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ADDRESSING MINERAL RESOURCES IN COMPREHENSIVE PLANNING

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INTRODUCTION

Geologists, mineral economists, environmental scientists, and engineers have long recognized the need to address mineral resources in comprehensive planning. With passage of The National Geologic Mapping Act of 1992 and an amendment to the Code of Virginia in 1996, the inclusion of mineral resources in comprehensive planning was given increased significance.

The National Geologic Mapping Act of 1992 was passed on May 18, 1992; the purpose of this act was to expediate the production of a geologic-map data base for the United States. This data can then be applied to land-use management, assessment, and utilization; conservation of natural resources; groundwater management; mineral resources; and environmental protection. Appropriations authorized to carry out State mapping activities under this Act were noted to be \$15 million for fiscal year 1993; \$18 million for fiscal year 1994; \$21 million for fiscal year 1995; and \$25 million for fiscal year 1996. Funding for Virginia's participation in this act began in 1996 at an amount just under \$20,000 to be matched with State funds. Work during that year consisted of conducting 1:100,000 scale and 1:24,000 (7.5-minute) scale geologic mapping as well as digitizing previously published 7.5-minute geologic maps, newly mapped 7.5-minute geologic maps, and recently compiled 1:100,000 scale geologic maps. Funding continued in 1997 and 1998 at a level of almost \$50,000 per year. In late 1998 almost 50 digitized products had been produced. Virginia's participation in the mapping program in 1999 and later may depend on Federal funding.

In early 1993, a Geologic Map Advisory Committee was formed. This committee was formed to advise the Virginia Division of Mineral Resources (DMR) as to type and scale of geologic maps to pursue in the STATEMAP program; it

consisted of individual consultants, company personnel, general public, academia and representatives from local and state government. In the late Spring of 1993, the Advisory Committee sent a questionnaire to 160 regional planning districts and individual counties/independent cities to determine the importance of the following categories: waste management, groundwater, surface water, natural hazards, industrial minerals, energy, urban construction, industrial land-use, low-level radioactive waste, corridors, wetlands, and recreation in their area of responsibility. This questionnaire helped provide the committee with data, designating potential growth areas, and thus the areas where geologic mapping and mineral resources studies would be needed in the future for planning and economic development. The Virginia Aggregates Association took the lead to make the General Assembly aware of the need for geologic mapping and site specific mineral resources data. This along with then Governor George Allen's, 1994, "Opportunity Virginia", a strategic plan for jobs and prosperity, allowed for a move toward making the Commonwealth more aware of the need for geology and mineral resources in county comprehensive plans.

ASSEMBLY ACTION

During the 1996 General Assembly of the Commonwealth of Virginia, House Bill 1522 and Senate Bill 475 were both passed with similar language regarding the revision of localities' comprehensive plans; the bills were signed by then Governor George Allen for implementation on July 1, 1996. Several sections of the Code of Virginia were amended and reenacted, including Chapter 15.1 447, which stated in part that "*furthermore, if a locality (county or independent city) chooses not to survey and study mineral resources, then the locality shall include mineral resources*

in the comprehensive plan, if such areas are identified and surveyed by the Department of Mines, Minerals and Energy." It was also stated that the locality shall also include a mineral resources map in their revised plan.

DMR RESPONSE TO ASSEMBLY ACTION

With the Virginia Code change, the Department of Mines, Minerals and Energy's Division of Mineral Resources (geological survey) became proactive in assisting the localities in Virginia. The Division has been involved in a long-term project, since the mid -1980s, of locating and compiling data for all of the past and current mineral resource activities in the Commonwealth. In May, 1996, the Division sent a letter and accompanying form to 137 counties and independent cities to determine the revision date for their Comprehensive Plan. This would allow the Division to possibly redirect their current project area to areas where data might be required sooner than planned. Approximately 110 counties and independent cities responded; a second letter was sent in July, 1997. Over the next several months nine more localities responded, for a total of 119. From this total, the number of comprehensive plans due in each year was reported as follows:

1996: 50
1997: 22
1998: 18
1999: 12
2000+ 17

Only five counties (Buchanan, Carroll, Grayson, Pittsylvania and Washington) had not responded by February 1, 1999. Thirteen cities have not responded; however many of them have no available potential economic resources within their jurisdiction. The Division began sending out individualized packets of geological and mineral resource data in February 1996, when the City of Richmond requested data. Through December 1998, 119 packets have been sent to localities. Many packets were sent up to 3 years in advance of the planning update. Awareness of mineral resources has been noted in revised comprehensive plans by many of the localities, including several with a large (25%+) projected population growth over the next fifteen years.

Packet of Information sent to each locality included

1. General summary of historical mineral resources, including county mineral production for the most recent year.
2. Location of active and major inactive mineral producers in the locality.
3. Importance of mineral resources in planning.
4. County maps locating mineral resource materials not presently being mined.
5. Copies of available analytical data for resources in the locality.
6. Commodity mineral resources data available.
7. Geologic maps and reports, any part of which may be within locality boundaries

After the packets were sent to the localities, some questions that arose follow:

1. We didn't ask for this?
2. What do we do with this data?
3. How do we incorporate this into our plan?
4. Can you prepare this data in a more compatible manner for us?
5. Can someone from your office explain the data?
6. Can you provide specific sites that can be mined?
7. We don't allow any mining in our locality.
8. Will someone come to our planning session?

VALUE OF MINERAL RESOURCES

Mineral resources can be mined only where they are found and planning for their potential environmentally sound extraction is the responsibility of state and local governments. As the saying goes, "If it can't be grown, it has to be mined". It has been noted by the former U.S. Bureau of Mines that every newborn infant in the United States will need a lifetime supply of about 620 short tons of stone, sand & gravel, and cement for building roads, homes, schools, offices, and factories; about 13.2 short tons of clays for making bricks, paper, paint, glass, and pottery; 3,593 pounds of aluminum for beverage cans, folding lawn chairs, aircraft, etc. If these numbers are multiplied by thousands of citizens, an enormous amount of resources will be needed in the future. Many of these mineral commodities are present in Virginia: 1997 preliminary State production figures indicate 66,000,000 short tons of crushed stone, 11,300,000 short tons of sand and gravel, and 862,000 short tons of clay. More than \$45 million worth of cement was also produced.

An aspect of mineral resources important to a locality is the transportation factor. Transporting aggregates, by truck after the initial minimum fee, averages \$0.15-0.20 / ton-mile: an example may be the purchasing of 15 tons of gravel (average truck load) for your driveway from a quarry more than 30 miles away. Transportation costs would be equal to the value of the stone; stone from a local (less than 10 miles) quarry would cut the cost almost in half. It is important to know historically where mining was in the county/city; where mining is present; and where potential mining sites may be. Planning for future mineral resource expansion can, besides providing affordable aggregates, add to the tax base, provide jobs, and may offer post-mining recreation sites.

MINERAL RESOURCES IN PLANS

The City of Virginia Beach, whose projected population increase from 1995 to 2010 is 31.9 percent (Spar and Sprung, 1996), revised their comprehensive plan in 1996 and noted that they already addressed mineral resources in their plan. In part, they note in their plan that "*sand is an important commodity, which is needed for both beach nourishment and the construction industry*". They also state that "*restrictions are currently incorporated in State permitting procedures and in the City's zoning regulations, which allow*

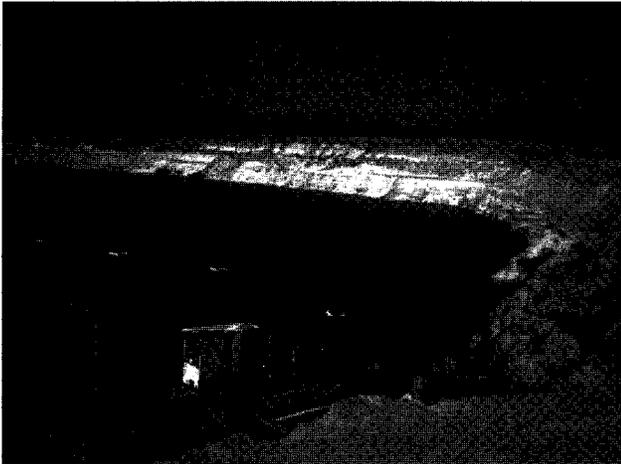


Figure 1. Masonry, play, and fill sand operation of Baillio Sand Company, Inc., City of Virginia Beach.

borrow pits only as conditional uses. However, the city must be careful not to create an environment where sand must be imported from other areas in order to meet continuing demands.” This last statement recognizes the importance of extracting mineral resources in the locality. Production of more than 1,575,000 short tons of sand in 1997; this production includes masonry sand, foundry sand, and fill sand (Figure 1). With continuing erosion along the Atlantic coast, the need for beach-replenishment sand, whether it is from sand resources on-shore or sand dredged off-shore will be very important in the future (Figure 2). For the last fifteen years, Virginia Beach has contracted to replenish 150,000 cubic yards of sand to the beach. Also they continually pump 60,000 to 100,000 cubic yards of sand from offshore at Rudee Inlet to replenish the first eight blocks of the beachfront (Figures 3 and 4). Presently, the City is

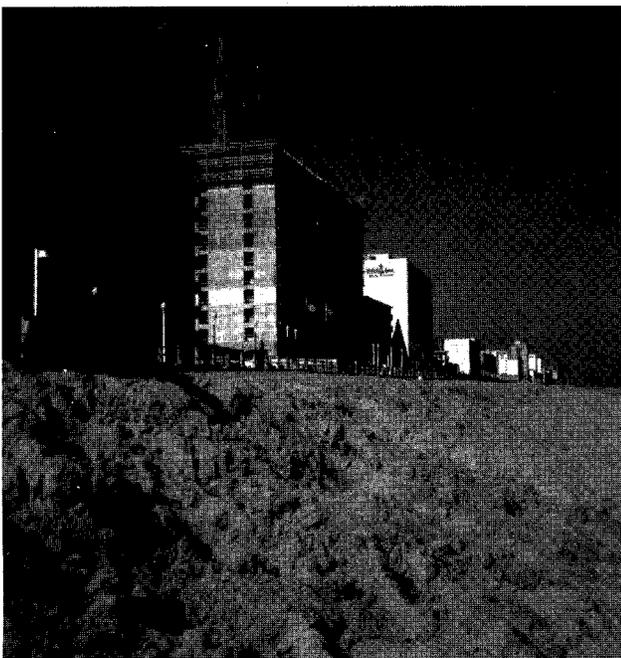


Figure 2. Erosion along the Atlantic coast, City of Virginia Beach.

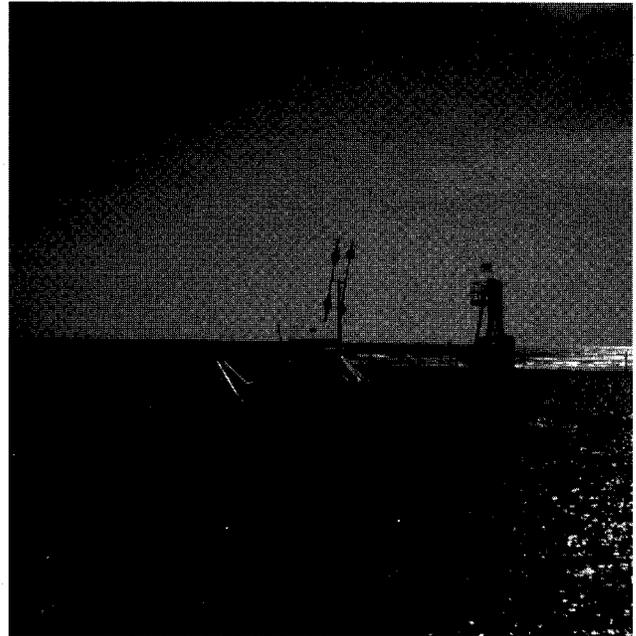


Figure 3. Pumping of sand from Rudee Inlet, City of Virginia Beach.

preparing to announce 3-year contracts to replenish 700,000 cubic yards of additional sand to the beachfront to increase the beach elevation. In the future, several seawalls are planned; they will require an additional 120,000 cubic yards of sand for the wall and to allow equipment to the construction site. A “stockpile” of sand is maintained at Lynnhaven Inlet, obtained from dredging the mouth of the Lynnhaven River, from dredged material by the contractor of the Chesapeake Bay Bridge Tunnel, and from sand supplied by local producers (Figure 5).

When the City of Blacksburg wrote their Comprehensive Plan in June, 1996, they utilized some of the Division’s mineral resource data that they had requested in March of that year. Under one of their ACTION STRATEGIES to take place within 5 years, one of the policies was to “consider the existence of mineral resources as part of land use decisions including zoning and site development”. Some mineral resource data was also included on their Geologic Features Map.



Figure 4. Replenishing of sand from Rudee Inlet onto the beach, City of Virginia Beach.

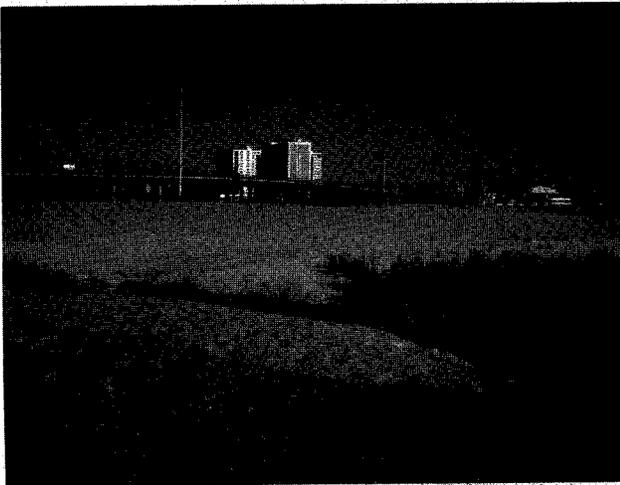


Figure 5. "Stockpile" of sand near Lynnhaven Inlet, City of Virginia Beach.

Page County, with a projected population increase of 11.2 percent from 1995 to 2010 (Spar and Sprung, 1996), notes in their comprehensive plan that "one effect of the geology on man's use of the land is the presence or possibility of rock and minerals of commercial value". The County requested someone to explain available mineral resources that could be exploited in the future. The available resources were discussed and a potential quarry site (northeast of an abandoned limestone quarry) was noted to the county administration; this site was included as the author was asked to revise and update the Geology section of their comprehensive plan (Figure 6).

The County of Powhatan, whose projected population increase from 1995 to 2010 is 25.2 percent (Spar and Sprung, 1996), adopted their comprehensive plan in January, 1998. Under the heading of Mineral Resources, the #1 County policy is to: *Encourage well-managed mineral extraction*

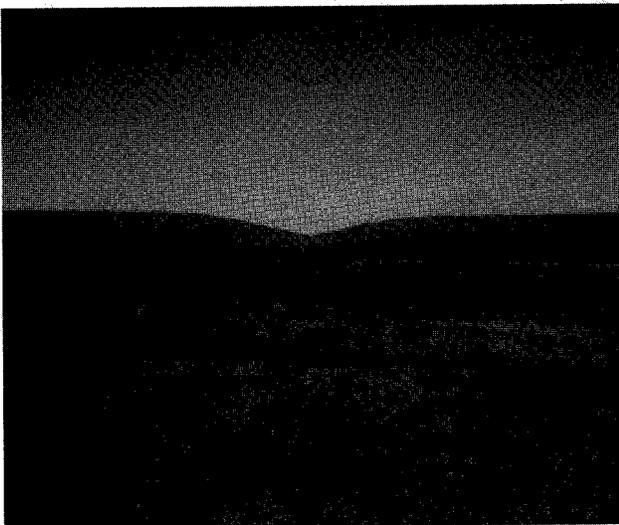


Figure 6. Area of substantial aggregate reserves (dolostone/limestone), northeast of the old Riverton Corporation quarry, Page County.

activities in compatible locations that do not conflict with existing adjacent land uses. An Implementation Action for mineral resources for the County is to: *Review and evaluate existing land development regulations to ensure that provisions are sufficient to protect existing and planned future adjacent land use.* Although mineral resources are noted in each of the statements, it appears that the availability of resources are as important as the present land uses.

Culpeper County, whose projected population increase from 1995 to 2010 is 29.7 percent (Spar and Sprung, 1996), adopted their plan in October, 1998 and stated that the Division of Mineral Resources data was **instrumental in our effort**. Geologic and mineral resource maps are included in the comprehensive plan: *the maps with the plan show the locations of available economic rock and mineral resources. Informal decisions on expected future needs can be made now by local governments, industry, and regulatory agencies to insure that the identified resources will be available when needed.*

These are positive statements for a County that is obviously aware of the value of resources, further evidenced by the following statement: *"one aspect of mineral resources important to a locality is transportation"*. In Knepper (1999), Culpeper County officials state: *"It is important to know where potential mining sites may be in the future. Future mineral resource expansion can add to the tax base, provide jobs and may offer post-mining recreation sites. By recognizing the mineral resources available for Culpeper County, it becomes easier to plan for these resources that are important to the developing community"*. Culpeper County had production of more than 805,000 short tons of aggregates from two active quarries in 1997: one in the south-central part of the county, east of Culpeper and one in the very southern part of the county, nine miles south of Culpeper (Figures 7 and 8).

Campbell County, located in the central portion of the Commonwealth, has a projected population growth of only a little under 4 percent over the next fifteen years (Spar and Sprung, 1996). However, their comprehensive plan contains a fairly detailed geologic map and the plan reflects an acute awareness of the need for mineral resources in an area with major east-west and north-south highways. Presently more than 1.86 million short tons of sand, limestone and greenstone are produced in the County.

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Knepper, Robin, 1999, Quarries a 'rock solid' business in Culpeper-Madison-Orange: The Magazine, Virginia Newspapers, Inc. p. 20-25.

Spar, M.A. and Sprung, L., 1996, Virginia Statistical Abstract: Weldon Cooper Center for Public Service, University of Virginia, Charlottesville, VA, 873 p.



Figure 7. Aggregate quarry in Mesozoic-age sandstone, operated by Martin Marietta Materials, Culpeper County.



Figure 8. Aggregate quarry in diabase, Cedar Mountain Stone, Culpeper County.

STATUS OF DMR GEOLOGIC MAPPING AND DIGITAL PROGRAMS

In 1993 DMR began to explore the preparation of geologic maps by digital techniques. Using general fund appropriation and beginning in 1996 funds provided by the National Geologic Mapping Act of 1992, nine 1:100,000-scale maps have been compiled and digitized and significant progress has been made on an additional six maps. 123 of 186 previously published 1:24,000-scale geologic maps have been digitized and several unpublished maps are in progress.

The graphs (Figures 1 & 2) show geologic mapping by scale, decade, area in progress, and total area mapped. Figures 3, 4, and 5 depict the 1:100,000 and 1:24,000 mapping program status and maps to be delivered under the current STATEMAP project.

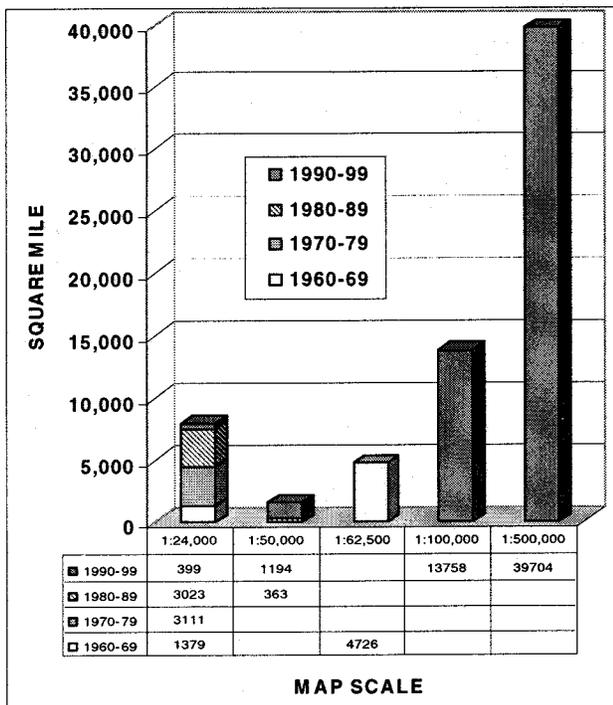


Figure 1. Graph showing the square miles of geologic mapping by scale and decade.

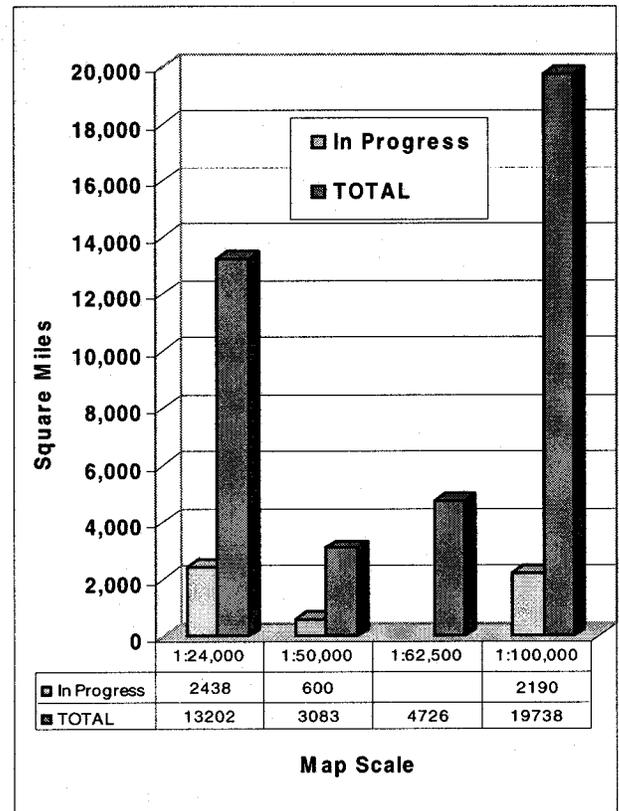


Figure 2. Graph showing In Progress and Total geologic mapping by scale.

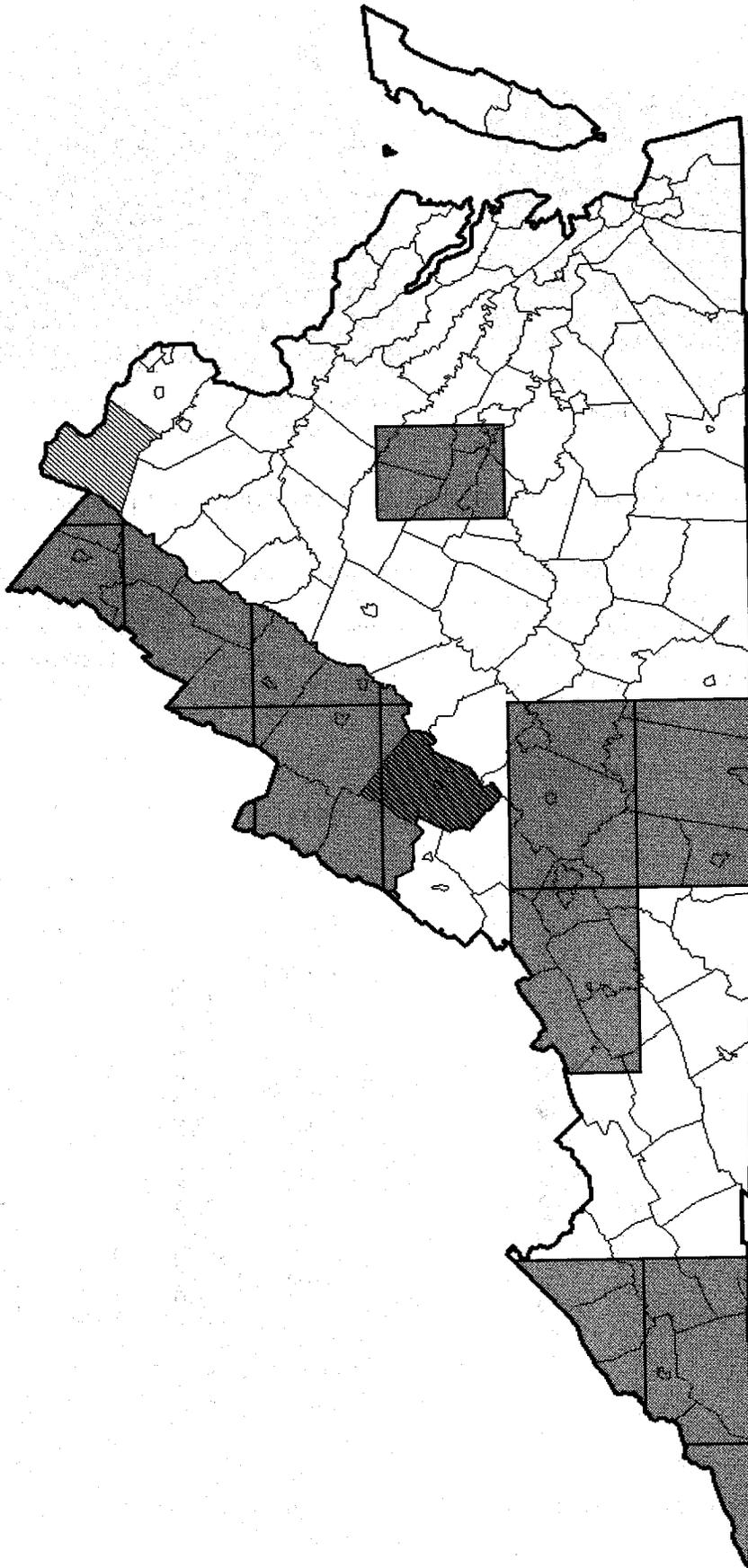


Figure 3. Map showing the 1:100,000-scale geologic mapping compiled and digitized.

Virginia 1:24,000 Scale Geologic Mapping

-  Geologic Mapping Completed and/or Published
-  Digital Work Completed, In Progress or Planned
-  Field Completed and In Compilation

All digital maps are in an "unedited" stage.

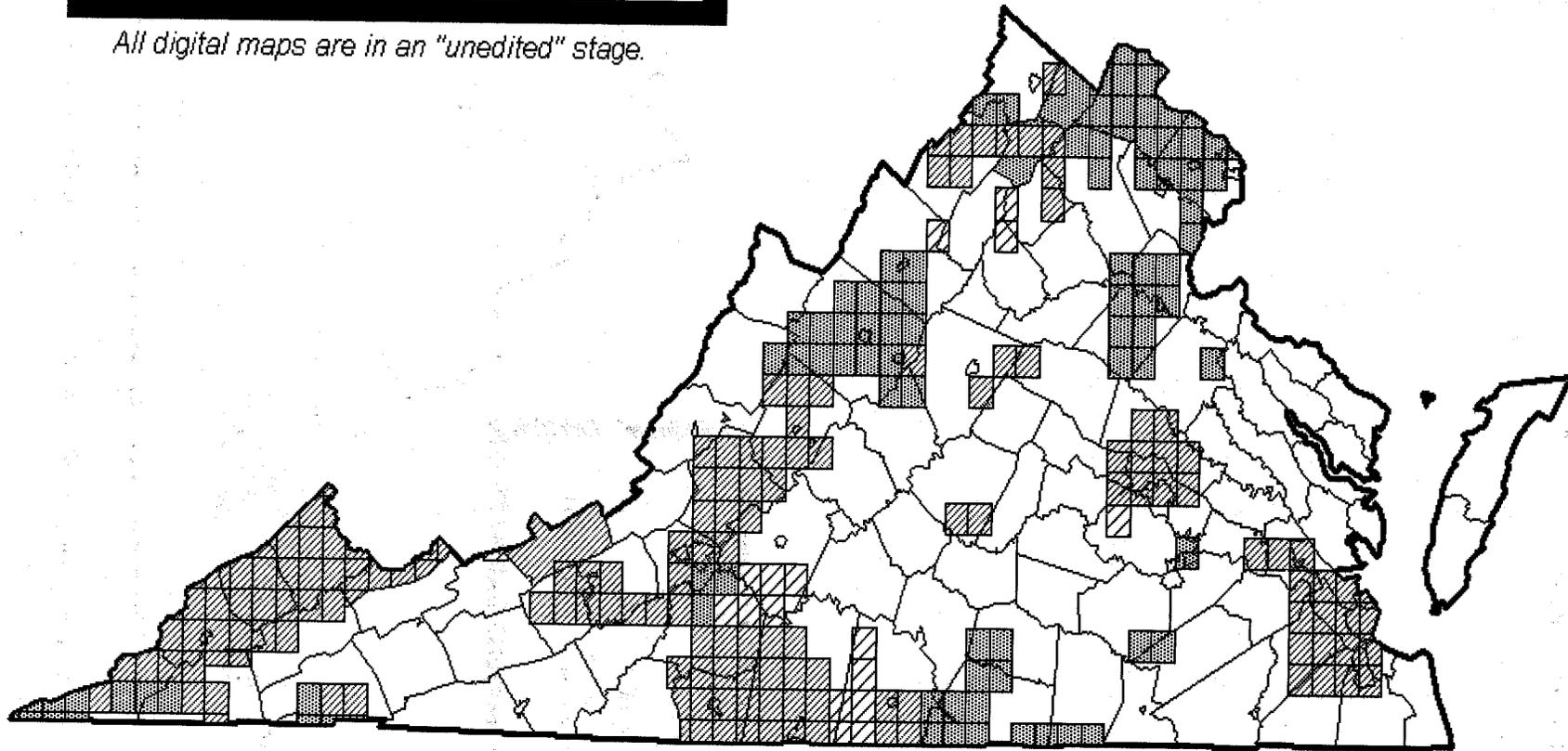


Figure 4. Map showing the distribution of geologic mapping (1:24,000-scale) and the status of each geologic map.

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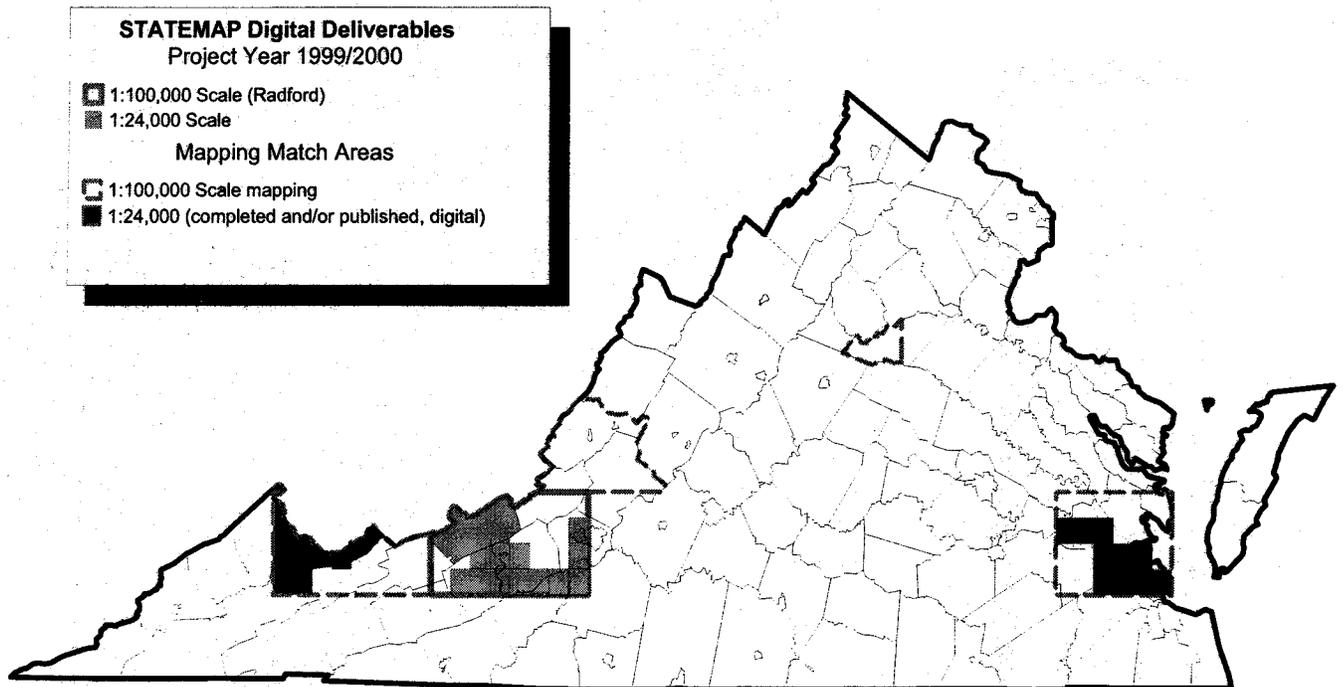


Figure 5. Map showing the STATEMAP digital deliverables for the project year 1999/2000.