ENVIRONMENTAL PRODUCT DECLARATION

HOLLOW STRUCTURAL SECTIONS

ATLAS TUBE, A DIVISION OF ZEKELMAN INDUSTRIES

Atlas Tube can produce round, square and rectangular sizes in the largest size range in North America

Atlas Tube

Atlas Tube was founded in 1984 and ever since has been growing and innovating to become the largest producer of Hollow Structural Sections in North America. As part of the Zekelman Industries family of companies, Atlas Tube is an integral part of the structural steel supply chain, serving the needs of Architects, Engineers, Fabricators, Contractors and Service Centers, by providing the largest size range in the industry and unmatched technical support.

The North American steel industry is the cleanest of all the major steel producing areas of the world. Of the seven largest steel producing countries, the U.S. has the lowest CO_2 emissions per ton of steel produced and the lowest energy intensity (AISI, 2021). Atlas is committed to maintain this fact by constantly improving our processes. For more information about Atlas Tube and the products we offer, please visit www.atlastube.com.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

Atlas Tube
A DIVISION OF ZEKELMAN INDUSTRIES

According to ISO 14025 and ISO 21930:2017

ATLAS TUBE
HOLLOW STRUCTURAL SECTIONS

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, Il 60611 https://www.ul.com https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.5 March 2020
ASSOCIATION NAME AND ADDRESS	Atlas Tube, 1855 East 122nd Street, Chicago, Illinois 60633 |
DECLARATION NUMBER	4790050508.101.1
DECLARED PRODUCT & DECLARED UNIT	Hollow structural steel sections, 1 metric ton
REFERENCE PCR AND VERSION NUMBER	Part A: Calculation Rules for the LCA and Requirements Project Report, (IBU/UL Environment, V3.2, 12.12.2018) and Part B: Designated Steel Construction Product EPD Requirements (UL Environment, V2.0, 08.26.2020).
DESCRIPTION OF PRODUCT APPLICATION/USE	Hollow structural steel sections used in construction
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	March 22, 2022
PERIOD OF VALIDITY	5 years
EPD TYPE	Product specific
EPD SCOPE	Cradle to gate
YEAR(S) OF REPORTED PRIMARY DATA	2019-2020
LCA SOFTWARE & VERSION NUMBER	GaBi v10
LCI DATABASE(S) & VERSION NUMBER	GaBi 2021 (CUP 2021.2)
LCIA METHODOLOGY & VERSION NUMBER	IPCC AR5 + TRACI 2.1

The sub-category PCR review was conducted by:	UL Environment PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment “Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report,”, v3.2 (December 2018), in conformance with ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ INTERNAL ☒EXTERNAL	Cooper McCollum, UL Environment
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Sphera Solutions Inc
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG

LIMITATIONS

The environmental impact results of steel products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the steel product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted. See the results section for additional EPD comparability guidelines.

Environmental declarations from different programs (ISO 14025) may not be comparable.

General Information

Description of Organization

Atlas tube is a division of Zekelman Industries which is the largest independent pipe and tube manufacturer in North America. The Atlas Tube division produces cold-formed, welded hollow structural sections (HSS) in round, square and rectangular shapes. Atlas Tube has the largest size range and produces the largest volume of HSS in the industry.

This environmental product declaration (EPD) represents hollow structural sections (HSS) produced by Atlas Tube at our facilities in Birmingham, AL, Blytheville, AR, Chicago, IL, Harrow, ON, and Plymouth, MI.

Product Description

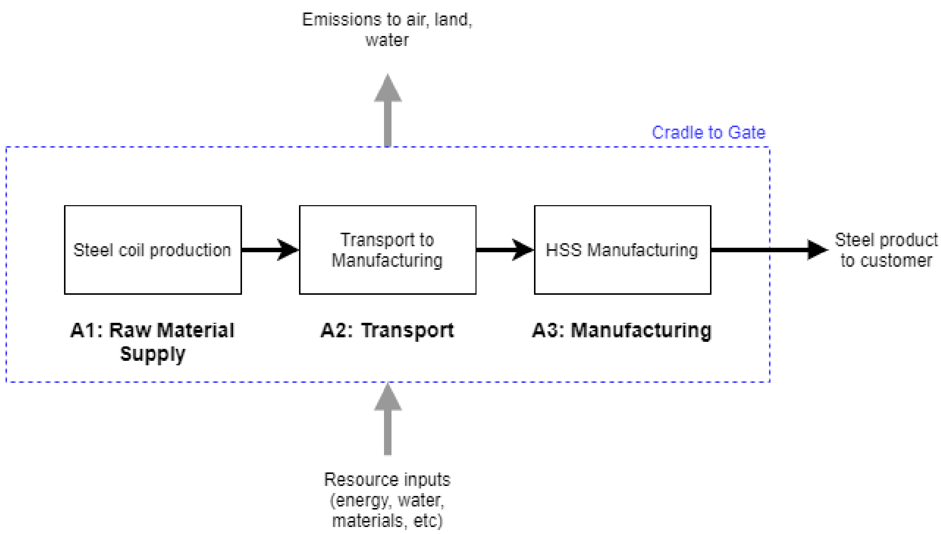
Steel tubes covered by this product declaration are classified as either Hollow Structural Sections (HSS) or mechanical tubing. They are produced by the single seam Electric Resistance Welded (ERW) process in round, square and rectangular shapes. These products can be used in any welded or bolted construction and in various manufactured products.

Product Specification

HSS products produced by Atlas Tube are defined by the following ASTM standards.

- **ASTM A500** – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- **ASTM A847** – Standard Specification for Cold-Formed Welded and Seanless High-Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance
- **ASTM A1085** – Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)
- **ASTM A252** – Standard Specification for Welded and Seamless Pipe Piles
- **CSA G40.20/G40.21** – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
- **ASTM A513** – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing

Flow Diagram



Product Average

The 2019 and 2020 production data used in this EPD considers HSS produced by Atlas Tube during those years. The products are manufactured in five facilities located in North America. Results are weighted according to production totals at all locations based on the data. Facility-specific global warming potential results are provided in a separate table.

Application

Applications can be, but are not limited to, buildings, bridges, sign support structures, driven pipe piles, and any other application that requires the strength and beauty of HSS.

Material Composition

Steel HSS products are made of carbon steel with a small percentage of alloy elements included. The products do not contain any hazardous substances according to the Resource Conservation and Recovery Act (RCRA), Subtitle 3. The products do not release dangerous substances to the environment, including indoor air emissions, gamma or ionizing radiation, or chemicals released to air or leached to water and soil.

Methodological Framework

Declared unit

The declared unit for this EPD is one metric ton of steel construction products. Note that comparison of EPD results on a mass basis alone is insufficient and should consider the technical performance of the product.

Table 1. Declared unit

NAME	VALUE	UNIT
Declared unit	1	metric ton
Density (typical)	7,850	kg/m^3

System Boundary

This EPD is "cradle-to-gate" in scope. The life cycle stages included in the assessment represent the product stage (modules A1-A3).

PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

* X = module included, MND = module not declared

Allocation

No multi-output allocation was required in the foreground system of the study.

Allocation of background data (energy and materials) taken from the GaBi 2021 databases is documented online at http://www.gabi-software.com/america/support/gabi/. Background data for steelmaking from AISI use the system expansion allocation method for co-products from the steelmaking process.

Since the EPD does not cover the end-of-life of the products, end-of-life allocation is outside the scope of the study. Metal scrap from manufacturing (module A3) was balanced with the scrap demand of the raw materials module (A1) in order to calculate the net scrap input to module A1.

Under a cradle-to-gate system boundary, scrap inputs to the system are not associated with any upstream burden, and scrap produced during manufacturing is assumed to be at least the same quality as scrap inputs into steelmaking. Remelting of scrap to produce structural steel and other raw materials is accounted for within module A1 using upstream datasets.

Cut-off Rules

In lieu of arbitrary cut-off criteria, all available energy and material flow data were included in the model for processes within the system boundary.

In cases where no matching life cycle inventories were available to represent a flow, proxy data were applied based on conservative assumptions regarding environmental impacts.

Data Sources

The LCA model was created using the GaBi 10 software system for life cycle engineering, developed by Sphera (Sphera, 2021). Background life cycle inventory data for raw materials and processes were obtained from the GaBi 2021 database (CUP 2021.1). Primary manufacturing data were provided by participating Atlas Tube.

Data Quality

A variery of tests and checks were performed by the LCA practitioner throughout the project to ensure high quality of the completed LCA. Checks included an extensive internal review of the project-specific LCA models developed as well as the background data used. A full data quality assessment is documented in the background report.

Period Under Review

Primary data were collected for HSS production during the year 2019 and 2020. Background data for steel coil production was taken from AISI and represents steel production during 2017. This analysis is intended to represent production in 2020.

Estimates and Assumptions

The underlying study was conducted in accordance with the PCR. While this EPD has been developed by industry experts to best represent the product system, real life environmental impacts of HSS products may extend beyond those defined in this document.

All of the raw materials and energy inputs have been modeled using processes and flows that closely follow actual production data on raw materials and processes. All of the reported material and energy flows have been accounted for. The HSS inventory data was collected as part of the STI industry-average EPD. Where inbound transportation data was incomplete, a distance of 500 miles by truck was used.

Proxy data were applied to some materials where no matching life cycle inventories were available, as documented in the background report.

Technical Information and Scenarios

Manufacturing

Hollow structural sections are manufactured by cold-forming steel coil into tubes. Hot-rolled coil is first slit into sections of appropriate width. The narrower coils are then uncoiled and passed through a series of rollers that form the continuous sheet into tubes. Tube cross-sections can be square, rectangular or round. The two edges of the coil are welded together via an electric resistance welding process and the product is then cut to length. Once manufactured, HSS can be powder coated or primed—or left uncoated. The tubes are subsequently packaged for shipment.

The primary input to HSS production is the steel itself, although small amounts of process materials are needed. Electricity is used for manufacturing and to move the materials. Manufacturing produces some metal scrap. The scrap generated during manufacturing is assumed to be produced at the same quality as used by the upstream metal production processes. Therefore, the scrap from manufacturing is treated assuming open-loop recycling.

Inbound Transportation

Inbound transportation distances and modes for steel and process materials were collected from each site.

Transportation

Transportation to the customer or construction site is outside the scope of this EPD.

Product Installation

Installation is outside the scope of this EPD. Refer to the American Institute of Steel Construction (AISC) for additional information about the impacts of fabrication and erection.

Use

Product use is outside the scope of this EPD.

Reuse, Recycling, and Energy Recovery

Product reuse, recycling, and incineration for energy recovery is outside the scope of this EPD.

Disposal

Product disposal is outside the scope of this EPD.

Environmental Indicators Derived from LCA

North American life cycle impact assessment (LCIA) results are declared using TRACI 2.1 (Bare, 2012; EPA, 2012) methodology, with the exception of GWP which is reported using the IPCC AR5 (IPCC, 2013) methodology, excluding biogenic carbon. Primary energy use represents the lower heating value (LHV) a.k.a. net calorific value (NCV).

LCIA results are relative expressions and do not predict actual impacts, the exceeding of thresholds, safety margins or risks.

Fabrication requires 1.08 metric tons of HSS per 1 metric ton of fabricated product (AISC, 2021). A1 includes production of all 1.08 metric tons of HSS.

Table 1. LCIA results, per 1 metric ton

PARAMETER	UNIT	TOTAL	A1	A2	A3
GWP 100	kg CO_2 eq.	1.94E+03	1.80E+03	4.46E+01	9.67E+01
ODP*	kg CFC 11 eq.	1.62E-09	-2.52E-12	8.67E-14	1.62E-09
AP	kg SO_2 eq.	4.21E+00	3.87E+00	1.83E-01	1.52E-01
EP	kg N eq.	2.23E-01	1.94E-01	1.64E-02	1.23E-02
SFP	kg O_3 eq.	7.18E+01	6.51E+01	4.44E+00	2.23E+00
ADP_{fossil}	MJ surplus	1.71E+03	1.53E+03	7.16E+01	1.04E+02

* ODP has limited relevance due to the absence of ozone-depleting emissions in the LCI, in both the background and foreground data.

Comparability: Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted.

Any comparison of EPDs shall be subject to the requirements of ISO 21930. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Table 2. Resource use results, per 1 metric ton

PARAMETER	UNIT	TOTAL	A1	A2	A3
RPR_E	MJ LHV	1.23E+03	9.55E+02	6.24E+01	2.16E+02
RPR_M	MJ LHV	–	–	–	–
$NRPR_E$	MJ LHV	2.50E+04	2.28E+04	6.91E+02	1.47E+03
$NRPR_M$	MJ LHV	1.27E+01	1.29E-01	0.00E+00	1.26E+01
SM	kg	5.26E+02	5.25E+02	0.00E+00	7.52E-01
RSF	MJ LHV	–	–	–	–
NRSF	MJ LHV	–	–	–	–
RE	MJ LHV	–	–	–	–
FW	m^3	9.63E+00	8.77E+00	1.81E-01	6.82E-01

Table 3. Output flows and waste categories results, per 1 metric ton

Parameter	Unit	Total	A1	A2	A3
HWD	kg	3.33E-01	5.26E-04	0.00E+00	3.32E-01
NHWD	kg	9.99E+00	3.33E-01	0.00E+00	9.66E+00
HLRW	kg	9.88E-04	8.39E-04	3.16E-05	1.18E-04
ILLRW	kg	8.26E-01	7.01E-01	2.64E-02	9.85E-02
CRU	kg	--	–	–	–
MR	kg	1.65E+02	8.81E+01	0.00E+00	7.71E+01
MER	kg	--	–	–	–
EE	MJ LHV	–	–	–	–

To align with the PCR, "product specific EPDs which include averaging shall report the range of results for all IPCC AR5 and TRACI indicators for products included in the average." The min and max results presented in Table 4 represent the facilities with the lowest (best) and highest (worst) impacts, respectively. Min and max facilities are determined for each impact category separately. The mean and median do not take production volumes across facilities into account (i.e., it is a calculation based on each individual facility as a data point), while the weighted average presented in Table 1 through Table 3 is calculated via production volume weightings reported by each participating facility.

Table 4. Statistical metrics across LCIA results, per 1 metric ton

Parameter	Unit	A1 (min)	A1 (Max)	Max/Min Ratio	A1 (Mean)	A1 (Median)
GWP 100	kg CO_2 eq.	1.67E+03	1.92E+03	1.15E+00	1.77E+03	1.74E+03
ODP	kg CFC 11 eq.	-2.66E-12	-2.32E-12	8.72E-01	-2.47E-12	-2.48E-12
AP	kg SO_2 eq.	3.55E+00	4.21E+00	1.18E+00	3.79E+00	3.72E+00
EP	kg N eq.	1.79E-01	2.13E-01	1.19E+00	1.90E-01	1.85E-01
SFP	kg O_3 eq.	5.98E+01	7.12E+01	1.19E+00	6.38E+01	6.23E+01
ADP_{fossil}	MJ surplus	1.44E+03	1.64E+03	1.14E+00	1.51E+03	1.48E+03

Atlas Tube's HSS product is manufactured at 5 different facilities. The results presented above represent a production-weighted average of these facilities. To understand how the GWP may vary between sites, facility-specific results are presented below.

Table 5. Facility-specific GWP100 results, per 1 metric ton

GWP 100 (kg CO_2 eq)	A1	A2	A3	Total	Cradle-to-Gate, Mill Product*
Birmingham, AL	1.71E+03	4.46E+01	9.67E+01	1.85E+03	1.58E+03
Blytheville, AR	1.78E+03	4.46E+01	9.67E+01	1.92E+03	1.65E+03
Chicago, IL	1.74E+03	4.46E+01	9.67E+01	1.89E+03	1.62E+03
Harrow, ON	1.92E+03	4.46E+01	9.67E+01	2.06E+03	1.78E+03
Plymouth, MI	1.67E+03	4.46E+01	9.67E+01	1.81E+03	1.55E+03

* Per 1 metric ton unfabricated product

Visualization of Life Cycle Impact Assessment

The relative contribution of each life cycle stage to the overall cradle-to-gate impact are presented in Figure 1, while the contribution of manufacturing components are presented in Figure 2.

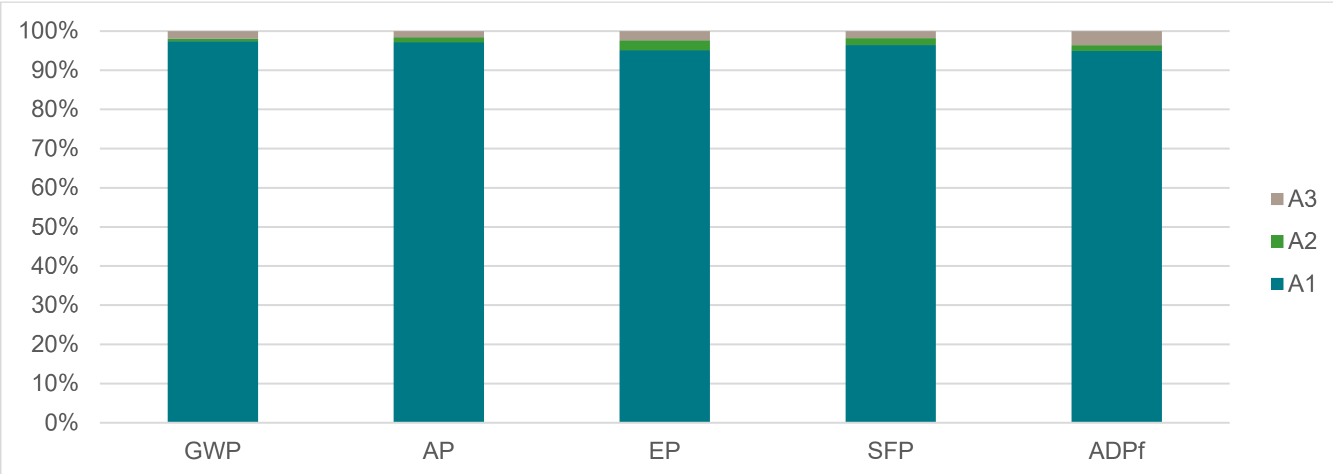


Figure 1: Relative contribution by life cycle stage for 1 metric ton of hollow structural sections

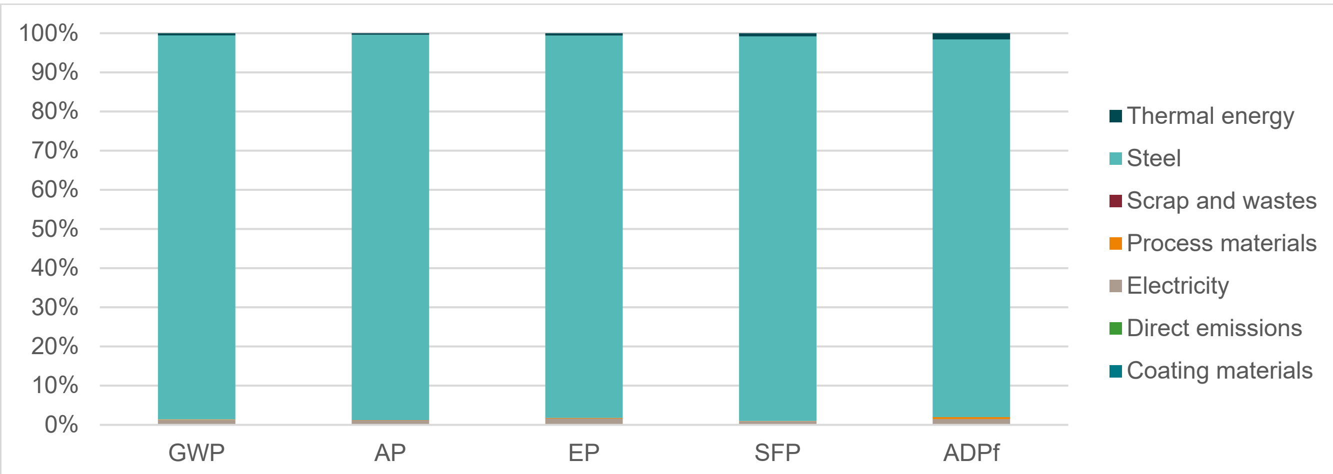


Figure 2: Relative contribution by manufacturing component for 1 metric ton of hollow structural sections

Interpretation

The cradle-to-gate potential environmental impacts of Atlas Tube's HSS products are driven by steel coil production (A1). Inbound transport to manufacturing (A2) and HSS manufacturing (A3) contribute to potential environmental impacts on a smaller order of magnitude.

Additional Environmental Information

Environment and Health During Manufacturing

Atlas Tube maintains an SDS of the product which contains specific Environmental, Health and Safety information of finished goods as it relates to local and international regulations. An SDS database is a centralized location in which recommended handling and regulatory exposure limits and recommended control measures can be found.

Atlas Tube always implements compliance focused measures with regulatory requirements in mind. A proactive compliance approach is used as a guidance tool at all Atlas Tube facilities. Each facility is accountable and held to a proactive compliance standard.

Environmental Activities and Certifications

Waste/Recycling: Atlas Tube facilities generate very little hazardous waste streams. All locations are classified as being a small quantity generator or very small quantity generator. Where feasible, Atlas Tube recycles what would otherwise be deemed a waste, with a goal of diverting wastes from landfill. All facilities have a procedure in place to extend the life expectancy of coolant minimizing overall generated industrial waste while reducing the introduction of virgin coolant. Contaminants are continuously removed from the process allowing coolants to be reused in a closed loop system for an extended period of time.

Emissions: The process at Atlas Tube generates minimal air emissions. Rust inhibitors used are generally water based with a very low organics content. All cleaners are either water based or Federally exempt organic based materials.

Safety: Zekelman Industries understands that the health and safety of its teammates are critical to the success of the organization and strives to provide a safe and healthy workplace that exceeds the most established health and safety standards. Our consistent improvements to safety and health are accomplished through the integration of safety in all teammates' daily duties and responsibilities. This has resulted in a sustainable level of safety engagement, empowerment, and accountability throughout the organization.

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