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Green Lands

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Green Lands
is a quarterly publication of the
West Virginia Mining & Reclamation Association,
with offices at 1624 Kanawha Boulevard East
Charleston, West Virginia 25311
(304) 346-5318, FAX 346-5310.

Our Cover
Kimberly Industries' Bear Run Project in Gilmer County highlights our special section on West Virginia's Abandoned Mine Lands program. Kimberly's work has been nominated for a national award. Cover story begins on page 12.

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COAL CALENDAR

June

10-11 **Coal Laboratory Technician Training,** University of Kentucky, Lexington, KY, contact Kim King, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-4634, FAX 257-2173.

July

14 **Annual Coal Foundation Golf Tournament,** The Virginian Golf Club, Bristol, VA, contact Patty Bruce, WVMRA, 1624 Kanawha Boulevard East, Charleston, WV 25311, (304) 346-5318, FAX 346-5310.

August

4-7 **Coal in the Classroom,** MSHA Academy, Beckley, WV, contact Sandi Davison, West Virginia Coal Association, 1301 Laidley Tower, Charleston, WV 25301, (304) 342-4153, FAX 342-7651.

7-10 **West Virginia Mining & Reclamation Association, Annual Meeting,** The Greenbrier, White Sulphur Springs, WV, contact Patty Bruce, WVMRA 1624 Kanawha Blvd. E., Charleston, WV 25311, (304) 346-5318, FAX 346-5310.

8 **10th Annual Kentucky Professional Engineers in Mining Seminar,** Holiday Inn North, Lexington, KY, contact Geaunita Caylor, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-2820, FAX 257-2173.

17-20 **19th Annual Association of Abandoned Mine Land Programs Conference,** Canaan Valley Resort Lodge, Davis, WV, contact Sherry Hale, Office of Abandoned Mine Lands & Reclamation, WV-DEP, 10 McJunkin Rd., Nitro, WV 25143, (304) 759-0522, FAX 759-0527.

September

8 **Annual Coal Foundation Golf Tournament,** Pete Dye Golf Club, Bridgeport, WV, contact Patty Bruce, WVMRA, 1624 Kanawha Boulevard East, Charleston, WV 25311, (304) 346-5318, FAX 346-5310.

10-12 **Bluefield Coal Show,** Brushfork Armory-Civic Center, Bluefield, WV, contact Greater Bluefield Chamber of Commerce, P.O. Box 4098, Bluefield, WV 24701, (304) 327-7184, FAX 325-3085.

14-16 **42nd Annual Canadian Conference on Coal,** Empress Hotel, Victoria, BC, contact The Coal Association of Canada, 502, 205 9th Ave. SE, Calgary, Alberta, Canada T2G 0R3, FAX (403) 265-7604

28-1 **National Mining Association, Annual Convention,** Buena Vista Palace Resort Hotel, Lake Buena Vista, FL, contact Dianne Taylor, NMA, 1130 17th St. NW, Washington, DC 20036, (202) 463-2607.

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New life for Grafton Coal

West Virginia Governor Cecil underwood (c) attended the recent celebration of Grafton Coal's new era. Also on hand to recognize C.E. "Jim" Compton (seated) were fellow WVMRA pioneers Buck Harless (l) and Lawson Hamilton (r).

West Virginia Governor Cecil Underwood helped Grafton Coal Co. celebrate its 55th anniversary this spring. The Governor was one of several dignitaries on hand for a special presentation by Grafton Coal's owners of the advancing technology being applied by the company's engineering department. Governor Underwood himself is a nationally recognized leader and innovator in the use and application of new technology to changing industries.

Once a primary coal producer for north central West Virginia, Grafton Coal is utilizing its long mining experience in an attempt to evolve into one of the best reclamation and development companies in the industry.

Founded in 1942 by C.E. "Jim" Compton, now of Bridgeport, Grafton Coal has dedicated its financial and human resources for more than half a century to build and maintain one of the Mountain State's most successful corporations.

"Grafton Coal Company is a success story for the Compton family but more importantly a success story for West Virginia and the mining industry," said Ben Greene, President of the WV Mining & Reclamation Association.

Greene was on hand to formally recognize Grafton Coal for a statewide award for excellence in reclamation for the company's work on an Abandoned Mine Land project in Randolph County. The award was jointly sponsored by WVMRA and the WV Department of Environmental Protection.

"The Whitman Flats reclamation project substantially improved the water quality of the Middle Fork River with Grafton Coal's use of several innovative water treatment technologies. The project literally brought that stream back to life," Greene said. He also commended Grafton Coal for its dedication to the mining industry and recognized the company for its many contributions over two generations of mining.

In it's early years, Grafton Coal was the first to use the block-cut method of mining, pioneering the haulback concept for surface operations. That method was responsible for the improvement of thousands of acres of surfaced mined land throughout West Virginia.

In the late 1940's, Jim Compton's quest to improve coal mining technology led to the development of the Compton Coal Auger. In 1951, a patent for the auger was issued and the machine's efficient recovery of mineable coal in a safe and environmentally responsible manner would forever change the coal industry throughout the world.

In 1957, the Compton Auger received nationwide acclaim when the machine was used to rescue five Ohio coal miners who were trapped in a rocky chamber left by a roof collapse. The 38-ton Compton Auger with its 42-inch wide bits drilled an escape route for the entombed miners.

In the mid-1950's Grafton Coal developed the Compton Flexible Miner, which revolutionized underground mining operations. The machine was then manufactured by Joy Manufacturing Co., which successfully marketed the miner throughout the world.

While the names of Grafton Coal Co. and Jim Compton are well known throughout the international coal industry, it is the corporate reputation locally which the Compton family treasures.

"My father has always emphasized and maintained that this family and this company will strive at all times to be West Virginia's number one corporate citizen", said Jeffrey Compton, a second generation principal owner in Grafton Coal Co. "We want to be industry leaders and community leaders. Grafton Coal has always tried to serve by example. Our parents' dedication to their community and this wonderful state is a seasoned family tradition passed on to my brother, sister and me. It's a tradition we wholeheartedly endorse and a challenge we take seriously."

The Compton family and Grafton Coal founder Jim Compton have made substantial commitments and contributions in the areas of education and children. West Virginia University, Salem-Teikyo University and Fairmont State College are all beneficiaries of the generosity of Grafton Coal and the Compton family.

Best recognized for his lifelong commitment to health research and nutrition education, Jim Compton was appointed in 1990 as Co-chairman of the Governor's Task Force on School Health. The West Virginia Healthy Schools Program, a direct result of the work of the Task Force, was the centerpiece behind a $6 million grant to West Virginia from the US Center for Disease Control. That grant enabled the state to be designated as the site for the National Training Center for Comprehensive School Health Programs.

Grafton Coal received a 1996 Reclamation Award for its outstanding performance on the Whitman Flats Abandoned Mine Lands Project in Randolph County. Participating in the award presentation wer (l-r) Grafton Coal President Jamie Corton, Jim Compton, Todd Satterfield, Governor Cecil Underwood, Rob Stuart and Ira Pritt of Grafton Coal, WVMRA President Ben Greene, AML Chief Pete Pitsenbarger, AML Supervisors Dave Broschart and Sam McClung, AML Inspector Dave Smith.

In 1993, as a result of his leadership on the Task Force, Jim Compton was one of eight individuals nationwide to receive the "Community Leadership Award from the US Department of Health and Human Resources.

Jim Compton's civic and community leadership and dedication to philanthropy is equaled only by his leadership within the industry he helped to create. He was instrumental in the formation of the West Virginia Mining & Reclamation Association. In 1976, Jim's peers selected him as the state's first "Coal Man of the Year". In 1984 he was recognized as West Virginia University's "Most Loyal West Virginian and in 1987, he was honored by the West Virginia Society as the "Son of the Year." In 1993, WV Governor Gaston Caperton proclaimed "Jim Compton Day" in the Mountain State.

Now, Grafton Coal addresses new challenges. As the coal industry has evolved by the ever increasing use of advanced technology, so too has Grafton Coal. Armed with the principals of quality workmanship, dedication to safety, accountability and integrity instilled by its founder, Grafton Coal is changing.

"Grafton Coal Co. will be the best reclamation and development company in the industry. We will be the leader through quality management, engineering, innovation, safety and commitment to good old fashioned hard work", said company executive James Corton. "Grafton Coal is an established and growing West Virginia-proud company, dedicated to excellence through quality. Our success will continue to be measured by the satisfaction of our customers and employees."

Corton said Grafton Coal will focus on the future with a concentration on land reclamation, land development and earth moving. The company will invest in and take advantage of leading edge technology as it becomes available. Corton was tapped recently by Governor Underwood to serve on the Governor's Transition Team's Technology Committee.

The WV Division of Environmental Protection recently awarded Grafton Coal one of the state's largest Abandoned Mine Lands reclamation projects for 1997. The Francis Mines project, located in Harrison County, is a $1.4 million contract for Grafton Coal which is expected to take eight months to complete.

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Blackwater River Limestone Station - Tucker County - This million dollar facility, funded by the AML program has cleaned up 16 miles of the scenic Blackwater River.

20 years of AML

West Virginia's program benefits the environment and the economy

As the 20th Anniversary of the Surface Mining Control and Reclamation Act (SMCRA) approaches, West Virginia will be the site of the 19th Annual Association of Abandoned Mine Land Programs Conference, scheduled for August 17-20 at Canaan Valley Resort, near Davis, WV. The West Virginia Office of Abandoned Mine Lands (AML) is an appropriate host in this landmark year, in that West Virginia was the first state in the nation to pass a reclamation law (1939) and was the first state with a special fund dedicated to restoring abandoned sites (1963). The Special Reclamation Fund was responsible for stabilizing thousands of acres by establishing vegetation and planting millions of trees. It also served as a model for the national program written into the federal reclamation law.

Appropriately, WV-AML arguably has developed the preeminent state program in the nation.

The AML program nationally is financed by provisions of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. That act imposed a tax of 35¢ a ton for surface mined coal and 15¢ per ton for underground production, for the purpose of bringing old, pre-law sites affected by mining activities into compliance with modern reclamation standards.

Carbondale - Fayette County **Ryder & Co.**

The designated regulatory authority in each respective state was authorized to administer AML, once that state achieved regulatory primacy for the overall SMCRA program. The tax is collected by the federal government, appropriated by Congress, and dispersed to state agencies by the federal Office of Surface Mining (OSM).

SMCRA regulations set forth a formula under which a state agency could reasonably expect to receive approximately 50% of the tax revenue collected within its borders. OSM reserves another piece of the money for a "discretionary fund," through which a state could possibly get a total of more than 50% of the funds generated by its coal production.

Problems arose from the requirement that a state's overall regulatory program must be approved, and that the agency must achieve primacy, before it could assume the reins of AML. Lawsuits flew back and forth and proposed interim regulations piled on top of pre-proposed permanent regulations. The tax was collected, but very little AML reclamation work was performed.

West Virginia was the first major coal state in the east to achieve primacy, and still it was five years before the first significant money flowed back to Charleston. During that period, the regulatory agency for permitting and reclamation was evolving from the Department of Natural Resources to the Department of Energy and finally into the Division of Environmental Protection. Through it all, there was an AML section, which was gearing up for the advent of actual reclamation. The agency developed a priority list, according to the dictates of federal legislation. Priorities 1 & 2, those situations with either a "clear danger" or "potential danger," still get the most attention and funding, particularly the hundreds of coal refuse piles that once dotted West Virginia's landscape. The original inventory listed $2.3 billion worth of Priority 1 & 2 projects.

In recent years, the WV-AML has turned its attention and its funding to water quality projects. In September 1994, DEP dedicated the $1 million Blackwater River Limestone Station which, powered by stream flow, disperses crushed limestone directly into the stream bed. The project produced immediate results, neutralizing miles of the acid impacted Blackwater River.

To date, the program has expended over $17 million on water projects, including $9 million in 1996 to run water lines to rural West Virginia communities. The 1997 DEP construction grant application includes another $6 million for continued development of this key infrastructure element.

Bear Run - Gilmer County **Kimberly Industries, Inc.**

AML was originally funded for 15 years, or until 1992, but Congress reauthorized the program in 1990, extending it to 1995. That bill also provided the opportunity for states to receive a larger share of AML funds, for the completion of Priority 1 & 2 projects, and for a special acid mine drainage fund. A year later, a provision of the National Energy Act established a new cutoff date at 2004. Due to the lag time between collection of the tax and final dispersal of the funds, AML is assured of work probably until 2010.

Though any tax is painful to the taxed, the AML program has been of enormous benefit to West Virginia. In addition to environmental cleanup, the program has provided hundreds of jobs in construction and reclamation companies and done immeasurable service to coalfield citizens. It has become, next to highway construction, the largest public works program of any kind in West Virginia, and it is totally funded by today's coal industry.

Through March, 1997, the State had completed nearly 400 AML projects in every coal producing county in the state, a total of more than 4,000 acres. In addition to refuse pile cleanup, the projects have resulted in highwall elimination, sealing of underground mine shafts, removal of abandoned tipples, treatment of acid mine drainage and construction of new water lines to rural communities.

Annual appropriations from OSM to the West Virginia Division of Environmental Protection began at a level of $15 million and have risen steadily over the last decade to a high of more than $30 million. In recent years however, Congressional infighting has prevented appropriate levels of funding. With the tax rate unchanged and production running at record levels in the big coal producing states, funding should also be at an all time high.

In 1996, West Virginia's AML program received just $22.9 million. Nationally, the AML fund holds well over $1 billion which Congress has failed to disperse. This, by the mandate of a law passed by that same body, is money extracted from every coal producer in the nation for the expressed purpose of restoring mined land. Since the program was instituted and collections began on October 1, 1977, the AML program has collected $4,304,210,807.18 nationally, through March 31, 1997. Of that total, $519,318,589.20 has come from West Virginia operators. That's how much should be spent on the ground, regardless of whether the Republicans and Democrats can agree on anything else.

Meanwhile, WV-DEP continues to do an outstanding job of working with the funds that have been made available and many West Virginia companies have completed noteworthy projects. These pages are a tribute to the best of AML.

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Buffalo Coal Co.

Six West Virginia companies are candidates for national honors

The US Department of the Interior, through its Office of Surface Mining has reinstituted its national "Excellence in Surface Coal Mining and Reclamation" awards program. The awards were inaugurated in 1986, but discontinued in 1996 due to budget constraints. The program has been revived in time for the milestone 20th anniversary of the signing of the Surface Mine Control Act of 1977.

OSM will present four types of awards this year:

National Awards - Presented to coal mining companies for achieving the most exemplary mining and reclamation in the country. The award recognizes top quality on-the-ground achievement of the goals of the surface mining law.

Director's Award - A special award to one coal mining company from the OSM Director for outstanding achievement in a specific area of reclamation. This year, the award will recognize a mine operator's special dedication and commitment that results in reclamation and post-mining land use benefiting the local community.

Best-of-the-Best Award - One operation will be selected from this year's national award winners to recognize the specific individuals (mine manager, reclamation specialist, state inspector, etc.) who were directly responsible for the outstanding reclamation accomplishment.

Reclamation Hall of Fame Award - A 20th anniversary award will be presented to one or more mining operations who have won a national award in previous years. The one time award will recognize the most outstanding past winners after that reclamation project has passed the test of time.

Award winners will be announced and recognized on August 3, the anniversary date of the Act.

The West Virginia Division of Environmental Protection has submitted five West Virginia companies for consideration for national awards for excellence in mining and reclamation. One additional company has been nominated for a national award in the Abandoned Mine Lands program.

Hobet Mining, Inc.

The West Virginia nominees are:

Buffalo Coal Co. - Perhaps the most decorated of state coal companies, Buffalo Coal has won 11 West Virginia Reclamation Awards, including nine in a row. It is the only three time winner of the "David C. Callaghan Award," symbolic of the most outstanding operation in the state. Among its many awards, Buffalo was honored by Ducks Unlimited with the "Wetlands West Virginia Award" for its achievements in wetland construction and maintenance. Also, the National Wild Turkey Federation recognized Buffalo with its "Wildlife West Virginia Award" for the company's reclamation contributions to wildlife habitat.

Hobet Mining, Inc. - One of the showplace operations in West Virginia mining, Hobet has hosted so many tours at its Boone County #21 operation that it constructed a viewing stand on the operation. Utilizing a dragline which was at the time the largest piece of machinery in the state, Hobet won the Callaghan award for 1994, capping a total of seven Reclamation Awards dating back to 1974. Hobet also won the Wildlife award for 1993 and the Wetlands award for 1996. In 1995, Hobet won the "Director's Award" from OSM as the outstanding operation in the nation. Last year, it was selected for a visit from Interior Secretary Bruce Babbit.

Dal-Tex Coal Co.- A recent recipient of NWTF "Land Stewardship Award," for its extensive reclamation efforts to return mined areas to productive woodland and turkey habitat, Dal-Tex first won a West Virginia Reclamation Award in 1986. The company was further honored with the Wildlife West Virginia award for 1995, a designation that led to the national Land Stewardship award, which cited the company's integration of wildlife management into its mining and reclamation activities.

Colony Bay Coal Co. - The winner of the latest NWTF Wildlife West Virginia award "for outstanding accomplishment in the establishment and enhancement of overall wildlife habitat, with special emphasis on wild turkeys." The company was also a Reclamation Award recipient in 1984.

Rawl Sales & Processing Co.- Won back-to-back Reclamation Awards in 1993-94, primarily for its work in Mingo County, where it constructed a multi-million dollar bridge spanning the Tug Fork River, removing heavy coal truck traffic from more than 15 miles of local roadway. The project required the approval of more than 20 government agencies in both West Virginia and Kentucky. Rawl also constructed and equipped a playground and physical fitness facility for the community of Sprigg.

Kimberly Industries - Nominated by the AML Division of WV-DEP for national awards to be presented at the upcoming 19th Annual Association of Abandoned Mine Land Program Conference. Kimberly is nominated for its outstanding reclamation of a refuse disposal site at Bear Run in Gilmer County. The Bear Run project is the only AML site to win the Wetlands West Virginia award, presented by Ducks Unlimited.

Dal-Tex Coal Co.

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Dump Heights			
Standard	18'-5" (5.61 m)	18'-10" (5.74 m)	21'-6" (6.55 m)
High Lift	19'-10" (6.04 m)	20'-0" (6.10 m)	23'-6" (7.16 m)

Use of Reclaimed Land for Horticultural Crop Production

by Donna Ballard, Bradford Bearce, and Jeff Skousen - West Virginia University

Abstract

A reclaimed surface mine soil near Welch, WV, was amended with sewage sludge, hardwood bark, sorghum-sudan green manure crop, or unamended to demonstrate production of crops on minesoils in southern West Virginia. In a concurrent greenhouse trial at WVU, minesoils from three WV sites were each similarly amended and placed in containers. A selection of horticultural crops including forsythia, zinnia, tomato, strawberry, and raspberry were planted and grown at the Welch site and in the greenhouse. Flower growth and fruit production were enhanced by sludge, but were generally reduced where green manure and hardwood bark amendments were used. Sludge increased minesoil pH, Ca, P, and Mg levels above the other treatments. The Welch minesoil showed better flower and fruit production than the other two minesoils. Based on this study, minesoils with amendments show good potential for horticultural crop production.

Introduction

In the state of West Virginia and much of the eastern United States, reclaimed minesoils are a resource that has been used mainly for pasture or forest lands. If the mining method produces a topography of gentle slopes, these areas have potential for more intensive development, and may be used for the production of horticultural crops.

Research on reclamation of surface mine sites has been on-going for many years, generating many research papers and review articles (Bondurant, 1971; Schaller and Sutton, 1978; Sutton and Dick, 1987). Soil amendments like lime, fertilizer, fly ash, sewage sludge, papermill sludge, and sawmill residues have all been used to improve plant growth. Waste materials used as amendments may cause problems as well as ameliorate the soil. Minesoils have been amended for improved pasture and agronomic crop growth, and certain trees and shrubs have also shown some success in providing cover on abandoned mine lands (Sutton and Dick, 1987). However little research has been reported on the production of horticultural crops. Small fruit growth on unamended reclaimed mine land is reported, but no fruit production is recorded (Chaplin, 1978; Hensley and Brown, 1981; Hensley and Sparks, 1980). Vegetable production has been researched (Morse and O'Dell, 1983), but production of ornamental horticultural plants, other than Christmas trees, is notably lacking.

Soil treatments selected for a particular site vary based on the physical and chemical properties of the minesoil. By-products of local industries or municipalities can be used to aid reclamation and improve both chemical and physical properties of southern WV minesoils, as well as provide an opportunity to beneficially use and dispose of these by-products. West Virginia's timber industry produces a variety of wastes including shredded bark and sawdust. All populated areas have municipal wastewater treatment systems, which produce sewage sludge. Green manure crops have also been used for revegetation of mine sites. All of these treatments improve the physical and chemical characteristics of minesoils, which may support intensive horticultural crop production. The objectives of this study were to demonstrate production of horticultural crops in minesoils amended with three different organic materials.

Figure 1. McDowell County Demonstration Minesoil Reclamation Plot.

Materials and Methods

A mountain top removal surface mine, located near Welch, WV and owned by the Pocahontas Land Corporation, was selected for a field demonstration site. Pocahontas Land Corporation provided financial support to the Division of Plant and Soil Sciences at West Virginia University to conduct field and greenhouse studies.

Overview of Mt. View High School and location of horticultural demonstration plots in center of photo.

During March 1991, a 1-acre area was cleared near the Mt. View High School in McDowell County, West Virginia, and plots laid out (Figure 1). All plots were fertilized in May 1991 with a 10-44-9 (N-P-K) granular fertilizer at a rate of 400 lbs/acre. Also in May, a green manure crop (sudan-sorghum hybrid FFR201) was sown in designated plots at a rate of 22 lbs/acre. The resulting cover crop was tilled into the soil on 1 July 1991. On July 10, sewage sludge from Bluefield, WV, and hardwood bark from Gilbert Lumber Co., Gilbert, WV, were spread at a rate of 27 tons/ac dry weight. Crops planted on 11 July were 'Better Boy' tomatoes, 'Red Oak' leaf lettuce, 'Inca Yellow' marigolds, 'Scarlet Splendor' zinnia, and 'Basket of Gold' yarrow.

During April 1992, the site was plowed and disked, more large rocks were removed, and electricity was extended to the site. On 17-18 April, 32 white pines, 23 blue spruce, 23 white birch, 32 'Lynwood Gold' forsythia, 48 'Heritage' raspberries, 48 'Blue Chip' junipers, and 32 'Blue Crop' blueberries were planted. A 5-strand Kiwi electric fence was installed to enclose the site and repel deer and small animals. A Trickel-Eez irrigation system was installed to supply water.

Minesoil conditions after clearing and plowing the soil.

Growth of horticulture crops after the first year.

In May 1992, 72 'Allstar' strawberries, 96 'Pink damask' daylilies, 48 'Red Splendor' gladiolus corms, 32 'Centennial' tomatoes, 64 'Inca Yellow' marigolds, and 64 'Red Sails' lettuce plants were planted. Several 'Blue Crop' blueberry plants in each plot were mulched 3 inches deep with well rotted sawdust and others were mulched with wood chips donated by Asplundh Tree Service. Half the raspberries were mulched with 0.25 bale of straw and the other half with 3 inches of wood chips. Soil samples for analysis were taken from each of the 8 plots.

By June, the gladiolus sprouted to about 6 inches. However, the tomatoes were yellow and losing leaves in all but the sludge-treated plots. New growth on all crops was slow due to cold wet weather that predominated through the spring of 1992. Ammonium nitrate was sidedressed on all crops at the rate of 13 lbs/acre. In July, the 32 'Centennial' tomato plants were replaced with new healthy transplants.

Annual crops were planted in the springs of 1992 through 1995 and growth and production rates were recorded until the first killing frost each year. The strawberry and raspberry production rates were recorded the third season after planting. The woody ornamentals crops were measured at the end of 1995, the fourth growing season.

A greenhouse study included three minesoils (from Mt. View site in McDowell, Barbour, and Monongalia Counties, WV) with each minesoil representing one of the three surface mining provinces. Each minesoil was amended with sewage sludge, hardwood residues, sudan-sorghum grass, or unamended. The sewage sludge and hardwood residues were applied at rates equivalent to that applied at the Mt. View site. The sewage sludge came from the Morgantown Municipal Sewage Treatment Plant, while the hardwood residues came from the Gilbert Lumber Company, Gilbert, WV. The sudan-sorghum grass was grown and incorporated into the minesoils at the WVU greenhouse in the fall of 1991. All treatments received 10-44-9 (N-P-K) granular fertilizer at a rate comparable to field applications at the Mt. View site (0.5 grams per six inch standard pot). Lime ($CaCO_3$) was applied at rates of 0.78 g/pot for McDowell soil, 6.22 g/pot for Barbour soil, and 24.88 g/pot for Monongalia soil. These rates were determined by lime tests, which adjusted the pH to between 6.0 and 6.5 in all three soils.

Horticultural crops were transplanted into the minesoil/amendment mixtures during the month of March 1992. The crops planted were 'Better Boy' tomato, 'Inca Yellow' marigolds, 'Tribute' strawberry plants, 'Cloth of Gold' yarrow, and rooted cuttings of forsythia. There were five replications per plant/minesoil amendment combination. After planting, they were placed on greenhouse benches in randomized complete blocks by species.

Growth of horticulture crops after the third year.

TABLE 1. Nutrient, cation exchange capacity and pH status in May 1992 of the Mt. View minesoil amended in July 1991 with sewage sludge, hardwood bark, a sudan grass green manure crop or unamended. All nutrients (lbs/A) were high (HI) or very high (VHI)).

Amendment	pH	P	K	Ca	Mg	CEC (meq/100g)
Sludge	7.7	233VHI	162 HI	16370VHI	775VHI	44
Hardwood	7.3	99VHI	260 VHI	5160VHI	628VHI	16
Green Manure	7.3	170VHI	215 HI	5990VHI	625VHI	18
Control	6.9	148VHI	191 HI	4830VHI	632VHI	15

TABLE 2. Flower growth after 16 weeks in 1992 at the Mt. View minesoil site in McDowell County in response to soil amendments.

Amendment	Forsythia plant height (in)	Zinnia plant height (in)	Zinnia flowers per plant
Sludge	33	31	16
Hardwood	13	26	6
Green Manure	36	24	7
Control	23	26	8

TABLE 3. Tomato growth and production in 1992 at the Mt. View minesoil site in McDowell county in response to soil amendments.

Amendment	Plant height (in)	Number of fruit per plant
Sludge	38	43
Hardwood	30	20
Green Manure	34	20
Control	35	25

TABLE 4. Projected returns for fruit production from 'Allstar' strawberries and 'Heritage' raspberries in the third year after planting in Mt. View minesoil with sewage sludge, hardwood residues, a green manure crop, or no amendment.

'Allstar' strawberries Amendment	berry weight (oz)	projected yield (lb/A)	projected gross ($/A)
Sludge	24	687	343.50
Hardwood	24	687	343.50
Green Manure	27	785	392.50
Control	31	900	450.00

'Heritage' raspberries Amendment	berry weight (oz)	projected yield (lb/A)	projected gross ($/A)
Sludge	48	1650	4291.00
Hardwood	47	1616	4202.00
Green Manure	54	1855	4822.00
Control	62	2127	5530.00

TABLE 5. Production and economic projections[z] for selected ornamental crops planted in 1992 and harvested in 1995 at the Mt. View horticultural demonstration plot, Welch, WV.

Crop	projected yield[y] (no./A)	unit price[x] ($/unit)	gross profit ($/A)	production costs ($/A)	net profit ($/A)
Zinnia	152,460 flws	$2/10 flws	30,492	18,519	11,973
Forsythia	1800 plants	$13/plant	23,400	18,000	5,400
White Birch	1298	$50	64,900	43,782	21,118

[z] profits and costs are calculated from data given in Taylor et al., 1986.
[y] Yields are actual plot yields projected to an acre.
[x] Prices are from a 1995 commercial nursery catalogue.

TABLE 6. Tomato and 'Tribute' strawberry growth in greenhouse study of minesoils from McDowell, Barbour, and Monongalia Counties of West Virginia. Each minesoil was amended with municipal sewage sludge, hardwood bark, a sudan grass green manure or was unamended. The crops were planted 30 March 1992 and data were taken 20 May 1992.

Soil:Amendment	Tomato Plant height (in)	Strawberry Plant area (in^2)
McDowell		
Sludge	24	73
Hardwood	21	25
Green Manure	16	54
Control	22	62
Barbour		
Sludge	24	73
Hardwood	15	16
Green Manure	10	19
Control	21	44
Monongalia		
Sludge	23	64
Hardwood	16	11
Green Manure	13	20
Control	20	31

Results

Mt. View Site - The amendments applied in 1991 raised pH in the Mt. View minesoil (Table 1), with the sewage sludge causing the highest pH. Some of the increase in soil pH is due to the high alkalinity of the irrigation water, which was determined to be 450 mg/L. Macronutrients were high or very high in all plots. Sewage sludge caused a two-fold increase in Ca over all other treatments and the sewage sludge plots were higher in P and Mg than the other plots. Hardwood bark plots were lower in P, but higher in K than the other plots. Sewage sludge plots had cation exchange capacities at least twice that of all other plots.

Forsythia plants in the hardwood bark plots tended to be shorter than those in the sludge and green manure plots (Table 2). Zinnas in the sludge plots were also taller and had more flowers per plant than the other treatments (Table 2). Tomato plant height was similar for all amendments, but the number of fruits was higher in sludge-treated plots (Table 3).

The third year yields for 'Allstar' strawberries showed fruit numbers similar for all plots. The results in this field study were different from the greenhouse study where fruit production and berry weight were highest in the sludge

Members of the High School Key Club transplant trees on school grounds.

The Mt. View High School Key Club planting horticultural crops at the demonstration site.

treatment (Coffindaffer-Ballard, 1994). This infers that residual fertilizer effects from the 1991 amendments had ceased to exist. However, overall lb/A yield was about one tenth of the expected 6000 lbs/A, and was very close to the economic break even point (Table 4). In the third year after planting 'Heritage' raspberries, the control plots produced the highest yield. That yield was approximately one half the expected 5000 lb/A. However, this level of production still showed a positive net return (Table 4).

The ornamental crops grew well in all amendments and therefore acceptable monetary returns for such crops were predicted (Table 5). Zinnia flowers in both the sludge and control plots produced a estimated net profit of almost $12,000 per acre (Table 5). Assuming that 50% of the forsythia plants were ready for sale in two years, the net profit was projected to be $5,400 per acre (Table 5). For White Birch, assuming half were ready for sale in four years, a net profit of over $20,000 was projected (Table 5). Members of the High School Key Club transplanted several forsythia, juniper, white birch, pine, and spruce to the school properties adjacent to the trial plots. The junipers, typical of the ornamentals, showed quality growth in all amendments.

Greenhouse Study - Tomato heights were not much different in amended McDowell minesoils in the greenhouse (Table 6). Green manure and hardwood residues reduced tomato heights in Barbour and Monongalia minesoils. Sludge-treated pots also produced larger strawberry plants in all three minesoils (Table 6).

In general, the McDowell minesoil produced higher plant growth and development parameters than either the Barbour or Monongalia minesoils. The McDowell minesoil occasionally mitigated or nullified the growth inhibitory effects of the green manure and hardwood residue amendments where the other two minesoils did not.

The reduction in crop growth and development in the hardwood residue and green manure treatments may be due to fixation of essential elements (Bollen, 1969) or release of inhibitory substances from the bark (Still et al., 1976) or sudan-sorghum residues (Geneve and Western, 1988, Iyer et al., 1980) into the soil. Differences in physical and textural characteristics among the three minesoils may have caused the variation in crop responses.

Conclusions

An opportunity exists for minesoils amended with sludge or other organic materials to be used profitably for production of horticultural crops.

Mt. View HS Key Club Activity

The Mt. View High School Key Club, advised by Mr. Edward Evans, began to grow vegetables and flowers at the Horticulture Project in 1993. They grew marigolds, zinnias, snapdragons, and several kinds of vegetables. Many of the flowers were harvested fresh and donated to local rest homes and the Welch hospital. Others were dried in a vacant room at the high school. In September 1994, these students assisted in transplanting forsythia, white birch, and hybrid poplar to the high school grounds. The previous year, they transplanted several hybrid poplar to the edge of the baseball field to form a windbreak.

In July 1994, the Mt. View High School Key Club, sponsored by Kiwanis International, won First Place for Single Service Project at the International Kiwanis Convention in San Antonio, Texas. Seventeen foreign countries, in addition to many places in the United States, competed in the contest.

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Association Notebook

New Members

The Board of Directors approved two new members, both in the General Division, at the Semi-Annual Meeting in January.

Welcome to the following companies and their representatives: **Capitol Cement Corp./Riverton Corp.**, Martinsburg, WV, Ted Bostic, representative; **Mettiki Coal Corp.**, Oakland, MD, David Thomas, representative.

In other Board action, Phil Cooper of Wind River Resources Corp. was appointed to the Board to fill the unexpired term of Sid Young.

At its spring meeting, the Board approved eight companies for membership in the Associate Division: **General Construction Services, Ltd.**, Hurricane, WV, J.F. Hodges, representative; **Greer Industries, Inc.**, Masontown, WV, Joseph B. Dean, representative; **Mega Power Southeast, WV Mining & Industrial, LLC**, Madison, WV, Harry Lee Ferrell, representative; **Potesta & Associates**, Charleston, WV, Ronald R. Potesta, representative; **RPM Industries, Inc.**, Washington, PA, Norman Seewer, representative; **Shelton trucking Co.**, Summersville, WV, John W. Shelton, representative; **Smith Electrical Contractors, Inc.**, Gate City, VA, Danny R. Smith, representative; **Woolpert Consultants**, Charleston, WV, John T. Clark, representative.

Also at the Spring meeting, the Board elected Pete Moran of Princess Beverly Coal Co. to fill the unexpired term of Don Blankenship.

Jack Anderson 1914-1997

John C. "Jack" Anderson, President of the Association in 1970, passed away May 1 in Princeton, WV. Jack was the retired President of Anderson & Anderson Contractors, Inc. in Princeton, a company he started with his brother Bill after they returned from WWII.

Anderson & Anderson was a charter member of WVMRA, and Jack was the Association's fourth President (now called chairman), serving on the Board of Directors from 1967-1974. Current Board member Bill Anderson was chairman in 1987-88, making the Andersons the only brother combination ever to head WVMRA.

James R. White 1925-1997

James R. White, former Associate Division Chairman, died in Beckley, May 17 at the age of 72.

Jim built his reputation as a reclamation specialist with Vecellio & Grogan, Sterling Smokeless Coal Co. and Pioneer Fuel Corp, where he retired as Vice President. He was the first recipient of the American Society for Surface Mining and Reclamation Award.

Jim served on the Association's Board of Directors from 1978-1984 and 1985-1987, chairing the Associate Division in 1980-81.

Norman Kilpatrick 1938-1997

Norman Kilpatrick, longtime friend and converted supporter of the coal industry, died at his home at Institute, April 20.

Norman was a unique individual with many interests, not the least of which was coal. In the 1960's he was at times an opponent of coal, but later lost patience with the implacable attitude of many environmentalists and became friendlier to the industry. He founded the Surface Mining Research Library and became an expert witness on a wide variety of coal related topics.

Dates to remember

Coal Foundation Golf - The Coal Foundation will hold its second golf event at Don Nicewonder's course, The Virginian, in Bristol, VA on Monday, **July 14**. The Coal Foundation will also host an event at Jim LaRosa's Pete Dye Golf Club in Bridgeport on Monday, **September 8**. Invitations to that event will be sent out this summer.

Coal in the Classroom - The annual "Coal in the Classroom" four day seminar for teachers will return to the MSHA Academy in Beckley **August 4-7**. This event is run by the West Virginia Coal Association, assisted by WVMRA. Members with friends or family who are schoolteachers should encourage them to participate.

Annual Meeting - The Association's Annual Meeting at The Greenbrier is scheduled for **August 7-10**.

Fall Board Meeting - The Board of Directors will hold its fall meeting at Lakeview in Morgantown on the weekend of **October 24-25**, in conjunction with the WVU-Virginia Tech football game.

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