area correlates with the tuff of the Castle Rock deposit. The bed is 12 feet thick in the rim outcrops, but erosion may have removed a considerable part of it. Exposures of the tuff are continuous along the creek for several miles. Available tonnages of the tuff are very large, well over 1,000,000 tons.

The tuff is dominantly gray with some bluish-gray material. The specific gravity of a hand specimen is similar to that of the gray tuff from deposit WT-1. It is assumed, therefore, that a tuff concrete made from this material would weigh about 115 to 125 pounds per cubic foot.

Other areas (figs. 4, 5, and 6)—The welded tuffs extend for several miles to the northeast, southeast, and southwest from the deposits described as WT-1 and WT-2. Other porous lavas or welded tuffs occur in Conejos County, a few miles south of Antonito. There is a porous lava deposit in Chaffee County, east of the town of Nathrop. A similar deposit is in Rio Grande County, approximately 4 miles east of Del Norte. These three deposits may contain material suitable for use as a medium-weight aggregate, but they may be too far from the major marketing centers to make present production economically feasible.

Blast-Furnace Slag

SL-1, Pueblo slag, Pueblo County (fig. 5)—Four blast furnaces produce approximately 46,000 tons of slag per month at the Colorado Fuel & Iron Corporation plant at Pueblo. Comparison of the composition of the slag with the suggested best composition for expansible slag shows a favorable amount of silica but some deficiency in the lime content. The 15 open-hearth furnaces at Pueblo produce about 18,000 tons of slag per month. Analysis of the open-hearth slag shows a considerable deficiency in the silica content and a slight excess in the lime content. The blast-furnace slag appears to be the more suitable of the two kinds.

SL-2, Leadville slag, Lake County (fig. 3)—Molten slag is produced at the rate of about 6,000 tons per month at the American Smelting & Refining Corporation smelter at Leadville, Colo. The slag is deficient in silica, very deficient in

lime, and contains a fairly high percentage of sulphur. The material probably is not suitable for the production of expanded slag; however, no adequate tests have been made of the material.

SUMMARY

Colorado has sufficient resources of lightweight aggregate material to meet the State's needs for many years.

There are tremendous tonnages of clay, shale, and slate suitable for expansion, and many of these deposits are easily accessible to the major marketing centers. Large and easily accessible tonnages of welded tuff are available between Denver and Colorado Springs. This material has not as yet been used as a light- or medium-weight aggregate. Two large deposits of pumice in Park and Saguache Counties are less accessible, and in general there has been little production of pumice in the State. One large perlite deposit is in production in Custer County. A less accessible deposit in Saguache County is not in production. In general, deposits of scoria are small and not easily accessible, and it is anticipated that any production from them will be used only in local areas.

Numerous vermiculite deposits are known in the State, but most of them are rather small. Large vermiculite deposits occur in Custer and Gunnison Counties. They are relatively inaccessible, and a long haul to the major marketing centers is necessary. Because of the rather low compressive strength of vermiculite concrete, it is anticipated that the demand for vermiculite aggregate will not be large. However, the demand may be considerable for vermiculite as a loose-fill insulation. Large quantities of blast-furnace slag are available at Pueblo, but more information is necessary as to the suitability of the material for expansion to a lightweight aggregate.

Prospects for additional discoveries of large deposits of clay, shale, welded tuff, and vermiculite are good. It is anticipated that other fairly large deposits of perlite and pumice can be found. If the expansion of obsidian becomes economically feasible, large deposits will be available, al-

though they are relatively inaccessible. Likewise if successful expansion of volcanic ash or pumicite is achieved, some large deposits will become available, even though they are some distance from the major marketing center of the state. The hope of finding large scoria deposits is remote.

Production of lightweight aggregates in Colorado has been small, mainly because of the high cost involved in producing and marketing. Further prospecting is advisable; in general, there is a fair chance of discovery of large deposits. Expansible clay and shale have had little use in Colorado, despite the large tonnages available and the accessibility to the major marketing centers. These materials seem to merit further investigation by the lightweight aggregate producers of the State.

SOURCES OF INFORMATION BY DEPOSIT

Pumice

Pm-1. Nathrop-Ruby Mountain deposit:
Field reconnaissance, June 7, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.

Pm-2. Capulin or Alamosa Creek deposit:
Field reconnaissance, May 23, 1947, A. L. Bush.
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Pm-3. Black Mountain or South Park deposit:
Field reconnaissance, June 24, 1947, A. L. Bush.
Personal communication, June 5, 1947, and May 25, 1951, R. D. Wilfley.
Personal communication, April 15, 1947, Dr. John C. Haff.

Pm-4. Cochetopa Dome deposit:
Field reconnaissance, June 8, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.

Scoria

S-1. Mesita deposit:
Field reconnaissance, May 22, 1947, A. L. Bush.
Personal communication, April 25, 1947, W. B. Cheek.

S-2. Mountain Saunders or State Bridge deposit:
Field reconnaissance, June 29, 1947, A. L. Bush.

S-3. Dotsero Crater deposit:
Field reconnaissance, June 13, 1947, A. L. Bush.

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Personal communication, April 25, 1947, W. B. Cheek.
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S-5. Volcano deposit:
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S-6. Riveira deposit:
Field reconnaissance, May 24, 1947, A. L. Bush.
Personal communication, May 4, 1947, Armando Riveira.

S-7. Southwest Materials Company deposit:
Field reconnaissance, May 24, 1947, A. L. Bush.
Personal communication, Feb. 13, 1947, F. B. Post.

Perlite

P-1. Nathrop-Ruby Mountain deposit:
Field reconnaissance, June 7, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.
Personal communication, April 15, 1947, Dr. John C. Haff.

P-2. Rosita Hills deposit:
Field reconnaissance, June 5, 1947, A. L. Bush.
Personal communication, Dec. 30, 1947, C. W. Taylor.
Personal communication, Jan. 12, 1948, and May 25, 1951, R. D. Wilfley.
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P-3. Morning Star deposit:
Personal communication, June 5, 1947, C. W. Taylor and R. D. Wilfley.

P-4. Prosser's Rock deposit.
Field reconnaissance, June 11, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.
Personal communication, May 3, 1947, L. Marcus.
Stark, J. T., and Behre, C. H., Jr., Tomichi Dome flow: Geol. Soc. America Bull., vol. 47, No. 1, pp. 101-110, Jan. 31, 1936.

P-5. Cathedral deposit:
Personal communication, June 5, 1947, R. D. Wilfley.
Personal communication, May 3, 1947, L. Marcus.

P-6. Cochetopa Dome deposit:
Field reconnaissance, June 8, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.
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V-4. "Shorty" Robison or Marjorie Lode deposit:
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Personal communication, June 6, 1947, O. W. Eikelman.
Colorado State Bur. Mines, Ann. Rept. 1943, p. 58, 1944.
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V-5. Young deposit:
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Personal communication, June 6, 1947, O. W. Eikelman.
Petar, A. V., Vermiculite: U. S. Bur. Mines Inf. Circ. 6720, p. 5, May 1933.

V-6. Sparling Ranch deposit:
Colorado State Bur. Mines, Inspectors Rept., May 13, 1937.

V-7. Quist Claim 72 deposit:
Field reconnaissance, June 6, 1947, A. L. Bush.
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Colorado State Bur. Mines, Inspectors Rept., May 14, 1937.

V-8. Voss Land or "Vermiculite King" deposit:
Field reconnaissance, June 6, 1947, A. L. Bush.
Personal communication, June 6, 1947, A. F. Quist.
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V-9. Phares and Allen deposit:
Field reconnaissance, June 6, 1947, A. L. Bush.
Personal communication, June 6, 1947, A. F. Quist.

V-10. Gem Park deposit ("Goldenite" and "Silverite" mines):
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V-11 Parkdale deposit:
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V-12. Powderhorn No. 1 deposit:
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Field reconnaissance, June 25, 1947, A. L. Bush.
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V-16. Resort Claim deposits:
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Personal communication, June 5, 1947, R. D. Wilfley.
Personal communication, April 15, 1947, Dr. John C. Haff.

V-17. Spinney Mountain deposit:
Field reconnaissance, June 14, 1947, A. L. Bush.
Personal communication, June 5, 1947, R. D. Wilfley.

V-18. Haymon deposit:
Field reconnaissance, June 14, 1947, A. L. Bush.
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V-19. San Isabel deposit:
Field reconnaissance, May 20, 1947, A. L. Bush.
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Welded tuff

WT-1. Castle Rock area:
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SL-2. Leadville slag:
Personal communication, Dec. 10, 1947, American Smelting & Refining Corporation, Denver, Colo.

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