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GEOLOGICAL SURVEY OF WYOMING

GENERAL AGGREGATE SURVEY

SOUTHEAST AND SOUTH CENTRAL WYOMING

MX MISSILE SYSTEM

BY

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GENERAL

The study site extends from the Wyoming-Nebraska border westward to Rock Springs and the Wyoming-Colorado border north to Casper and Lusk.

Three types of construction aggregates are considered, namely (a) limestone, (b) crystalline rocks (granite) and (c) sand and gravel. These materials are defined by location, abundance and suitability for aggregates. Impact is briefly discussed pertaining to depletion of aggregate sources adjacent to populated areas.

LIMESTONE

Hartville Formation and Guernsey Formation

The Hartville Formation and Guernsey Formation outcrop in an area encompassing about 250 square miles, extending from Guernsey to Glendo and north to Manville. The Guernsey Limestone generally outcrops in a thin band around the east edge of this area.

The Hartville Formation is primarily limestone and dolomite with lesser amounts of sandstone and siltstone. Thickness of the formation averages 1000' throughout the area. Underlying the Hartville is the Guernsey Formation, consisting of limestone with some dolomite, sandstone and shales. The Guernsey Formation is 142'-260' thick.

Specific sections of the Hartville and upper portions of the Guernsey produce excellent aggregate. The aggregate is very durable, compatible to concretes and asphaltic pavements, and quarries with little difficulty due to its nearly flat lying attitude.

Extensive quarries have been developed in Guernsey and north of Glendo.

Madison Limestone and Alcova Limestone

Limestones and dolomites are exposed along the flanks of the mountains occurring in the study area; notably the Laramie Range, Medicine Bow Range, and southeast portion of the Wind River Range. Beds of limestone and dolomite tend to encircle the granitic core of these mountains. However, outcrops exposed at the surface are sporadic in occurrence due to covering by overburden or Tertiary sediments.

Outcrops are generally found at high elevations and usually dip steeply away from the mountain core at attitudes of 25-90^{o} making these materials somewhat difficult to extract.

Good to excellent aggregate sources exist in the upper 100' of the Madison Limestone and the total Alcova Limestone about 20' in thickness. Lesser quality limestone beds occur in the Casper Formation and Phosphoria Formation.

Aggregate has been extracted from numerous quarries scattered throughout the study area.

CRYSTALLINE ROCKS (GRANITE)

The mountain cores are composed of "granite" with minor amounts of metamorphic rocks. Granite also forms the highlands that protrude above surrounding flat lying Tertiary sediments in the Muddy Gap-Jeffery City area. The granite is typically medium-coarse grained consisting predominantly of quartz and feldspar.

The granite is considered an overall poor source of aggregate for asphaltic pavements and a fair source for concrete aggregates. The coarse portion (+1") of the manufactured aggregate is adequate for concrete and asphaltic pavements. The coarse portion also makes good base material and railroad ballast. When the granite is crushed down to -½" size, it tends to form individual particles of quartz and feldspar. The feldspar forms flat cleavage planes that exhibit severe stripping properties when used in asphalt pavements.

Quarry operations in granite produce large variations of particle size from large blocks to many fines. This is due to the massive nature of granite. Limestone quarries produce particles of more uniform size due to bedding planes and fractures that occur with regularity.

The U.P. Quarry at Granite Canyon quarries and processes large quantities of granite for railroad ballast.

SAND AND GRAVEL

The main source of gravel occurs along the North Platte River in Carbon, Natrona, Converse, Platte and Goshen Counties. The typical commercial deposit contains 100,000-300,000 tons sand and gravel of 1-3" average size. The deposits usually contain about 50% durable rock and 50% sand with varying amounts of silt and clay.

Tributaries of the Platte and other drainages throughout the study area have spotty sand and gravel deposits generally of lesser quantity.

Extensive deposits of "granite wash" occur in western Laramie County from deep disintegration of the Sherman Granite. The deposits consist predominantly of individual particles of feldspar and quartz of ½" maximum size.

The sand and gravel deposits in the study area, except Laramie County, contain rock that produces fair to excellent aggregate. Aggregate that reacts with the cementing agents in concrete is a severe problem in Laramie County deposits. Also, asphalt tends to strip from aggregates obtained in Laramie County.

Hundreds of gravel pits are scattered about the study area. Most are concentrated near populated areas or adjacent to existing highways.

CONCLUSIONS

Limestone

The limestone and dolomite of the Hartville and Guernsey Formations are considered the most suitable source for aggregates. These formations can provide the tremendous quantities (100+ million tons) of excellent quality aggregate necessary to construct the MX Missile System.

Quarries can be located in remote sites away from populated areas. Depletion of limestone aggregate for continuing future public and private use will not be significantly hurt due to the vast quantities existing in the 250 square mile outcrop area. Transportation facilities for haulage away from the areas are good, especially by rail.

The Madison and Alcova Limestone can provide sources of suitable aggregate. However, several sites located in rugged terrain remote from major transportation facilities may be necessary to obtain sufficient quantities. No significant depletion of private and public aggregate sources is forecast due to probable remote quarry locations.

Crystalline Rocks (Granite)

Granite would be considered the most suitable if production aggregate were of better quality. Quarry sites can be located in remote areas near transportation facilities, such as the Granite Canyon Quarry.

Several granite quarry locations are possible around the perimeter of the MX System, thus saving aggregate haulage.

Sand and Gravel

Many sand and gravel pits are probable to supply the 100+ million tons required for the system. The majority of the pits will be located along the North Platte River. Severe depletion of the public and private sources of aggregate is anticipated if pits are located on the North Platte near Rawlins and from Casper to Torrington. Location of pits on established farm and ranch lands should also be anticipated. The above types of problems are a possibility for pits sited on tributaries of the North Platte or other drainages.

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