BRS

BIG RIVER STEEL

a U. S. Steel company

BIG RIVER STEEL
WATER STEWARDSHIP PLAN

DECEMBER 2021

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Section 1

Site Overview

1.1 Site Boundaries

The Big River Steel (BRS) scrap to steelmaking facility is located near the City of Osceola, Arkansas. The Site, consists of a steel manufacturing facility that occupies approximately 1,400 acres and is surrounded primarily by agricultural and industrial properties to the north, south and west, and the Mississippi River to the east.

Big River Steel utilizes water ("process water") from the Wilcox Aquifer via four source water wells (typically referred to as "deep wells"). Drinking water is provided from the city of Osceola and is supplied by three wells, located throughout the city's service area and from the same Wilcox Aquifer. Water for dust suppression is sourced via three "shallow wells" on the BRS site.

Process water is the major use of water onsite and is used primarily for cooling during the production of steel. The water-related infrastructure at the facility is mapped and included as **Figure 1-1** and includes:

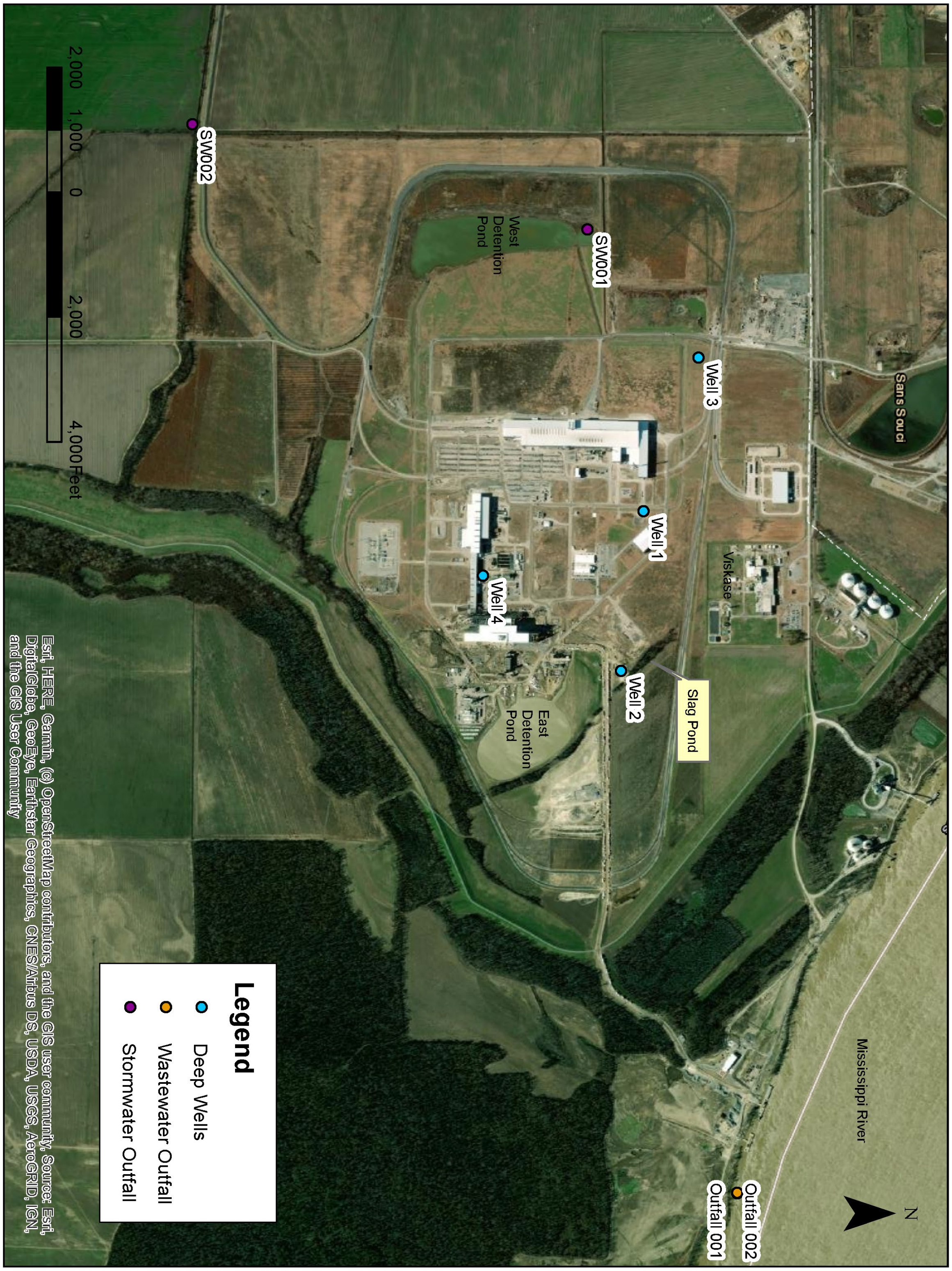
a. the location of the source water wells (both deep wells and shallow wells),

b. stormwater discharge,

c. and industrial discharge to the Mississippi.

Process water effluent is treated by the BRS Wastewater Treatment Plant (WWTP) and then discharged to the Mississippi River. Stormwater at the site is directed to two onsite retention ponds. One pond, the "slag water pond" is combined with effluent from BRS's WWTP and discharged to the River. The second pond and stormwater system discharge ultimately to Sandy Bayou. Treated sanitary wastewater is returned to the Town's collection system.

Figure 1-1 Big River Steel Site and Water Infrastructure

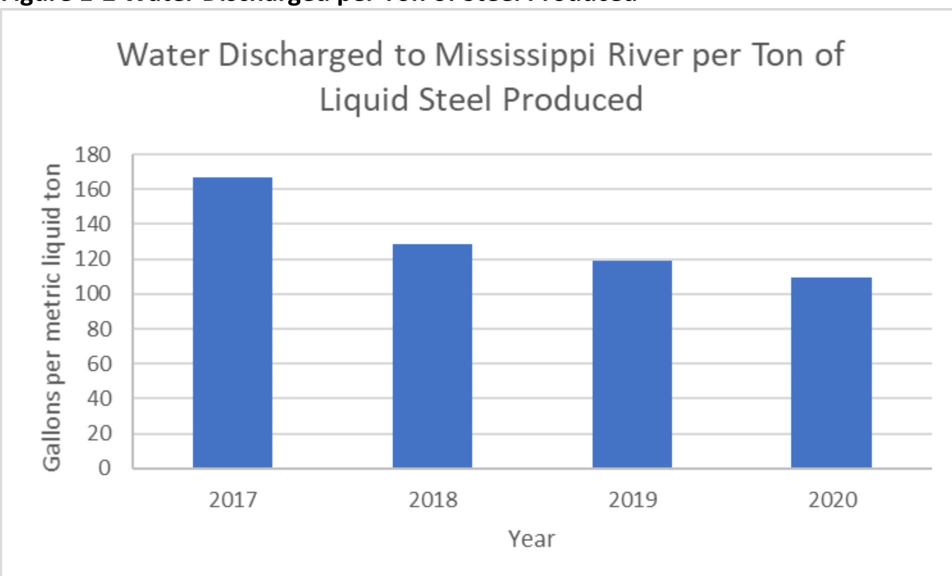


1.2 Water-Related Infrastructure

The water-related infrastructure on site includes groundwater pumping and distribution (via pipeline and truck), conveyance and wastewater treatment systems, stormwater ponds, ditches, and outfalls.

From Phase 1 to Phase 2, significant investments were made in the water system to increase recycling of water and reduce the m3 water used per ton of steel produced. Efforts were also made to improve water quality, resulting in lower concentrations of metals such as zinc, nickel, lead and chromium per m3 of water discharged. The reduction in water usage per ton of steel produced can be best described by graph in **Figure 1-2**. Data was not available for historic water use, however it can be assumed the discharge is proportional to water used and that the downward trend in discharge per steel produced is representative of continuing reductions in water usage.

Figure 1-2 Water Discharged per Ton of Steel Produced



Source: Big River Steel, 2020, Corporate Social Responsibility Report

According to the NPDES renewal application for treated wastewater, the specific improvements included in the Phase 2 expansion were:

- More efficient cooling towers;
- Process improvements to improve cooling tower efficiency, resulting in water conservation;
- Upgrades and enhancements to cooling water systems throughout the plant;
- Installation of "water polishing equipment" for production units to improve feed water quality and reduce the volume of blowdown;
- Upgrades to the existing Phase 1 wastewater treatment system to improve performance and efficiency.

In addition to the process water and industrial wastewater, the site also has stormwater-related infrastructure including the following:

- Wet stormwater detention pond (East Detention Pond),
- Dry stormwater detention pond (West Detention Pond),
- Vegetated swales to convey stormwater to detention ponds,
- And vegetated filter strips.

1.3 Water Sources

1.3.1 Wilcox Aquifer

The Big River Steel plant uses approximately 3.0 million gallons per day (MGD) or 11,000 m3/day of process water from four deep wells on the site. Water use can vary from approximately 1.5 MGD to over 3.0 MGD, depending on the time of year and cooling tower demands. The deep wells are at a depth of 1,500 to 1,600 feet which, based on the geology of the area, means water is drawn from the Wilcox Aquifer. The Wilcox Aquifer is a source of industrial and public water supply in northeastern Arkansas and accounts for 0.5% of the groundwater demand in the state (ANRC, 2014). As of 2010, approximately 150 wells in Arkansas were reported to be using water from the Wilcox aquifer pulling a total of 36.52 MGD. As there are relatively few Wilcox aquifer users in Arkansas, this data is not regularly published, but updated water use data should be included here when available.

1.3.2 Mississippi River Valley Alluvial Aquifer

Big River Steel has three "shallow wells" that use approximately 45 MG per year to provide dust control of the MR plant yard, haul road, and occasionally the WATCO scrap yard as well as some other site operations. The water use from the shallow wells is highly variable based on weather (significantly less is used during wet months).

These shallow wells are located within the Mississippi River Valley Alluvial Aquifer. 97.5 percent of Arkansas' groundwater usage is from this aquifer (ANRC, 2014). 2010 data shows a total of 7,426 MGD of water usage for the state with 362 MGD reported in Mississippi County (Rodgers and Whaling, 2020). Multiple agricultural users surrounding the Big River Steel site also have wells drawing from the alluvial aquifer. A USGS study found that the water level altitude in Mississippi County decreased an average of 1.9 feet between 2010 and 2014 (Rodgers and Whaling, 2020).

1.4 Discharge Locations

1.4.1 Wastewater Discharge

The site has two discharge points having Authorization to Discharge Wastewater NPDES permits, referred to as Outfalls 001 and 002 which are located to the east of site on the Mississippi River. Both Outfalls discharge to Segment 6C of the Mississippi River and are detailed in Appendix A.

Outfall 001 is the discharge for the treated wastewater from the RH degasser unit, continuous casting line, hot rolling mill, alkaline cleaning operations, chromate reactor, galvanizing lines, pickling lines, skin pass mill, tandem cold mill, reversing cold mills, coating operations, contact cooling water systems, and non-contact cooling water systems. The NPDES monitoring requirements for Outfall 001 are summarized in **Section 4.3.2**.

Outfall 002 is the discharge from stormwater and dust suppression from the slag pile. The slag runoff is captured in a sediment pond prior to being pumped to the outfall and is level controlled. The discharge from the slag pond is combined with the process wastewater prior to the discharge location, but these sources of wastewater are monitored separately. The monitoring requirements per the NPDES permit for Outfall 002 are summarized in **Section 4.3.2**.

Figure 1-1 shows the location of Outfall 001 and Outfall 002.

1.4.2 Stormwater Discharge

All stormwater runoff from the approximately 1,400-acre site flows to the West Detention Pond and discharge through Outfall SW001 into a ditch at the northwest corner of the site. This ditch conveys the stormwater, combined with run-on from adjacent properties, to Outfall SW002 where stormwater discharges into Sandy Bayou. The ultimate receiving water of Sandy Bayou is the St. Francis River. Because these outfalls are considered to be similar, only Outfall SW001 is monitored. The monitoring requirements for the NPDES Industrial Stormwater General Permit are summarized in **Section 4.3.2**.

In addition to the NPDES requirements, BRS also has a Stormwater Pollution Prevention Plan (SWPPP) that contains additional measures to reduce the quantity and pollutants in the runoff.

Figure 1-1 includes the locations of Outfall SW001 and Outfall SW002.

The BRS site is located in the Lower St. Francis Watershed – Ditch No. 9 (HUC 080202031207).

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Section 2

Identification of Stakeholders

As part of the Water Stewardship Plan, attempts were made to contact neighboring water users and facilities in the vicinity discharging to the same water bodies. To date, attempts to schedule meetings or gather information have been limited. However, moving forward, there is an acknowledgement of the importance of working with regional stakeholders.

Table 2-1 includes an abbreviated list of stakeholders identified in Big River Steel's area of influence. This list will continue to be updated and revised annually.

Table 2-1 List of Stakeholders in Area of Influence

Stakeholder	Contact	Source Water & Volume	Discharge Volume (NPDES)
City of Osceola, AR - Drinking water - Wastewater	Brandon Haynes Bhaynes58@yahoo.com	Wilcox Aquifer 3 wells @ 1500 ft Avg Day – 2.5 MGD Max Day – 3.1 MGD	
Plum Point Power Station	Stormwater: Michael Lavesque 870-563-5002 michael.lavesque@nrg.com Wastewater: Kevin Ziegler kevin.ziegler@nrg.com	Mississippi River	*Stormwater* – Brown Bayou, no listed volume limit *Landfill Sediment Pond Discharge* – Sandy Bayou, no listed volume limit *Industrial Wastewater* – Mississippi River, 1.87 MGD
Razorback Concrete Company	Keith Wetsell 870-735-4132 keith.wetsell@razorbackconcrete.com		*Stormwater* – Sandy Bayou Per 2013 report: 26,255 gal Jan-June: 52,378 gal Jul-Dec
Viskase Corporation	Wastewater: Spencer Harston 870-563-3541 spencer.harston@viskase.com Stormwater: Dwayne Lucius Dwayne.lucius@viskase.com		*Wastewater* – Mississippi River. 1.37 MGD *Stormwater* – Sandy Bayou, Per 2013 report: 307,928 gal Jan-June; 533,743 gal Jul-Dec
Consolidated Grain and Barge	Terry Douglas 870-400-2226 terry.douglas@cgb.com		*Treated Wastewater* – Mississippi River, no listed discharge volume

Stakeholder	Contact	Source Water & Volume	Discharge Volume (NPDES)
Arkansas Steel Processing	General Manager 870-882-1908 2141 E State Hwy 198 Osceola, AR 72370 Osceola, AR 72370 Phone: (870) 576-6019		

Section 3

Water-Related Challenges and Risks

3.1 Climate Change Projections

In 2008, the Governor's Commission on Global Warming published a report summarizing the anticipated effects of climate change on the state. The potential impacts to Arkansas included increases in severe weather and drought, increase in flooding levels, and salt water intrusion into aquifers (Arkansas Governor's Commission of Global Warming, 2008).

A USGS study on the effects of climate change in the Mississippi Embayment looked at both wet and dry scenarios using historical data on dry years and wet years to forecast future scenarios as well as projected impacts on groundwater usage in each scenario. In both cases, they concluded that groundwater levels would decrease as projected pumping rates exceeded the rate of recharge (Clark, 2011).

Of note, the World Steel Association, of which BRS is a member, is committed to reducing the CO2 footprint within the steel industry through continuing research into low-carbon steelmaking technologies and considering the entire lifecycle of steel products (World Steel Association, 2021a).

3.2 Population Projections

According to the Osceola 2040 Comprehensive Plan, the population of Mississippi County is projected to decline following a 75-year long trend. The population of Osceola is projected to remain stable over the next twenty years with maximum growth predicted at one percent. If the population of Osceola did increase, the withdrawal of water from the Wilcox Aquifer for city water would also likely increase creating additional stress on the shared aquifer. At present there are no population-related concerns related to water stewardship at BRS.

3.3 Water-Related Infrastructure

3.3.1 Existing

The existing water-related infrastructure at the BRS site is summarized in **Section 1.2**. Additional water-related infrastructure located within the area of influence will be detailed following future meetings with stakeholders.

3.3.2 Planned

This section will be added after future discussions between BRS and stakeholders to identify any future water-related infrastructure in the area of influence.

3.4 Water Scarcity Concerns

According to a USGS report, in 2010 9.92 MGD of water withdrawn from the Wilcox Aquifer was reported for Mississippi County. The addition of water usage from BRS starting in 2016 increased water usage in the county by 25% compared to 2010 levels. The same study also reported that the water level in the Wilcox Aquifer in Mississippi County has been declining over the past twenty years (Kresse, et. al., 2014).

According to the Arkansas Water Plan Update (2014), the statewide projected groundwater demand for 2050 is 10 million AFY but available groundwater is only 1.9 million AFY, assuming sustainable pumping under dry climatic conditions. Based on this projection, reduction in the withdrawal of groundwater will be necessary to allow aquifers to recharge and remain a sustainable source of freshwater (ANRC, 2014).

While at present the sources of groundwater that BRS is using are plentiful, there may be a future date within the lifetime of the plant where the aquifers can no longer support the withdrawals. Because of this, BRS is committed to continuing to reduce their water use per ton of steel produced.

Even where water is plentiful, it is industry best practice to reuse water multiple times before discharge back to the environment. Guidance from the World Steel Association acknowledges that while reuse of water is ideal, the cleaning and cooling of water required for reuse may be at odds with goals to reduce energy and emissions (World Steel Association, 2021b). BRS will consider a holistic approach and set goals for water use reduction accordingly.

3.5 Water Related Risks

Utilizing WWF's "Water Risk Filter", as recommended by Responsible Steel, water risk was assessed for the BRS site. The full Water Risk Report is included as **Appendix C**. The most significant water risks identified for BRS include:

- Flooding, due to the proximity of the Mississippi River
- Operational Related-Risks, such as:
  - Large volumes of water are used for steel production
  - Water

As BRS implements its Water Stewardship Plan, including tracking and managing the volumes of water used, and working with other major water users in the area, a clearer understanding of risks and development of relevant risk management actions will continue to improve and evolve.

Section 4

Water-Related Data

4.1 Existing Incident Response Plans

Big River Steel has developed and implemented response plans to manage incidents in a responsible manner to eliminate or minimize environmental impacts. The following are the two primary incident response plans in place at Big River Steel:

- Spill Prevention, Control, and Countermeasure Plan (SPCC)
- Stormwater Pollution Prevention Plan (SWPPP)

These plans are discussed in more detail in the following sections.

4.1.1 Spill Prevention, Control, and Countermeasure Plan

The objective of the SPCC Plan is to help facilities prevent the discharge of oil into navigable waters or adjoining shorelines. The plan details what facilities must do to prevent, prepare for, and respond to oil spills which occur around inland waters.

The SPCC Plan is reviewed on an annual basis and re-certified once every five years. Big River Steel's SPCC Plan is currently on its 2nd revision and was last certified on April 5th, 2019.

Regularly scheduled formal inspections and documentation of incidents are two of the key components of an SPCC Plan. The SPCC Plan establishes the frequency and type of testing and inspections according to the size, configuration, and design of the oil container. While tanks are categorized based on a combination of the aforementioned features, Category 1 generally refers to tanks which present the lowest risk, while Category 3 tanks present the highest risk. Additionally, the plan identifies the responsible individuals and required qualifications for the inspections.

All oil storage tanks and containers at the Big River Steel facility are aboveground tanks. Big River Steel's SPCC Plan states that all oil storage areas and secondary components will be inspected by the SPCC designated individual per the formal inspection procedures specified in the plan. Visual monthly inspections are required for all Category 1 tanks and containers. In addition to the visual inspections, formal external monthly inspections must also be conducted on all Category 1 tanks between 5,001 and 30,000 gallons in size. There are four Category 1 tanks at Big River Steel which require these formal external monthly inspections. These tanks are located in the Cold Mill and Hot Mill areas and are listed below:

- 20,000-gallon Diesel Tank
- 21,900-gallon Bearing Lube Tank 1
- 21,900-gallon Bearing Lube Tank 2

- 21,900-gallon Gearbox Lube Tank

Annual inspections are recommended to be performed after large storm events. These are inspections which require formal documentation. The annual and monthly inspection forms are found in the appendix of the SPCC Plan. Daily visual inspections are also required as part of the SPCC Plan, but these are informal and do not required documentation.

Another feature of the SPCC Plan is to prepare for possible reasonable failures and implement a planned response to minimize environmental impacts. Big River Steel uses reasonable release scenarios to predict direction, rate of flow, and total quantity of oil that could be discharged from the facility from reasonable types of failures. Countermeasure plans are identified for each of these scenarios to control the discharge and minimize the environmental impact.

4.1.1 Stormwater Pollution Prevention Plan

A Stormwater Pollution Prevention Plan (SWPPP) is a required step for facilities to obtain a National Pollution Discharge Elimination System (NPDES) Permit. The objective of the SWPPP is to preserve and improve water quality by helping the Environmental Protection Agency (EPA) regulate facilities that discharge water containing small amounts of pollutants.

The current SWPPP became effective on July 1st, 2019 and is set to expire on June 30th, 2024, when it will require recertification for another 5 years. The SWPPP outlines how Big River Steel will comply with the requirements of its Industrial Stormwater General (IGP) Permit to minimize the discharge of stormwater pollutants through the implementation of Best Management Practices (BMPs). The SWPPP covers areas at the facility which are not covered under the NPDES permit. Therefore, the wastewater treatment process for the mill, slag pile storage, material handling, dust suppression, and quenching activities are not covered in the SWPPP. Additionally, the four leased lots on the north end of the property will not be operated by Big River Steel and are also not covered in the SWPPP. Stormwater generated from all other parts of the facility are covered in the SWPPP.

The SWPPP outlines the proactive control measures that the facility will take to prevent water pollution via contaminated stormwater discharges. It also includes procedures and equipment that will be used in case of a release. While the SWPPP contains lots of information to accomplish these goals, the following are the main components of the SWPPP:

- Facility Description and Information
- Stormwater Pollution Prevention Team
- Industrial Activities Which May Cause Pollution and Corresponding Pollutants
- Control Measures, Schedules, and Procedures for Each Pollutant Source
- Spill Response Procedures
- Parameter Benchmark Monitoring
- Inspections

- Employee Training

Conformance with SWPPP requires that Big River Steel implement the following items at the facility:

- Conduct at least 4 annual inspections with at least 1 conducted during a period of stormwater discharge
- Implement an employee training program as described in the SWPPP
- Sample Outfall 001 for Total Suspended Solids (TSS), pH, Total Aluminum, and Total Zinc once per year and investigate cause and/or source if elevated pollutant levels are detected
- Prepare an annual report by the 31st of January for the previous calendar year as outlined in the SWPPP

4.2 Site Water Balance

Big River Steel initiated efforts to construct a comprehensive water balance in July of 2021 for its facility and those efforts are ongoing. Since the water balance development is still in its early stages, a phased approach is planned to facilitate construction of the water balance and allow Big River Steel to work through some of the logistical issues that inherently accompany this process.

This phased approach is intended to initiate the process of building the water balance by focusing on the largest water users at the facility and creating the framework for the balance that can be built upon over time with additional details. The water balance will include both design and actual flows for each of its major components. The plan includes the following steps:

- Quantify the bookend influent and effluent flows for the facility
    - Influent flows
        - Four deep wells drawing from Wilcox Aquifer
        - Three shallow wells drawing from Mississippi River Valley Alluvial Aquifer
    - Effluent flows
        - Outfall 001 discharge of treated wastewater
        - Outfall 002 discharge from the slag area (stormwater and dust suppression water)
        - Outfall SW001 discharge of facility wide stormwater
- Quantify the three distinct influent water streams which are distributed throughout the facility
    - Filtered Water

- Softened Water
- Demineralized Water

- Apply the Pareto Principle (80/20 Rule) to identify the approximately 20% of the processes which should account for approximately 80% of the water consumption for each influent stream identified above
- Complete the water balance with the smaller water users not yet captured in the previous steps
- Update the water balance on an annual basis and when significant changes are made to the facility water usage

Big River Steel has completed the first step and is currently working on the second step. One of the key challenges which has been encountered to date is that while Big River Steel has various flow meters installed throughout the facility, the flow data was only being captured instantaneously, for the most part, and not accessible via a historian. Big River Steel has been working with the consultant responsible for data programming and management to ensure that flow information is saved to a historian and easily accessible in the future. This is an ongoing effort and should substantially facilitate water balance construction and management in the future.

Refer to **Appendix B** for a current version of the facility water balance.

Once the water balance has been completed, the objective is for Big River Steel to utilize it as a living document to guide its water usage both on a facility wide level as well as for individual processes. Water usage will be able to be trended on a monthly and yearly basis and serve as an important tool for system optimization and identification of water saving opportunities.

4.3 Water Quality

4.3.1 Source Water

4.3.3.1 Wilcox Aquifer

According to the well construction information, Wells 1 and 2 had Hardness of 110ppm, pH around 7.2, and iron levels of 1.287 ppm (this data was not included for Wells 3 and 4). Regionally, the water contained in the potion of the Wilcox Aquifer in northeastern Arkansas is typically soft sodium-bicarbonate water. The dissolved solids range from 100 to 150 mg/L. There were pockets of high iron and sulfate concentrations found in Mississippi County and chloride levels are low (Kresse, 2014). Several Arkansas state reports anecdotally mention that the groundwater from the Wilcox Aquifer is of very high quality. **Table 4-1** contains an overview of water quality parameters for the Wilcox Aquifer throughout the state.

Table 4-1 Wilcox Aquifer Water Quality Parameters

Parameter	Minimum	Median	Maximum	Standard Deviation
Calcium (mg/L)	0.3	4.4	24,000	2,260
Magnesium (mg/L)	0.01	1.2	2,600	244

Parameter	Minimum	Median	Maximum	Standard Deviation
Sodium (mg/L)	0.5	37.8	73,000	6,930
Potassium (mg/L)	0.1	2.1	840	81.8
Bicarbonate (mg/L)	2.0	110	512	101
Chloride (mg/L)	0.8	4.8	150,000	12,600
Sulfate (mg/L)	0.02	3.4	430	52.7
Silica (mg/L)	4.6	11	66	11
Nitrate (mg/L as nitrogen)	0.01	0.11	19	2.33
Dissolved solids (mg/L)	14	128	253,000	23,700
Iron (µg/L)	0.05	130	220,000	20,800
Manganese (µg/L)	0.13	10	1,800	287
Arsenic (µg/L)	0.03	0.52	1.0	0.48
Hardness (mg/L as calcium carbonate)	1.0	21	71,000	6,060
Specific conductance (µS/cm)	16	205	13,500	1,200
pH (standard units)	4.9	7.5	8.9	0.8

Source: Kresse, T.M., Hays, P.D., Merriman, K.R., Gillip, J.A., Fugitt, D.T., Spellman, J.L., Nottmeier, A.M., Westerman, D.A., Blackstock, J.M., and Battreal, J.L., 2014, Aquifers of Arkansas—Protection, management, and hydrologic and geochemical characteristics of groundwater resources in Arkansas: U.S. Geological Survey Scientific Investigations Report 2014–5149, 334 p., *http://dx.doi.org/10.3133/sir20145149.*

4.3.3.2 Mississippi River Valley Alluvial Aquifer

The groundwater from the Mississippi River Valley Alluvial Aquifer contains higher levels of hardness, iron, and manganese as well as pockets of high chloride concentrations. Small pockets of high arsenic concentrations are also present in the alluvial aquifer. **Table 4-2** contains an overview of water quality parameters for the alluvial aquifer throughout Arkansas. Testing for pesticides in the groundwater has been conducted since the 1990s with a 14-percent detection rate while concentrations detected have been low (Kresse, 2014). Because BRS uses the shallow well water for non-product and non-domestic uses, the elevated presence of contaminants in this water source should not present long-term concerns.

Table 4-2 Mississippi River Valley Alluvial Aquifer Water Quality Parameters

Parameter	Minimum	Median	Maximum	Standard Deviation
Calcium (mg/L)	0.1	65	659	47.3
Magnesium (mg/L)	0.03	16	663	22.8
Sodium (mg/L)	0.23	22	771	61
Potassium (mg/L)	0.08	1.8	54	2.8
Bicarbonate (mg/L)	2.0	276	830	151
Chloride (mg/L)	0.12	23	7,150	237

Parameter	Minimum	Median	Maximum	Standard Deviation
Sulfate (mg/L)	0.1	11	1,200	64
Silica (mg/L)	1.2	31	667	23
Nitrate (mg/L as nitrogen)	0.002	0.09	228	7.9
Dissolved solids (mg/L)	28	320	3,435	292
Iron (µg/L)	0.05	1,200	109,000	6,812
Manganese (µg/L)	0.13	413	25,000	1,010
Arsenic (µg/L)	0.03	2.09	80	8.8
Hardness (mg/L as calcium carbonate)	1.05	220	4,380	215
Specific conductance (µS/cm)	7	596	10,200	550
pH (standard units)	4.2	7.2	9.4	0.6

Source: Kresse, T.M., Hays, P.D., Merriman, K.R., Gillip, J.A., Fugitt, D.T., Spellman, J.L., Nottmeier, A.M., Westerman, D.A., Blackstock, J.M., and Battreal, J.L., 2014, Aquifers of Arkansas—Protection, management, and hydrologic and geochemical characteristics of groundwater resources in Arkansas: U.S. Geological Survey Scientific Investigations Report 2014–5149, 334 p., *http://dx.doi.org/10.3133/sir20145149.*

4.3.2 Effluent

Big River Steel has an NPDES permit which governs the discharge at Outfall 001 and Outfall 002. Outfall 001 includes current and new treated process wastewater from the following sources:

- PH Degasser Unit
- Hot Rolling Mill
- Chromate Reactor
- Pickling Line
- Tandem Cold Mill
- Non-contact Cooling Water Systems
- Coating Operations
- Continuous Casting Line
- Alkaline Cleaning Operations
- Galvanizing Line
- Skin Pass Mill
- Contact Cooling Water Systems
- Reversing Cold Mills

Outfall 002 includes runoff from the slag pile area and dust suppression/quenching water runoff from the slag pile.

The NPDES permit has established effluent limitations and monitoring requirements for Outfall 001 based on Big River Steel's average daily production of liquid steel for a calendar month. Tier I limitations and requirements apply when production of liquid steel is equal to or less than 11,000,000 lbs./day, while Tier II limitations and requirements apply when production exceeds that amount. **Table 4-3** and **Table 4-4** provide the effluent characteristics, discharge limitations, and monitoring requirements for Outfall 001 under Tier I and Tier II conditions, respectively.

Table 4-3 Tier I Conditions for Outfall 001

Effluent Characteristics	**Discharge Limitations**				**Monitoring Requirements**	
	Mass (lb/day, unless otherwise specified)		Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow	N/A	N/A	Report, MGD	Report, MGD	once/day	totalizing meter
Total Suspended Solids (TSS)	235.3	610.9	Report	Report	once/week	composite
Oil and Grease (O&G)	78.6	143.9	10	15	once/week	grab
Chromium (VI)[1]	0.02	0.06	Report[3]	Report[3]	once/week	composite
Chromium, Total Recoverable[1]	0.1	0.3	Report[3]	Report[3]	once/week	composite
Lead, Total Recoverable[1]	0.5	1.6	Report[3]	Report[3]	once/week	composite
Nickel, Total Recoverable[1]	0.08	0.2	Report[3]	Report[3]	once/week	composite
Zinc, Total Recoverable[1]	0.8	2.3	Report[3]	Report[3]	once/week	composite
Naphthalene[1]	0.01	0.03	Report[3]	Report[3]	once/week	grab
Tetrachloroethylene[1]	0.02	0.04	Report[3]	Report[3]	once/week	grab
pH	N/A	N/A	Minimum 6.0 s.u.	Maximum 9.0 s.u.	once/week	grab
Acute WET Testing[2, 4]	N/A	N/A	Report		once/quarter	24-hr composite
***Pimephales promelas* (Acute)**[2]	N/A	N/A	48-hr Minimum			
Pass/Fail Lethality (48-Hr NOEC) **TEM6C**			Report (Pass=0/Fail=1)		once/quarter	24-hr composite
Survival (48-Hr NOEC) **TOM6C**			Report %		once/quarter	24-hr composite
Coefficient of Variation (48-Hr NOEC) **TQM6C**			Report %		once/quarter	24-hr composite
Pass/Fail Retest 1 (48-Hr NOEC) 22418			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 2 (48-Hr NOEC) 22419			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 3 (48-Hr NOEC) 51444			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
***Daphnia pulex* (Acute)**[2]			48-hr Minimum			
Pass/Fail Lethality (48-Hr NOEC) **TEM3D**			Report (Pass=0/Fail=1)		once/quarter	24-hr composite
Survival (48-Hr NOEC) **TOM3D**			Report %		once/quarter	24-hr composite
Coefficient of Variation (48-Hr NOEC) **TQM3D**			Report %		once/quarter	24-hr composite
Pass/Fail Retest 1 (48-Hr NOEC) 22415			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 2 (48-Hr NOEC) 22416			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 3 (48-Hr NOEC) 51443			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite

Table 4-4 Tier II Conditions for Outfall 001

Effluent Characteristics	Discharge Limitations				Monitoring Requirements	
	Mass (lb/day, unless otherwise specified)		Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow	N/A	N/A	Report, MGD	Report, MGD	once/day	totalizing meter
Total Suspended Solids (TSS)	585.3	1515.0	Report	Report	once/week	composite
Oil and Grease (O&G)	195.5	356.9	10	15	once/week	grab
Chromium (VI)[1]	0.07	0.20	Report[3]	Report[3]	once/week	composite
Chromium, Total Recoverable[1]	0.2	0.6	Report[3]	Report[3]	once/week	composite
Lead, Total Recoverable[1]	1.4	4.2	Report[3]	Report[3]	once/week	composite
Nickel, Total Recoverable[1]	0.18	0.53	Report[3]	Report[3]	once/week	composite
Zinc, Total Recoverable[1]	2.0	6.0	Report[3]	Report[3]	once/week	composite
Naphthalene[1]	0.03	0.06	Report[3]	Report[3]	once/week	grab
Tetrachloroethylene[1]	0.04	0.09	Report[3]	Report[3]	once/week	grab
pH	N/A	N/A	Minimum 6.0 s.u.	Maximum 9.0 s.u.	once/week	grab
Acute WET Testing[2]	N/A	N/A	Report		once/quarter	24-hr composite
Pimephales promelas **(Acute)[2]**			48-hr Minimum			
Pass/Fail Lethality (48-Hr NOEC) **TEM6C**			Report (Pass=0/Fail=1)		once/quarter	24-hr composite
Survival (48-Hr NOEC) **TOM6C**			Report %		once/quarter	24-hr composite
Coefficient of Variation (48-Hr NOEC) **TQM6C**			Report %		once/quarter	24-hr composite
Pass/Fail Retest 1 (48-Hr NOEC) 22418			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 2 (48-Hr NOEC) 22419			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 3 (48-Hr NOEC) 51444			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Daphnia pulex **(Acute)[2]**			48-hr Minimum			
Pass/Fail Lethality (48-Hr NOEC) **TEM3D**			Report (Pass=0/Fail=1)		once/quarter	24-hr composite
Survival (48-Hr NOEC) **TOM3D**			Report %		once/quarter	24-hr composite
Coefficient of Variation (48-Hr NOEC) **TQM3D**			Report %		once/quarter	24-hr composite
Pass/Fail Retest 1 (48-Hr NOEC) 22415			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 2 (48-Hr NOEC) 22416			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite
Pass/Fail Retest 3 (48-Hr NOEC) 51443			Report (Pass=0/Fail=1)		once/month[4]	24-hr composite

The NPDES permit also has established effluent limitations and monitoring requirements for Outfall 002 which are presented in the following **Table 4-5**.

Table 4-5 Outfall 002

Effluent Characteristics	Discharge Limitations				Monitoring Requirements	
	Mass (lb/day, unless otherwise specified)		Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow	N/A	N/A	Report, MGD	Report, MGD	two/week	calculated[1]
Total Suspended Solids (TSS)	N/A	N/A	100	150	once/quarter	grab
Oil and Grease (O&G)	N/A	N/A	10	15	once/quarter	grab
pH	N/A	N/A	Minimum 6.0 s.u.	Maximum 9.0 s.u.	once/month	grab

Based on the NPDES reporting data for Outfall 001 and 002, the annual pollutant loading from 2020 is summarized in **Table 4-6**.

Table 4-6 2020 Pollutant Loading from Wastewater

Pollutant Name	Total Pounds (lbs./yr.)
Solids, total suspended	54,779
Oil and grease	2,739
Zinc	99
Nickel	6.33
Chromium	2.41
Lead	0.408
Chromium, Hexavalent	0
Tetrachloroethylene	0
Naphthalene	0

An important note is that the data included in Table 4-6 shows pollutant loading prior to the implementation of Phase 2 improvements which was commissioned in 2021. These improvements have already shown significantly lower metals concentrations in the water discharge so the above table may not necessarily represent current plant operations.

4.3.3 Receiving Water Bodies

The Arkansas Department of Environmental Quality (DEQ) monitors water quality for surface water and streams in the state and compares to the Arkansas Water Quality Standards. They produce lists of impaired water bodies every two years under the Federal Clean Water Act. The Sandy Bayou is not listed on the Arkansas 303(d) Impaired Water Body list for 2020. The ultimate receiving water of Sandy Bayou, the St. Francis River, is impaired for dissolved oxygen and chlorides, however no TMDLs have been set.

The Mississippi River is not included in the list of impaired surface waters, however this is a major water body with uses across industries and the long-term water quality impacts should be protected. The Sans Souci Landing park in Osceola is located on the Mississippi River, immediately upstream of the wastewater outfall.

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Section 5

Proposed Water Stewardship Strategy

5.1 Water Strategy

5.1.1 Mission, Vision, and Goals

The mission and vision for Big River Steel is to minimize water consumption, water discharges, and to reduce the environmental impact of the facility on local water resources.

To meet this mission and vision, the amount of water used at the site annually per ton of steel produced will be tracked and reported. As shown below, in July 2021 this was calculated as 1.8 m^3 water per ton of liquid steel produced. Going forward, this will continue to be reported annually as well as daily (internally). This serves as BRS's overarching water metric. Note that water volumes from deep wells as well as shallow wells is integrated into this metric.

Water Use Intensity (m3 water/ton of steel)
Baseline – from July 2021
1.8

5.1.2 Organizational Chart

At the BRS site, Dean Caldwell and his team are responsible for leadership in water management. Dean works with US Steel through their Environmental Steering Committee to establish goals and policies related to environmental performance. **Figure 5-1** includes a chart showing additional key staff at BRS that will be responsible for implementing and tracking progress on the water goals included in this section.

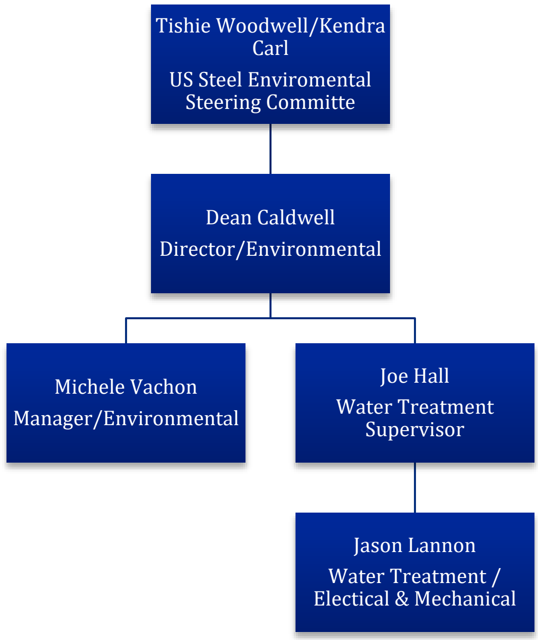

Figure 5-1 BRS Environmental Organizational Chart

5.2 Water Reduction Strategy

As described in the targets identified below, there are opportunities to continue to improve water management at BRS that can be formalized and tracked by operations staff and the Environmental Steering Committee. These targets should be modified and updated to reflect current conditions at the site and reflect corporate water management goals. As a starting point, the following goals (or targets) have been identified which are detailed further in the following sections:

- Establish a baseline metric for water use per ton of steel produced through:
  - Daily *internal* reporting of m3 water/metric ton of steel, on an internal dashboard.
  - Annual *external* reporting of m3 water/metric ton steel produced.
  - Conducting a quarterly review and update of the BRS site Water Balance.
- Annual review and update of this Water Stewardship Plan document.

5.2.1 Target

Reduce water use per ton of steel produced by baselining and better quantifying water use at BRS.

5.2.2 Measurement and Monitoring Methods

Utilizing the new water balance, baseline water use at the facility can be documented and goals for water reduction can be established.

In addition to the deep wells, volumes extracted from the shallow wells will be quantified and factored into the water use calculations for the site.

5.2.3 Actions

Baseline site-wide water use at BRS in 2022.

5.2.4 Timeframe

Begin baselining in 2021, with completion of totalizer programming. Measure water use in 2022 using the water balance template, while also improving measurement/tracking of shallow water use.

5.2.5 Budget

BRS will establish an adequate budget for this effort.

5.2.6 Responsible Persons

Dean Caldwell and Jason Lannon will be responsible for this target.

5.3 Internal Reporting

5.3.1 Targets

- Daily *internal* reporting of m3 water/metric ton of steel, on an internal dashboard.
    - Include monitoring of water usage from shallow wells

5.3.2 Measurement and Monitoring Methods

Utilizing a dashboard that captures daily deep well and shallow well water usage, this goal will be considered complete when a functioning dashboard is reporting accurate daily water metrics (per ton of steel produced) and is accessible by BRS staff.

5.3.3 Actions

- Determine best procedure for accessing and recording daily water use (daily steel production is currently reported).
- Establish monitoring system for daily shallow well usage.
- Create an internal dashboard for staff to view water usage data on a daily basis.
- Collect and store daily records to analyze trends.
- Monitor daily water use and note any deviations from expected values and changes in processes.

5.3.4 Timeframe

- Winter 2021: Solve any outstanding issues with daily data collection on deep well use and implement system to monitor shallow well withdrawal.
- Spring 2022: Set up dashboard and begin daily monitoring and reporting.

5.3.5 Budget

BRS will establish an adequate budget for this effort.

5.3.6 Responsible Persons

Dean Caldwell and Jason Lannon will be responsible for this target

5.4 External Reporting

5.4.1 Targets

- Annual *external* reporting of m3 water/metric ton steel produced.

5.4.2 Measurement and Monitoring Methods

5.4.3 Actions

- Once the processes are in place for the internal daily reporting in Section 5.3, the data collected can be aggregated on an annual basis.

- Publish water use metric annually on BRS website or through another company publication.

5.4.4 Timeframe

- Assuming data reporting and collection can be implemented by December 2021, data collection should be ongoing throughout 2022.

- Early 2023: Publish 2022 annual m3 water used/metric ton steel produced.

5.4.5 Budget

BRS will establish an adequate budget for this effort.

5.4.6 Responsible Persons

Dean Caldwell and Michele Vachon will be responsible for ensuring data collection is implemented, aggregate the data at year-end, and ensure the appropriate metrics ire included on the BRS website or in publication.

5.5 Water Balance Update

5.5.1 Targets

Conduct a quarterly review and update of the BRS Water Balance.

5.5.2 Measurement and Monitoring Methods

The measurement and monitoring of this goal includes utilizing the data from flow meters throughout the plant. Additional metrics to measure and monitor this goal include regular internal review of progress on obtaining flow data and updates to the diagram. Other improvements could include:

- Addition of a flow meter to Outfall 002 for improved reporting accuracy.

- Addition of flow meters on the deep wells to monitor each one individually.
- Continued addition of totalizers throughout the plant on existing flow meters.
- Use one month's worth of data when calibrating water balance.
- Understand where at least 90% of process water flows go. Formally calculate evaporation rates.

5.5.3 Actions

- Continue working with Russula to get flow analyzers working and ensure data collection over time is efficiently available and to ensure major flows in and out of each process are captured.
- Continue to add additional detail to water balance where flow data is available to further enhance the functionality focusing on large water users first.
- Review and modify water balance diagram and update as needed to reflect process changes, additions, and improvements.
- Update flow data on a quarterly basis to reflect long-running averages that capture typical plant operations.
- Utilize water balance to identify which processes would benefit most from additional water reuse or reduction opportunities and improvements for future capital projects.

5.5.4 Timeframe

The initial water balance can be populated by BRS in September/October 2021. BRS should continue to progress the data accuracy and continue incorporating additional detail with regularly scheduled quarterly reviews.

5.5.5 Budget

BRS will establish an adequate budget for this effort.

5.5.6 Responsible Persons

Dean Caldwell, BRS Environmental Director, is responsible for the oversight and continued review and improvement of the site water balance. Jason Lannon, BRS Water Treatment Systems Engineer, is primarily responsible for data collection and analysis to update the water balance diagram as processes and water streams are modified at the plant. Both will continue to coordinate with Russula to ensure they are fulfilling BRS's requests for flow monitoring that can be easily collected and analyzed throughout the plant.

5.6 Water Stewardship Plan Update

5.6.1 Targets

Annual review and update of this Water Stewardship Plan document.

5.6.2 Measurement and Monitoring Methods

Monitoring the progress of the overall WSP and the establishment of targets and goals involves continued monitoring and tracking of all the system included in this section as well as continual review and update of the site narrative to reflect updates and changes related to water use at the plant and any changes in the local environment, water sources, or water bodies being discharged to.

5.6.3 Actions

- Review current Water Stewardship Plan and update any outdated information contained in the background information sections.
- Review progress made on goals from prior year.
- Update document to include progress on prior goals.
- Conduct meeting(s) with relevant stakeholders and neighboring water users/dischargers to review draft plan for their input on impacts and to gather ideas for additional collaborative water strategies within the larger area of influence.
- Create new water stewardship goals for BRS based on the suggestions of stakeholders and to reflect any changes in the local environment, water scarcity, or emerging water quality concerns. Goals should be measurable and timebound with strategies in place for tracking progress made.
- Finalize updated plan and publish to website for public viewing.

5.6.4 Timeframe

This document is estimated to be complete in October 2021, based on that date, a timeline for completing an annual update in October 2022 may be:

- Spring 2022: Engage stakeholders and conduct meetings to discuss water-related concerns and local challenges.
- Summer 2022: Review progress on current Water Stewardship goals and begin brainstorming goals for the next iteration.
- Fall 2022: Complete review of current information, update as needed, and draft update on progress made on prior-year goals and outline plans for implementing new goals.
- October 2022: Finalize Water Stewardship Plan and make available to the public.

5.6.5 Budget

BRS will establish an adequate budget for this effort.

5.6.6 Responsible Persons

The Environmental Director is responsible for the annual review and update of the Water Stewardship Plan and overseeing the progress toward goals. BRS and USS Corporate

Communications will coordinate local and regional stakeholder engagement and support the Environmental Director on incorporating feedback into future water stewardship goals and strategies.

Section 6

Continual Improvement

6.1 Stakeholder Engagement Plan

It is recommended that BRS develop a stakeholder engagement plan and begin routine implementation of stakeholder meetings. Given that water could be a future business risk for BRS, it is important to manage water regionally and understand other major users and dischargers in the area. It is also important to understand new users/industries that may move into the area and increase pressure on water resources.

6.2 Progress and Performance Tracking

By continually making progress against and editing the targets and goals identified in Section 5, BRS will continue to drive more efficient water use.

6.2.1 Relevant Sector Best Practices

According to the World Steel Association, based on a survey published in 2011, the average water intake for integrated plants was 28.6 m^3 per metric ton of steel produced and the average water discharge was 25.3 m^3. For electric arc furnace plants, the water intake was 28.1 m^3 per metric ton of steel produced with discharges of 26.5 m3. Reports from another Responsible Steel certified producer reported water usage rates more in line with BRS, at 2.4 m3/ton steel.

The World Steel Association also advises that local and regional water management regulations are the best method of setting guidelines and restrictions for water use and discharge as they capture the variability of local conditions surrounding water availability and discharge limitations (World Steel Association, 2021b).

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Appendix A

BRS Water-Related Permits and Reporting

Type of Permit	Permit or Registration No.	Date Issued	Expiration Date	Reporting Required
Deep Wells Construction Registration		May 19, 2016 May 18, 2016 November 4, 2019 November 6, 2019	N/A	Well construction records
Water Use Registration (ANRC)	Pending	Pending	Renew annually between October 1 and March 1	Annual withdrawal for any wells with potential to withdraw over 50,000 gallons per day
Shallow Wells Construction Registration			N/A	Well construction records
NPDES Industrial Stormwater General Permit	ARR001578	July 1, 2019	June 30, 2024	Outfall SW001: Once/year grab samples for pH, Total Suspended Solids, Total Aluminum, Total Zinc
NPDES Authorization to Discharge Wastewater	AR0052582	July 1, 2016	June 30, 2021 (Renewal application submitted)	Outfall 001: See permit – Tier 1 and Tier 2 limits depending on production Outfall 002: two/week flow, once/quarter grab of TSS and O&G, once/month grab of pH
NPDES State Construction Permit	ARR0052582C	February 1, 2020	N/A	Permit to modify wastewater treatment plant
NPDES Stormwater Construction General Permit	ARR154284	March 11, 2014	October 31, 2021	Must provide SWPPP
NPDES Application Modification Outfall 001 & 002				

Appendix B

Draft Water Balance

Provided as a separate file.

Appendix C

WWF Water Risk Filter Results

Provided as a separate file.