Geosyntec consultants

MANUFACTURING WATER MANAGEMENT TOOLKIT

WATER FOOTPRINTING

Over the course of years, facilities often evolve without a good understanding of how much water they use or how they use it. For such facilities, Geosyntec asks the right questions to create a full inventory of water usage. A "water footprint" is calculated following a comprehensive review of total water used at a particular site and is often expressed as a volume of water per unit of product. Assessing a facility's water footprint is a comprehensive review of the total water volume used at a production facility and is often expressed as a volume of water per unit of product. Assessing the water footprint is an important first step in uncovering opportunities for reducing water use, minimizing waste, and saving money. After measuring a facility's water footprint, we help clients find ways to use less water in production, improve the characteristics of effluent wastewater, and minimize total discharge. At Geosyntec, we understand the demands of manufacturing within regulatory constraints and the sustainability drivers of an organization; we have the expertise to develop best-value, practical solutions.

Clients value Geosyntec's ability to provide the following:

- Broad experience at a variety of manufacturing facilities
- Comprehensive methods for water footprint accounting in manufacturing facilities
- Calculation of water footprints for individual processes and products
- Ranking and evaluation of water uses based on cost-benefit assessments
- Options for reducing the water footprint

When acting upon an industrial water footprint, we often consider the following factors to find and prioritize ways to save money and water:

- Cost of water consumption over time
- Water supply and water quality risks
- Wastewater discharge fees
- Pretreatment technologies
- Energy and operating costs associated with water use (heating, pumping, water treatment, etc.)
- Energy reduction initiatives
- Sustainability goals and metrics
- Regulatory costs (permits, compliance monitoring, etc.)
- Costs for water management measures (staff time and resources, technology, equipment and materials)
- Site constraints
- Relationships with stakeholders (suppliers, financial institutions, employees, regulators, customers, shareholders, neighbors, and local communities)

OUR EXPERTS, WORKING FROM MANY LOCAL OFFICES THROUGHOUT THE WORLD, HELP CLIENTS MANAGE THE MANY WAYS THEY USE WATER, NO MATTER WHERE THEY OPERATE.

Geosyntec professionals have experience integrating pollution prevention, water and waste management, and wastewater treatment optimization directly to manufacturing facilities. Once we have completed a water footprint for a client, we act on our findings by integrating them with existing plans to prevent pollution and to manage water and waste more generally. We create a comprehensive plan with actionable steps for each facility. The best way to determine how these general approaches can fit a manufacturing facility's needs is to conduct a phased-source water management and control audit. The steps involved in a phased-source water management and control audit are outlined in the figure below.

Reducing a facility's water footprint can provide value in several ways. Geosyntec evaluates economic, risk reduction (financial, strategic, operational and hazard), social, and environmental factors to prioritize water footprint reduction options. We work with our clients to establish fit-for-purpose solutions, weighing potential water reductions while evaluating engineering and cost complexities.

PHASE I: PRE-ASSESSMENT

- Audit focus and preparation
- Identify unit operations and processes
- Prepare process flow diagrams

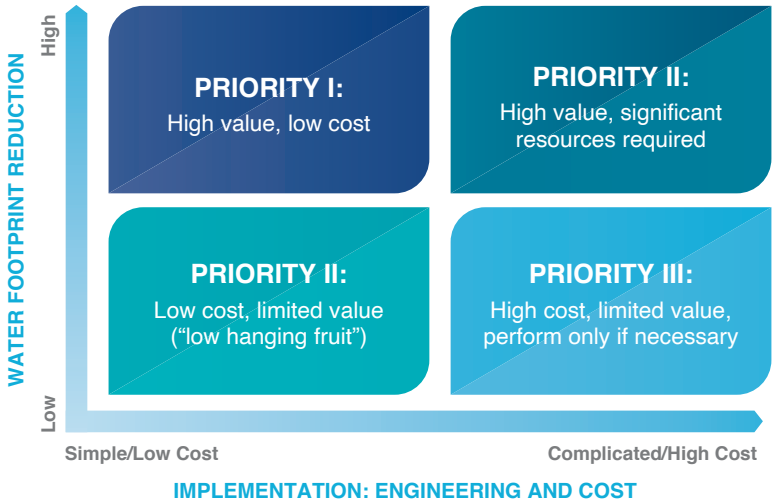
PHASE II: MASS BALANCE

- Determine water and raw material inputs
- Record water usage
- Assess present practice and procedures
- Quantify process outputs
- Account for discharges
  - To atmosphere
  - To wastewater
  - **To off-site disposal**
- Assemble input and output information
- Derive a preliminary mass balance
- **Evaluate and refine the mass balance**

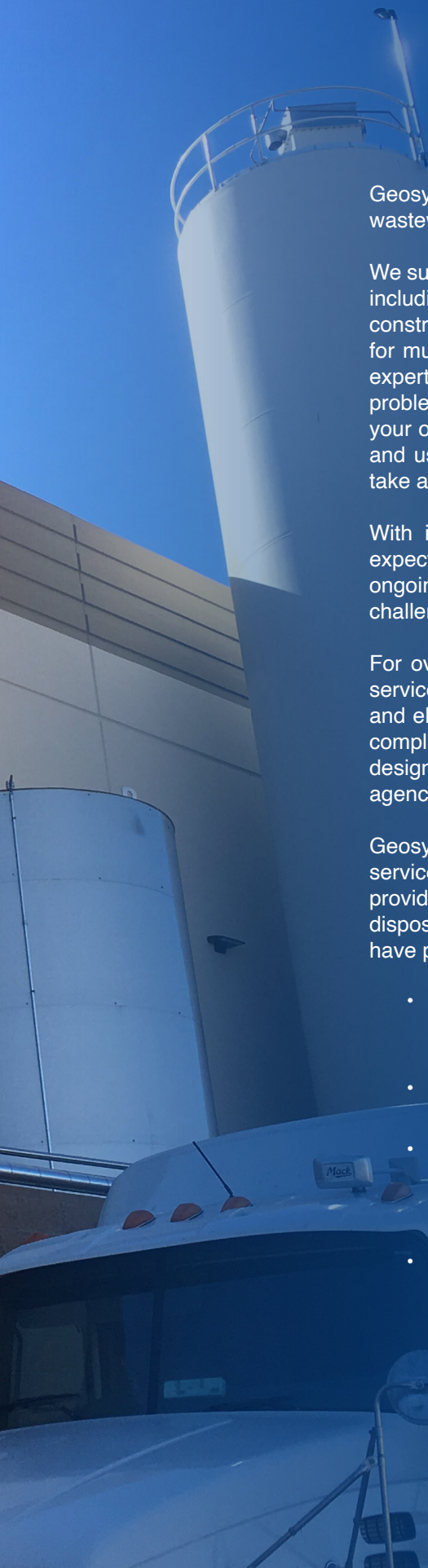
PHASE III: SYNTHESIS

- Identify options
  - Identify opportunities
  - Target problem areas
- Evaluate options
  - Technical, regulatory, sustainability, economic
- Prepare action plan
  - Waste reduction plan
  - **Production efficiency plan**
  - Training

Working with our team, many facilities were able to recycle waste streams back into manufacturing as a raw material or were able to use their waste material to generate energy. These projects have been successful from both technical and community relations viewpoints. The sustainability efforts of these leading companies demonstrated a positive commitment to their local communities.



Manufacturers seek sustainability and efficiency to benefit customer value, employee recruitment and retention, and bottom-line savings. At Geosyntec, we seek opportunities to integrate sustainability from the earliest stages of a project. A successful project displays resource conservation, best-value pricing, and sustainable operation for our clients.



HAVE YOU CONSIDERED GEOSYNTEC?

Geosyntec's engineers and industry experts help clients manage process water and wastewater and provide comprehensive environmental management services.

We support clients throughout the life of a facility, from concept through all that follows, including conducting feasibility studies, designing projects and processes, managing construction, training and supervising personnel, and managing operations, often for multimillion-dollar facilities. Clients turn to our engineers, scientists, and process experts to create complete solutions to many kinds of water and water-treatment problems. Geosyntec's tightly knit team is intentional about sharing information across your organization and our own. We know this is the surest way to create high-quality and useful work products. We create reports and share knowledge so that you can take action and use our findings to implement best practices across multiple facilities.

With increasingly stringent regulations and shrinking budgets, manufacturers are expected to do more with less. Our people solve problems, rather than creating an ongoing need for our services. Clients know we understand and address their unique challenges so that they can get back to work.

For over 16 years, Geosyntec has provided water, engineering, and environmental services to clients in Canada, the United States, Europe, Australia, the Middle East, and elsewhere. Our services have included a variety of technical support: regulatory compliance evaluations, pollutant source investigations, corrective action planning and design, stormwater evaluations, treatability assessments, pilot studies, and regulatory agency/stakeholder support.

Geosyntec's in-house engineers, scientists, and technicians provide comprehensive service solutions for water, wastewater, and environmental management. We also provide a full range of design for wastewater treatment, water treatment, sludge disposal, and solid waste handling facilities, and other manufacturing processes. We have provided the following types of services to our clients:

- Developing of sitewide water balances to support client decisions and risk assessments
- Identifying of water and cost reduction opportunities
- Optimizing of existing wastewater treatment systems to allow for production increases without major capital investment
- Developing strategies to mitigate increasing sewer discharge costs
- Evaluating of potential environmental impacts from proposed changes in operating procedures, production levels or product formulation
- Upgrading outdated water and wastewater systems and equipment
- Complying with changes in permitting requirements
- Planning for facility expansions, refurbishment, or green-field developments

OUR EXPERIENCE

To address our clients' needs, Geosyntec provides a full range of water and wastewater engineering services globally:

- Water balance and water footprinting
- Water and wastewater cost-benefit analyses
- Compliance auditing
- Data collection network design
- Planning studies, feasibility studies, and permitting
- Collection and distribution system studies
- Hydraulic and process modeling
- Wastewater characterization
- Technology evaluations
- Bench and pilot-scale treatability studies
- Equipment sizing and selection
- Computer-aided Design (CAD) services, drawing management
- Water and wastewater collection and treatment plant design and construction
- Asset management
- Corrective action plan implementation
- Control strategy development
- Instrumentation selection and integration
- Electrical and power infrastructure
- Pump-station design
- Program and project management
- Construction specification development
- Construction supervision and inspection
- Operations assistance, startup, training, and troubleshooting

WE ARE PROUD TO LIST THE FOLLOWING COMPANIES AS SOME OF OUR CURRENT INDUSTRIAL WATER AND WASTEWATER CLIENTS:

- Aerojet
- Bacardi
- Boeing
- Cargill
- Coca-Cola
- Crown Holdings CSX
- Cummins Atlantic General Motors
- L.A. Metro
- Lehigh Hanson
- Lockheed Martin
- Nestlé
- Northrop Grumman
- Pepsi
- Plansee
- Thermal Management Solutions Raytheon
- United States Navy
- J.R. Simplot
- Teck Resources
- Trident Plating
- Maple Lodge Farms
- Weber Metals
- Zoetis

GEOSYNTEC TEAM MEMBERS HAVE EXTENSIVE EXPERIENCE WORKING IN THE FOLLOWING TYPES OF INDUSTRIAL FACILITIES:

- Aerospace
- Automotive
- Chemical
- Manufacturing
- Fiber spinning
- Food and beverage
- Metal casting
- Oil and gas
- Mining and ore Processing
- Power and utilities
- Public sector infrastructure
- Resin manufacturing
- Steel manufacturing
- Waste reclamation

COMPLEMENTARY WATER SERVICES

WATER/WASTEWATER TREATMENT

Clients trust Geosyntec to find and help them implement the best water-use reduction and wastewater treatment programs for their particular operation. In addition to reducing water use, we consider costs, environmental impacts, operational resiliency, resource recovery, your brand, and all of the ways water can impact your business.

We understand the demands of industrial clients, and we have the waste treatment process, design, and operations expertise to develop practical solutions. Our client's benefit from Geosyntec's ability to independently evaluate water and wastewater treatment options specific to site requirements. We are not obligated to use specific technologies or vendor packages, which results in better overall solutions for our clients.

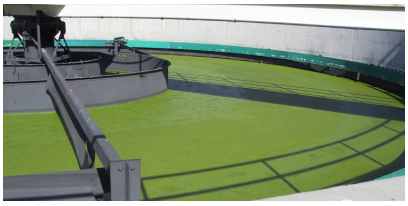
We also assess, implement, and troubleshoot the following water and waste-water technologies.

Pretreatment

- Equalization
- Coarse or bar screening
- Metals removal
- Grinding
- Fine screening
- Dissolved air flotation
- Vapor capture

Physical-Chemical Treatment

- Oxidation/advanced oxidation
- Electrocoagulation
- Electrowinning
- Coagulation/flocculation
- Oil/water separation
- pH Adjustment
- Membrane separation
- Multistage removal of complex contaminants



Biological Treatment

- Anaerobic digestion
- Attached growth bioreactors
- Membrane bioreactors
- Sequencing batch reactors
- Fluidized beds
- Biofilm filters
- Activated sludge
- Thin-film bioreactors

Residuals Management

- Thickening
- Sludge digestion
- Dewatering

Polishing

- Phosphorus removal
- Ammonia removal
- Suspended solids removal
  Disinfection
- Ozonation
- Constructed wetlands

Reuse Polishing

- Ozonation, advanced oxidation
- Activated carbon
- Micro-, ultra-, nanofiltratration

TREATABILITY TESTING SERVICES

Geosyntec has extensive experience with performing treatability studies, which allows our team to consider many potential wastewater treatment solutions and gather quantitative treatment efficiency data. We tailor technologies to the specific needs of your site, and when the site calls for it, we conduct R&D to develop new technologies that effectively address complex problems. When designing system upgrades, we emphasize integrating existing equipment. Our experts design water and wastewater treatment systems that range from simple filtration processes to sophisticated multistage, biological nutrient removal systems. In addition, we offer emergency and ongoing troubleshooting assistance for our clients wastewater treatment systems.

PROCESS ENGINEERING AND PROJECT DELIVERY

In addition to the water management services mentioned above, we work with industrial clients to maintain routine operations, undertake capital improvements to increase their capacity, and expand their product line. We do this by working closely with clients to identify process efficiencies, remove bottlenecks, automate or modify routine procedures, and optimize production (and discharge) schedules. We can help develop a single drawing, or we can help you specify, tender, and manage the construction of a new manufacturing line. Staff resources to develop and execute these projects are often challenging to obtain internally. Geosyntec can supplement your in-house team for your next capital project.

Geosyntec offers project delivery services and construction expertise to safely deploy new equipment and technologies at operating facilities. Our personnel have experience working throughout the project life-cycle from pre-feasibility evaluations, engineering design, analysis, and construction, to end-of-project closure or facility demolition and repurposing. We have an excellent track record of timely and best-value, on budget project execution. Clients appreciate Geosyntec's ability to coordinate with operations teams to proactively communicate construction schedules and limit impacts to operations. We deliver technology-based, best-value solutions to our clients, working together as true partners and trusted advisors.

Geosyntec offers the full suite of project delivery services to support your facility's capital projects:

- Overall project management
- Construction and operation permitting
- Owner's engineer services
- Bid document and specification development
- Contract tender management
- Construction management
- Construction quality control
- Procurement support
- Project delivery under various models: design/bid/build, progressive design/build, design/build, and construction management at risk

OPERATIONAL RESILIENCY AND WATER RISK

Geosyntec works with industrial clients to identify and understand their exposure to water-related risks. We identify the best actions to manage these risks so they can execute operational and growth strategies. Our experts offer the latest technologies to address water supply problems, including conjunctive use and manage aquifer recharge. We use global perspectives to provide a consistent approach to mitigating supply risk while providing proven, practical solutions customized at the local level.

A source-water protection program is designed to help ensure adequate supplies of high-quality source water to clients' critical infrastructure given inherent risks related to water usage locally and regionally. A manufacturing facility's assets rely on water for their daily operation; therefore, source-water protection is key to maintaining uninterrupted operation, long-term sustainability, and production efficiency while protecting the brand and corporate image around the world.

Typical key components of a source-water protection program include a source vulnerability assessment and source water protection plan which evaluate and establish measures to manage the risk to water supplies for critical operations. The ultimate objective of the source vulnerability assessment and source water protection plan is to identify water supply and other vulnerabilities for operations related to business continuity and community and prepare a plan containing specific, practical measures to mitigate risk. Usually, a source-water protection plan includes a source vulnerability assessment and a source-water protection plan. These two compnents establish measures to evaluate and help manage risks to water supplies for critical opertations. Together, these components identify and mitigate risks related to water supply vulnerabilities.

STORMWATER

Geosyntec is known for its innovative work in stormwater management, permitting, and monitoring. Our personnel bring a depth and breadth of expertise that has helped shape the state of the stormwater practice in North America over the past 15 years. Clients can attest to our impressive project resume for stormwater management and regulatory advocacy projects. These projects range from high-level planning work through best management practice (BMP) selection, implementation, and monitoring.

Our staff brings diverse experience on the preparation of industrial site compliance plans, including stormwater pollution prevention and spill prevention, control and countermeasure plans. This experience is based not only on our successful project work but also on the range of backgrounds and prior employment experience of our staff. Having experience as regulator/reviewer (agency), user (industry), and preparer, Geosyntec's staff understands what makes an effective plan.

Stormwater management and control information is vital to clients; therefore, it needs to be organized and presented in a concise manner. Geosyntec has a creative, analytical team that is skilled at collecting and communicating information that is clear and easy-to-deploy for clients. We do this by working closely with the client to understand their current procedures and the audiences that will be using the plan, while firmly grasping regulatory requirements. Our plans emphasize maps, figures, and tables that can be readily updated. Where appropriate, we integrate forms and guidance information to facilitate inspection, record-keeping, and other day-to-day compliance activities.

We are not obligated to use specific technologies or vendor packages, which results in better overall solutions for our clients.

KNOWLEDGE VIDEOS

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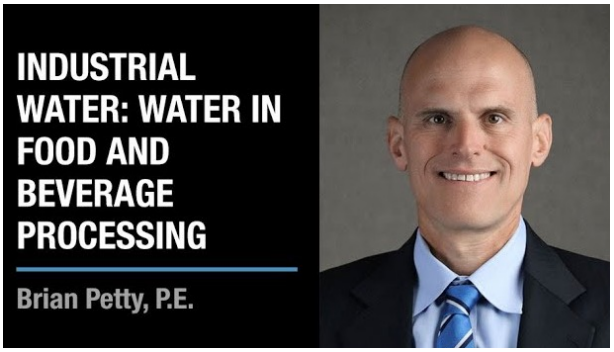

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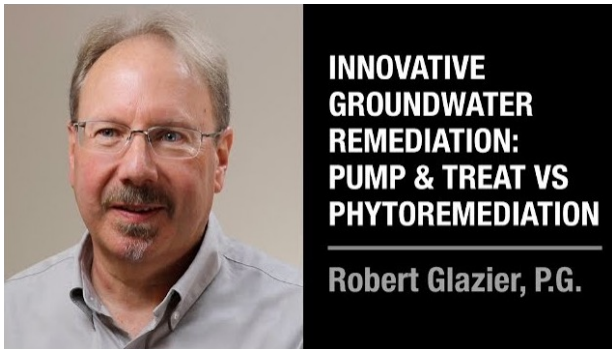

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PROJECT EXAMPLES

Bioaugmentation Pilot Test for Chlorinated Solvent Impacts, SWECO VIAK and COWI A/S, Hillerstorp, Sweden

High levels of the chlorinated solvents tetrachloroethene (PCE) and trichloroethene (TCE) occur in groundwater beneath a manufacturing facility in southern Sweden. Geosyntec teamed with internal staff to evaluate the feasibility of in situ chemical oxidation (ISCO) with permanganate and biological in situ enhanced reductive dechlorination (ERD) using bioaugmentation for treatment of site groundwater. Given that ERD and ISCO are commonly employed for groundwater remediation in neighboring Denmark, these two technologies were chosen for pilot testing at the Sweden site. The objective of the testing was to identify the best value technology and to develop a remedial strategy for full-scale groundwater remediation at the site. Geosyntec's involvement in this project led to the first use of bioaugmentation in Sweden for in situ treatment of chlorinated solvents in groundwater. Based on the success of the bioaugmentation pilot test, and with Geosyntec's support, the Swedish EPA approved ERD as the final remedy for the site.

Beverage Manufacturing Water Footprint/ Reduction Guidance Program, Confidential Client, California, USA

As part of a global water reuse guidance program, Geosyntec developed guidance procedures for water balance/footprinting, water minimization, and reuse for various types of beverage manufacturing facilities within the client's portfolio. The program included collecting and evaluating data within the manufacturing process to assess best practices for water minimization and treated water reuse at various user points and assess the microbial, chemical, human health, safety, and environmental risks of reuse programs. The overall project included developing a global guidance document for water reuse at various facilities worldwide.

Aluminum Can Manufacturing Water Footprint Assessment, Confidential Client, Illinois, USA

Geosyntec investigated two water management approaches for an aluminum can manufacturing plant: (i) identify improvements to the facility's existing wastewater treatment processes (reducing costs and improving performance) and (ii) identify cost-effective reductions in the volume of water used and discharged from its manufacturing facilities. The basis for the water balance included incoming water flow meters (to determine the water coming into the facility and how it is distributed); wastewater effluent discharge flow meters; water and sewer utility bills; engineering estimates of the volume of graywater; calculations for evaporative water losses; engineering estimates of the volume of recycled wastewater; and wastewater characterization data before and after treatment. Following the water balance data collection and analyses, Geosyntec suggested water reduction measures at the cooling towers, including increasing the cycles of concentration, side-stream treatment, treated wastewater reuse (from the main wastewater treatment plant), and cooling tower maintenance as well as several wastewater treatment system enhancements. These recommendations improved the facility's water footprint and reduced effluent treatment costs.

Computer Hardware Manufacturing Water Balance and Reuse, Seagate Technology, Colorado, USA

Geosyntec developed a water balance in support of water minimization, wastewater treatment optimization, and water reuse for an information technology hardware manufacturing facility. The project included developing a site-wide water balance, water use optimization plan, and a wastewater treatment optimization and reuse plan. The site-wide water balance included evaluating multiple data sources, including existing and temporary flow meters, utility information, engineering/deign estimates, and manufacturing system specifications. These data were used to evaluate water use cost, including energy costs (heating, pumping, water treatment, etc.); wastewater discharge fees; pretreatment costs; regulatory costs (permits, compliance assessment, etc.); and cost for water management measures (staff time and resources, technology, equipment, and materials). Results of the water balance activities fed into overall water footprinting (cost/volume) to support implementation priorities for wastewater optimization and reuse.

Beverage Manufacturing Water Balance, Confidential Client, USA

Geosyntec conducted a detailed wastewater characterization study for a juice processing client to evaluate options to address high BOD in the effluent, including developing a flow balance for the facility. Flow data was collected at approximately 10 locations using a combination of existing flowmeters, field measurements, staff input, and temporary flowmeters. The wastewater characterization identified the sources of high flow and high loads across a range of operating conditions, including production and sanitation, and identified three major sources of organic loading in the effluent which contributed 70% of the BOD. By identifying these sources, we were able to give the client immediate opportunities to capture and divert them.

Feasibility Study and Treatability Testing for a Shoreline Site Impacted by Pharmaceutical Manufacturing Wastes, Ribe County, Denmark

Kærgård Plantage is one of the most widely publicized contaminated sites in Denmark. For 17 years, a pharmaceutical manufacturing facility, with regulatory approval, discharged

7.5 million gallons of wastewater containing approximately 60,000 metric tons of various salts, sulfa drugs, barbiturates, and organic solvents to pits situated on a plantation (Kærgård) approximately 400 meters from the beach. Waste constituents in groundwater at the site discharged to the ocean at an estimated rate of 50 metric tons/year. Geosyntec provided a systematic and successful approach for identifying effective remediation technologies. The team completed a five-week FS evaluation to provide our clients with the scientific, defensible data they needed to pursue an effective remediation strategy. As a result, our client had two viable treatment technologies (Fenton's reagent and AOP) to test in the field and team has been selected to design a Fenton's reagent pilot test at the site.

Electroplating and Metal Finishing Facility Water Balance, Trident Plating Inc., California, USA

Geosyntec developed a water balance at an electroplating and metal finishing facility, which is a supplier of aerospace components, that was experiencing cyanide detections in its acidic wastewater collection and discharge systems. Geosyntec used the water balance to provide water consumption and wastewater generation reduction strategies such as decreasing the rinse tank volumes and purge frequencies, implementing best practices for spill cleanup, selecting a metal recovery system to allow for reuse of certain treated waste streams, and developing a streamlined water metering program to chart future progress. Geosyntec also identified and discontinued incompatible waste mixing to improve the wastewater process. By implementing these water and wastewater reduction strategies, the facility was able to reduce water usage by approximately 75% and reduce the wastewater volume by approximately 30%.

Baking Facility Water Audit, Confidential Client, Nevada, USA

Geosyntec audited water and wastewater practices and developed diagrams to communicate pollution prevention and water conservation practices with facility personnel at a large commercial bakery. By using an open channel ultrasonic area-velocity meter, we measured and logged the total facility discharge while internal outfalls from clean-in-place processes were cycled during normal operations and cleaning events. We made recommendations for waste reduction practices, prepared and implemented treatability testing protocols, designed a wastewater pH adjustment system to prevent permit violations, and discussed clean-in-place discharge sequences with the facility to control slug discharges and take advantage of the cycling acid and caustic discharges to self-neutralize the discharge.

Metal Forging Facility Water Balance Inventory, Weber Metals, California, USA

Geosyntec evaluated water usage and discharge for a large metal forging facility that produces wheels and other titanium, aluminum, steel, and other metal components for the aerospace industry. This facility was facing significant fees due to stormwater and wastewater discharges. Our water footprint evaluation included modeling, direct measurement, and meter readings. We identified and quantified the production-related water usage and discharge flows and then evaluated stray flows related to drainage from air scrubbers, quality control lab discharges, and ancillary equipment. We also modeled stormwater to evaluate drainage flows from exterior locations for sizing treatment systems and assessing the cost-benefit of reuse and infiltration.

Dairy Product Manufacturer Water Balance, Confidential Client, California, USA

For this dairy product manufacturer, Geosyntec prepared a baseline water balance to quantify the discharge flows associated with process wastewater, pump cooling water, reverse osmosis retentate, clean-in-place systems, and other minor discharges. The results were used to educate the operations team on best practices and signs of wastage, to save money in water purchases and discharge fees. The Geosyntec team prepared target reduction goals and implemented a continual improvement program that significantly improved water usage per unit product and saved the client millions of dollars in sewer discharge fees and associated pretreatment costs.

Seafood Processing Water Balance, Confidential Client, USA

Geosyntec collected detailed flow data and wastewater samples to develop the design basis and select the subsequent wastewater treatment technology for a seafood processing facility. The facility discharges approximately two million gallons per day of wastewater. In order to assess options to upgrade the wastewater treatment facility, we developed a detailed water balance and associated total nitrogen mass balance for the entire facility. The water balance used a combination of existing flowmeters, temporary flowmeters, manual flow data collection, field measurements and rainfall data across 30+ sources, and was complicated by the age of the facility and a lack of current facility drawings. Additionally, the facility employs several recycle loops that required a separate testing phase and special permission from the USEPA to assess. Due to the complexity of the facility, we used a systematic node-by-node approach across 15 nodes to build the mass balance. By integrating the field observations collected by our staff and completing a detailed data assessment, we were able to develop the mass balance to within 10% of the final effluent wastewater quality. The mass balance developed by Geosyntec on behalf of our client continues to serve as the basis for ongoing negotiations with the USEPA.

Semiconductor and Metal Component Finishing Facility Audit, Plansee, California, USA

In addition to hazardous materials and compliance auditing, Geosyntec consulted with facility personnel to evaluate the water usage and the processes that were consuming significant resources and labor to maintain. We developed a water and material balance by measuring flow and collecting composite samples from selected water streams and obtain-

ing concurrent flowmeter readings from streams that were already being measured. During the development of the water balance, Geosyntec identified unnecessarily high solids loading and pH adjustments in their wastewater treatment process. The material balance led to a breakthrough in cost savings by recovering gold from a relatively low-flow but concentrated discharge stream by using an electrowinning technique. In addition, low-strength streams were segregated for direct discharge, which streamlined the treatment processes and decreased utility and labor costs.

Metals Recycling Facility Wastewater Improvements and Water Reuse, Water Balance, Confidential Client, Illinois, USA

Geosyntec was retained by a metal recycling facility that refines precious metals and manufactures copper alloys to assist them in attaining lead and mercury compliance with the local POTW Sewage and Waste Control Ordinance (Ordinance). The facility was issued a Cease and Desist Order by the POTW and retained Geosyntec to develop corrective actions and a schedule to meet mercury compliance in their wastewater discharge. Based on Geosyntec's work, the facility achieved lead and mercury compliance using sewer reconstruction and sanitary and stormwater segregation measures instead of wastewater treatment and discharge that required large capital expenditures and long-term operational and maintenance expenses. Geosyntec also successfully negotiated higher mercury discharge limits at the facility's discharge permit. In addition, Geosyntec developed an alternative wastewater volume measurement and reporting protocol, which resulted in significant user charge cost savings for the facility. Geosyntec also designed a recycling system for the facility's stormwater and noncontact cooling water, which enabled the facility to achieve its goal of zero discharge.

Quarry and Cement Facility Water Balance, Lehigh Cement Company, Cupertino, California, USA

Geosyntec conducted a water audit of Lehigh's quarry and cement facility. We generated a comprehensive water balance accounting for more than 200 million gallons of municipal, process reuse, sewer, and stormwater components. We developed water use categories based on flows and characteristics. This categorization allowed the client to prioritize water use minimization efforts. Geosyntec provided Lehigh with a simple tool to use while planning the Site's water demand and/or discharge volumes given a range of precipitation conditions. A series of upgrades were made to conserve water and realize tangible savings, with a cost payback period of two years or less. Geosyntec provided recommendations for high-leverage water savings including decreasing tire wash volumes, recycling certain cooling water streams, and changing dust control methods to use raw water instead of treated water. Water usage was decreased based on Geosyntec's recommendations, and these decreases are estimated to save the client approximately $5 million per year in water purchasing and maintenance costs.

Membrane and Medical Device Manufacturing Facility Water and Material Balance, Parker Hannifin, Oxnard, California, USA

Geosyntec performed a water and material balance for a membrane and medical device manufacturing facility to quantify the flow and mass loading from multiple internal outfalls, which was correlated with the total discharge to the Publicly-Owned Treatment Works (POTW). Strap-on ultrasonic flow meters were used on piping, weirs were deployed in trench drains, displacement over time was measured for minor flows, and autosamplers were used to gather composite samples for a full production cycle. Geosyntec used the results to recommend a treatment and discharge scheme that optimized costs and labor requirements by routing low-strength discharges directly to the sewer, segregating high-strength discharges for slipstream treatment, and prioritizing water use minimization upgrades.

Aggregate Production Facility Water Balance, Hanson Aggregates, Irwindale, California, USA

Geosyntec was retained by Hanson Aggregates to help fix problems with their water treatment plant associated with new aggregate washing processes. Due to facility changes and a capacity expansion, the facility was using excess water (leading to prematurely reaching their limit for allowable groundwater withdrawal) and, as a result, the water treatment plant discharged poor water quality and were paying compliance violation fines. To solve these problems, Geosyntec prepared a water balance for the facility and prioritized improvements to the water treatment plant that removed the bottleneck at the thickener unit operation, improved discharge water quality, and allowed the treated water to be recycled to the aggregate washing feed tank. The water balance required strap-on ultrasonic flowmeters on pipelines and open channel flowmeters in discharge channels combined with calculations of volume displacement within tanks of known dimensions, which was able to simulate water usage and discharge volumes that correlated well with the groundwater withdrawal volumes.

Frozen Product Manufacturer, Confidential Client, California, USA

Geosyntec analyzed and compiled handwritten logs into spreadsheets to prepare a water balance for a facility that had previously relied on influent water meter readings to estimate discharge flows. We compared the measured water volumes and flowrates for production equipment to industry standards to prioritize water reduction opportunities in an effort to establish a lower water usage baseline and realize significant savings in sewer discharge fees. To date, the facility has successfully decreased water usage to offset several million dollars of potential fees.

CONTACT AN EXPERT

HOW CAN WE HELP?

Our team of experts is dedicated to helping you solve your water management challenges, big or small.

Use this link to schedule a meeting with a Geosyntec manufacturing water managment expert to get started.

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