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**Work Plan for Produce Garden Sampling
Saint-Gobain Performance Plastics
701 Daniel Webster Highway
Merrimack, New Hampshire 03054
NHDES Site No.: 199712055
Project Number: 36430**

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WORK PLAN

WORK PLAN FOR PRODUCE GARDEN SOIL SAMPLING

SAINT-GOBAIN PERFORMANCE PLASTICS
MERRIMACK, NEW HAMPSHIRE

Submitted To: New Hampshire Department of Environmental Services
Hazardous Waste Remediation Bureau
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Project No.: 166-8623

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Table of Contents

1.0	INTRODUCTION.....	1
2.0	SCOPE OF WORK	2
2.1	Soil Sampling	2
2.1.1	Sampling Methodology	2
2.1.2	Sample Analysis.....	3
2.1.3	Sample Data Validation	4
3.0	SCHEDULE.....	5
4.0	CLOSING	6
5.0	REFERENCES.....	7

List of Figures

Figure 1 Map of Potential Sampling Locations

List of Appendices

Appendix A Standard Operating Procedure SOP-1
Appendix B Standard Operating Procedure SOP-2
Appendix C Standard Operating Procedure SOP-3



1.0 INTRODUCTION

Golder Associates Inc. (Golder), on behalf of Saint-Gobain Performance Plastics (SGPP), prepared this work plan in response to a letter dated November 3, 2017 from the New Hampshire Department of Environmental Services (NHDES; NHDES, 2017) requesting that SGPP sample garden soils located “in close proximity” to the Merrimack, New Hampshire SGPP facility (the facility; Figure 1) for analysis of per- and poly-fluoroalkyl substances (PFAS). As discussed with NHDES during meetings on January 18, 2018 and February 22, 2018, SGPP understands that NHDES’ request is to sample soils from gardens used to grow produce (produce gardens).

NHDES identified four properties near the SGPP facility where produce gardens may be present: 704, 704A, and 706 Daniel Webster Highway and 1 Granite Circle in Merrimack, New Hampshire (Figure 1). This work plan includes the following:

- Scope of work to identify whether produce gardens are present at the properties identified by NHDES
- Scope of work and methodology for surface soil sample collection at the properties with produce gardens
- Specification of analytical parameters and methodologies
- A schedule for sampling and reporting

SGPP is providing this work plan to NHDES for its review and approval.



2.0 SCOPE OF WORK

This section presents the scope of work to address NHDES' request.

2.1 Soil Sampling

Prior to sampling, SGPP will contact and/or visit the owners of the four properties to determine if produce gardens are present. If present, SGPP will request that the property owner execute an access agreement for soil sampling. For each property for which an access agreement is executed, SGPP will collect soil samples as follows:

- One composite sample for every 100 square-feet of produce garden up to a maximum of 3 composite samples per property. Each composite sample will be comprised of 5 sub-samples distributed across the produce garden(s).
- One composite background sample on each property from 5 sub-locations outside the produce garden(s), landscaped areas, and irrigated areas.
- All samples will be collected from a depth of 0 to 12 inches below ground surface (in-bgs).

2.1.1 Sampling Methodology

Field personnel will collect surface soil samples as follows and in accordance with the methods and procedures outlined in Appendices A and B:

- Decontaminate a stainless-steel hand auger, trowel, bowl, and spoon using the procedures listed in Appendix A.
- Remove leaf litter, mulch, et cetera and above-ground vegetation from immediate sample location.
- Advance the stainless-steel hand auger to 12 in-bgs, remove the auger, and collect a representative soil sub-sample using the stainless-steel trowel.
- Place the soil sub-sample in the stainless-steel bowl and homogenize with the stainless-steel spoon.
- Repeat at remaining sub-sample locations (5 sub-samples per composite sample).
- Homogenize all sub-samples.
- Transfer the homogenized composite samples into laboratory-provided sample containers.
- Replace and re-seal the lid on the soil sample containers and complete the sample container label.
- Place the soil sample containers into new Ziploc® storage bags.
- Place the soil sample containers enclosed in the Ziploc® storage bags into a laboratory-provided cooler containing ice.
- Backfill auger holes with bagged topsoil purchased from a national home improvement center.

In accordance with the standard operating procedure included as Appendix C, one set of quality assurance/quality control samples (field duplicates, equipment blanks, field blanks, and trip blanks) will be submitted for analysis of PFAS.



2.1.2 Sample Analysis

Soil and QA/QC samples will be submitted to Eurofins Lancaster Laboratories Environmental Inc. of Lancaster, Pennsylvania (ELLE) under chain-of-custody protocols for analysis of PFAS compounds by EPA 537 Version 1.1 Modified (see list of analytes in Table 1), total organic carbon (TOC; SW-846 9060), and moisture content (SM 2540 G-1997). Soil samples will also be analyzed for:

- Target analyte list (TAL) metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, silver, thallium, vanadium, and zinc) (SW-846 6010C or SW-846 6020A)
- Mercury (SW-846 7471)
- Polycyclic Aromatic Hydrocarbons (PAHs; SW-846 8270D)
- PCB congeners (EPA 1668C)

These parameters, including PFAS, are potential indicators of non-SGPP facility related anthropogenic impacts to soil.

NHDES requested analysis for PFAS after a total oxidizable precursor (TOP) assay. SGPP will submit a split sample from one of the three garden soil samples at each property to SGS AXYS Analytical Services Ltd. of Sidney, British Columbia, Canada for analysis of PFAS before and after the TOP assay (SGS AXYS Method MLA-111 Rev 01 Ver 01).

Table 1: PFAS Analyte List

PFAS Analytes	Abbreviation	CAS Id.
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
Perfluorobutanoic acid	PFBA	375-22-4
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDaA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorotetradecanoic acid	PFTA	376-06-7
Perfluorotridecanoic acid	PFTTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8



2.1.3 Sample Data Validation

Upon receipt from ELLE, soil sample and QA/QC sample analytical results will be submitted to Environmental Standards, Inc. (ESI) for validation. The PFAS analytical data will be validated using Level 4 protocols¹. All other analytical parameters will be validated using Level 2 protocols. The schedule for transmittal of unvalidated and validated analytical data to the NHDES is discussed in Section 3.0.

¹ Validation levels are described in accordance with Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 540-R-08-005; January, 2009)



3.0 SCHEDULE

SGPP anticipates the following schedule, pending weather conditions and NHDES' approval of the work plan by April 20, 2018 (two weeks after work plan submission):

- April 23, 2018 to May 7, 2018 – Contact property owners to schedule field visits. [2 weeks]
- May 7, 2018 to May 21, 2018 – Complete field visits and submit access agreements to property owner(s). [2 weeks]
- May 21, 2018 to June 4, 2018 – Property owner(s) to provide executed access agreements to SGPP. [2 weeks]
- June 4, 2018 to June 25, 2018 – Complete soil sampling. [3 weeks]
- June 25, 2018 to July 23, 2018 – Laboratory analysis. [4 weeks]
- Transmit unvalidated analytical data to NHDES and property owner(s) – within 1 week of receipt of results from laboratory.
- Submit sampling summary reports to NHDES and property owner(s), including validated analytical results – within 6 weeks of receipt of analytical results from laboratory.

The above schedule is dependent on property owner responsiveness. SGPP will schedule each property independently, so that delays on one property will not delay sampling or reporting on another property.



4.0 CLOSING

The undersigned are the principal authors of this work plan. Should you have any questions regarding this document, please contact Mr. Ross Bennett at (603) 668-0880.

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5.0 REFERENCES

NHDES, 2017. Letter Re: October 30, 2017 Meeting. November 3, 2017.

FIGURES

APPENDIX A
STANDARD OPERATING PROCEDURE SOP-1

APPENDIX A

STANDARD OPERATING PROCEDURE

SOP-1

Title: General Field Methods for PFAS Sampling Programs

Page 1 of 3

1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures that shall be used during implementation of this perfluorinated compound (PFAS) sampling program.

Due to the extremely low method detection limits associated with PFAS analysis (i.e., nanograms per liter [ng/l]) and the many potential sources of trace levels of PFASs, field personnel shall employ the greatest caution by strictly following the protocols described herein. Frequent replacement of nitrile gloves and decontamination of non-dedicated sampling equipment in accordance with the appropriate procedures will reduce the potential for false detections of PFASs.

This SOP includes the following:

- Considerations regarding food packaging and food consumption during PFAS sampling programs
- Field gear and clothing restrictions
- Personal hygiene requirements
- Sample area access restrictions
- Field equipment decontamination

Some of the provisions of the PFAS sampling program requirements described herein may conflict with standard health and safety procedures (e.g., use of insect repellent or sunscreen). Therefore, prior to implementation of a field program subject to these General Provisions, an Addendum to the site-specific Health and Safety Plan (HASP) shall be prepared to address any potential conflicts between the requirements described herein and standard health and safety procedures.

2.0 RESPONSIBILITIES

The Field Team Leader and field personnel have the shared responsibility to oversee and ensure that the PFAS sampling program is performed in accordance with the program-specific protocols described in this SOP. The Field Team Leader shall ensure that on-site personnel, including subcontractors and third parties that may have direct access to the sampling area, understand and comply with this SOP. Field personnel shall be notified of these requirements a minimum of three days prior to the start of field work in order to have the time to appropriately comply with many of the food and clothing requirements prior to arriving at the site.

3.0 GENERAL FIELD METHODS

3.1 Food Consumption

Components of some food packages have been treated to resist wetting. Historically, this was achieved through the use of PFASs. Accordingly, field personnel shall avoid the use of paper bags and other paper packaging to transport food to the site, including pre-wrapped foods and snacks (e.g., chocolate bars, energy bars, granola bars, potato chips, etc.). Field personnel shall not bring any fast food to the site that uses any form of paper wrapping such as sandwiches or paper drinking cups. If possible, field personnel shall use hard plastic or stainless steel food containers. Field personnel shall not use aluminum foil, wax paper, or coated textiles to transport food to the site.

APPENDIX A STANDARD OPERATING PROCEDURE SOP-1

Title: General Field Methods for PFAS Sampling Programs

Page 2 of 3

The Teflon® coating on some frying pans contains fluorinated compounds and as such represents a potential source of PFASs. Field personnel shall not transport to or consume food at the site that has been prepared using a Teflon® coated cooking utensil.

Field personnel shall not consume food or beverages in the field vehicle or in the immediate vicinity of the sample location. Prior to consuming food or beverages, field personnel shall remove their nitrile gloves and coveralls and move to a location a minimum distance of 35 feet away from the sample location, preferably in the downwind direction. When finished eating or drinking, field personnel shall wash their hands, put their coveralls back on and put on a new pair of nitrile gloves prior to returning to the work area.

3.2 Field Gear and Clothing Restrictions

Because treatments to provide water resistant, water proof, or stain-resistant clothing include the use of PFASs, field personnel shall not wear any water resistant, water proof, stain-resistant treated clothing or Tyvek clothing during the field program. Permissible outer field clothing for PFAS sampling programs includes clothing made from natural fibers, preferably cotton, and rain gear made of polyethylene, vinyl or PVC. Clothing made of synthetic fibers shall be avoided (i.e., reflective vests); however, during cold-weather field events, it shall be allowable to wear synthetic under-layers, provided that they be completely covered by clothing made of natural fibers.

Field clothing shall be laundered with a minimal amount of detergent and no fabric softener or scented products shall be used. Once field clothing has been washed appropriately, field clothing shall be washed a second time on a rinse-only cycle, using only water, prior to drying. Anti-static dryer sheets shall not be used when drying field clothing. Field clothing shall preferably be old cotton clothing that has been laundered many times, as new clothing may contain PFAS related treatments. Clothing containing Gore-Tex™ shall not be worn during the sampling program, as Gore-Tex™ clothing contains a PFAS membrane.

Because field vehicle seats may have been treated with PFAS-containing products for stain resistance, the seats of field vehicles shall be covered with a well laundered cotton sheet or blanket for the duration of the field program in order to avoid direct contact between field personnel clothing and vehicle seat fabric. Measures taken to mitigate field personnel contact with field vehicle seat fabric shall not in any way interfere with the functionality or impede the use of vehicle safety belts.

Waterproof field books shall not be used; field notes shall be recorded on loose paper using aluminum clip boards. Plastic clip boards, self-sticking notes, binders or spiral hard cover notebooks shall not be used. Field notes shall be recorded in pen or pencil. Markers shall not be used.

Most safety footwear is constructed of leather and synthetic materials that have been treated to provide some degree of waterproofing and/or increased durability. Therefore, footwear materials represent a potential source of trace PFASs. Field personnel contact with safety footwear including donning footwear or tying laces shall not occur within 35-feet of the sampling area. If footwear must be adjusted, field personnel shall re-locate to an area a minimum of 35-feet from the sampling area, preferably in a downwind direction, and make the necessary adjustments. Nitrile gloves shall be worn when contacting footwear. The nitrile gloves worn while contacting footwear shall be removed and new nitrile gloves shall be put on prior to re-entering the sampling area.

Disposable nitrile gloves shall be worn at all times. A new pair of nitrile gloves shall be donned prior to the following activities at each sample location:

APPENDIX A STANDARD OPERATING PROCEDURE SOP-1

Title: General Field Methods for PFAS Sampling Programs

Page 3 of 3

- Contact with laboratory-supplied sample containers or PFAS-free water containers
- Decontamination of sampling equipment
- Sample collection
- Handling of QA/QC samples including field blanks and equipment blanks
- After the handling of any non-dedicated sampling equipment or contact with non-decontaminated surfaces

3.3 Personal Hygiene

Field personnel shall not use shampoo, conditioner, body gel, cosmetic cream, or hand cream as part of their personal showering routine on the day of a sampling event, as these products may contain surfactants and represent a potential source of PFASs. Field personnel shall follow their normal hygiene routine the night before a sampling event and then rinse with water only the morning before a sampling event. The use of bar soap is acceptable; however, bar soap including moisturizers shall be avoided.

Field personnel shall not use moisturizers, cosmetics, dental floss, sunscreen, and/or insect repellent (unless they are made with natural ingredients or DEET in the case of insect repellent) for the duration of the field program, either on-site or off-site, as these products may contain trace PFASs. Appropriate accommodation to address the prohibition of the use of these substances must be incorporated into a site-specific HASP.

3.4 Sample Area Access

Visitors, including contractors or site personnel, who are not following these general PFAS sampling program protocols shall not be allowed to approach within 35 feet of the sample area until PFAS sample collection activities are complete and the PFAS sample container has been enclosed in a Ziploc® storage bag and placed in the sample cooler.

3.5 Field Equipment Decontamination

Use the procedures in this section to decontaminate all non-dedicated sampling equipment (e.g., hand-auger, trowel, bowl and spoon) used to collect samples:

- Rinse thoroughly with Alconox, Liquinox, or Citranox solution
- Rinse thoroughly with de-ionized (DI) water
- Rinse with methanol
- Rinse with DI water
- Allow to air dry
- Store equipment in clean Ziploc® storage bag until needed for sampling

Decontamination fluids used to clean equipment including Alconox/Liquinox/Citranox, DI water, and methanol shall not be reused during field decontamination and shall be collected and discharged to the publicly-owned treatment works at the on-site treatment building.

APPENDIX B
STANDARD OPERATING PROCEDURE SOP-2

APPENDIX B

STANDARD OPERATING PROCEDURE

SOP-2

Title: PFAS Program Sampling Protocols

Page 1 of 2

1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures that shall be followed during sample collection for analysis of perfluoroalkyl substances (PFAS).

This SOP includes the following:

- Sample Container Considerations
- Sample Collection
- Sample Shipping Requirements

2.0 RESPONSIBILITIES

The Field Team Leader and field personnel have the shared responsibility to oversee and ensure that the soil sampling program is performed in accordance with the program-specific protocols described in this SOP. The Field Team Leader shall ensure that field personnel understand and comply with this SOP.

3.0 SAMPLING PROCEDURES

3.1 Sample Containers

Soil samples shall be collected in HDPE sample containers provided by the laboratory specifically for use in the collection samples for analysis of PFAS (i.e., HDPE without a Teflon® liner). Glass containers shall not be used due to the potential for loss of PFAS through adsorption.

Sample container lids shall remain on the sample container until immediately prior to sample collection and lids shall be resealed immediately following sample collection. Field personnel shall hold the sample container lid in their hand until the lid is replaced on the sample container. Field personnel shall not rinse sample container bottles during sample collection. Sample container labels shall be completed using a pen or a pencil after the lid has been re-secured on the sample container. Field personnel shall not use markers to complete sample container labels.

3.2 Sample Collection

Field personnel shall wash their hands and put on a new pair of nitrile gloves prior to sample collection. Once the nitrile gloves are put on, field personnel shall not handle papers, pens, clothes, etc. prior to the collection of groundwater samples. If field personnel need to take notes or handle anything other than the sample container prior to collecting the sample, the old nitrile gloves with which contact was made shall be removed and new nitrile gloves put on.

Field personnel shall hold the sample container in such a manner that the sample container does not come in direct contact with the sampling equipment. The sampling container shall be filled completely.

Samples shall be placed directly into the laboratory-supplied HDPE containers. Once the sample container lid has been resealed, groundwater sample containers are to be placed into individual new Ziploc® (or equivalent) storage bags. Following sample collection, sample containers enclosed within their Ziploc® (or equivalent) storage bags shall be placed on ice in the laboratory-provided sample cooler. Field personnel shall minimize sample exposure to sunlight during sample handling and storage.

APPENDIX B STANDARD OPERATING PROCEDURE SOP-2

Title: PFAS Program Sampling Protocols

Page 2 of 2

All sampling materials shall be treated as single use and disposed of following completion of sampling at each location.

3.3 Sample Shipping

Soil sample containers shall be stored on ice and maintained at approximately 4 degrees Celsius (°C) and transported by overnight courier to the laboratory. Field personnel shall only use new, fresh ice. Reusable chemical or gel ice packs shall not be used as these may contain PFAS. Tracking numbers for all shipments shall be provided once the sample coolers have been shipped to ensure their timely delivery.

APPENDIX C
STANDARD OPERATING PROCEDURE SOP-3

APPENDIX C

STANDARD OPERATING PROCEDURE

SOP-3

Title: Quality Assurance / Quality Control Sampling Program Protocols Page 1 of 3

1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the Quality Assurance / Quality Control (QA/QC) samples that shall be collected during a perfluoroalkyl substances (PFAS) sampling program.

This SOP includes protocols for the collection of the following QA/QC samples:

- Equipment Blanks
- De-ionized Water Blanks
- Field Duplicates
- Field Blanks
- Trip Blanks
- Analytical QA/QC

2.0 RESPONSIBILITIES

The Field Team Leader and field personnel have the shared responsibility to oversee and ensure that the PFAS QA/QC sampling program is performed in accordance with the program-specific protocols described in this SOP. The Field Team Leader shall ensure that field personnel understand and comply with this SOP.

Field personnel shall inquire of the equipment necessary for soil sampling (hand-auger, trowel, bowl and spoon) and identify equipment constructed of stainless steel that does not include any Teflon® components.

3.0 QA/QC PROTOCOLS

3.1 Equipment Blanks

Equipment blanks shall be collected at a rate of one per 20 soil samples collected per event for non-dedicated sampling equipment (i.e., hand-auger, trowel, bowl and spoon). Equipment blanks shall be collected using laboratory-supplied PFAS-free water and shall be collected in laboratory-supplied high-density polyethylene (HDPE) containers.

After decontamination of the sampling equipment in accordance with the procedure described in SOP-1, equipment blanks will be collected by pouring the laboratory supplied PFAS-free water into a new and unused HDPE sample bottle and then pouring the PFAS-free water over, and through, if applicable (e.g., hand augers), the sampling equipment into the sample container. When the sample container is full, replace the sample container lid and re-seal. Equipment blank container lids shall remain in the hand of field personnel until replaced on the sample container. Sample container labels shall be completed using a pen or pencil after the sample container lid has been resealed. Field personnel shall not use markers to complete sample container labels.

APPENDIX C STANDARD OPERATING PROCEDURE SOP-3

Title: Quality Assurance / Quality Control Sampling Program Protocols Page 2 of 3

3.2 Field Duplicates

Field personnel shall collect one blind field duplicate for every 20 primary field samples collected. Field personnel shall collect field duplicates immediately after collection of the primary field samples. Field duplicates shall be collected in the laboratory-supplied PFAS-free HDPE sample containers. Field duplicate container lids shall remain in the hand of field personnel until replaced on the sample container. Sample container labels shall be completed as described above.

Field personnel shall collect soil sample field duplicates for analysis of PFAS using the following procedures:

- Following collection of the primary sample, change gloves and prepare to collect the field duplicate.
- Field duplicates shall be collected immediately following collection of the primary sample.
- Transfer an amount of the homogenized soil sample equal to that which was collected for the primary sample into the laboratory-provided HDPE soil sample container.
- Replace and re-seal the lid on the soil sample containers and then complete the sample container label as described above.

3.3 Field Blanks

Field personnel shall submit one field blank per day of sampling. Field blanks shall consist of PFAS-free water containerized in an HDPE sample container filled at the laboratory prior to beginning the field program. Field blank sample containers shall be opened during the collection of a sample and the laboratory-supplied PFAS-free water contained therein shall be poured directly into a laboratory-supplied HDPE sample container and then resealed. Field blank container lids shall remain in the hand of field personnel until replaced on the sample container. Sample container labels shall be completed as described above.

3.4 Trip Blanks

Field personnel shall submit one laboratory-supplied trip blank per day of sampling. Trip blanks shall consist of PFAS-free water containerized in an HDPE sample container filled at the laboratory prior to the beginning of the field program. Field personnel shall place one trip blank container in the sample cooler at the beginning of the day and the trip blank shall remain in the cooler for the duration of sampling activities conducted on that day. Trip blank containers shall be submitted to the laboratory with the daily field sample shipment.

3.5 Analytical QA/QC

Internal laboratory QA/QC shall consist of one laboratory blank and one matrix spike / matrix spike duplicate (MS/MSD) for every 20 primary field samples collected for analysis. Field personnel shall collect MS/MSDs immediately after collection of the primary field samples as described above for field duplicates.

APPENDIX C STANDARD OPERATING PROCEDURE SOP-3

Title: Quality Assurance / Quality Control Sampling Program Protocols Page 3 of 3

As part of the internal QA/QC, relative percent difference (RPD) shall be calculated between samples and corresponding field or laboratory duplicates. The laboratory quality assurance portion of the laboratory certificates shall be reviewed to verify that all calculations/recoveries were within acceptable limits as established by the laboratory method.

3.6 Sample Shipping

QA/QC samples shall be maintained at a temperature between 0 and 4° C during shipping. Only new, fresh ice may be used in sample coolers. Field personnel shall not use reusable chemical or gel ice packs, as these may contain PFAS. Samples shall be shipped via courier service with priority overnight delivery. Tracking numbers for all shipments shall be provided once they have been sent out so to ensure their timely delivery.

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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