Migration of Contaminated Groundwater Under Control

Facility Name: AZZ Galvanizing (a.k.a. Gregory Galvanizing)
Facility Address: 1723 Cleveland Avenue, Canton, OH 44707-3689
Facility EPA ID #: OHD981950207

1. Has all available relevant/significant information on known and reasonably suspected releases to groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

   X    If yes - check here and continue with #2 below.

   ___  If no - re-evaluate existing data, or

   ___  If data are not available - skip to #8 and enter "IN" status code.

BACKGROUND

AZZ Galvanizing ("AZZ") currently operates a hot-dip galvanizing operation at the facility. No manufacturing is done at the facility; however, large steel parts are delivered to the facility via truck for galvanizing. These steel parts are subsequently galvanized by the following method: the parts are 1) processed through an initial alkaline cleaning phase, 2) etched with dilute hydrochloric acid, 3) typically rinsed with water, 4) immersed in a zinc chloride-ammonium chloride solution tank (i.e., "pre-flux tank"), 5) removed via a crane system and transported overhead, 6) dipped in a molten zinc kettle, 7) the steel parts then emerge from the kettle with a zinc coating which provides superior rust-proofing, and 8) are rinsed in a water tank. The finished galvanized parts are stored on site until they are returned to the customer.

The facility was formerly owned by Gregory Galvanizing ("Gregory") which also ran hot-dip galvanizing operations from circa 1957 to 2005. Gregory has been subject to RCRA Corrective Action since being cited for unpermitted storage of hazardous waste in 1987. Director's Final Findings and Orders ("Orders") were issued in 1990. The Orders called in a Closure Plan, inter alia, which was submitted, implemented and certified. The certification was accepted by the Ohio Environmental Protection Agency ("Ohio EPA") on April 13, 1994.

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).
Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, (GPRA). The “Migration of Contaminated Groundwater Under Control” EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids of NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).
2. Is groundwater known or reasonably suspected to be “contaminated” above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from the facility?

   X   If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

   _____ If no - skip to #8, and enter “YE,” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

   _____ If unknown - skip to #8 and enter “IN” status code.

_Rationale:_

_Site Investigation:_ Ground water contamination became evident at Gregory since 1987 when seepage was noted along the west bank of the West Branch of Nimishillen Creek ("West Branch Nimishillen Creek"). The seepage displayed characteristics of corrosivity and extraction procedure toxicity for lead and chromium. It was determined that substantial ground water contamination occurred from a leak in Plant 1’s Acid Storage Tank (i.e., Waste Management Unit 2; "WMU 2").

1990 through 2005: In October 1990, Ohio EPA issued Orders for Gregory to conduct soil and ground water investigations in the area extending from the east foundation of Plant No. 1 to the bank of the West Branch Nimishillen Creek. In December 1990, Gregory submitted an investigative sampling and analysis plan to Ohio EPA; this plan was approved in November 1999.

In 1999, seven on-property monitoring wells and one off-property well were installed to determine Gregory’s operational impact on the uppermost ground water zone. These wells were located with respect to the source at WMU 2 (source upgradient: ESN 1, MW 2; source downgradient: ESN 2, ESN 3, MW 1, MW 3, MW 4R). The off-property well, ESN 4 was located across Nimishillen Creek and downgradient from the WMU 2 source. Total depths of these wells ranged from approximately 20.1 feet (ESN 2) to 27.2 feet (MW 2) below ground surface ("bgs"). Static water levels were determined to range from approximately 8.8 to 13.32 feet bgs, with flow toward the West Branch of Nimishillen Creek.

2005 through 2011: Phase I and Phase II Property Assessments were conducted under Ohio’s Voluntary Action Program ("VAP") to characterize subsurface conditions in unconsolidated materials beneath the property. Approximately 41 soil borings were advanced from 3 to 12 feet bgs and 15 monitoring wells installed ranging from 16.4 to 45 feet bgs. Monitoring wells completed as 2-inch diameter wells with varying screen lengths (some greater than 10 feet).

Results indicated 8 Identified Areas ("IAs"): Plant 1 with filled-in basement (IA-1), Plant 2 (IA-2), abandoned railroad spur (IA-3), former RCRA drum storage area (IA-4), former heating oil underground storage tank (UST; IA-5), former gasoline UST (IA-6), historic metal forging/machine shop (IA-7), and the approximate area of early 1980s fill placement (IA-8).

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1 "Contamination" and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or so lids, that are subject to RCRA) in concentrations in excess of appropriate “levels” (appropriate for the protection of the groundwater resource and its beneficial uses).
Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)
Page 4 of

Question 2 continued from previous page

Soil Results: Historic soil results reported zinc concentrations more than its calculated, site-specific soil partitioning value ("SPV") and exhibited low pH values (< 5 Standard Unit, "S.U."). These exceedences were noted inside the Plant 1 drag out area north of the pre-flux, rinse, and HCL tanks where liquid drippage occurs from the overhead transport of large steel parts. Other locations exhibited similar zinc characteristics in soils. These areas were noted proximal to the former Plant 2 pre-flux tank, and at soil boring SB-12, located east of the former underground drain, which flowed from Plant 2 to the former acid pit located south of the Plant 1 pre-flux tank.

Ground Water Results: Elevated zinc and ammonia concentrations, along with low pH values (< 5 S.U.) in ground water were historically reported at the facility (i.e., wells ESN-2, ESN-3). Low pH ground water was noted in two primary areas: between the Plant 1 pre-flux tank and molten galvanizing kettle, and downgradient from seeps emerging along the Nimishillen Creek bank (between monitoring wells MW-1 and MW-6).

Ground Water Standards Used (mg/L): Regional Screening Levels ("RSLs"), Maximum Containment Levels ("MCLs"; primary and secondary MCLs), VAP Generic Unrestricted Potable Use Standards or VAP risk-based Generic Unrestricted Potable Use Standards and VAP Supplemental Unrestricted Potable Use Values.

Surface Water Standards: Outside Mixing Zone Average for zinc (0.39 mg/l); State of Ohio water quality standards ("Ohio WQSSs").

<table>
<thead>
<tr>
<th>Media</th>
<th>Rationale and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Historic Results (1999):</td>
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<tr>
<td></td>
<td>• Zinc, total [max: 146,000 mg/kg (ESN 3); min: 118 mg/kg (ESN 1)]</td>
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<td></td>
<td>• Lead, total [max: 146,000 mg/kg (ESN 3); min: 15,200 mg/kg (ESN 1)]</td>
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<tr>
<td>Monitoring Wells:</td>
<td>Historic Results (1999 to 2007): Zinc, total (ESN 3: max: 5920 mg/L; min: 5.3 mg/L; Secondary MCL: 5 mg/L), Ammonia (ESN 2: 154 mg/L; ESN 3: 45.2 mg/L) and pH (ESN 3: max: 8 S.U.; min: 5.08 S.U.).</td>
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<td>Primary Seep (Main Seep/Location 360): Historic Zinc Concentrations and pH values (2011 to 2015): Zinc [452 mg/L (2011) to 33 mg/L (2013) to 360 mg/L (2015); Surface Water Hardness Dependent Criteria for Zinc – 0.39 mg/L] and pH [3.0 S.U. (2011) to 5.8 (2013) to 6.02 (2015)].</td>
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<td>Primary Seep (Main Seep/Location 360): Current Zinc Concentrations and pH values (10/25/2016): Zinc (max: 0.45 mg/L; min: 0.19 mg/L; Surface Water Hardness Dependent Criteria for Zinc – 0.39 mg/L) and pH (max: 7.90 S.U.; min: 7.80 S.U.).</td>
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<td>Secondary Seeps: Historic Zinc Concentrations and pH values (2012 to 2014): Zinc [max: 210 mg/L (Seep 1B); min: 32 mg/L (Seep 1A); Surface Water Hardness Dependent Criteria for Zinc – 0.39 mg/L] and pH [min: 3.53 S.U. (Seep 1B); max: 6.87 S.U. (Seep 2)].</td>
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Reference(s):

HzW Letter, "Status Update and Data Transmittal, 1723 Cleveland Avenue SW Site, Canton, Stark County, Ohio", dated October 6, 2016.

3. Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”\(^2\) as defined by the monitoring locations designated at the time of this determination)?

\(\text{X}\) If yes – continue after presenting or referencing the physical evidence (e.g., ground water sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain with the (horizontal or vertical) dimensions of the “existing area of contaminated groundwater”\(^2\).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of contaminated groundwater”\(^2\)) - skip to #8 and enter “NO” status code, after providing an explanation.

_____ If unknown - skip to #8 and enter “IN” status code

**Rationale:** Since the 1990 DFFOs, Gregory has conducted assessments of facility zinc-impacted soils, ground water and the surface water quality of the adjoining West Branch Nimishillen Creek. On-site remedial actions included soil and sediment removals, as well as in-situ ground water treatments. AZZ (current property owner) has also added process improvement measures that include floor upgrades and secondary containment to dip tanks.

Soil and ground water zinc concentrations have been reduced through on-site remedial efforts; however, current zinc concentrations in ground water remain slightly above regional screening levels (i.e., secondary MCLs). These elevated zinc concentrations are present in ground water samples collected from the seeps along the bank adjacent to AZZ Gregory. This bank area is owned by the City of Canton and is **NOT** included as part of the AZZ Gregory property.

In 2017, it was determined that verification data was needed to demonstrate whether selected soil and ground water remedies have decreased zinc concentrations enough to meet the standards for exposure of important ecological resources, such as the Nimishillen Creek’s sediments and waters [OAC 3745-30-08(l)]. It was decided that water quality and biota studies would provide the necessary information to demonstrate whether improvements had occurred along the Gregory portion of the creek since Ohio EPA’s-Division of Surface Water’s 2008 biocriteria study.

**2017 Ohio EPA-Division of Surface Water (“DSW”) Bioassay Stream Survey Results:** Ohio EPA’s DSW conducted water quality and biological studies along the West Branch Nimishillen Creek during the summer of 2017. The stream adjacent to Gregory/ZZ was sampled in 2017 in accordance with Ohio EPA sampling protocol. Water samples were collected on June 2, July 10, August 9, September 13, and October 3, and sediment samples were collected on October 26, 2017.

The 2017 data demonstrated that the fish and macroinvertebrate communities have improved since the 2008 biological study. It should also be noted that no exceedances of Ohio WQS criteria were identified in the 2017 Ohio EPA-DSW stream survey for West Branch Nimishillen Creek as well. Results noted elevated zinc concentrations in sediments adjacent to AZZ Gregory compared to sediments from upstream locations.

\(^2\) "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e.: including public participation) allowing a limited area for natural attenuation.
Question 3 continued from previous page

Reference(s):


4. Does “contaminated” groundwater discharge into surface water bodies?

[ ] If yes – continue after identifying potentially affected surface water bodies.

[ ] If no – skip to #7 (and enter “YE status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that ground water “contamination” does not enter surface water bodies.

[ ] If unknown – skip to #8 and enter “IN” status code

Rationale:

West Branch Nimishillen Creek: Ground water daylights off-facility in the form of seeps along the west bank of the West Branch Nimishillen Creek. Seepage was first noted in 1987 because of leakage from Plant 1’s Acid Storage Tank (WMU 2). This seepage displayed corrosivity and extraction procedure toxicity characteristics for lead and chromium. It was determined that the WMU 2 leakage had caused substantial ground water contamination in this area. In early February 2011, a “primary seep” was discovered as vegetation covering the bank slope was removed. Several smaller seeps (i.e., “secondary seeps”) were also identified during this time. These seeps appear to have been associated with the hard pan layer situated immediately north of the primary seep.

Elevated zinc concentrations have been reported in ground water samples collected from the seeps along the bank adjacent to AZZ/Gregory since sampling activities have been conducted. Historic ground water/seep results range from 452 mg/L (2011) to 360 mg/L (2015) in the primary seep; from 210 mg/L to 32 mg/L in the secondary seeps.

The hardpan layer and associated sediments were removed in 2014 near the primary seep area; however, additional subsurface digging toward Plant 1 caused concern with respect to slope stability. It should also be noted that this bank area is owned by the City of Canton and is NOT included as part of the AZZ/Gregory property.

Reference(s):

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration\(^3\) of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions [e.g., the nature, and number, of discharging contaminants, or environmental setting], which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

\[\checkmark\] If yes – skip to \#7 (and enter "YE" status code in \#8 if \#7 = yes), after documenting: 1) the maximum known or reasonably suspected concentrations of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

\[\_\_\_\_\_\_\_\_\] If no – (the discharge of "contaminated" groundwater into surface water is potentially significant) – continue after documenting: 1) the maximum known or reasonably suspected concentrations of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations\(^3\) greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

\[\_\_\_\_\_\_\_\_\] If unknown – enter “IN” status code in \#8.

**Rationale:**

Water quality and biological studies of the West Branch Nimishillen Creek were conducted by Ohio EPA in 2017. The water quality study indicated no exceedances of Ohio WQ standards at that time; the biological study did not detect a localized impact associated with the Gregory site. Sediment results showed elevated zinc levels above upstream sample results. This indicates a potential source of zinc to the West Branch Nimishillen Creek from the former Gregory Galvanizing Facility; however, the impacts on sediment chemistry appear to be localized.

Based on these findings, it is Ohio EPA’s assessment that remedial activities undertaken at Gregory and AZZ have contributed to the overall improvement in the West Branch Nimishillen Creek.

**Reference(s):**


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\(^3\) As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.
6. Can the discharge of "contaminated" groundwater into surface water be shown to be "currently acceptable" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

   If yes – continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment⁵, appropriate to the potential for impact that shows the discharge of groundwater contaminants into the surface water is in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

   If no – (the discharge of "contaminated" groundwater cannot be shown to be "currently acceptable") – skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

   If unknown – skip to #8 and enter "IN" status code.

**Rationale:**

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⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) or many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly alter41g or reversing groundwater flow pathways near surface water bodies.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.
7. Will groundwater monitoring/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

   X   If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

   ___ If no - enter "NO" status code in #8.

   ___ If unknown - enter "IN" status code in #8.

Rationale:

Findings in Ohio EPA-DSW's 2017 biosurvey show improvements to surface water conditions adjacent to the facility and that Ohio WQ standards are currently being met. The purpose of continued ground water monitoring will be to ensure that the West Branch Nimishillen Creek is continuing to meet the Ohio WQ standards.

Both Gregory and AZZ will implement on-going Operation & Maintenance ("O&M") Agreements for the following purposes:

1) **Gregory O&M Agreement — Continued evaluation of current ground water conditions:** Gregory will continue to gather ground water data to determine whether ground water improvement continues or remains stable or if conditions degrade over the O&M period. The hypothesis is that meeting Ohio surface WQ standards adjacent to the facility are linked to the ground water concentrations found on-property. If concentrations of chemicals of concern in ground water increase, the waters adjacent to the facility will likely degrade.

2) **AZZ O&M Agreement — Evaluation of current source control:** AZZ will conduct regular inspections of the pre-flux tanks, process tanks (i.e., rinse, acid) and primary kettle, as well as the secondary containment systems associated with those tanks. Inspection records will be submitted to Ohio EPA periodically. Timely notification will be given when a breach occurs from any tank and its contents accumulates greater than 3 inches in its associated secondary containment system.

Reference(s):

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

Page 12 of

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI event code (CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility):

YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the AZZ Galvanizing facility (i.e., AZZ Galvanizing/Gregory Galvanizing), EPA ID #OHD981950207, located at 1723 Cleveland Avenue, Canton, OH 44707-3689. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be reevaluated when the Agency becomes aware of significant changes at the facility.

NO - Unacceptable migration of contaminated groundwater is observed or expected.

IN - More information is needed to make a determination.

Completed by  
(print) Donald Vogel
(title) Environmental Specialist 2

Date 5-18-2020

Supervisor  
(print) Erik Hagen
(title) Environmental Manager

Locations where references may be found:

Ohio Environmental Protection Agency, Northeast District Office, 2110 East Aurora Road, Twinsburg, OH 44087.

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.
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NO - Unacceptable migration of contaminated groundwater is observed or expected.

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Completed by

(signature) ________________________________ Date 5-18-2020
(print) Donald Vogel
(title) Environmental Specialist 2

Supervisor

(signature) ________________________________ Date 5-19-2020
(print) Erik Hagen
(title) Environmental Manager

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