STEFAN SCHADINGER, P.E., PMP

Principal Engineer, Energy

Years with the firm

21

Years total

25

Professional qualifications

Professional Engineer:
AL - DE - IN - MA - MD
ME - MI - NC - NH - NJ
NY - PA - TN - TX - VA
VT - WI - WV

Project Management Professional (PMP)

Areas of practice

Dam Safety

Independent Consultant

Dam Rehabilitation and Remediation

Analysis and Design – Civil/Structural

Structural Inspection

Instrumentation and Monitoring

Languages

English

German

CAREER SUMMARY

Stefan Schadinger is the national business line structural lead within the Energy Group. A principal engineer with extensive experience in hydropower and thermal power projects, Stefan has performed steel and concrete detailed structural designs and stability analyses of hydropower and thermal projects. Stefan is approved as a Federal Energy Regulatory Commission (FERC) Independent Consultant to perform Part 12D dam inspections and has experience directing Potential Failure Mode Analyses (PFMA) sessions. He has over 25 years' experience, with a majority of this time, working on FERC and State Dam Safety and related concerns.

Stefan has been a FERC Independent Consultant on 5 projects, and has participated/assisted on several other Part 12D dam safety inspections and been a core member of the PFMA review sessions.

Stefan has experience inspecting, performing site condition assessments and working on various structural and stability aspects of arch dams, concrete gravity dams, earthen embankments, spillways, Tainter and Stoney gates, penstocks and tunnels, high capacity post-tensioned anchor designs and installation. As part of the analyses and evaluations performed, he also has extensive experience interpreting dam instrumentation.

EDUCATION

M.S., Structural Engineering, Northeastern University	2005
B.S., Civil Engineering, University of Vermont	1995

PROFESSIONAL MEMBERSHIPS

American Institute of Steel Construction	AISC
United States Society on Dams	USSD
American Concrete Institute	ACI
Association of State Dam Safety Officials	ASDSO

PROFESSIONAL EXPERIENCE

Dam Safety Independent Consultant

- Allegheny No. 8 Hydroelectric Project (H2O Power, PA) FERC Part 12 Inspection Report (2020). As Project Manager and Independent Consultant, specific duties included the following:
  - Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
  - Preparation of the FERC Sixth Periodic Safety Inspection Report for the Allegheny No. 8 Hydroelectric Project.
  - Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.

  - Responsible for the review and evaluation of the instrumentation records.
  - Responsible for the update of the STID (2021) for Allegheny No. 8 Hydroelectric Project.
- Allegheny No. 9 Hydroelectric Project (H2O Power, PA) FERC Part 12 Inspection Report (2020). As Project Manager and Independent Consultant, specific duties included the following:
  - Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
  - Preparation of the FERC Sixth Periodic Safety Inspection Report for the Allegheny No. 9 Hydroelectric Project.
  - Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
  - Responsible for the review and evaluation of the instrumentation records.
  - Responsible for the update of the STID (2021) for Allegheny No. 9 Hydroelectric Project.
- Allegheny No. 5 Hydroelectric Project (Cube Hydro, PA) FERC Part 12 Inspection Report (2018/2019). As Project Manager and Independent Consultant, specific duties included the following:
  - Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
  - Performed the field inspections of the project structures.
  - Preparation of the FERC Sixth Periodic Safety Inspection Report for the Allegheny No. 5 Hydroelectric Project.
  - Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
  - Responsible for the review and evaluation of the instrumentation records.
- Allegheny No. 6 Hydroelectric Project (Cube Hydro, PA) FERC Part 12 Inspection Report (2018/2019). As Project Manager and Independent Consultant, specific duties included the following
  - Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
  - Performed the field inspections of the project structures.
  - Preparation of the FERC Sixth Periodic Safety Inspection Report for the Allegheny No. 6 Hydroelectric Project.
  - Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
  - Responsible for the review and evaluation of the instrumentation records.
- Lake Lynn Hydroelectric Project (Cube Hydro, WV). FERC Part 12 Inspection Report (2017/2018). As Project Manager, Principal Engineer & Co-Independent Consultant, specific duties included the following:
  - Participated in the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report.

- Preparation of the FERC Tenth Periodic Safety Inspection Report for the development.
- Performed the field inspections of the project structures.
- Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
- Responsible for the review and evaluation of the instrumentation records. The project has been monitored periodically with instrumentation to evaluate the data with respect to dam performance and safety

Dam Safety/Water Resource/Hydropower

- FERC Part 12 Inspection Report (July-October 2015), Bear Swamp Pump Storage Project. As Project Manager and a principal engineer his specific duties included assisting the Independent Consultants with the following:
  - Participated in the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report.
  - Preparation of the FERC Tenth Safety Inspection Report for the project.
  - Participated in the field inspection of the project.
  - Responsible for the review and evaluations of the existing stability analyses.
  - Responsible for the development of the STID Update.
  - Responsible for the review and evaluation of the instrumentation records. The upper reservoir, lower reservoir and Fife Brook Dam have been monitored periodically to evaluate the data with respect to dam safety and performance.
- Dam Safety Inspection (August - December 2018), Eagle, Elmer, Taylorville, and Belfort Developments. As Project Manager and as a Consultant for the project, his specific duties included the following:
  - Performed a 4-site field inspections of the project structures.
  - Prepared a Safety Inspection Report for each site.
  - Directed the PFMA review session for each site.
  - Prepared an updated PFMA report for each site.
  - Reviewed/evaluated existing stability, seismic and hydraulic analyses.
  - Reviewed/evaluated project instrumentation records.
- Helen Gould Dike Flood Wall (July – October 2018). As Project Manager and Owner's Engineer his specific duties included:
  - Responsible for the design of a timber flood wall to prevent overtopping of the dike under the project's Spillway Design Flood. Issued an Engineering Report along with drawings for construction and a work plan/specification.
- Dam Safety Inspection (August – December 2018), Franklin Falls Development. As Project Manager and as a Consultant for the project, his specific duties included the following:
  - Performed the field inspections of the project structures.
  - Prepared a Safety Inspection Report.
  - Directed the PFMA review session.

  - Prepared an updated PFMA report.
  - Reviewed/evaluated existing stability, seismic and hydraulic analyses.
  - Reviewed/evaluated project instrumentation records.
- Dam Safety Inspection (April – July 2018), Hydraulic Race and Oak Orchard Projects. As Project Manager and as a Consultant for the project, his specific duties included the following:
  - Performed a 2-site field inspections of the project structures.
  - Prepared a Safety Inspection Report for each site.
  - Directed the PFMA review session for each site.
  - Prepared an updated PFMA report for each site.
  - Reviewed/evaluated existing stability, seismic and hydraulic analyses.
  - Reviewed/evaluated project instrumentation records.
- Yards Creek Pump Storage Generating Station (June – December 2018). As Project Manager and Responsible Engineer his specific duties included:
  - Performed the concrete inspection of the Lower Portal Structure that encases the penstock and protects it from potential falling rock from hillside above and the prepared inspection report.
  - Responsible for the design, construction drawings and specifications of a new mandoor to allow entry into the penstock through the Lower Portal Structure.
  - Responsible for the Cathodic Protection evaluation of the penstock at the Lower Portal Structure and a Roadway Crossing and associated report.
  - Responsible for the penstock wall thickness assessment and associated report.
  - Responsible for the penstock manway access door assessment and associated report.
  - Responsible for the penstock expansion joint assessment and associated report.
  - Responsible for a FEM analysis of the potential for the water in the penstock to freeze to during an extended outage during extreme cold winter months.
  - Performed the inspection of three draft tubes, worked with a Sub-consultant that performed non-destructive concrete testing, and responsible for the inspection report with recommendations.
- Dam Safety Surveillance Monitoring Reports (January-March for 2016, 2017, 2018, 2020 & 2021), Allegheny Hydroelectric Projects Nos 5 & 6. As Project Manager:
  - Responsible for the preparation of the 2015, 2016, 2017, 2019 & 2020 DSSMRs including review of the projects' instrumentation monitoring.
- STID Preparation (June – December 2018) for six dam projects in New York State (Brookfield). As Project Manager and Responsible Engineer his specific duties included:
  - Responsible for the original development of the STID for six dam projects.

- Afobaka Dam (Suralco, Suriname) (2017). As principle engineer was responsible for the development of some engineering studies for this large concrete and embankment dam in South America, including:
  - A report providing recommendations regarding planning for emergency conditions at the Afobaka Dam, if indications of a Potential Failure Mode (PFM) are detected.
  - A report providing a qualitative comparison of options for stopping uncontrolled flow through the spillway bays, including some technologies considered and the method deemed the most suitable for Afobaka Dam.
- Trash Rack Rail Risk Assessment (2017) for Conowingo Dam. As principle engineer was responsible for the development of a risk-based report for the life expectancy of the trash rack rail system at the Project, which included:
  - Calculating the hydrodynamic forces, headloss and loads associated with different levels of trash rack clogging.
  - Calculating the structural stressed in the components of the trash rack rail system and assessing their structural integrity and projected life span
- Emergency Spillway Potential Failure Mode (August/September 2017), Bear Swamp Pump Storage:
  - Assisted Brookfield Renewable and the active Independent Consultant with the review and development of the potential failure mode that considered over pumping at the Bear Swamp pump storage project causing flow through the emergency spillway.
- FERC Annual Inspection (May 2017), Bear Swamp Pump Storage and Fife Brook Dam:
  - Participated in the FERC Annual Inspection and discussions related to the project, the instrumentation and the need to review the emergency spillway.
- Penstock/Pipeline External and Concrete Foundation 5-Year Inspection (May 2017), Santeetlah Development. As principal engineer his specific duties included:
  - Performed the inspection of the steel pipeline and saddles including bents, where applicable.
  - Performed the inspection of the concrete foundations supporting the steel pipeline.
  - Responsible for developing the inspection report documenting the observations.
- FERC Eighth Part 12 Follow-up Recommendations (August-September 2016), Bear Swamp Pump Storage and Fife Brook Dam. As Project Manager and principal engineer, his duties included:
  - Reviewed the project piezometers, developed plots showing the phreatic surfaces, and evaluated the acceptability of the existing piezometers.
  - Evaluated the crest and embankment surveys.
- Dam Breach Analysis (April-October 2016), Kinzua Pumped Storage Project. As Project Manager his duties included:

  - Responsible for the Dam Breach Analysis of the Kinzua Pumped Storage Project to determine the potential inundation extents for various breach locations and activation of the emergency spillway.

- Dam Safety Inspection (August-November 2016), Peck's, Rockwood, Ephratah and Caroga Creek Dams and Helen Gould Dike. As Project Manager and as a Consultant for the project, his specific duties included the following:
  - Performed a 5-site project inspection in accordance with FERC Part 12 guidelines (per client request).
  - Preparation of the Safety Inspection Report.
  - As a core member participated in the PFMA session.
  - Preparation of a PFMA report for each site.
  - Review/evaluation of project instrumentation records.
- Dam Stability Analysis and Spillway Design Flood Analysis (September 2014-November 2016), Caroga Creek Project. As Project Manager his duties included:
  - Responsible for the Stability Analysis of Ephratah Dam including Spillway, Multi-Arch Buttress, Concrete Non-overflow and Earthen Embankments.
  - Responsible for the Stability Analysis of Rockwood Dam including Spillway, Intake Structure and Earthen Embankments.
  - Responsible for the Stability Analysis of Peck's Lake Dam including Spillway, Multi-Arch Buttress, Concrete Non-overflow and Earthen Embankments.
  - Responsible for the Stability Analysis of Helen Gould Dike Earthen Embankments.
  - Responsible for the Stability Analysis of Pleasant Lake Outlet Gate Structure.
  - Responsible for the Spillway Design Flood analysis and evaluation, as well as, the revisions to the EAP Maps.
- Dam Breach Incremental Impact Assessment and Hazard Classification (August 2015-March 2016), Allegheny Hydroelectric Projects Nos 5 & 6: As Project Manager his specific duties included the following:
  - Performed an incremental hazard classification study to determine the hazard classification for two FERC licensed powerhouses located at USACE lock and dams on the Allegheny River. The study assessed the incremental impacts of powerhouse failures on structures located downstream of the dam for given flow conditions, utilizing a HEC-RAS model created using HEC-GeoRAS.
  - Responsible for the preparation of the inundation maps.
  - Responsible for the preparation of the study report.
- FERC Part 12 Inspection Report (June-August 2016), Piney Dam. As a principal engineer his specific duties included assisting the Independent Consultant with the following:
  - Active participant in the supplemental PFMA session; provided IC with initial review comments on the existing PFMA report, provided input and assistance on the preparation of the supplemental PFMA report.
  - Reviewed and evaluated the existing stability analyses as directed by the IC.

  - Active participant in the Part 12 Inspection.
  - Assisted in the preparation of the Tenth Periodic Safety Inspection Report.
- Kinzua Pumped Storage Project (February 2014-February 2015). As Project Manager and Owner's Engineer his specific duties included:
  - Preparation of presentations for training the staff on the Owner's Dam Safety Program.
  - Responsible for the revisions to the Emergency Action Plan and updating the GIS inundation maps.
  - Participated in the Tabletop Emergency Action Plan Exercise.
  - Preparation of the Report on the Tabletop and Functional Emergency Action Plan Exercises.
- Lake Lynn Dam (February 2014-February 2015). As Project Manager and Owner's Engineer his specific duties included:
  - Preparation of presentations for training the staff on the Owner's Dam Safety Program.
  - Responsible for the revisions to the Emergency Action Plan and updating the GIS inundation maps.
  - Review and evaluation of the instrumentation records and development of the 2013 Dam Safety Surveillance Monitoring Report.
  - Responsible for the development of the STID Update.
  - Preparation of a tailrace bathymetry evaluation and report.
  - Participated in the 2014 FERC Annual Inspection.
- All Dams No. 5 and No. 6 Projects (February 2014-February 2015). As Project Manager and Owner's Engineer his specific duties included:
  - Preparation of presentations for training the staff on the Owner's Dam Safety Program.
  - Responsible for the revisions to the Emergency Action Plan.
  - Review and evaluation of the instrumentation records and development of the 2013 Dam Safety Surveillance Monitoring Report.
  - Design of the upstream and downstream anchorage for the All Dams No. 5 Trash Boom used to minimize debris and ice from collecting on the trash racks.
- PE Hydro [Shenandoah, Luray and Newport, Warren, Dam No. 4, Dam No. 5 & Millville Projects] (February 2014-February 2015). As Project Manager and Owner's Engineer his specific duties included:
  - Preparation of presentations for training the staff on the Owner's Dam Safety Program.
  - Review and evaluation of the instrumentation records and development of the 2013 Dam Safety Surveillance Monitoring Reports.
  - Design of the foundations for an Eel Ladder on the right side of Newport Dam.

  - Responsible for the repair design details of the forebay embankment at Warren Dam.
  - Performed monthly instrumentation data review and provided summaries.
  - Responsible for updates to the Newport and Millville DSSMPs, with a significant change recommended to the Millville Survey.
- Annual Dam Safety Inspection (September-November 2015), Millville Project. As Project Manager and Owner's Engineer his specific duties included:
  - Performed the annual project inspection.
  - Reviewed/evaluated the instrumentation data.
  - Preparation of Annual Inspection Report.
- FERC 5-yr Dam Safety Inspection (August-October 2014), Shenandoah Project. As Project Manager and Owner's Engineer his specific duties included:
  - Performed the annual project inspection.
  - Reviewed/evaluated the instrumentation data.
  - Preparation of Annual Inspection Report.
- FERC 5-yr Dam Safety Inspection (August-October 2014) Luray Project. As Project Manager and Owner's Engineer his specific duties included:
  - Performed the annual project inspection.
  - Reviewed/evaluated the instrumentation data.
  - Preparation of Annual Inspection Report.
- Safe Harbor Dam (March-July 2012). As a lead engineer his specific duties included:
  - Performed a detailed inspection of the emergency, flood and regulating spillway gates (48 ft W x 35 ft H).
  - Performed a non-linear analysis and evaluation of the skinplates to determine the structural integrity of the gates and confirmed that observed levels of pitting were still acceptable.
- Annual Dam Safety Inspection Reports (May-September 2012), High Rock and Tuckertown Developments. As a lead engineer his specific duties included:
  - Participated in the FERC annual dam safety and annual in-house maintenance field inspections of the project structures.
  - Preparation of the Annual Inspection Reports for the developments and review and evaluation of the instrumentation records.
- Penstock and Pipeline Non-Destructive Ultrasonic Testing (November 2011[modified for non-hydro time]-January 2012), Santeetlah and Cheoah Developments. As a lead project engineer his specific duties included:
  - Conducting a non-destructive ultrasonic testing of the penstocks' and pipelines' wall thickness and the evaluation of the test data.
  - He was responsible for preparation of the inspection reports documenting the observations.

- Trash Gate Replacement and Upgrade (January 2010[modified for non-hydro time]-March 2011, May-July 2012), Lake Lynn Hydroelectric Project. As a lead project engineer his specific duties included:
  - Evaluation of location alternatives for the replacement trash gate. The chosen effort included replacement of two 12-foot-wide dual segmented vertical slide trash gates, separated by a 3-foot-wide pier, with one new hydraulic operated hinge crest gate.
  - Design work included the installation and removal of temporary and permanent stop logs, removal of the existing deck and gatehouse, and the installation of steel decking, a new walkway along the upstream face of the deck, and a steel superstructure with a stop log hoist.
  - Responsible for preparation of performance specification for the design of the hinged crest gate.
  - Performed shop and QA/QC inspections during the crest gate fabrication.
  - Provided engineering construction support during the project execution.
  - Preparation of the FERC Construction Reports.
- Pre-, Phase I-, Phase 2- Feasibility Studies, Technical Studies and the FERC Integrated Licensing Process (ILP) (January 2005-February 2009 90% Full time, 2004 & 2010 25% Part-time), Massena Grasse River Hydroelectric Project: As lead engineer, for a proposed multipurpose project consisting of a new dam and facilities to provide energy to the Town of Massena and ice control for the local area his specific duties included:
  - Feasibility Studies considering hydrology, power, cost, engineering, regulatory, location siting, etc.
  - Hydrology and Hydraulic Flood Studies up to the 100-year flood using with HEC-RAS.
  - Conceptual Dam Design and Stability analyses.
  - Floodplain Management including Ice Management, and other water retaining structures.
  - Preliminary upstream and downstream fish passages.
  - Gate sizing and equipment procurement.
  - Cost estimates and construction schedules.
  - Several occasions of interfacing with and presentations to client, subconsultants, stakeholders, state and federal agencies.
- Lake Lynn Hydroelectric Project (January-March 2010-2012). As a lead engineer his specific duties included:
  - Review and evaluation of monthly dam safety instrumentation data.
  - Preparation of the annual DSSMRs.
- Stoney Gate Hoist Inspection and Full Gate Testing (June 2009), High Rock Development. As a structural engineer his specific duties included:
  - Performed operational inspection of the Stoney gates during the Full Gate Open tests to assess the condition of the sheave block and sheave block frames,

the roller trains, rocker plates and side rollers.ir structural condition and to confirm as-built dimensions of the gates.

- Preparation of the inspection report documenting the visual observations.

- Concrete Dam Inspection (August-December 2008), Safe Harbor Water Power Corp. As a lead engineer his specific duties included:
  - Performed and oversaw the concrete inspection, to determine areas necessary of repair, for the overflow spillway sections, the non-overflow island bulkhead section and abutment totaling a length of about 3,700 ft.
  - Preparation of the final report documenting the observation and areas requiring repair.
- Lake Lynn Hydroelectric Project (September-November 2008). As a lead engineer his specific duties included:
  - As part of team assisted in the developed of the Debris Management Report for the project. This report reviewed how to best manage and minimize the flood debris accumulation and avoid the potential reduction of the spillway Tainter gate flows due to debris blockage.
  - Performed a detailed hands-on inspection of the trash gate to assess binding issues and its overall structural integrity.
- FERC Part 12 Safety Inspection and Report (May-September 2007), Lake Lynn Hydroelectric Project: As a structural engineer his specific duties included:
  - Assisted IC with the safety inspection and prepared the safety inspection report with the IC's guidance.
  - Developed the Supporting Technical Information Document the project with the IC's guidance.
  - As a core member participated in the PFMA session.
  - Preparation of a PFMA report.
- Lake Lynn Hydroelectric Project (June-December 2007). As a lead engineer his specific duties included:
  - Performed upstream face, downstream toe inspection with divers and a side sonar evaluation of the tailrace area (July-August 2007).
  - Developed a scope of work and evaluated the results of an upstream reservoir bathymetry survey to understand the extent of the debris accumulation.
  - Performed a hands-on inspection of the intake gates in conjunction with a ROV inspection to better understand increased leakage.
  - Performed evaluation of the expansion joints in the spillway deck, developed performance specifications, and supported the construction effort to re-establish expansion joints.
- Tainter (Radial) Gate Inspection, Analysis and Remediation Project (May 2002-December 2006), Lake Lynn Hydroelectric Project. As a structural engineer his specific duties included:
  - Performed and was responsible for a team of engineers conducting the detailed inspection of the Tainter gates to assess their structural condition and to confirm as-built dimensions of the gates (May 2002).

- Preparation of the inspection reports documenting the visual observations (June-July 2002).
- Responsible for overseeing and checking the structural analysis and the evaluation of existing Tainter gates to ensure their structural integrity and safe operation for current design loadings.
- Responsible for developing and analyzing the appropriate Tainter gate remediations (July 2002).
- Developed the specifications and drawings for construction services to remediate the gates for long-term maintenance improvements (2003).
- Provided engineering construction support during the project execution (3-year duration, May 2004-Septemeber 2006).
- Preparation of the FERC Construction Reports.

- Stoney Gate Inspection (July July-September 2005), High Rock Development. As a structural engineer his specific duties included:
  - Performed and was responsible for a team of engineers conducting the detailed inspection of the Stoney gates to assess their structural condition and to confirm as-built dimensions of the gates.
  - Preparation of the inspection report documenting the visual observations.
- Diamond Wire Slot Cutting – Right Side (January-March 2003), Santeetlah Development. As on-site structural engineer:
  - Responsible for a two-member engineering crew during diamond wire saw cutting of a full width by 80-foot-deep (27 meter) slot in the dam to remediate the structural impacts from alkali-aggregate reactivity (AAR). With the project's sensitive safety issues, his responsibilities focused on evaluating the dam's response to the slot cutting by means of evaluating automated monitoring of movements, stresses, inclinations and other indicators. Additional responsibilities included performing frequent visual inspections of the dam while overseeing and interfacing with the contractor to ensure proper work execution. Due to the structural sensitivity, the work had to be performed on a round-the-clock basis for over 12 days.
- Analysis of Concrete Dam Expansion Slot - Right Side of Dam (June 2002–January 2003), Santeetlah Development. The dam has experienced seepage, progressive cracking, and displacements primarily due to alkali-aggregate reactivity (AAR). As a structural engineer his specific duties included:
  - Reviewed a three-dimensional finite element model of the right side of the dam including all applicable loads. Loads include gravity, reservoir water levels, thermal seasonal variations, and AAR concrete growth. The model was used to evaluate corrective measures to reduce internal stress and control movements caused by the concrete growth.
  - Evaluated the potential impact of the slot cut on the adjacent intake.
- Tainter (Radial) Gate Inspection, Narrows (July-September 2002) and Tuckertown (August-October 2002) Developments. As a structural engineer his specific duties included:

  - Performed and was responsible for a team of engineers conducting the detailed inspection of the Tainter gates to assess their structural condition and to confirm as-built dimensions of the gates.
  - Preparation of the inspection reports documenting the visual observations.
- FERC Part 12 Safety Inspection and Report (April-July 2002) Lake Lynn Hydroelectric Project: As a structural engineer his specific duties included:
  - Assisted IC with the safety inspection and prepared the safety inspection report with the IC's guidance.
  - Reviewed/evaluated the instrumentation data.
- Analysis of Concrete Dam Wide Slot - Left Side (2000-January 2001), Santeetlah Development: As a structural engineer:
  - Performed and reviewed a three-dimensional finite element model of the left side of the dam used to evaluate the option of removing a wide slice of concrete since the expansion slot cut in 1999 had closed and was starting to transfer forces and build-up stresses. The finite element model incorporated loads that represent gravity, reservoir water levels, thermal seasonal variations, and AAR concrete growth. The model was used to evaluate additional corrective measures to reduce internal stress and control movements caused by the AAR concrete growth.
- Tainter (Radial) Gate Analysis (2001), North Anna Dam. As an engineer his specific duties included:
  - Assisted in the seismic analysis and evaluation of existing Tainter gates to ensure their structural integrity and safe operation for current design loadings. Tasks included model development of the concrete structures, application of seismic loads, and seismic evaluation of the Tainter gates using STAAD/Pro software and the response spectrum method.
- Tainter (Radial) Gate Inspection, Cheoah (June-July 2000) and Santeetlah (August 2000, May-June 2002) Developments. As an engineer his specific duties included:
  - Performed the detailed inspection of the Tainter gates to verify the structural integrity and as-built dimensions of the gates.
  - Assisted in the preparation of the inspection reports documenting the visual observations.
- Penstock Inspection and Non-Destructive Ultrasonic Testing (September-December 2000), Narrows Development. As an engineer his specific duties included:
  - Performed the internal and external inspection of penstocks including the saddles and the concrete foundations.
  - Assisted in preparation of the final report documenting observation.
  - Responsible for conducting (via subconsultant) a non-destructive ultrasonic testing of the penstocks' wall thickness and the evaluation of the test data.
  - Responsible for preparation of the inspection reports documenting non-destructive ultrasonic testing as well as analyzing stress state of the penstocks.
- High Capacity Post-tensioned Rock Anchors (1999 - 2001), High Rock Development. As a structural engineer he performed multiple tasks associated with the high

capacity post-tensioned rock anchors installed to improve the dam's stability in flood events:

  - Responsibilities include designing the anchors, and the anchor bearing plates, and reviewing the contractor's submittal documents which, in part, address the drilling, consolidation grouting, anchor placement, primary/secondary grouting, and tendon stressing.
  - During the construction phase of the project, he conducted on-site inspections, supervised fieldwork and various other tasks (1999-2001).
  - Determined the anchor loads at 40 years (2001).
  - Preparation of the construction report submitted to both the owner and the Federal Energy Regulatory Commission (FERC) (2001).

- Dam Stability Investigation (November 1999), Cheoah Development. As an engineer his specific duties included:
  - Analyzed the structural stability of a curved gravity dam using the two-dimensional method.
  - Evaluated the post-tensioned rock anchor requirements to satisfy the dam's stability safety requirements during flood events.
- Tainter (Radial) Gate Inspection (April-November 1999), Tuckertown and Falls Developments. As an engineer his specific duties included:
  - Performed a detailed field inspection to verify the properties and the existing condition of the structural members.
  - Performed the structural analysis and evaluation of existing Tainter gates to ensure their structural integrity and safe operation for newly imposed safety requirements. He performed the analysis of the Tainter gates using STAAD/Pro for all loading conditions, including trunnion friction.
- Concrete Dam Diamond Wire Slot Cut (January-May 1999), Santeetlah Development. As a site structural engineer:
  - Responsible for a three-member engineering crew during diamond wire saw cutting of a full width by 90-foot-deep (27 meter) slot in the dam to remediate the structural impacts from alkali-aggregate reactivity (AAR). With the project's sensitive safety issues, his responsibilities focused on evaluating the dam's response to the slot cutting by means of evaluating automated monitoring of movements, stresses, inclinations and other indicators. Additional responsibilities included performing frequent visual inspections of the dam while overseeing and interfacing with the contractor to ensure proper work execution. Due to the structural sensitivity, the work had to be performed on a round-the-clock basis for over 21 days.
  - Assisted in the preparation of the construction report documenting the slot cutting effort.
- Concrete Stress and Stability Evaluation of Santeetlah Development, (October 1997-December 1998): As a support engineer his specific duties included:
  - Assisted in the stress analysis of a single curvature concrete arch dam and the stability of the supporting gravity thrust blocks and gravity wing wall sections of an AAR inflicted structure. Due to their complexity, the arch, the thrust blocks, and the gravity wing wall sections were analyzed with a 3D finite

element ANSYS model. Tasks included solid model generation, mesh generation, application of boundary conditions, application of loads and interpretation of results. In conjunction with the model development and its calibration, which accounted for the elastic response of the dam and foundation due to gravity loading, AAR growth, measured deflections, in situ stresses, reservoir loading, and ambient air temperature, Stefan interpreted and incorporated the information obtained from instrumentation. This included inclinometers, extensometers, strain meters, crack meters, linear and three-dimensional, and piezometers. The model was used to evaluate corrective measures to reduce internal stress and control movements caused by the AAR concrete growth.

- Post-tensioned Anchor Design (January-March 1998), Santeetlah Development. As a support engineer his specific duties included:
  - Performed the design of the vertical and inclined high-capacity post-tensioned rock anchors to improve resistance to joint and foundation sliding which is attributed to force build-up associated with AAR.
  - Calculated the expected design life of these 1,500–2,000-kip anchors, accounting for the concrete growth attributed to the AAR.
- Concrete Stress and Stability Evaluation (1997), Calderwood Development. As a support engineer, Stefan assisted in performing the evaluation and analysis of the concrete arch dam, including thrust blocks, using three-dimensional finite element analysis approaches. He also conducted a thermal distribution analysis to predict the temperature distribution and mean concrete temperature in a concrete arch dam.
- Headwater Benefits, Allegheny and Ohio River Basins (October 1995-April 1997), Federal Energy Regulatory Commission (FERC): As a support engineer, Stefan performed all aspects associated with the FERC Headwater Benefits Study, which defined the energy gains provided by federal headwater projects to downstream hydropower plants. Tasks included the preparation of river basin schematics and compilation of data from various hydropower plant owners, the U.S. Army Corps of Engineers, and the U.S. Geological Survey. Once the data was compiled, he analyzed the Allegheny and Ohio River Basin using the FERC HEGE model or, when appropriate, using the flow duration curve method.

PUBLICATIONS AND PRESENTATIONS

Publications

- Stefan Schadinger, Mark J. Gross, Michael McCaffrey, Paul F. Shiers, and Christopher Godwin, “Reducing Seepage into Inter-Gallery Drains within the Narrows Dam Intake Structure”, presented at the 33nd Annual USSD Conference, Phoenix, Arizona, February 11-15, 2013.
- Stefan Schadinger, Bryce Mochrie, Andrew Datsko, and Jacob Vozel, “Improving Debris Management at Lake Lynn Dam”, presented at the 32nd Annual USSD Conference, New Orleans, Louisiana, April 23-27, 2012.
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