

Larry Kent Nuss, P.E.

Nuss Engineering, LLC
10065 Silver Maple Circle
Highlands Ranch, Colorado 80129
Cell: 303-517-8504
Email: Larry.K.Nuss@NussEngineering.com
Website: <http://NussEngineering.com/>

Larry retired from the Bureau of Reclamation on December 31, 2011 with 36 years of experience in the design, structural analyses (static, thermal, and seismic), dam safety, risk analysis, and security of concrete dams (gravity, arch, spillway, and buttress dams). He formed Nuss Engineering, LLC on January 20, 2012.

**Area of Expertise**

- Senior Structural Engineer specializing in the structural analysis and design of concrete dams: Thirty-six years of experience in civil/structural engineering with the Bureau of Reclamation specializing in the advanced state-of-the-art (static and dynamic, linear and non-linear) structural analysis, design, rehabilitation, risk assessment, and security protection of concrete dams (arch, gravity, and buttress dams). Duties have included advanced dynamic structural analysis, Team Leader on Issue Evaluations (IE) and Corrective Action Studies (CAS), Technical Approval, Peer Review, mentoring, site inspection; Comprehensive Facility Review (CFR), risk analyses facilitator and member, and member of dam safety (DSAT) and security (SAT) advisory teams.
- Structural analysis and design of other structures: Seismic evaluation of buildings, intake towers, and Echelon pumping plant design.
- Team Leader: Team Leader on numerous dam stability evaluation projects for multidiscipline and multi-agency teams.
- Advancement of Profession: Developed and directed numerous research projects related to the seismic stability and blast effects on concrete dams and spillways. Current member of technical committees. Have written and reviewed guidelines for Reclamation and other Agencies.
- Risk Analyses: Facilitated, co-facilitated, and team member on numerous dam safety and security risk analyses of concrete dams.
- Comprehensive Facility Reviews - Senior engineer on dam safety assessments.
- Comprehensive Security Reviews - Senior engineer on dam security assessments.
- Security Clearances: Renewed on March 5, 2010, Established August 4, 2005

Education

Master of Science, University of Colorado, Boulder, Colorado, Civil Engineering, 1978, GPA 4.0
Bachelor of Science, University of Colorado, Boulder, Colorado, Architectural Engineering, 1975, GPA 3.53.
High School Diploma, Windsor High School, Windsor, Colorado, Graduated 1971.

Projects and Accomplishments**Team Leader and Structural Engineer**

I have been a Team Leader (TL) of multi-disciplined and multi-agency teams (seismologists, geologists, geotechnical engineers, structural engineers, materials engineers, technicians, and cost estimators), the Lead Structural Engineer (LSE) and Design Engineer (DE), the Structural Engineer (SE) determining the seismic stability/safety of dams or developing feasibility designs, and a Risk Facilitator (RF) and co-facilitator (CRF) and risk participant (RP) on numerous risk analyses (RA). Team Leader duties have included: developing project plans, developing statements of work, organizing teams, facilitating brainstorming sessions, tracking expenditures, keeping clients informed of progress, resolving conflicts, developing field exploration requests and data collection requirements, presenting results to Consultant Review Boards or clients, writing final

reports, performing risk analyses, developing final conclusions, specifications review, and developing alternatives. Structural engineer duties have included: performing static, dynamic, or thermal, implicit or explicit, linear or non-linear, 2- or 3-dimensional (3D) state-of-the-art finite element analysis of solid, thin shell, and frame structures, creating finite element models to perform structural and stability analyses, post-process results, evaluate results, determine stability of the structure, coach and mentor (M) others, checking and peer reviewing (PR); technically approving (TA); and developing and maintaining in-house software.

- Hoover Dam – 727-ft-high thick arch dam (TL, IE, LSE, RP, TA, M, ANACAP, SAP, EACD3D96). Linear and material nonlinear dynamic finite element analyses of the largest curved gravity dam in the USA. First time Reclamation used nonlinear dynamic analysis and linear dynamic with mass in foundation. Lead multidiscipline team of seismologists, geologists, geotechnical, material engineers, and structural engineers on the determination of the seismic safety of this iconic dam.
- East Canyon Dam – 265-ft-high thin arch dam (TL, IE, LSE, RF, TA, PR, LS-DYNA, EACD3D96). Linear and nonlinear dynamic structural analysis of the thinnest arch dam in Reclamation’s inventory including eccentric mass shake of dam, field investigations, and risk assessment. Lead multidiscipline team of seismologists, geologists, geotechnical, material engineers, and structural engineers on extremely difficult and complex determination of the safety of the dam.
- Smokejumper Dam – Multiagency effort (TL) to build a \$3Million full-scale embankment dam for a security vulnerability blast test leading a multi-agency team: Naval Surface Warfare Center (NSWC), Sandia National Laboratory (SNL), Corps of Engineers (USACE), New Mexico Technology Energetic Research Materials Testing Center (EMRTC), and the Alcohol, Tobacco, and Firearms (ATF).
- Upper San Joaquin Dam – New 650-ft-high RCC gravity dam (SE, DE, TA, EAGD). Lead structural engineer on the feasibility layout design and dynamic finite element analysis of the proposed highest roller compacted concrete dam in the United States.
- Morrow Point Dam – 460-ft-high thin-arch dam (SE, IE, EACD3D96). Studied the effect of foundation mass on radiation damping in comparison to field vibration tests.
- Warm Springs Dam – 106-ft-high thin-arch dam (TL, IE, LSE, DE, RA, TA, PR, DYNA, SAP4). Linear dynamic finite element analyses for safety evaluation and modification. Feasibility study to replace or resurface dam. Geometric nonlinear analysis of deteriorating structure to determine limit of freeze-thaw damage. Team member that performed the first risk analysis of a concrete dam at Reclamation (1987).
- Friant Dam – 319-ft-high gravity dam (TL, IE, LSE, SAP4). Safety evaluation. Alkali-aggregate reaction problems.
- Monticello Dam – 304-ft-high thin arch dam (TL, IE, LSE, TA, RF, M, ABAQUS, SAP4, EACD3D96). Linear and geometric nonlinear dynamic finite element analyses. First time Reclamation used contact surfaces to model contraction joints and lift lines.
- Big Timber Creek Dam – 130-ft-high roller-compacted (RCC) gravity dam (TL, LSE, DE, GRAVDAM). Layout and design of new dam near Leadore, Idaho for the Snake River Area Office and the Fish and Wildlife Service.
- Black Canyon Dam – 183-ft-high curved gravity dam (TL, IE, LSE, TA, RF, PR, M, EAGD, DYNA). In 2005, linear and geometric nonlinear dynamic structural analysis of dam and spillway. In 1984 (SE), dynamic finite element analyses for safety evaluation. First time a comparison between 2D and 3D finite element analysis of curved gravity dam. Pseudostatic analysis of spillway piers for dynamic stability.
- Ririe Spillway – Pseudostatic analysis of side-channel spillway piers for dynamic stability.
- Canyon Ferry Dam and Spillway – 225-ft-high gravity dam with 4 radial gates (PR, RF). Nonlinear dynamic structural analysis of the dam and spillway piers.
- Bartlett Dam – 287-ft-high multiple arch and buttress dam (LSE, DE, TA, CAS, ABAQUS). Static and dynamic 3D linear-elastic finite element analyses. This was the first time a 3D analysis of the entire buttress dam had been performed at Reclamation. Dynamic nonlinear analysis was performed by reducing modulus of overstressed elements to compute displacement beyond yield displacement. Dam modified by raising top of dam 25-feet. Performed structural analyses, design concepts, final designs and specifications, reviewed final drawings, and construction support.
- Clear Lake Dam (Reclamation) – 46-ft-high roller-compacted gravity dam (LSE, DE, TA, GRAVDAM). Static, thermal, and dynamic finite element analyses and layout/design optimization for a new dam.

- Milltown Hill Dam – 187-ft-high roller-compacted gravity dam (SE, GRAVDAM, EAGD). Static, non-linear thermal and linear dynamic finite element analyses and layout/design optimization for a new dam.
- Stewart Mountain Dam – 207-ft-high thin-arch dam (SE, DE, CAS, TA, SAP). Dam had alkali-aggregate reaction problems and seismic stability concerns because of unbonded lift surfaces. First arch dam stabilized for dynamic safety with post-tensioned anchors. Performed state-of-the-art complex static, thermal, and linear dynamic finite element analyses; developed final quantities, designs, and specifications; member of Technical Proposal Evaluation Committee (TPEC) to select post-tensioned anchor contractor; participated in construction inspections during drilling operations.
- Yellowtail Dam – 525-ft-high medium thick arch dam (LSE, IE, M, TA, PR, EACD3D96). Linear static, thermal, and dynamic finite element analyses.
- Anchor Dam - 208-ft-high medium thick arch dam (M, TA, NIKE). Dynamic and flood stability.
- Upper Stillwater Dam - 292-ft-high RCC gravity dam (SE, NIKE). Static 2-D analysis of membrane modification to determine limits of drilling to not crack existing concrete.
- Altus Dam – 110-ft-high thick-arch dam (SE, SAP, M). Dynamic linear finite element analyses for safety evaluation.
- Pueblo Dam – 160-ft-high massive head buttress dam (only massive head buttress in United States) (RA, RF, SE, CFR, ABAQUS). Helped develop and review nonlinear static and thermal finite element analyses of the roller-compacted concrete rehabilitation for the spillway section.
- Stony Gorge - 140-ft-high slab and buttress dam and spillway (RA, RF, PR, ABAQUS). Static and geometric nonlinear dynamic analysis for safety evaluation and modification designs.
- Green Mountain Spillway – (TA, PR). FLAC dynamic analysis of embankment and spillway using non-linear soil properties (Mohr-Coulomb and Hyperbolic) for pressures on spillway wall.
- Hoover Intake Tower – 350-ft-high reinforced concrete intake tower (LSE, TA, ABAQUS). Static and dynamic finite element stability analysis of the intake tower with 2D and 3D finite element analysis. Participated in the on-site vibration tests of an unbalanced cylinder gate closure.
- Medina Dam - 164-ft-high gravity dam (LSE, TA, GRAVDAM). Static stability analysis of this historic gravity dam built in 1919 for the BMA Water District, San Antonio, Texas.
- Carriaso and La Plata Dams - 105-ft and 131-ft-high gravity dams (SA, GRAVDAM, ABAQUS). Static and dynamic 3-D analysis of two gravity dams for Puerto Rico.
- Yellowtail Dam Visitor Center (SE) – Building seismic safety evaluation of precasted concrete.
- Bureau of Land Management Fire Center Information Systems Building No. 410A, Boise, Idaho (SE) - Building seismic safety evaluation of unreinforced concrete masonry.
- Echelon Pumping Plant (SE) – Designed an off-canal Echelon pumping plant near Willows, California and developed computer automatic layout program.

Advisory Teams and Review Panels

- AGL Energy Limited (2014) – Structural Engineer member of Technical Review Panel for seismic and flood loading of Clover and Junction slab and buttress dams, Melbourne, Australia.
- Xcel Energy (2014) – Federal Energy Regulatory Commission (FERC) Independent Review Structural Engineer Panel member for Clear Lake Dam, a new RCC dam near Georgetown, Colorado.
- MWH Global (2014) – Independent review and guidance on seismic finite element modeling of Watana arch dam using LS-DYNA, Alaska.
- Trust Power (2013) – Independent Peer Review and Potential Failure Modes Facilitator for Mahinerangi Dam (concrete arch and gravity dam), Dunedin, New Zealand.
- Bureau of Reclamation - Security, Safety, and Law Enforcement (2013-2014) – Help development a revised risk analysis methodology for project security reviews, Denver, Colorado.
- Tennessee Valley Authority (2012-2014) – Independent Reviewer for Field Investigations and Laboratory Testing Review (FILTR) and stability analysis for 17 of their concrete dams, Knoxville, Tennessee.
- San Clemente (2013) – Independent review for structural analysis of arch dam removal, Kleinfelder.
- Enerjisa (2012) – Developed document titled, “Performance Based Earthquake Engineering Guidelines for Concrete Dams” for Enerjisa in Istanbul, Turkey.

- Mactaquac Dam (2012-2013) – Member of Peer Review Panel for New Brunswick Power on this concrete dam affected by alkali-aggregate reaction near Fredericton, New Brunswick, Canada.
- New Gatun Spillway (2012-2013). Peer Review Board member for the Panama Canal Authority on the design of the new Gatun spillway and reviewer for structural analysis to develop fragility curves of the Gatun spillway piers for risk analysis (2013)
- Bluestone Dam – (2012-2014) Independent Peer Reviewer and Risk Team Member for DLZ, Stantec, and the Corps of Engineers static and dynamic analysis of this gravity dam and spillway in West Virginia.
- Salmon Creek Dam (2012) – Independent Peer Reviewer for MWH Global on the nonlinear seismic finite element analysis of this thin arch dam in Alaska.
- Dam Safety Advisory Team (DSAT) - Member of Senior Level team of advisors in the Technical Service Center of the Bureau of Reclamation that review Comprehensive Facility Review Reports (CFR) and Issue Evaluations to make recommendations to the Dam Safety Office.
- Security Advisory Team (SAT). Senior Level team of advisors from the Bureau of Reclamation, Sandia National Laboratory, and the Corps of Engineers that review security upgrades to dam structures and make recommendations to the Security, Safety, and Law Enforcement (SSLE) Office.
- Interagency Committee on Dam Safety (ICODS) – Leader on a multiagency effort within the Department of the Interior to write a report titled, “Selecting Structural Analysis to Address Key Events along Potential Failure Mode Paths”.
- Salinas Dam. Independent reviewer for the City of San Luis Obispo for Salinas Dam (thin arch dam).
- Northern Pacific Railroad Dam – Independent reviewer for the State of Montana on stability analysis performed on a small, but very old, gravity dam.
- Prisoner Dam – Independent reviewer for the Bureau of Land Management of a masonry arch dam.
- Comprehensive Facility Reviews (CFR). As a Senior Engineer at Reclamation, I have performed CFRs that include risk analyses on: East Canyon Dam, Pueblo Dam, Hungry Horse Dam, Owyhee Dam, Deadwood Dam, Buffalo Bill Dam and Diamond Creek Dike, Keswick Dam, Seminoe Dam, Warm Springs, and Pathfinder Dam. These are reviews of the analysis, design, construction, instrumentation, hydrology, seismology, consequences, and risks imposed by the dam to identify any dam safety deficiencies. I have been the Mentor/Peer Reviewer on 6 CFRs: Savage Rapids Dam, Gerber, Hoover Dam, Stewart Mountain Dam, Gibson, Pathfinder, and Thief Valley Dam.
- Comprehensive Security Reviews (CSR). As a Senior Engineer at Reclamation, I was the Peer Reviewer on 8 CSRs. These are comprehensive security reviews of various projects looking at the vulnerability of the dam, spillway, powerplants, pumping plants, outlet works, and other assets at the site.
- Risk Facilitation: Facilitator: East Canyon Dam, Minidoka Dam, Monticello Dam, Canyon Ferry Dam, Pueblo Dam, and Stony Gorge; Co-facilitation: Elephant Butte Dam, Cherry Creek Dam, Boca spillway, Guernsey spillway, and Lewiston spillway; Risk team member: Loco Dam, Luchetti Dam, Guayo Dam, Hoover Dam, Warm Springs Dam, Upper San Joaquin Dam, Altus Dam, and Morrow Point Dam.

Research Projects

Since 1987, I have identified over 20 research topics for dam safety and security, developed Project Plans, obtained funding, obtained co-sponsors, performed the study, or led and directed the research efforts as the Contracting Officer’s Technical Representative (COTR). Funds have averaged about \$100,000 per year, to \$400,000 in FY03, and \$600,000 in FY04. A few of the projects include:

- “Smokejumper”, Full scale top of embankment dam blast test.
- “Leprechaun and Fat Boy” Series of quarter and third scale blast tests on embankment dams
- “Perfectly Matched Layers,” University of California at Berkeley, Dr. Anil Chopra (COTR).
- “Testing Dynamic Properties of Structures Using an Eccentric Mass Vibrator,” Bureau of Reclamation and ANCO Engineers. An eccentric mass vibration system was purchased to test structures (COTR).
- “Nonlinear Seismic Analysis of Morrow Point Dam,” Lawrence Livermore National Laboratory, Dr. Chad Noble (TL).
- “Develop Fragility Curve Analysis for Gravity Dams.” Bureau of Reclamation, Larry Nuss (SE).
- “Plastic-Damage Model for Concrete,” University of California at Berkeley. Co-sponsors: Harza Engineers, Reclamation, Pacific Gas and Electric, and the Corps of Engineers; Dr. Greg Fenves (COTR).
- “Stability of Fix-Wheel and Radial Spillway Gates,” Navy Surface Warfare Center (COTR).

- “Damping in Concrete Dams during Earthquakes and Use and Misuse of Rayleigh Damping,” California Institute of Technology, Dr. John Hall (COTR).
- “Hydrodynamic Interaction Program RSVR2,” California Institute of Technology, Dr. John Hall (COTR).
- “Implementation of Nonlinear C45 Concrete Model in the DYSMAS Family of Finite Element Computer Programs”, Naval Surface Warfare Center (NSWC) (COTR).

Structural Analysis Software

Analysis Software [Proficient (P), Familiar or have used (F), Aware of capabilities and limited use (L)]
 LSDYNA (F), NIKE (F), DYNA (F), TOPAZ (F), EAGDSLIDE (P), EACD3D96 (P), SAPIV (P), ABAQUS (P), ANACAP (F), GRAVDAM (P), ADINA (P), FLAC (L), MERLIN (L), BIAx (P), MATHCAD (P), and @RISK (P).

Professional Affiliations, Lectures, Courses, and Licenses

- License (Current) - Professional Engineer, State of Colorado, No. 17615.
- License (Current) - Practicing Professional Engineer, New Brunswick, Canada, No. L4915.
- Security Clearances: Renewed March 5, 2010, August 4, 2005, and Sept. 23, 1999.
- Team Leader - Interagency Committee on Dam Safety (ICODS), Multi-agency group writing report titled, “Selecting Structural Analysis to Address Key Events Along Potential Failure Mode Paths”, 2008-2011.
- Member - United States Society on Dams (USSD) – Member of Earthquake Committee since 2005. Currently Team Leader for white paper on research needed for concrete dams.
- Instructor - Introduction to Concrete Dams lecture series at Reclamation for new engineers. These were 20 hour-long classes that included an Overview of Concrete Dams, Material Property Considerations, Loads and Loading Considerations, Arch Dam Layout and Design, Gravity Dam Layout and Design, TRUEGRID modeling, LS-DYNA analyses, EAGDSIDE modeling and Analyses, GRAVDAM analyses and other topics.
- Lecturer - For the Best Practices lecture series for Risk Analysis at the Bureau of Reclamation, Chapter 10 – Reinforced Concrete and Chapter 14 – Buttress Dams.
- Member - American Society of Civil Engineers - Risk Assessment Task Committee to publish a book on risk assessment. Team Leader on Chapter 3: “Risk Analysis”.
- Member - Corp of Engineers CASE Task Group on Massive Concrete Structures and Arch Dams
- Member - Association of State Dam Safety Officials (ASDSO)
- Member - Reclamation technical representative for Electric Power Research Institute (EPRI) Dam Safety Advisory Group
- Reviewer - Civil Engineering Research Foundation (CERF) for various Corps of Engineers and American Society of Civil Engineer publications
- Reviewer - Federal Energy Regulatory Commission (FERC) of their guidelines on gravity dams, on arch dams, and on buttress dams.
- Lecturer - Association of State Dam Safety Officials (ASDSO) Workshop on the Seismic Evaluation of Existing Dams, Durango, Colorado, 1990.
- Lecturer - College class at the University of Colorado, Boulder, Colorado, 1998 and 2009.
- Lecturer - College class each year at the Southern University, Baton Rouge, Louisiana, 1995 to 2000.
- Lecturer - RCC Dams Short Course, Monterey, California, December, 1995.
- Lecturer - Dam Safety Short Course, National Commission on Water, Mexico City, Mexico, 2000.

International Courses, Lectures, and Meetings

- Corps of Engineers (USACE) (2014) – Two-day lecturer at the Huntington District, West Virginia: History of Concrete Dam Development and Structural Analyses, Case Histories of Concrete Dam Failures, and Historic Seismic Performance of Concrete Dams.
- NZSOLD/ANCOLD (2013) – Guest speaker at their conference in Rotorua, New Zealand on the seismic performance of concrete dams and seismic design considerations.
- Intertechne, Curitiba, Brazil (2013), Conducted class on Arch Dam Layout and Design.

- Federal Energy Regulatory Commission (FERC) (2013), Lecturer at 5 Regional Offices, “Case Histories of Concrete Dam Failures”.
- China Three Gorges University in Yichang City, China (2012) – Lecturer on the history of concrete dams and on the seismic analysis of concrete dams in the United States.
- Changjiang Institute of Survey, Planning, Design, and Research in Wuhan, China (2012) – Lecture on the history of concrete dams and using risk analysis for dam safety assessments.
- Hubei University of Technology in Wuhan, China (2012) – Lecture on the history of concrete dams and on the seismic analysis of concrete dams in the United States.
- Japan Dam Engineering Center (2012) – One day lecture on May 9, 2012 on the Seismic Analysis of Concrete Dams, Reclamation’s Dam Safety process, Potential Failure Modes, and Risk Analysis.
- Dongguk University Seoul, South Korea (2011), Guest lecturer with Dr. Anil Chopra teaching a class on the dynamic analysis of concrete gravity dams. Similar class as the Indian Institute of Technology in Kanpur, Kanpur India (2010).
- Mexico: Lecturer on Dam Engineering Basics and Dam Safety for the Central Water Commission.
- Japan Dam Engineering Center (JDEC) (1992): Participate in second meeting in Japan. Organized third meeting in United States for Reclamation Assistant Commissioner, Darrel Webber.
- Peoples Republic of China: Lecturer for 2 months of a 6 month training program at Reclamation.
- India: Lecturer for 4 week training program for 3 engineers on dam design at Reclamation.
- South Korea: Lecturer for 3 month training program for 3 engineers on dam design at Reclamation.

Publications/Articles

- Currently team member for the Federal Energy Regulatory Commission (FERC) writing risk guidelines for concrete dams (2013-2014).
- “Lessons Learned from Concrete Dam Failures since St. Francis Dam,” by Larry K. Nuss and Kenneth D. Hansen, 2014 USSD Annual Conference, San Francisco, CA.
- “Seismic Upgrades for Concrete Dams – Then and Now,” by Kenneth D. Hansen and Larry K. Nuss, 2013 ASDSO Annual Conference and ASDSO Journal of Dam Safety, Vol. 11, Issue 4, 2013.
- “Shaken, But Not Stirred - Earthquake Performance of Concrete Dams,” By Larry K. Nuss, P.E., Bureau of Reclamation (retired), Norihisa Matsumoto, Japan Dam Engineering Center, and Kenneth D. Hansen, P.E., Consulting Engineer, USSD Annual Conference, New Orleans, LA, April, 2012.
- “Lessons Learned from the Earthquake Performance of Concrete Dams”, by Kenneth D. Hansen and Larry K. Nuss, International Water Power & Dam Construction, July 2011.
- “Blast Physical Tests and Structural Analyses on Homogeneous and Zoned Embankments for Vulnerability and Mitigation Assessments”, by Larry Nuss, Garrett Sutley, and Kimberley Langston, ASDSO Annual Conference, Washington D.C., 2011.
- “Selecting Structural Analysis to Address Key Events along Potential Failure Mode Paths,” Interagency Committee on Dam Safety (ICODS), December, 2011.
- “Comparing Dam Safety Risks and Security Risks,” by Larry Nuss and Dave Hinchliff, ASDSO Annual Conference, Seattle, WA, Sept 2010.
- “Risks Associated with Deteriorating Concrete Dams,” by Larry K. Nuss, Tim Dolen, and Matt Jones, 2008 USSD Annual Conference, Portland, OR, April 29, 2008.
- Publication: “Evaluation and Comparison of Stability Analysis and Uplift Criteria for Concrete Gravity Dams by Three Federal Agencies,” by Robert M. Ebeling, Larry K. Nuss, Fred T. Tracy, and Bruce Brand, US Army Corps of Engineers, ERDC/ITL TR-00-1, January 2000.
- Publication: “State-of-Practice for the Non-Linear Structural Analysis of Dams at the Bureau of Reclamation,” by Barbara Mills-Bria, Larry K. Nuss, David Harris, and Dan O’Connell, 2003.
- “Implicit and Explicit Nonlinear Dynamic Analysis of a Large Thin-Arch Dam using Massively Parallel Computing”, by Chad Noble and Larry K. Nuss, 13th World Conference on Earthquake Engineering, Vancouver, BC, Canada, August 1-6, 2004.
- “Comparison of Vibration Generator Tests To Analyses Including Dam-Foundation-Reservoir Interaction for Morrow Point Dam,” by Larry K. Nuss, Anil K. Chopra, and John F. Hall, 21st ICOLD Congress, Montreal Canada, June 15-21, 2003.

- “Analyses Using EACD3D96 For Morrow Point Dam,” by Larry K. Nuss and Anil K. Chopra, US-Japan Earthquake Engineering Workshop, San Diego, CA, June 22-23, 2002.
- “Comparison of the Nonlinear Behavior of Concrete Arch Dams Using Physical and Numerical Models,” by David Harris, Terry Payne, and Larry Nuss, US-Japan Earthquake Engineering Workshop, San Diego, CA, June 22-23, 2002.
- “Concrete Dam Evolution”, by John LaBoon, Larry Nuss, and Gregg Scott, Bureau of Reclamation History Symposium, Las Vegas, 2002.
- “Grouted RCC Contraction Joints at Pueblo Dam”, by John Trojanowski, Larry Nuss, and Peter Aberle, ASDSO Annual Conference, Park City, Utah, Sept, 2001.
- “Seismic Risk Analysis of Monticello Dam Based on a Nonlinear Finite Element Model”, by Roman Koltuniuk and Larry Nuss, 21st USSD Annual Meeting and Lecture, Denver, Colorado, July 2001.
- “Influence of Dam-Foundation Interaction in Seismic Safety Evaluation of Two Arch Dams,” by Larry Nuss, Anil Chopra, Rich Munoz, and Frank Jackmauh, 12th World Conference on Earthquake Engineering, New, Zealand, January 30, 2000.
- “Seismic Analysis of Hoover Dam,” by Larry K. Nuss, 30th U.S.-Japan Panel on Wind and Seismic Effects, Gaithersburg, Maryland, 1998.
- Similar paper topic for the Association of State Dam Safety Officials (ASDSO), 1998.
- “Case Study of the Dynamic Analyses of an Existing Multiple Arch Dam: Bartlett Dam, Phoenix, Arizona, USA’, by L.K. Nuss, T.L. Payne, and M.A. Sozen, Dam Fracture Conference, Chambéry, France, March, 1994.
- Similar paper topic for:
 - International Committee on Large Dams (ICOLD), 1994
 - United States Committee on Large Dams (USCOLD), 1993
 - Association of State Dam Safety Officials (ASDSO), 1993
- “Considerations for and Advantages of Roller-Compacted Concrete (RCC) Arch Dams,” by Dolen, Dollar, Higinbotham, Nuss, Richardson, and Roehm, Third JDEC/Reclamation Technical Exchange, Denver, Colorado, October, 1992.
- “Current Seismic Design Methods at the Bureau of Reclamation, Larry K. Nuss, Japan/Reclamation Technical Exchange, Oct, 1991.
- “Cable Anchoring of a Deteriorated Arch Dam’, Avinash C. Singhal and Larry K. Nuss, ASCE Journal of Performance of Constructed Facilities, Vol 5, No. 1, February 1991, Paper No. 25481.
- Similar paper topic for:
 - International Committee on Large Dams (ICOLD)
 - United States Committee on Large Dams (USCOLD)
 - 12th Engineering Mechanics Conference, La Jolla, CA, May 1998
- “Parameters Influencing the Shear Strength between Clay Masonry Units and Mortar, “Larry K. Nuss, Master Thesis, University of Colorado, 1978.

Work Experience

Bureau of Reclamation

Denver Federal Center, Building 67
P.O. Box 25007, Denver, Colorado 80225

My career after college has been with the Bureau of Reclamation. The projects have been varied and I have thoroughly enjoyed my career. There has been no reason to leave Reclamation and pursue other career opportunities because of my enjoyment and fulfillment at Reclamation even though I have received unsolicited job opportunities from other agencies and private companies.

- **Structural Analysis Group (86-68110)**

Structural Engineer, Series 0810, GS14, Step 7

Duration Oct 2005 to Present Grade GS14, Step 7

May 1994 to Oct 2007 Grade: GS13

May 1981 to May 1994 Grade: GS12

Supervisor: Barbara Mills-Bria, Group Manager,

Office: 303-445-3229

Duties and accomplishments:

My duties and accomplishments while in this position are described in other sections of this resume. In 2011, I was on a full-time detail to the Security, Safety, and Law Enforcement Office (SSLE) to provide expertise on vulnerability to concrete dams and security risk Peer Reviews.

- **Dam Safety Group**

Structural Engineer, Series 0810, Grade: GS12

Duration: Oct 1980 to May 1981

Supervisor: Fred Clark (retired), Telephone unknown

Duties and accomplishments:

Hired as GS12 in the newly formed Analysis Section of the Dam Safety and Inspections Branch. Because of duplication of efforts, this group was dissolved and absorbed into the Concrete Dams Branch. My duties here were very similar to the Structural Analysis Group above.

- **Powerplants and Pumping Plants**

Structural Engineer, Series 0810 Grade: GS7, GS9, and GS11, 40 hours per week

Duration: July 4, 1976 to Oct 1980

Supervisor: Jim Hill (retired), Home: 303-985-7577

Duties and accomplishments

- Started my career with the Bureau of Reclamation in the Powerplants and Pumping Plants Branch as an entry level engineer.
- Analytical design, analysis, and checking of pumping and power plants. Projects included 4 (Colusa County, Little Harquahala, Bouse Hills, and Kanawa) pumping plants. Involved state-of-the-practice structural analysis methods, reinforced concrete design, and drafting skills.
- Branch Coordinator for the Blue Mesa powerplant feasibility study. Chaired design meetings with electrical, mechanical, laboratory, and geology personnel.
- Wrote Design Summary and Design Consideration reports. Checked drawings for accuracy and Reclamation drafting standards.
- Supervised lower grade engineers and worked with drafting technicians.
- Participated in Rotation Engineer Training Program, July 1976 to July 1977. Four 3-month rotations were in the Structures and Architecture Branch - Power & Pumping Plant Section, Contract Administration, Field inspector at Auburn damsite, and Concrete Dams Branch.
- Special detail from Feb 1978 to Feb 1979 for the Assistant to the Chief, Division of Design. Developed and implemented a computer data base system from scratch for assessing safety of dams, work schedules, and travel reports. Interactive program inventoried 490+ USBR, BIA, and FWS dams for location, physical features, hazard assessment, and status. Used by Regional, E&R Center, and Washington DC offices.
- Selected as computer programmer backup for the full-time programmer involved with the USBR Intergraph Drafting CAD Stations in the Drafting Branch.
- Wrote useful Fortran programs. TENLAP calculates tension splice lengths for reinforcing steel by the ACI code. ECHELON sizes & designs small echelon pumping plants given only pump data from the Mechanical Branch.
- Completed Masters of Science Degree while working full-time.

Other Experience

Athletic Director. From 1988 to 1989, my wife and I managed the athletic program at Notre Dam Catholic School for 140 4th through 8th graders: girls' softball, basketball, and volleyball; and boys' volleyball, basketball, and baseball. Each class had one or more teams per sport. The sports were unfunded school supported activities. We recruited coaches and volunteers, formed teams, organized fund raisers (concession stand, raffles, spaghetti dinner, games at the Denver Nuggets and Air Force Academy, tournaments, and duffle bags sales), purchased equipment and uniforms, scheduled courts and fields, ran tournaments, handled complaints, and organized the athletic banquet. When we started the program it was in shambles. In 2 years, we purchased all new uniforms and equipment for every sport, a pitching machine, and professional volleyball standards. We won four 8th grade City Championship and 10 League Championship banners that hang in the Family Center.

AWARDS:

- 2009 Retention Incentive, 15% of yearly salary, calendar year 2010
Step 6 to Step 7 increase, Oct, 2009; Individual cash award, Aug 2009
Second individual cash award, Aug 2009; Star Award, July 2009
- 2008 Retention Incentive, 15% of yearly salary, calendar year 2009; Performance award, 2008; Award of Appreciation, Aug 2008; Individual Time-Off Award, 8 hours, Feb 2008; Individual Cash Award, Feb 2008
- 2004 to 2007 Star Awards every year Special thanks for achieving results
- 2003 On-the-Spot, Work on Nonlinear Analysis report
Exemplary TSC Performance, Non-Cash Award from Chief Dam Safety Office
On-the-Spot, Director TSC Marketing and Tech Specialist
Star Award for Work on Morrow Point Dam IE
- 2002 Peer, General D8110 Assistance
- 2001 Certificate of Appreciation, ASCE (Guest Lecture Series at Southern University)
Star, Contributions to D8110;
Peer, Assistance on Building Seismic Safety Program and Black Canyon CFR
Peer, Newmark interaction program
- 1998 Special Act, Writing GRAVDAM program
- 1997 On-the-Spot, Hoover Team Leader Issue Evaluation
- 1995 Performance Level 4 rating
- 1994 Certificate of Appreciation Civil Engineering Research Foundation (CERF)
Performance Level 4 rating; Special Act TQM - Move off Cyber to HP workstation
- 1993 Certificate of Appreciation Civil Engineering Research Foundation (CERF)
Reclamation Performance and Special Act (TQM)
- 1992 Special Act (TQM) and Performance

References:

Contact information provided on request:

- Dr. Anil Chopra, Johnson Professor of Structural Engineering, University of California, Department of Civil Engineering, Berkeley, California.
- Enrique Matheu - Chief, Dam Sector Branch, Office of Infrastructure Protection, Department of Homeland Security, Washington, DC.
- Robert Hall - retired Division Chief of Geosciences, Corps of Engineers, Engineering Research and Development Center, Vicksburg, Mississippi.
- Robin Charwood - Consultant, past Vice President of the U.S. Society of Dams; retired, Vice President, Acres International Corporation; Chairman, ICOLD Committee on Concrete Dams, Seattle, Washington.
- Mark Schultz - Supervising Engineer, Division of Safety of Dams, California Department of Water Resources, Sacramento, California.

General

- Citizenship: United States of America

Application Certification

I certify that, to the best of my knowledge and belief, all of the information on and attached to this application is true, correct, complete, and made in good faith.

Larry K. Nuss, PE

Date