

CONNELLY-GPM, INC.

THE IRON AGGREGATE PEOPLE™

3154 SOUTH CALIFORNIA AVENUE

CHICAGO, IL 60608-5176

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ESTABLISHED 1875



IRON AGGREGATE

ETI CC-1004
(COARSE GRADE)

CC-1200
(FINE GRADE)

CC-1190
(MEDIUM GRADE)

OR ANY OTHER GRADE.....WE CAN GRIND OUR IRON
AGGREGATE TO MEET YOUR SPECIFICATION



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Connelly-GPM, Inc. is an iron grinder that has been in business for over 144 years, and is one of the longest operating manufacturing facilities in Chicago.

Our Iron Aggregate/ZVI is tested in Universities and private laboratories around the world for various applications, including groundwater remediation. We take great pride in the quality and consistency of our product, but we always recommend that our customers test the suitability of our iron for their proposed application.

Connelly-GPM, Inc.'s Quality Control process is considered to be the industry standard for ground Iron Aggregate, and has allowed us to maintain the highest standards of quality while fulfilling the largest orders in the history of this groundwater remediation technology.

GROUNDWATER REMEDIATION WITH CONNELLY GPM'S ZERO-VALENT IRON

Connelly-GPM's Iron Aggregate (ZVI) is currently being used for **in-situ** treatment of contaminated groundwater at sites containing several chlorinated degreasing compounds, such as trichloroethylene (TCE), tetrachloroethylene (toxic PCE), trichloroethane (TCA), and vinyl chloride (VC), which represent the most volatile organic compounds (VOC's) contaminating groundwater.

In contrast, in-situ reactive barriers provide a passive remediation technique, which after installation, requires little maintenance. The natural flow of groundwater does all the work. After the groundwater flow of a contaminated site is determined, a trench is dug across the contaminant plume width and filled with either Iron Aggregate alone or a mix of Iron Aggregate and coarse sand. By designing the wall to allow sufficient contact time with the Iron Aggregate, the contaminants are eliminated as the water passes through the treatment material. This process produces non-toxic end products; it chemically destroys the contaminants.

Connelly-GPM's Iron Aggregate has been proven effective in worldwide laboratory testing and in hundreds of full-scale treatment systems. This technology represents the most promising remediation system available for such contaminated sites.





STORMWATER REMEDIATION WITH CONNELLY GPM'S ZERO-VALENT IRON

To protect nearby streams, ponds and rivers, urban centers such as Minneapolis metropolitan area have begun installing raingardens to capture stormwater before it can carry fertilizers, oils, asphalt and other contaminants into local waters. These raingardens use a blend of Iron Aggregate and graded sand in a retention chamber, under a soil bed planted with local grasses and wild flowers. Neighborhood collection sites achieve the dual purpose of beautifying the area while protecting fresh water sources.

Fertilizers, not just from large farms, but also from residential yards and gardens represent a significant threat to local waters. When fertilizers enter waters, algae populations explode, and dying algae feeds bacteria growth that consumes so much of the oxygen dissolved in the water that fish and plants are killed off. In some locations, it has even spurred the growth of algae harmful to humans. Raingarden projects seek to eliminate these harmful chemicals from the stormwater runoff before it reaches these bodies of water. Connelly-GPM's Iron Aggregate plays a vital role in capturing these contaminants.

The effects of algae blooms can be devastating to aquatic environments;



whereas, prevention can represent an asset for any community.



Our Iron Aggregate is currently being tested by universities and schools across the country to develop new strategies for stormwater remediation.

To learn more about this technology:

www.extension.umn.edu/environment/water/property-owners/rain-garden

<https://metroblooms.org/>

<https://www.groundwater.org>

<http://rainwatercommunitysolutions.ca/en/>

<http://phillywatersheds.org>

Washington D.C. District Stormwater districtstormwater@tnc.org



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February 26, 2019



<u>U.S. SCREEN NUMBER</u>	<u>OPENING</u>	<u>% PASSING</u>
4	4.75 mm	100
8	2.36 mm	95 - 100
16	1.18 mm	75 - 90
30	0.600 mm	25 - 45
50	0.300 mm	0 - 10
100	0.150 mm	0 - 5

**MATERIAL WEIGHS
 APPROXIMATELY
 140 - 160 POUNDS
 PER CUBIC FOOT**

TYPICAL ANALYSIS OF IRON AGGREGATE

Iron/Iron Oxide	Balance
Total Carbon	2.48
Manganese	0.93
Sulphur	0.120
Phosphorous	ND
Silicon	0.35
Nickel	>0.01
Chromium	>0.01
Vanadium	ND
Molybdenum	0.33
Copper	0.10
Aluminum	>0.01
Magnesium	0.01
Boron	0.01
Zinc	0.01
Zirconium	0.01

GALEN B. DIXON
 Technical Director



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<u>U.S. SCREEN NUMBER</u>	<u>(OPENING SIZE)</u>	<u>% PASSING</u>
8	(2.36 mm)	100%
16	(1.18 mm)	98.5 - 100%
30	(0.600 mm)	45 - 80%
50	(0.300 mm)	15 - 40%
100	(0.150 mm)	0 - 20%
200	(0.075 mm)	0 - 10%

**MATERIAL WEIGHS
APPROXIMATELY
175 - 195 POUNDS PER
CUBIC FOOT**

TYPICAL ANALYSIS OF IRON AGGREGATE

Iron/Iron Oxide	Balance
Total Carbon	2.48
Manganese	0.93
Sulphur	0.120
Phosphorous	ND
Silicon	0.35
Nickel	>0.01
Chromium	>0.01
Vanadium	ND
Molybdenum	0.33
Copper	0.10
Aluminum	>0.01
Magnesium	0.01
Boron	0.01
Zinc	0.01
Zirconium	0.01

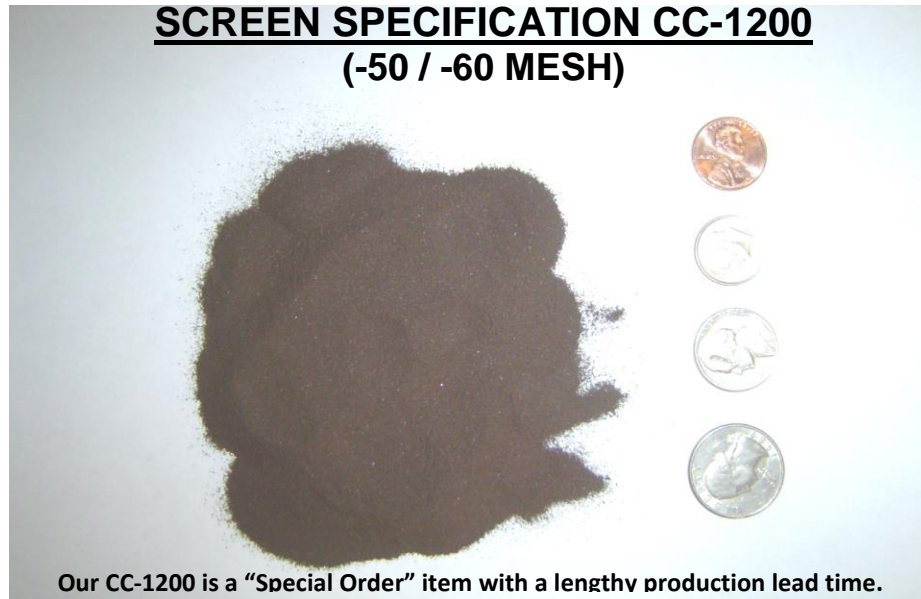
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<u>U.S. SCREEN NUMBER</u>	<u>(OPENING SIZE)</u>	<u>% PASSING</u>
20	(0.850 mm)	100
40	(0.420 mm)	98 - 100
60	(0.250 mm)	90 - 100
100	(0.150 mm)	40 - 75
200	(0.075 mm)	15 - 40

**MATERIAL WEIGHS
 APPROXIMATELY
 195 - 215 POUNDS
 PER CUBIC FOOT**

TYPICAL ANALYSIS OF IRON AGGREGATE

Metallic Iron	89.82
Total Carbon	2.85
Manganese	0.60
Sulphur	0.107
Phosphorous	0.132
Silicon	1.85
Nickel	0.05 - 0.21
Chromium	0.03 - 0.17
Vanadium	Nil
Molybdenum	0.15
Titanium	0.004
Copper	0.15 - 0.20
Aluminum	Trace
Cobalt	0.003

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COMPANY HISTORY

CONNELLY was founded in 1875, known as the CONNELLY IRON SPONGE & GOVERNOR COMPANY. In 1946, when they divested themselves of the Governor business, the Company name was changed to CONNELLY, INC. The primary business of the Company was to manufacture IRON SPONGE for the removal of hydrogen sulfide from illuminating gas and other gases.

GAS PURIFYING MATERIALS COMPANY, INC., was founded in 1919 and until 1958 manufactured an IRON SPONGE material, known as GPM IRON HYDROXIDE.

In the 1930's, CONNELLY also began producing Metallic and Non-Metallic Building Products on a private-label basis for the heavy construction industry, and Chemical Iron for reduction purposes in chemical plants. GAS PURIFYING MATERIALS COMPANY did likewise starting in 1950.

In 1956, GAS PURIFYING MATERIALS COMPANY, INC., purchased CONNELLY, INC. and operated CONNELLY as a wholly owned subsidiary, with the GAS PURIFYING MATERIALS plant located in Long Island City, New York, and the CONNELLY plants in Elizabeth, New Jersey, and Chicago, Illinois - all three plants producing and selling Building Products, Iron Sponge and Chemical Iron.

In 1970, the parent company - GAS PURIFYING MATERIALS COMPANY, INC., was merged into the subsidiary, CONNELLY, INC., and the name changed to CONNELLY-GPM, INC. The GAS PURIFYING MATERIALS plant in Long Island City was shut down.

In 1991 it was determined that our customers' needs could be more efficiently served by consolidating our operations in the more centrally located Chicago plant and leasing the New Jersey site to other business interests.

CONNELLY-GPM, INC. manufactures the following products: METALLIC and NON-METALLIC BUILDING PRODUCTS for the industrial construction industry on a private-label basis only: IRON SPONGE for the removal of hydrogen sulfide (H₂S) from gases; CHEMICAL IRON for reduction purposes for the chemical industry, and IRON AGGREGATE for groundwater remediation.

The CHEMICAL IRON products and IRON AGGREGATE for groundwater remediation are the result of many years of research and development by our own Technical Department in conjunction with many governmental and private enterprises. Current environmental concerns have opened new and exciting uses for our IRON AGGREGATE. We have the capabilities to custom-grind IRON AGGREGATE to any specification for both the Chemical Iron and environmental markets.

In our many years of producing iron products (for Chemical Iron, Building Products, Environmental, or other uses) we have often found it necessary to sit down with our customers and design specific products to meet their needs. It is this experience, both in iron production and in the co-operative process itself which enable us to efficiently and effectively meet the needs of our customers. This flexibility is of particular value in the rapidly growing area of ground water remediation, which is marked by frequently changing and improving techniques and where each site provides unique design and implementation challenges.

The success of CONNELLY-GPM, INC. is based on the original policies of the founders of GAS PURIFYING MATERIALS COMPANY, INC. - Oliver H. Smith and Bernard D. Klein, and their successors, to offer to the Gas, Chemical, Building and Environmental industries the best products for the dollar, and to develop a relationship with our customers and suppliers which is based on respect and confidence. The logical thinking and extensive research and business acumen of the management and the efforts of its employees in the fields of research, manufacturing, purchasing, and sales have been devoted to realizing those goals.

Basically, our policy has been to concentrate on good solid products and pursue practical specialties which require repeat business. Our customers are very dependent on the quality of our products and services, as we play a very vital part in their operations.

Research and Development is currently working on new products for the Gas Industry, Building Products Industry, as well as working on new applications of its present products to the Petrochemical and Environmental industries.

In December 1986, after serving for 50 years, Mr. B.L. Klein retired from the Company as President. Mr. Miles M. Klein became Chairman of the Board and CEO. In May of 1994, Mr. Stephen M. Klein became President. In 1997 Mr. Miles M. Klein, who had been with the Company since 1950, officially retired, and Mr. Stephen M. Klein, who had various management positions since 1971, succeeded his father.

In June 2018, Stephen M. Klein passed away and was succeeded by his two daughters, Ms. Cindy Mann and Ms. Amy Krevit, who become the fourth generation (and as a newly established woman-owned company) to carry on Connelly-GPM's mission, fulfilling the needs of our customers in a broad range of industries.

CONNELLY-GPM, INC.'s nucleus of well-trained, experienced people, with many years of accumulated knowledge and know-how, stands ready to direct that experience to help industries meet a variety of challenges in an ever-changing market.

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