



REPORT OF AGGREGATE ANALYSIS

Project:
Kafka Granite
2023 Construction Projects

Reported To:
Kafka Granite
550 East Hwy 153
Mosinee, WI 54455

AET Project No.: P-0021353

Attn: Tiffany Koss
Date: August 9, 2023

INTRODUCTION

This report presents the results of laboratory work performed by our firm on one fine aggregate sample submitted to us by Tiffany Koss of Kafka Granite on July 12, 2023. The scope of our work was limited to performing petrographic analysis on the aggregate sample to provide a geological description of the material as well as identify any potentially deleterious properties when it is used as concrete aggregate.

SAMPLE IDENTIFICATION

Sample Identification: Starlight Black
Sample Type: Manufactured Sand
Original Sample Size: Approximately 15 lbs.

RESULTS OF PETROGRAPHIC ANALYSIS

Our complete petrographic analysis results appear on the attached data sheets. A summary of our analysis and opinions are as follows:

1. The aggregate was quarried and consisted of, generally, dark gray to grayish black particles of gabbroic igneous rock. The aggregate was crushed which produced particles that were generally very angular to sub-angular. The igneous aggregate was judged to be hard, sound, and durable. The majority of the sample consisted of medium grained altered meta-gabbro (approximately 40%), individual feldspar minerals (approximately 36%), and individual pyroxene and olivine mineral (approximately 3.8% cumulative) particles. Lesser amounts of individual serpentine and magnetite were also observed. The individual mineral particles observed were consistent with the crushed gabbroic parent rock. Overall, the particles displayed only minor compositional and textural variations.

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2. The aggregate was a quarried and crushed product free of any secondary coatings such as calcite and iron oxide. The gradation indicated 11.6% of the material passed the #200 sieve.
3. A small portion of the meta-gabbro particles in the sample were observed to be partially altered to serpentine. Serpentine minerals can be considered soft, generally with a Moh's hardness of ~ 2.5.
4. A small amount (approximately 3.83%) of a potential iron staining mineral, magnetite, was observed during thin section analysis.
5. Small amounts of undulatory quartz (0.27%) were observed during thin section analysis. We believe the risk for expansive alkali-silica reactivity is very low. However, unless an adequate service history exists for this material when used in the production of concrete, AET would recommend further testing for the potential of alkali silica reactivity using the performance based or prescriptive based approach stated in ASTM C1778, "Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete." If additional testing is requested, it would be beneficial if more aggregate and any portland cement and supplementary cementitious materials which are intended for production be supplied.

PROCEDURES

Laboratory analysis was performed on July 25, 2023, and subsequent dates. The petrographic analysis was performed on representative hand samples and in thin section. A total of 5 thin sections were produced. Observations were made using a Nikon E600 polarizing-light microscope with magnification up to 600x and an Olympus stereozoom microscope with magnification up to 130x. Analysis was performed in accordance with Standard Operating Procedure 24-LAB-004, "Petrographic Examination of Aggregates for Concrete, ASTM C295."

The procedure included conducting a gradation on the submitted sample. The percent retained was determined for each of the sieve sizes #200, #100, #50, #30, and #16. At least 150 particles were split from the material retained on each sieve, when available, and each particle identified lithologically. The weight percent of each lithology by sieve size in the entire sample was calculated by multiplying the lithologic percentage for a particular size fraction by the percent retained on that sieve.

Photographs are included to illustrate our work and conclusions.

REMARKS

The sample will be retained for a period of at least sixty days from the date of this report. Unless further instructions are received by that time, the sample may be discarded. Potential reactivity testing can be performed in our laboratories. The geologic services for this project have been conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in this area under similar budget and time constraints. The results relate only to the sample analyzed. No warranty, expressed or implied, is made.

We appreciate the opportunity to have been of service to you on this project. If you have any questions regarding the information presented in this report or if we can be of additional assistance, please contact us.

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24-LAB-004 PETROGRAPHIC EXAMINATION OF AGGREGATES, ASTM C295

AET Project No.: P-0021353
 Sample ID: Starlight Black

Percent of Rock Type Retained in Each Sieve Size**

Lithology	#16	#30	#50	#100	#200
Metamorphic					
Altered meta-gabbro	76	57	39	23	15
Minerals					
Quartz (unit)	0	0	1	0	1
Quartz (strained)	0	0	1	1	1
Feldspar	20	36	46	53	56
Amphibole	0	1	0	1	3
Pyroxene	2	2	4	2	6
Biotite	0	2	4	9	7
Olivine	0	0	1	4	2
Magnetite	1	3	4	7	10
Total	100	100	100	100	100

**Table displays rounded values

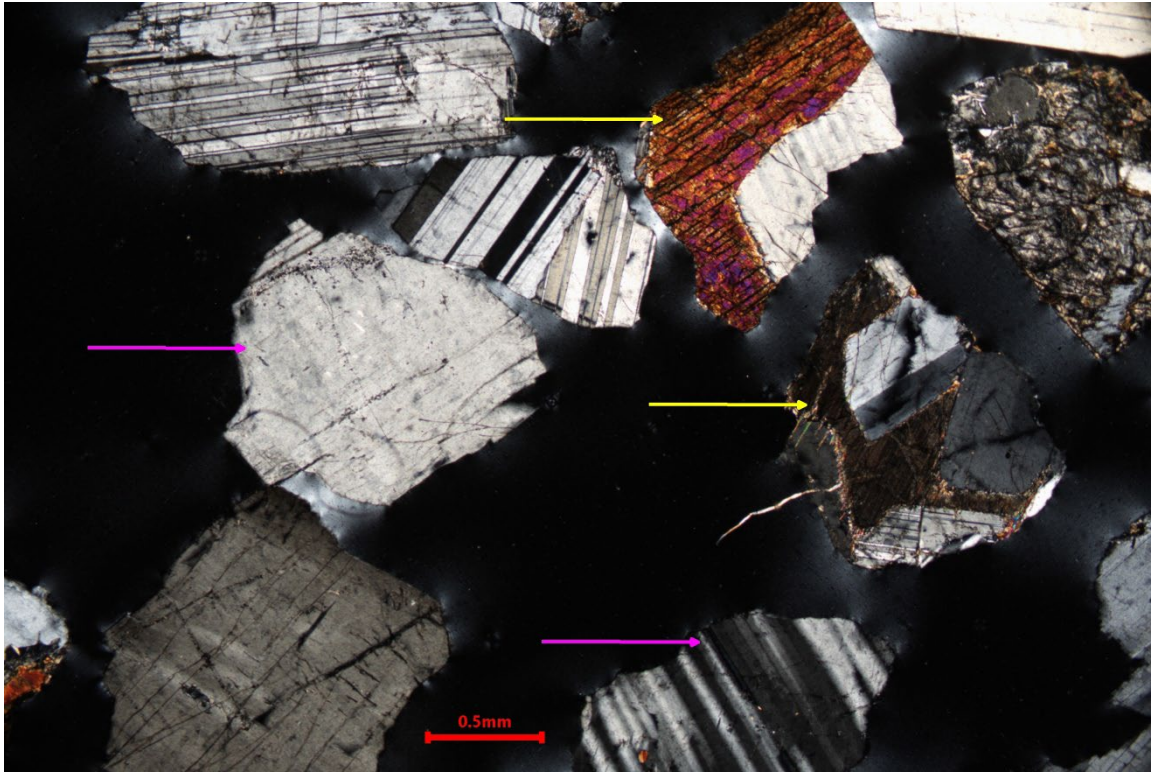
24-LAB-004 PETROGRAPHIC EXAMINATION OF AGGREGATES, ASTM C295

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Calculated Percentage in Entire Sample

Lithology	#16	#30	#50	#100	#200	Total
Metamorphic						
Altered meta-gabbro	10.07	16.29	8.67	3.68	1.28	39.99
Minerals						
Quartz (unit)	0.00	0.00	0.13	0.00	0.05	0.18
Quartz (strained)	0.00	0.00	0.13	0.10	0.05	0.28
Feldspar	2.68	10.18	10.22	8.35	4.95	36.38
Amphibole	0.00	0.17	0.00	0.20	0.29	0.65
Pyroxene	0.30	0.51	0.78	0.30	0.57	2.45
Biotite	0.00	0.51	0.91	1.49	0.62	3.52
Olivine	0.00	0.00	0.26	0.70	0.14	1.10
Magnetite	0.15	0.85	0.91	1.09	0.86	3.85
Total	13.2	28.5	22.0	15.9	8.8	88.4
% Retained	13.2	28.5	22.0	15.9	8.8	88.4

Photo: 1

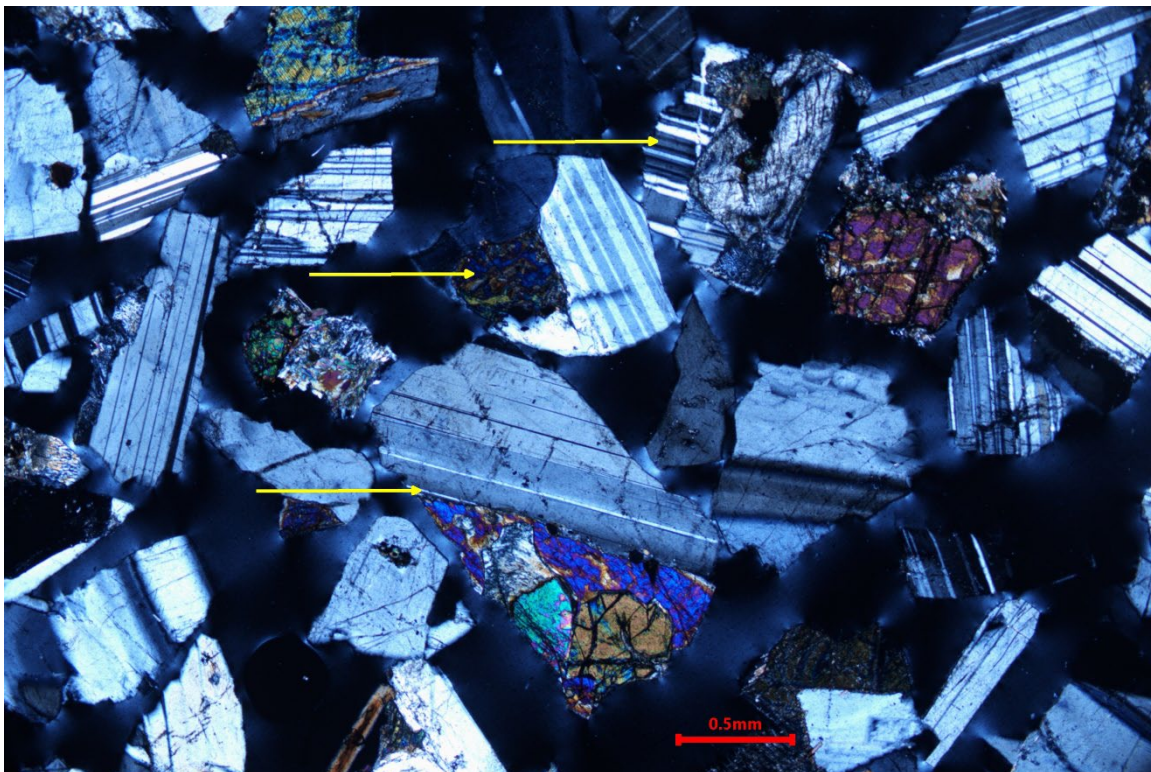


Sample ID:
Mag:

#16 Sieve
40x

Description: Overall view of material retained on the #16 sieve in thin section of an epoxy grain mount under cross polarized transmitted light. Note the feldspar (purple arrows) and altered meta-gabbro (yellow arrows) within the sand.

Photo: 2

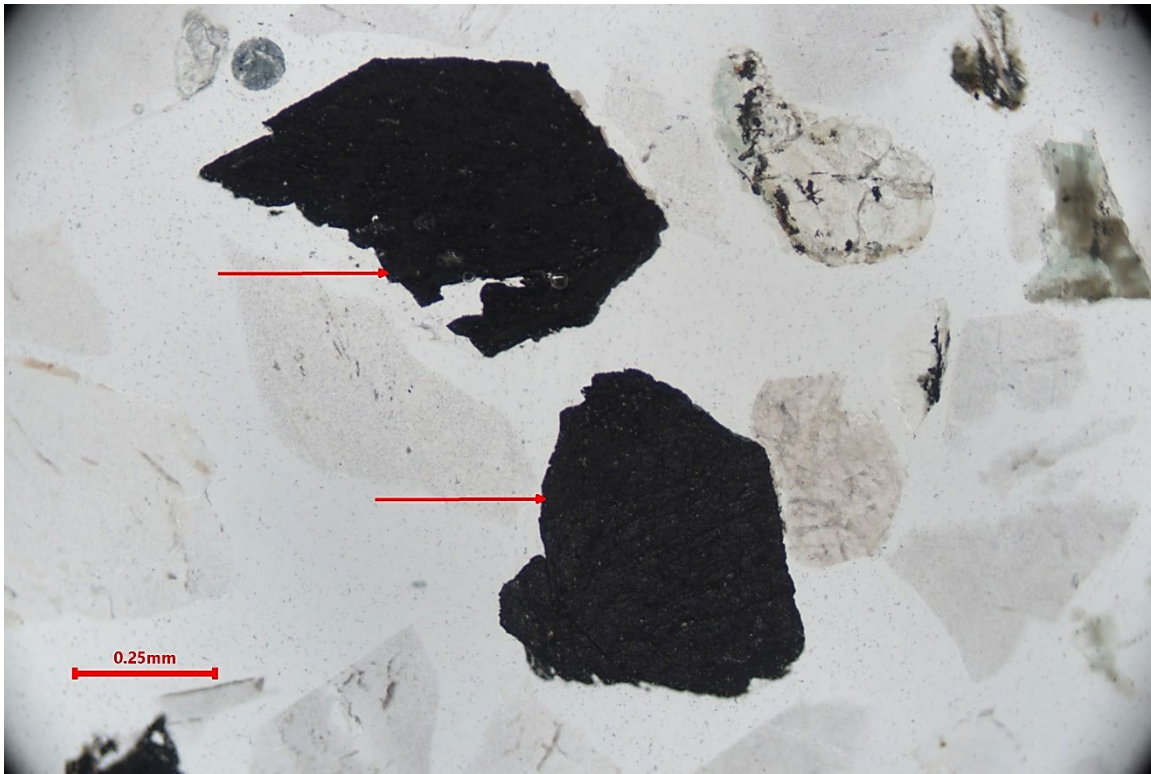


Sample ID:
Mag:

#30 Sieve
40x

Description: Overall view of material retained on the #30 sieve in thin section of an epoxy grain mount under cross polarized transmitted light. Note the altered meta-gabbro (yellow arrows) within the sand.

Photo: 3

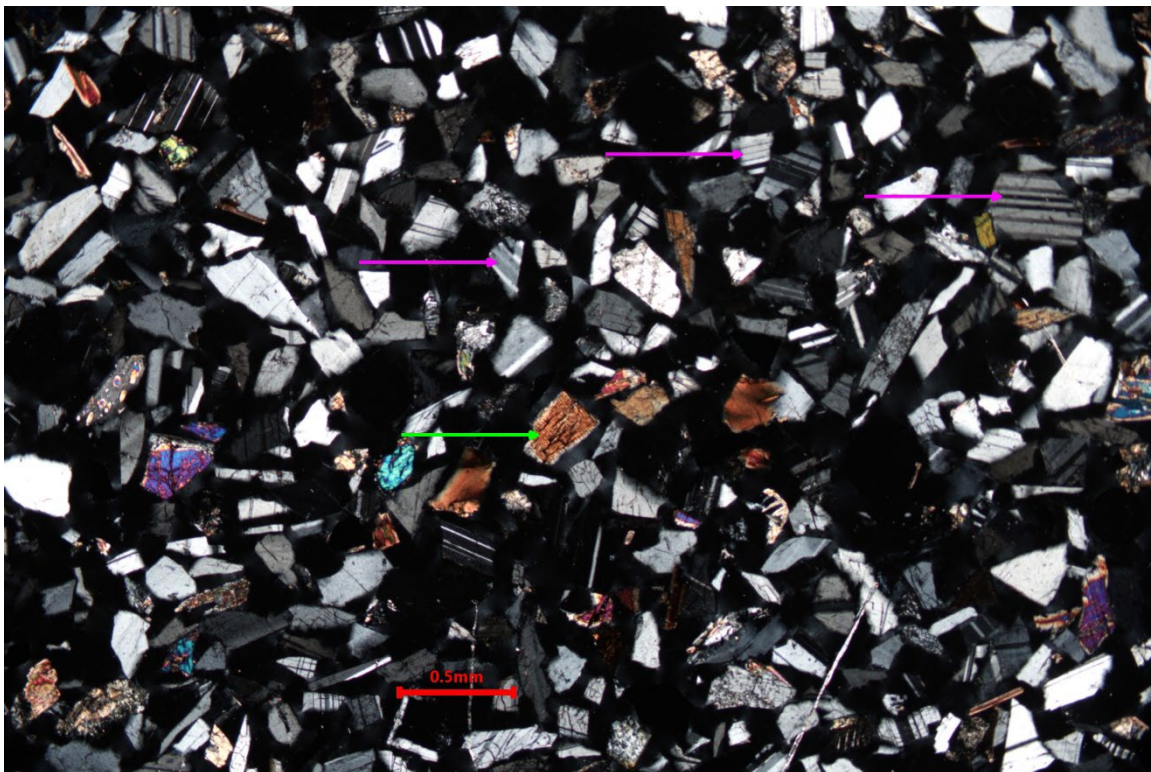


Sample ID:
Mag:

#50 Sieve
100x

Description: Overall view of material retained on the #50 sieve in thin section of an epoxy grain mount under reflected light. Note the magnetite particles (red arrows) within the sand.

Photo: 4

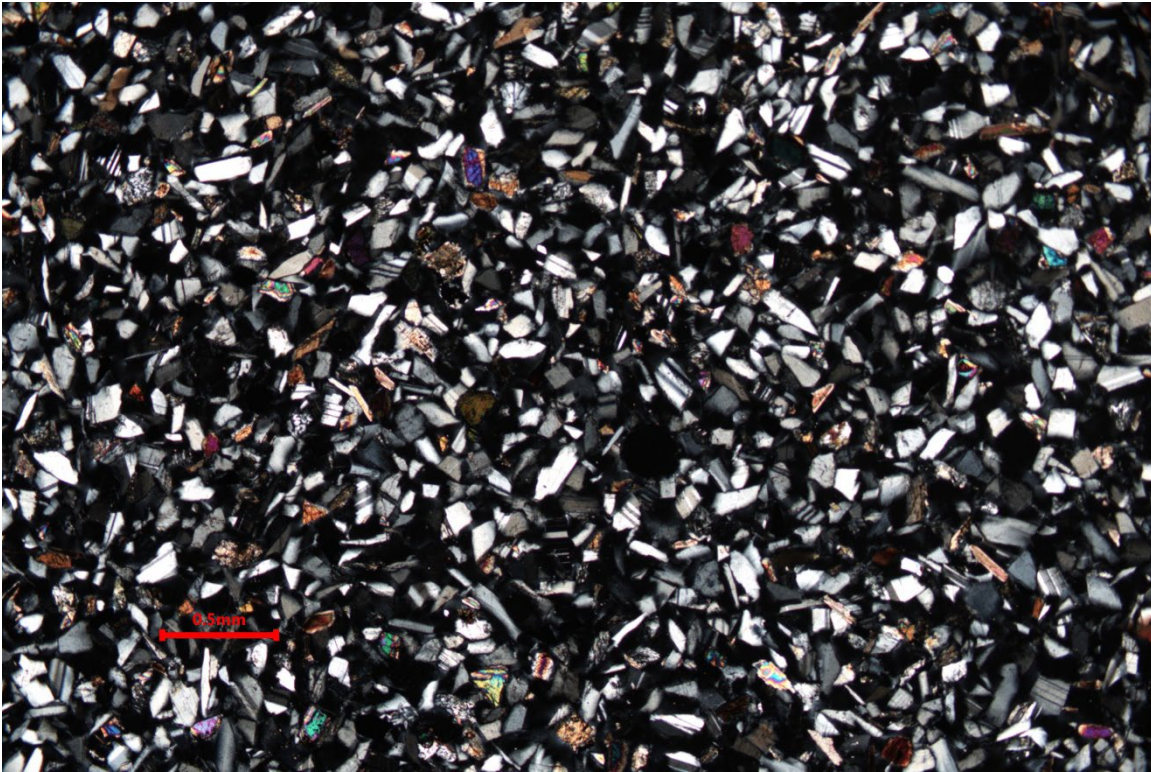


Sample ID:
Mag:

#100 Sieve
40x

Description: Overall view of material retained on the #100 sieve in thin section of an epoxy grain mount under cross polarized transmitted light. Note the feldspar (purple arrows) and pyroxene (green arrow) minerals within the sand.

Photo: 5

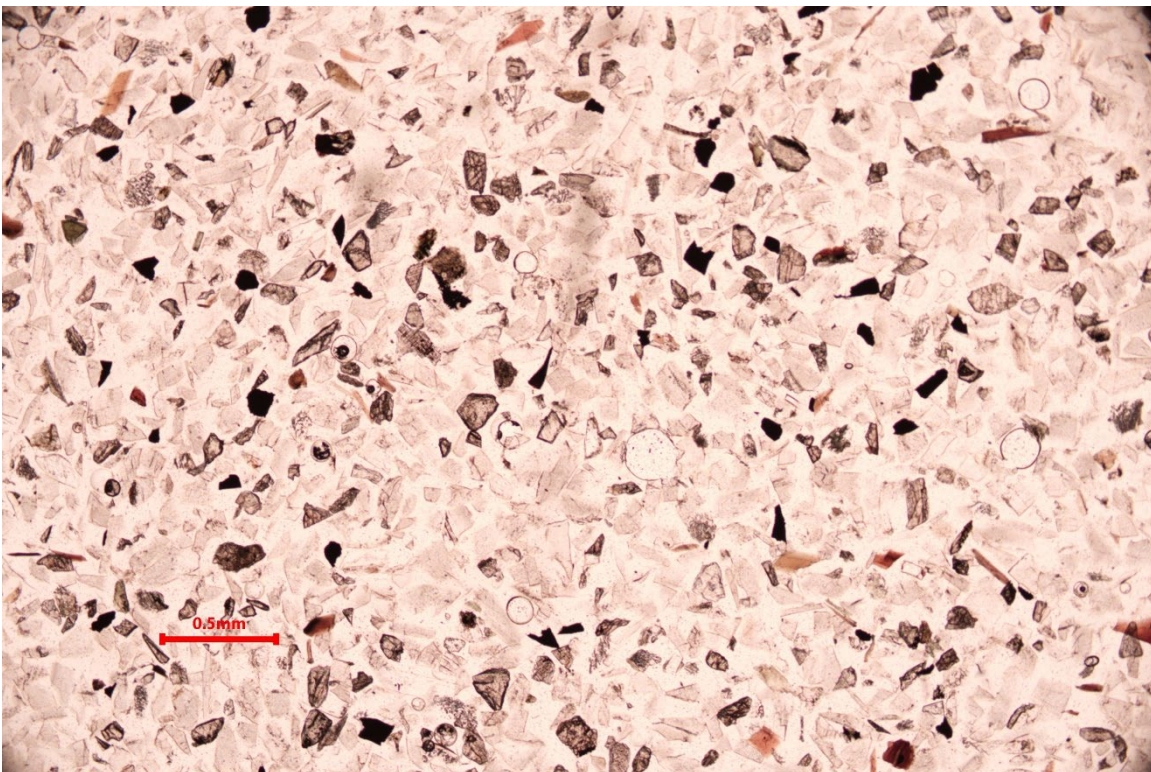


Sample ID:
Mag:

#200 Sieve
40x

Description: Overall view of material retained on the #200 sieve in thin section of an epoxy grain mount under cross polarized transmitted light.

Photo: 6



Sample ID:
Mag:

#200 Sieve
40x

Description: Same view as Photo: 5 under plane polarized transmitted light.