCHESTER COALS, INC.	O-10-81	12/7/93	Lincoln
WINCHESTER COALS, INC.	D-23-81	12/7/93	Logan
PRINCESS SUSAN COAL CO.	S-32-83	12/7/93	Kanawha
PRINCESS SUSAN COAL CO.	S-6002-87	12/7/93	Kanawha
PRINCESS SUSAN COAL CO.	S-6033-86	12/7/93	Kanawha
CENTURY ENTERPRISES	S-58-82	1/6/94	Preston
ROCKVILLE MINING CO.	S-65-82	1/12/94	Preston
ROCKVILLE MINING CO.	65-78	1/12/94	Preston
MOUNTAIN LAUREL RES.	R-734	1/19/94	Summers
WILLIAMS CONSTRUCTION CO.	S-3079-86	1/21/94	Fayette
HARVEY ENERGY CORP.	P-3029-89	1/27/94	Fayette
HARVEY ENERGY CORP.	P-3053-88	1/27/94	Fayette
K-STEELE CORP.	P-47-83	1/27/94	Fayette
EASTERN ENERGY INVEST.	U-6012-88	1/28/94	Boone
M & T MINING CO.	S-3026-89	2/9/94	Nicholas
PRESTON ENERGY, INC.	UO-235	3/18/94	Preston
VMS, LTD.	S-1045-87	4/4/94	Monongalia
EASTERN ENERGY INVEST.	S-6029-86	5/2/94	Kanawha
PRESTON ENERGY, INC.	UO-429	5/5/94	Preston
VALLEY CARBON, INC.	S-3030-90	5/6/94	Kanawha



## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
DVR MINING INC.	U-4009-88	5/24/94	McDowell
ROCKVILLE MINING CO.	S-105-82	5/24/94	Preston
PRESTON ENERGY, INC.	O-86-82	5/25/94	Preston
KEENCO COAL CO.	U-106-83	6/28/94	Mingo
REGENCY FINANCIAL SERVICES	P-723	7/7/94	McDowell
DREAMLAND LTD.	I-650	7/29/94	Fayette
MARTIN SALES & PROCESSING	U-5024-90	8/1/94	Mingo
ELK RIVER SEWELL COAL CO.	S-1021-90	8/3/94	Webster
DOUBLE N MINING CO.	S-3055-88	8/9/94	Greenbrier
OAK HILL EXCAVATING	S-3059-88	8/9/94	Nicholas
OAK HILL EXCAVATING	S-3011-87	8/9/94	Nicholas
ELK RIVER SEWELL COAL CO.	O-127-83	8/12/94	Webster
L & R EQUIPMENT CO.	S-3058-86	8/19/94	Nicholas
BRADY CLINE COAL CO.	EM-97	8/23/94	Nicholas
GAULEY COAL SALES CO.	O-43-84	8/23/94	Nicholas
WILLIAMS CONSTRUCTION CO.	P-3015-91	8/29/94	Fayette
GARY COAL SALES, INC.	U-58-84	8/30/94	McDowell
GARY COAL SALES, INC.	S-4030-89	8/30/94	McDowell
MOUNTAIN LAUREL RES.	P-751	9/8/94	Summers
PINNACLE MINING COMPANY OF NORTHERN WV	S-62-85	9/12/94	Monongalia
PINNACLE MINING COMPANY OF NORTHERN WV	S-1028-86	9/12/94	Monongalia
PRESTON ENERGY, INC.	U-103-83	9/29/94	Preston
PRESTON ENERGY, INC.	U-43-84	9/29/94	Preston
PRINCESS SUSAN COAL CO.	S-76-82	10/4/94	Kanawha
OMEGA MINING CO. INC.	D-79-82	10/7/94	Monongalia
SUMMERSVILLE FIVE BLOCK	S-3051-88	11/1/94	Nicholas
SUMMERSVILLE FIVE BLOCK	O-100-83	11/1/94	Clay
REGENCY FINANCIAL SERVICES	U-93-84	11/17/94	Wyoming
MOUNTAIN LAUREL RES.	D-60-82	12/1/94	Fayette
MOUNTAIN LAUREL RESOURCES	D-54-82	12/1/94	Fayette
PINNACLE CREEK MINING CORP.	69-81	12/7/94	Wyoming
PINNACLE CREEK MINING CORP.	R-721	12/7/94	Wyoming
KMADER ENTERPRISES, INC.	U-3020-90	1/9/95	Clay
VICKIE ENERGY, INC.	U-53-85	1/11/95	Pocahontas
VICKIE ENERGY, INC.	S-3038-86	1/11/95	Nicholas
R & C LEASING, INC.	U-59-84	2/1/95	McDowell
SUMMERSVILLE FIVE BLOCK	O-66-82	2/15/95	Clay
B & S CONTRACTING, INC.	S-3031-87	3/9/95	Raleigh
COMFORT RUN COAL CO.	S-3028-89	3/10/95	Fayette
CUB BRANCH DEVELOPMENT	U-5035-87	4/4/95	Mingo
E & A COAL CO.	D-10-81	4/13/95	Raleigh
B & S CONTRACTING, INC.	O-3086-87	4/24/95	Nicholas
B & S CONTRACTING, INC.	U-3055-87	4/24/95	Nicholas
B & S CONTRACTING, INC.	P-645	4/24/95	Nicholas
B & S CONTRACTING, INC.	U-3016-86	4/25/95	Nicholas
VIRGIN COAL SALES, INC.	U-4028-92	5/2/95	McDowell

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
PHOENIX RESOURCES, INC.	S-462	5/12/95	Randolph
WILLIAMS CONSTRUCTION CO.	S-3028-90	5/22/95	Nicholas
WILLIAMS CONSTRUCTION CO.	S-3003-92	5/22/95	Nicholas
CHAFIN COAL CO.	U-70-85	7/11/95	Logan
CHAFIN COAL CO.	UO-21	7/11/95	Logan
CHAFIN COAL CO.	U-140-82	7/11/95	Logan
CHAFIN COAL CO.	D-13-82	7/11/95	Logan
CHAFIN COAL CO.	O-69-82	7/11/95	Logan
CHAFIN COAL CO.	D-18-82	7/11/95	Logan
CHAFIN COAL CO.	U-5027-86	7/11/95	Logan
B & S CONTRACTING, INC.	R-668	7/12/95	Nicholas
M & H COAL CO.	UO-406	7/13/95	Logan
M & H COAL CO.	U-144-83	7/13/95	Logan
POWELLTON CO.	P-5005-88	7/13/95	Mingo
RIDGEWAY DEV.	U-3037-89	10/12/95	Raleigh
WEST VIRGINIA ENERGY, INC.	O-32-83	10/25/95	Brooke
WEST VIRGINIA ENERGY, INC.	S-41-84	10/25/95	Brooke
T & T FUELS, INC.	EM-113	10/31/95	Preston
T & T FUELS, INC.	U-125-83	12/4/95	Preston
M & T MINING CO.	P-3032-90	1/31/96	Nicholas
JIM DANDY COALS INC.	U-77-85	2/27/96	Lewis
COAL ENTERPRISES, INC.	D-108-82	3/6/96	McDowell
IAEGER ENERGY CORP.	UO-155	3/8/96	McDowell
BARRETT FUEL CORP.	EM-133	3/15/96	Raleigh
BARRETT FUEL CORP.	P-731	3/15/96	Raleigh
BARRETT FUEL CORP.	R-737	3/15/96	Raleigh
RALPH KNICELEY CONSTRUCTION	S-2006-93	4/3/96	Randolph
RESOURCES DEVELOPMENT CORPORATION	R-4030-86	4/19/96	McDowell
SLATE CREEK ENERGY, INC.	U-4018-86	4/24/96	McDowell
G & L COAL CO.	S-3035-87	5/21/96	Fayette
G & L COAL CO.	U-3036-87	5/21/96	Fayette
MOUNTAIN TOP FUEL CO., INC.	Z-87-81	6/26/96	Lewis
COAL STRIPPING, INC.	S-1034-90	6/28/96	Monongalia
PAULEY LEASING CO., INC.	U-4029-89	7/3/96	McDowell
FITZPATRICK INDUSTRIES	S-3018-89	7/18/96	Fayette
GREEN MOUNTAIN ENERGY	O-3032-91	8/8/96	Raleigh
STONE COAL COMPANY	D-109-82	8/8/96	Wyoming
STONE COAL COMPANY	U-3024-88	8/26/96	Wyoming
STONE COAL COMPANY	U-3028-86	8/26/96	Raleigh
MERIT COAL COMPANY	U-4008-94	9/23/96	Mingo
AMIGO SMOKELESS COAL CO.	UO-623	10/16/96	Raleigh
AMIGO SMOKELESS COAL CO.	EM-71	10/16/96	Raleigh
WEST VIRGINIA ENERGY, INC.	S-20-83	10/17/96	Ohio
WEST VIRGINIA ENERGY, INC.	S-69-82	10/17/96	Ohio
SOUTHEAST LEASING, INC.	U-3003-89	10/24/96	Raleigh
SOUTHEAST LEASING, INC.	U-3023-87	10/24/96	Raleigh

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
SOUTHEAST LEASING, INC.	S-3024-87	10/24/96	Raleigh
ENERGY LEASING, INC.	I-750	10/24/96	Fayette
GREEN MOUNTAIN ENERGY	U-154-83	10/29/96	Raleigh
STONE COAL COMPANY	U-42-85	11/15/96	Raleigh
STONE COAL COMPANY	R-3025-87	11/15/96	Raleigh
GREEN MOUNTAIN ENERGY	U-4012-90	11/15/96	Wyoming
GREEN MOUNTAIN ENERGY, INC.	U-4007-91	11/15/96	Wyoming
WEST VIRGINIA ENERGY, INC.	S-1012-87	12/4/96	Ohio
KIDD'S ENERGY SALES	UO-383	12/10/96	McDowell
MOUNTAIN CARBON, INC.	O-137-83	12/10/96	Fayette
GREEN MOUNTAIN ENERGY	U-3053-88	1/10/97	Raleigh
MABEN ENERGY CORPORATION	UO-727	1/10/97	Wyoming
STONE COAL COMPANY	UO-252	1/10/97	Wyoming
ATLAS COAL LEASING, INC.	S-3021-89	1/10/97	Wyoming
WEST VIRGINIA ENERGY, INC.	S-29-80	1/23/97	Ohio
WEST VIRGINIA ENERGY, INC.	S-1071-86	1/23/97	Brooke
WEST VIRGINIA ENERGY, INC.	S-72-84	1/23/97	Ohio
WEST VIRGINIA ENERGY, INC.	S-55-85	1/23/97	Brooke
IAEGER ENERGY CORP.	U-231-83	2/3/97	McDowell
BICKFORD MINING INC.	U-44-83	2/5/97	Raleigh
MOUNTAIN MINERALS, INC.	U-225-83	2/19/97	Fayette
MOUNTAIN MINERALS, INC.	O-169-83	2/19/97	Fayette
BICKFORD MINING	U-78-85	3/12/97	Raleigh
J & D COAL CO.	S-44-84	3/12/97	Monongalia
J.A.L. COAL CO., INC.	S-23-82	3/12/97	Monongalia
GREEN MOUNTAIN ENERGY	U-4013-91	3/19/97	Wyoming
BARRETT FUEL CORPORATION	U-82-84	4/10/97	Boone
BARRETT FUEL CORPORATION	U-1-85	4/22/97	Boone
CUB BRANCH DEVELOPMENT	S-5034-87	9/10/97	Mingo
SPRING RIDGE COAL CO.	U-138-83	9/12/97	Webster
SPRING RIDGE COAL CO.	O-68-82	9/12/97	Webster
SPRING RIDGE COAL CO.	R-722	9/12/97	Webster
SPRING RIDGE COAL CO.	S-2034-88	9/12/97	Webster
SPRING RIDGE COAL COMPANY	U-2016-88	9/12/97	Webster
JO-LEE COAL COMPANY	UO-380	9/17/97	Harrison
HILO ENERGY CORP.	U-4019-92	10/20/97	McDowell
SHELL ENERGY COMPANY, INC.	U-1007-90	10/28/97	Harrison
MOUNTAINEER FUELS, INC.	U-3083-87	1/30/98	Nicholas
KEYSTONE COAL, INC.	U-5058-87	3/17/98	Mingo
KEYSTONE COAL, INC.	S-101-85	3/17/98	Mingo
KEYSTONE COAL, INC.	S-84-83	3/17/98	Mingo
KEYSTONE COAL, INC.	U-5045-87	3/17/98	Mingo
KEYSTONE COAL, INC.	U-5057-87	3/17/98	Mingo
KEYSTONE COAL, INC.	U-186-83	3/17/98	Mingo
KEYSTONE COAL, INC.	S-5059-87	3/17/98	Mingo
KEYSTONE COAL, INC.	O-56-85	3/17/98	Mingo

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
WESTSIDE RIVER TERMINAL, INC.	O-46-85	3/23/98	Monongalia
OKEMO CORP.	U-5016-87	4/3/98	Logan
OKEMO CORP.	U-5078-86	4/3/98	Logan
OKEMO CORP.	O-16-85	4/3/98	Logan
OKEMO CORP.	O-16-82	4/3/98	Logan
OKEMO CORP.	D-20-82	4/3/98	Logan
G.L.X. DEVELOPMENT CORP.	UO-675	4/6/98	Kanawha
WILLIAMS CONSTRUCTION	S-3061-88	4/6/98	Nicholas
WAR EAGLE CONSTRUCTION CO.	S-5046-88	5/28/98	Logan
KEYSTONE COAL, INC.	U-5044-87	7/17/98	Mingo
KIDD'S ENERGY SALES, INC.	U-4011-88	10/13/98	McDowell
UPCO COAL, INC.	S-1059-91	11/18/98	Upshur
TRIPLE A COALS, INC.	S-96-85	12/17/98	Nicholas
TRIPLE A COALS, INC.	U-3046-87	12/17/98	Nicholas
TRIPLE A COALS, INC.	S-3028-87	12/17/98	Nicholas
LOGAN COALS, INC.	UO-353	1/26/99	Logan
ILLUSION COAL COMPANY	U-61-83	2/1/99	Wyoming
WHITE HORSE MINING INC.	U-4020-87	2/1/99	Wyoming
COAL VALLEY MINING, INC.	O-3062-89	4/12/99	Raleigh
COAL VALLEY MINING, INC.	S-3047-91	4/12/99	Raleigh
COAL VALLEY MINING, INC.	UO-342	4/12/99	Raleigh
COAL VALLEY MINING, INC.	U-26-83	4/12/99	Raleigh
ROYAL SCOT MINERALS, INC.	31-72	4/28/99	Greenbrier
BLONDY MINING, INC.	EM-118	5/4/99	Barbour
LITWAR ENERGY, INC.	U-4002-94	6/22/99	McDowell
WESTSIDE RIVER TERMINAL, INC.	O-46-84	8/5/99	Monongalia
ACME LEASING, INC.	U-4013-88	9/28/99	McDowell
MARSON COAL COMPANY, INC.	S-2052-86	10/12/99	Randolph
MARSON COAL COMPANY, INC.	U-2005-88	10/12/99	Randolph
MARSON COAL COMPANY, INC.	U-2029-87	10/12/99	Webster
MARK A. SOUTHERN GENERAL CONTRACTOR	S-1006-92	10/20/99	Harrison
MORGANTOWN ENERGY EXPORT COMPANY	S-8-84	11/2/99	Monongalia
SANDRIDGE COAL CO.	S-1084-86	11/2/99	Monongalia
PUPS CREEK COALS, INC.	S-3006-94	12/6/99	Raleigh
QUINTAIN DEVELOPMENT, LLC	S-5033-96	1/24/00	Mingo
TRIPLE A COALS, INC.	U-22-85	1/24/00	Nicholas
EASTERN LEASING & EQUIPMENT COMPANY	U-2037-86	2/9/00	Webster
BOLINGREEN MINING COMPANY	S-1024-88	2/10/00	Preston
JINKS MINING COMPANY	S-113-85	2/24/00	Nicholas
JINKS MINING COMPANY	U-3031-93	2/24/00	Nicholas
TRIPLE A COALS, INC.	U-3006-87	2/24/00	Nicholas
TRIPLE A COALS, INC.	O-3077-87	2/24/00	Nicholas
K. C. & M. COAL COMPANY, INC.	S-1023-88	3/8/00	Preston
FLAGGY MEADOW COAL COMPANY	U-1012-93	3/16/00	Monongalia
MARSON COAL COMPANY, INC.	O-2044-88	4/13/00	Randolph
STARCO ENERGY, INC.	R-7-81	4/25/00	McDowell

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
STARCO ENERGY, INC.	O-36-84	4/25/00	McDowell
ROYAL SCOT MINERALS, INC.	S-3050-86	4/26/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-3076-86	4/26/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-65-85	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-682	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3017-87	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3046-88	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	D-125-82	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	O-103-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	O-104-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	56-81	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-40-85	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	D-32-81	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3074-87	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	32-81	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-107-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3062-87	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3020-86	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-90-82	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-99-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	O-1-82	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	U-3066-88	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	O-71-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-176-75	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-3012-93	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	O-67-82	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-3070-88	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-3011-88	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-47-83	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-3009-89	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	UO-571	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	R-3078-86	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-65-76	4/27/00	Greenbrier
ROYAL SCOT MINERALS, INC.	S-60-83	4/27/00	Greenbrier
PUPS CREEK COALS, INC.	S-3002-92	7/18/00	Raleigh
BELVA COAL COMPANY	S-5029-93	8/16/00	Logan
MARSON COAL COMPANY, INC.	S-2021-87	9/11/00	Randolph
EPLING COAL ENTERPRISES, INC.	S-67-85	10/25/00	Nicholas
C. C. CONLEY & SONS, INC.	S-3046-91	12/7/00	Nicholas
MID-ATLANTIC RESOURCE CORPORATION	U-3040-87	1/2/01	Raleigh
MID-ATLANTIC RESOURCE CORPORATION	U-3044-91	1/2/01	Raleigh
MID-ATLANTIC RESOURCE CORPORATION	U-3045-86	1/2/01	Raleigh
MID-ATLANTIC RESOURCE CORPORATION	U-3067-86	1/2/01	Raleigh
MID-ATLANTIC RESOURCE CORPORATION	D-73-82	1/2/01	Raleigh
MID-ATLANTIC RESOURCE CORPORATION	O-23-85	1/2/01	Raleigh
ELMINA COAL COMPANY	U-4012-86	1/8/01	McDowell

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COMPANY	PERMIT	DATE REVOKED	COUNTY
VIKING COAL COMPANY	UO-519	1/18/01	Preston
BELVA COAL COMPANY	P-654	1/26/01	Logan
BELVA COAL COMPANY	R-591	1/26/01	Logan
BELVA COAL COMPANY	S-41-80	1/26/01	Logan
BELVA COAL COMPANY	S-94-82	1/26/01	Logan
DELTA TERMINALS, INC.	S-42-80	1/30/01	Boone
DELTA TERMINALS, INC.	Z-54-81	1/30/01	Boone
LANDMARK CORPORATION	S-5047-89	1/30/01	Boone
LANDMARK CORPORATION	S-34-82	1/30/01	Boone
LANDMARK CORPORATION	S-5069-88	1/30/01	Boone
MARSON COAL COMPANY, INC.	EM-44	2/8/01	Webster
MARSON COAL COMPANY, INC.	EM-91	2/8/01	Randolph
MARSON COAL COMPANY, INC.	I-608	2/8/01	Randolph
MARSON COAL COMPANY, INC.	U-90-84	2/8/01	Webster
RHINO COAL, LLC	U-4027-88	3/6/01	McDowell
RALEIGH APPALACHIAN REMINING, INC.	P-3038-97	3/29/01	Raleigh
TYPICAL ENTERPRISES	U-5006-95	4/5/01	Lincoln
UPCO COAL, INC.	S-197-75	4/17/01	Upshur
UPCO COAL, INC.	S-2009-89	4/17/01	Upshur
UPCO COAL, INC.	S-2010-87	4/17/01	Upshur
MID-ATLANTIC RESOURCE CORPORATION	U-3036-92	4/23/01	Raleigh
DEAN FUELS, INC.	S-24-83	6/11/01	Monongalia
J & N PROCESSING COMPANY, LLC	O-58-83	6/29/01	Raleigh
MATE CREEK LOADING, INC.	O-5059-86	7/14/01	Mingo
DEAN FUELS, INC.	U-160-82	8/7/01	Monongalia
BALDWIN MINING COMPANY	D-75-82	8/22/01	Gilmer
C. C. CONLEY & SONS, INC.	S-2002-92	9/10/01	Webster
C. C. CONLEY & SONS, INC.	U-1041-91	9/10/01	Webster
ALAN BLOSSER	S-1010-87	1/2/02	Monongalia
D & A RESOURCES, INC.	U-3042-89	1/30/02	Fayette
ATWELL HOLDING, INC.	U-4019-88	3/4/02	McDowell
COUGAR COAL CO.	P-1029-97	5/1/02	Taylor
A & B THOMAS, INC.	U-50-85	7/12/02	Nicholas
A & B THOMAS, INC.	U-171-83	7/12/02	Nicholas
LO-MING COAL CORPORATION	U-5036-88	9/17/02	Logan
LO-MING COAL CORPORATION	O-5092-87	9/17/02	Logan
LO-MING COAL CORPORATION	U-5049-87	9/17/02	Logan
LO-MING COAL CORPORATION	O-5035-88	9/17/02	Logan
AUTHOR ENTERPRISES, INC.	U-4012-94	10/4/02	McDowell
BELL HOLDING, INC.	EM-116	10/4/02	McDowell
AUTHOR ENTERPRISES, INC.	U-4017-91	10/4/02	McDowell
BELL HOLDING, INC.	H-290	10/4/02	McDowell
GOLDEN FALCON RESOURCES, INC.	U-61-84	10/4/02	McDowell
BARBOUR ENTERPRISES, INC.	S-2003-97	10/24/02	Lewis
PREMIUM ROCK COAL COMPANY, INC.	P-3027-99	10/24/02	Raleigh
INDUSTRIAL ENERGY, INC.	U-101-83	11/21/02	Nicholas

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
J. C. B. MINING, INC.	U-2006-88	12/30/02	Lewis
A & B THOMAS, INC.	UO-131	1/28/03	Nicholas
LO-MING COAL CORPORATION	U-5018-98	1/28/03	Logan
LO-MING COAL CORPORATION	U-5023-97	1/28/03	Logan
LO-MING COAL CORPORATION	U-5084-88	1/28/03	Logan
LO-MING COAL CORPORATION	U-5085-88	1/28/03	Logan
CHICOPEE COAL COMPANY, INC.	O-6013-88	1/31/03	Clay
CHICOPEE COAL COMPANY, INC.	O-6021-89	1/31/03	Clay
CHICOPEE COAL COMPANY, INC.	S-73-85	1/31/03	Clay
CHICOPEE COAL COMPANY, INC.	U-6018-86	1/31/03	Clay
ANTAEUS GARY PROJECT, INC.	O-20-84	3/25/03	McDowell
LINN MINING COMPANY	U-1008-92	6/30/03	Harrison
FREEMPORT MINING CORPORATION	S-1005-95	7/8/03	Preston
FREEMPORT MINING CORPORATION	S-1004-88	7/8/03	Preston
FREEMPORT MINING CORPORATION	S-1019-87	8/18/03	Preston
QUINTAIN DEVELOPMENT, INC.	P-5013-96	11/3/03	Wayne
QUINTAIN DEVELOPMENT, INC.	P-5036-98	11/3/03	Wayne
QUINTAIN DEVELOPMENT, INC.	P-5007-98	11/3/03	Wayne
QUINTAIN DEVELOPMENT, INC.	P-5038-97	11/3/03	Wayne
PLUM TREE MINERALS LLC.	S-3010-98	12/2/03	Raleigh
THE MASTELLER COAL COMPANY	S-10-85	12/10/03	Mineral
LODESTAR ENERGY, INC.	S-3016-92	1/13/04	Raleigh
LODESTAR ENERGY, INC.	S-3006-89	1/21/04	Nicholas
LODESTAR ENERGY, INC.	S-3083-86	1/21/04	Nicholas
LODESTAR ENERGY, INC.	S-19-85	1/21/04	Nicholas
PEACHTREE RIDGE MINING, INC.	U-18-83	1/29/04	Raleigh
PLUM TREE MINERALS LLC.	P-3035-01	1/30/04	Raleigh
LODESTAR ENERGY, INC.	O-172-83	1/30/04	Fayette
GRACE ENTERPRISES, INC.	S-2007-01	3/15/04	Harrison
GRACE ENTERPRISES, INC.	S-1008-97	3/15/04	Marion
ANDERSON COAL COMPANY	U-3049-86	3/30/04	Nicholas
THE MASTELLER COAL COMPANY	S-125-82	5/3/04	Mineral
LODESTAR ENERGY, INC.	R-5-84	5/24/04	Wyoming
GLADY FORK MINING, INC.	D-35-82	6/7/04	Upshur
THE MASTELLER COAL COMPANY	P-741	6/7/04	Mineral
REGENCY LAND COMPANY	U-5069-87	9/7/04	Logan
MAURICE JENNINGS	S-61-83	11/30/04	Preston
MAURICE JENNINGS	53-78	12/10/04	Preston
FLEX DEVELOPMENT CORPORATION	S-1013-91	1/11/05	Harrison
FALCON LAND COMPANY, INC.	P-656	4/5/05	Nicholas
C & M COAL CONTRACTING, INC.	S-1001-99	4/19/05	Harrison
FALCON LAND COMPANY, INC.	P-664	5/9/05	Nicholas
GLADY FORK MINING, INC.	U-60-83	5/23/05	Upshur
GLADY FORK MINING, INC.	U-2001-01	5/23/05	Upshur
GLADY FORK MINING, INC.	O-4-84-1	5/23/05	Upshur
GLADY FORK MINING, INC.	P-2012-00	6/21/05	Upshur

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
PINE CREEK MINING INC	U-51-84	2/27/06	Logan
PINE CREEK MINING INC	U-5056-88	2/27/06	Logan
LITTLE HOPE MINING INC.	U-63-85	3/21/06	Mingo
CHICOPEE COAL COMPANY, INC.	U-3010-87	3/28/06	Nicholas
CHICOPEE COAL COMPANY, INC.	UO-223	3/28/06	Nicholas
CHICOPEE COAL COMPANY, INC.	U-3003-86	3/28/06	Nicholas
CHICOPEE COAL COMPANY, INC.	U-55-85	3/28/06	Nicholas
CHICOPEE COAL COMPANY, INC.	S-3036-86	3/28/06	Nicholas
CHICOPEE COAL COMPANY, INC.	S-3006-99	3/28/06	Nicholas
MARK POWELL CONSTRUCTION COMPANY	P-1018-00	4/24/06	Monongalia
MARK POWELL CONSTRUCTION COMPANY	P-1013-00	4/24/06	Monongalia
CHICOPEE COAL COMPANY, INC.	U-10-85	6/23/06	Nicholas
LOYAL G. FORMAN & SON	S-2009-01	6/23/06	Preston
CHICOPEE COAL COMPANY, INC.	S-3002-98	6/23/06	Nicholas
LOYAL G. FORMAN & SON	S-1002-99	6/23/06	Preston
LAYLAND COAL COMPANY	O-20-85	7/28/06	Fayette
BUFFALO COAL COMPANY, INC.	S-53-80	9/29/06	Grant
BUFFALO COAL COMPANY, INC.	S-52-80	9/29/06	Grant
BUFFALO COAL COMPANY, INC.	S-122-80	9/29/06	Tucker
BUFFALO COAL COMPANY, INC.	O-96-83	9/29/06	Grant
BUFFALO COAL COMPANY, INC.	O-97-83	9/29/06	Tucker
BUFFALO COAL COMPANY, INC.	S-2001-86	9/29/06	Grant
BUFFALO COAL COMPANY, INC.	O-40-84	10/24/06	Grant
BUFFALO COAL COMPANY, INC.	H-499	10/24/06	Grant
BUFFALO COAL COMPANY, INC.	U-2001-02	10/26/06	Grant
BUFFALO COAL COMPANY, INC.	S-2005-95	10/26/06	Tucker
BUFFALO COAL COMPANY, INC.	U-38-85	10/26/06	Tucker
BUFFALO COAL COMPANY, INC.	U-2013-00	10/26/06	Grant
LEVEL LAND MINING CORPORATION	S-3031-90	11/8/06	Fayette
LID ENTERPRISES, INC.	P-4008-04	11/16/06	McDowell
LAKE ENERGY, INC	U-133-83	2/15/07	Logan
TYGART VALLEY MINING, INC.	U-2002-95	2/28/07	Barbour
FOSSIL FUELS, INC.	P-3020-02	3/14/07	Nicholas
LEVEL LAND CONSTRUCTION COMPANY, INC.	S-3026-88	8/8/07	Nicholas
LEVEL LAND CONSTRUCTION COMPANY, INC.	S-3007-89	8/8/07	Nicholas
LEVEL LAND CONSTRUCTION COMPANY, INC.	S-3027-90	8/8/07	Nicholas
POCAHONTAS RESOURCES, INC.	S-3012-92	9/6/07	Nicholas
ALTEC ENERGY, INC	P-3010-99	10/22/07	Kanawha
MANGUS COAL, INC.	S-1036-91	3/14/08	Preston
TYPICAL ENTERPRISES	P-5009-91	5/28/08	Lincoln
TYPICAL ENTERPRISES	P-5013-91	5/28/08	Lincoln
CLEARWATER CONSTRUCTION	S-3016-99	5/28/08	Fayette
POLARIS COAL JOINT VENTURE	P-2007-00	5/28/08	Clay
BLACKHEART MINING INC	P-5034-90	5/28/08	Boone
SANDRIDGE COAL, LLC	UO-401	7/1/08	Barbour
BUFFALO COAL COMPANY, INC.	146-77	7/10/08	Tucker



## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
BUFFALO COAL COMPANY, INC.	S-1048-91	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-74-76	7/10/08	Tucker
BUFFALO COAL CO., INC.	U-2004-03	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-100-84	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-32-84	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2023-92	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-7-80	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-61-85	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-2003-03	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2018-88	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-2008-02	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2007-96	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-2018-00	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2011-92	7/10/08	Preston
BUFFALO COAL COMPANY, INC.	O-2006-95	7/10/08	Tucker
BUFFALO COAL COMPANY, INC.	S-2004-02	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2006-86	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2011-87	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2011-95	7/10/08	Grant
BUFFALO COAL COMPANY, INC.	S-2003-88	8/20/08	Tucker
BUFFALO COAL COMPANY, INC.	U-2010-94	10/6/08	Grant
GRACE ENTERPRISES, INC.	P-2016-02	10/6/08	Harrison
BURN COAL, INC.	U-2005-97	11/25/08	Upshur
LAROSA FUEL CO., INC.	S-39-84	11/25/08	Upshur
DECONDOR COAL CO.	U-1080-86	11/25/08	Preston
DECONDOR COAL CO.	U-147-82	11/25/08	Preston
RODNEY RIDDLE	P-3041-05	12/12/08	Nicholas
BUFFALO COAL COMPANY, INC.	I-542	12/12/08	Grant
RIFFE ENTERPRISES, INC.	O-3012-07	2/3/09	Raleigh
FALCON LAND COMPANY, INC.	P-5023-01	7/2/09	Logan
CHEYENNE SALES COMPANY, INC.	O-11-83	7/9/09	Upshur
LAROSA FUEL CO., INC.	S-1051-86	7/24/09	Marion
CHEYENNE SALES CO., INC.	S-2009-96	9/22/09	Upshur
CHEYENNE SALES CO., INC.	O-2025-86	9/22/09	Upshur
ROBLEE COAL COMPANY	O-1009-93	11/9/09	Upshur
ROBLEE COAL COMPANY	U-1001-91	1/11/10	Upshur
ROBLEE COAL COMPANY	U-2026-87	3/16/10	Barbour
ROBLEE COAL COMPANY	D-49-82	3/16/10	Barbour
ROBLEE COAL COMPANY	U-2001-00	4/22/10	Upshur
ENERGY MARKETING COMPANY INC	U-24-84	5/24/10	Barbour
ENERGY MARKETING COMPANY INC	O-44-83	6/7/10	Barbour
CARSON ONE MINING, LLC	O-4-84	10/1/10	Upshur
BOOMERANG COAL, INC.	S-2015-06	3/8/11	Randolph
PRIMROSE COAL, INC.	7-81	3/23/11	Preston
SHARON COAL CO.	S-1028-87	3/23/11	Preston
HAROLD KITZMILLER	O-2008-07	3/30/11	Grant

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
APPALACHIAN FUELS, LLC	S-3041-88	7/25/11	Clay
APPALACHIAN FUELS, LLC.	P-3055-06	10/23/12	Fayette
APPALACHIAN FUELS, LLC.	P-3019-08	10/23/12	Fayette
APPALACHIAN FUELS, LLC.	P-3005-09	10/23/12	Fayette
KANAWHA DEVELOPMENT CORPORATION	H-631	11/29/12	Fayette
KANAWHA DEVELOPMENT CORPORATION	O-14-81	1/17/13	Fayette
KANAWHA DEVELOPMENT CORPORATION	O-38-84	1/17/13	Fayette
MARY RUTH CORPORATION	S-1015-88	1/17/13	Preston
CHICOPEE COAL COMPANY, INC.	P-3015-99	2/13/13	Nicholas
ENERGY MARKETING CO. INC.	UO-885	2/27/13	Barbour
ENERGY MARKETING CO. INC.	UO-520	2/27/13	Barbour
ENERGY MARKETING CO., INC.	U-16-83	2/27/13	Barbour
ENERGY MARKETING CO. INC.	U-72-83	2/27/13	Barbour
ENERGY MARKETING CO. INC	O-26-84	2/27/13	Barbour
ENERGY MARKETING CO. INC.	U-74-83	3/4/13	Barbour
ROARING RIVER HOLDING COMPANY	P-3006-07	8/20/13	Fayette
HIDDEN VALLEY ESTATES GOLF COURSE, INC.	S-1003-98	8/20/13	Marion
DOUBLE H MINING CO. INC.	U-1004-94	12/5/13	Preston
MARROWBONE DEVELOPMENT CO.	P-5035-99	12/5/13	Mingo
ASSET MINING, LLC.	S-5030-95	12/6/13	Boone
ASSET MINING, LLC.	S-5024-96	12/6/13	Boone
RAVEN HOCKING COAL CORP	O-6003-87	7/14/14	Mason
UNITED COALS, INC.	U-2015-87	9/8/14	Barbour
UNITED COALS, INC.	S-2008-00	9/8/14	Barbour
GOLD RESOURCES, LLC	S-1003-97	9/8/14	Harrison
HAROLD KITZMILLER	P-2031-08	11/14/14	Grant
ENVIROSERVE, INC. dba BETCON, INC.	P-4001-02	3/19/15	Mercer
T.S. MINING, LLC	P-2038-11	3/20/15	Webster
T.S. MINING, LLC	P-2043-11	3/20/15	Webster
SHAFER BROTHER CONSTRUCTION, INC.	S-2002-12	5/11/15	Monongalia
SHAFER BROTHER CONSTRUCTION, INC.	S-2006-02	5/11/15	Monongalia
SHAFER BROTHER CONSTRUCTION, INC,	S-2008-09	5/11/15	Monongalia
SHAFER BROTHER CONSTRUCTION, INC.	S-2011-10	5/11/15	Monongalia
SHAFER BROTHER CONSTRUCTION, INC.	S-2004-04	5/11/15	Monongalia
SHAFER BROTHER CONSTRUCTION, INC.	S-2012-06	5/11/15	Monongalia
DEEPGREEN WV, INC.	O-164-83	10/5/15	McDowell
ANGEL COAL COMPANY, INC.	U-1012-92	10/13/15	Marion
EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3018-93	6/22/16	Fayette
EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3027-05	6/22/16	Fayette
EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3003-06	6/22/16	Fayette
EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3016-08	6/22/16	Fayette
EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3035-07	6/22/16	Nicholas
OMEGA MINING COMPANY	S-15-84	1/11/18	Monongalia
CHARLES EUGENE WITHROW	Q-3015-95	8/8/18	Greenbrier
APPALACHIA COAL CORPORATION	P-2056-08	8/16/18	Preston
EAGLE RIDGE DEVELOPMENT GROUP, LLC	P-3031-09	8/16/18	Nicholas

## Bond Forfeiture Inventory

COMPANY	PERMIT	DATE REVOKED	COUNTY
MAPLE COAL COMPANY LLC	P-3025-14	8/16/18	Fayette
MAPLE COAL COMPANY LLC	P-3031-11	8/16/18	Fayette
MAPLE COAL COMPANY LLC	P-3012-11	8/16/18	Fayette

**Acid Mine Drainage Inventory with Estimated Operating/Maintenance Costs**

OFFICE	COMPANY	PERMIT	DATE REVOKED	ESTIMATED OP/MAIN COSTS
C	ALPHAINE CORP.	S-6032-86	4/27/1989	\$3,694.86
C	APPALACHIAN FUELS, LLC	S-3041-88	7/25/2011	\$6,010.00
C	ASSET MINING, LLC.	S-5030-95	12/6/2013	\$26,967.00
C	B & S CONTRACTING, INC.	U-3055-87	4/24/1995	\$5,049.64
C	BELLE CONTRACTING, INC.	S-6020-87	11/14/1989	\$6,549.93
C	BENHAM GROUP, LTD.	120-79	1/1/1990	\$21,553.33
C	BLACK DIAMOND MINING CO.	13-79	4/1/1989	
C	BRADY CLINE COAL CO.	EM-97	8/23/1994	\$11,241.91
C	C. C. CONLEY & SONS, INC.	S-3046-91	12/7/2000	\$23,154.43
C	CHAFIN COAL CO.	O-69-82	7/11/1995	\$615.81
C	CHICOPEE COAL COMPANY, INC.	S-3002-98	6/23/2006	\$14,206.00
C	CHICOPEE COAL COMPANY, INC.	O-6013-88	1/31/2003	\$5,442.00
C	CHICOPEE COAL COMPANY, INC.	S-3006-99	3/28/2006	\$95,442.00
C	COAL X, INC.	UO-396	1/1/1986	\$1,969.26
C	COWACO, INC.	R-3022-87	1/22/1992	\$1,724.27
C	CRADDOCK & SON COAL CO.	S-68-83	10/1/1992	\$246.32
C	EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3016-08	6/22/2016	\$29,000.00
C	EASTERN ENERGY INVEST.	U-6012-88	1/28/1994	\$479.47
C	EASTERN ENERGY INVEST.	S-6029-86	5/2/1994	\$93,849.37
C	GOLD STAR MINING CORP.	S-121-85	7/15/1987	\$862.13
C	GREENDALE COALS, INC.	S-75-83	4/1/1987	\$273,976.00
C	HAWKS NEST MINING CO.	O-1-81	12/7/1993	\$13,055.16
C	HUNT COAL, INC.	U-5071-86	6/14/1989	\$13,039.93
C	JOHN GALT	D-76-82	8/29/1991	\$2,500.10
C	KEYSTONE COAL, INC.	U-186-83	3/17/1998	\$11,593.00
C	KEYSTONE COAL, INC.	S-84-83	3/17/1998	\$6,158.09
C	LANDMARK CORPORATION	S-5069-88	1/30/2001	\$24,657.00
C	LANDMARK CORPORATION	S-34-82	1/30/2001	\$8,917.00
C	LO-MING COAL CORPORATION	U-5049-87	9/17/2002	\$11,555.00
C	LODESTAR ENERGY, INC.	S-3006-89	1/21/2004	\$46,794.00
C	LODESTAR ENERGY, INC.	S-3083-86	1/21/2004	\$10,088.00
C	M & T MINING CO.	S-3026-89	2/9/1994	
C	PRINCESS SUSAN COAL CO.	S-6033-86	12/7/1993	\$3,571.70
C	PRINCESS SUSAN COAL CO.	S-6-85	12/7/1993	\$7,046.53
C	PRINCESS SUSAN COAL CO.	S-76-82	10/4/1994	\$246.32
C	SALYERS LEASING CORP.	U-5066-87	8/1/1989	\$246.32
C	SAN SUE COAL CO.	19-75	1/13/1989	\$24,755.54
C	SUMMERSVILLE FIVE BLOCK	S-3051-88	11/1/1994	\$230,853.00
C	TEMPLEMAN CONST. CO., INC.	151-75	6/1/1988	\$985.30
C	WINCHESTER COALS, INC.	O-52-83	12/7/1993	\$51.37
C	X W CORP.	S-6013-87	4/20/1989	\$5,600.00
C	ZY COAL CO	S-6028-88	12/12/1991	\$7,526.00

**Acid Mine Drainage Inventory with Estimated Operating/Maintenance Costs**

C	ZY COAL CO.	91-79	12/12/1991	\$2,600.00
C	ZY COAL CO.	S-30-80	12/12/1991	\$1,152.00
N	A S & K, INC.	S-1011-89	8/23/1991	\$31,463.00
N	ALAN BLOSSER	S-1010-87	1/2/2002	\$0.00
N	AMANDA NICOLE FUELS, INC.	S-1018-88	6/12/1992	\$4,926.48
N	BALDWIN MINING COMPANY	D-75-82	8/22/2001	\$29,398.00
N	BJORKMAN MINING CO.	S-37-81	9/23/1992	\$41,765.44
N	BOLINGREEN MINING COMPANY	S-1024-88	2/10/2000	\$1,724.27
N	BOOMERANG COAL, INC.	S-2015-06	3/8/2011	\$27,349.00
N	BORGMAN COAL CO.	EM-32	10/1/1991	\$15,796.89
N	BUFFALO COAL COMPANY, INC.	S-53-80	9/29/2006	\$122,443.00
N	BUFFALO COAL COMPANY, INC.	S-2001-86	9/29/2006	\$66,769.00
N	BUFFALO COAL COMPANY, INC.	S-2011-92	7/10/2008	
N	BUFFALO COAL COMPANY, INC.	S-2003-88	8/20/2008	\$82,266.00
N	BUFFALO COAL COMPANY, INC.	S-52-80	9/29/2006	\$107,233.00
N	BUFFALO COAL COMPANY, INC.	S-2006-86	7/10/2008	\$3,616.00
N	BUFFALO COAL COMPANY, INC.	S-122-80	9/29/2006	\$42,831.00
N	BUFFALO COAL COMPANY, INC.	S-2003-03	7/10/2008	\$30,748.00
N	CARSON ONE MINING, LLC	O-4-84	10/1/2010	\$49,046.00
N	CHESTNUT RIDGE COAL CORP.	S-28-83	11/15/1993	\$31,283.12
N	CHEYENNE SALES CO., INC.	S-2009-96	9/22/2009	\$67,181.00
N	CHEYENNE SALES COMPANY, INC.	O-11-83	7/9/2009	\$77,579.00
N	CRANE COAL CO., INC.	S-27-83	1/3/1992	\$3,941.18
N	DAUGHERTY COAL COMPANY, INC.	246-74	8/1/1989	
N	DAUGHERTY COAL COMPANY, INC.	S-73-83	7/17/1989	
N	DAUGHERTY COAL COMPANY, INC.	S-1009-86	7/17/1989	\$25,680.23
N	DAUGHERTY COAL COMPANY, INC.	124-79	8/18/1989	
N	DAUGHERTY COAL COMPANY, INC.	192-77	7/1/1989	\$134.20
N	DAUGHERTY COAL COMPANY, INC.	65-77	7/12/1989	\$19,178.88
N	DAUGHERTY COAL COMPANY, INC.	17-81	4/1/1989	
N	DECONDOR COAL CO.	U-147-82	11/25/2008	\$35,521.00
N	DELTA MINING, INC.	U-2024-87	3/18/1993	\$8,166.56
N	DLM COAL CO.	12-78	9/16/1985	
N	DLM COAL CO.	R-423	9/16/1985	
N	DLM COAL CO.	2-80	9/13/1985	
N	DLM COAL CO.	23-76	10/1/1985	
N	DLM COAL CO.	164-77	9/16/1985	
N	DLM COAL CO.	71-75	10/1/1985	
N	DLM COAL CO.	58-77	9/16/1985	
N	DLM COAL CO.	135-78	9/16/1985	
N	DLM COAL CO.	P-426	9/16/1985	
N	DLM COAL CO.	1-78	9/16/1985	
N	DLM COAL CO.	138-74	9/3/1985	
N	ED-E DEVELOPMENT CO., INC.	S-10-81	1/23/1993	\$49,702.41
N	ED-E DEVELOPMENT CO., INC.	S-1032-86	3/29/1993	\$26,216.84

**Acid Mine Drainage Inventory with Estimated Operating/Maintenance Costs**

N	EDWARD E. THOMPSON	S-1041-89	2/15/1994	\$63,858.40
N	ENERGY MARKETING CO. INC.	U-72-83	2/27/2013	\$29,398.00
N	ENERGY MARKETING COMPANY INC	O-44-83	6/7/2010	\$46,217.00
N	F & M COAL CO.	46-79	9/24/1992	\$369.49
N	F & M COAL CO.	S-57-84	3/13/1992	\$69,889.06
N	F & M COAL CO.	S-1026-87	4/30/1992	\$246.32
N	F & M COAL CO.	S-1044-87	4/30/1992	\$163,074.48
N	F & M COAL CO.	S-1073-86	3/13/1992	
N	FARKAS COAL CO.	34-81	7/1/1988	\$4,846.09
N	FREEMPORT MINING CORPORATION	S-1005-95	7/8/2003	\$48,592.00
N	FRUSH ENTERPRISES	S-1052-86	5/30/1991	
N	FRUSH ENTERPRISES, INC.	S-1008-89	11/10/1992	\$8,867.66
N	GLADE RUN MINING CO.	3-72	10/3/1983	\$24,958.23
N	GLADY FORK MINING, INC.	D-35-82	6/7/2004	\$191,169.96
N	GLORY COAL CO., INC.	UO-744	12/1/1985	\$47,466.35
N	GOLDEN PRODUCTS CO.	S-1009-88	3/1/1991	\$1,464.10
N	HALLELUJAH MINING	40-81	9/24/1992	\$27,894.99
N	HIDDEN VALLEY COAL CO.	S-60-84	8/29/1989	\$16,503.69
N	INTER-STATE LUMBER COMPANY, INC.	S-52-83	7/31/1995	\$1,601.10
N	INTER-STATE LUMBER COMPANY, INC.	S-96-82	7/31/1995	\$0.00
N	INTER-STATE LUMBER COMPANY, INC.	176-77	7/31/1995	\$18,474.29
N	INTER-STATE LUMBER COMPANY, INC.	S-39-82	7/31/1995	\$43,254.00
N	INTER-STATE LUMBER COMPANY, INC.	S-112-80	7/31/1995	\$14,163.62
N	J. C. B. MINING, INC.	U-2006-88	12/30/2002	\$11,441.00
N	J. E. B., INC.	S-61-82	11/1/1991	\$3,356.30
N	J. E. B., INC.	S-1063-86	11/1/1991	\$7,759.20
N	J.A.L. COAL CO., INC.	S-23-82	3/12/1997	\$33,077.00
N	JONES COAL INC	S-9-83	11/17/1992	\$13,422.00
N	JONES COAL INC	S-1030-86	7/24/1992	\$6,650.74
N	KEISTER COAL COMPANY, INC.	184-77	9/1/1983	\$7,456.29
N	LAKEVIEW COAL COMPANY	S-55-84	1/23/1997	\$8,621.33
N	LAROSA FUEL CO., INC.	S-1051-86	7/24/2009	\$106,717.00
N	LOBO CAPITOL, INC.	UO-204	8/7/1985	\$47,631.00
N	MANGUS COAL, INC.	S-1036-91	3/14/2008	\$54,102.00
N	MARY RUTH CORPORATION	S-1015-88	1/17/2013	\$35,015.00
N	MAURICE JENNINGS	53-78	12/10/2004	\$37,295.00
N	MAURICE JENNINGS	S-61-83	11/30/2004	\$32,337.00
N	MOHIGAN MINING CO.	U-109-83	6/30/1992	\$16,028.06
N	MORGANTOWN ENERGY EXPORT COMPANY	U-8-83	6/14/1994	\$5,049.64
N	NATIONAL CONSTRUCTION COMPANY, INC.	S-2004-86	12/7/1998	\$1,041.88
N	OMEGA MINING CO. INC.	D-79-82	10/7/1994	\$294,531.88
N	PIERCE COAL & CONSTRUCTION, INC.	252-76	12/1/1982	\$14,040.46
N	PIERCE COAL & CONSTRUCTION, INC.	71-80	12/1/1982	\$1,070.58

**Acid Mine Drainage Inventory with Estimated Operating/Maintenance Costs**

N	PRESTON ENERGY, INC.	O-86-82	5/25/1994	\$12,305.15
N	PRESTON ENERGY, INC.	O-43-85	5/24/1994	\$316.79
N	PRESTON ENERGY, INC.	UO-235	3/18/1994	
N	PRESTON ENERGY, INC.	O-1035-87	5/5/1994	\$60,078.00
N	PRIMROSE COAL, INC.	7-81	3/23/2011	\$59,628.00
N	ROBLEE COAL COMPANY	U-2001-00	4/22/2010	\$16,975.00
N	ROBLEE COAL COMPANY	U-1001-91	1/11/2010	
N	ROBLEE COAL COMPANY	U-2026-87	3/16/2010	
N	ROBLEE COAL COMPANY	O-1009-93	11/9/2009	\$23,341.00
N	ROCKVILLE MINING CO.	65-78	1/12/1994	\$41,123.76
N	ROCKVILLE MINING CO.	S-1035-86	1/12/1994	\$29,000.00
N	ROCKVILLE MINING CO.	S-65-82	1/12/1994	\$76,372.69
N	ROCKVILLE MINING CO.	S-91-85	1/12/1994	\$48,309.00
N	ROCKVILLE MINING CO.	237-76	1/12/1994	\$64,783.16
N	S. KELLY INDUSTRIES	51-78	6/13/1985	\$67,751.11
N	SHAFER BROTHER CONSTRUCTION, INC.	S-2002-12	5/11/2015	
N	SHARON COAL CO.	S-1028-87	3/23/2011	\$56,257.00
N	SOUTHERN EAGLE MINING CORPORATION	U-32-84	2/6/1985	\$0.00
N	STEWARTOWN COAL CORP.	67-78	6/28/1988	\$738.97
N	T & J COAL, INC.	P-177-85	5/29/1987	\$522.28
N	T & T FUELS, INC.	EM-113	10/31/1995	\$346,610.31
N	T & T FUELS, INC.	U-125-83	12/4/1995	\$14,442.10
N	THE MASTELLER COAL COMPANY	S-125-82	5/3/2004	\$36,861.00
N	THE MASTELLER COAL COMPANY	S-10-85	12/10/2003	\$9,374.00
N	VALLEY MINING CO., INC.	S-17-82	9/24/1992	\$14,803.70
N	VALLEY MINING CO., INC.	S-64-83	6/12/1992	\$43,106.67
N	VIKING COAL COMPANY	UO-519	1/18/2001	\$90,157.00
N	VMS, LTD.	S-1045-87	4/4/1994	\$6,650.74
N	WERNER MINING CO., INC.	S-2003-86	5/20/1992	\$35,224.30
N	WETER CO.	S-71-79	7/10/1995	\$33,077.00
N	WOCAP ENERGY RESOURCES, INC.	S-26-85	12/14/1993	\$30,609.15
N	Z & F DEVELOPMENT CO.	S-21-84	11/6/1985	\$22,697.86
N	ZINN COAL CO.	60-79	4/16/1991	\$2,340.08
S	B & S CONTRACTING, INC.	R-668	7/12/1995	
S	B & S CONTRACTING, INC.	O-3086-87	4/24/1995	\$1,909.01
S	BARRENSHE COAL CO.	UO-694	8/17/1993	\$3,219.31
S	BARRETT FUEL CORP.	R-737	3/15/1996	
S	BRENKEE COAL CO.	UO-435	11/12/1986	
S	CLASSIC RES., INC.	S-55-81	5/12/1986	\$8,266.00
S	DUSTY COALS, INC.	S-119-85	8/10/1987	\$1,724.27
S	E. J. & L. CO., INC.	S-3041-87	5/9/1990	\$738.97
S	FALCON LAND COMPANY, INC.	P-656	4/5/2005	\$83,904.00
S	GAULEY COAL SALES CO.	O-43-84	8/23/1994	\$1,909.01
S	GOLDEN FALCON RESOURCES, INC.	U-61-84	10/4/2002	

**Acid Mine Drainage Inventory with Estimated Operating/Maintenance Costs**

S	GREEN MOUNTAIN ENERGY	U-4013-91	3/19/1997	\$11,792.00
S	HARVEY ENERGY CORP.	S-35-81	9/16/1991	\$1,601.10
S	HARVEY ENERGY CORP.	S-3030-89	9/16/1991	\$223.02
S	HARVEY ENERGY CORP.	S-11-82	9/16/1991	\$4,221.07
S	J & N PROCESSING COMPANY, LLC	O-58-83	6/29/2001	
S	JINKS MINING COMPANY	U-3031-93	2/24/2000	
S	KANAWHA DEVELOPMENT CORPORATION	O-38-84	1/17/2013	\$10,333.20
S	KODIAK LAND CO., INC.	S-3052-87	5/19/1992	
S	LEVEL LAND MINING CORPORATION	S-3031-90	11/8/2006	\$12,500.00
S	LILLYBROOK COAL CO.	S-86-85	6/1/1990	\$2,955.89
S	LODESTAR ENERGY, INC.	R-5-84	5/24/2004	\$12,500.00
S	LODESTAR ENERGY, INC.	S-19-85	1/21/2004	\$16,585.00
S	LOW ASH COAL CO.	UO-389	2/1/1985	\$376.73
S	MERIDAN OF VIRGINIA, INC.	S-4005-89	9/14/1992	\$5,904.00
S	MOUNTAINEER FUELS, INC.	U-3083-87	1/30/1998	\$1,231.62
S	PEACHTREE RIDGE MINING, INC.	U-18-83	1/29/2004	
S	PINNACLE CREEK MINING CORP.	R-721	12/7/1994	
S	PRINCESS CINDY MINING, INC.	30-79	5/26/1987	\$1,970.59
S	PUPS CREEK COALS, INC.	S-3006-94	12/6/1999	\$11,120.00
S	RALEIGH COMMERCIAL DEVELOPMENT	149-79	1/21/1987	\$7,178.00
S	ROYAL COAL CO.	R-676	11/1/1989	\$61,971.00
S	ROYAL COAL CO.	P-688	1/1/1990	
S	ROYAL SCOT MINERALS, INC.	R-3078-86	4/27/2000	\$3,694.86
S	ROYAL SCOT MINERALS, INC.	S-90-82	4/27/2000	
S	ROYAL SCOT MINERALS, INC.	U-40-85	4/27/2000	\$862.13
S	ROYAL SCOT MINERALS, INC.	S-99-83	4/27/2000	
S	ROYAL SCOT MINERALS, INC.	56-81	4/27/2000	\$2,258.00
S	ROYAL SCOT MINERALS, INC.	D-32-81	4/27/2000	\$1,616.90
S	ROYAL SCOT MINERALS, INC.	U-3046-88	4/27/2000	\$8,202.00
S	ROYAL SCOT MINERALS, INC.	31-72	4/28/1999	
S	ROYAL SCOT MINERALS, INC.	S-65-76	4/27/2000	\$2,795.42
S	SMITH & STOVER	EM-29	5/17/1984	\$31,970.00
S	SOLITAIRE COAL CORPORATION, INC.	S-87-85	6/23/1989	\$31,907.00
S	STAR INDUSTRIES, INC.	R-3-81	5/27/1987	\$13,194.04
S	TRIPLE A COALS, INC.	S-96-85	12/17/1998	\$3,694.85
S	TRIPLE A COALS, INC.	S-3028-87	12/17/1998	\$3,694.86
S	TRIPLE A COALS, INC.	U-3046-87	12/17/1998	
S	VICKIE ENERGY, INC.	U-53-85	1/11/1995	\$123.16
S	W & E LOGGING & COAL	S-20-82	5/5/1986	\$0.00



### Mine Drainage Treatment Prioritization

PRIORITY	COMPANY	PERMIT	PROJECT	Acid Load (TPY)
1	ROYAL COAL CO.	P-688	L/W	755.68
3	CHEYENNE SALES CO., INC.	S-2009-96	Water	54.22
4	ASSET MINING, LLC.	S-5030-95	Water	44.11
6	MAURICE JENNINGS	S-61-83	Water	26.68
7	KEYSTONE COAL, INC.	U-186-83	Water	21.98
8	CARSON ONE MINING, LLC	O-4-84	L/W	17.53
9	INTER-STATE LUMBER COMPANY, INC.	S-39-82	Water	17.3
10	MANGUS COAL, INC.	S-1036-91	Water	16.41
11	CHEYENNE SALES COMPANY, INC.	O-11-83	Water	16.2
12	CHICOPEE COAL COMPANY, INC.	S-3006-99	L/W	14.69
14	SMITH & STOVER	EM-29	Water	11.44
15	BUFFALO COAL COMPANY, INC.	S-53-80	L/W	8.47
16	MARY RUTH CORPORATION	S-1015-88	Water	7.14
17	LODESTAR ENERGY, INC.	S-3006-89	Water	6.21
18	BUFFALO COAL COMPANY, INC.	S-2001-86	Water	4.96
19	BALDWIN MINING COMPANY	D-75-82	Water	4.824
20	MAURICE JENNINGS	53-78	Water	4.55
21	APPALACHIAN FUELS, LLC	S-3041-88	Water	4.31
22	SUMMERSVILLE FIVE BLOCK	S-3051-88	Water	3.81
23	SHAFFER BROTHER CONSTRUCTION, INC.	S-2002-12	Water	2.97
24	ROYAL SCOT MINERALS, INC.	U-3046-88	Water	2.63
25	A S & K, INC.	S-1011-89	Water	2.36
26	LODESTAR ENERGY, INC.	S-3083-86	Water	1.73
27	ALAN BLOSSER	S-1010-87	Water	1.64
28	CHICOPEE COAL COMPANY, INC.	S-3002-98	Water	1.5
29	BUFFALO COAL COMPANY, INC.	S-2003-03	Water	1.34
31	J. C. B. MINING, INC.	U-2006-88	L/W	0.7527
33	BUFFALO COAL COMPANY, INC.	S-2011-92	Water	0.6
34	ROBLEE COAL COMPANY	U-2026-87	Water	0.5731
35	MERIDAN OF VIRGINIA, INC.	S-4005-89	Water	0.284
37	CLASSIC RES., INC.	S-55-81	Water	0.1836
38	EAGLE RIDGE DEVELOPMENT GROUP, LLC	S-3016-08	Water	0.155
39	KEYSTONE COAL, INC.	S-84-83	L/W	0.08
43	ROYAL COAL CO.	R-676	Water	0.0189
44	LANDMARK CORPORATION	S-5069-88	Water	0.003
45	ROYAL SCOT MINERALS, INC.	S-65-76	Water	0.0022
46	KANAWHA DEVELOPMENT CORPORATION	O-38-84	L/W	0