APPENDIX I - RESOURCE EXTRACTION

General : The extraction and processing of coal, minerals, aggregates, oil, gas and timber resources represents a significant segment of the State's economy. In some counties, these extractive industries represent the predominant share of the wages and employment in local communities. Taxes and revenues generated by the extractive industries provide financial resources for education, community services, and public safety and health services. Other industries closely associated with the extractive industries (i.e. transportation, processing, machinery, etc.) also provide substantial employment opportunities and tax revenues within the State.

It is a recognized fact that significant land-surface disturbances associated with resource extraction/development industries (mining, timbering, oil and gas extraction, quarrying, agriculture, etc.), like all other land disturbance activities (strip malls, industrial parks, residential subdivisions), can have a measurable effect on the volume and quality of excess stormwater runoff. The spatial extent of the land disturbance, the level of compliance with regulations and application of Best Management Practices (BMPs) by these industries determines whether or not such disturbances can have any measurable impact on lower probability floods (25 to 100 year flood frequency event) that affect large watersheds in the state. Due to the enormous volumes of stormwater runoff associated with these larger rainfall events, there are few measures that can be deployed by any single industry to affect the resulting elevation of floodwaters in the stream. See Appendix 10 for stormwater runoff impacts.

During the extensive public involvement portion of the WV Statewide Plan effort, numerous comments where received from citizens in several regions of the state regarding perceived adverse impacts to flooding and water quality from timbering and mining activities in the watersheds. Many floodplain citizens perceived that greater amounts of sediment and debris-laden stormwater were being produced from upstream areas where extensive mining and timbering operations were active. Many floodplain residents observed heavy loads of sediment, debris and sawn-logs being moved downstream or deposited (post-flood) on floodplain land or at bridge piers in their watersheds. Some citizens at the public workshops expressed serious concern that their homes and property were being placed at a greater risk of loss due to these upstream

resource extraction activities. Although no one present at the meeting was able to provide credible proof of the complicity of these activities in generating additional stormwater, debris and sediment, the public's perception was steadfast.

The flood events of May and July 2001 in the six southern counties in the state further strengthened this perception as floodplain residents expressed their displeasure at the amount of additional runoff, woody debris, logs and sediment that appeared in the streams during those events. In a series of public workshops conducted by the Corps of Engineers following the July 2001 flood events, many floodplain residents presented information concerning the amount and types of vegetative debris, sawn-logs and sediment volumes observed both during the flood event and later deposited on floodplain properties and at bridge piers. Numerous operating timbering and mining operations in the headwaters of several watersheds were identified by local residents as the primary sources of these problems. Again, although no one presented any specific evidence implicating these upstream timbering and mining activities in the flooding per say, pictures and eye-witness accounts of the resulting debris flows and post-flood cleanup indicated that land disturbances within the upper reaches of several watersheds may have contributed to the flood problems.

Members of the Task Force were aware of numerous instances within the state where sawmills, log landings, load-out areas and timbering debris (woody vegetation) had been located within the regulatory floodway zone. Since the floodway zone (by definition) experiences high-velocity, high-volume flows during flood events, much of the material located within the floodway by timber harvesting and sawmill companies becomes floatable debris further endangering development downstream. Further coordination with the Division of Forestry indicated that this State agency was not legislatively empowered to regulate the location of sawmills, timber consolidation yards and such facilities within the regulatory floodway. The Division of Forestry's regulatory authority ended when the sawn logs were removed from the permitted timbering area.

Indeed, lack of State government authority to regulate where these facilities are located should not result in that responsibility being automatically defaulted to the individual counties and municipal governments whose tax base interest in harvesting of timber may hinder effective regulation activities. Failure to regulate timber storage locations in one county may result in damages downstream in another county or municipal area during flood events. Hydrologic watersheds do not recognize political boundaries and litigation through the courts system may hinder more efficient solutions. Statewide regulation of these facilities in concert with accepted floodplain management ordinances should be the goal.

Flood Investigation Advisory Study: Following the disastrous flooding that occurred in the southern part of the State between May and July of 2001, the Governor appointed a Flood Investigation Advisory Committee (FIAC) chaired by the Secretary of the Department of Environmental Resources to examine the potential effects of mining and timbering activities on stormwater runoff during those flood events. The Executive Order outlines the duties of the committee as:

a) Assist and support the investigation of the scientific and hydrological cause for the flooding which occurred in the State in May and July 2001;
b) Assist in the determination of the effect and, if any be found, the impact on the flooding from current or past methods of coal mining and timbering practices in the affected counties and watersheds;
c) Provide assistance to the Flood Analysis Technical Team of the State Department of Environmental Protection in its mission to prepare a report for the Secretary of the Department of Environmental Protection on the cause of the floods of May and July 2001; and
d) Retain or hire such hydrological, forestry, mining, or meteorological experts as it deems necessary to assist it in reviewing any draft technical assessment prepared by the Flood Analysis Technical Team;

The FIAC organized a separate group known as the Flood Advisory Technical Team (FATT) that conducted the actual investigation and wrote the study report. The complete report can be seen at: http://www.dep.state.wv.us/item.cfm?ssid=9&ss1id=401 or contact the WVDEP.

WV Division of Forestry Study: Once the study by the FIAC group was completed and reviewed by several state and Federal agencies, it became apparent that certain of the hydrological runoff models used to determine the potential affects of timbering on stormwater runoff were more specific to conditions found at coal mining operations than those found in the forest cover where timber is being extracted. For this reason, a separate study was commissioned by the West Virginia Division of Forestry through Dr. Steven C. McCutcheon, Hydrologist and Environmental Engineer in cooperation with the Fernow Experimental Forest in Parsons, West Virginia and U.S. Forest Service.

This February 2003 study compared the hydrologic models used in the FAIC study to those models used by the Fernow Research Forest in Parsons in determining the amounts of runoff that would be generated by watersheds where timbering operations were being conducted. This study determined that the uncertainty of the model parameters used in the FIAC study could not decisively show whether timbering operations in the watersheds studied by WVDEP contributed significantly to the flooding events in the southern region of West Virginia. Subsequent review of the FATT study by the NRCS national office indicated that the NRCS runoff curve numbers used in the FATT study may not have been sufficiently robust for use in establishing state policies for forestry operations.

Based upon the findings of the McCutcheon study, it was determined that additional investigations of the hydrologic models used for calculating forest runoff due to timbering operations were needed before any connection between timbering and increased stormwater runoff could be made. Generally speaking, the uncertainty imbedded within the models due to the choice of parameter values, may have been greater than the amount of runoff affect detected by the models. A copy of the McCutcheon study can be obtained from the West Virginia Division of Forestry.

Additional Forest Hydrology Studies: In furtherance of this question regarding the involvement of timbering operations in the generation of excess stormwater in the state's watersheds, several initiatives are underway to better define the hydrologic modeling techniques that are applicable to the Appalachian forests in the state. Among those studies are:

1) A $100,000 grant to further study the three watersheds identified in the FATT study using alternative hydrologic models.

2) An ongoing study over a 3-year period to formulate new hydrologic models for Appalachian forests in conjunction with the US Forest Service and the Fernow Experimental Forest.

The purpose of these additional forest hydrology studies is to ensure that appropriate science is being applied to the public questions regarding the affects that timbering operations may have on flooding in the watersheds of the forested areas of West Virginia. The two studies mentioned above are dedicated to formulating the appropriate models that can be applied to stormwater runoff from timbered areas in the state. Currently, the data and analyses presented by the FATT study and the McCutcheon study are available for the public's information.

Recommendations for Mining and Reclamation Operations.
Based upon information provided in the various studies and input from the WVDEP Task Force members, the following issues were addressed by rule changes during the 2003 Legislative session, as follows:

1. Regulations were revised to enhance Hydrologic Reclamation Plans for all existing, pending and future permits to prohibit any increase in surface water discharge over pre-mining conditions.
2. Regulations were revised so that the post-mining drainage design of all existing and future mining permits corresponds with the permitted post-mining land configuration.
3. Regulations were revised to enhance contemporaneous reclamation requirements to further reduce surface water runoff.
4. Regulations were revised to require that each application for a permit contain a sediment retention plan to emphasize runoff control and minimize downstream sediment deposition during precipitation events.
5. Regulations were revised to require durable rock fills be limited to "bottom up or incremental lift construction" methods for enhanced runoff and sediment control.
6. Regulations were revised to require the condition of the total watershed be reviewed prior to any approved placement of excess spoil material. Conditions that should be considered include the proximity of residents, structures, etc., to excess spoil disposal structures.
7. Regulations were revised to require that valley fill designs minimize erosion within the watershed during precipitation. The permittee shall consider the total disturbance of the disposal area.

8. Regulations were revised to prohibit “wing dumping” of spoil in excess spoil disposal structures.
9. Regulations were revised to prohibit placement of windrowed material in areas that encroach upon natural drainage-ways.
10. Regulations were revised to limit areas allowed for clearing/grubbing of operations in excess spoil disposal areas.
11. Regulations were revised to maximize reforestation opportunities for all types of post mining land uses.
12. Regulations were revised to require rain gages be located on all mine sites and that monitoring and reporting schedules be developed in order to evaluate runoff response to precipitation.

RECOMMENDATIONS FOR FORESTRY OPERATIONS

Comments by the public indicated potential movement of sawn logs, woody debris and sediment from logging operations into streams during flood events. Transport of this material may have been caused in part by concentration of flow by poorly constructed logging and skid roads. In addition, location of sawmills and load-outs within the regulatory floodway and disposal of slash near streambeds also contributed material that may have increased flood damages due to blocked stream crossings and downstream impact damages. See Figures I-1 and I-2below.

Logging Road Along a Steam
(Photo from FATT Study)

Log Landing Adjacent to a Steam
(Photo from FATT Study)

While research shows the value of using BMPs and enforcing regulations in reducing impacts associated with timbering operations, close field verification and vigorous enforcement are necessary to provide the social and economic benefits associated with proper timbering methods. Research has also shown that uncontrolled forest fires result in significant stormwater runoff and sedimentation. The Division of Forestry is currently under-staffed to accomplish all of the inspection, fire-fighting, and enforcement responsibilities assigned to the Division by the State.

In view of this staffing shortfall, the Task Force recommends that the Legislature provide sufficient funding to the Division to increase staffing that would aid in: forest fire prevention and suppression, forest hydrology, and field inspection and verification of the use of existing and proposed BMPs. These additional staff would include a Forest Hydrologist, wildfire specialists, foresters and four civil enforcement officers, to implement the recommendations in this plan.

In response to comments received from the public during the workshop phase of the Statewide planning process and based in part on various studies prepared by WVDEP and the WV Division of Forestry, the following recommendations are offered to address future potential timbering impacts on flooding.

1. The Task Force recommends that the State Attorney General's office evaluate the current agency authorities to determine which agency(s) has been empowered to regulate the location of sawmills, sawn-log storage areas, load-out areas, log landings and consolidation yards within designated regulatory floodway zones. Should no State agency currently be so empowered, the Legislature should authorize and fund an appropriate agency to regulate the location of these facilities in the regulatory floodway. Such regulatory authority should be vested in an agency that is not directly involved with

harvesting timber resources within the State. Timber harvesting companies and contractors should be required by the regulation to coordinate the location of these temporary timber storage and milling facilities with local municipal or county floodplain managers prior to construction.

2. The Task Force recommends that the Division of Forestry revise BMPs to prohibit the use of lopped slash as a substitute for seeding on skid roads, require out-sloping and seeding of all roads prior to a post-operational site inspection or within sixty days of the end-date in the timber harvesting notification.

3. The Task Force recommends that the Division of Forestry revise BMPs to require a slash disposal plan be included in all timber harvesting notifications to provide for the removal of slash from roadways and landing areas. The BMPs should be revised to prohibit placement of large woody vegetation in intermittent and perennial stream channels.

4. The Task Force recommends that the Division of Forestry revise BMPs to require that the past history of uncontrolled burning in the watershed be taken into account in designing timbering operation plans to reduce runoff from these areas.

5. The Task Force recommends that the State Legislature consider providing funds for increased staffing to address forest fire prevention and suppression with the long-term goal of significantly reducing forest fires as a contributor to increased runoff and sedimentation.

6. The Task Force recommends that the Division of Forestry conduct pre-operational site inspections to review proposed timbering operation plans, sediment control practices, and BMPs to be used by operators.

7. The Task Force recommends that the Division of Forestry consider modifying the BMP's covering the construction of timber access roads and stream crossings in accordance with the recommendations provided in Appendix G (Stream Crossings and Access Roads) of this plan and in Chapter 6 (paragraph g) of the main report.

8. The Task Force recommends that the Division of Forestry develop and enforce regulations that requires the timbering industry to minimize the disturbed area at extraction sites, maximize the preservation of soils and under-story brush and trees, mandates reseeding or planting seedlings on all lands timbered, and mandates stockpiling topsoil disturbed in access road construction for use in seeding and reforestation.

9. The Task Force recommends that the Division of Forestry implement a routine inspection regime to monitor and enforce BMPs and timbering notification requirements during active operations.

10. The Task Force recommends that the Division of Forestry conduct a post-operational site inspection at the end-date of the timbering operation to insure that all BMPs and sediment control practices have been met prior to removal of equipment from the site.

11. The Task Force recommends that the Division of Forestry provide increased technical assistance to timber operators in training and field verification, specifically with regard to road construction, stream-crossing construction, log landing location, and sediment control measures.

12. The Task Force recommends that the Division of Forestry investigate alternative uses for slash, logging waste and less desirable wood to prevent logging waste from being left in and along streams.

13. The Task Force recommends that the Division of Forestry develop regulations requiring development of a plan by the landowner for use of the land after it has been timbered. This plan should include details of how the land will be protected from erosion and sedimentation including short-term and long-term seeding and mulching, and who is responsible for implementing the plan after timbering has ceased.

14. The Task Force recommends that the Division of Forestry prepare educational material on the effects of wildfires and repetitive wildfires on soils and the resulting increase in runoff and flood damages for presentation to high school students, landowners, public officials, floodplain managers and the public.

In addition to the recommendations specifically proposed for mining and timbering industries, the Task Force has specific recommendations for other resource development and extraction industries. These recommendations are provided below.

AGRICULTURE

The agricultural industry contributes to flooding and flood damages through three primary processes: 1) inappropriate construction and maintenance of access roads, 2) conversion of forested areas into pasture and cropland, 3) creation of impervious areas within the state's floodplains and regulatory floodways. The current Best Management Practices (BMPs) established for agricultural would be adequate to reduce flood damages if they were universally applied. It is recommended that the WV Department of Agriculture, the Conservation Agency, and the Natural Resources Conservation Service expand the number of cooperators who adhere to these BMPs.

MINES AND QUARRIES

Slurry impoundments and sediment control structures are necessary components of coal processing and protection of water quality in West Virginia. Coal must be washed before it is shipped to the end users (power plants, furnaces, etc.). Slurry impoundments enable coal companies to economically clean coal and dispose of the remaining refuse and slurry mixture in a stable and environmentally sound manner. Sediment control structures are necessary to maintain water quality standards of the surface runoff from mining areas. When these structures function as intended, they protect the water quality of West

Virginia's streams as the State prospers from resource development. However, when these structures are not constructed according to sound engineering practices, the results can be disastrous.

The typical slurry impoundment is built by constructing a dam of coal refuse across a hollow. This method significantly reduces the cost of constructing the retention basin. The necessary elements of a properly designed impoundment include a sound foundation (including the dam abutments), a correctly engineered outflow and overflow system and the use of appropriate materials and compaction within the dam structure itself. Should any of these elements be overlooked when either designing or constructing a structure, failure may result, especially in times of heavy rainfall events.

The following failures of slurry impoundments in the State highlight the need for diligence in their design, construction and maintenance.

On February 26, 1972, three impoundments, in series, on Middle Fork of Buffalo Creek in Logan County collapsed during heavy rain. Three coal-waste dams were located in a narrow valley about six hundred feet apart. The second was built at the upper end of the first and the third and largest impoundment was built at the upper end of the second. Days of heavy rain in the area caused the upper dam to collapse, unleashing a flood of water, rock, timbers, coal sediment into the lower dams causing them to overtop and fail. The resulting floodwaters carried houses, churches, trailers, cars, bridges, people, and trees down the valley. One hundred twenty five adults and children died on Buffalo Creek. The collapse of the dams on Buffalo Creek resulted in the greatest loss of life and greatest monetary loss of all the dam failures in West Virginia.

On July 17, 1980, a slurry cell on top of a refuse site at Philpott Coal Corporation in Raleigh County overtopped when too much slurry was inadvertently pumped into the structure. A significant amount of black water was released.

On April 8,1987, the principle spillway pipe in the Lower Big Branch impoundment at Peabody Coal Companies Montcoal No. 7 preparation plant in Raleigh County breached due to heavy snowmelt and associated ground movement. Twenty-three million gallons of black water was released into the downstream watershed.

On January 28, 1994 a 5-foot earthen berm overtopped at a slurry impoundment at Consolidated Coal Companies Arkwright Mine in Monongalia County due to ice blockage in the 4-inch discharge pipe. Some 375,000 gallons of water were released into the Town of Granville. Although no one was injured three residences directly downstream were damaged.

According to recent data, West Virginia has less than 130 coal mine impoundments. The sheer number of these impoundments in the state represents only part of the problem. The total storage of the impoundments involved in the Buffalo Creek disaster totaled less than 500 acre-feet. Many current impoundments hold more than 20,000 acre-feet of water. One acre-foot of water is equivalent to 325,851 gallons (the measurement of one acre-

foot is the amount of water that will cover one acre of flat surface one foot deep). Notably, the increased size of today's impoundments emphasizes the need for continued scrutiny and vigilance associated with their design, construction and inspection.

Due in large part to the disaster at Buffalo Creek, the West Virginia Legislature passed the Dam Safety Act of 1973. In 1977 the United States Congress specifically cited the Buffalo Creek disaster when it passed the Surface Mining Control and Reclamation Act.

In 2003, the West Virginia Department of Environmental Protection promulgated new regulations for mining, reducing the industry's contributions to stormwater runoff and downstream flooding consequences. An addition to the regulations now requires each coal company to maintain a rain gage at the actual mining site. While there is no discussion of the type of rain gage required, the proposed regulation change does provide the mining industry the opportunity to install rain gages with ALERT communications capabilities compatible with those used by the WV Office of Emergency Services. WVOES could install, operate and maintain each rain gage for five years for approximately $10,000 ($2,000 per year). Rainfall data collected at these gages would then be available for flood forecasting and could be evaluated and distributed via the internet.

Regulations passed in 2003 require a surface water runoff analysis (SWROA) to be performed on all surface mining permits. As a result, the during-mining and post-mining land conditions cannot increase peak runoff compared to the pre-mining conditions. This quantitative hydrologic analysis, based on a "no-net" increase threshold, insures that mining will not contribute to downstream flooding impacts during mining activities through complete reclamation. Although quarry operations don't have this requirement, their potential to offer significant contributions to runoff is limited by their smaller areas of impact, compared to surface mines.

The Department of Environmental Protection has existing regulations, covering both surface mining and quarrying, that presently exceed the minimum standards detailed in the Stream Crossings and Access Roads appendix of this plan. For mining operations, 38-CSR2-§4, et seq. provides detailed design requirements for haulroad construction and maintenance. For quarrying operations, 38-CSR3-§5, et seq., presents the design requirements for quarry roads.

Additional, the Task Force recommends that the Department of Environmental Protection require new mining and quarrying operations in the State to be coordinated with the local municipal or county floodplain manager in that area prior to initiating construction.

OIL AND GAS

Generally speaking, exploration and development of the oil and gas resources within the state requires a much smaller footprint than other resource extraction industries and is generally confined to particular regions where these resources are concentrated. However, numerous comments were received during the public workshop process for the statewide plan indicating that these industries have caused problems in those areas where exploration and extraction take place.

As with all other land-uses in the state, the oil and gas extraction industry contributes to increased stormwater flooding and downstream flood damages by engaging in three primary activities including: 1) inappropriate construction and maintenance of access roads (including poorly designed, constructed and maintained stream crossings), 2) conversion of forested lands into more impervious surfaces that generate additional stormwater runoff, and 3) inappropriate development within the state's floodplains and regulatory floodways.

Consequently, the Office of Oil and Gas has established an Erosion and Sediment Control Field Manual that presents standards for stream crossings. The Task Force recommends that the Department of Environmental Protection continue to implement and enforce the standards established by this manual. The Task Force also recommends that new oil and gas well exploration and drilling operations in the State be coordinated with the local municipal or county floodplain manager in that area prior to initiating construction.